

Description of Wells Drilled at the U.S. Coast Guard Support Center Kodiak, Alaska, 1988-89

By Mark R. Carr

U.S. GEOLOGICAL SURVEY

Open-File Report 96-134

Prepared in cooperation with the

U.S. COAST GUARD



Anchorage, Alaska
1996

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CONVERSION FACTORS

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
gallon (gal)	3.785	liter

ELEVATION DATUM

Mean Sea Level: In this report, mean sea level refers to a tidal datum midway between the arithmetic means of the high-water heights and low-water heights for the Kodiak, Kodiak Island, tidal station. This is also called mean tide level.

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ABSTRACT

The U.S. Coast Guard, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act, is conducting environmental studies at its Support Center in Kodiak, Alaska, to determine if hazardous materials have been spilled or disposed of at the facility. The U.S. Geological Survey conducted a hydrologic evaluation of the Support Center to assess the extent of possible ground-water, surface-water, and soil contamination resulting from the handling of hazardous materials. This report describes the borehole and monitoring-well drilling program conducted on the Support Center by the U.S. Geological Survey. It contains maps and diagrams depicting well locations, logs, and construction details, as well as soil-sampling information for 121 boreholes, of which 102 were completed as water-quality monitoring wells.

INTRODUCTION

The U.S. Coast Guard (USCG) has a Support Center on Kodiak Island, Alaska (figs. 1 and 2). At this installation, fuels and potentially hazardous materials such as solvents, polychlorinated biphenyls, and pesticides may have been used and (or) disposed of. To determine if hazardous materials have been spilled or disposed of at this facility, the USCG is conducting environmental studies mandated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). To complete these environmental studies, the USCG required information about the hydrology and geology of the Support Center area. In 1987, the USCG asked the U.S. Geological Survey (USGS) to evaluate the extent of possible ground-water, surface-water, and soil contamination.

To prepare the hydrologic evaluation of the Support Center, the USGS interviewed persons knowledgeable about past and present fuel and hazardous-waste storage and handling practices at the Support Center, conducted soil-gas surveys, drilled monitoring wells, and collected and analyzed soil, sediment, and ground- and surface-water samples for the presence of inorganic and organic compounds.

This report describes the well-drilling and soil-sampling methods employed during the program. The USGS drilled monitoring wells to obtain information about subsurface geologic conditions, soil and ground-water quality, and local and regional ground-water flow directions. Additional reports from this evaluation describe hydrologic data, ground-water occurrence and movement, surface-water occurrence and flow, aquifer characteristics and test methods, local geology, and an overall assessment of hydrologic conditions at the Support Center.

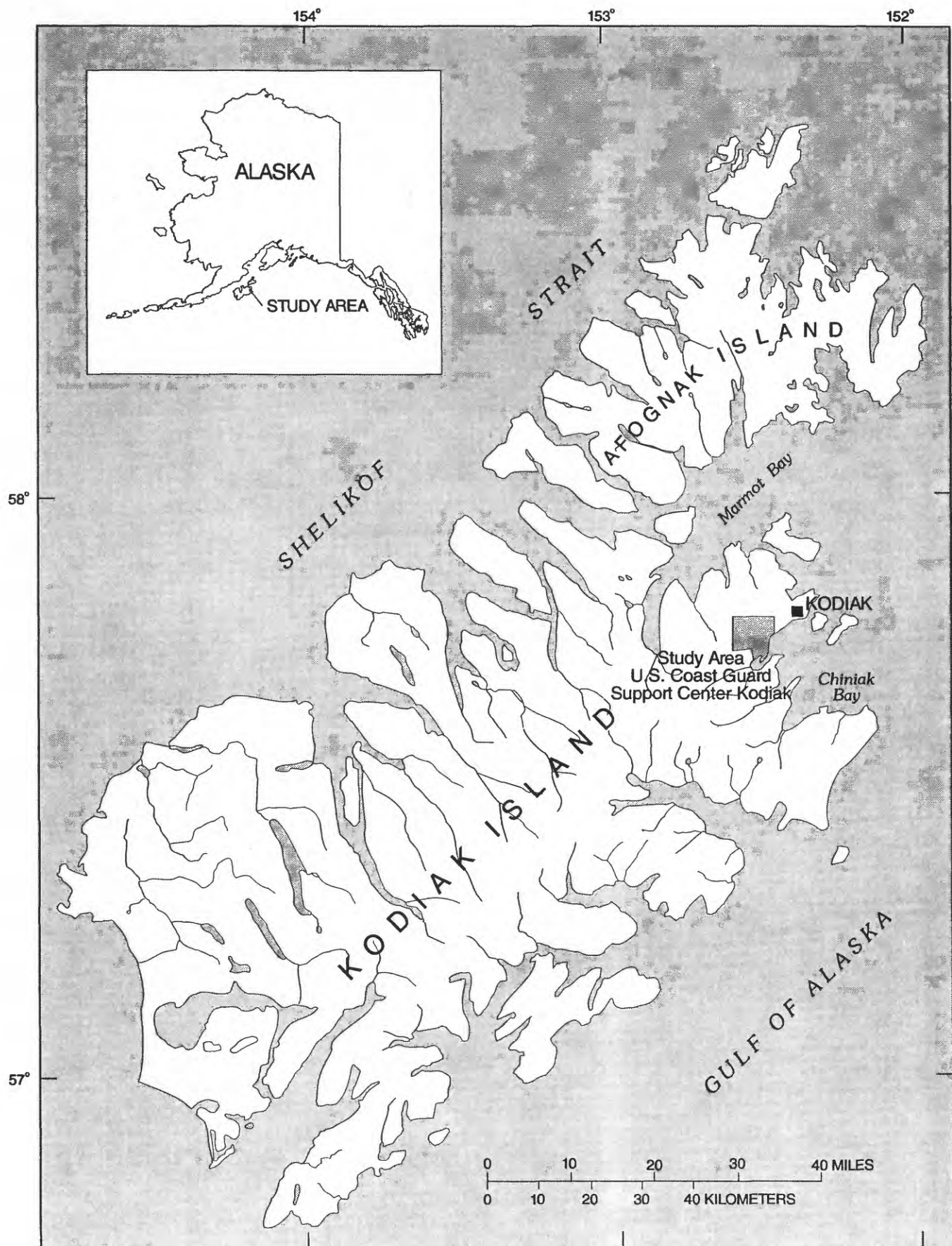
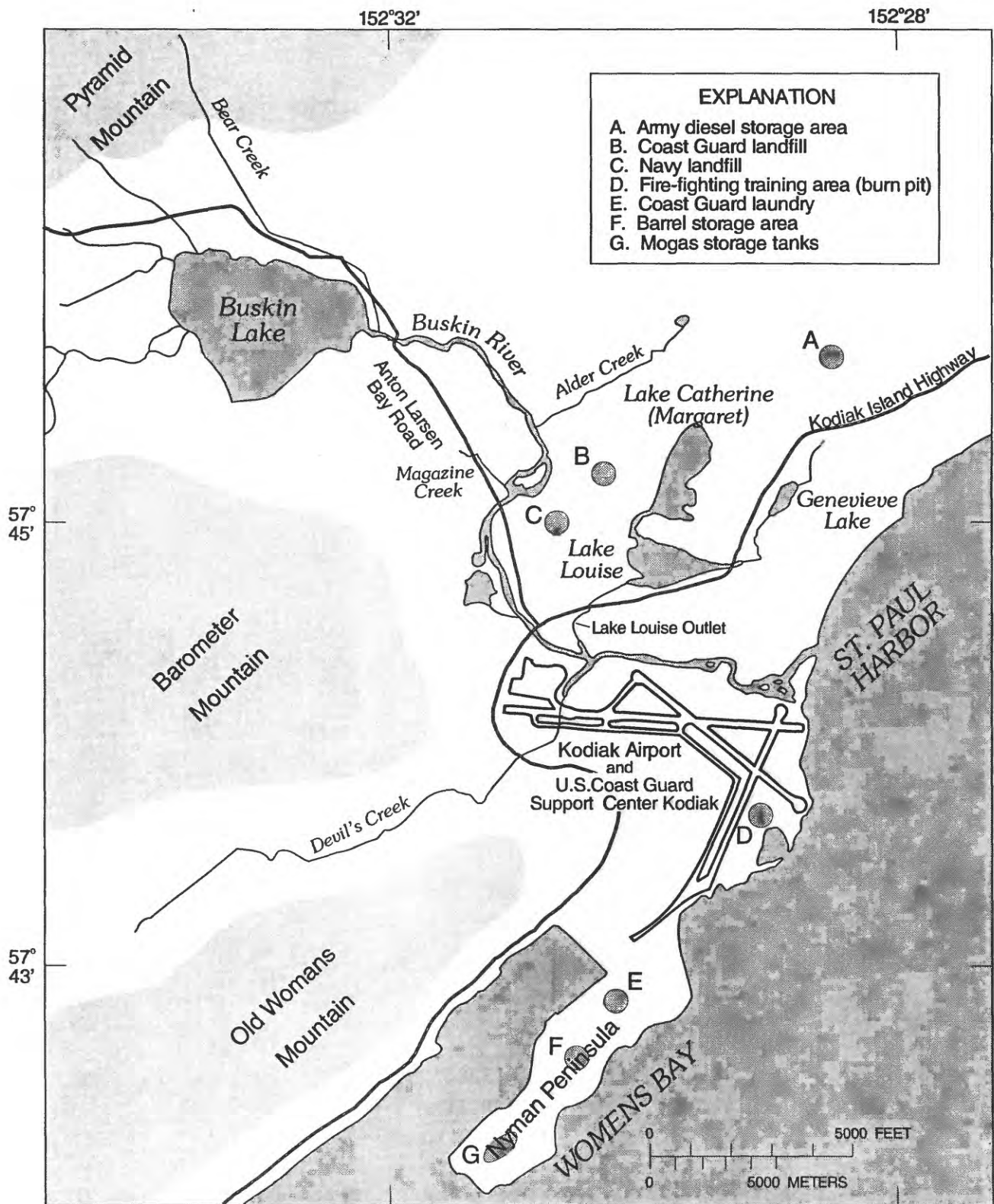


Figure 1. Location of Kodiak Island, Alaska and study area.



Base from U.S. Geological Survey, Kodiak, Alaska, 1:250,000, 1952

Figure 2. Location of U.S. Coast Guard Support Center Kodiak.

WELL-DRILLING PROGRAM

The well-drilling program was completed in two stages: the first during the Spring of 1988 and the second during May 1989. A total of 121 boreholes and 2 hand-dug soil-sampling holes were constructed. Of the 121 boreholes, 102 were completed as monitoring wells. Monitoring wells were placed up- and downgradient from potential contaminant sources to allow sampling of water and soil under both ambient and possibly contaminated conditions.

This report contains maps and diagrams depicting well locations, logs, and construction details, as well as soil-sampling information. Wells drilled during Stage I are designated with an 'A' prefix followed by the well number; exceptions are wells A-1 and A-1A, which were drilled during Stage II (table 1). The remaining wells drilled during Stage II are designated with a 'B' prefix (table 1).

STAGE I DRILLING PROGRAM

During Stage I, from January to April 1988, 94 boreholes were drilled. Of these, 88 were completed as water-quality monitoring wells.

Drilling Method

A hollow-stem auger drilling rig was used to drill 6-inch diameter holes during Stage I of the drilling program. Drill cuttings were logged and bit action was noted during drilling. The bit typically turns smoothly when drilling through sand and silt, binds up in clay, and bounces in coarser material. Where possible, boreholes were completed at least 10 ft below the water table. Drilling was interrupted several times by cobbles, boulders, bedrock, or a tight clay hardpan at depths between 3 and 10 ft below the water table.

The auger rig had limited drilling capabilities. The rig could not access drill sites on steep or swampy terrain and the drill bits could not cut through cobbles, boulders, clay hardpan, or bedrock. To overcome these limitations, a rig with the capability of drilling through bedrock was used during Stage II of the program.

Soil-Sampling Method

Soil samples were collected using a hammer-driven 2-in split-spoon sampler. The number of blows needed to drive the sampler 1 ft was recorded and is noted on the well log illustrations (appendix 1). A core sample was collected from each borehole at a depth of about 5 ft, the core material was described, and representative samples were placed into sample containers using a stainless-steel spoon. The sample containers were then placed in a cooler iced to maintain a temperature below 4° C. The cooler was then sealed and shipped to the analytical laboratory, usually arriving within 48 hours of sample collection. The soil samples were analyzed for halogenated volatile organics, aromatic volatile organics, lead, total petroleum hydrocarbons, and moisture content. The analytical results are described in the hydrologic data report published as a part of this study.

The split-spoon sampler and sampling spoon were decontaminated following the collection of each sample. The decontamination method included thorough washing and rinsing with clean tap water, a detergent/tap-water mixture, a methanol/tap-water mixture, hexane, and deionized water. In areas of known or suspected contamination, the drilling rig was moved to a decontamination site where all augers, drill tools, and the back of the rig were steam-cleaned.

Table 1. Summary of well data, U.S. Coast Guard Support Center Kodiak
[---, well was not leveled in; NS, no screen or casing installed]

Well number	Date well drilled	Elevation above mean sea level		Depth below land surface				Date of water-level measurement
		Top of casing (feet)	Land surface (feet)	Bottom of well (feet)	Top of screen (feet)	Bottom of screen (feet)	Water level (feet)	
A-1	05-20-89	---	92	17.5	7.5	17.5	8.35	05-22-89
A-1A	05-20-89	---	84	14.5	4.5	14.5	5.27	05-22-89
A-2	01-16-88	---	84	7.5	1.5	7.5	4.36	01-17-88
A-2A	04-19-88	85.5	82.5	7	2	7	1.31	08-30-88
A-3	01-15-88	70.1	68.3	22	0	22	3.83	08-30-88
A-4	01-16-88	83.2	82.3	19	9	19	10.43	08-30-88
A-5	01-20-88	135.9	134.5	14.5	4.5	14.5	1.98	08-30-88
A-6	01-18-88	37.7	36.1	15.5	3.5	15.5	10.21	08-30-88
A-6A	04-21-88	36.9	36.2	9	1	6	1.45	08-30-88
A-7	01-18-88	45.8	44.7	18.5	3.5	18.5	8.39	08-30-88
A-8	01-21-88	47	44.6	37.5	17.5	37.5	23.1	08-30-88
A-9	01-21-88	26.1	24.4	12	1	12	37.6	08-30-88
A-10	01-19-88	28	28	19.5	4.5	19.5	3.47	08-30-88
A-10A	04-19-88	75.4	73.9	13.5	3.5	13.5	0.42	08-30-88
A-11	02-18-88	65.4	66.2	5.5	0.5	5.5	5.11	08-30-88
A-12	02-17-88	16.2	16.5	27	17	27	10.46	08-30-88
A-12A	04-18-88	24	24	25	15	25	17.49	08-30-88
A-13	02-17-88	19.5	17.4	25	15	25	14.92	08-30-88
A-14	01-27-88	38.3	35.2	46	41	46	32.72	08-30-88
A-15	01-25-88	55.1	53.9	42.5	27.5	42.5	20.50	08-30-88
A-16	01-23-88	55.2	51.5	26.5	16.5	26.5	14.99	08-30-88
A-17	01-23-88	38.6	36.0	34.5	24.5	34.5	25.47	08-30-88
A-18	02-16-88	16.1	13.9	23	18	23	12.67	08-30-88
A-19	01-26-88	29.2	28.4	19	14	19	12.02	08-30-88
A-20	01-26-88	64.1	60.7	21.5	16.5	21.5	10.61	08-30-88
A-20A	04-17-88	31.5	31.2	28.5	8.5	28.5	12.2	09-16-88
A-21	02-16-88	13.8	12.3	11.01	6	11	9.22	03-04-88

Table 1. Summary of well data, U.S. Coast Guard Support Center Kodiak--Continued

Well number	Date well drilled	Elevation above mean sea level		Depth below land surface				Date of water-level measurement
		Top of casing (feet)	Land surface (feet)	Bottom of well (feet)	Top of screen (feet)	Bottom of screen (feet)	Water level (feet)	
A-21A	04-20-88	14.2	12.4	20	5	20	9.1	08-30-88
A-22	01-27-88	29.1	27.1	5	0	5	Dry	03-04-88
A-22A	04-17-88	27.3	26.5	11	6	11	Dry	08-30-88
A-23	01-27-88	---	12	NS	NS	NS	NS	NS
A-23A	04-17-88	11.7	10.3	23.5	8.5	23.5	9.14	08-30-88
A-24	02-18-88	190.3	189.4	16	1	16	4.58	08-30-88
A-25	02-17-88	19.0	16.1	7	2	7	5.65	08-29-88
A-26	02-14-88	21.0	20.1	9	4	9	3.72	08-29-88
A-27	01-28-88	26.9	24.2	4.5	-0.5	4.5	0.84	08-29-88
A-28	02-14-88	23.7	22.2	15.5	10.5	15.5	7.98	08-29-88
A-29	01-31-88	33.0	32.0	23	13	23	5.07	08-29-88
A-30	01-30-88	68.6	67.1	18.5	13.5	18.5	5.98	08-29-88
A-31	01-30-88	---	70.0	NS	NS	NS	NS	NS
A-32	01-29-88	52.6	50.9	3.5	-1.5	3.5	0.25	08-29-88
A-32A	04-15-88	54.7	53.0	13.5	3.5	13.5	-0.54	08-30-88
A-33	01-29-88	74.0	72.9	16	11	16	6.19	08-29-88
A-34	02-15-88	24.1	22.9	9	4	9	0.89	08-29-88
A-35	02-15-88	24.4	22.7	18.5	8.5	18.5	11.53	08-29-88
A-36	02-14-88	22.9	21.9	7.5	2.5	7.5	4.56	08-29-88
A-37	02-13-88	21.3	19.2	25	15	25	13.87	08-29-88
A-38	02-14-88	18.9	18.3	11.0	1	11	1.23	08-29-88
A-39	02-15-88	24.9	22.1	12	2	12	4.89	08-29-88
A-40	02-15-88	23.7	21.5	8	3	8	-0.88	08-29-88
A-41	02-15-88	26.8	25.6	9	4	9	1.44	08-29-88
A-42	02-06-88	10.6	10.8	18.5	8.5	18.5	11.35	08-29-88
A-43	02-05-88	14.3	12.5	18	8	18	14.27	08-29-88
A-44	02-05-88	8.2	6.7	18.5	8.5	18.5	10.87	08-29-88
A-45	02-06-88	13.0	10.2	7	2	7	1.17	08-29-88
A-46	02-12-88	12.4	10.9	13.5	3.5	13.5	0.91	08-29-88

Table 1. Summary of well data, U.S. Coast Guard Support Center Kodiak--Continued

Well number	Date well drilled	Elevation above mean sea level		Depth below land surface				Date of water-level measurement
		Top of casing (feet)	Land surface (feet)	Bottom of well (feet)	Top of screen (feet)	Bottom of screen (feet)	Water level (feet)	
A-47	02-07-88	14.3	12.5	15	5	15	-1.58	08-29-88
A-48	02-06-88	16.0	13.7	6.5	1.5	6.5	1.67	08-29-88
A-49	02-08-88	12.1	10.0	7	2	7	0.45	08-29-88
A-50	02-07-88	10.7	8.2	12.5	7.5	12.5	4.47	08-29-88
A-51	02-09-88	40.7	38.1	10	4.5	10	1.33	08-29-88
A-52	02-09-88	43.1	41.9	18.5	13.5	18.5	4.15	08-29-88
A-53	02-09-88	31.7	29.4	2.5	.5	2.5	0.25	08-29-88
A-54	02-03-88	33.3	30.5	12	7	12	2.32	08-29-88
A-55	02-02-88	27.4	25.4	15	10	15	1.32	08-29-88
A-56	02-02-88	31.1	27.8	16.5	6.5	16.5	2.99	08-29-88
A-57	02-10-88	58.0	56.7	8.5	3.5	8.5	3.41	08-29-88
A-58	02-10-88	53.1	52.7	10	3	8	2.27	08-29-88
A-59	02-10-88	56.9	55.6	13.5	3.5	13.5	4.17	08-29-88
A-60	02-10-88	60.7	57.1	8.5	1.5	6.5	1.51	08-29-88
A-61	02-11-88	67.9	66.1	17	2	7	9.25	08-29-88
A-62	02-13-88	63.1	61.5	10.5	3.5	8.5	2.86	08-29-88
A-63	02-12-88	62.5	61.2	7.5	2.5	7.5	2.74	08-29-88
A-64	02-03-88	35.3	34.0	19	9	19	3.16	08-29-88
A-65	02-01-88	32.9	30.7	8	3	8	2.71	08-29-88
A-66	02-11-88	---	70.0	NS	NS	NS	NS	NS
A-66A	02-11-88	72.7	70.2	12.5	2.5	12.5	3.55	08-29-88
A-67	02-11-88	76.9	75.0	12	4	9	0.17	08-29-88
A-68	02-12-88	---	102.0	NS	NS	NS	NS	NS
A-68A	04-13-88	83.7	82.6	15	5	15	1.79	08-29-88
A-69	02-12-88	63.5	60.5	9	2	7	2.75	08-29-88
A-70	02-04-88	54.2	51.2	19	9	19	3.52	08-29-88
A-71	02-04-88	63.2	61.5	18.5	8.5	18.5	8.91	08-29-88
A-72	02-04-88	85.6	83.6	3	-2	3	2.02	08-29-88
A-73	02-01-88	60.9	58.9	28	23	28	13.75	08-29-88

Table 1. Summary of well data, U.S. Coast Guard Support Center Kodiak--Continued

Well number	Date well drilled	Elevation above mean sea level		Depth below land surface				Date of water-level measurement
		Top of casing (feet)	Land surface (feet)	Bottom of well (feet)	Top of screen (feet)	Bottom of screen (feet)	Water level (feet)	
A-74	01-28-88	29.8	27.3	4.5	-.5	4.5	1.44	08-29-88
A-75	01-28-88	16.4	14.3	10	5	10	-2.10	08-29-88
A-76	02-12-88	69.0	67.8	6	1	6	3.50	08-29-88
A-77	04-19-88	31.2	29.5	23.5	8.5	23.5	8.68	08-30-88
A-78	04-19-88	84.8	83.1	8.5	3.5	8.5	0.67	08-30-88
A-79	04-18-88	55.7	56.6	19	9	19	14.82	08-30-88
A-81	04-21-88	70.1	68.1	18	3	18	1.11	08-30-88
A-82	04-20-88	41.0	39.4	30.5	10.5	30.5	24.40	08-30-88
A-84	04-14-88	47.4	45.9	13.5	3.5	13.5	0.52	08-29-88
A-85	04-13-88	51.2	49.1	19	9	19	5.35	08-29-88
A-86	04-17-88	7.1	7.3	12	2	12	4.73	08-29-88
B-1	05-12-89	37.7	37.7	40	30	40	21.07	05-22-89
B-2	05-13-89	38.2	38.4	40.5	30.5	40.5	38.56	05-23-89
B-3	05-16-89	28.2	28.4	32.5	22.5	32.5	28.45	05-23-89
B-4	05-14-89	21.9	21.9	22.5	12.5	22.5	9.21	05-20-89
B-5	05-15-89	27.1	25.1	20.5	10.5	20.5	6.41	05-23-89
B-6	05-14-89	21.3	21.5	30	20	30	4.94	05-23-89
B-7	05-18-89	52.8	52.6	7.5	2.5	7.5	3.68	05-24-89
B-8	05-19-89	56.7	55.6	9	4	9	3.02	05-24-89
B-9	05-19-89	---	56.3	NS	NS	NS	NS	NS
B-10	05-18-89	57.2	56.0	14	4	14	7.16	05-24-89
B-11	05-17-89	40.9	39.6	11.5	1.5	11.5	2.26	05-21-89
B-12	05-17-89	27.9	27.5	22	12	22	11.64	05-24-89
B-13	05-25-89	---	33.0	.5	NS	NS	NS	NS
B-14	05-25-89	---	33.0	2	NS	NS	NS	NS
CG-1	08-05-86	46.9	45.1	23	NS	NS	10.35	05-24-89
CG-2	08-05-86	59	58	7	NS	NS	6.85	05-24-89
CG-3	08-05-86	79	77	6.5	NS	NS	5.54	05-24-89
CG-4	1941	38	36	110-115	NS	NS	3.75	05-22-89

Monitoring of Organic Vapors

Air quality at the drill sites was monitored using a flame-ionization detector or a photo-ionization detector. These readings, reported in parts per million (ppm), are noted on the well log illustrations. If concentrations were more than 5 ppm in the breathing zone, respirators and chemical-resistant clothing were required. If concentrations were more than 1,000 ppm at the well head, the drill cuttings were sealed in 55-gallon drums and placed near the well. Water pumped from the wells during well development and water-quality sampling was also put in drums. When filled, the drums were sealed and moved to the USCG Hazardous Waste Transfer Facility. Split-spoon samples collected from the boreholes were also surveyed with the organic vapor analyzers to determine if the sediments were contaminated.

Well Completion

The first nine boreholes drilled were completed with 2-inch schedule 40 polyvinyl chloride (PVC) casing with bell joints or push couplings. Screens were made by sawing slots in the casing at 6-inch intervals. The bottom of the casing was not plugged or capped. All other wells were completed with 2-inch schedule 40 PVC monitoring-well casing with flush screw joints and monitoring screens with 0.01- or 0.02-inch slots. The bottoms of the casings were plugged and all wells were capped. Typically, the length of the well screen equalled or exceeded the thickness of the water-bearing formation encountered during drilling.

When a borehole was drilled, the casing was lowered through the hollow-stem auger and the auger was extracted. In several wells, the PVC casing was unstable due to heaving sands and it was necessary to weight the casing down with water or drill rods.

Most wells were backfilled with sand or gravel to a few feet below the land surface. Some wells were backfilled with drill cuttings. The backfill was then capped with a layer of bentonite clay 1 to 2 ft thick to an elevation just below the land surface. A locking steel protective casing (4-inch diameter by 4-foot length) was placed over the PVC well casing and concrete traffic pads (2 ft diameter) and steel guard posts were placed around most wells. Seven wells are below grade and are protected by a below-grade protective casing.

Wells less than 30 ft deep were developed using a peristaltic pump. Deeper wells were developed with bailers. Wells were maintained by purging prior to sampling. Well depths and water levels were surveyed and referenced to a common (mean tide) datum.

STAGE II DRILLING PROGRAM

During May 1989, 14 additional monitoring wells and 13 boreholes were constructed to provide additional information about potential contaminant migration at the following Support Center sites: the laundry, the burn pit, the barrel storage areas, the mogas (former motor fuel) storage tanks (fig. 2), and the barrel dumps near Buskin Lake. Two hand-dug boreholes, B-13 (6 in. deep) and B-14 (2 ft deep), were dug at the burn pit for the purpose of collecting soil samples there.

Drilling Method

Drilling, air monitoring, soil sampling, decontamination, and well-maintenance procedures were similar to those used during Stage I. Tester Drilling Company of Anchorage, Alaska, drilled Stage II wells using a drilling rig with 7-inch hollow-stem augers and 4 1/4-

inch air hammers. To drill the wells above Buskin Lake, the drilling rig was shifted from the truck to a tracked vehicle. Wells drilled with the air hammer and that were less than 30 ft deep were developed using a peristaltic pump. Deeper wells were developed with bailers.

Well Completion

Wells were completed with 2-inch-diameter schedule 40 PVC monitoring-well casing (pre-cleaned at the factory and sealed in a plastic sleeve) with flush screw joints and monitoring screens containing 0.01-inch slots. Colorado silica sand was placed in the annulus around the well to 5 ft above the screen. The sand pack was capped with a 1- to 2-foot thick layer of bentonitic clay pellets, over which was placed a bentonitic clay-based grout extending to just below the land surface. Locking PVC caps or steel protective casing and a concrete traffic pad were installed at most wells.

ADDITIONAL WELLS

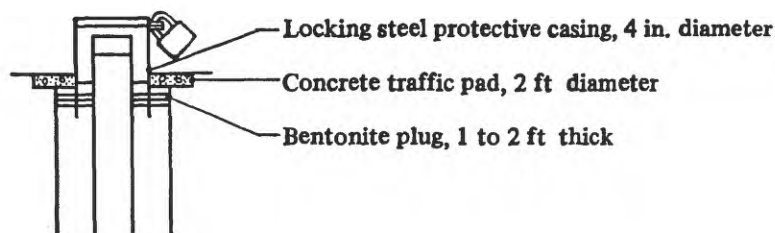
Four additional wells were used during the hydrologic evaluation of the USCG Support Center at Kodiak. Three of the wells were drilled at a closed USCG landfill by Kodiak Drilling Company in August 1986. These monitoring wells—two downgradient and one upgradient—were drilled to meet the State of Alaska landfill closure requirements. In this report, the wells are designated as USCG landfill test wells 1, 2, and 3 (CG1, CG2, and CG3; table 1). Well locations and construction details are included in this report.

The USCG Beach House well (CG4, table 1) was also included in this investigation. The reported depth of the well is 110 to 115 ft. The well was completed with 6-inch steel casing extending to an unknown depth.

LOCATIONS, LOGS, AND CONSTRUCTION DETAILS OF WELLS

The remainder of this report consists of detailed well-log illustrations. Each well or borehole has a location map and a well log describing the lithology and construction details. A large map depicting the locations of the wells is available for inspection at the U.S. Geological Survey office listed on page ii of this report.

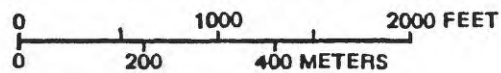
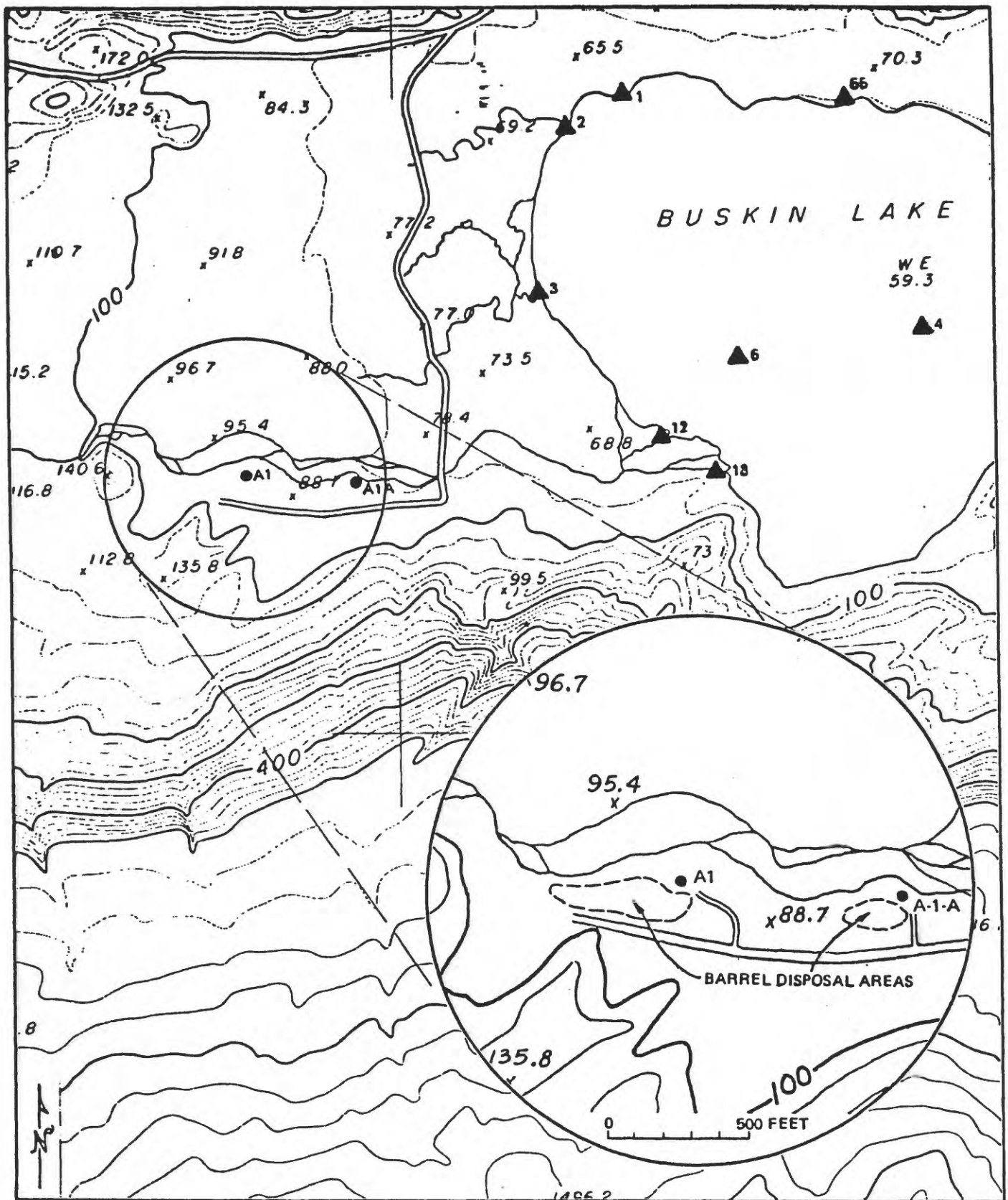
EXPLANATION FOR WELL LOGS



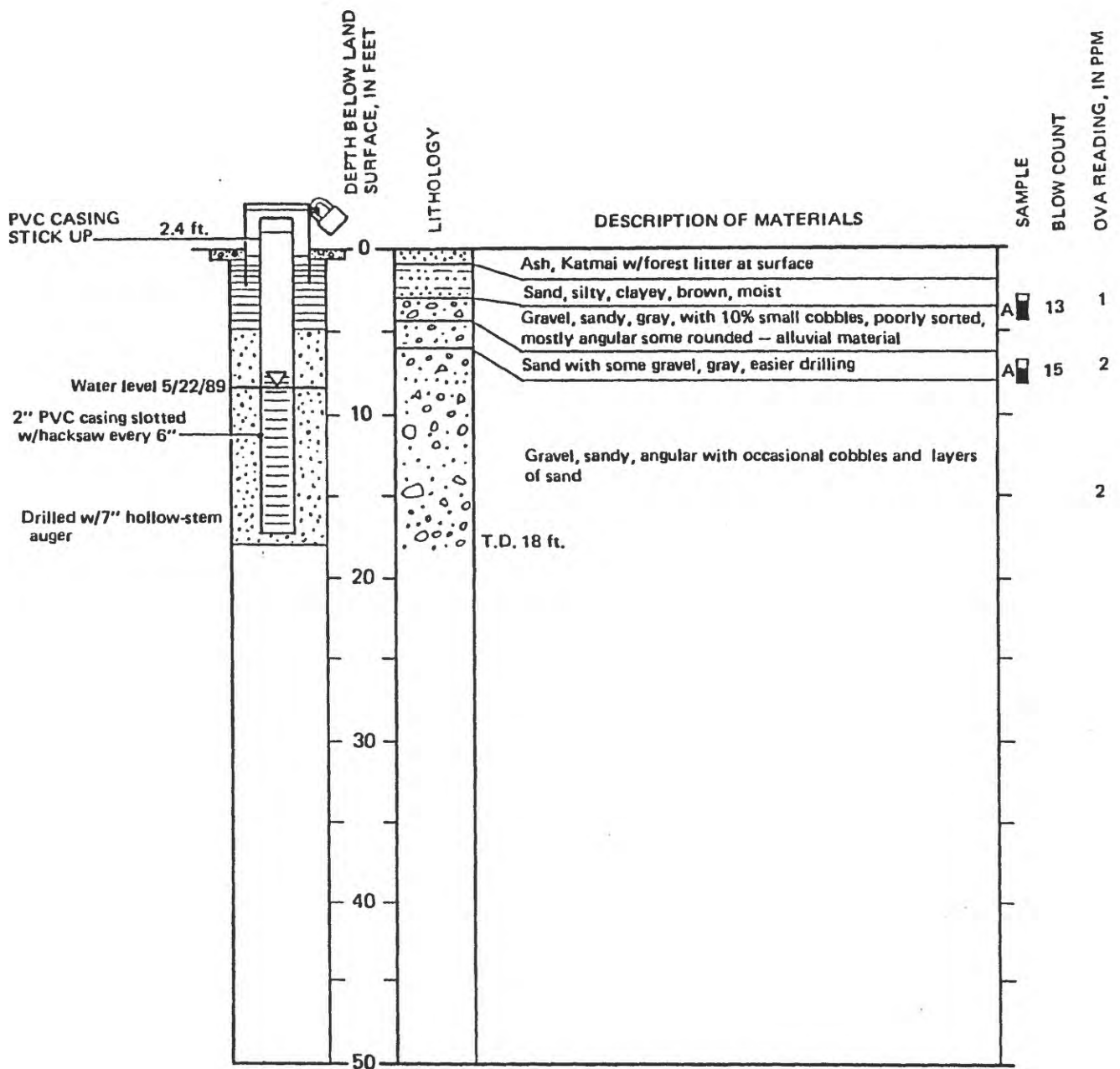
- Soil sample collected with a 1½ ft long split-spoon sampler. Black portion indicates the length of the sample recovered
 - The length of the sample recovered is uncertain
 - Exact depth at which soil sample was collected is uncertain
 - Soil sample was analyzed for :
 - SW 8010 — Halogenated volatile organics
 - SW 8020 — Aromatic volatile organics
 - E 239.2 — Lead
 - E 418.1 — Total petroleum hydrocarbons
 - E 160.3 — Moisture content
 - 26 — Blow count — Number of blows needed to drive the split-spoon sampler down 1 foot
 - Collected soil sample with shovel at depth of about 1 foot
 - 6 (s.s.) — OVA reading of a split-spoon (soil) sample, other OVA readings were taken in the borehole
 - OVA — A flame ionization type, organic vapor analyzer
 - PID — A photo ionization type, organic vapor analyzer
- NOTE:** Readings from both the OVA and the PID are in PPM (parts per million). These readings are not absolute but are relative to the gas used for calibration of the instrument, and the relative response of the organic vapors being measured (The OVA is more sensitive for hydrocarbons than any other class of organic compounds, and the PID is more sensitive to complex compounds [i.e. benzene] and less sensitive to simpler ones [i.e. methane]).

EXPLANATION FOR MAP SYMBOLS

- A4 Well or borehole sampling site and number
- ▲ 18 Surface-water sampling site and number
- ① 167 Fuel or oil storage tank
- × 67.7 Elevation in feet
- Woods

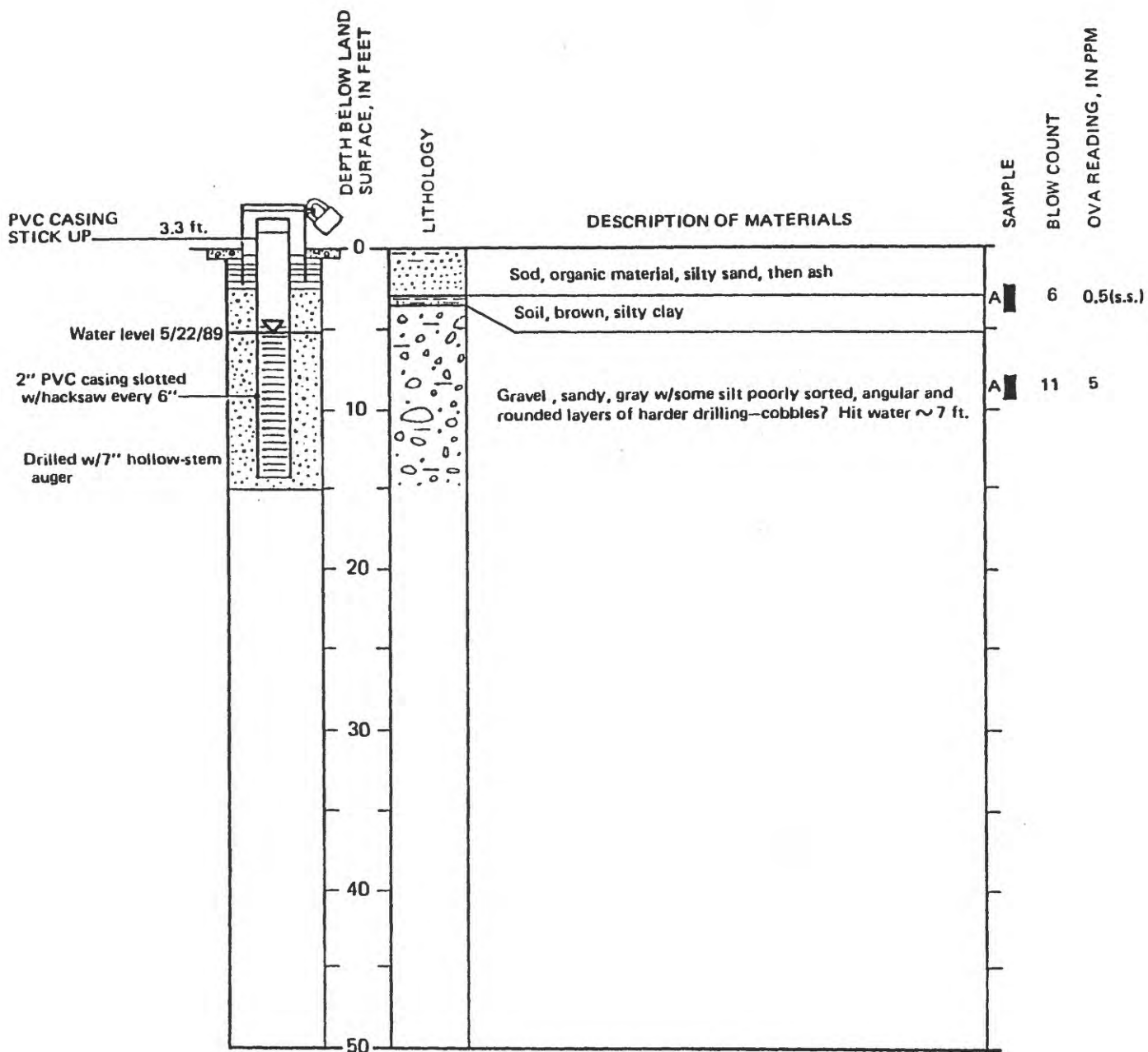


Location of well A-1.



USGS SITE ID No. 574630152341601
 DATE WELL DRILLED 5/20/89
 LATITUDE 57° 46' 30" LONGITUDE 152° 34' 16'
 ELEVATION OF TOP OF WELL CASING Well not leveled in
 GROUND SURFACE ELEVATION 92 ft. (estimated from map)
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-1.



USGS SITE ID No. 574630152340101

DATE WELL DRILLED 5/20/89

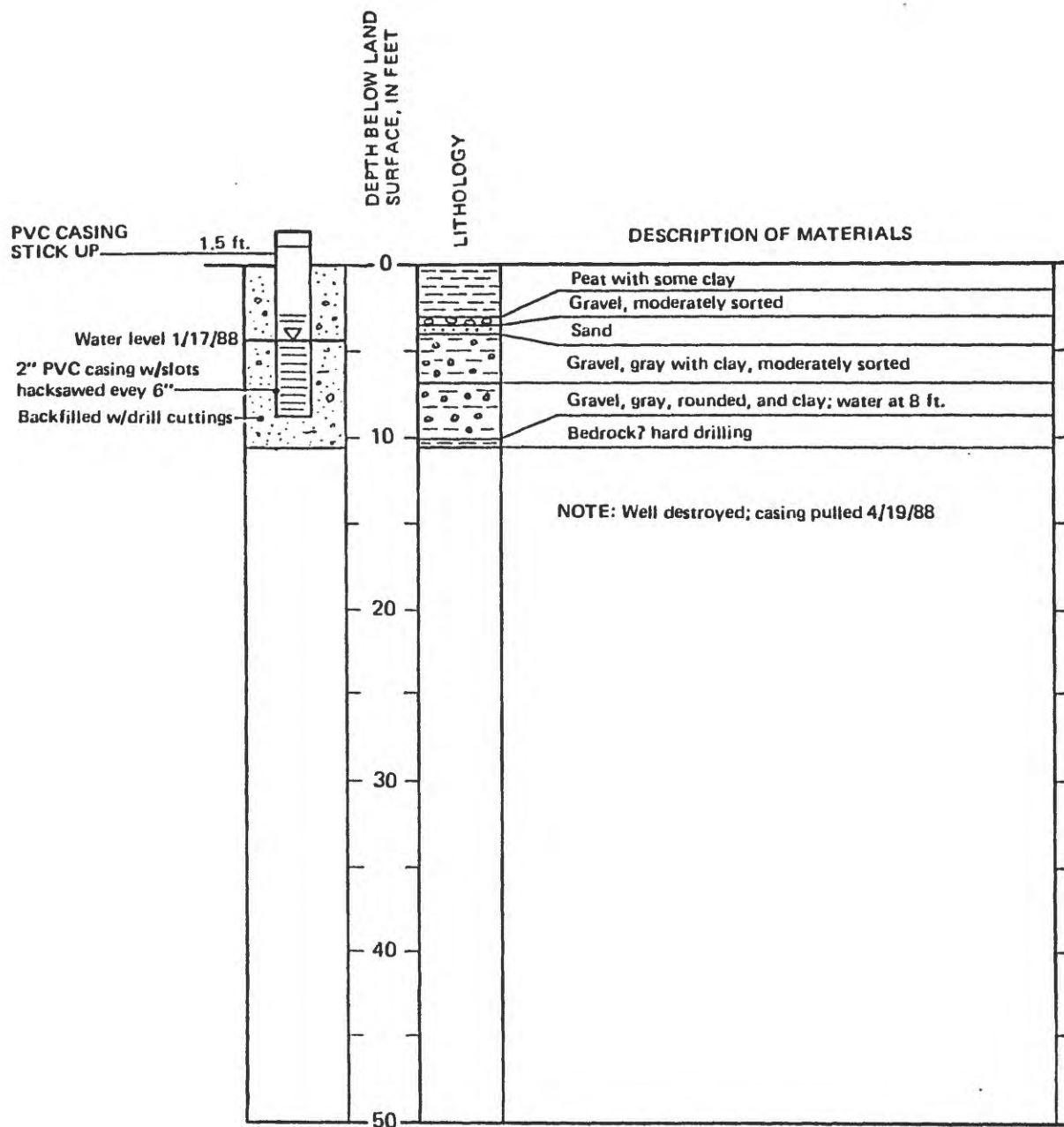
LATITUDE 57° 46' 30" LONGITUDE 152° 34' 01"

ELEVATION OF TOP OF WELL CASING Well not leveled in

GROUND SURFACE ELEVATION 84 ft. (estimated from map)

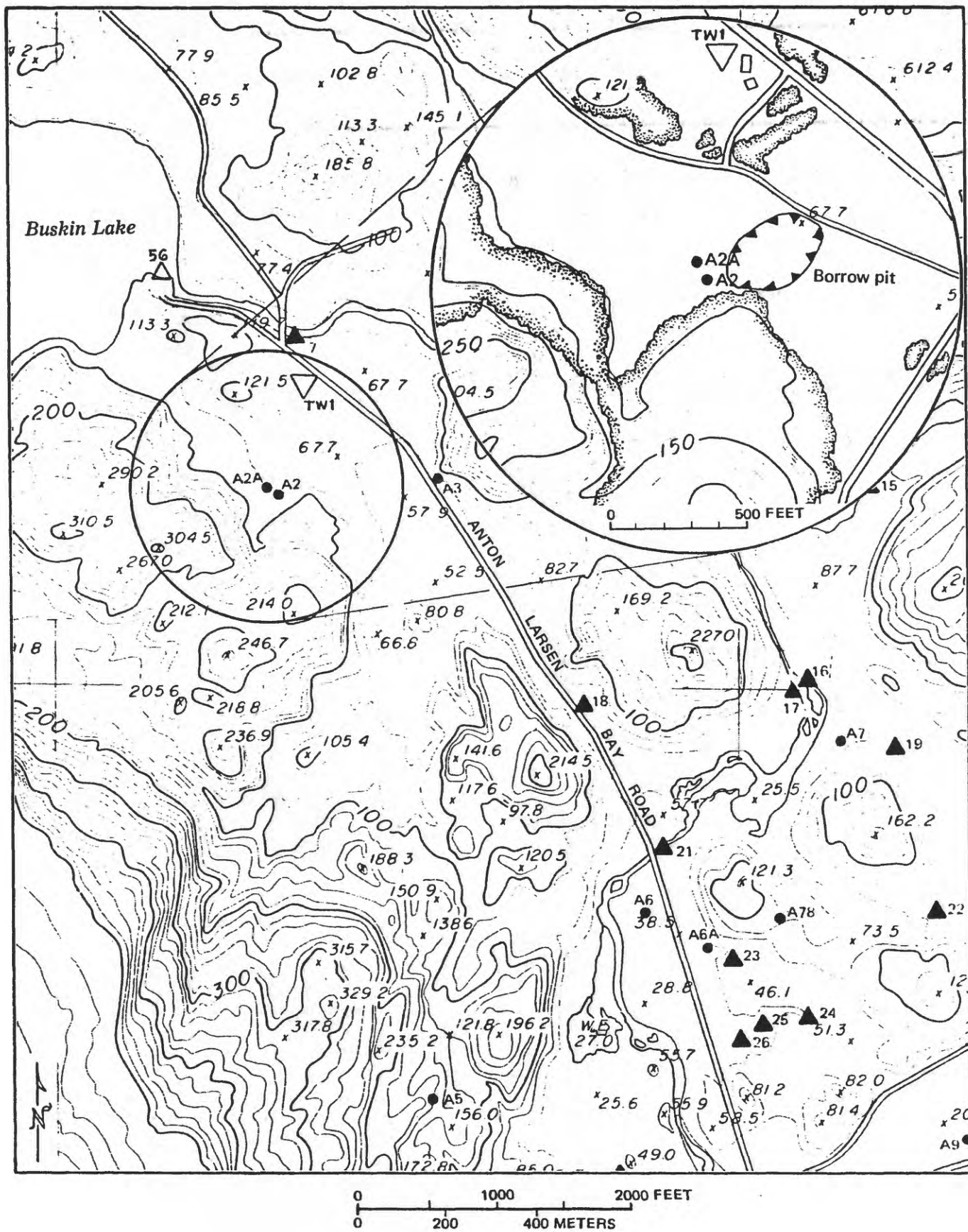
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-1-A.

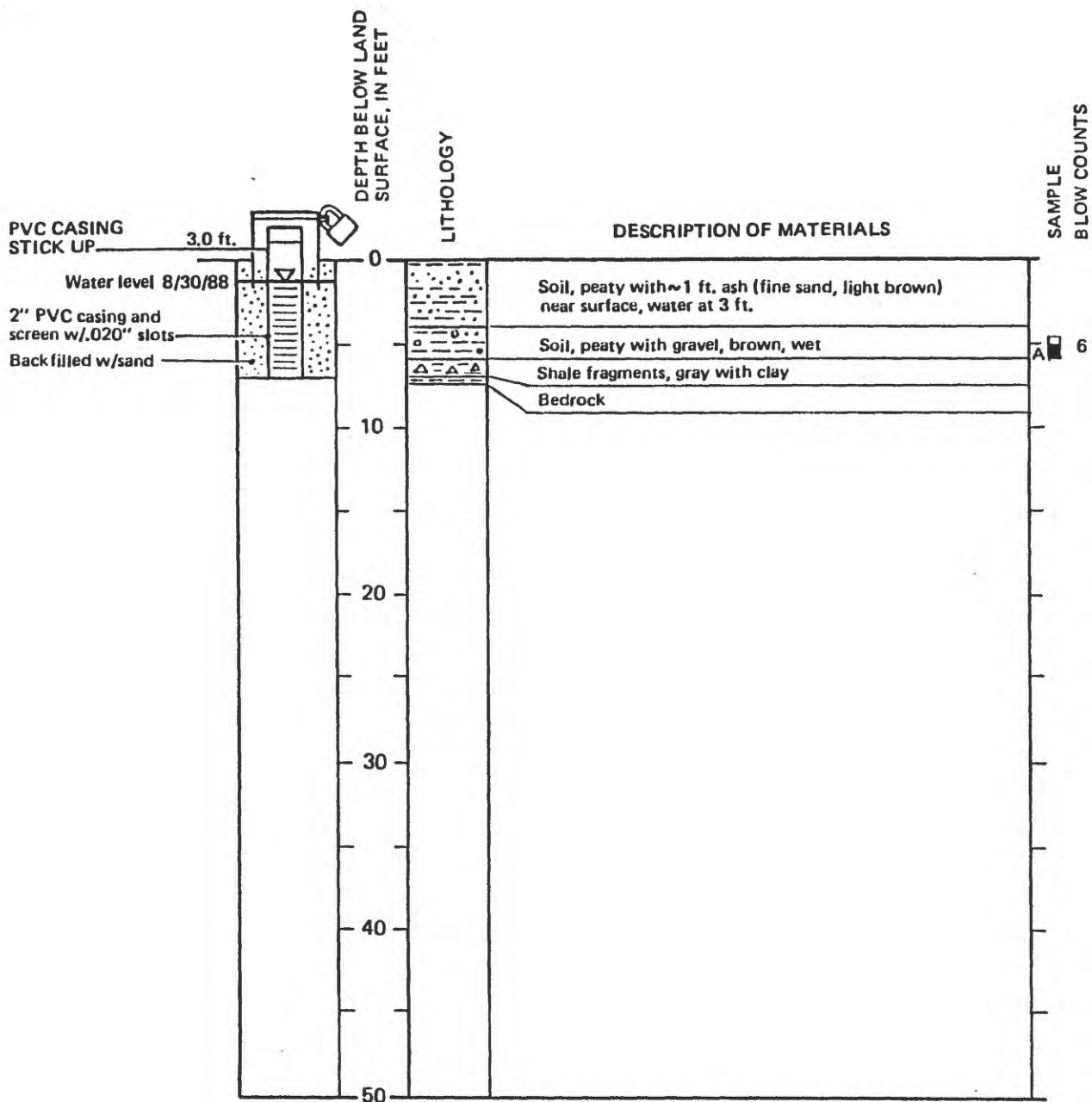


USGS SITE ID No. 574624152320801
 DATE WELL DRILLED 1/16/88
 LATITUDE 57°46' 24" LONGITUDE 152°31' 52"
 ELEVATION OF TOP OF WELL CASING Well not leveled in
 GROUND SURFACE ELEVATION 84.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-2.



Location of well A-2-A.



USGS SITE ID No. 574626152320801

DATE WELL DRILLED 4/19/88

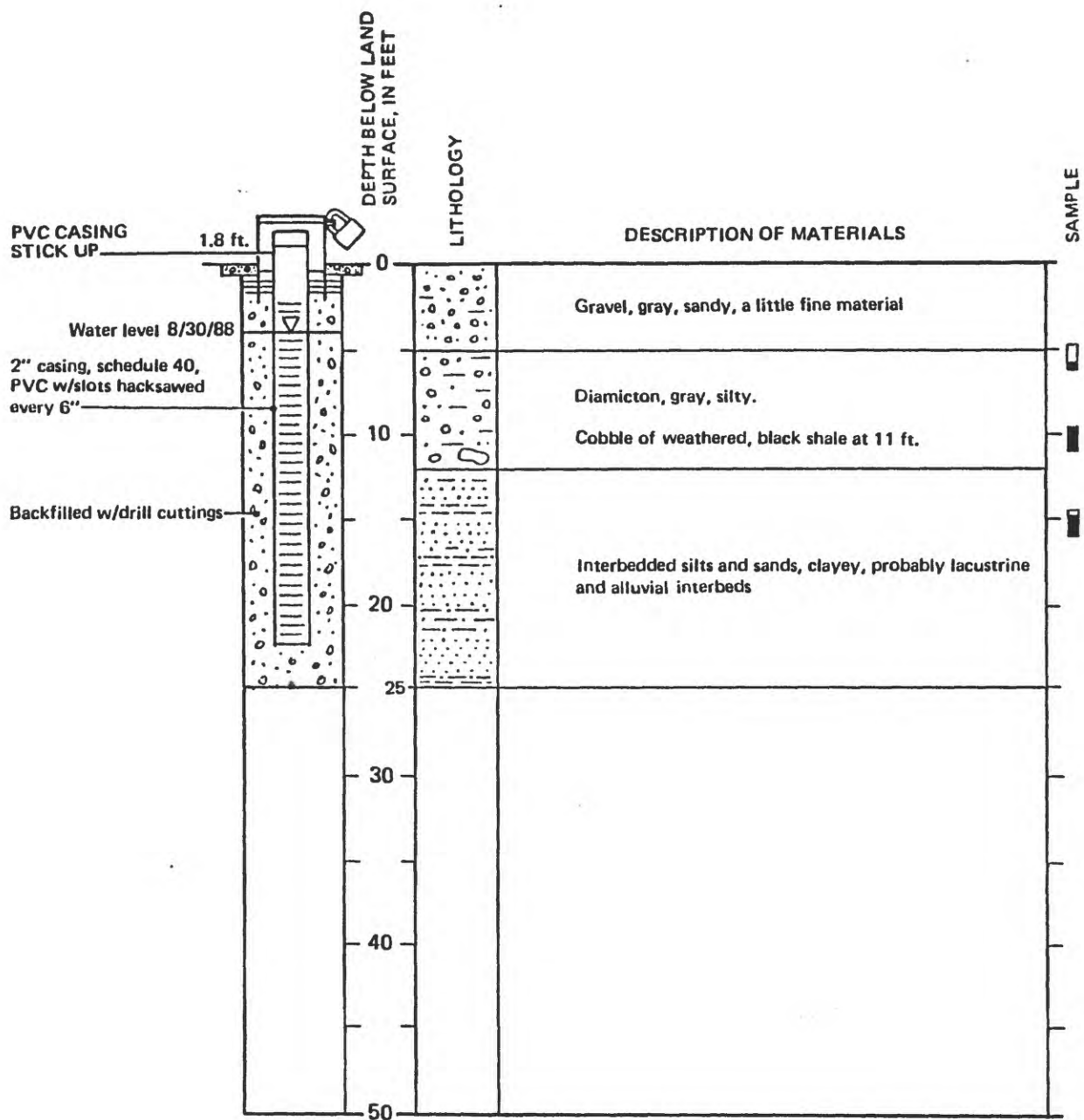
LATITUDE 57° 46' 26" LONGITUDE 152° 31' 53"

ELEVATION OF TOP OF WELL CASING 85.5 ft.

GROUND SURFACE ELEVATION 82.5 ft.

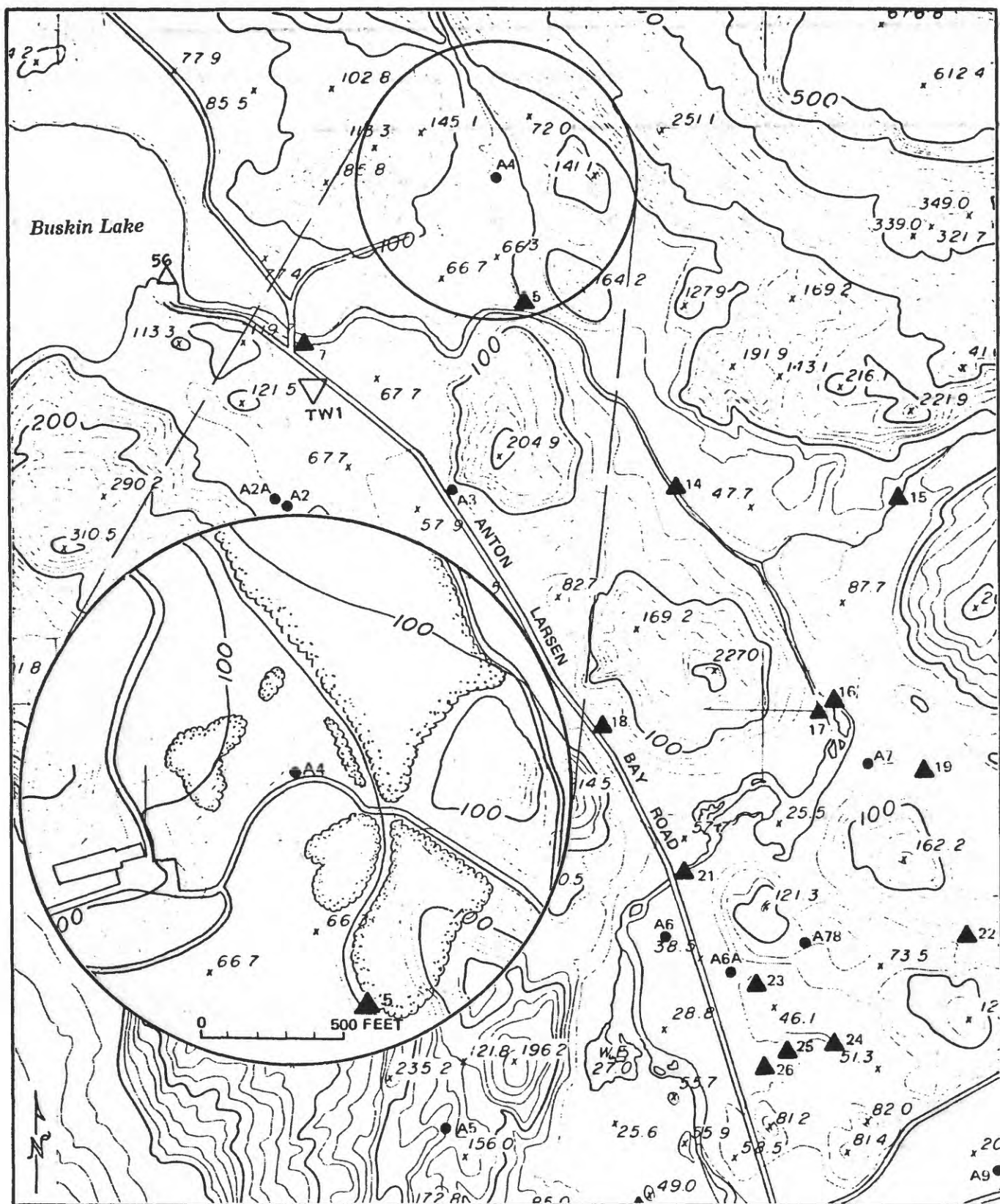
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-2-A.

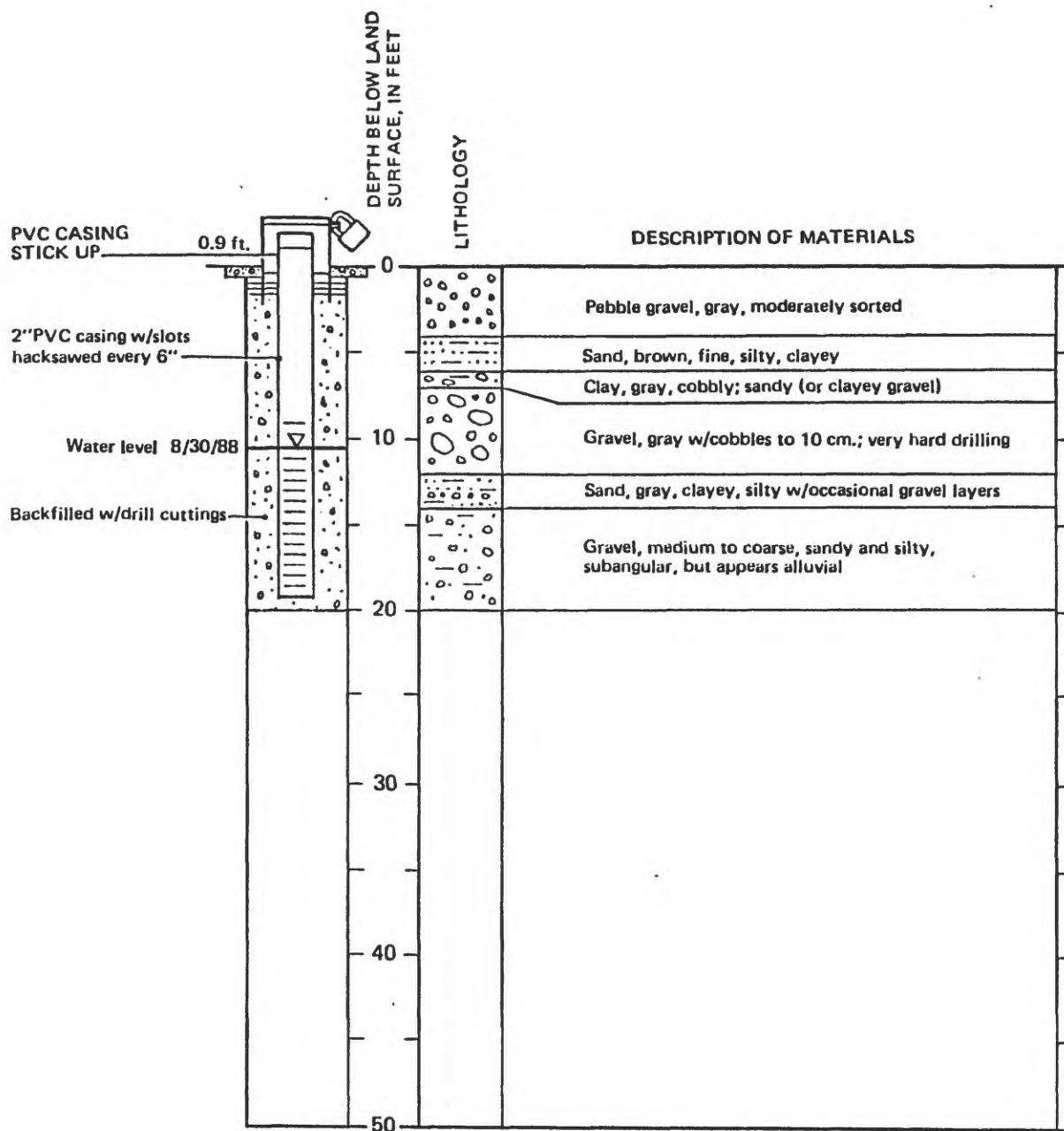


USGS SITE ID No. 574626152313301
 DATE WELL DRILLED 1/15/88
 LATITUDE 57° 46' 26" LONGITUDE 152° 31' 33"
 ELEVATION OF TOP OF WELL CASING 70.1 ft.
 GROUND SURFACE ELEVATION 68.3 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-3.



Location of well A-4.

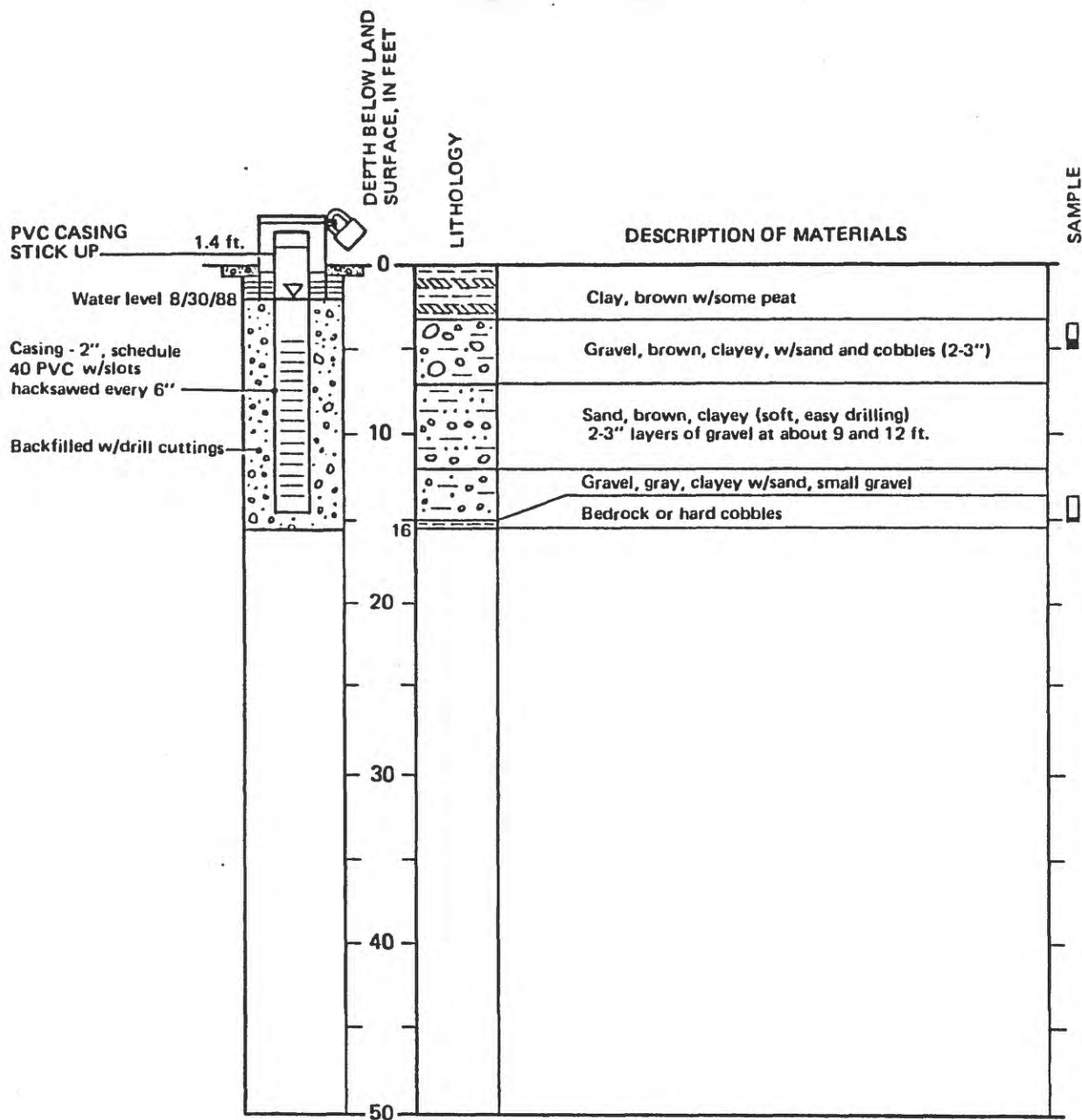


USGS SITE ID No. 574654152312401
 DATE WELL DRILLED 1/16/88
 LATITUDE 57° 46' 54" LONGITUDE 152° 31' 24"
 ELEVATION OF TOP OF WELL CASING 83.2 ft.
 GROUND SURFACE ELEVATION 82.3 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-4.



Location of well A-5.



USGS SITE ID No. 574540152313601

DATE WELL DRILLED 01/20/88

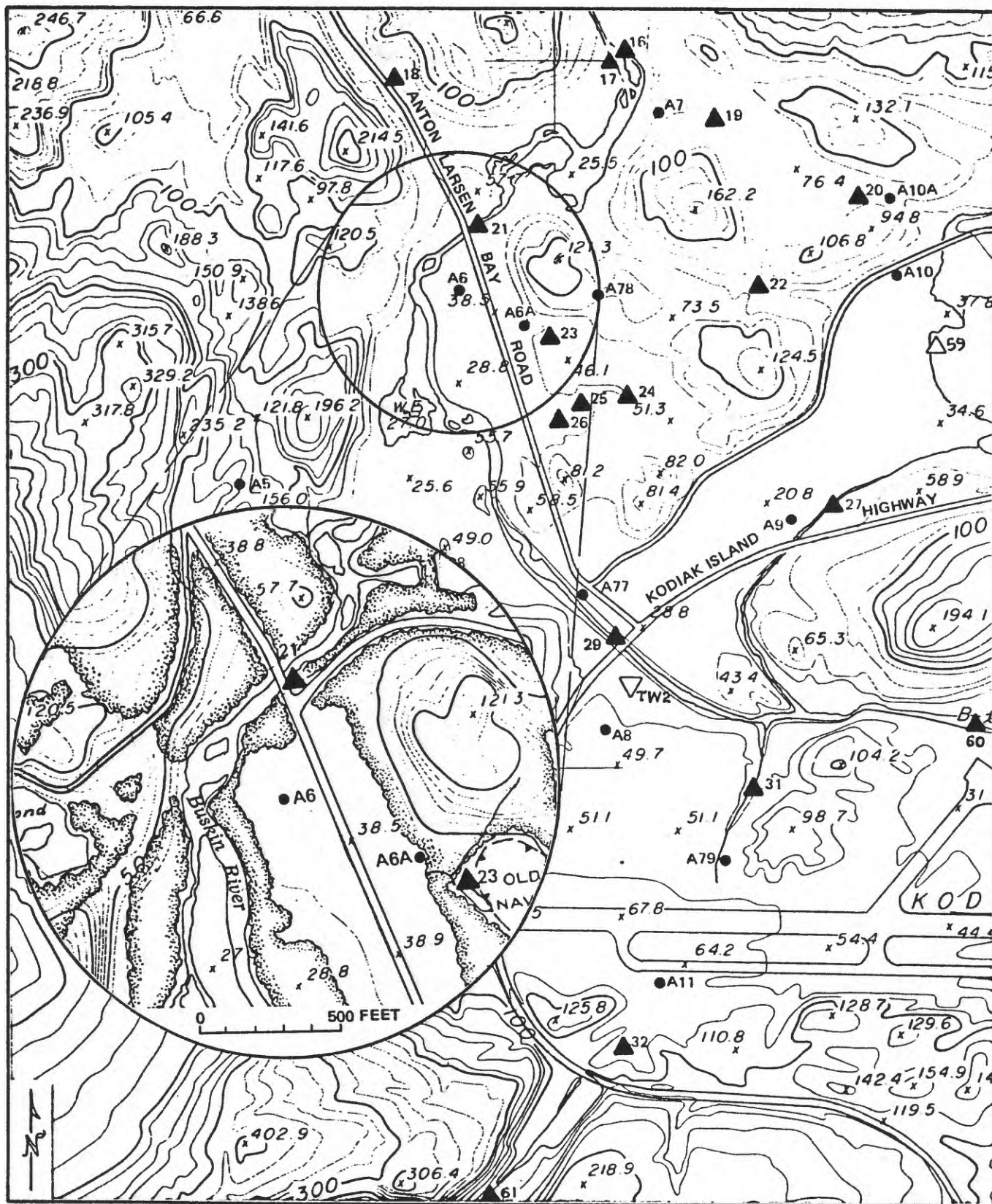
LATITUDE 57° 45' 40" LONGITUDE 152° 31' 36"

ELEVATION OF TOP OF WELL CASING 135.9 ft.

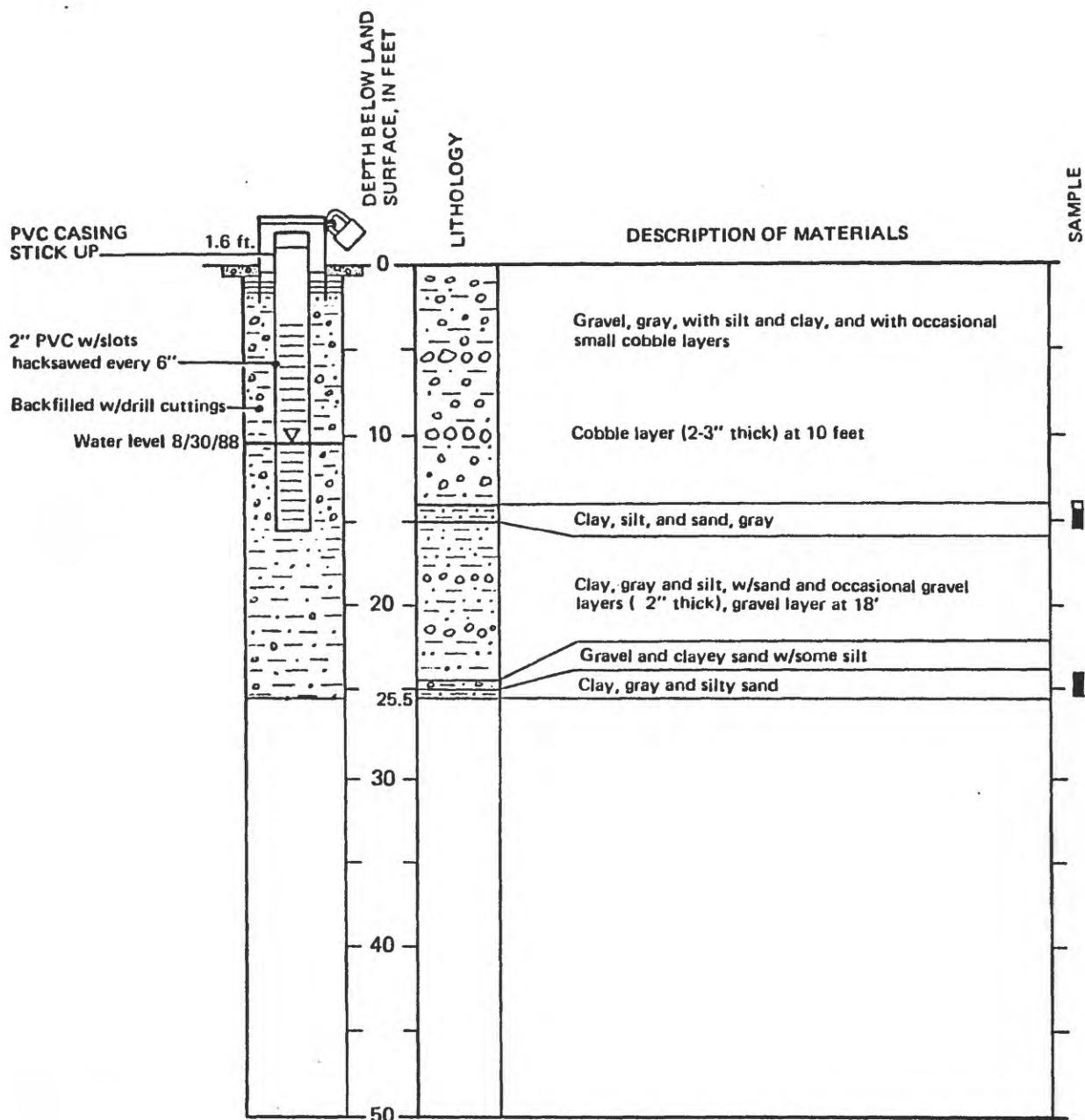
GROUND SURFACE ELEVATION 134.5 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-5.

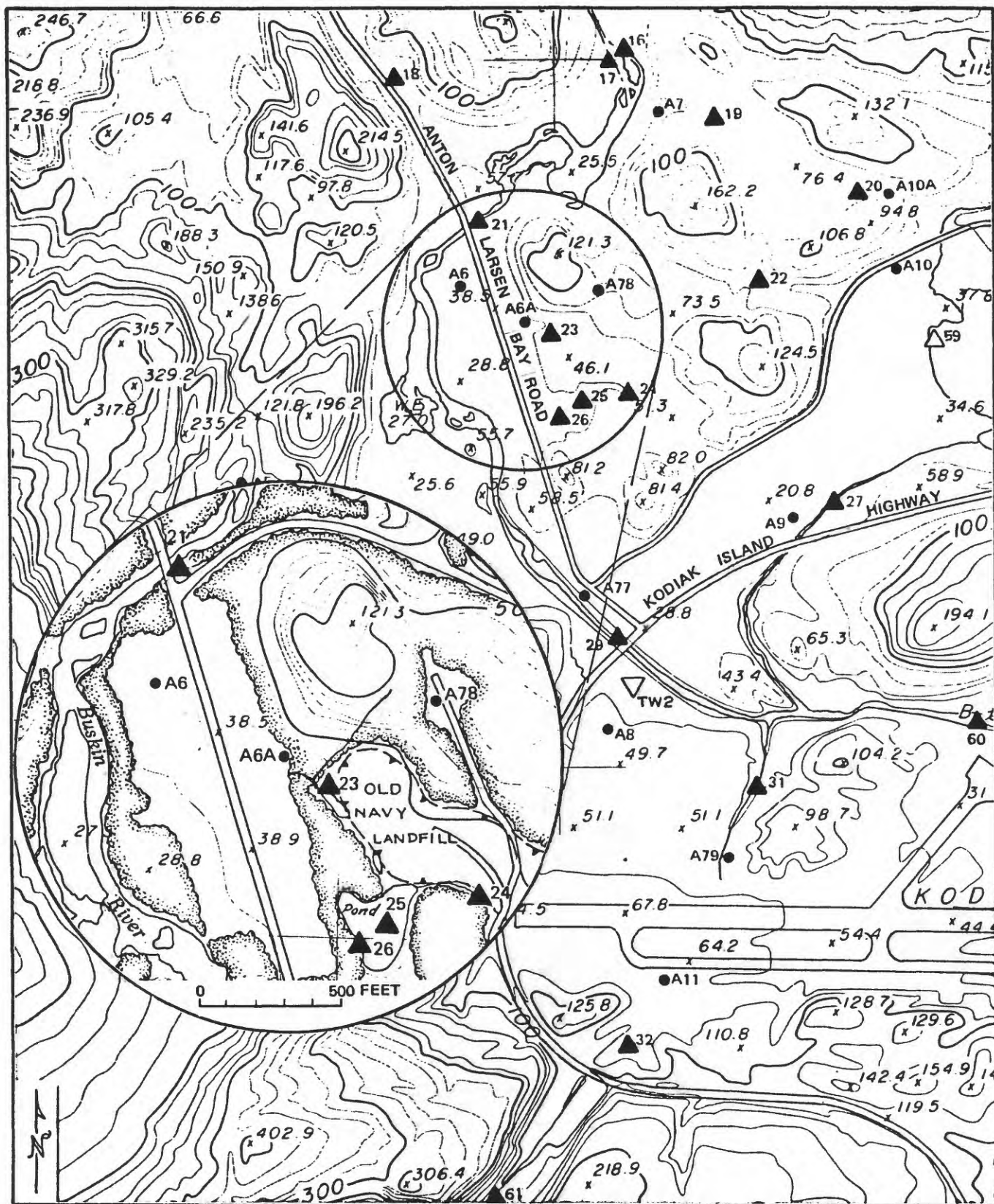


Location of well A-6.



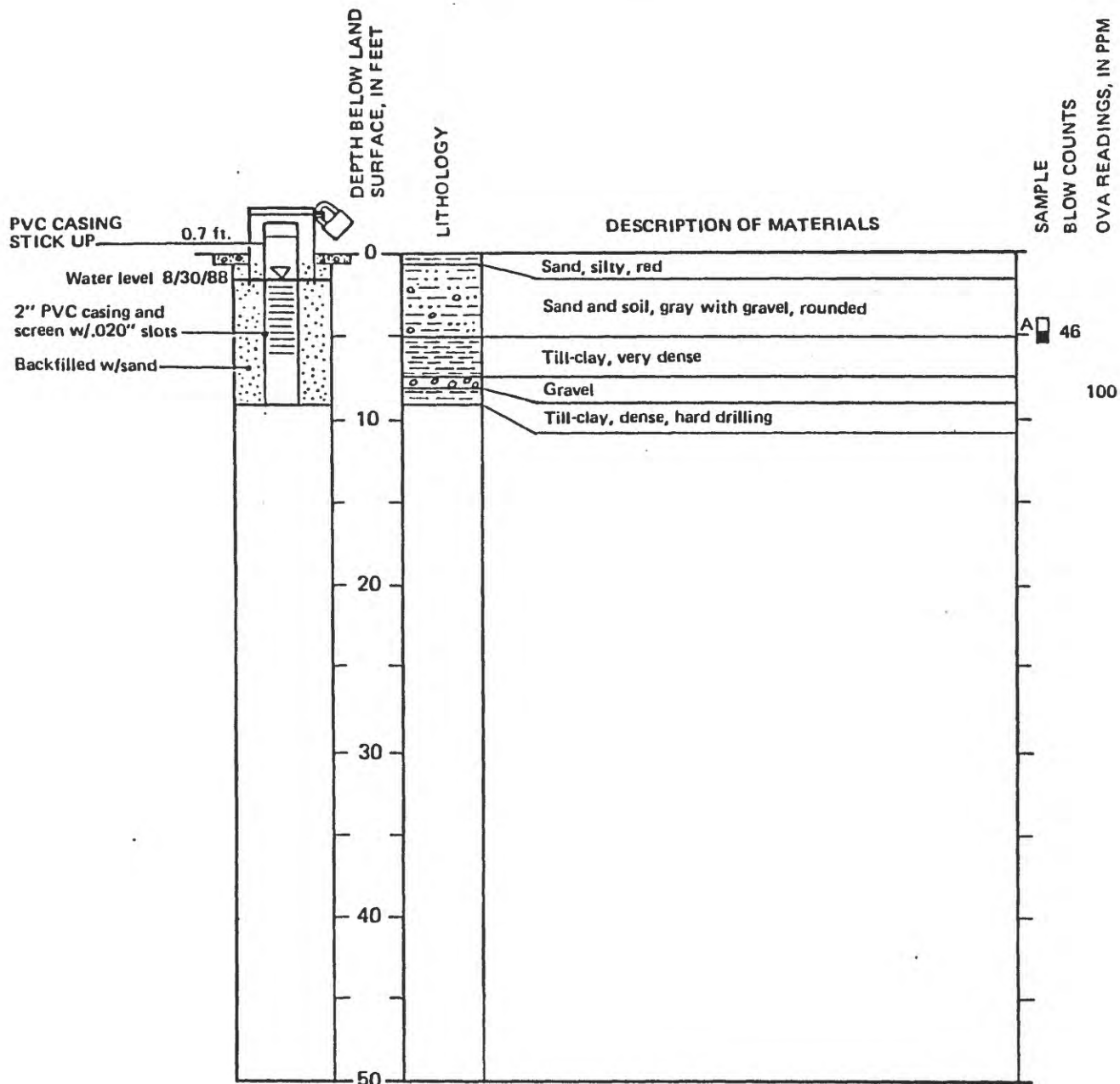
USGS SITE ID No. 574554152310601
 DATE WELL DRILLED 1/18/88
 LATITUDE 57° 45' 54" LONGITUDE 152° 31' 06"
 ELEVATION OF TOP OF WELL CASING 37.7 ft.
 GROUND SURFACE ELEVATION 36.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-6.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-6-A.



USGS SITE ID No. 574554152305901

DATE WELL DRILLED 4/21/88

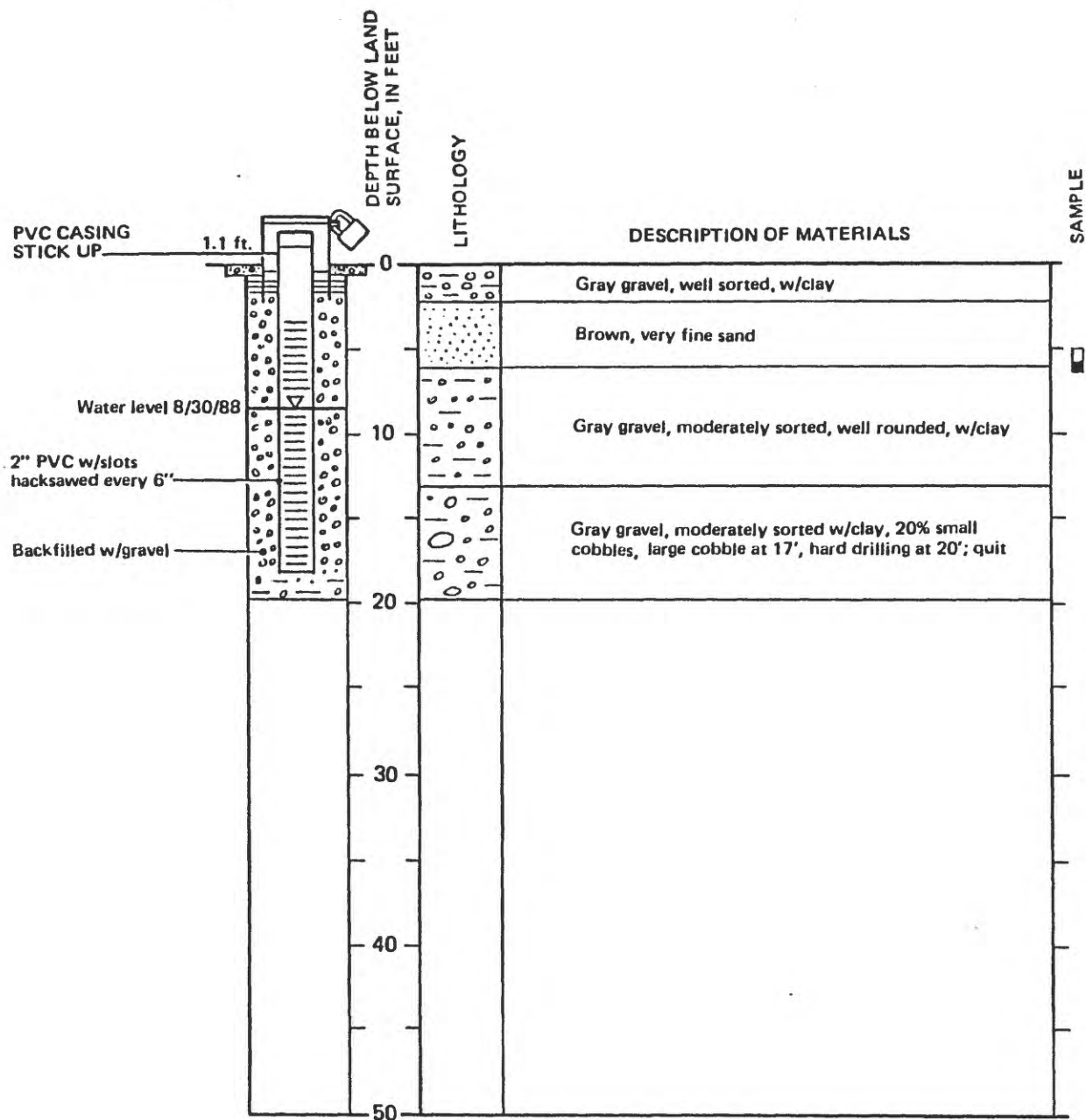
LATITUDE 57° 45' 54" LONGITUDE 152° 30' 59"

ELEVATION OF TOP OF WELL CASING 36.9 ft.

GROUND SURFACE ELEVATION 36.2 ft.

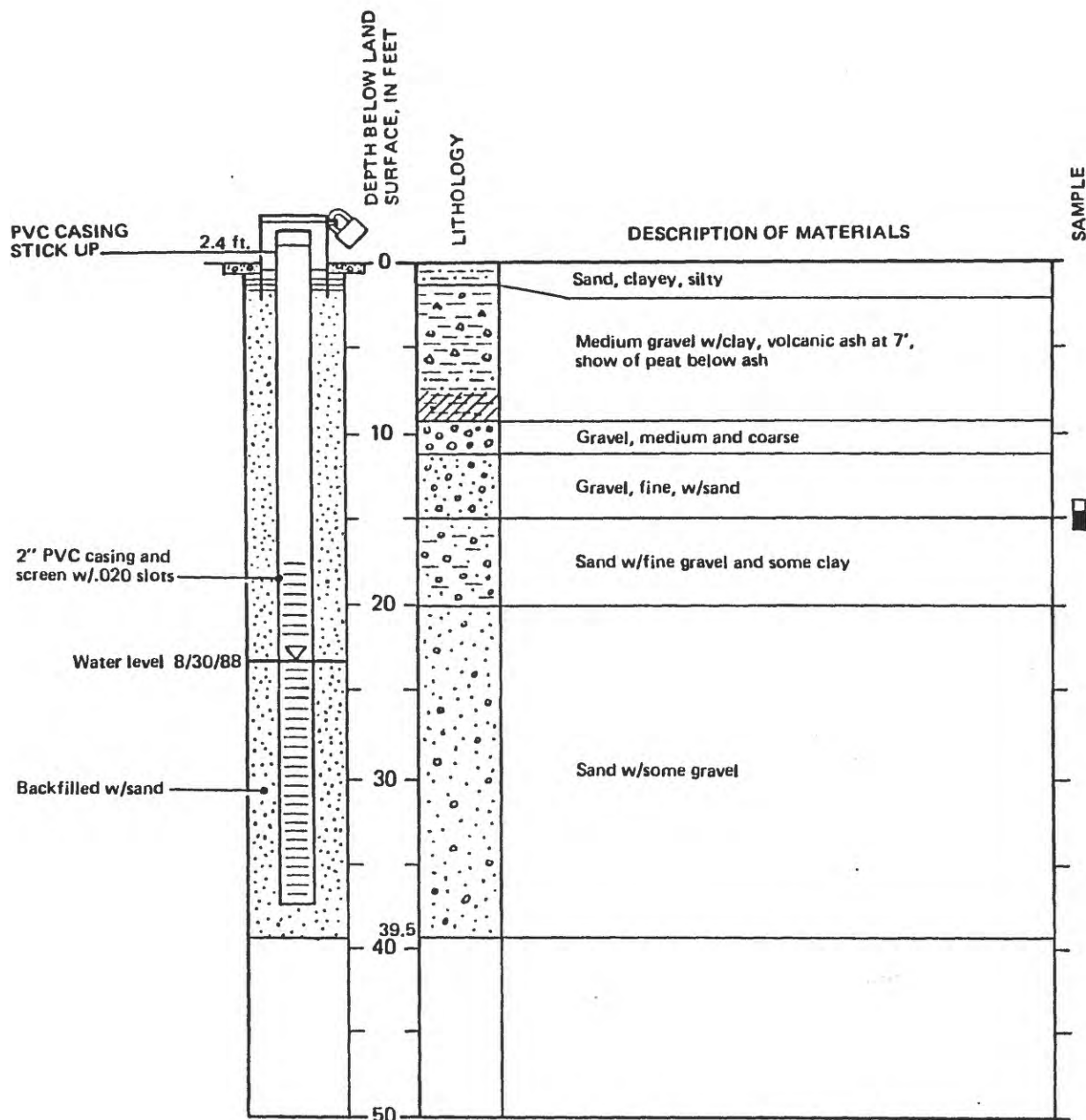
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-6-A.



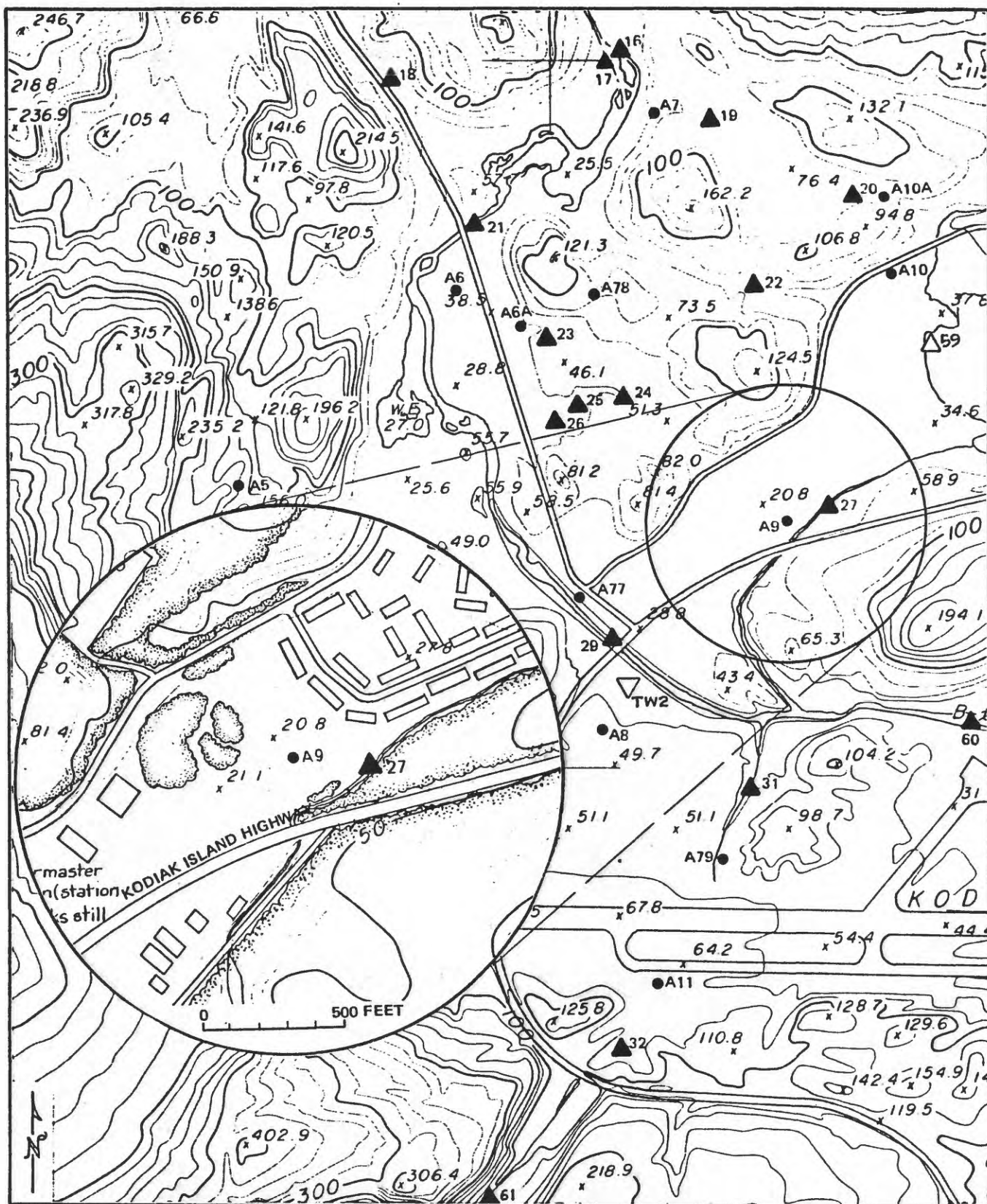
USGS SITE ID No. 574605152304101
 DATE WELL DRILLED 1/18/88
 LATITUDE 57° 46' 05" LONGITUDE 152° 30' 41"
 ELEVATION OF TOP OF WELL CASING 45.8 ft.
 GROUND SURFACE ELEVATION 44.7 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-7.

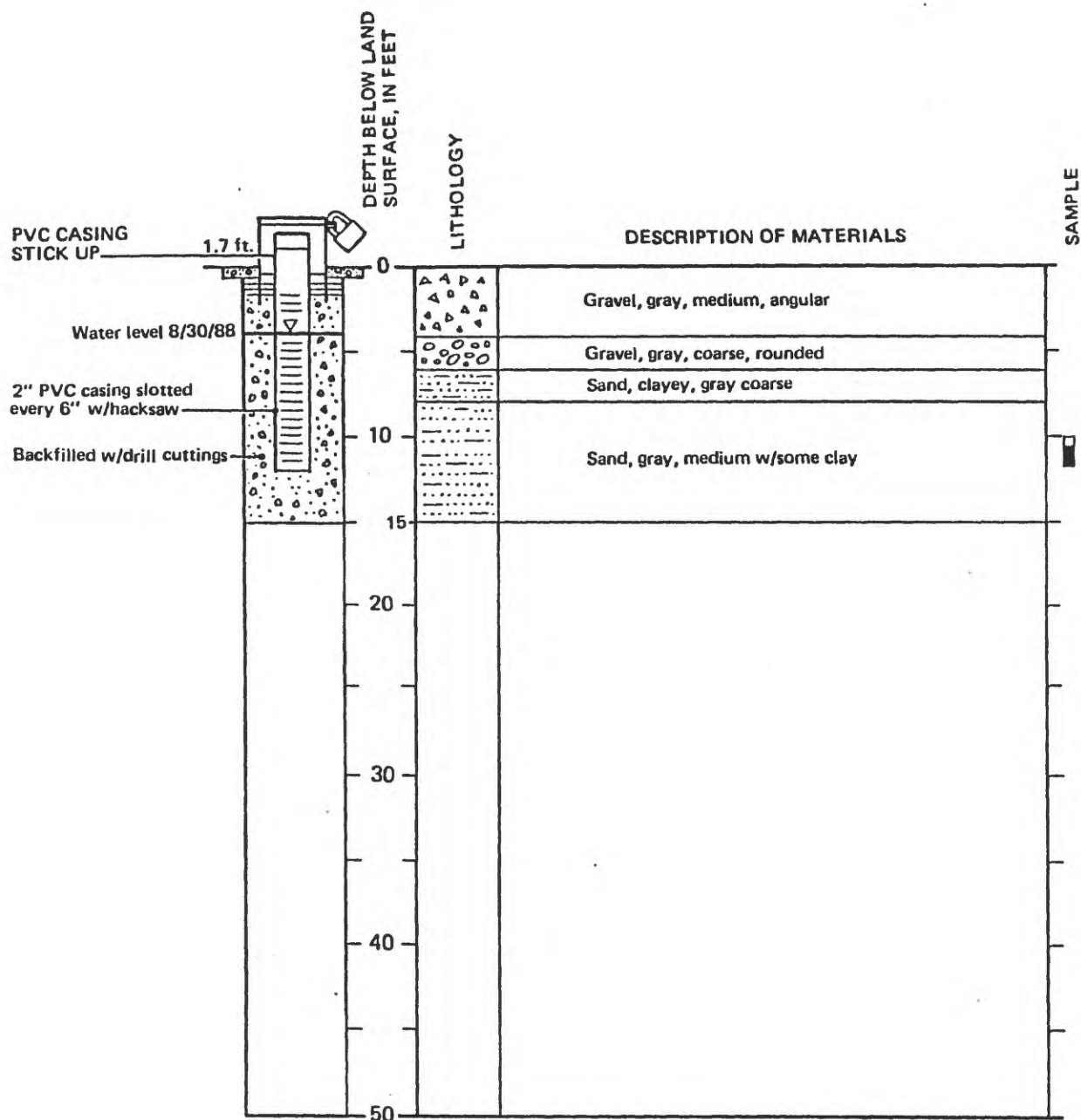


USGS SITE ID No. 574522152304801
 DATE WELL DRILLED 1/21/88 WELL DEEPENED 4/19/88
 LATITUDE 57° 45' 22" LONGITUDE 152° 30' 48"
 ELEVATION OF TOP OF WELL CASING 47.0 ft.
 GROUND SURFACE ELEVATION 44.6 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-8.

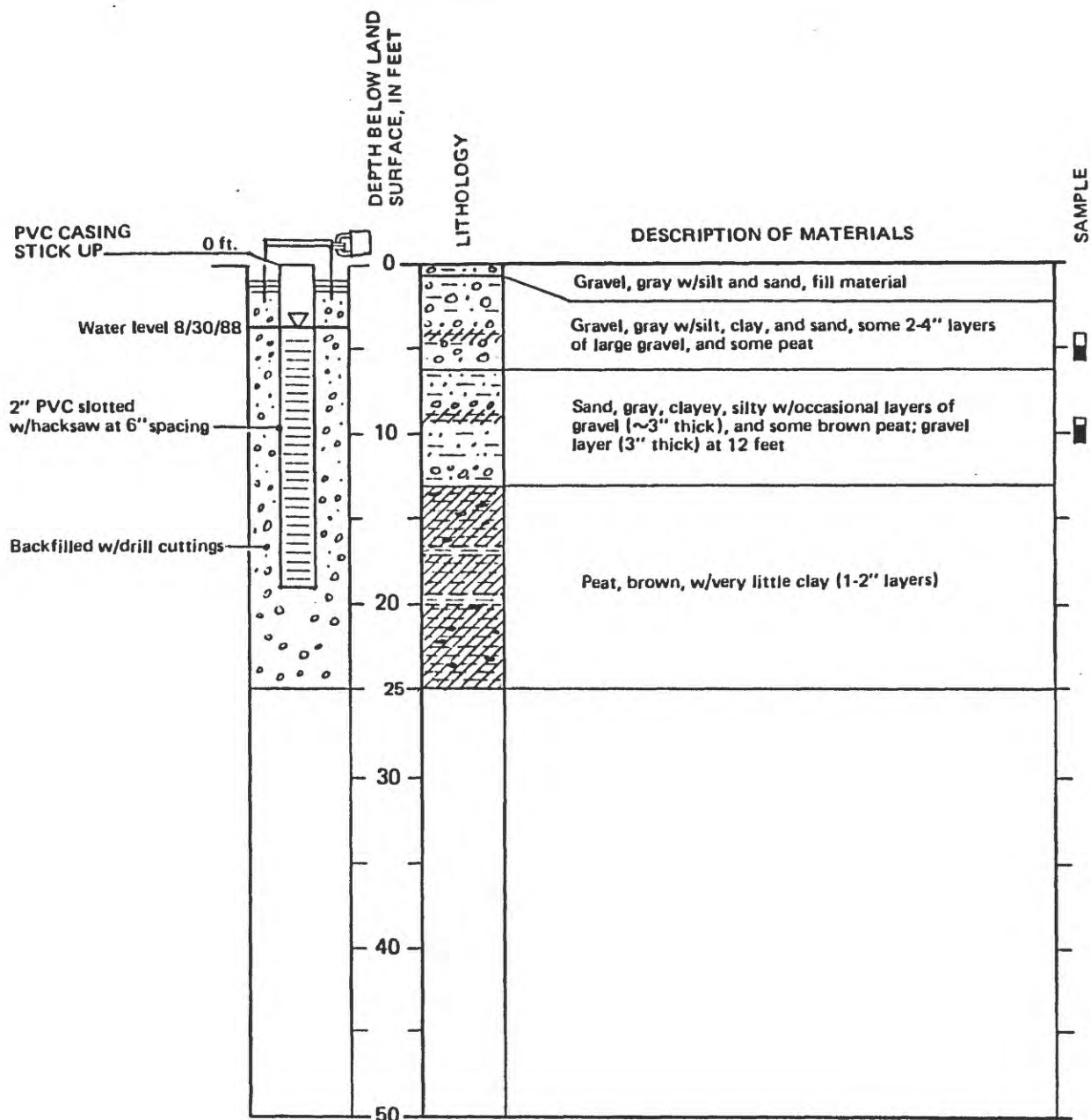


Location of well A-9.



USGS SITE ID No. 574536152302301
 DATE WELL DRILLED 01/21/88
 LATITUDE 57° 45' 36" LONGITUDE 152° 30' 23"
 ELEVATION OF TOP OF WELL CASING 26.1 ft.
 GROUND SURFACE ELEVATION 24.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-9.

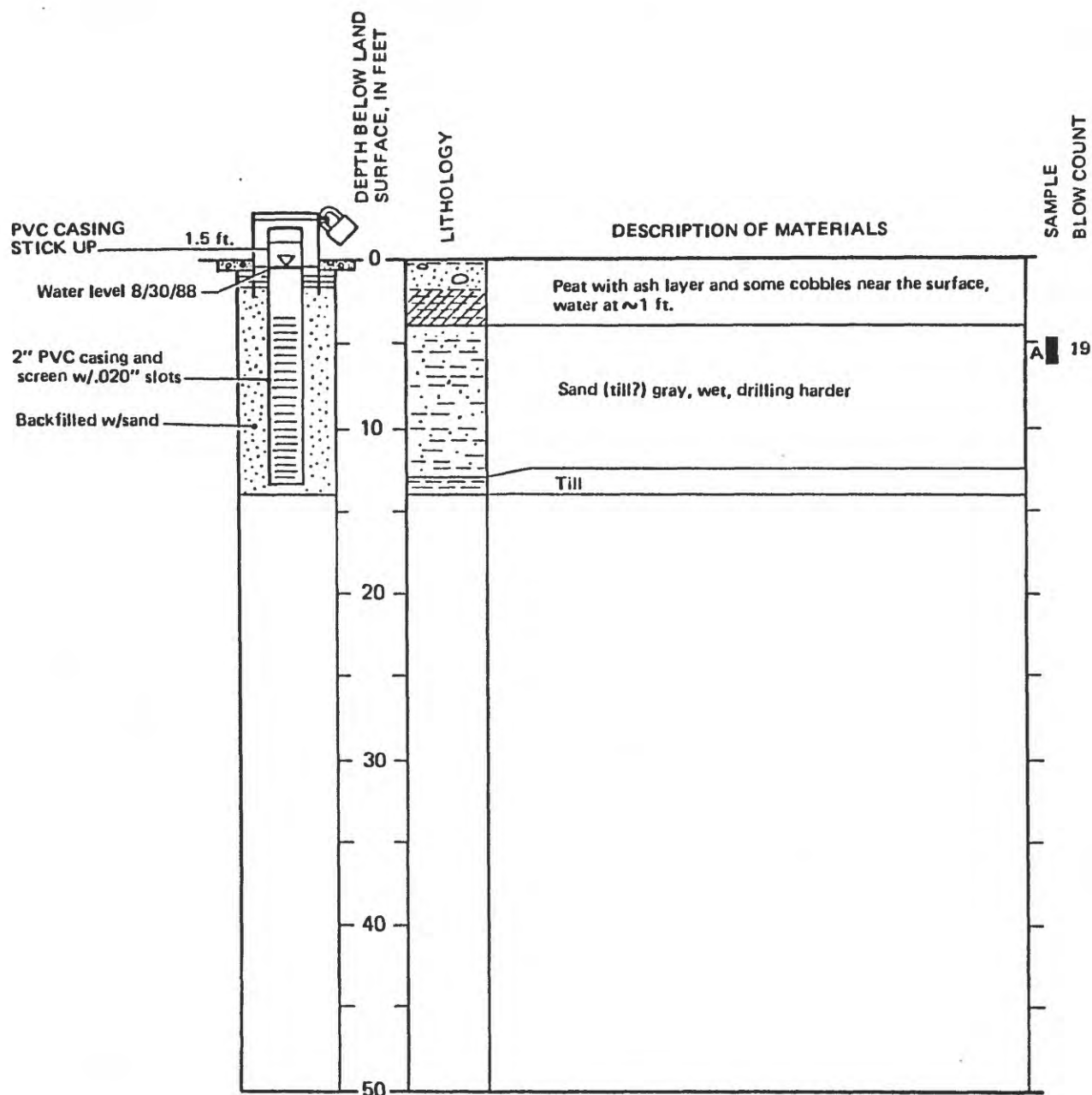


USGS SITE ID No. 574553152300901
 DATE WELL DRILLED 1/19/88
 LATITUDE 57° 45' 53" LONGITUDE 152° 30' 09"
 ELEVATION OF TOP OF WELL CASING 28.0 ft.
 GROUND SURFACE ELEVATION 28.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-10.

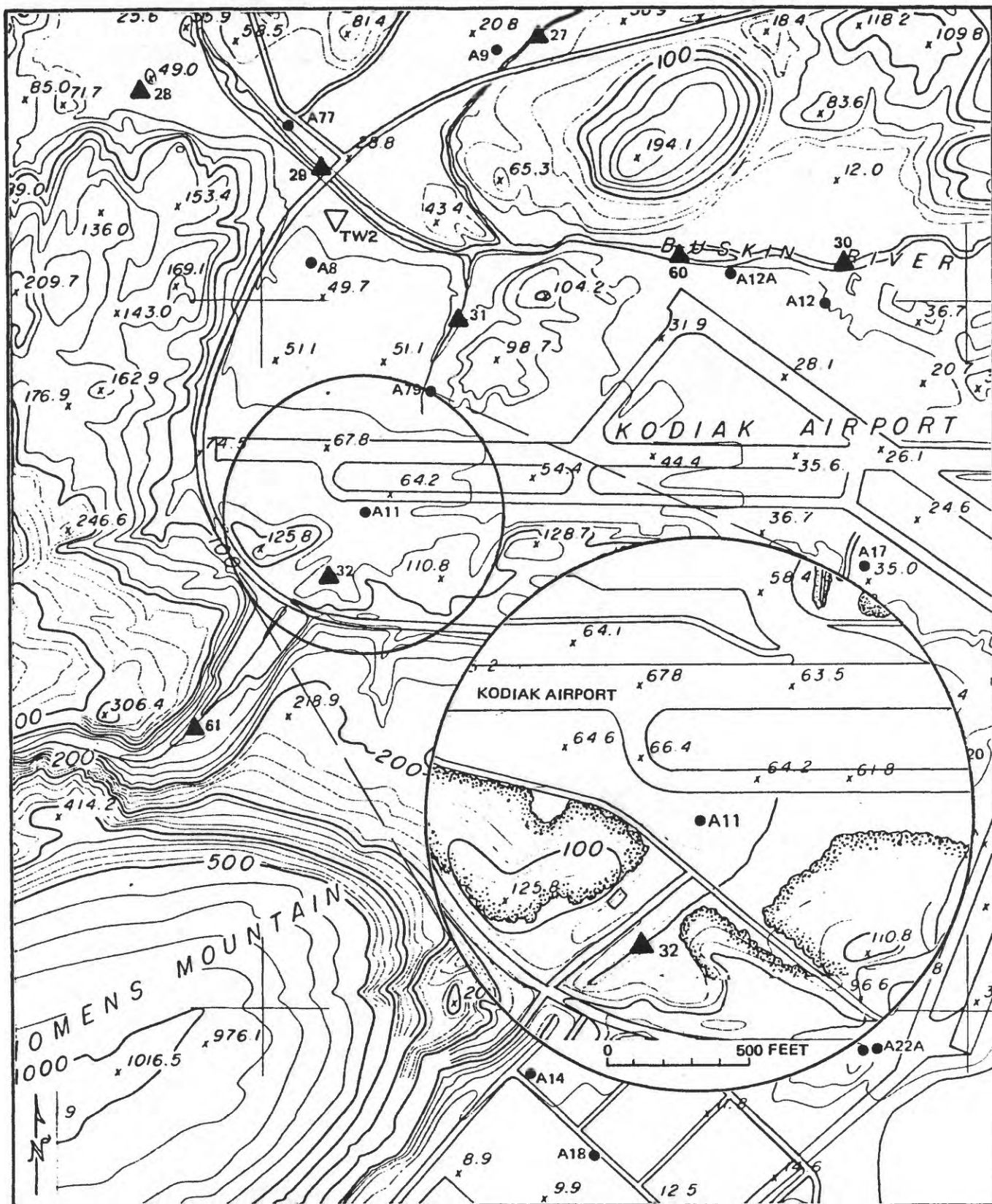


Location of well A-10-A.

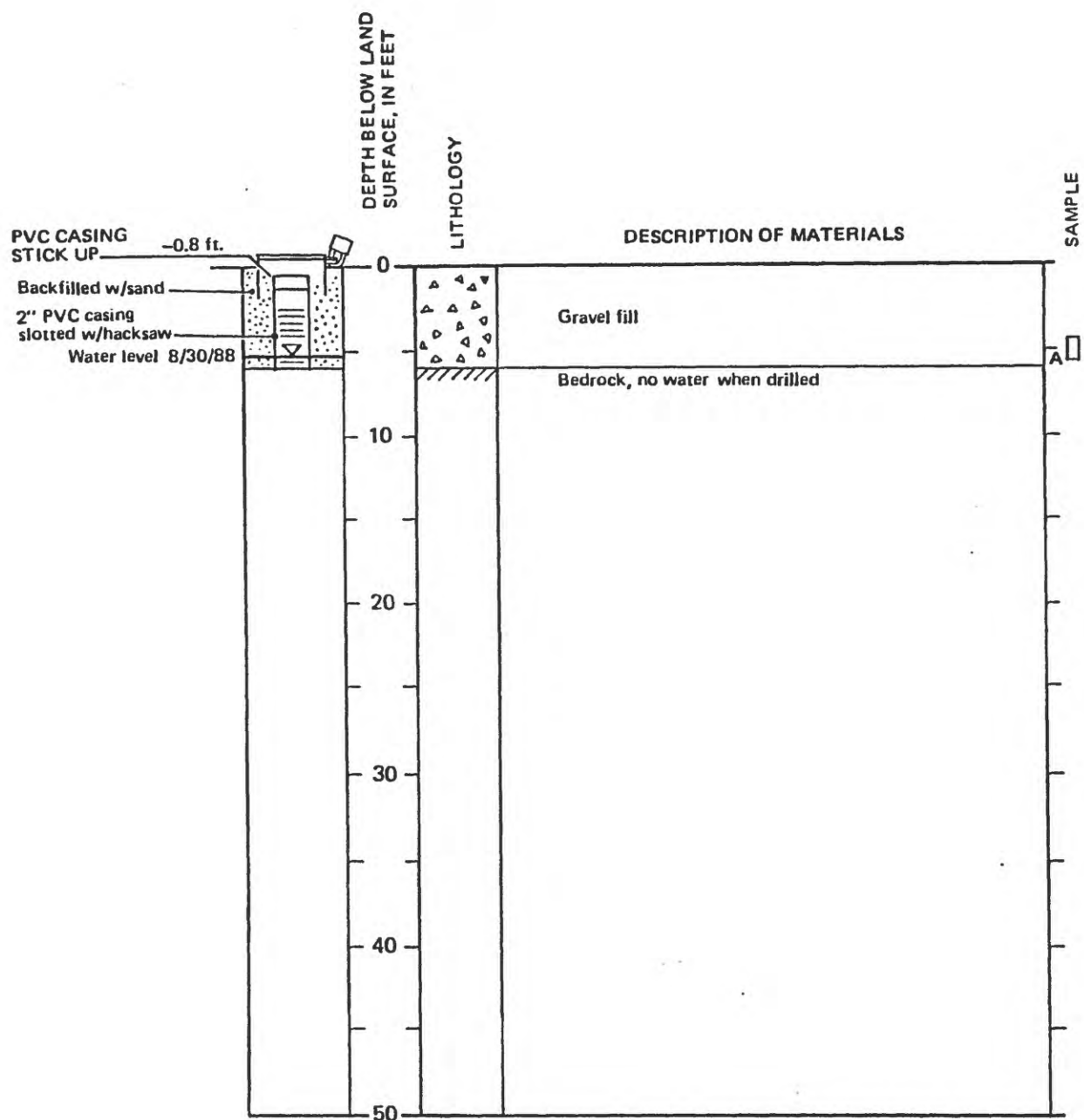


USGS SITE ID No. 574602152301701
 DATE WELL DRILLED 4/19/88
 LATITUDE 57°46' 02" LONGITUDE 152°30' 08"
 ELEVATION OF TOP OF WELL CASING 75.4 ft.
 GROUND SURFACE ELEVATION 73.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-10-A.

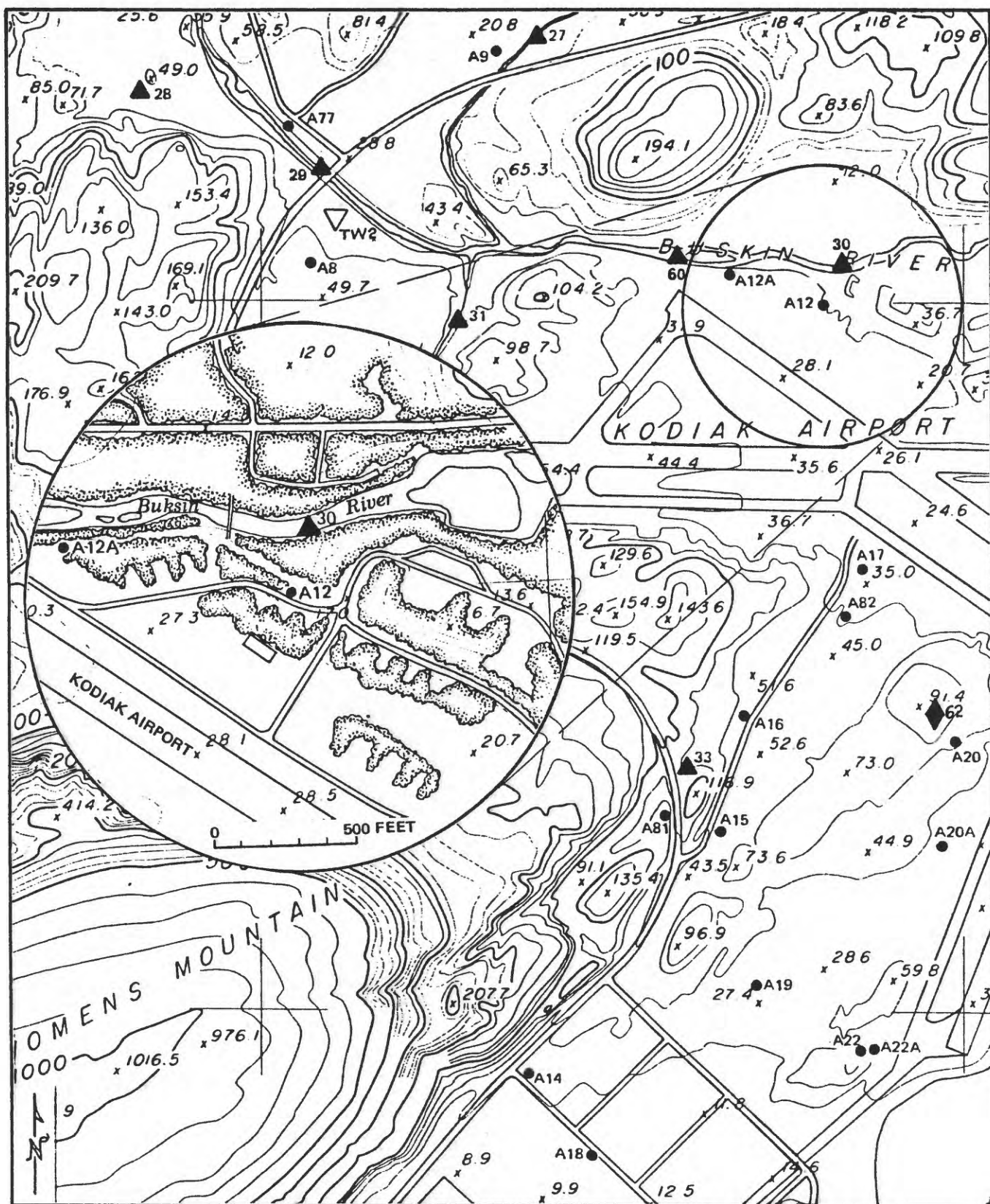


Location of well A-11.

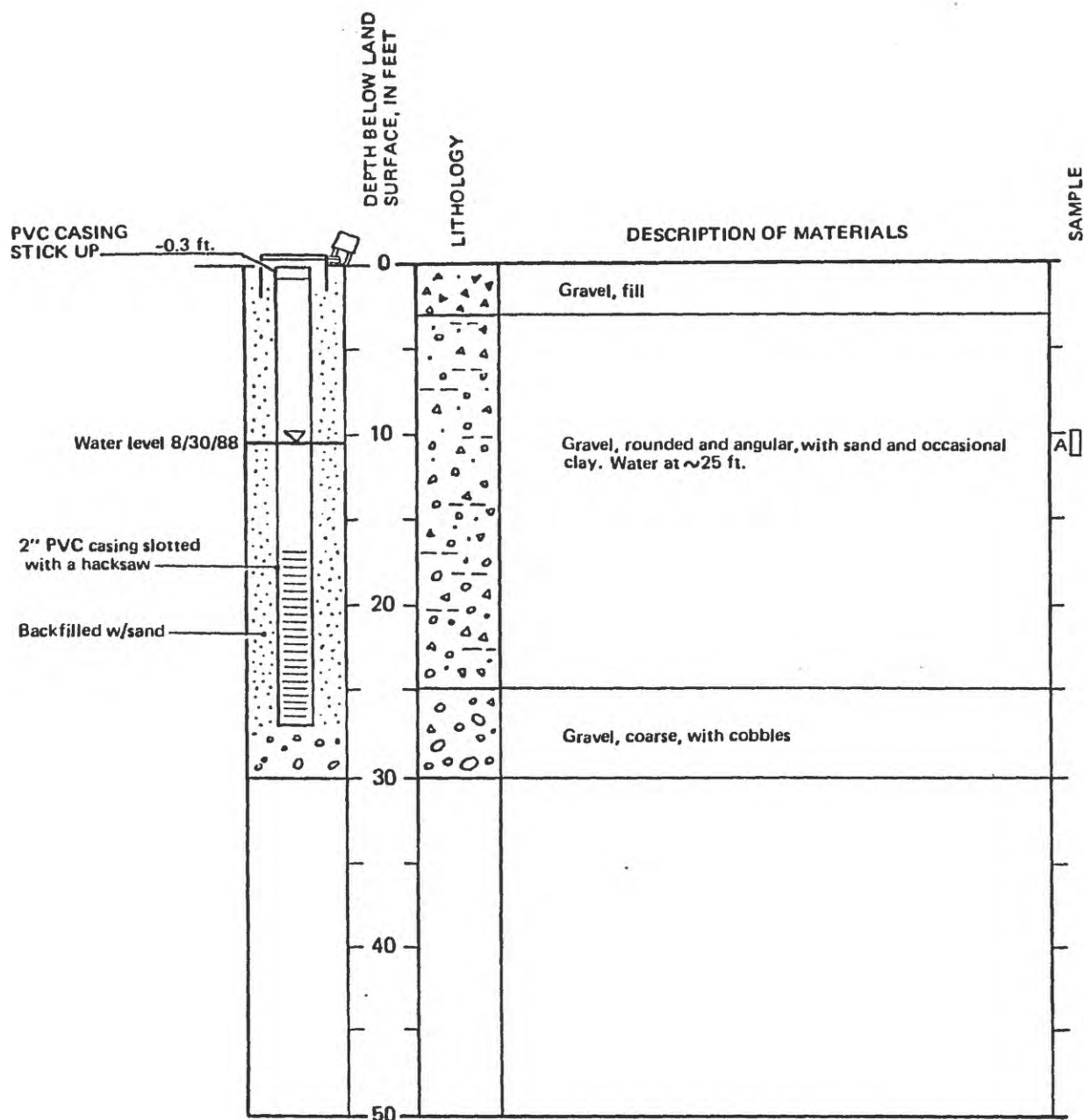


USGS SITE ID No. 574504152304201
 DATE WELL DRILLED 2/18/88
 LATITUDE 57° 45' 04" LONGITUDE 152° 30' 42"
 ELEVATION OF TOP OF WELL CASING 65.4 ft.
 GROUND SURFACE ELEVATION 66.2 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-11.

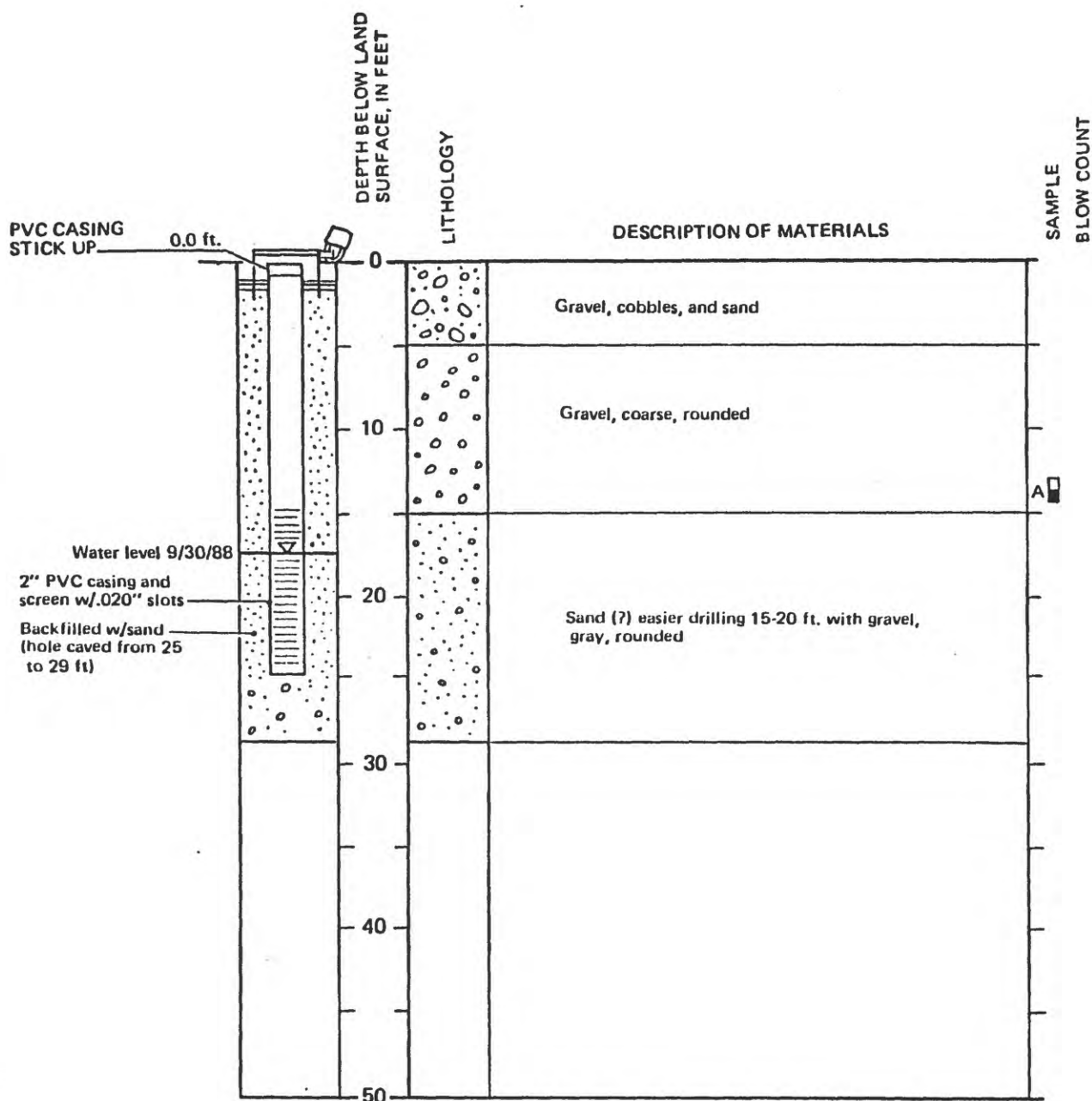


Location of well A-12.



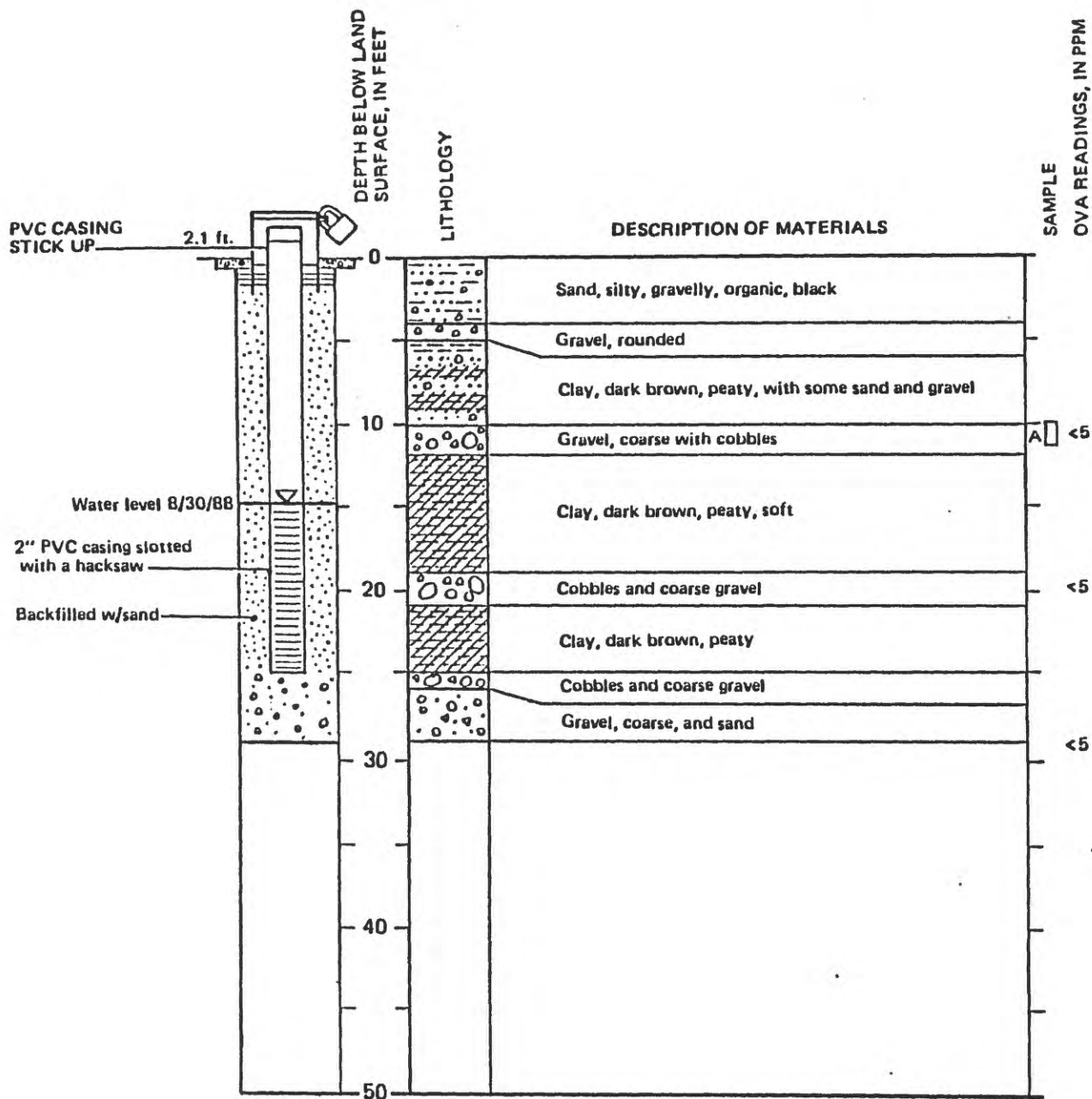
USGS SITE ID No. 574519152293901
DATE WELL DRILLED 2/17/88
LATITUDE 57°45' 19" LONGITUDE 152°29' 39"
ELEVATION OF TOP OF WELL CASING 16.2 ft.
GROUND SURFACE ELEVATION 16.5 ft.
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-12.



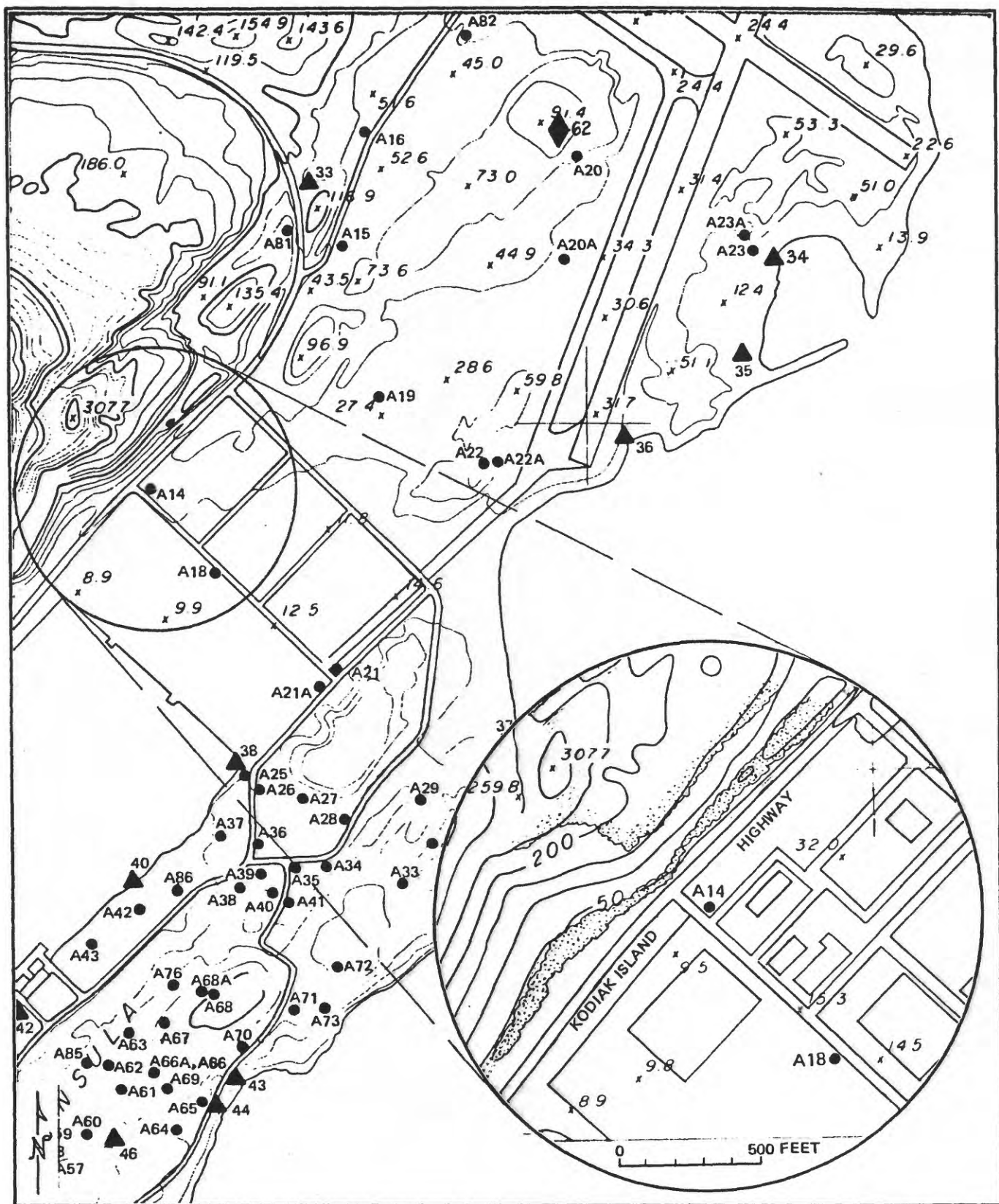
USGS SITE ID No. 574520152295301
 DATE WELL DRILLED 4/18/88
 LATITUDE 57°45' 20" LONGITUDE 152°29' 53"
 ELEVATION OF TOP OF WELL CASING 24.0 ft.
 GROUND SURFACE ELEVATION 24.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-12-A.

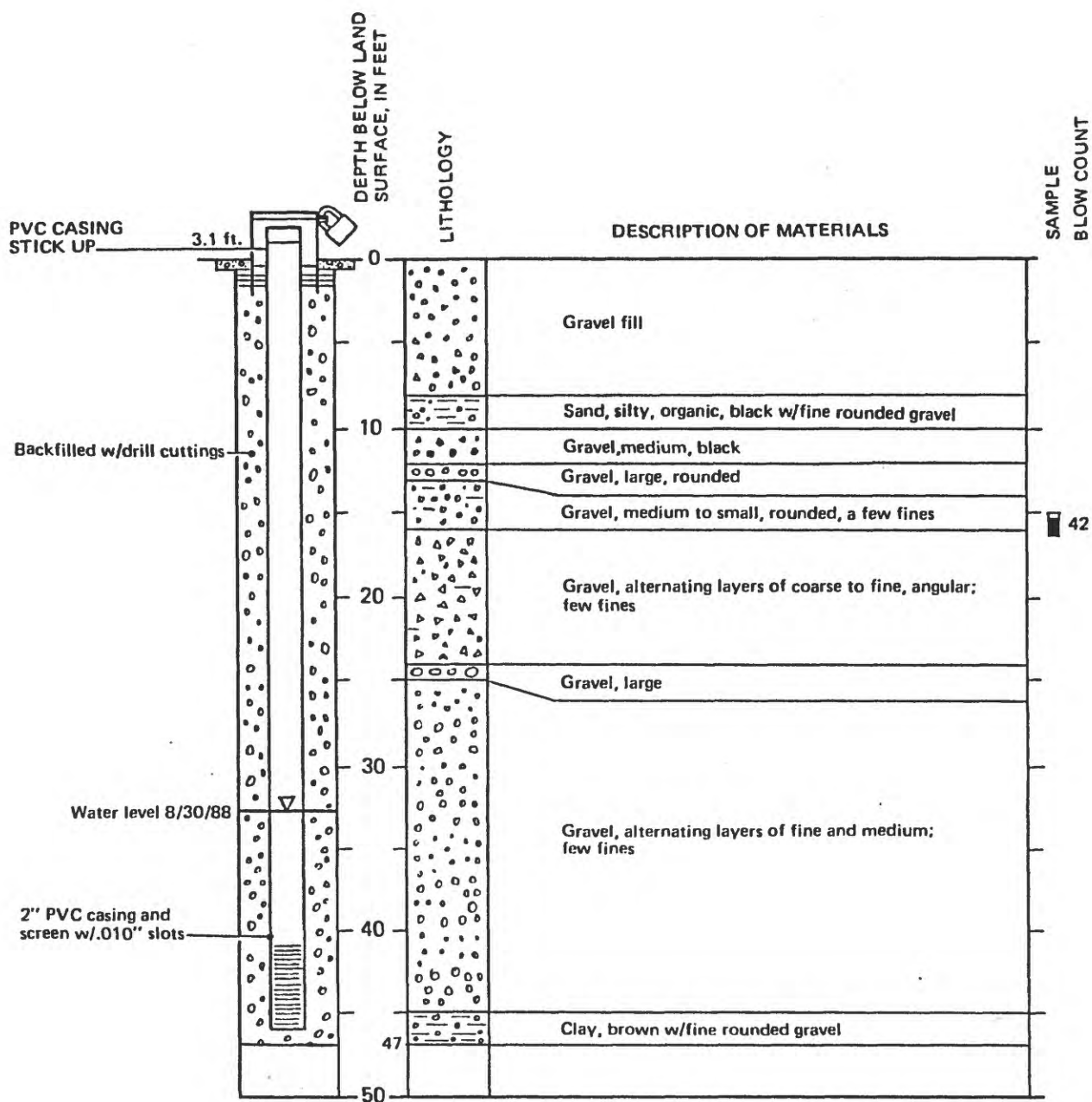


USGS SITE ID No. 574514152291501
 DATE WELL DRILLED 2/17/88
 LATITUDE 57°45' 14" LONGITUDE 152°29' 15"
 ELEVATION OF TOP OF WELL CASING 19.5 ft.
 GROUND SURFACE ELEVATION 17.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-13.



Location of well A-14.



USGS SITE ID No. 574425152302001

DATE WELL DRILLED 1/27/88

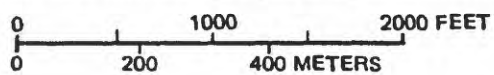
LATITUDE 57° 44' 25" LONGITUDE 152° 30' 20"

ELEVATION OF TOP OF WELL CASING 38.3 ft.

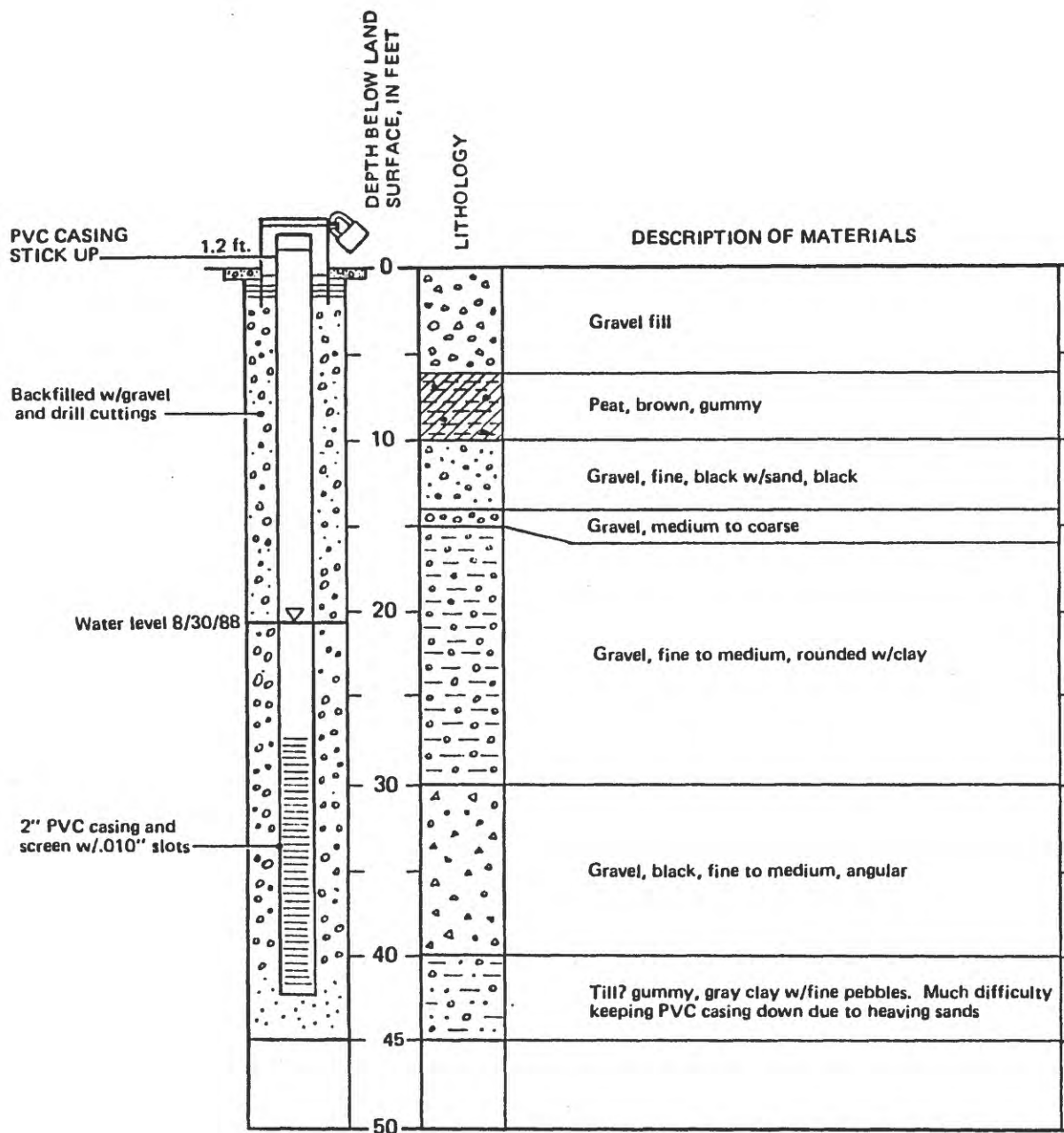
GROUND SURFACE ELEVATION 35.2 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-14.

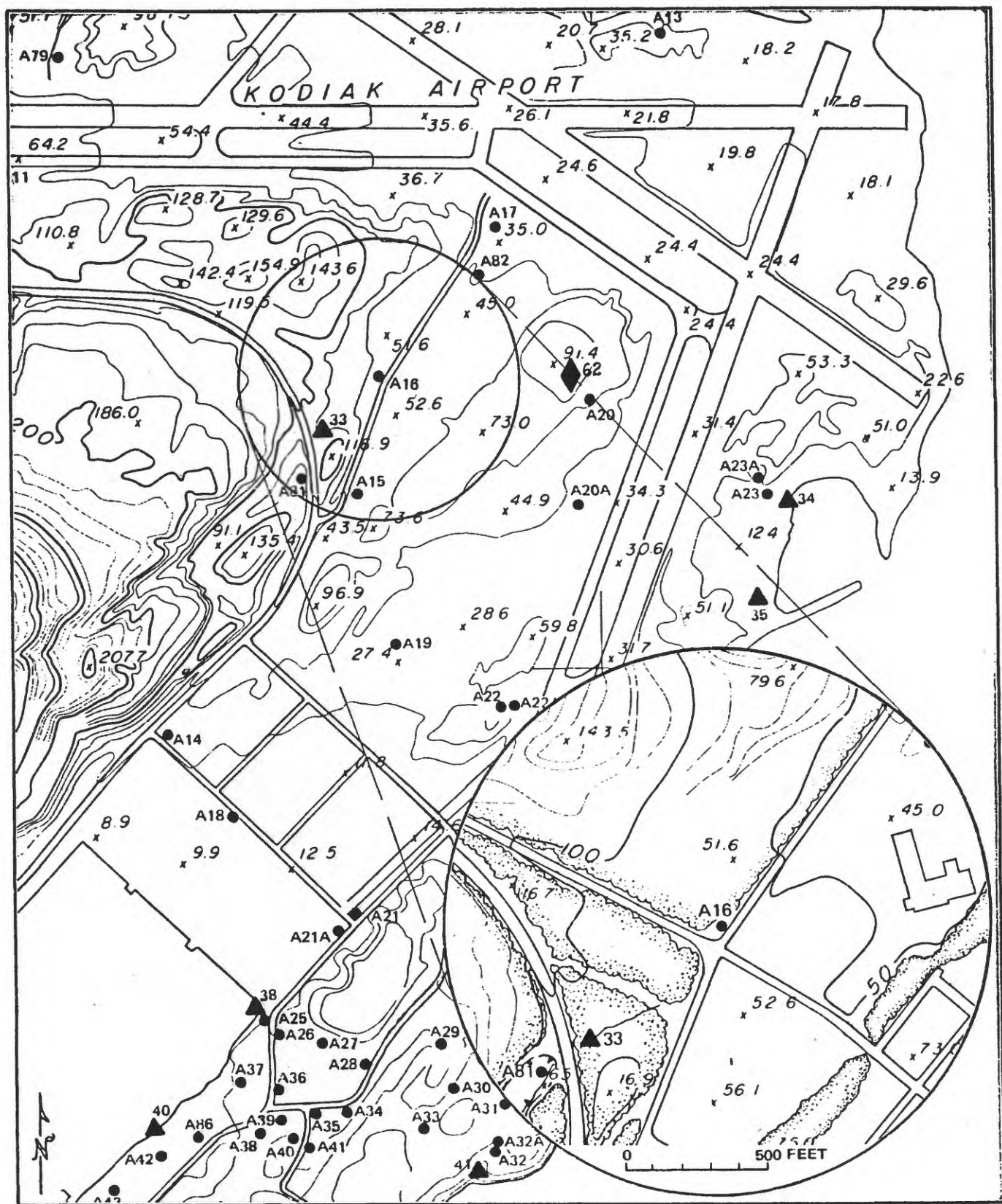


50

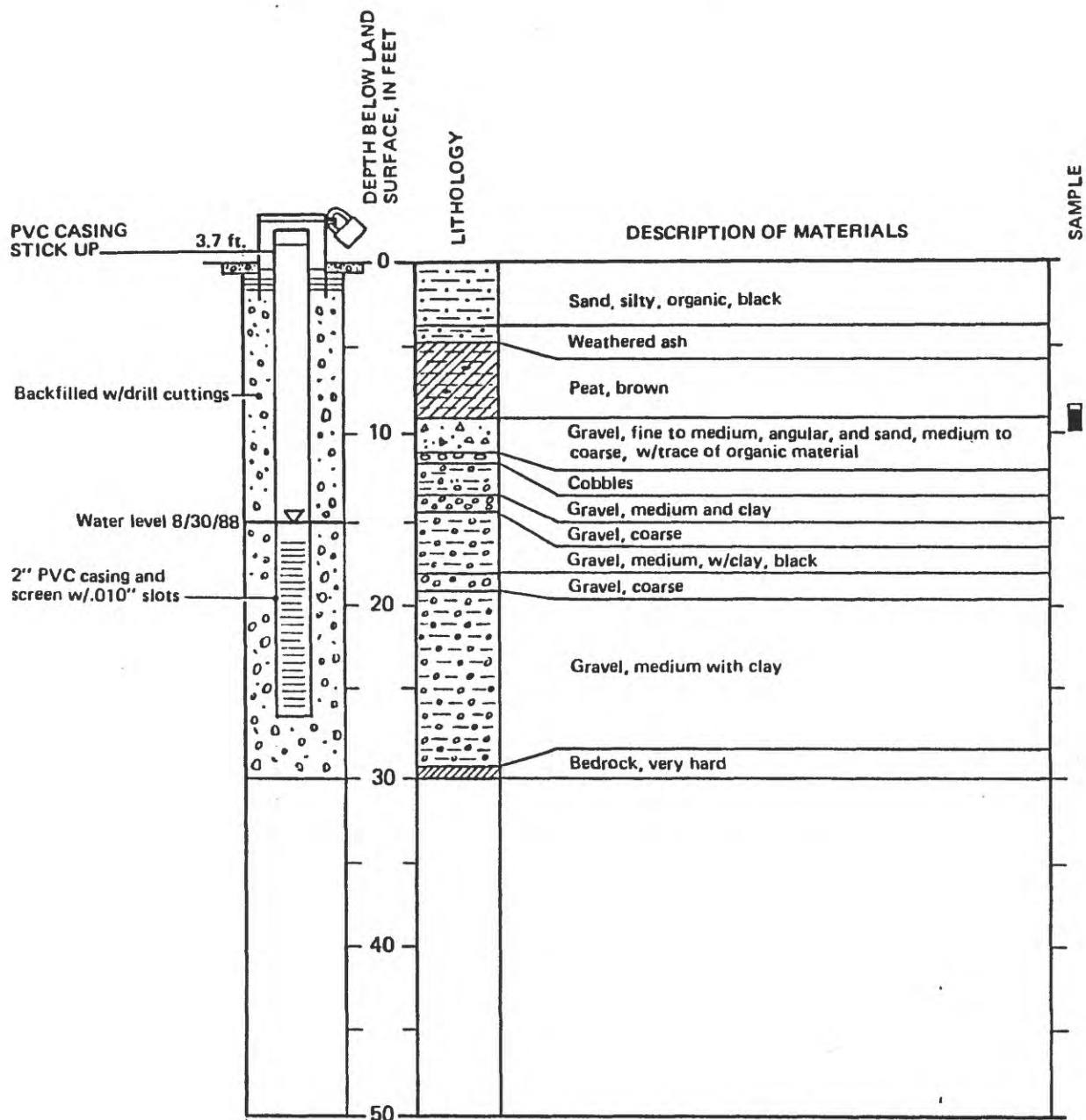


USGS SITE ID No. 574442152295501
 DATE WELL DRILLED 1/25/88
 LATITUDE 57° 44' 42" LONGITUDE 152° 29' 55"
 ELEVATION OF TOP OF WELL CASING 55.1 ft.
 GROUND SURFACE ELEVATION 53.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-15.



Location of well A-16.



USGS SITE ID No. 574450152295201

DATE WELL DRILLED 1/23/88

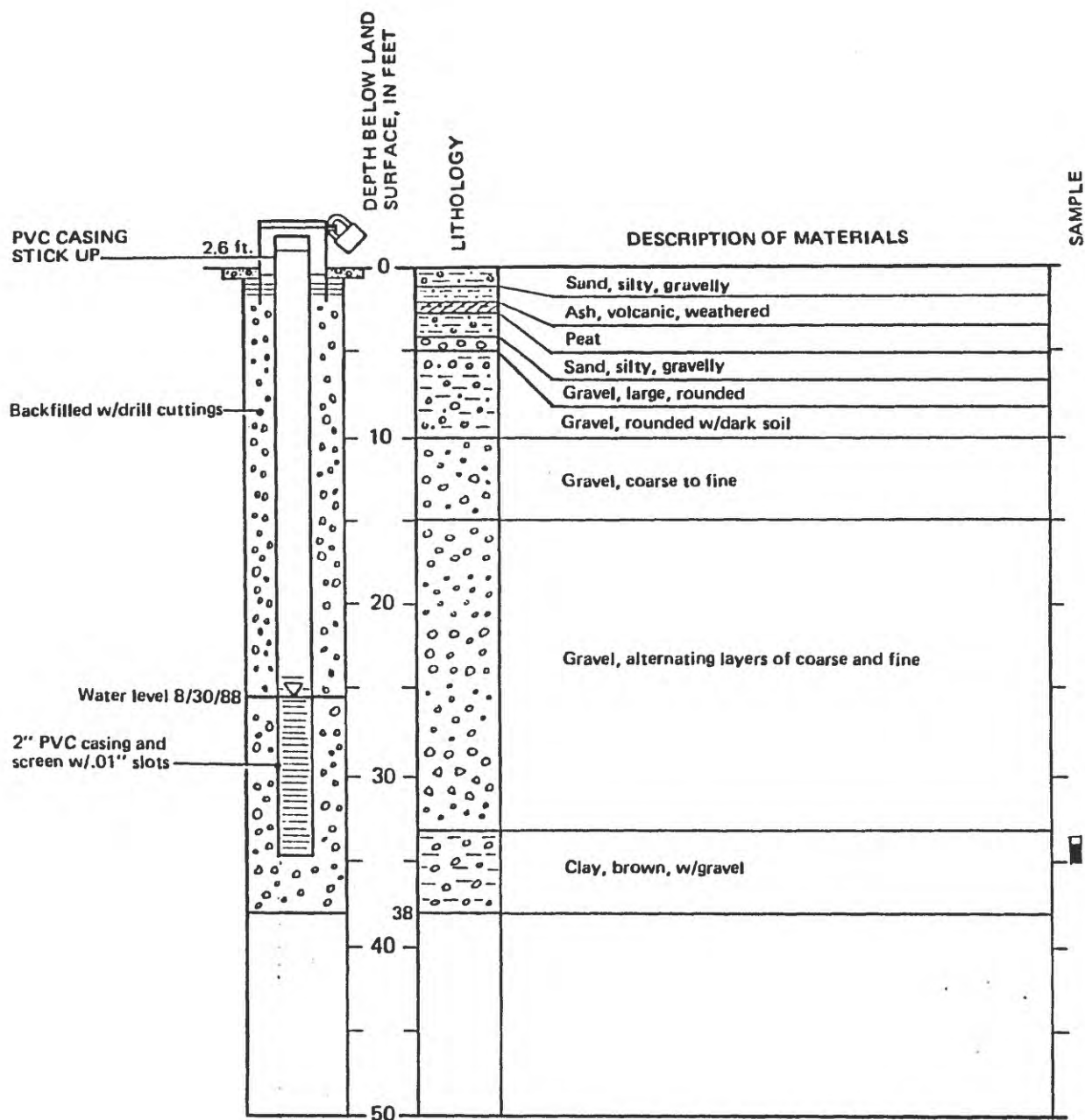
LATITUDE 57°44' 50" LONGITUDE 152°29' 52"

ELEVATION OF TOP OF WELL CASING 55.2 ft.

GROUND SURFACE ELEVATION 51.5 ft.

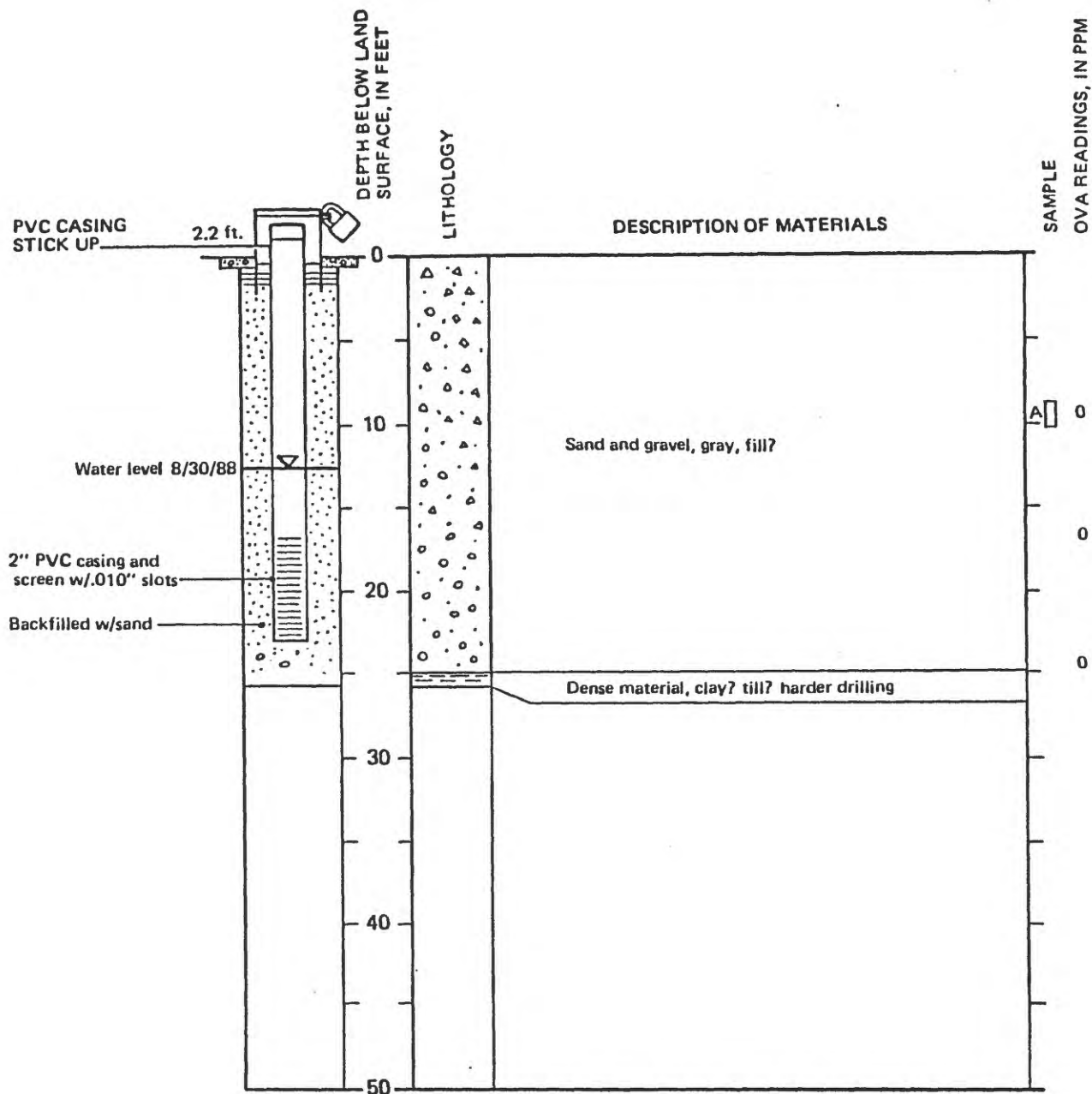
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-16.



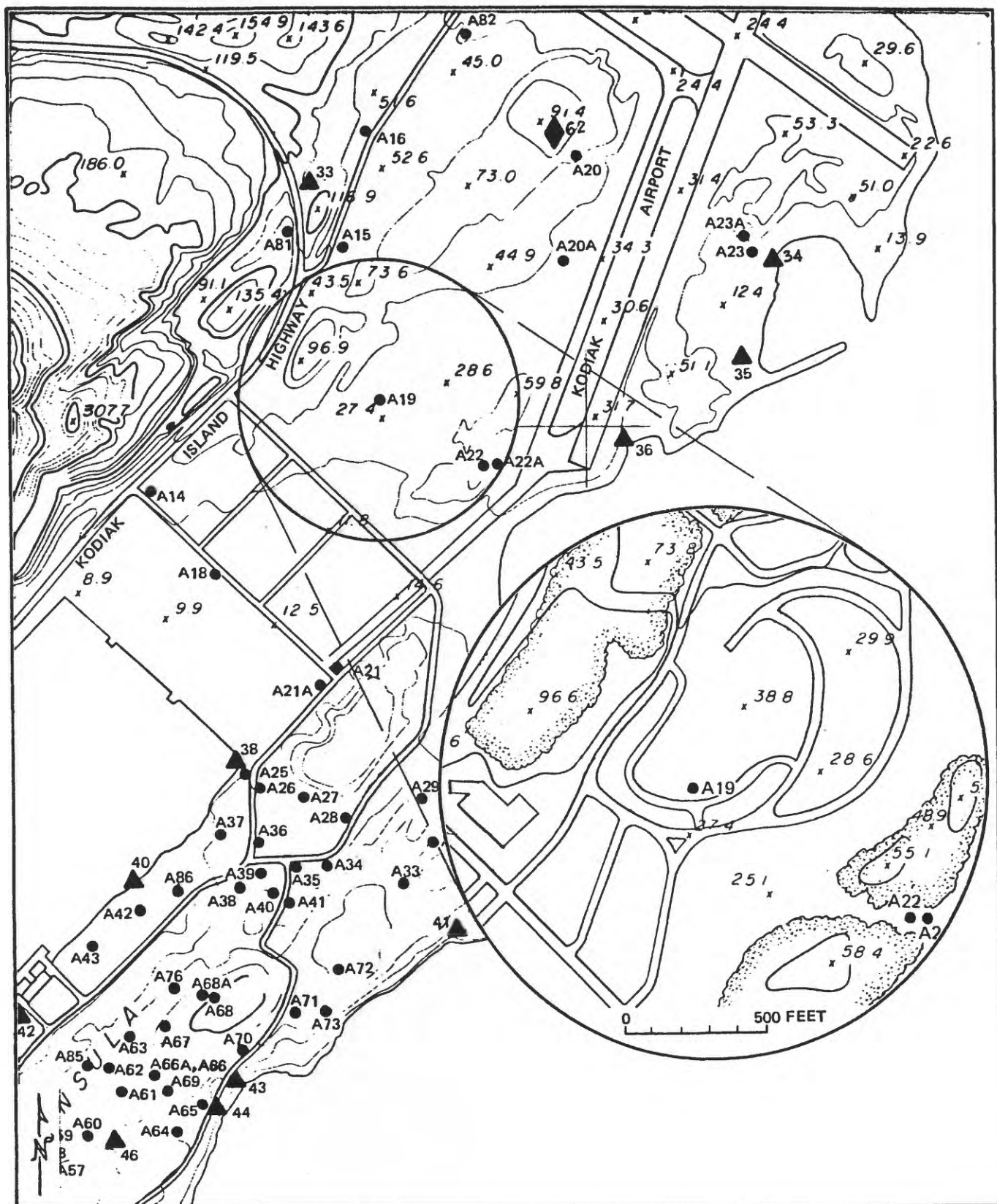
USGS SITE ID No. 574501152293601
 DATE WELL DRILLED 1/23/88
 LATITUDE 57° 45' 01" LONGITUDE 152° 29' 36"
 ELEVATION OF TOP OF WELL CASING 38.6 ft.
 GROUND SURFACE ELEVATION 36.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-17.



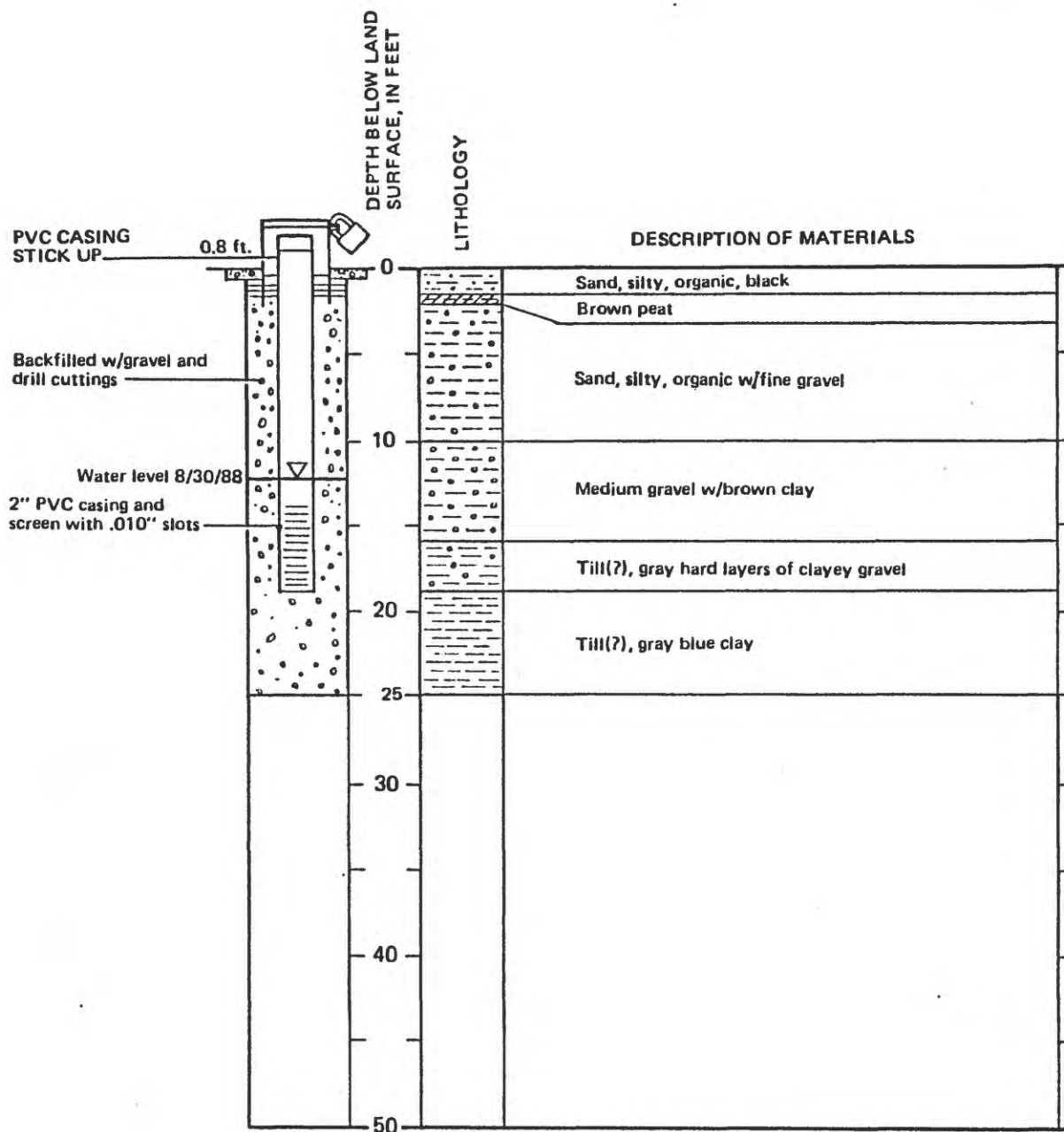
USGS SITE ID No. 574420152301201
 DATE WELL DRILLED 2/16/88
 LATITUDE 57°44' 20" LONGITUDE 152°30' 12"
 ELEVATION OF TOP OF WELL CASING 16.1 ft.
 GROUND SURFACE ELEVATION 13.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-18.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-19.



USGS SITE ID No. 574432152295001

DATE WELL DRILLED 1/26/88

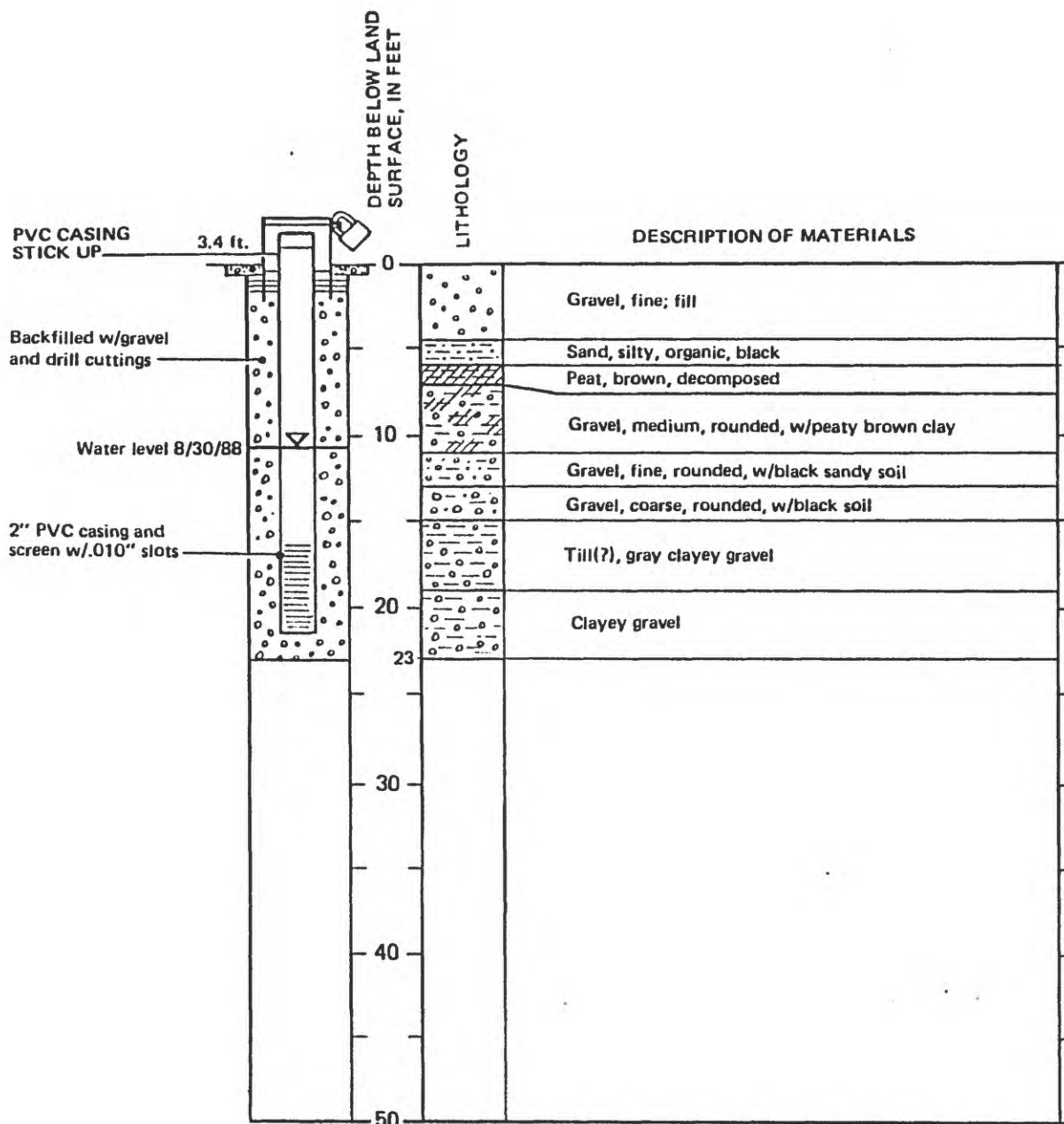
LATITUDE 57° 44' 32" LONGITUDE 152° 29' 50"

ELEVATION OF TOP OF WELL CASING 29.2 ft.

GROUND SURFACE ELEVATION 28.4 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-19.



USGS SITE ID No. 574448152292301

DATE WELL DRILLED 1/26/88

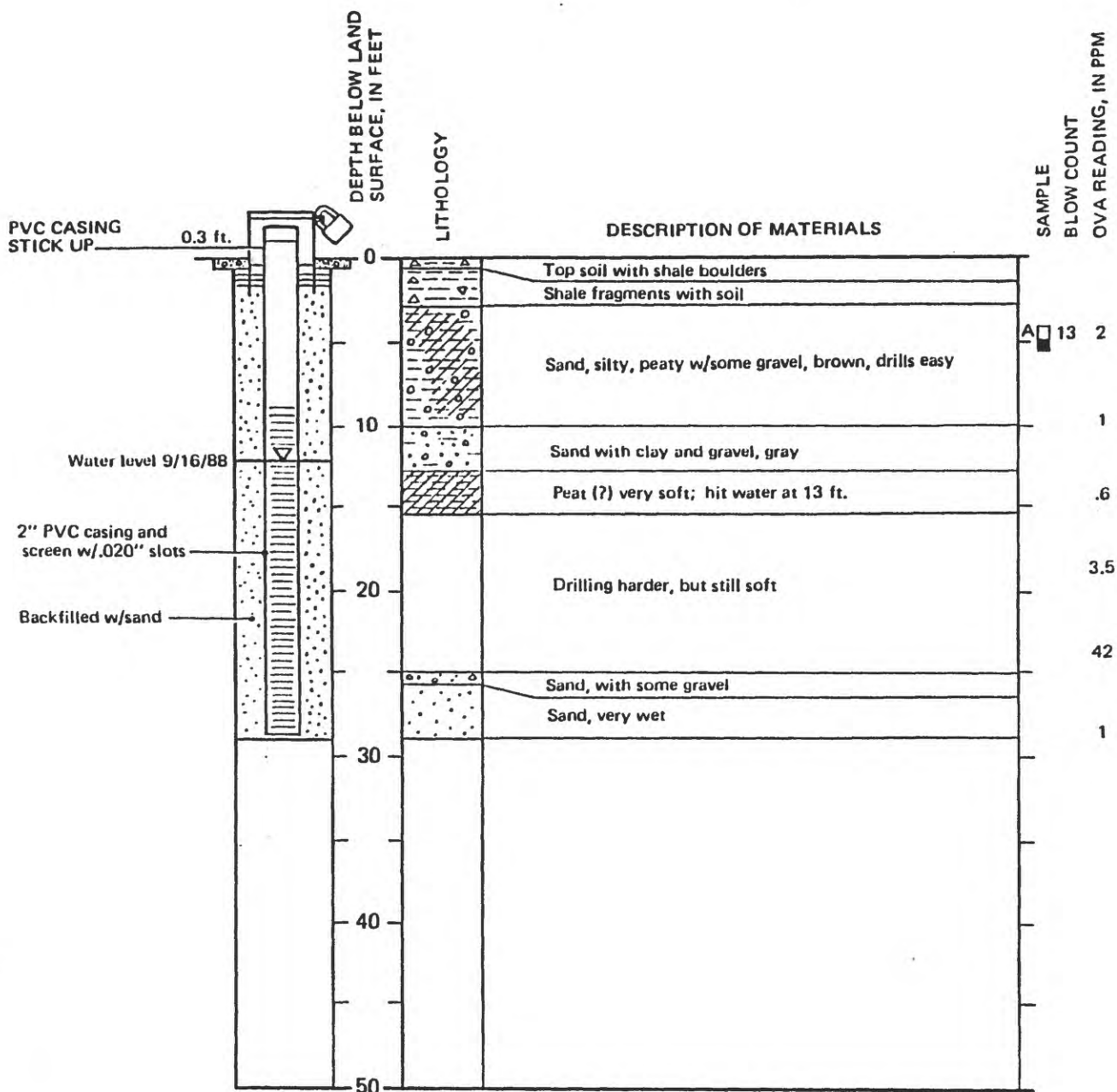
LATITUDE 57°44' 48" LONGITUDE 152°29' 23"

ELEVATION OF TOP OF WELL CASING 64.1 ft.

GROUND SURFACE ELEVATION 60.7 ft.

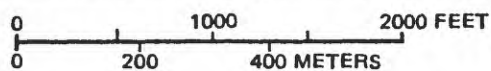
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-20.

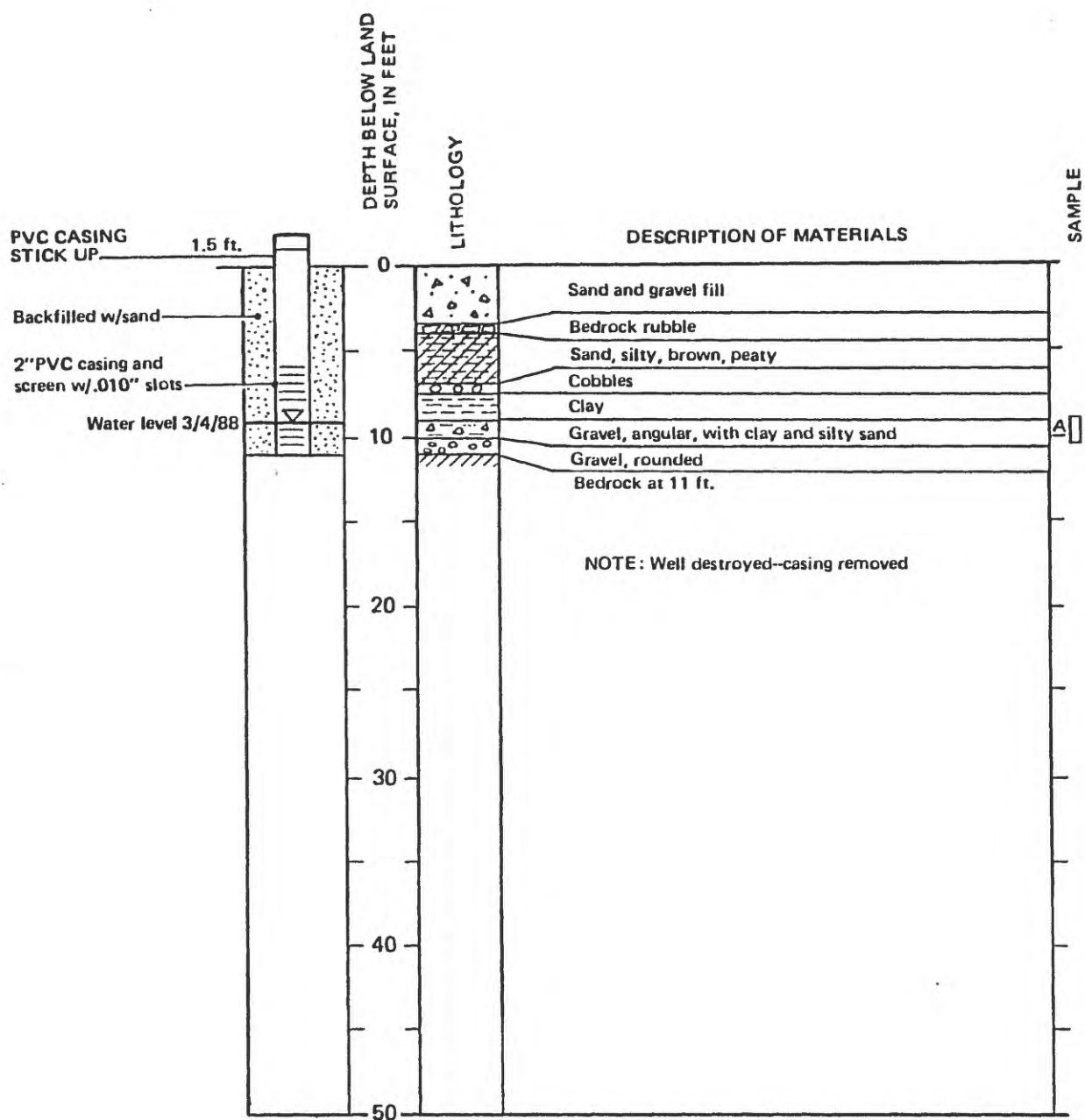


USGS SITE ID No. 574442152292801
 DATE WELL DRILLED 4/17/88
 LATITUDE 57°44' 42" LONGITUDE 152°29' 28"
 ELEVATION OF TOP OF WELL CASING 31.5 ft.
 GROUND SURFACE ELEVATION 31.2 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-20-A.

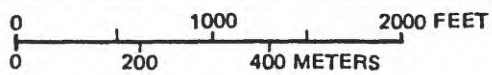
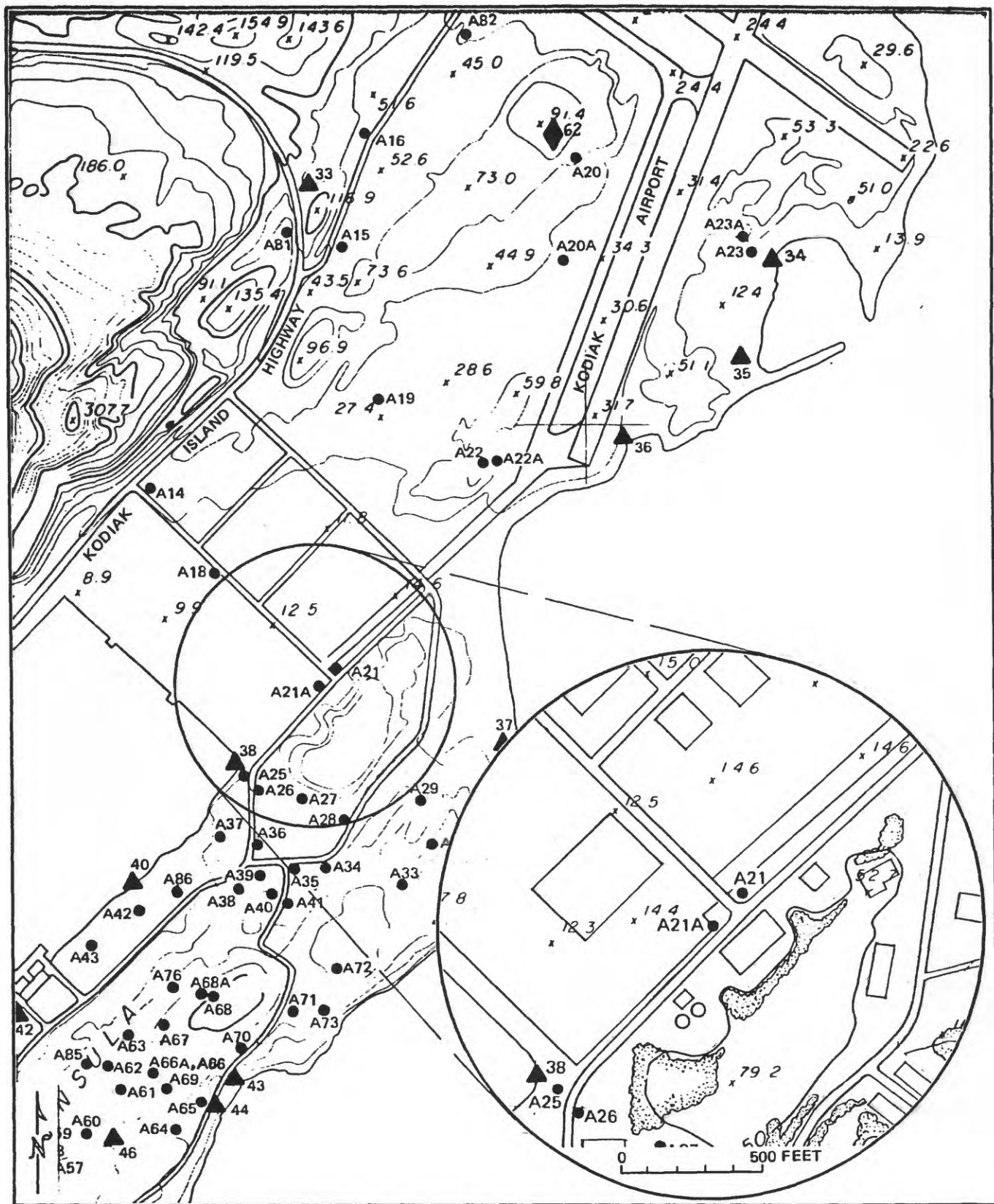


64

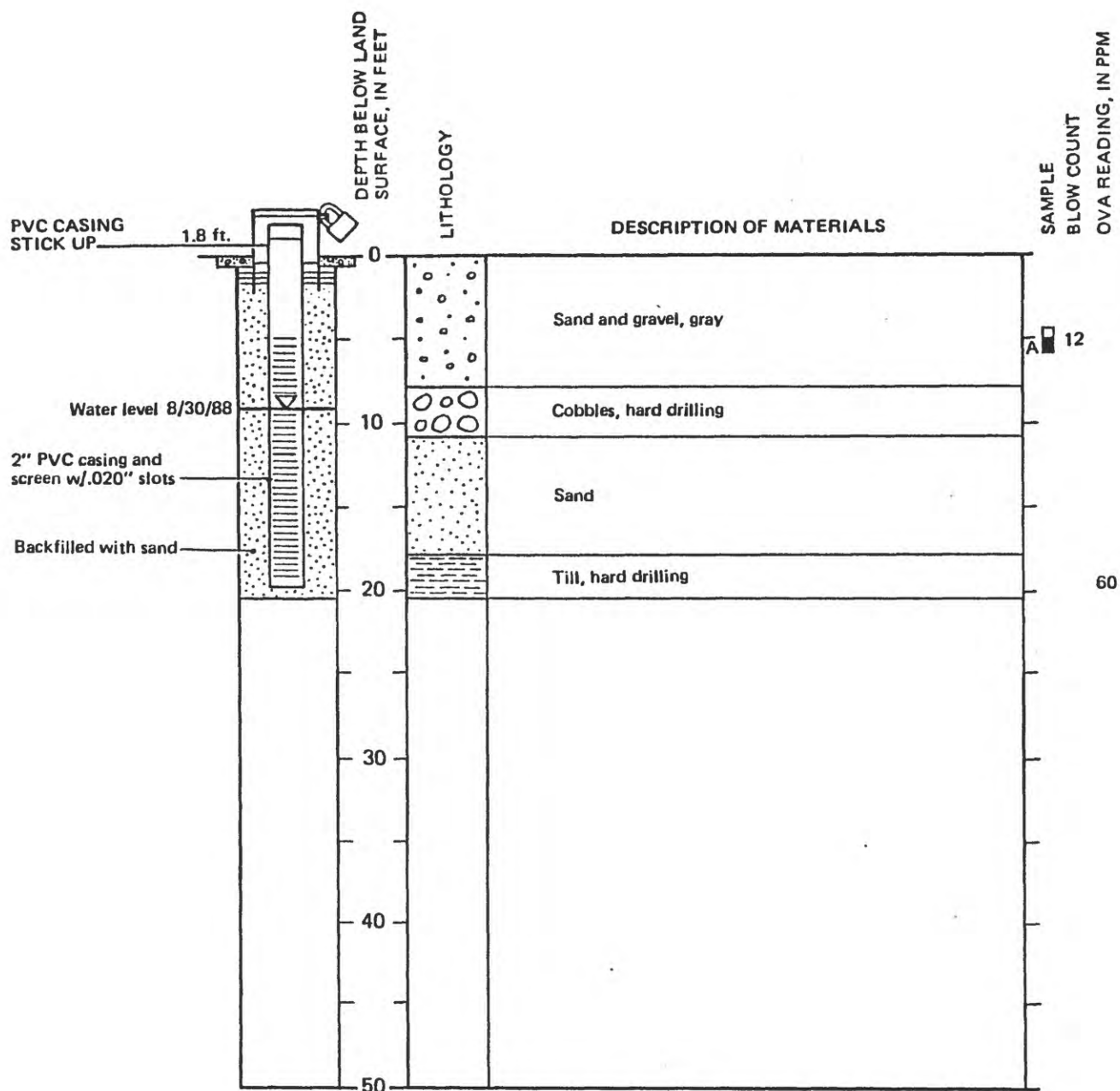


USGS SITE ID No. 574414152295701
 DATE WELL DRILLED 2/16/88
 LATITUDE 57° 44' 14" LONGITUDE 152° 29' 57"
 ELEVATION OF TOP OF WELL CASING 13.8 ft.
 GROUND SURFACE ELEVATION 12.3 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-21.

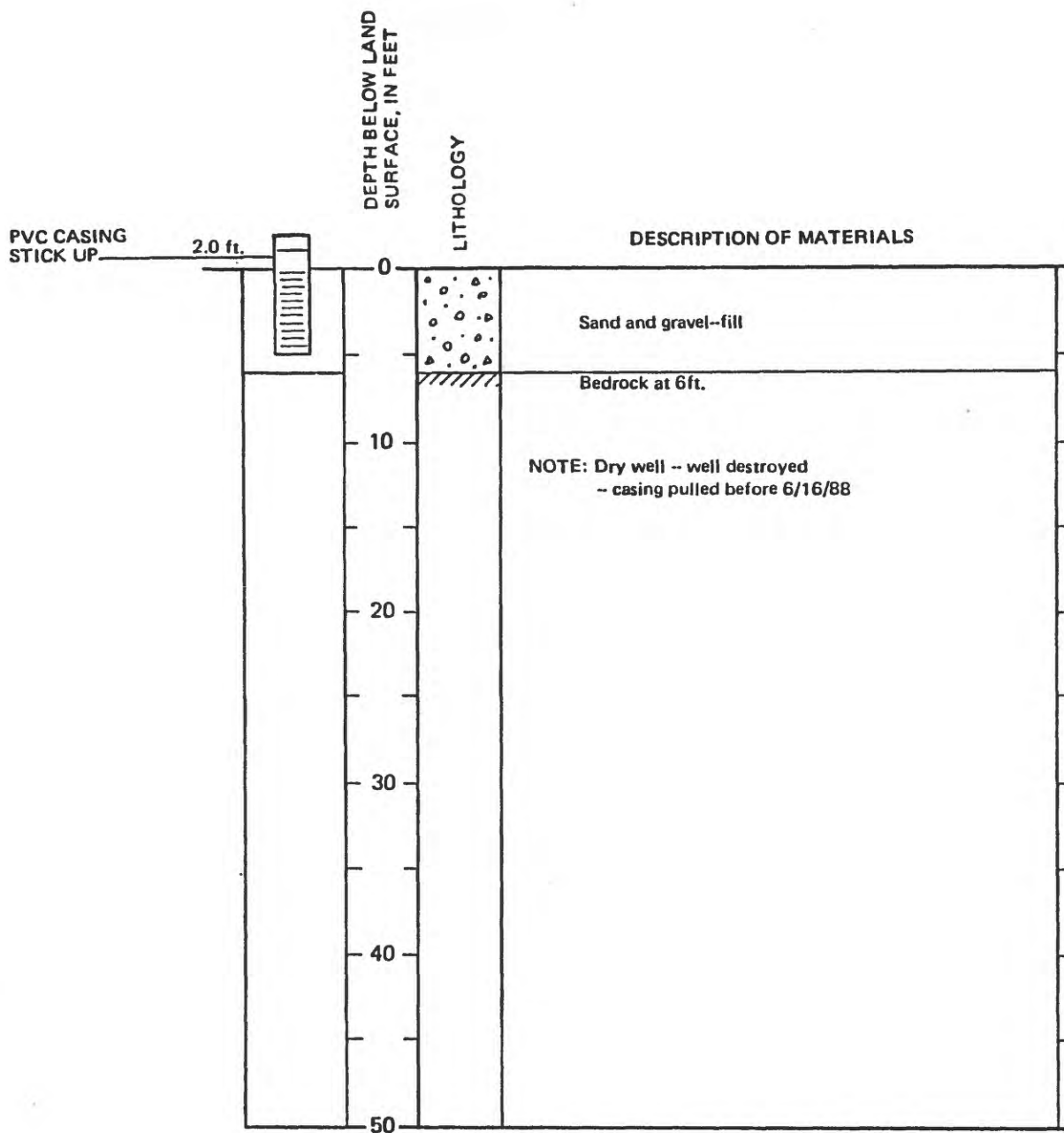


Location of well A-21-A.



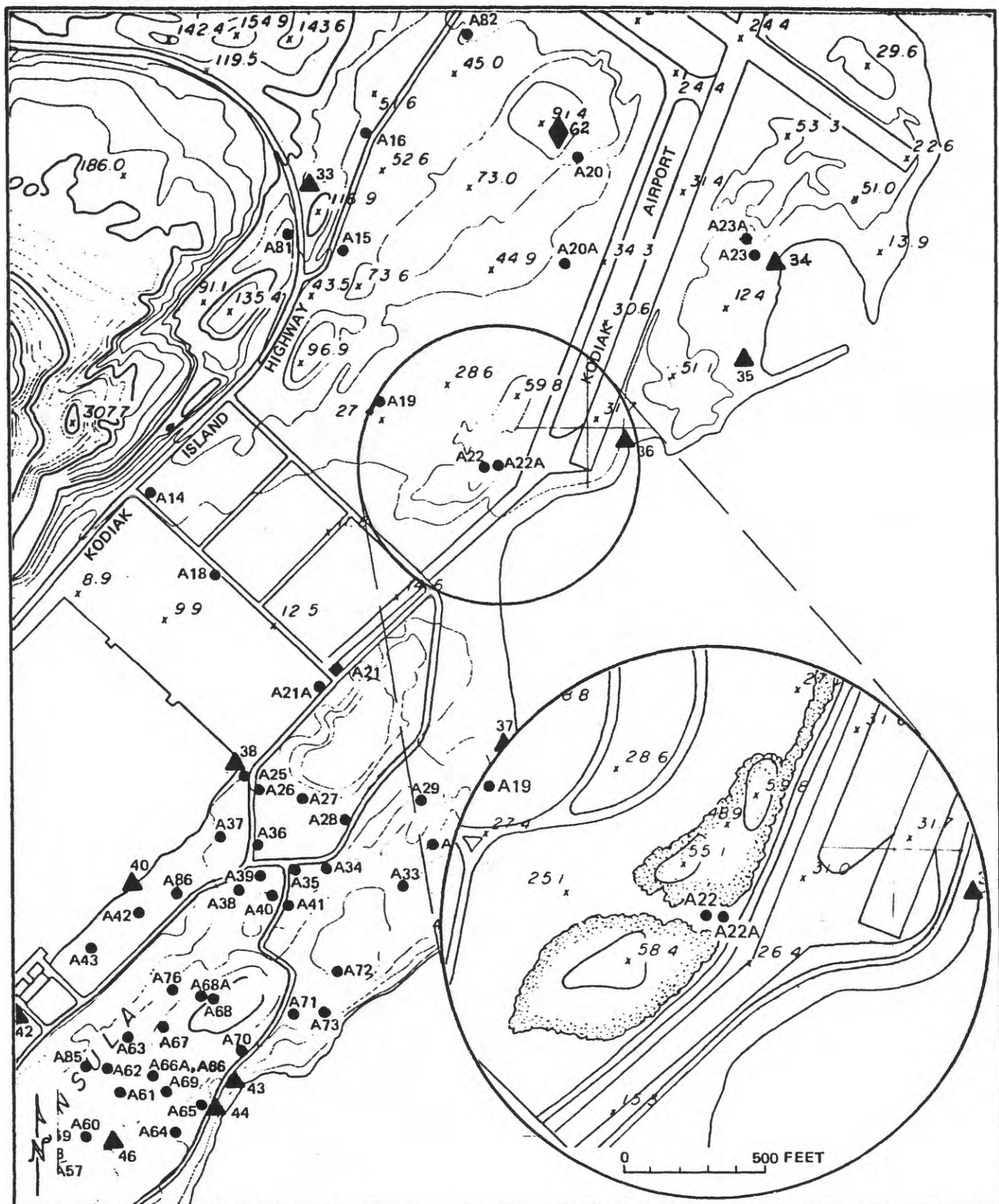
USGS SITE ID No. 574412152295901
 DATE WELL DRILLED 4/20/88
 LATITUDE 57°44' 12" LONGITUDE 152°29' 59"
 ELEVATION OF TOP OF WELL CASING 14.2 ft.
 GROUND SURFACE ELEVATION 12.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-21-A.



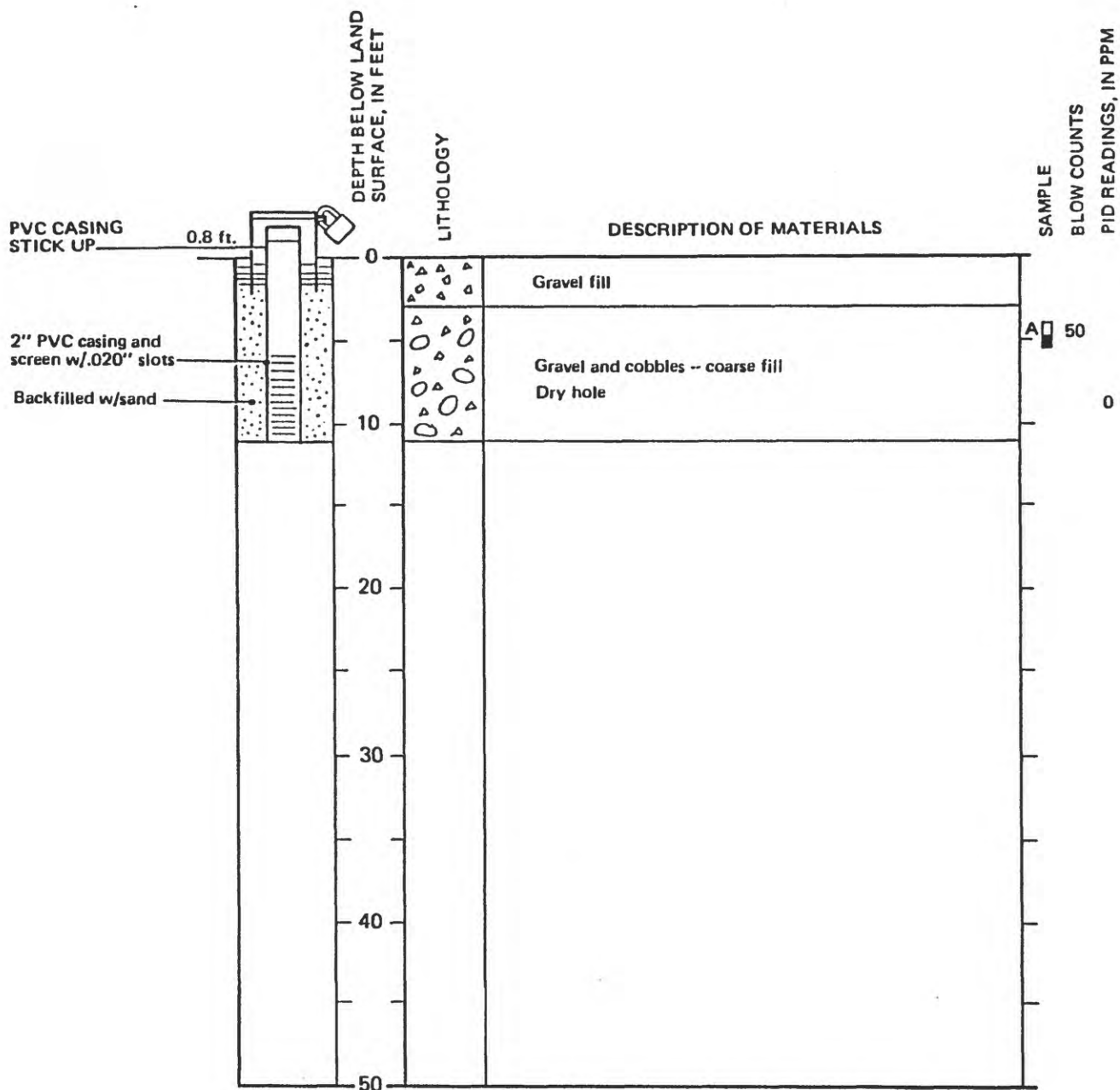
USGS SITE ID No. 574427152293901
 DATE WELL DRILLED 1/27/88
 LATITUDE 57° 44' 27" LONGITUDE 152° 29' 39"
 ELEVATION OF TOP OF WELL CASING 29.1 ft.
 GROUND SURFACE ELEVATION 27.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-22.



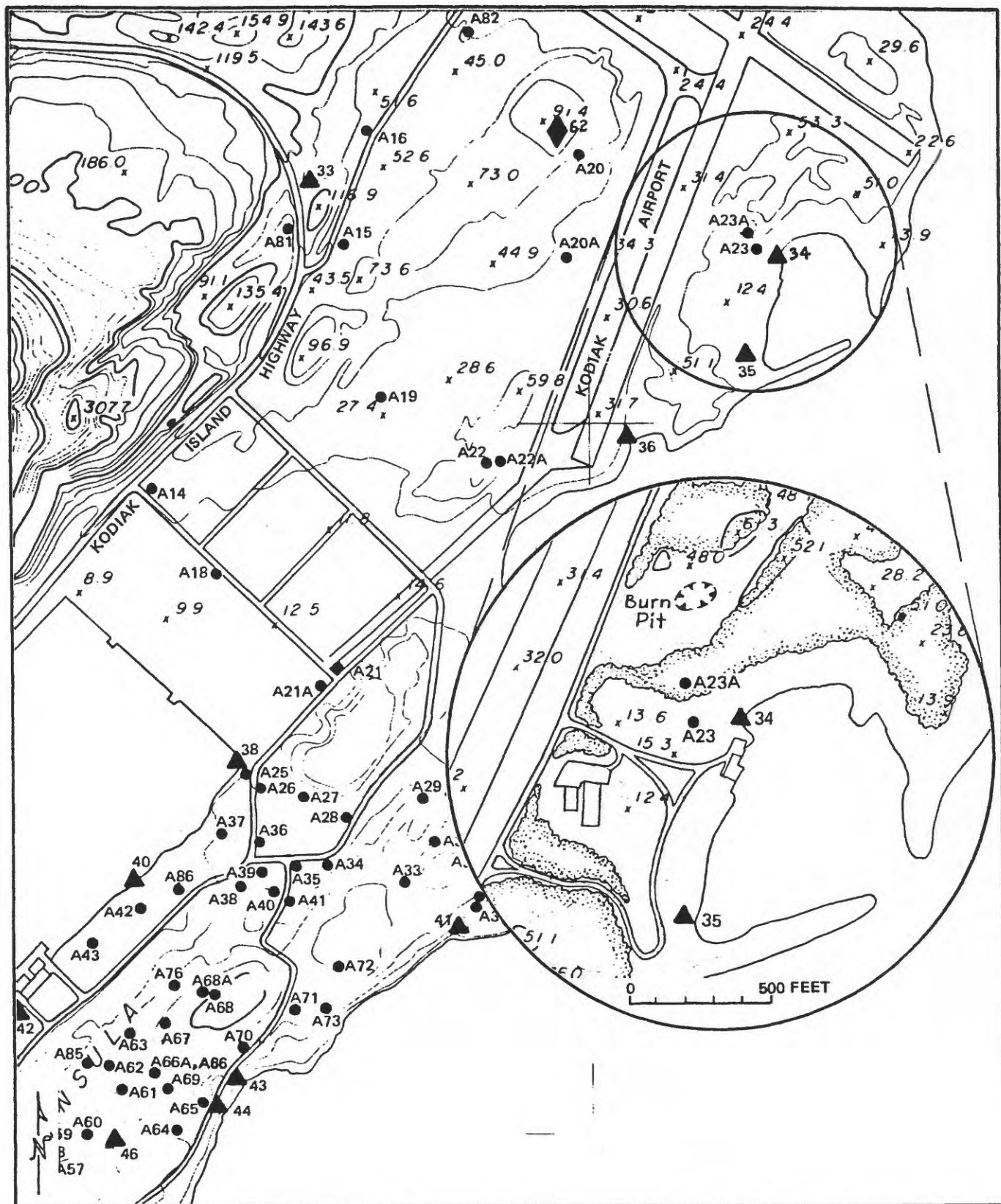
0 1000 2000 FEET
0 200 400 METERS

Location of well A-22-A.

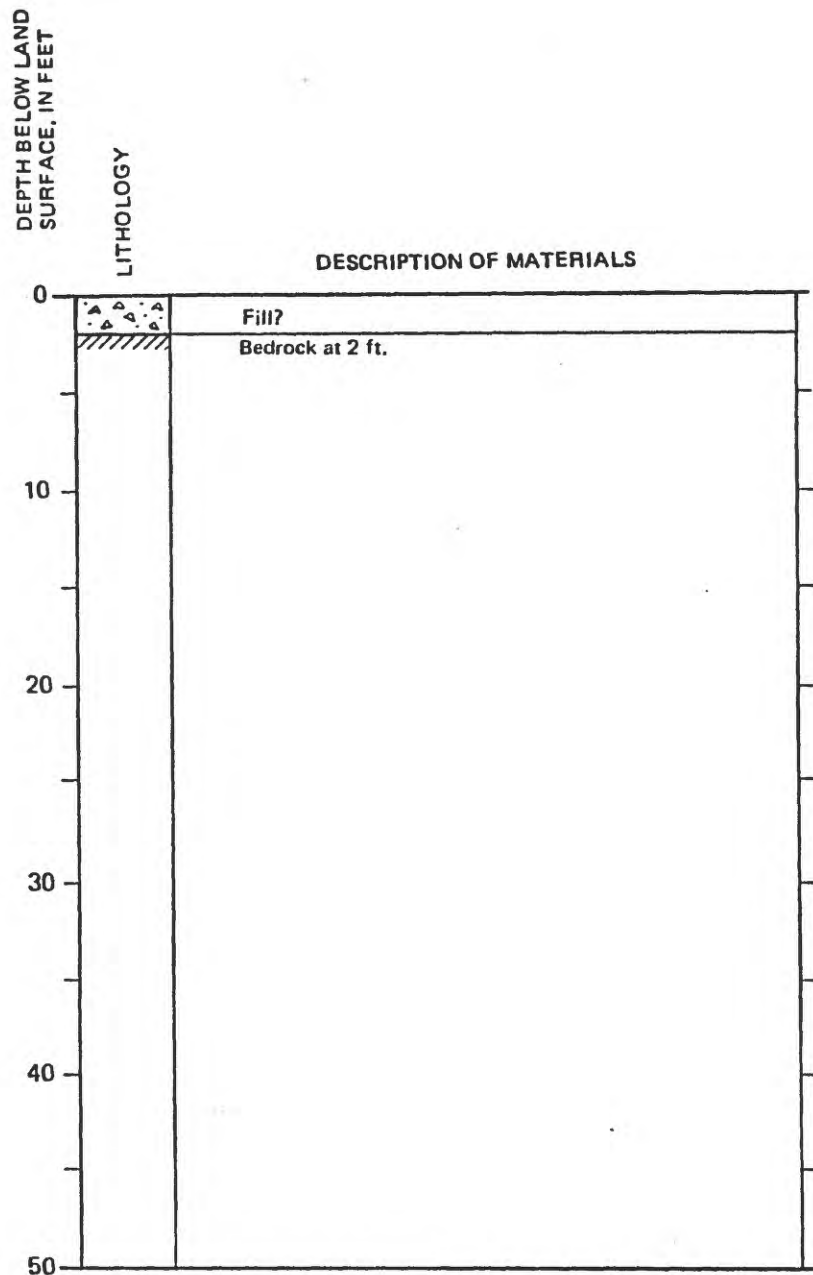


USGS SITE ID No. 574427152293401
DATE WELL DRILLED 4/17/88
LATITUDE 57° 44' 27" LONGITUDE 152° 29' 34"
ELEVATION OF TOP OF WELL CASING 27.3 ft.
GROUND SURFACE ELEVATION 26.5 ft.
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-22-A.

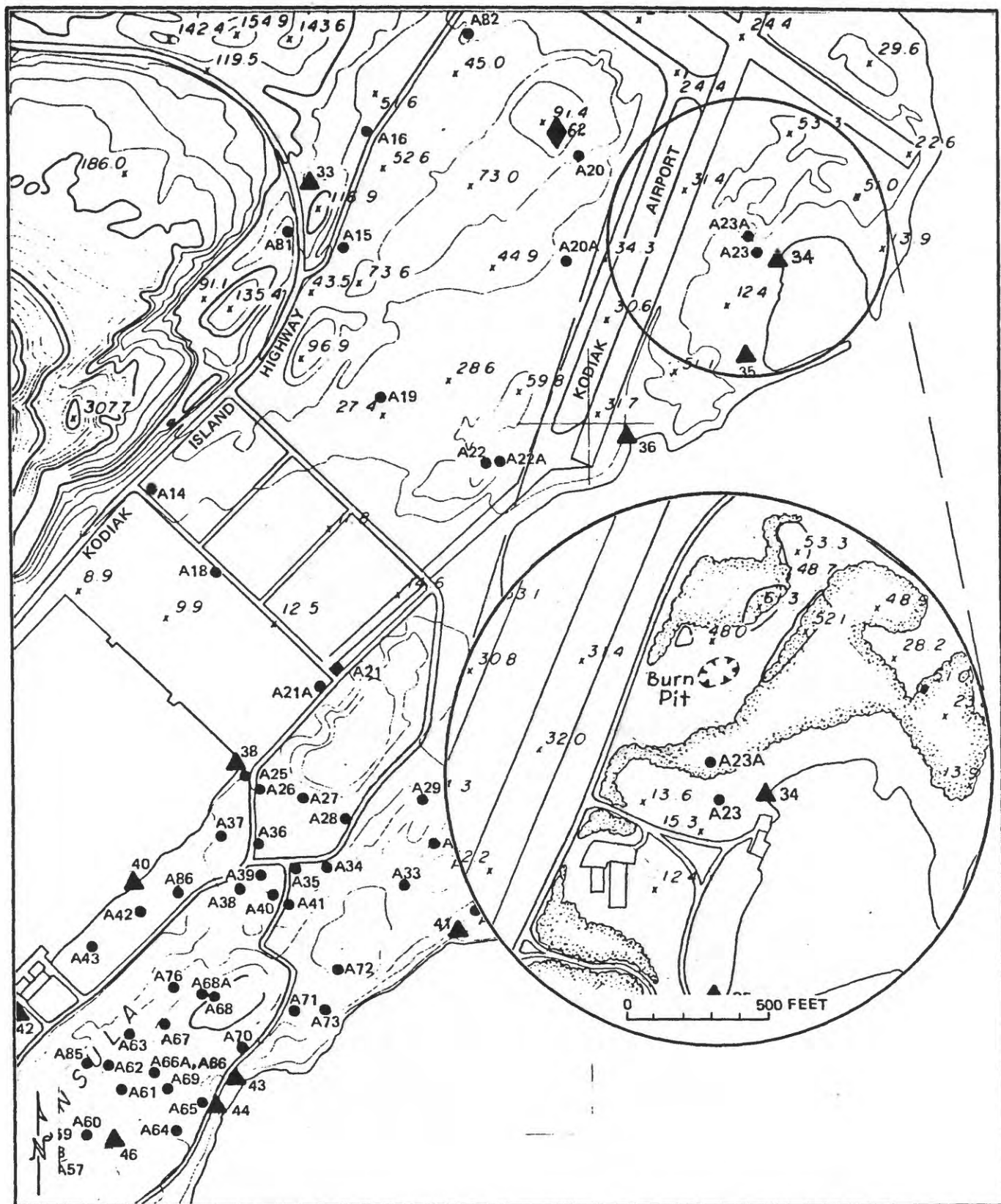


Location of borehole A-23.

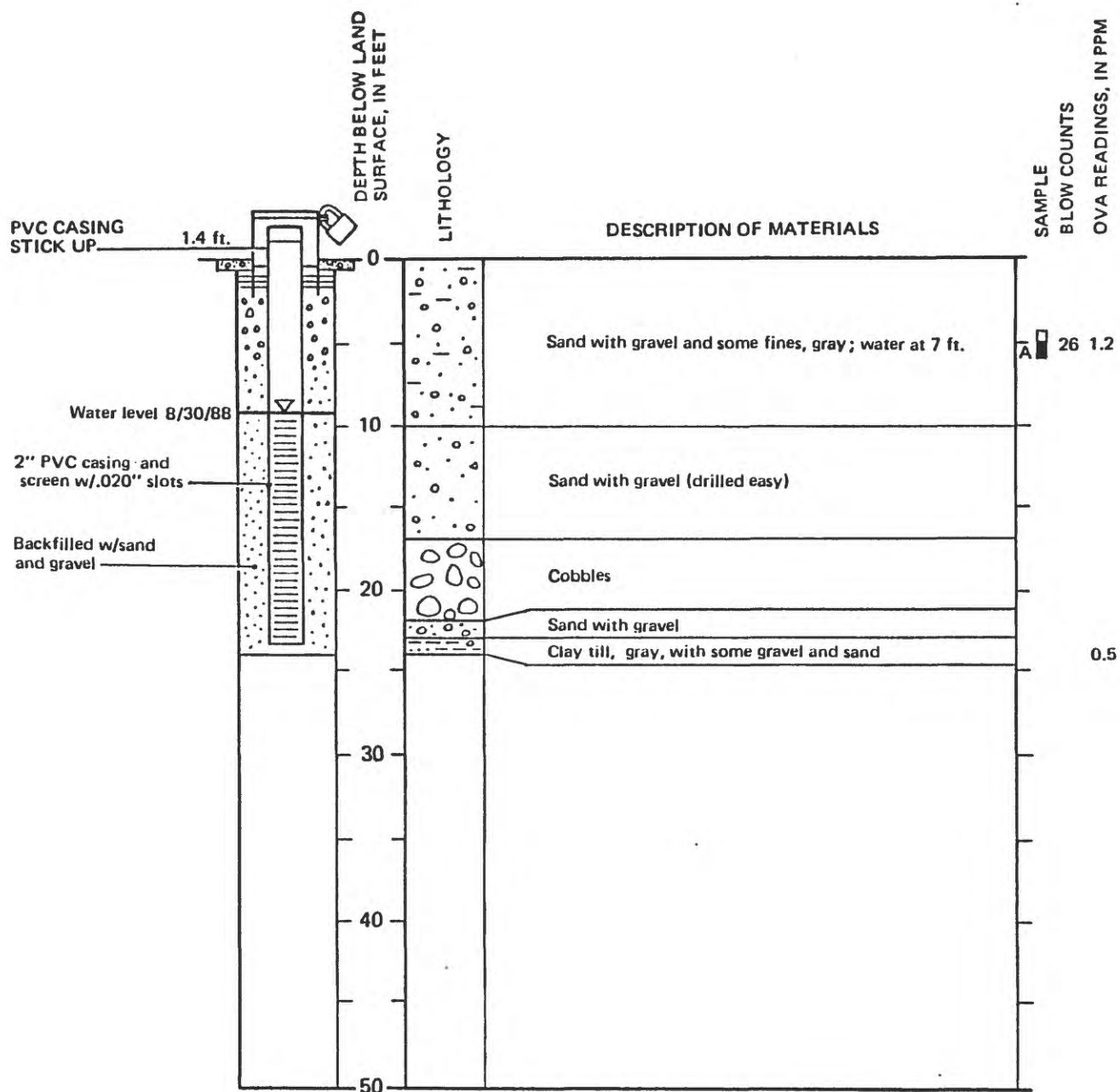


USGS SITE ID No. 574442152290201
 DATE WELL DRILLED 1/27/88
 LATITUDE 57° 44' 44" LONGITUDE 152° 29' 03"
 GROUND SURFACE ELEVATION (ESTIMATED) 12 ft.
 DATUM IS MEAN SEA LEVEL

Log of borehole A-23.

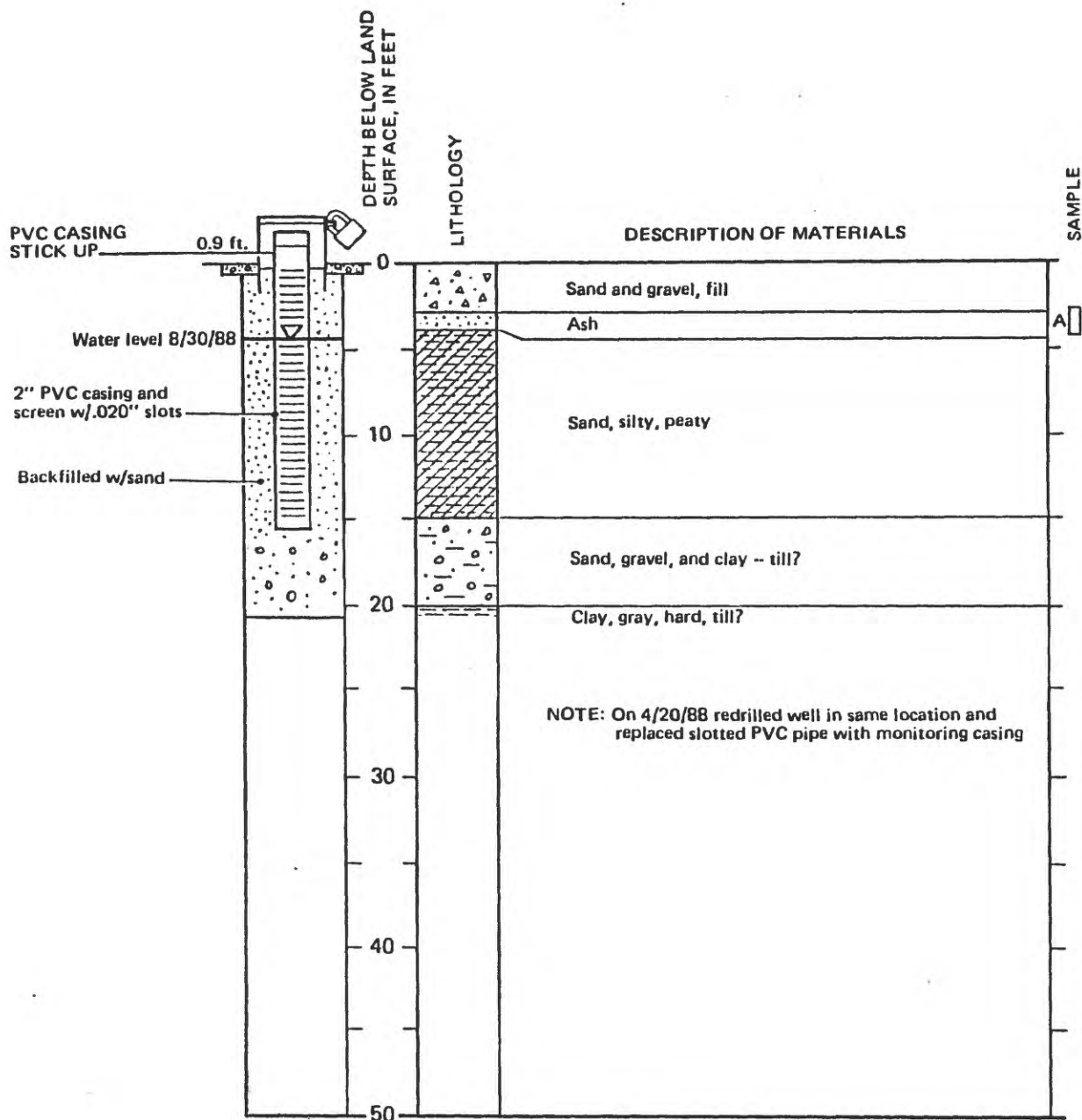


Location of well A-23-A.



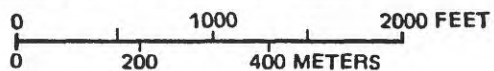
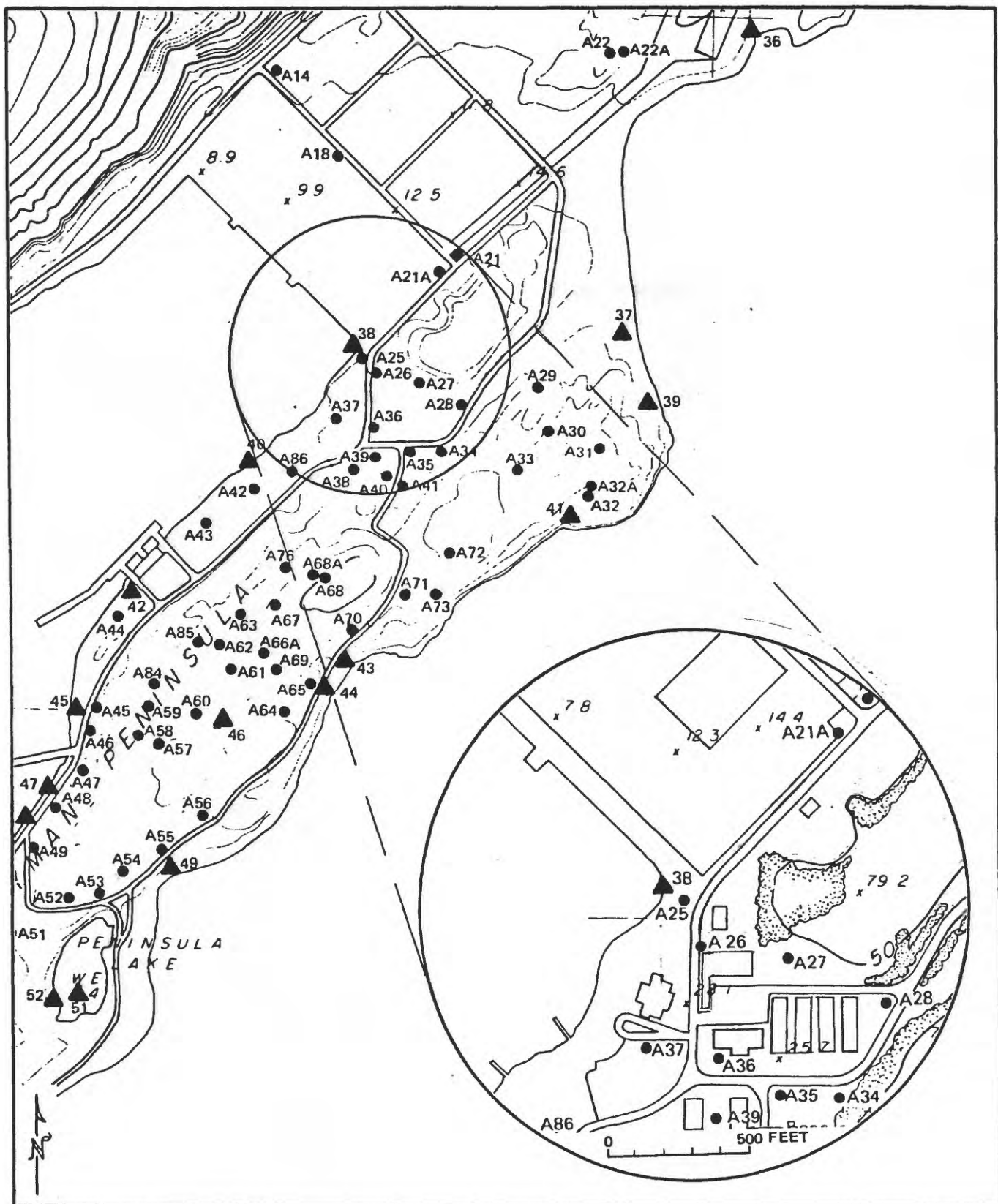
USGS SITE ID No. 574444152290301
 DATE WELL DRILLED 4/17/88
 LATITUDE 57°44' 44" LONGITUDE 152°29' 03"
 ELEVATION OF TOP OF WELL CASING 11.7 ft.
 GROUND SURFACE ELEVATION 10.3 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-23-A.

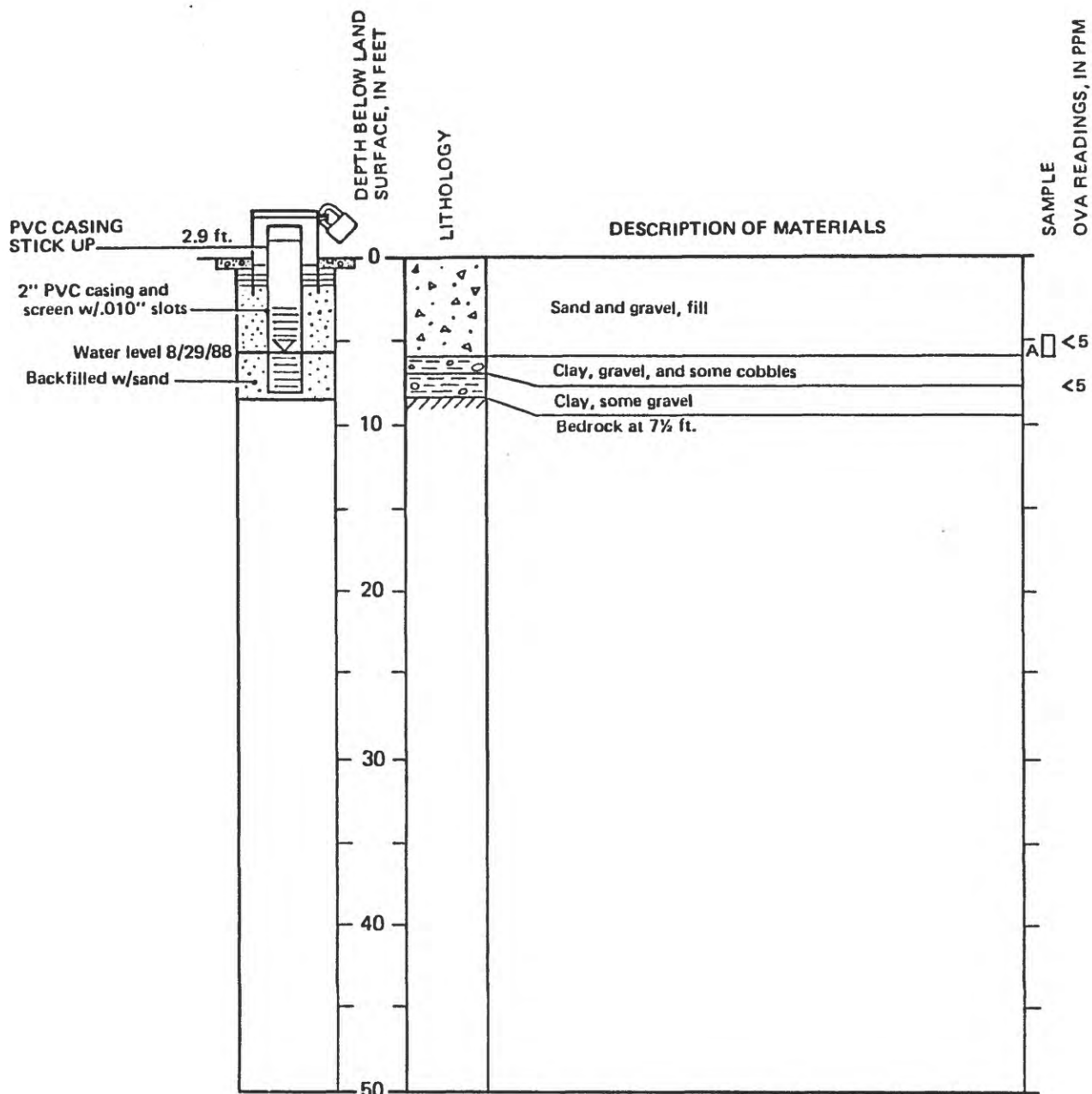


USGS SITE ID No. 574636152283401
 DATE WELL DRILLED 2/18/88
 LATITUDE 57° 46' 36" LONGITUDE 152° 28' 34"
 ELEVATION OF TOP OF WELL CASING 190.3 ft.
 GROUND SURFACE ELEVATION 189.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-24.

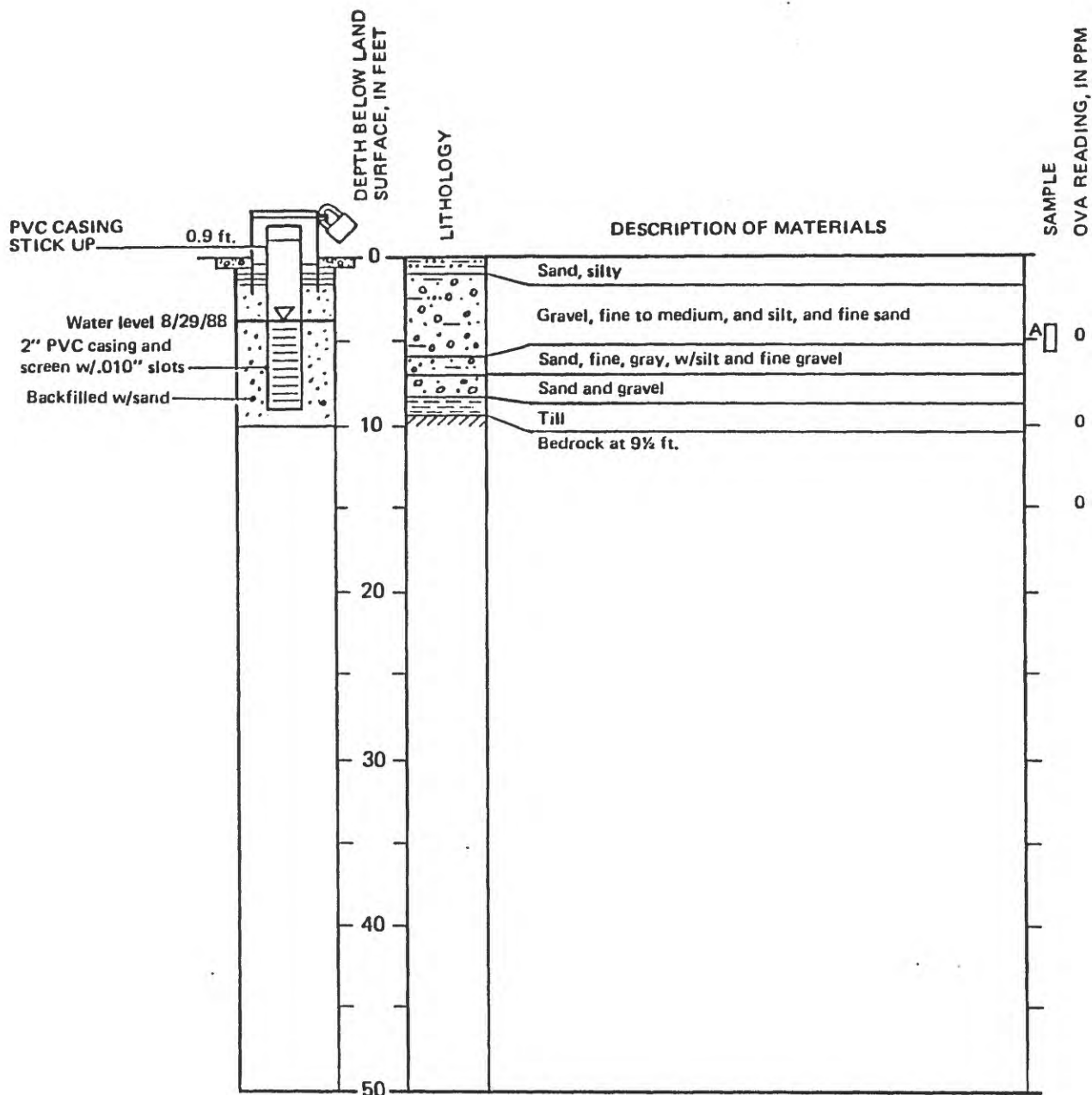


Location of well A-25.



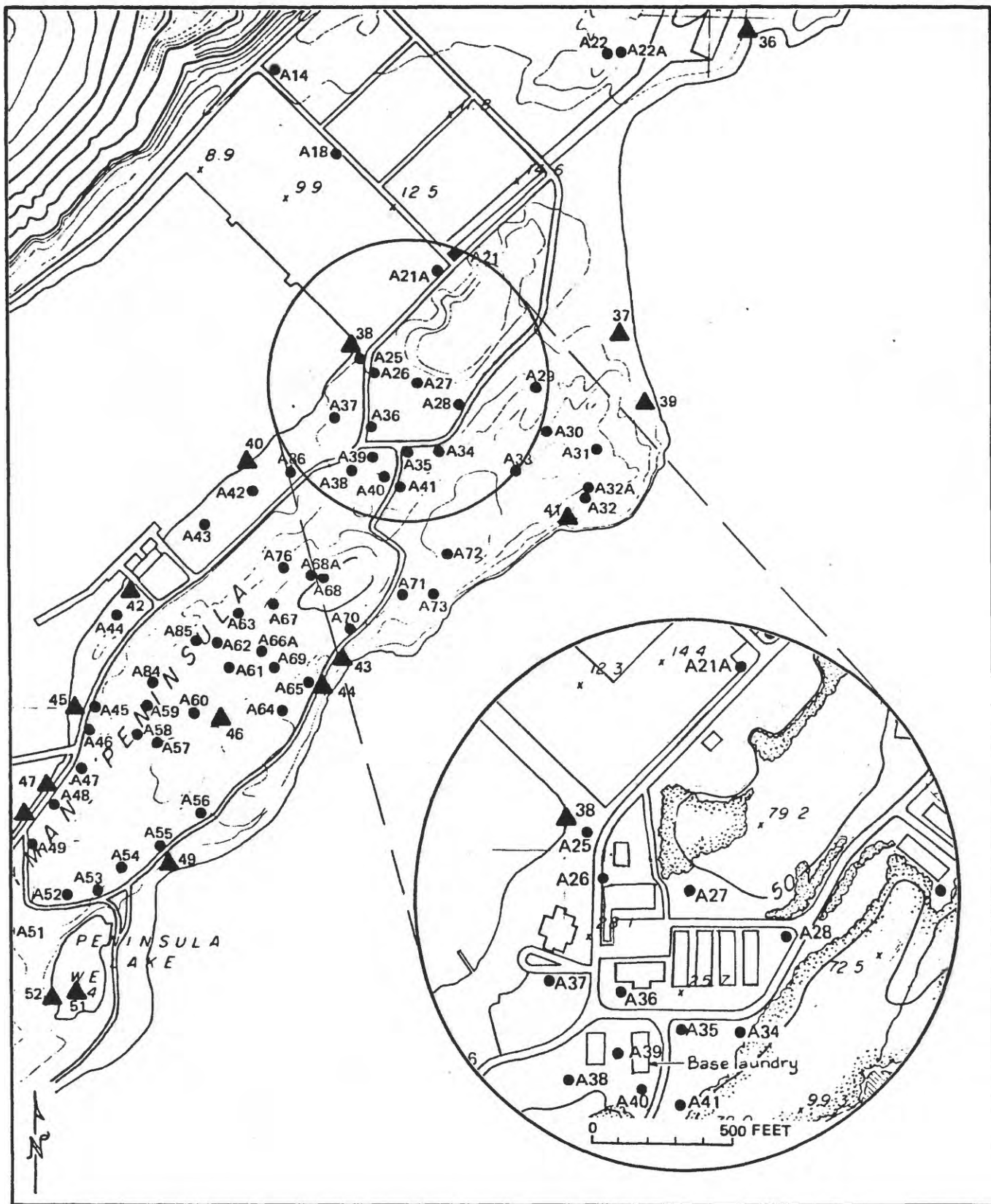
USGS SITE ID No. 574407152300901
 DATE WELL DRILLED 2/17/88
 LATITUDE 57° 44' 07" LONGITUDE 152° 30' 09"
 ELEVATION OF TOP OF WELL CASING 19.0 ft.
 GROUND SURFACE ELEVATION 16.1 ft.
 DATUM IS MEAN SEA LEVEL

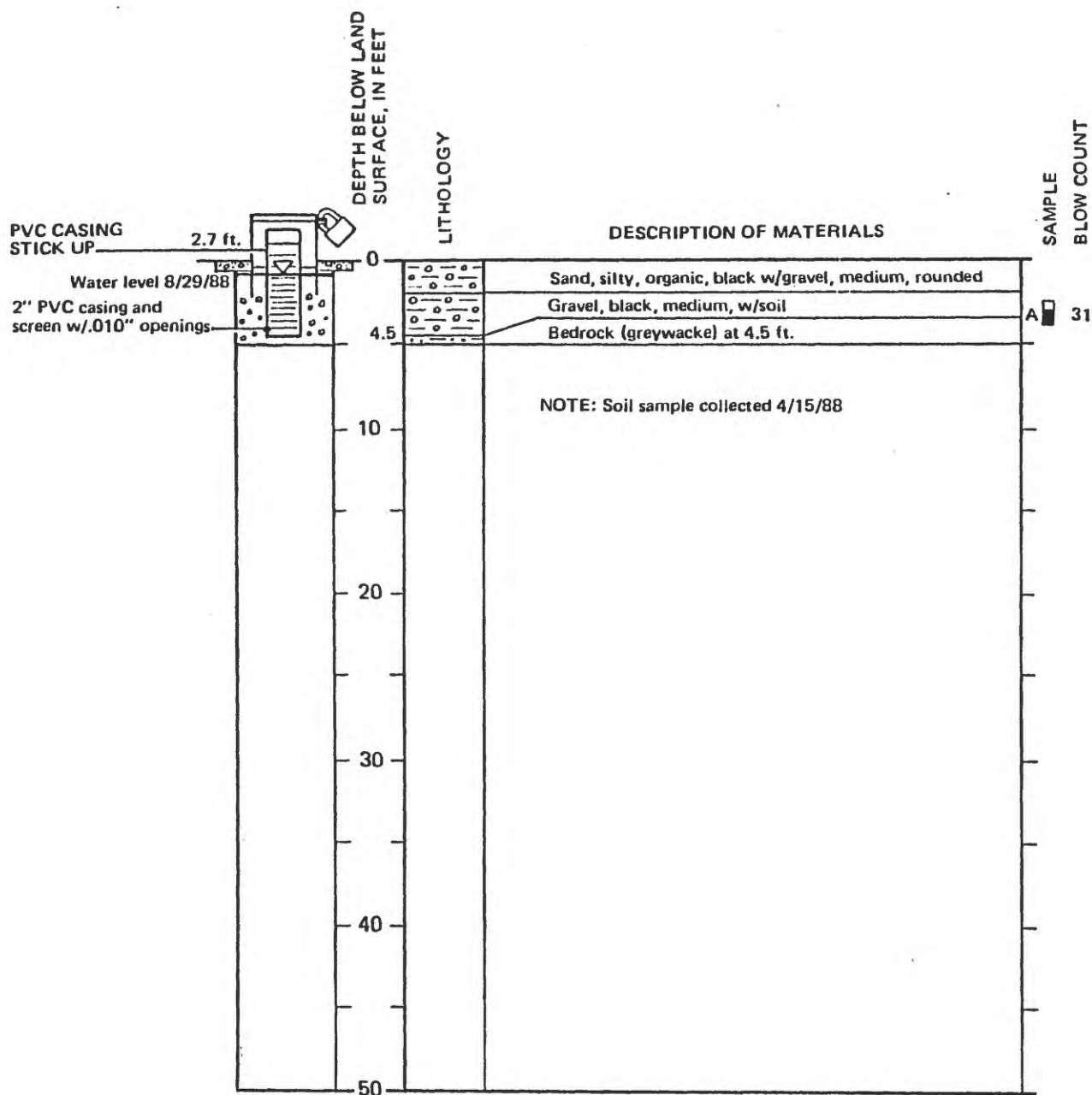
Log and construction details of well A-25.



USGS SITE ID No. 574405152300801
 DATE WELL DRILLED 2/14/88
 LATITUDE 57°44' 05" LONGITUDE 152°30' 08"
 ELEVATION OF TOP OF WELL CASING 21.0 ft.
 GROUND SURFACE ELEVATION 20.1 ft.
 DATUM IS MEAN SEA LEVEL

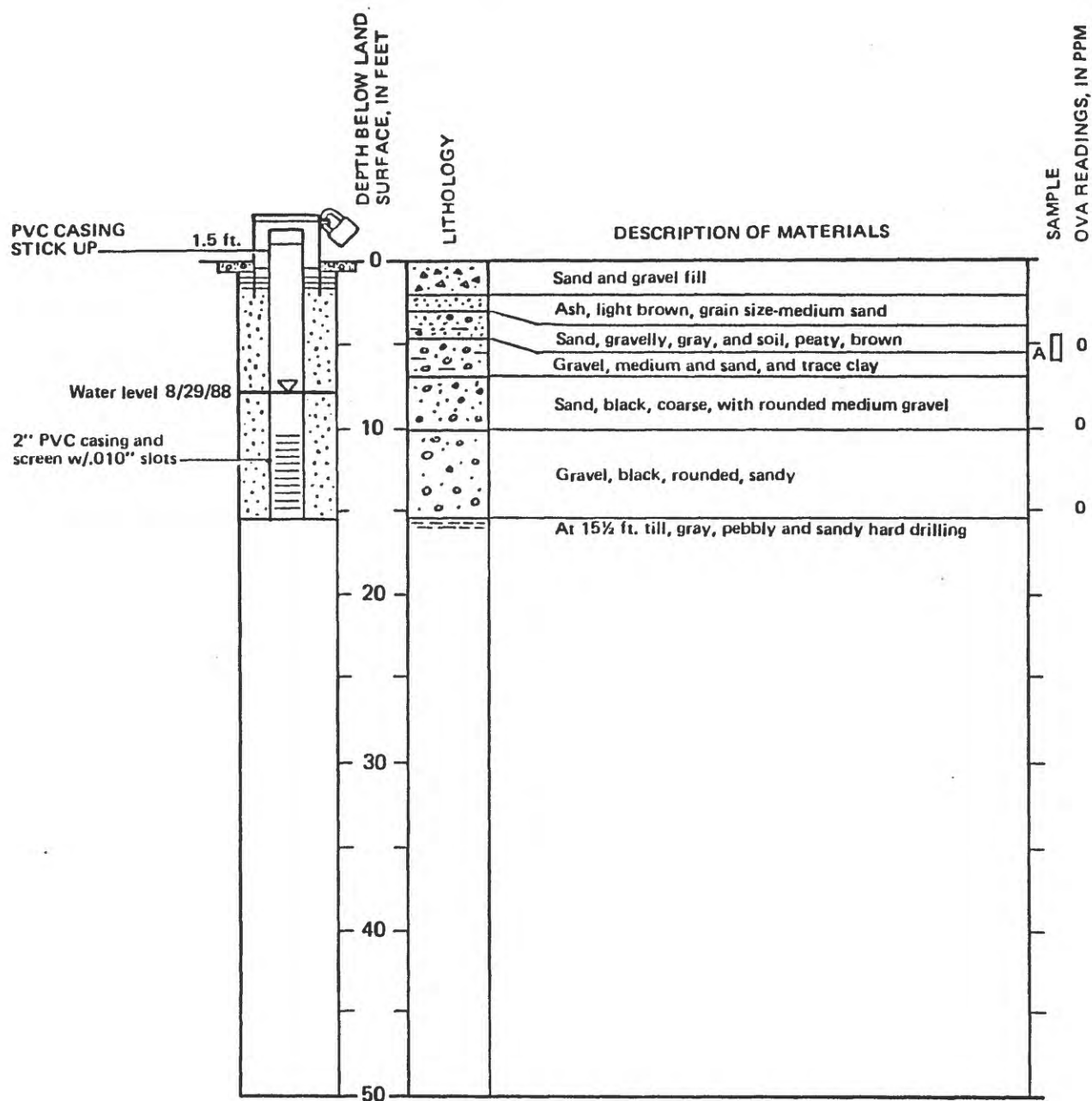
Log and construction details of well A-26.





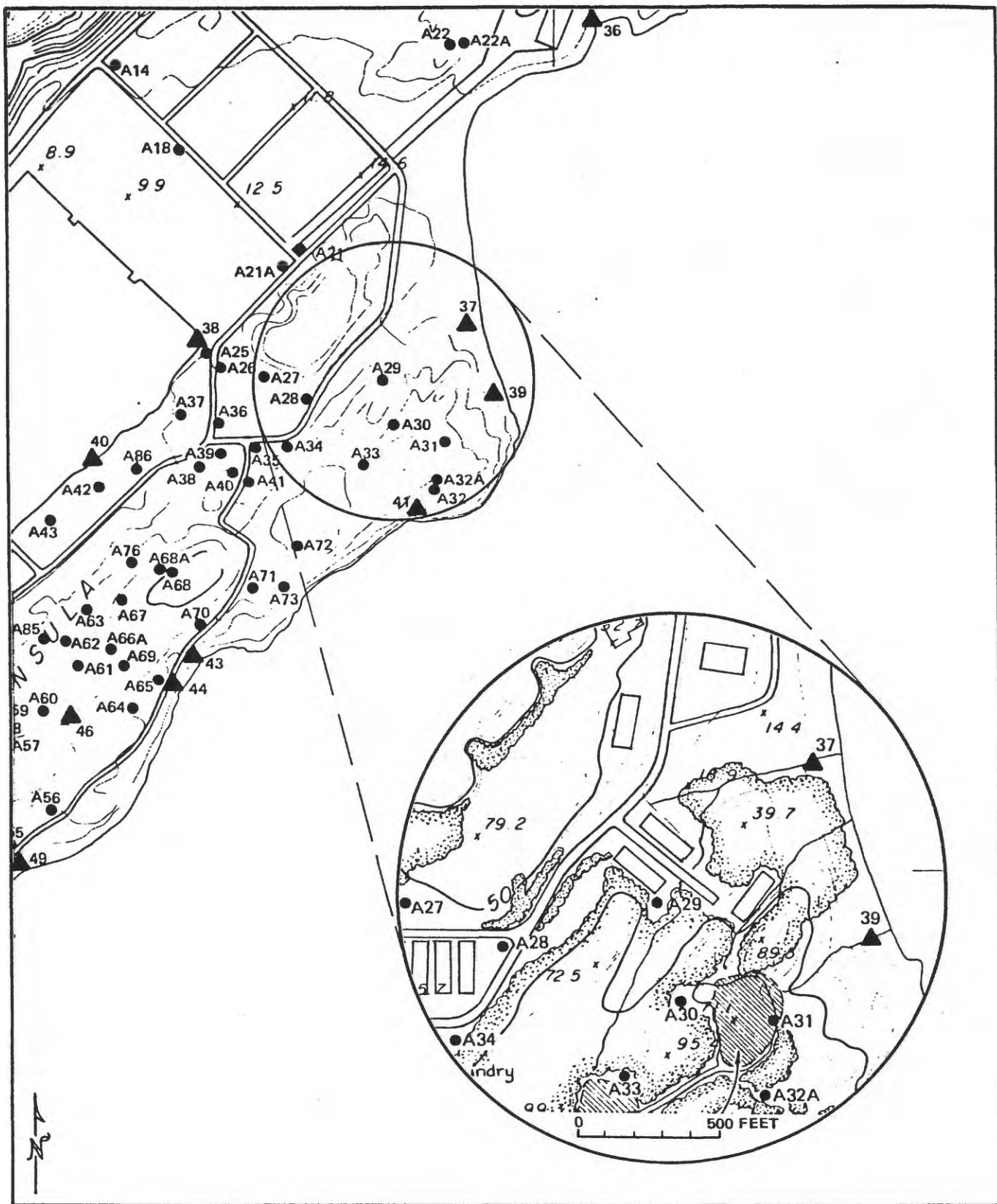
USGS SITE ID No. 574404152300301
 DATE WELL DRILLED 1/28/88
 LATITUDE 57 44' 04" LONGITUDE 152 30' 03"
 ELEVATION OF TOP OF WELL CASING 26.9 ft.
 GROUND SURFACE ELEVATION 24.2 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-27.



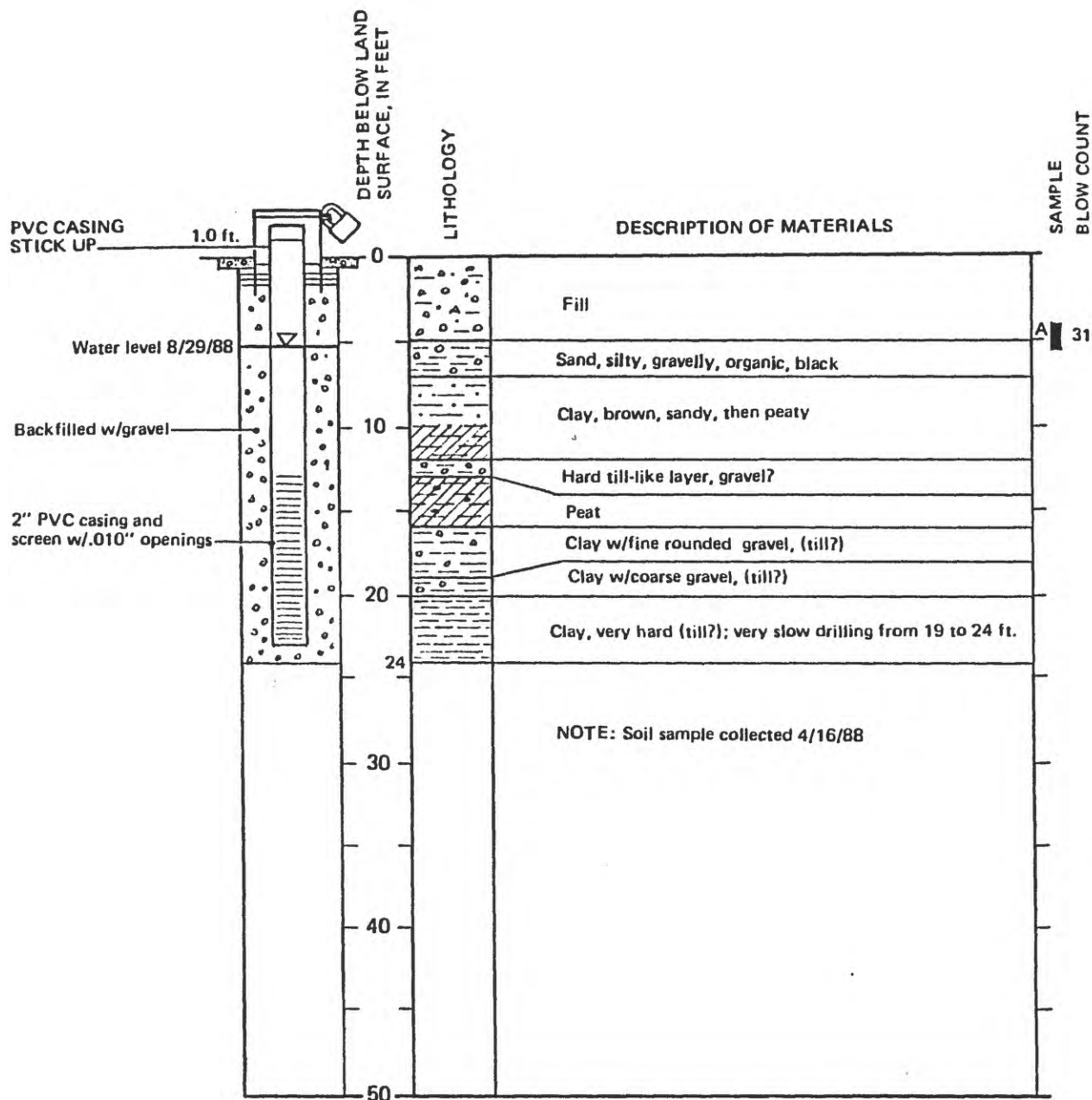
USGS SITE ID No. 574403152295601
 DATE WELL DRILLED 2/14/88
 LATITUDE 57° 44' 03" LONGITUDE 152° 29' 56"
 ELEVATION OF TOP OF WELL CASING 23.7 ft.
 GROUND SURFACE ELEVATION 22.2 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-28.



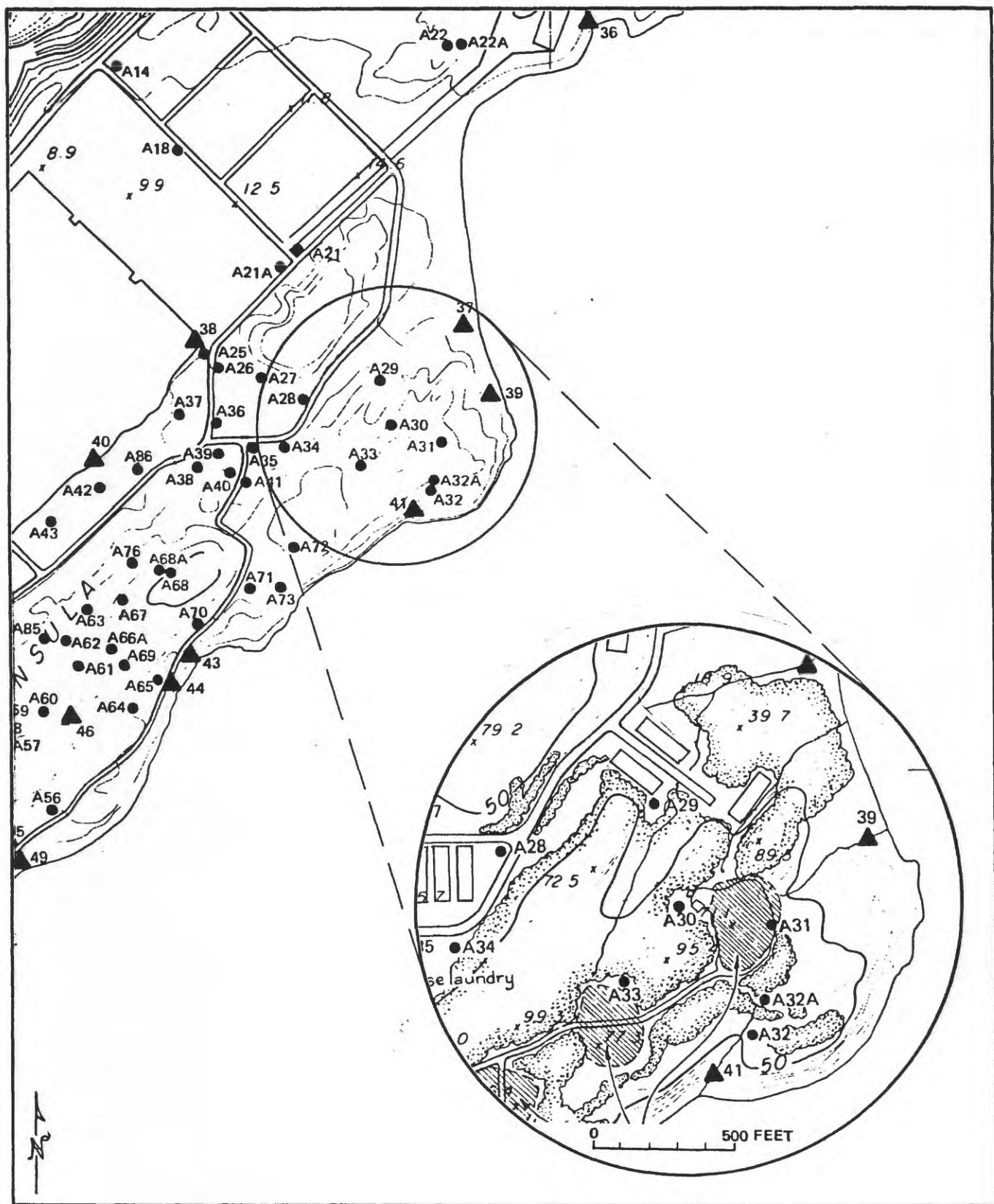
0 1000 2000 FEET
0 200 400 METERS

Location of well A-29.

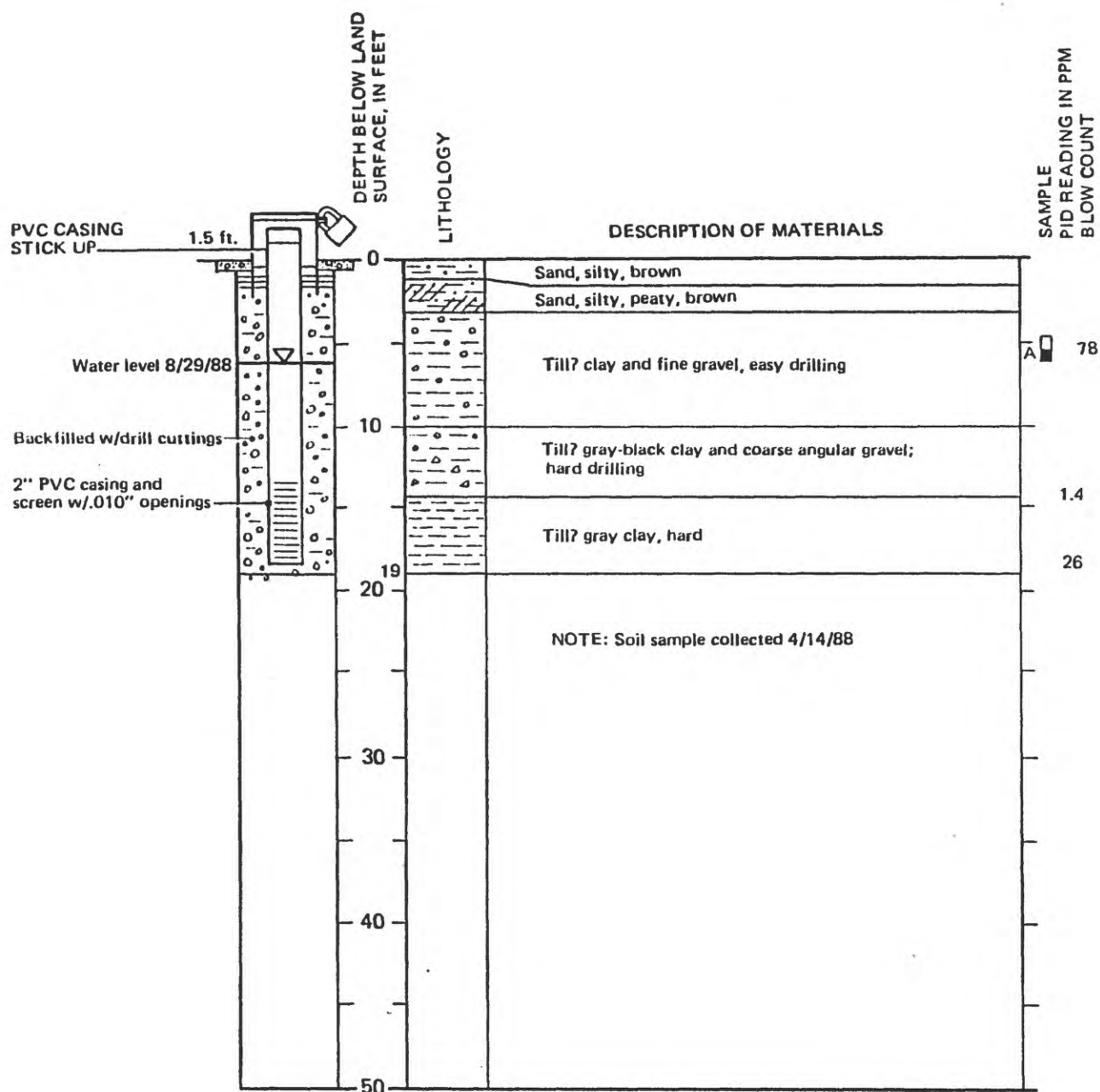


USGS SITE ID No. 574405152294601
 DATE WELL DRILLED 1/31/88
 LATITUDE 57° 44' 05" LONGITUDE 152° 29' 46"
 ELEVATION OF TOP OF WELL CASING 33.0 ft.
 GROUND SURFACE ELEVATION 32.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-29.



Location of well A-30.

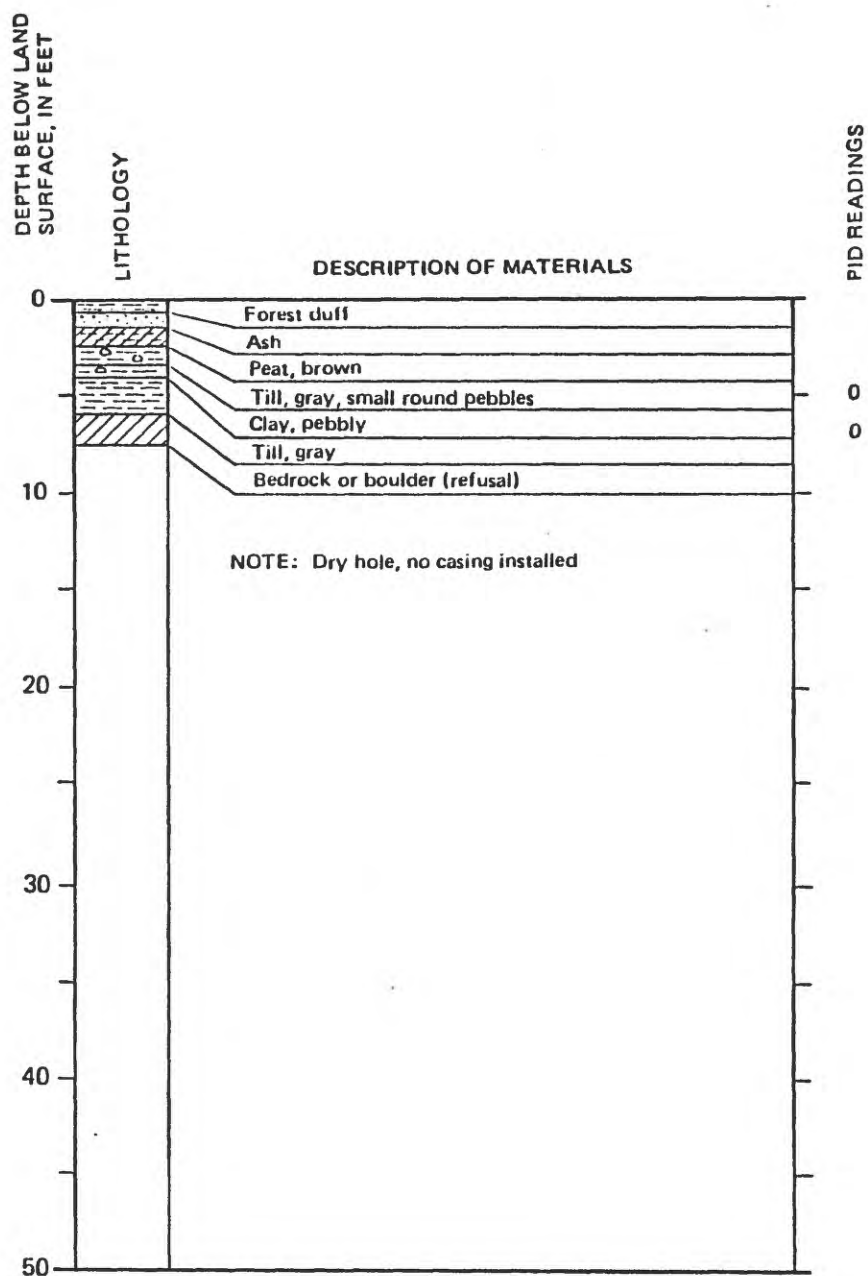


USGS SITE ID No. 574402152294401
 DATE WELL DRILLED 1/30/88
 LATITUDE 57° 44' 02" LONGITUDE 152° 29' 44"
 ELEVATION OF TOP OF WELL CASING 68.6 ft.
 GROUND SURFACE ELEVATION 67.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-30.



Location of borehole A-31.



USGS SITE ID No. 574401152293801

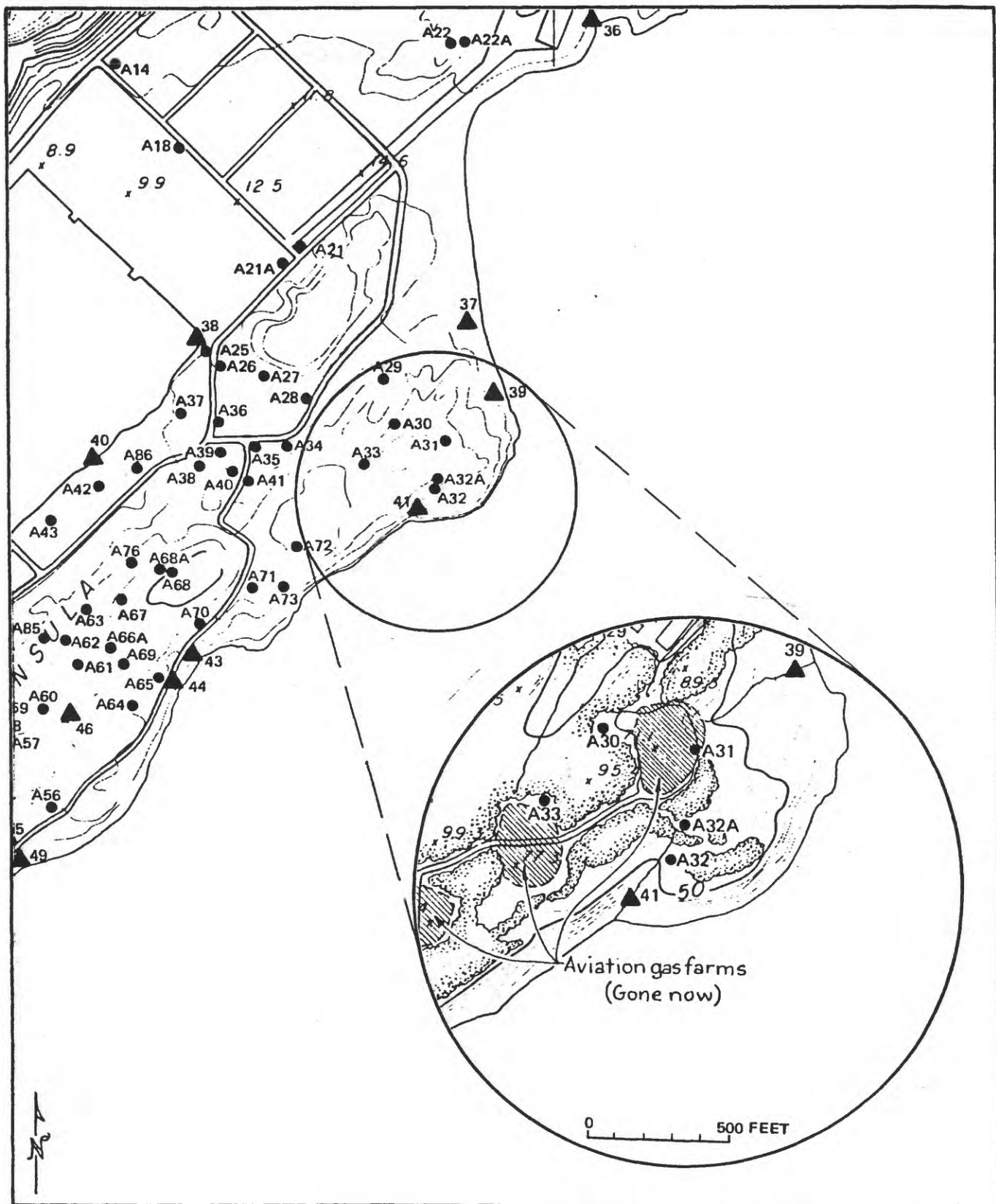
DATE WELL DRILLED 1/30/88

LATITUDE 57° 44' 01" LONGITUDE 152° 29' 38"

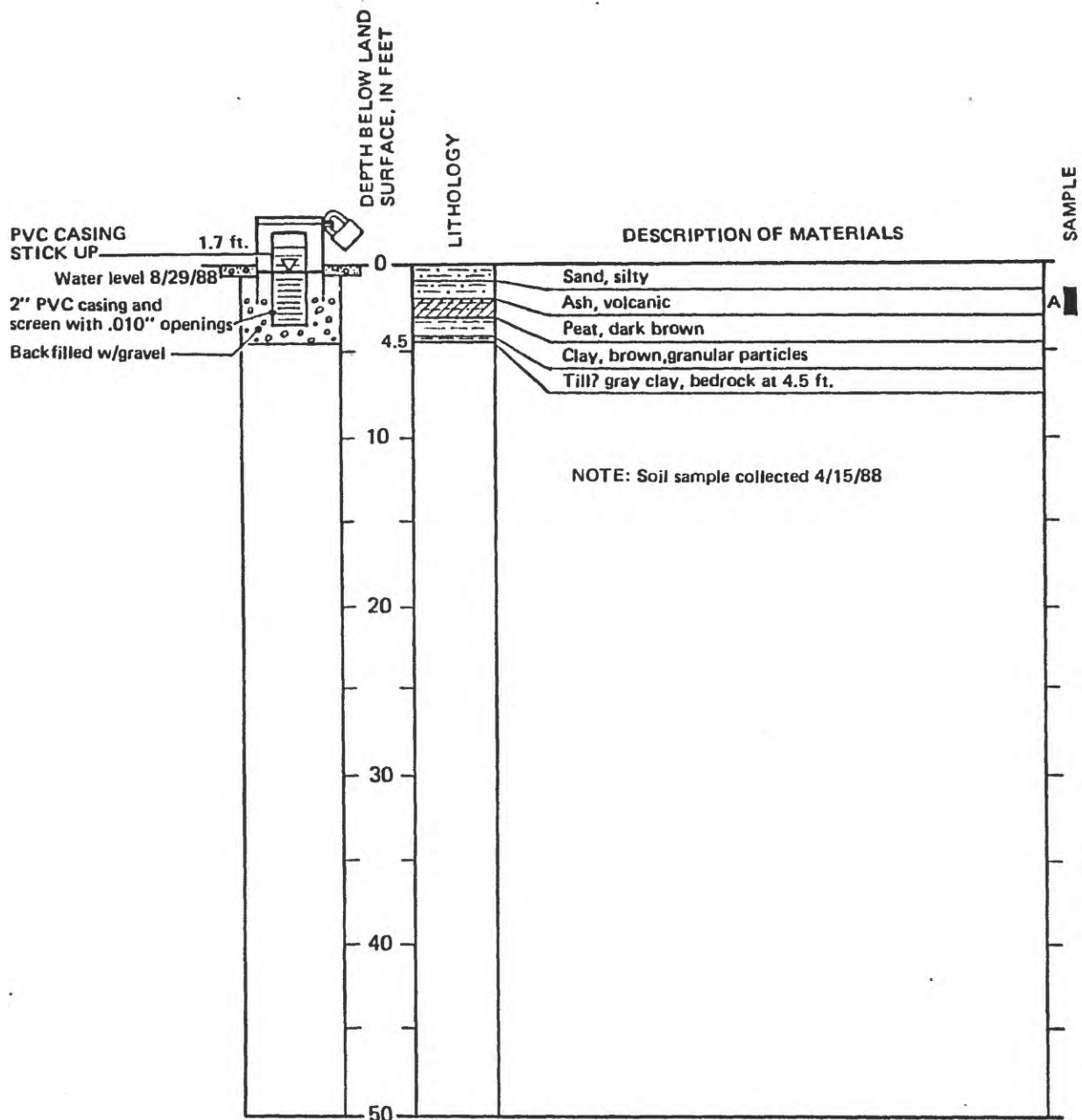
GROUND SURFACE ELEVATION (ESTIMATED) 70 ft.

DATUM IS MEAN SEA LEVEL

Log of borehole A-31.



Location of well A-32.



USGS SITE ID No. 574358152294101

DATE WELL DRILLED 1/29/88

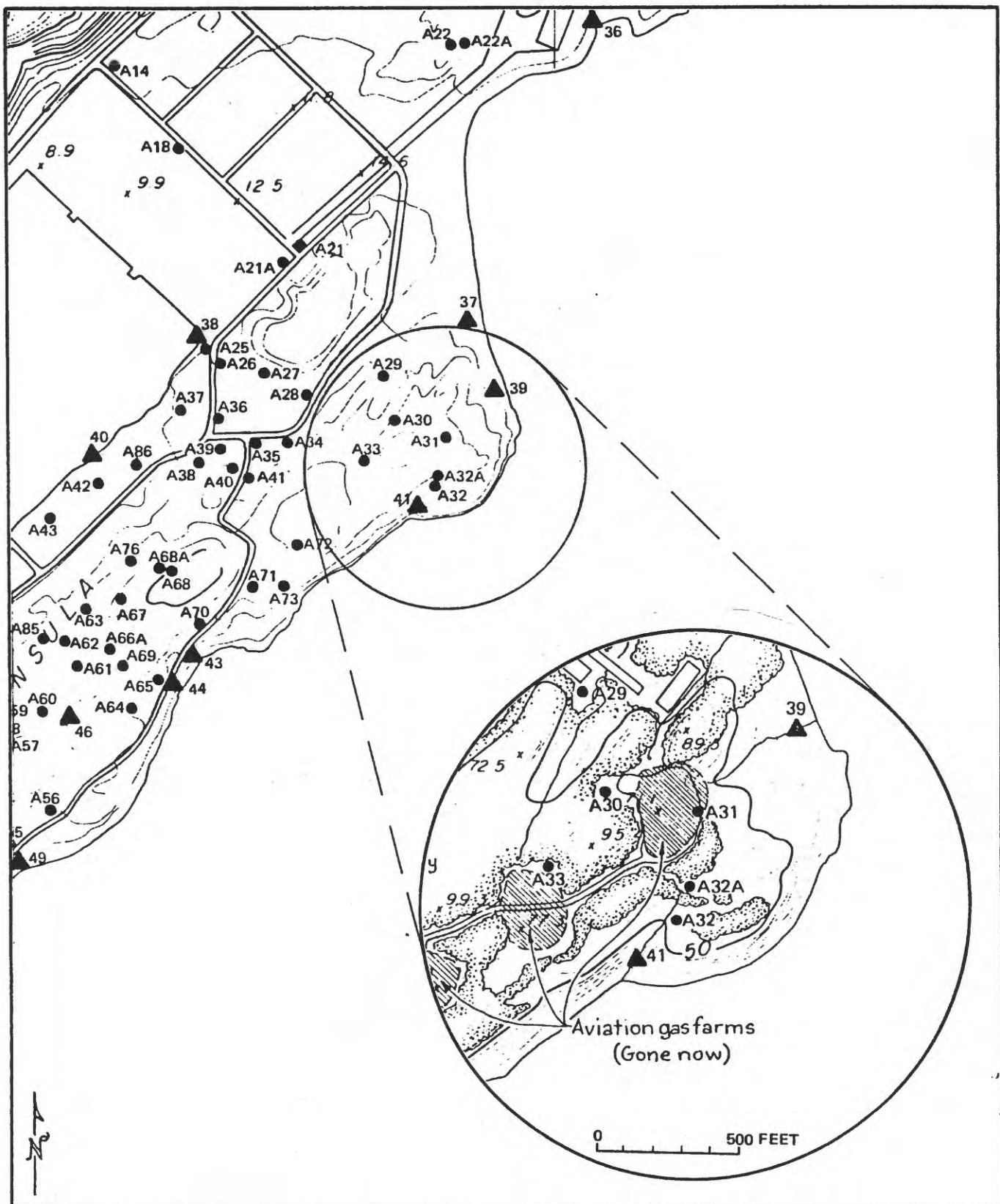
LATITUDE 57° 43' 58" LONGITUDE 152° 29' 41"

ELEVATION OF TOP OF WELL CASING 52.6 ft.

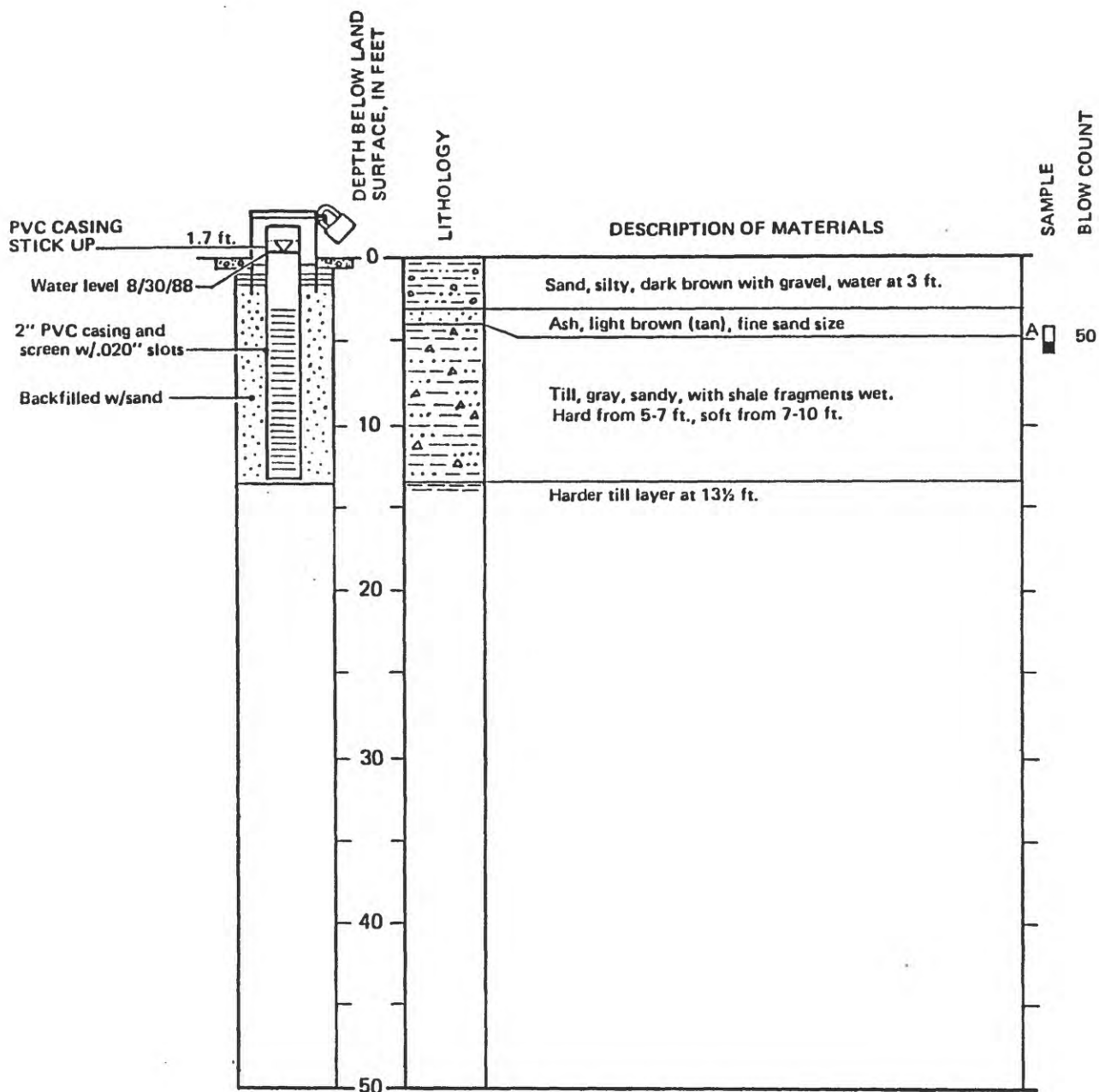
GROUND SURFACE ELEVATION 50.9 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-32.

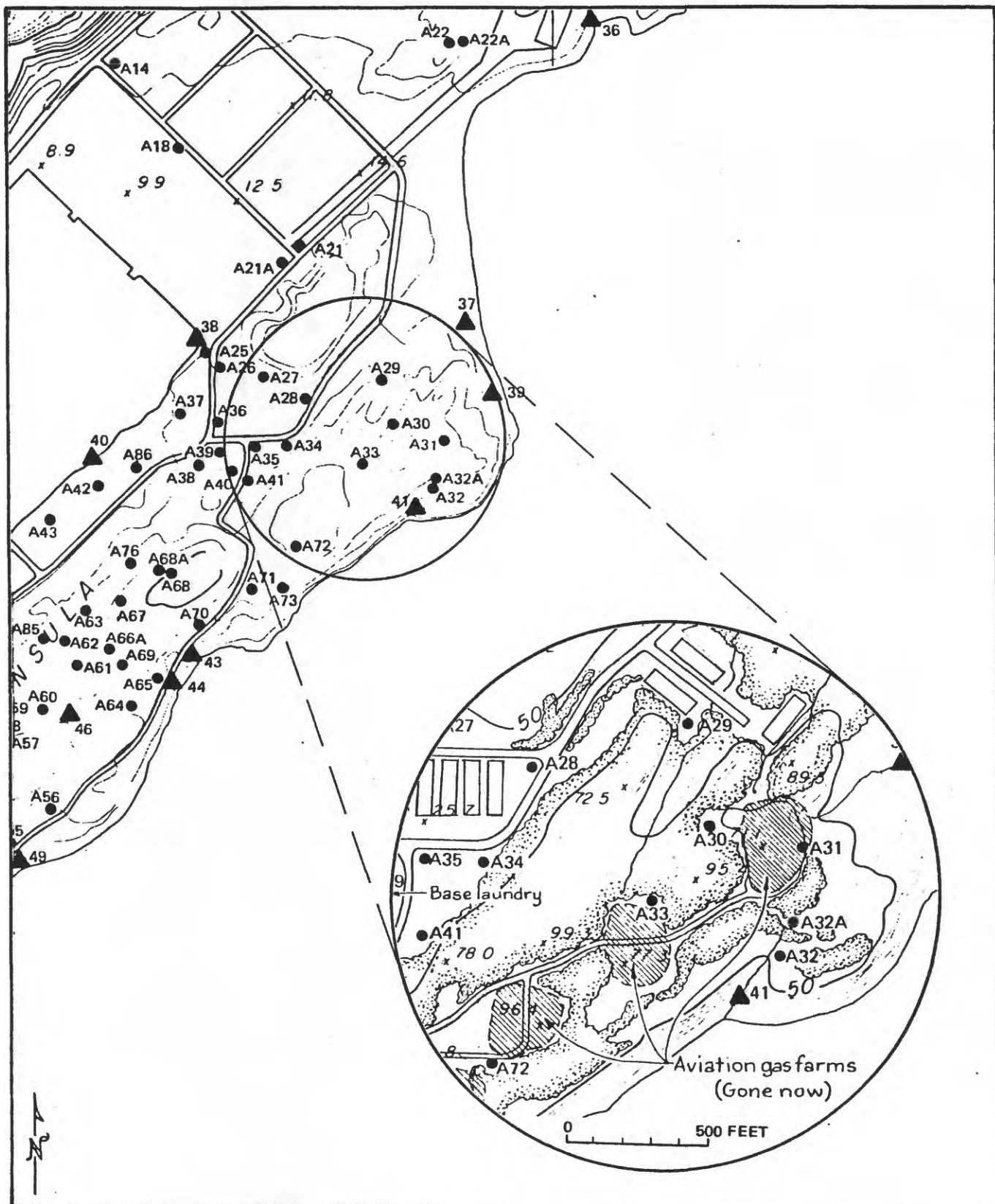


Location of well A-32-A.

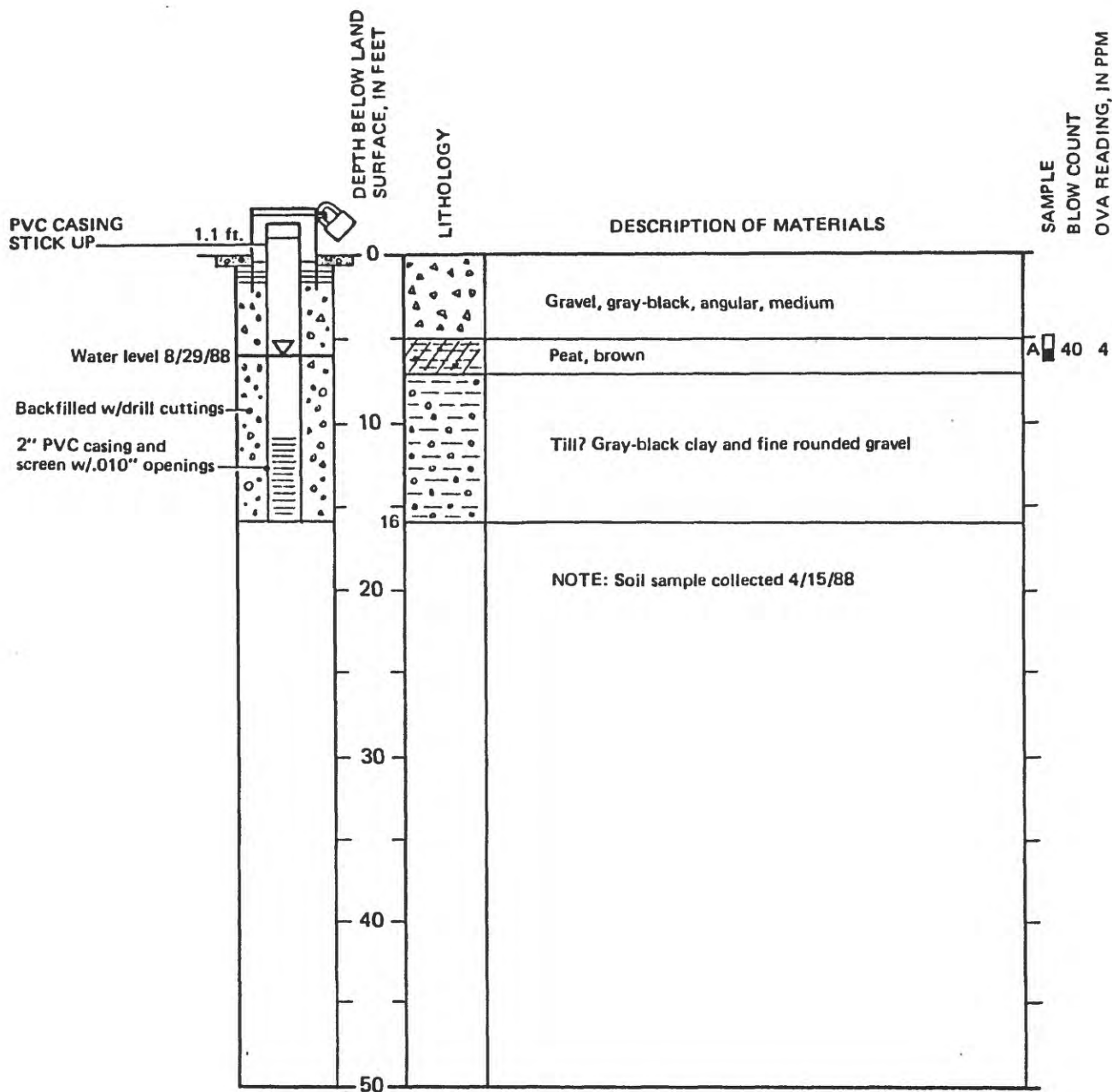


USGS SITE ID No. 574359152294001
 DATE WELL DRILLED 4/15/88
 LATITUDE 57°43' 59" LONGITUDE 152°29' 40"
 ELEVATION OF TOP OF WELL CASING 54.7 ft.
 GROUND SURFACE ELEVATION 53.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-32-A.

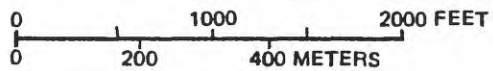


Location of well A-33.

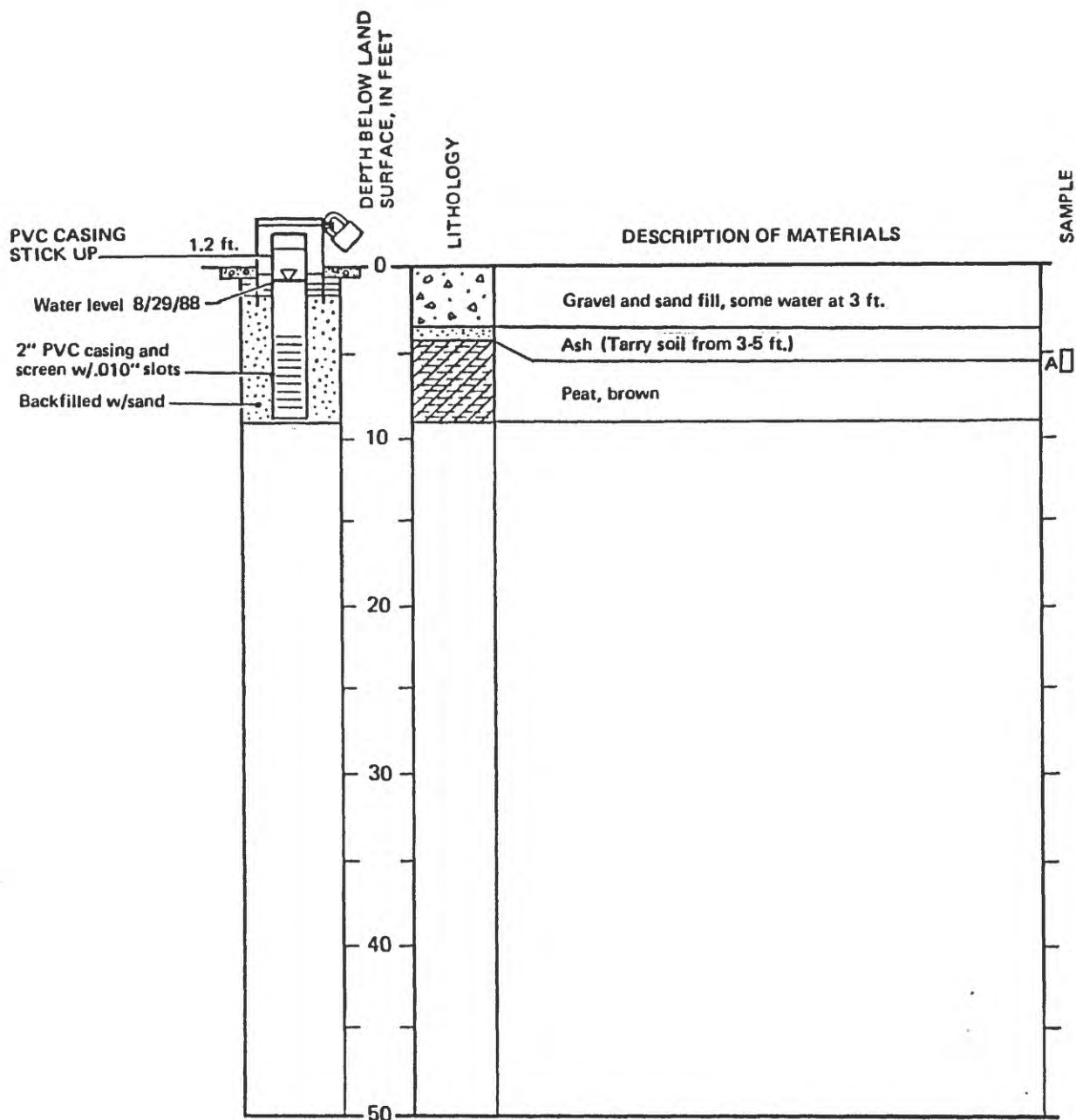


USGS SITE ID No. 574400152294901
 DATE WELL DRILLED 1/29/88
 LATITUDE 57° 44' 00" LONGITUDE 152° 29' 49"
 ELEVATION OF TOP OF WELL CASING 74.0 ft.
 GROUND SURFACE ELEVATION 72.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-33.

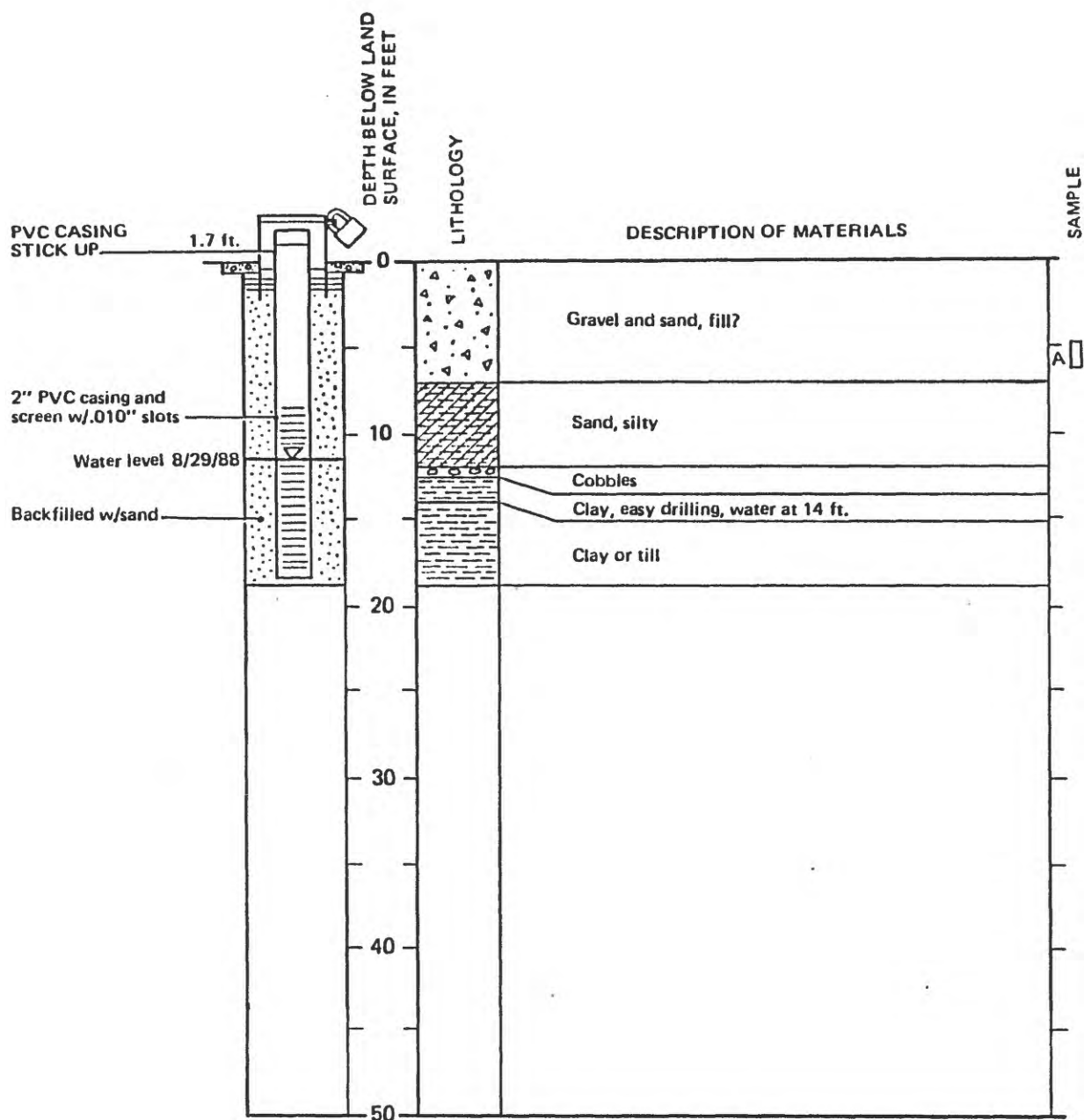


98



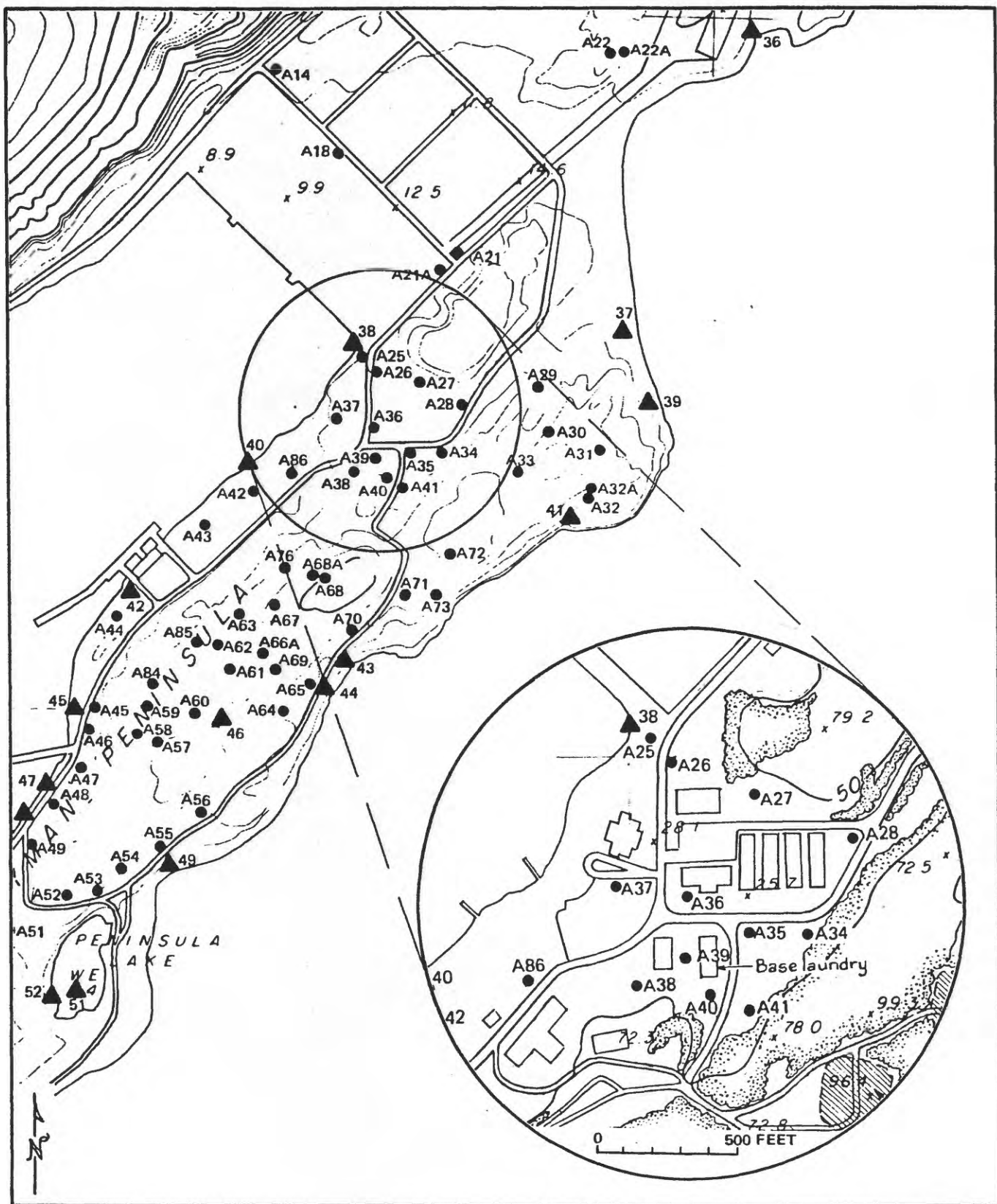
USGS SITE ID No. 574400152295901
 DATE WELL DRILLED 2/15/88
 LATITUDE 57° 44' 00" LONGITUDE 152° 29' 59"
 ELEVATION OF TOP OF WELL CASING 24.1 ft.
 GROUND SURFACE ELEVATION 22.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-34.



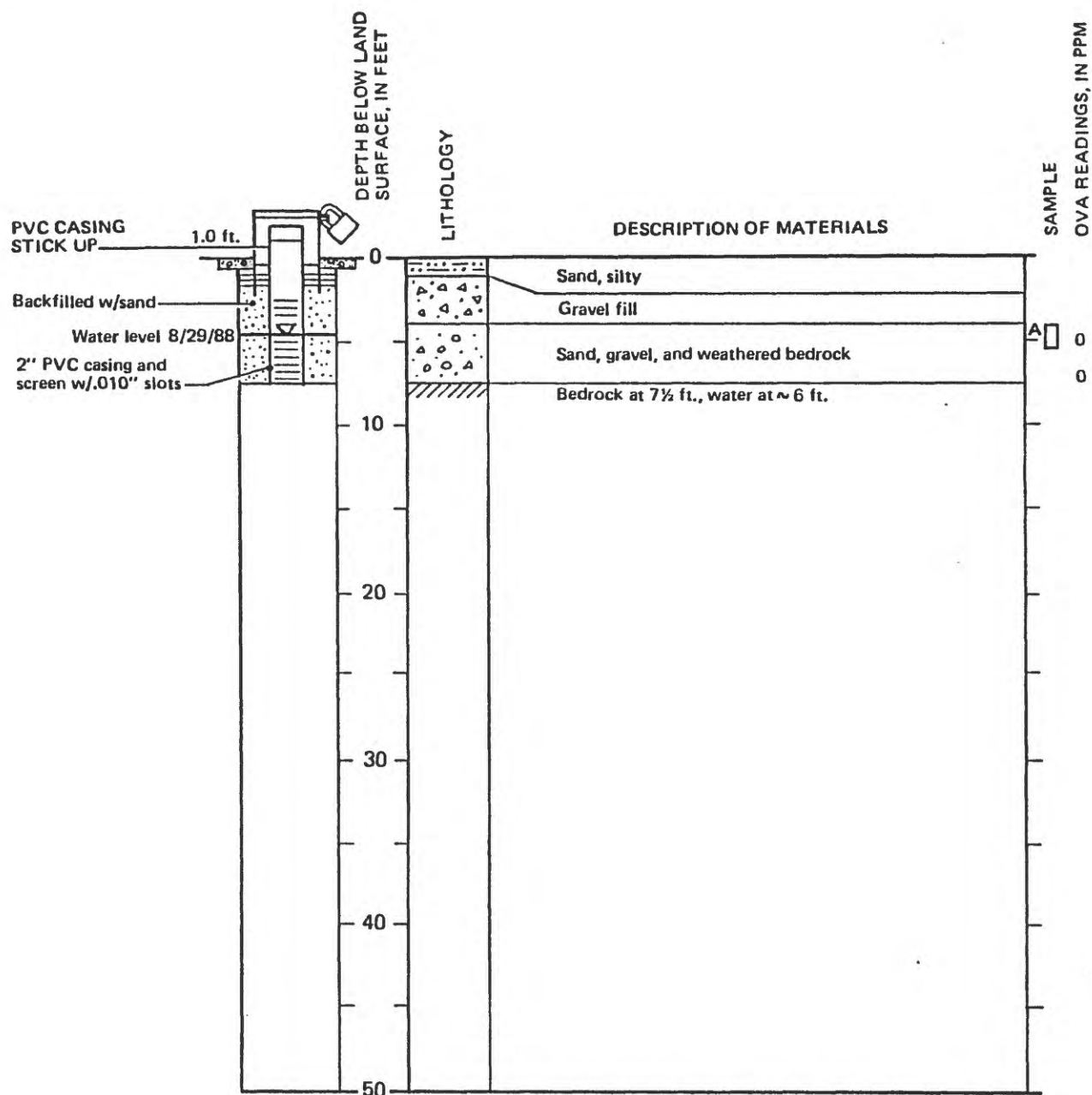
USGS SITE ID No. 574400152300301
 DATE WELL DRILLED 2/15/88
 LATITUDE 57° 44' 00" LONGITUDE 152° 30' 03"
 ELEVATION OF TOP OF WELL CASING 24.4 ft.
 GROUND SURFACE ELEVATION 22.7 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-35.



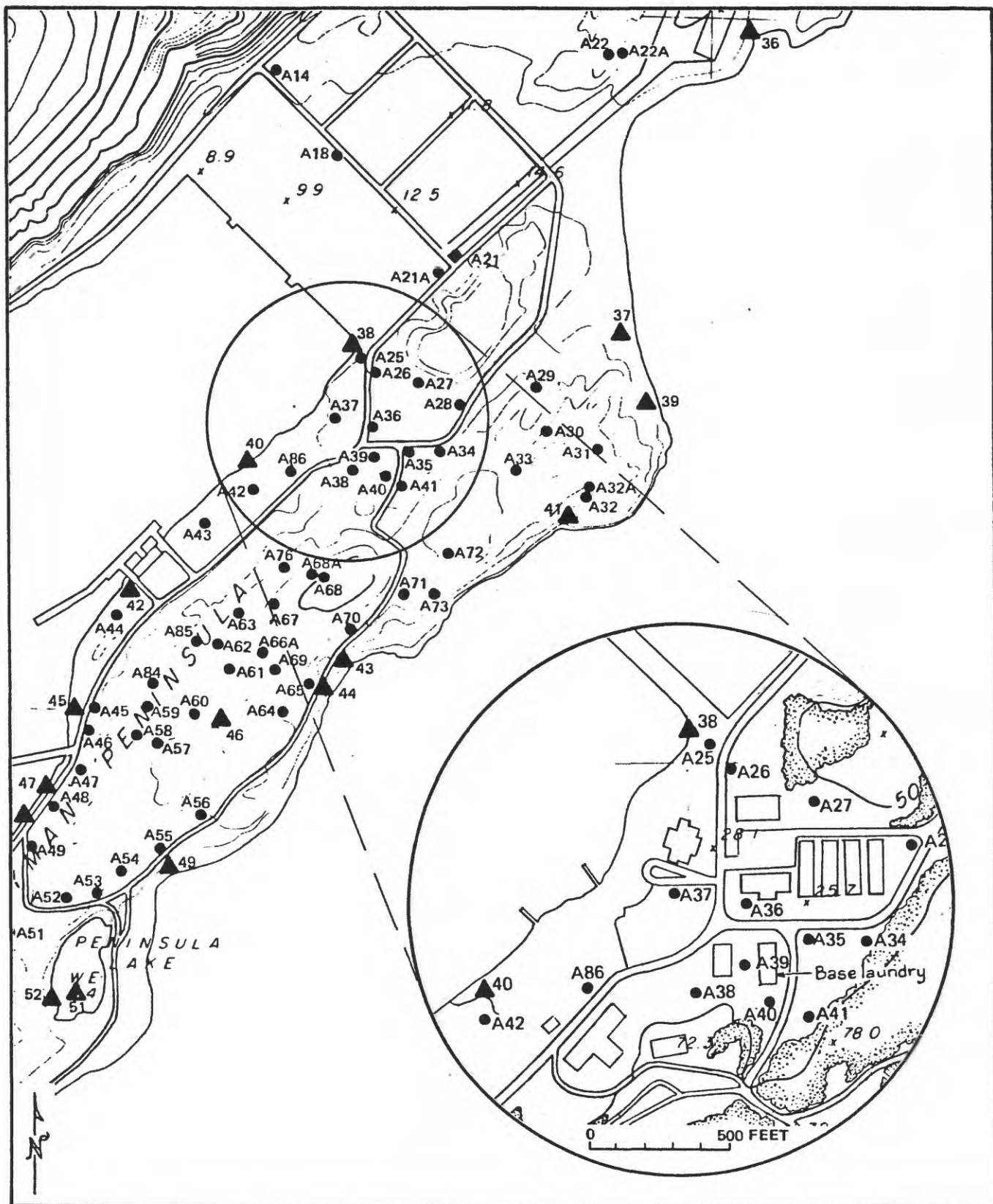
0 1000 2000 FEET
0 200 400 METERS

Location of well A-36.

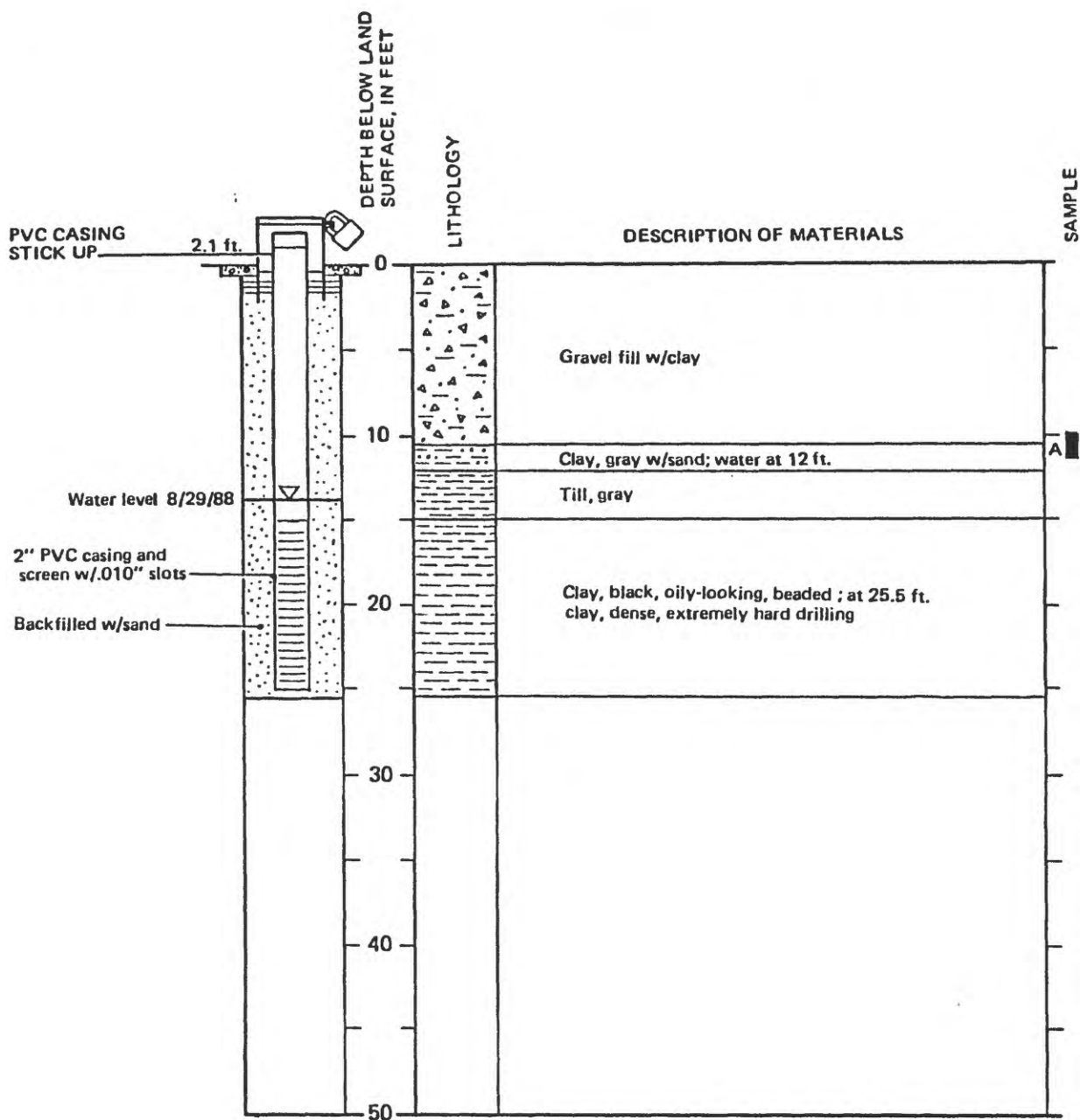


USGS SITE ID No. 574401152300801
 DATE WELL DRILLED 2/14/88
 LATITUDE 57° 44' 01" LONGITUDE 152° 30' 08"
 ELEVATION OF TOP OF WELL CASING 22.9 ft.
 GROUND SURFACE ELEVATION 21.9ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-36.

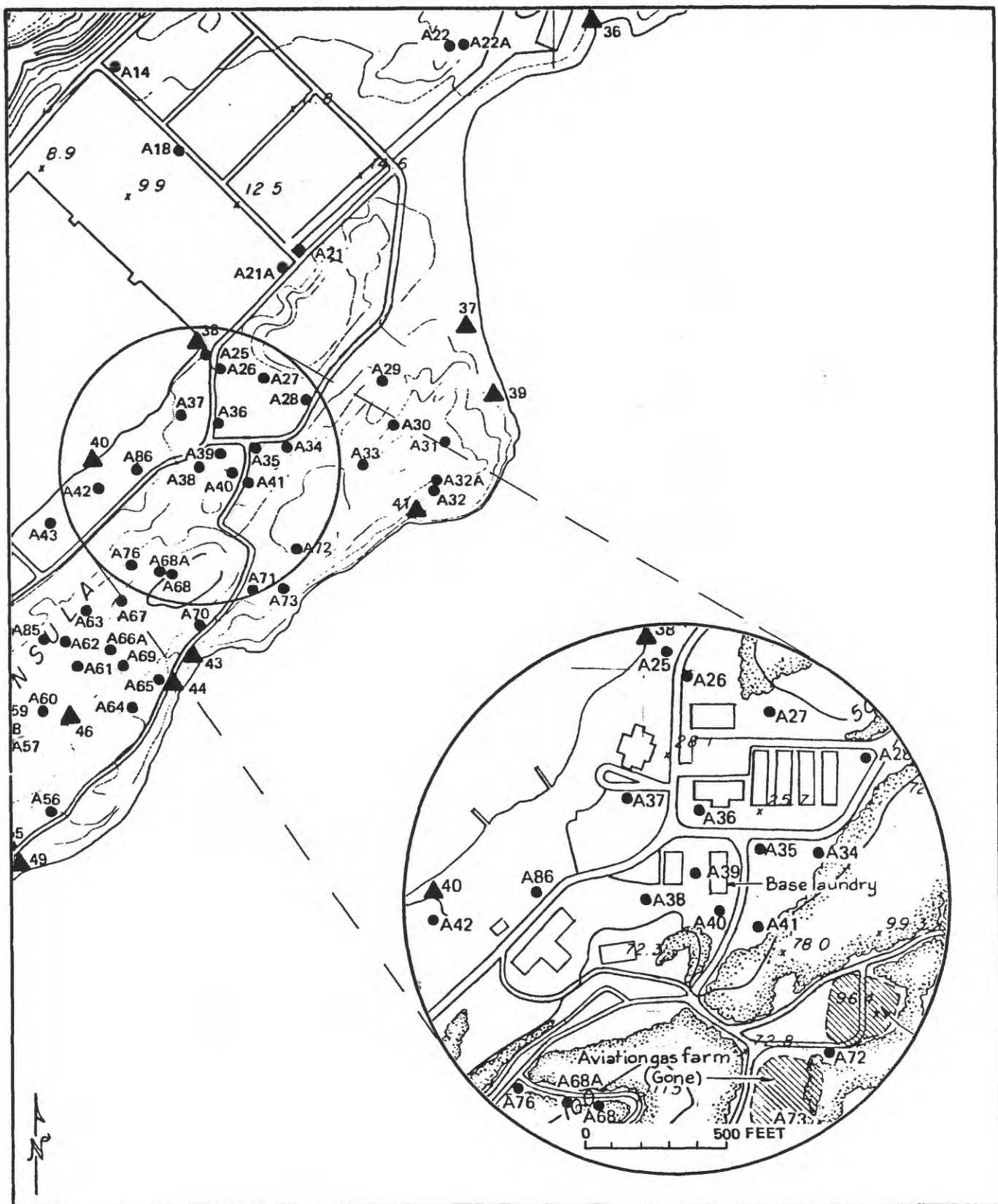


Location of well A-37.

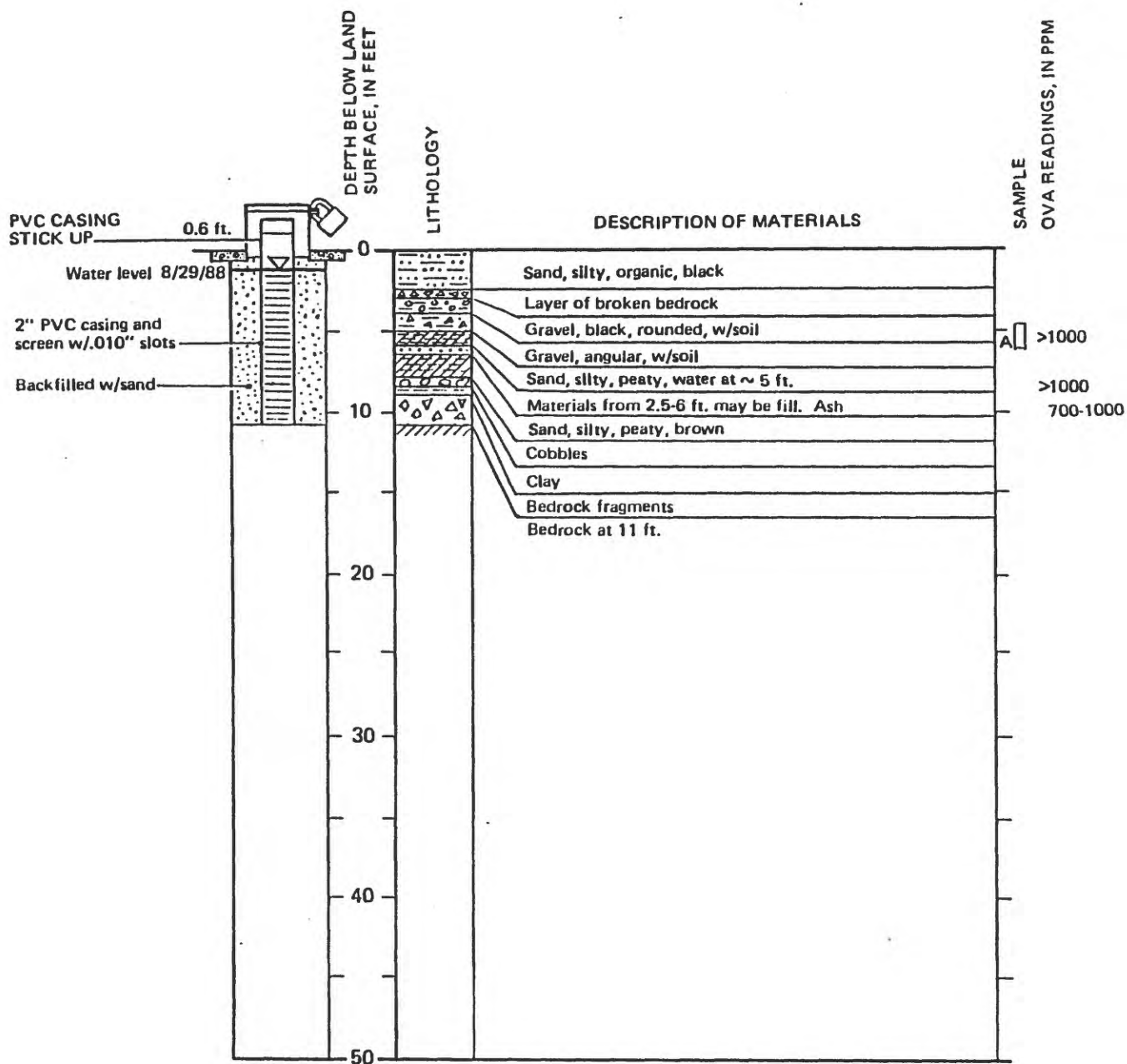


USGS SITE ID No. 574402152301201
DATE WELL DRILLED 2/13/88
LATITUDE 57° 44' 02" LONGITUDE 152° 30' 12"
ELEVATION OF TOP OF WELL CASING 21.3 ft.
GROUND SURFACE ELEVATION 19.2 ft.
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-37.

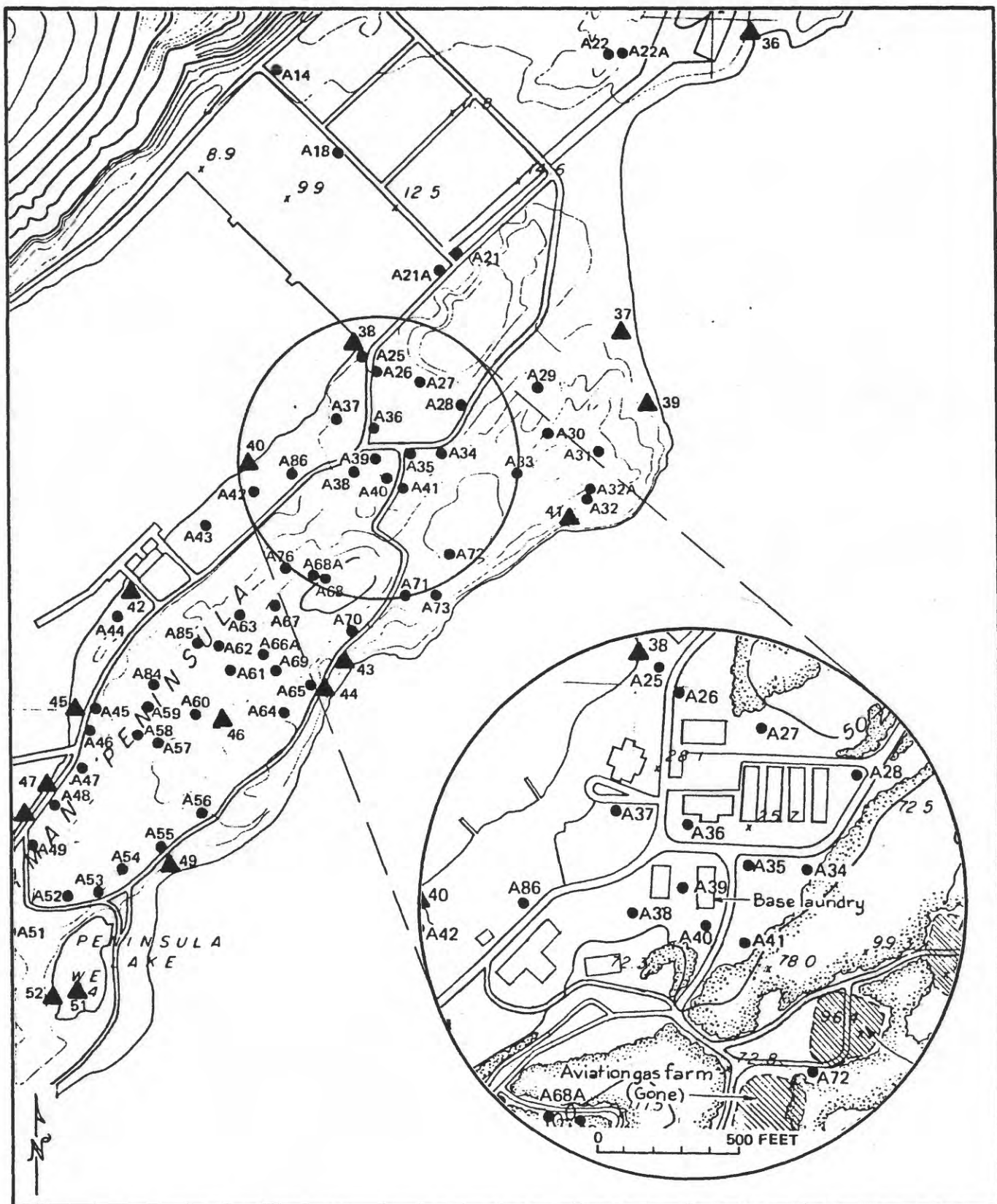


Location of well A-38.

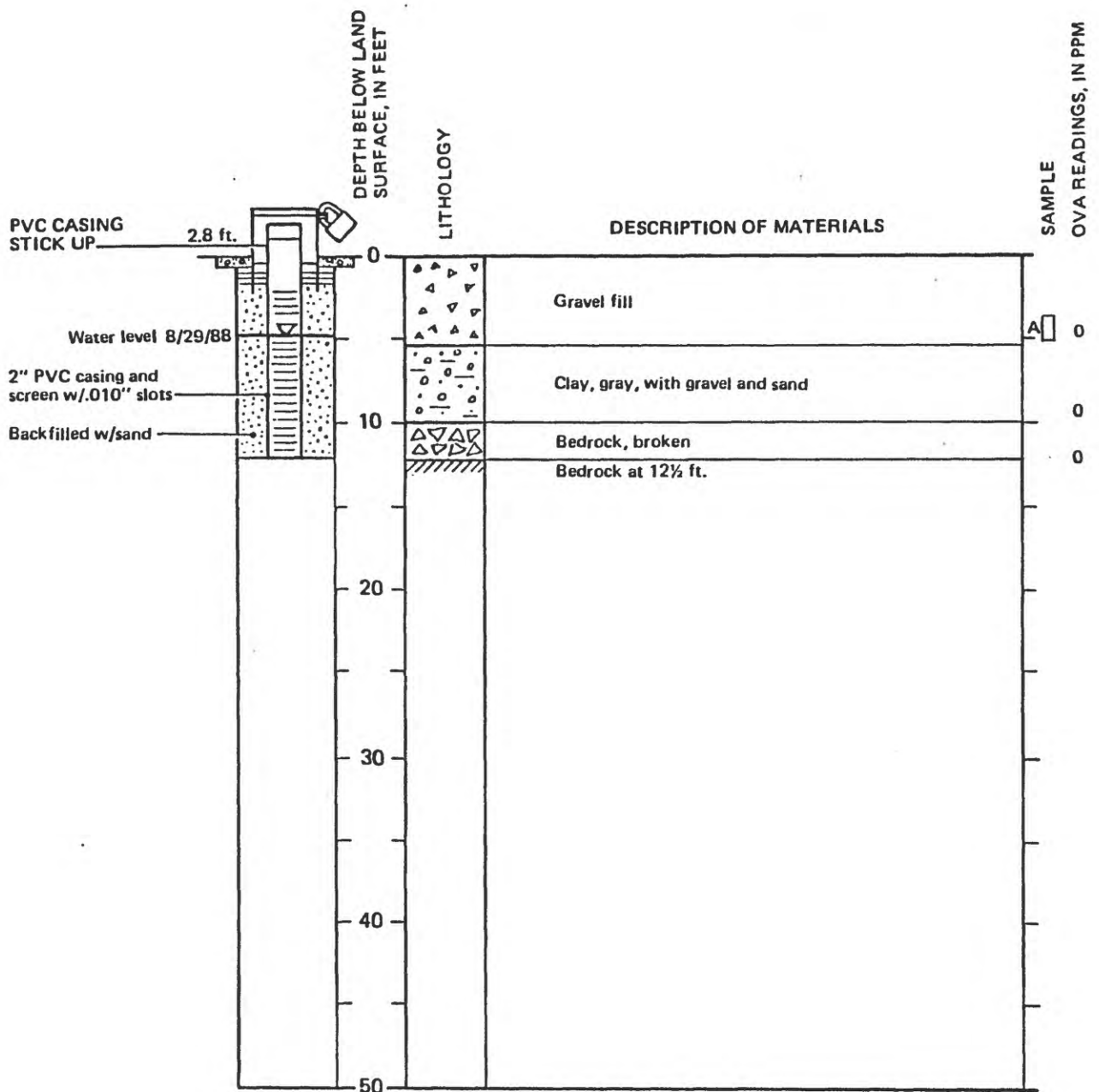


USGS SITE ID No. 574358152301001
 DATE WELL DRILLED 2/14/88
 LATITUDE 57° 43' 58" LONGITUDE 152° 30' 10"
 ELEVATION OF TOP OF WELL CASING 18.9 ft.
 GROUND SURFACE ELEVATION 18.3 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-38.

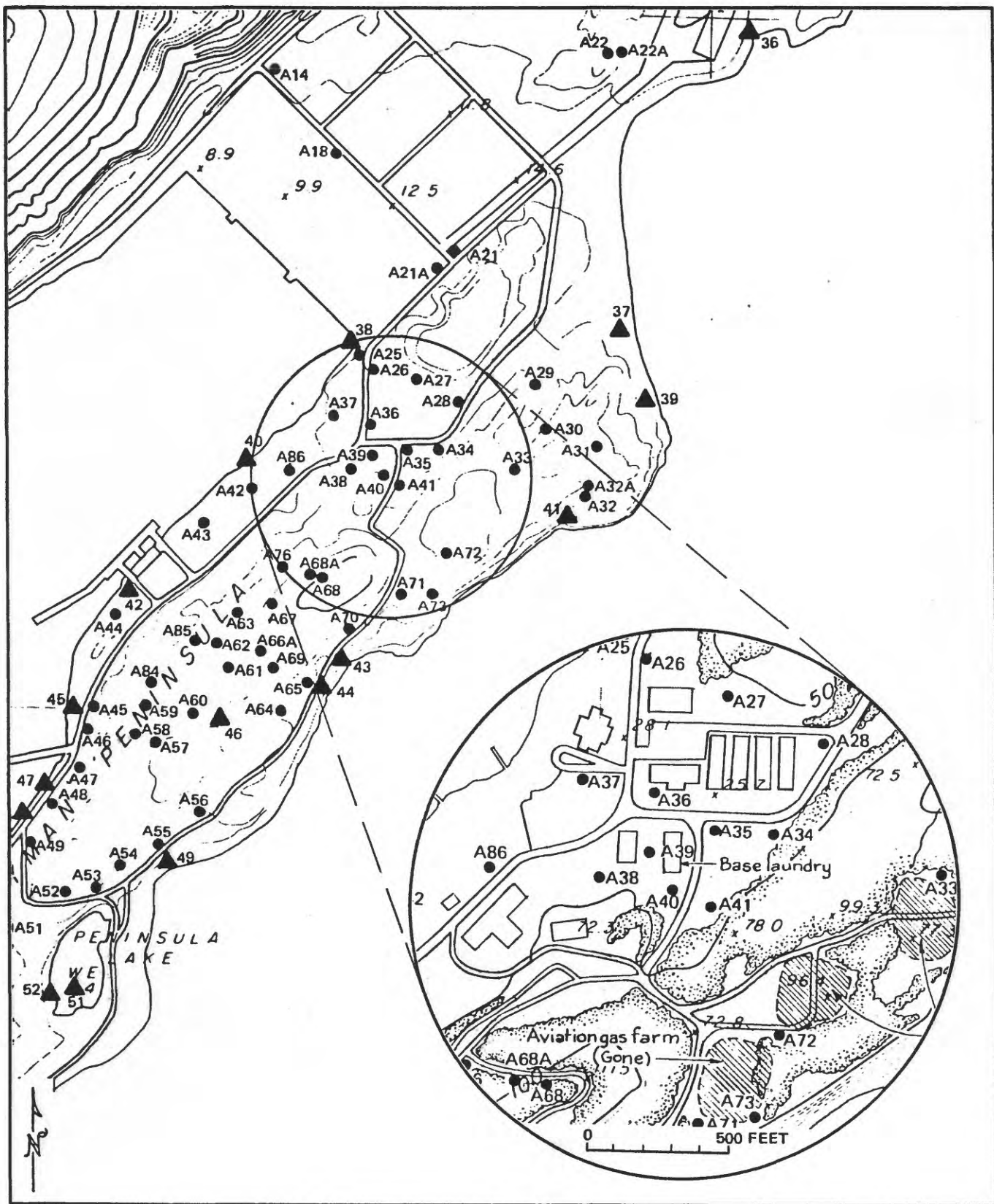


Location of well A-39.



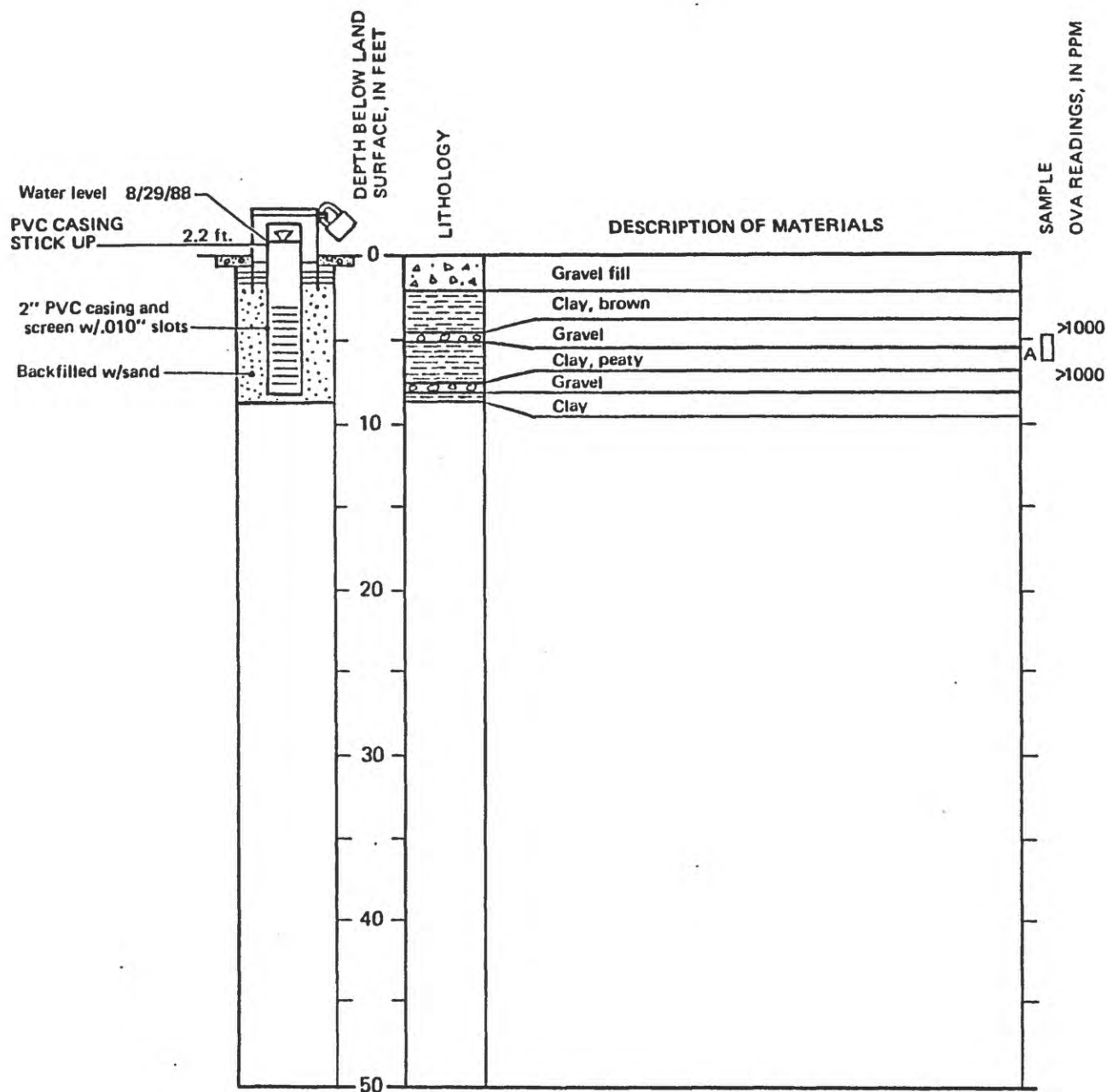
USGS SITE ID No. 574359152300701
 DATE WELL DRILLED 2/15/88
 LATITUDE 57° 43' 59" LONGITUDE 152° 30' 07"
 ELEVATION OF TOP OF WELL CASING 24.9 ft.
 GROUND SURFACE ELEVATION 22.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-39.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-40.



USGS SITE ID No. 574358152300601

DATE WELL DRILLED 2/15/88

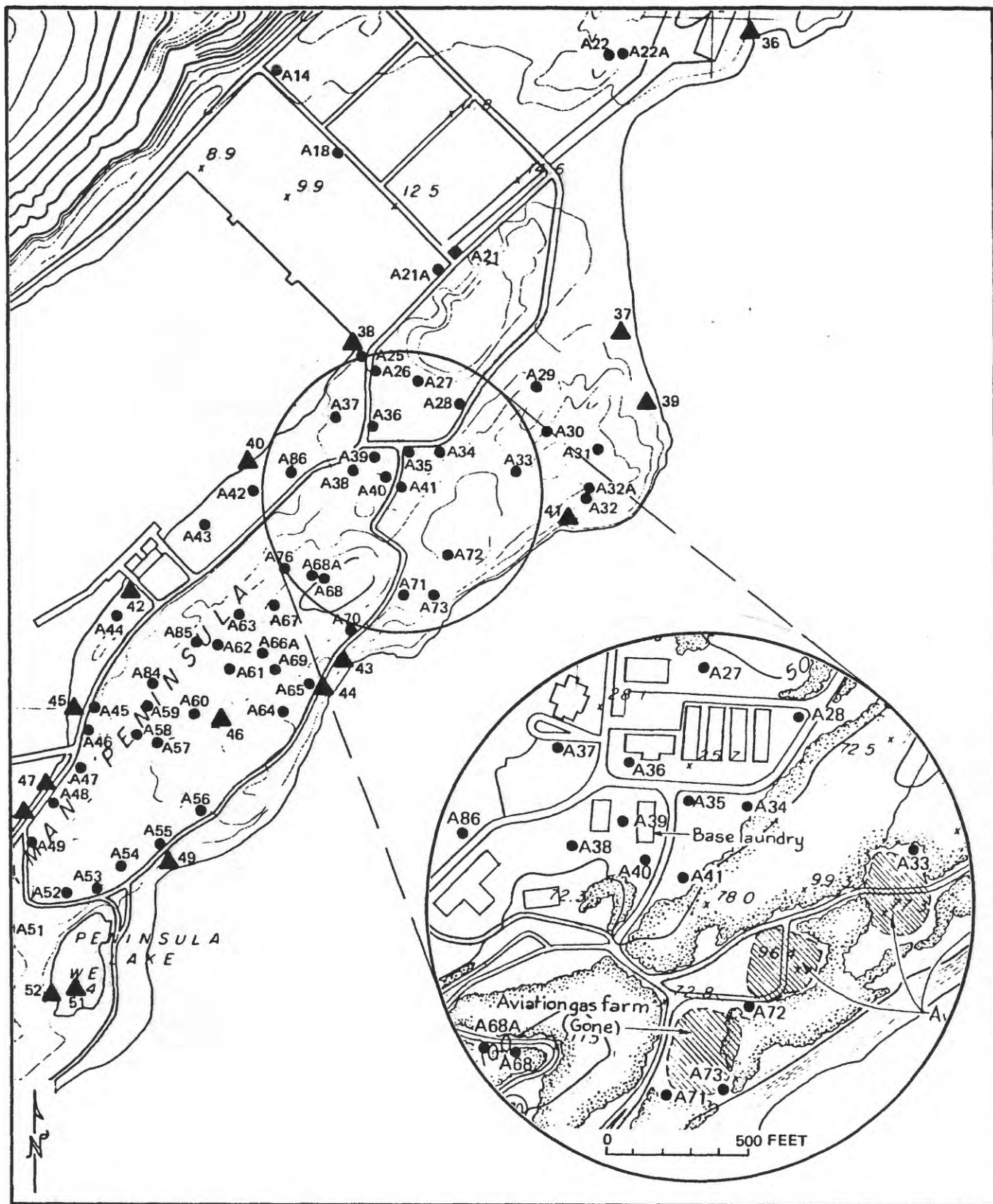
LATITUDE 57° 43' 58" LONGITUDE 152° 30' 06"

ELEVATION OF TOP OF WELL CASING 23.7 ft.

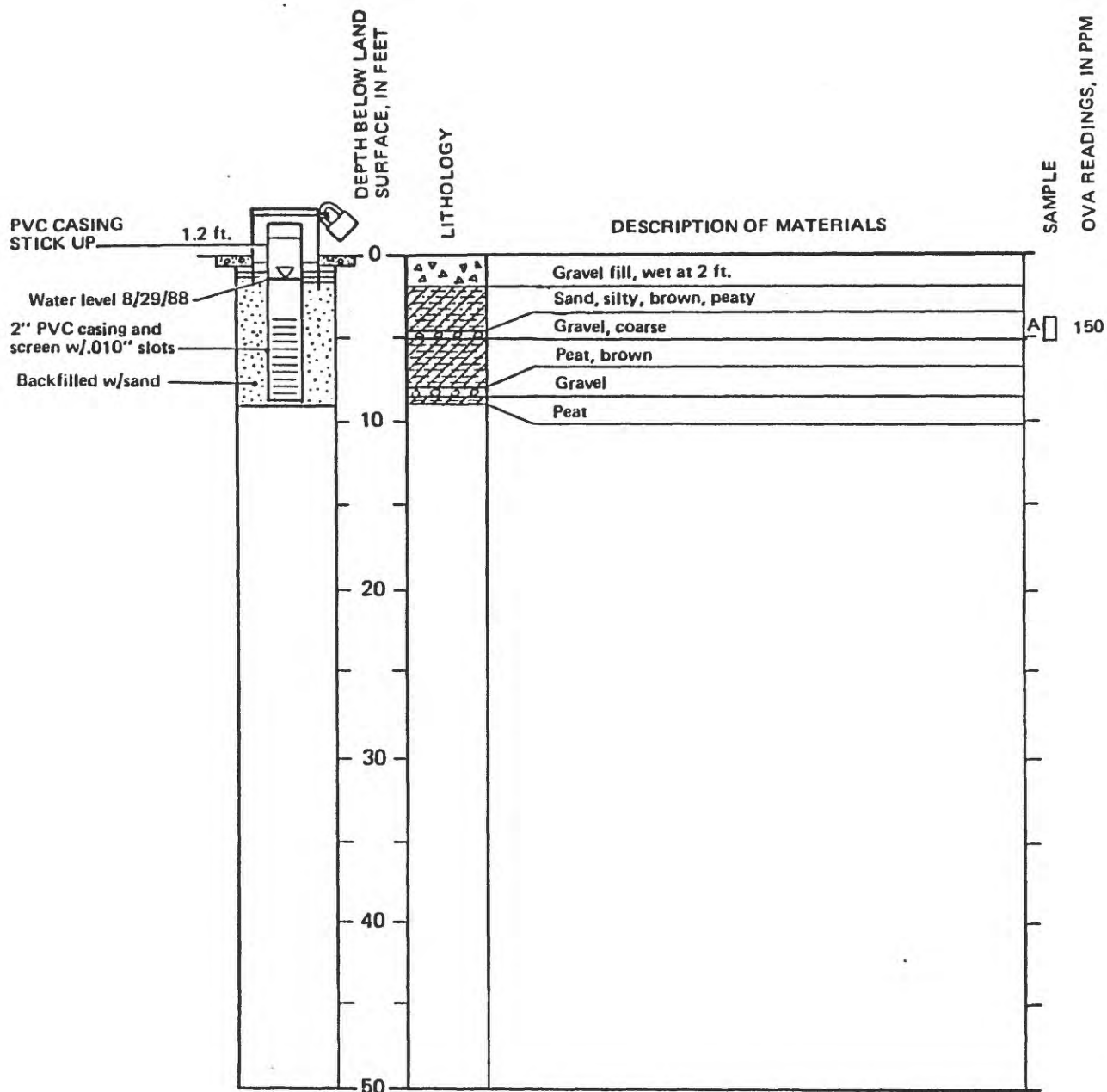
GROUND SURFACE ELEVATION 21.5 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-40.



Location of well A-41.



USGS SITE ID No. 574357152300301

DATE WELL DRILLED 2/15/88

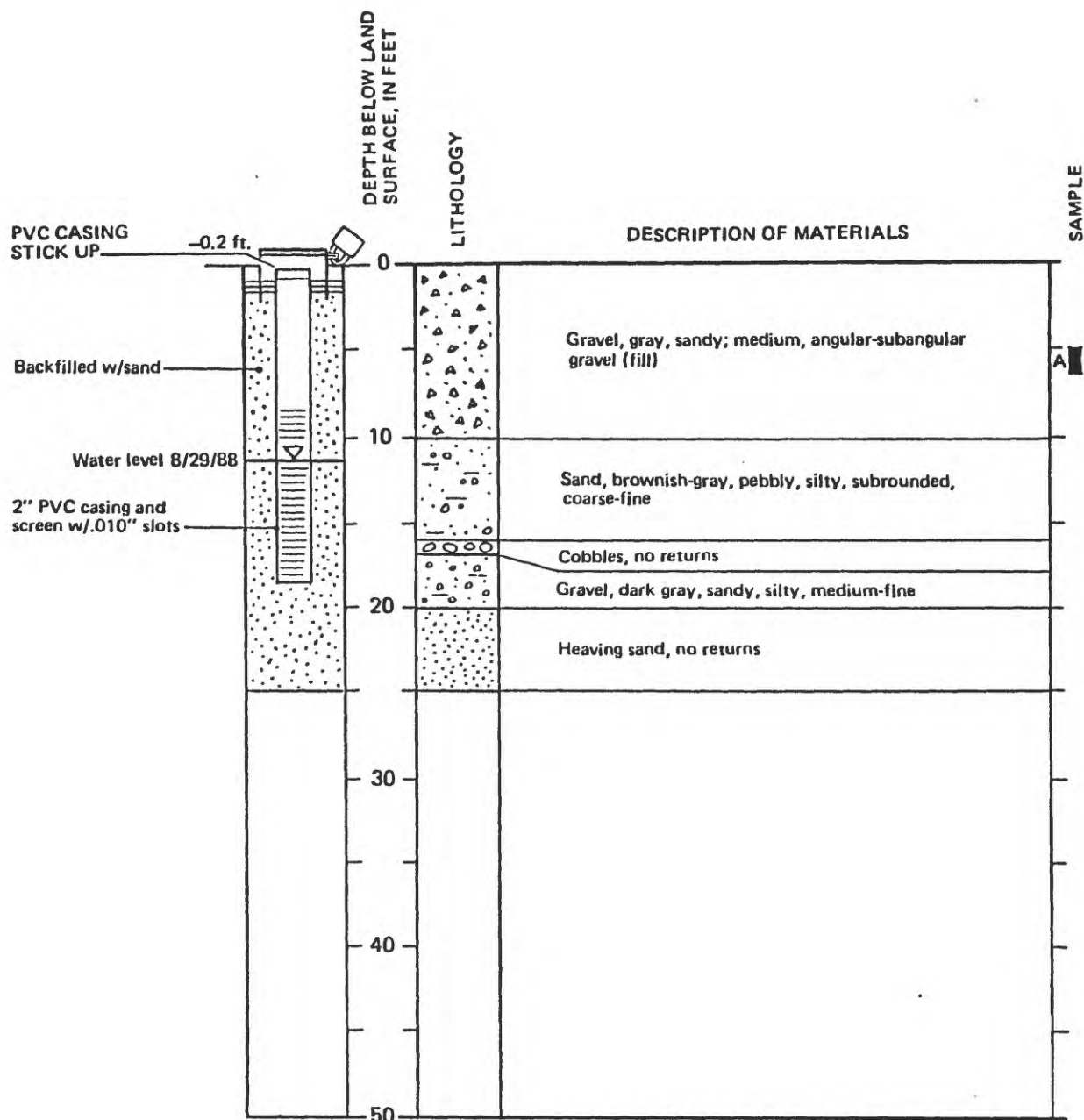
LATITUDE 57°43' 57" LONGITUDE 152°30' 03"

ELEVATION OF TOP OF WELL CASING 26.8 ft.

GROUND SURFACE ELEVATION 25.6 ft.

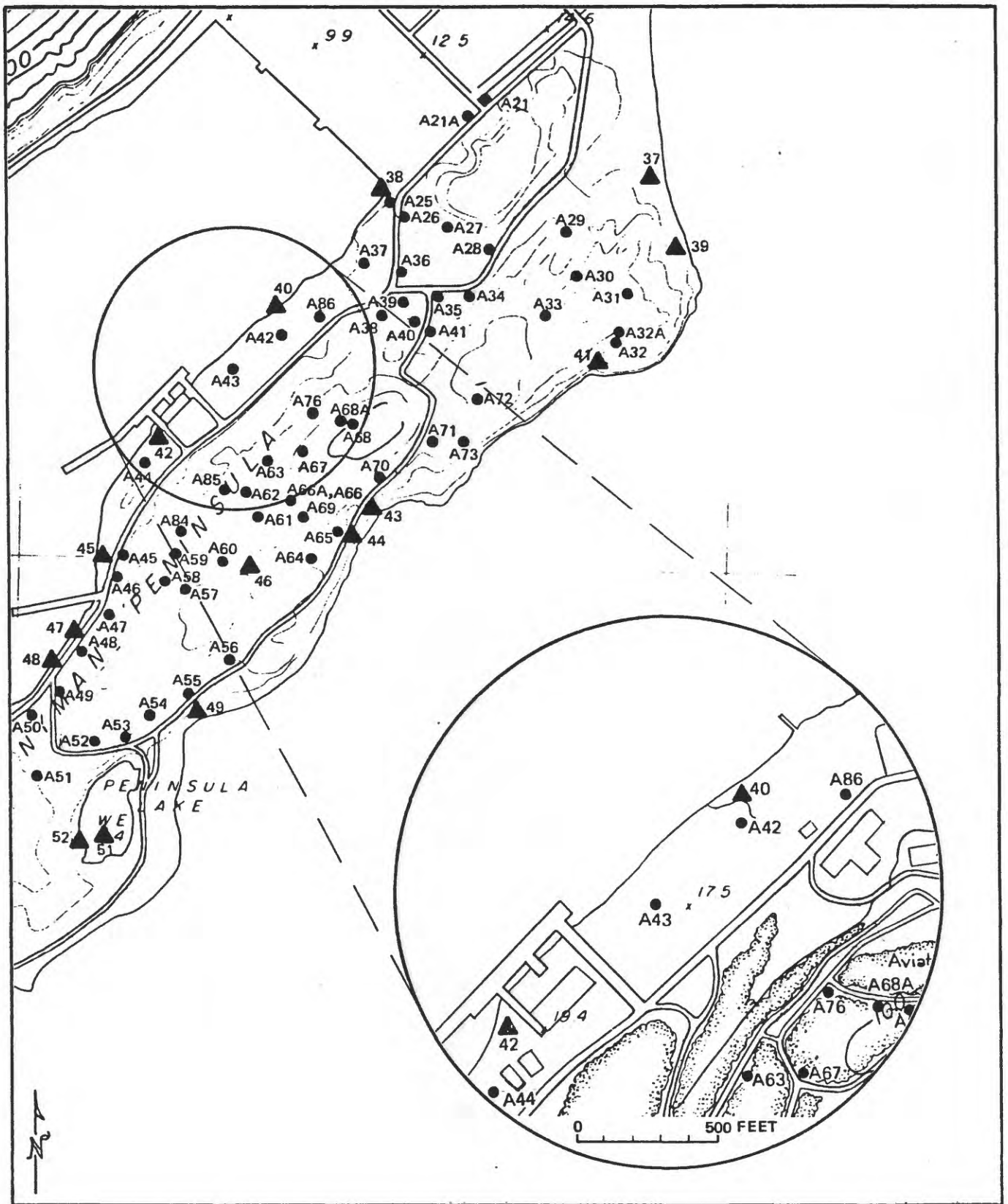
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-41.

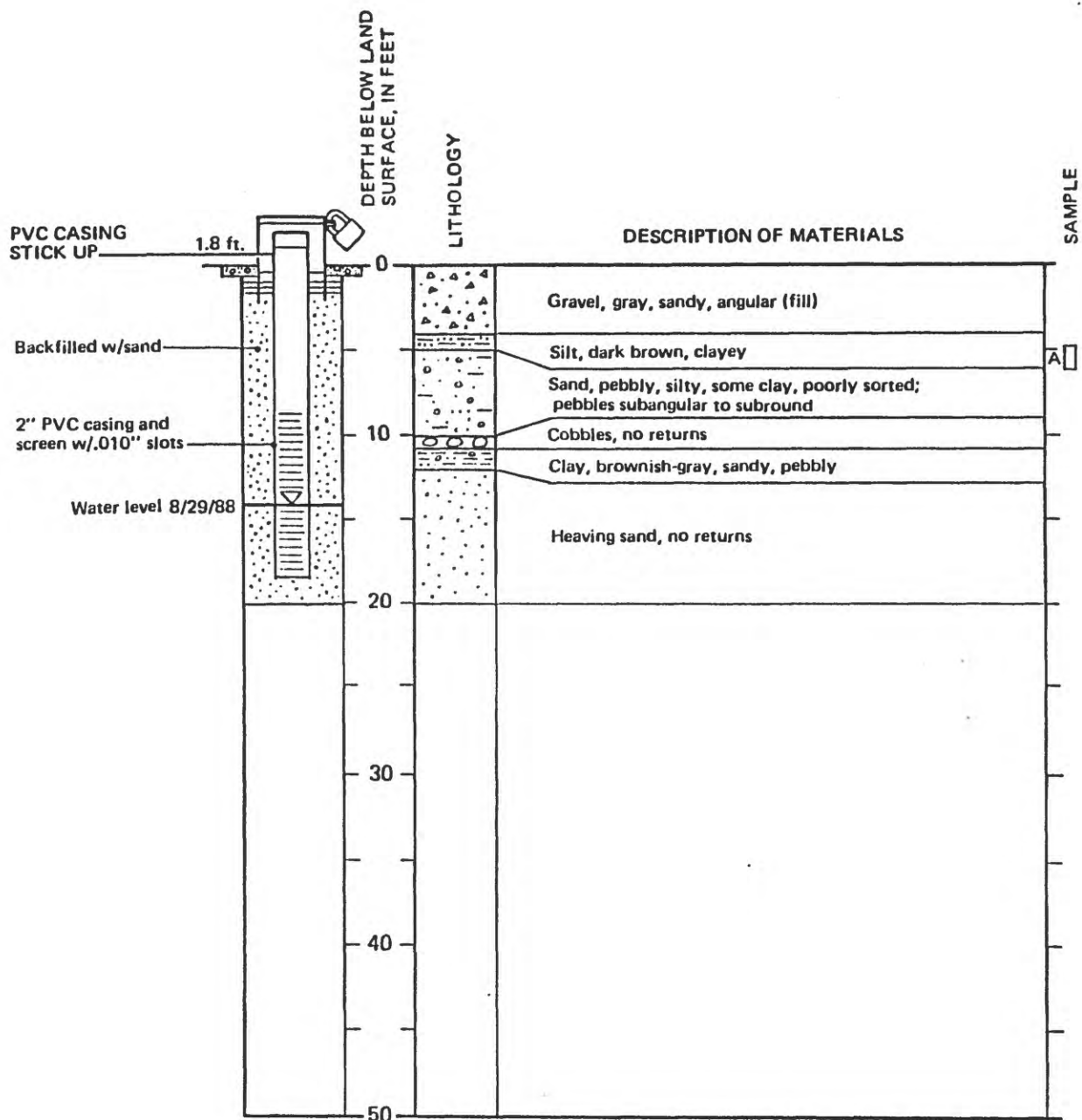


USGS SITE ID No. 574358152302301
 DATE WELL DRILLED 2/6/88
 LATITUDE 57° 43' 58" LONGITUDE 152° 30' 23"
 ELEVATION OF TOP OF WELL CASING 10.6 ft.
 GROUND SURFACE ELEVATION 10.8 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-42.

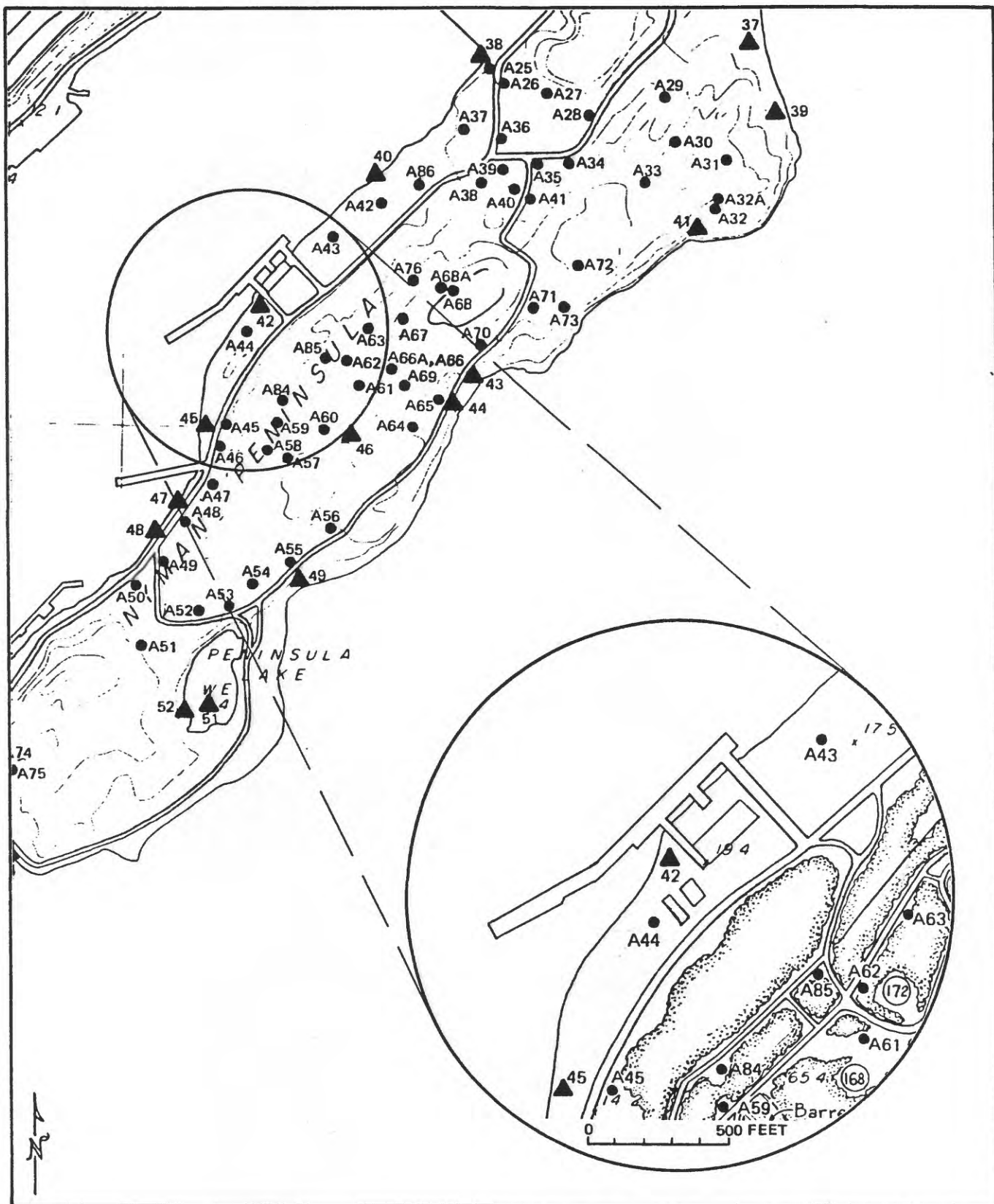


Location of well A-43.

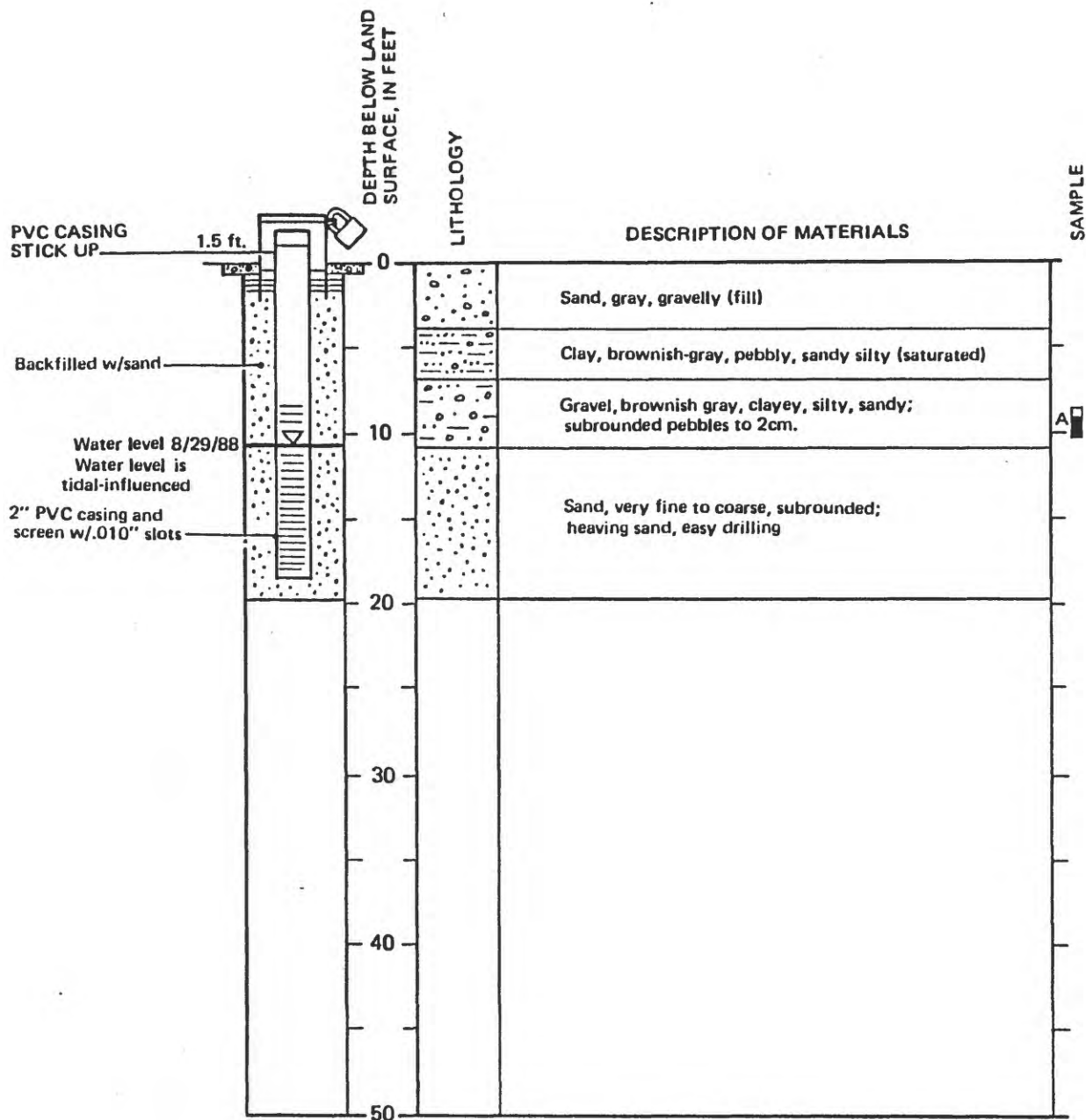


USGS SITE ID No. 574355152303001
 DATE WELL DRILLED 2/5/88
 LATITUDE 57° 43' 55" LONGITUDE 152° 30' 30"
 ELEVATION OF TOP OF WELL CASING 14.3 ft.
 GROUND SURFACE ELEVATION 12.5 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-43.



Location of well A-44.



USGS SITE ID No. 574355152303001

DATE WELL DRILLED 2/5/88

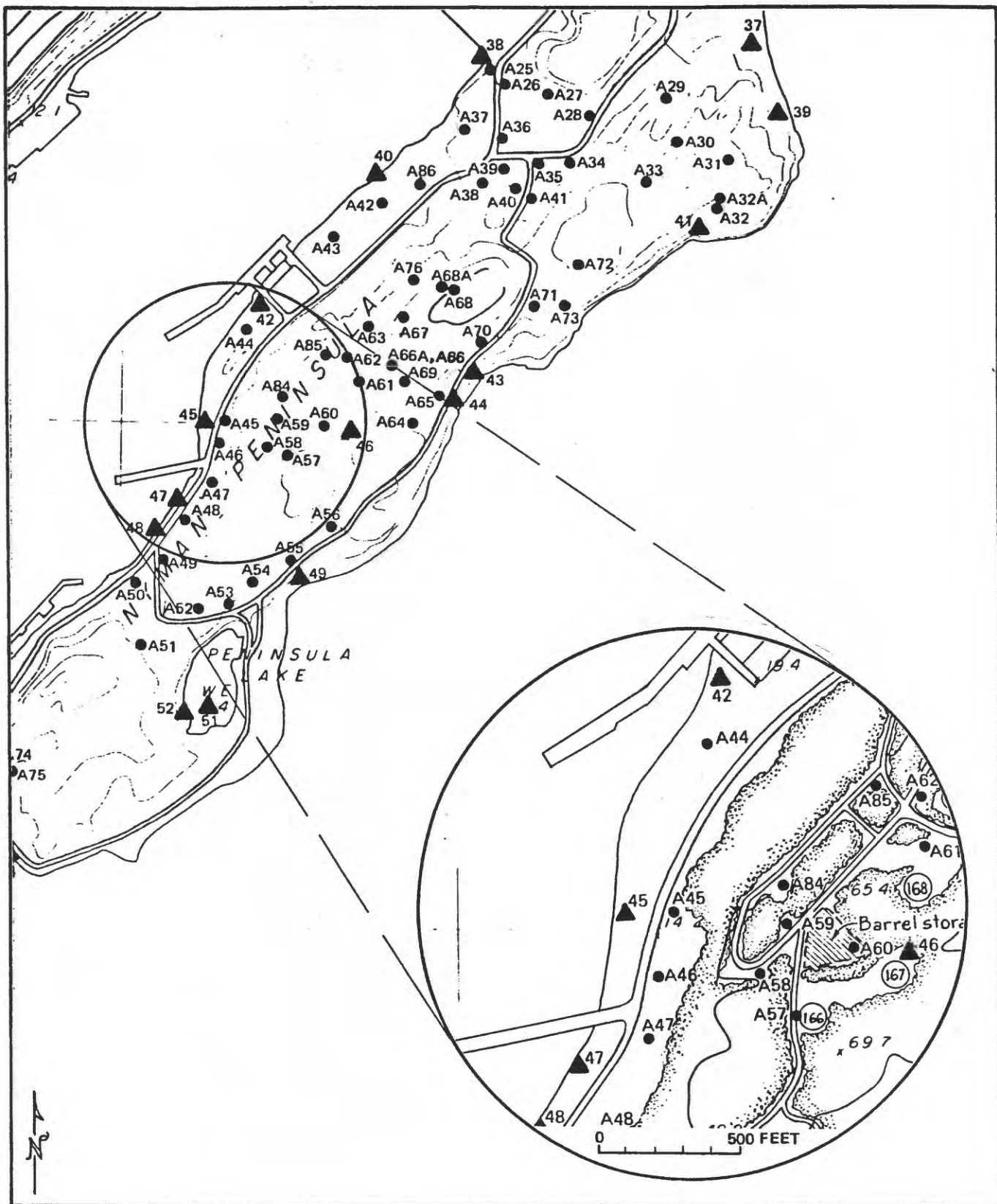
LATITUDE 57°43' 48" LONGITUDE 152°30' 40"

ELEVATION OF TOP OF WELL CASING 8.2 ft.

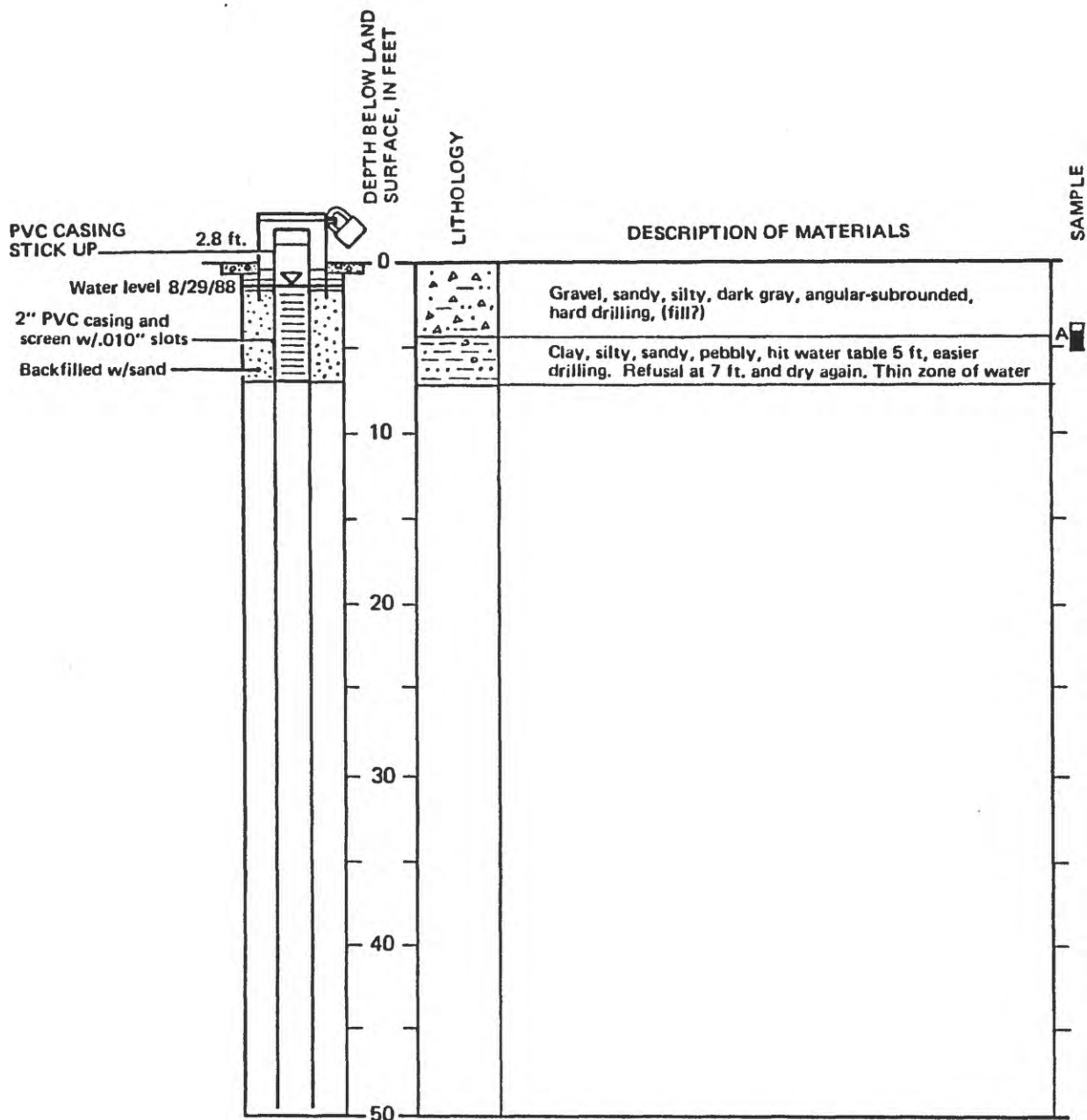
GROUND SURFACE ELEVATION 6.7 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-44.



Location of well A-45.



USGS SITE ID No. 574342152304301

DATE WELL DRILLED 2/6/88

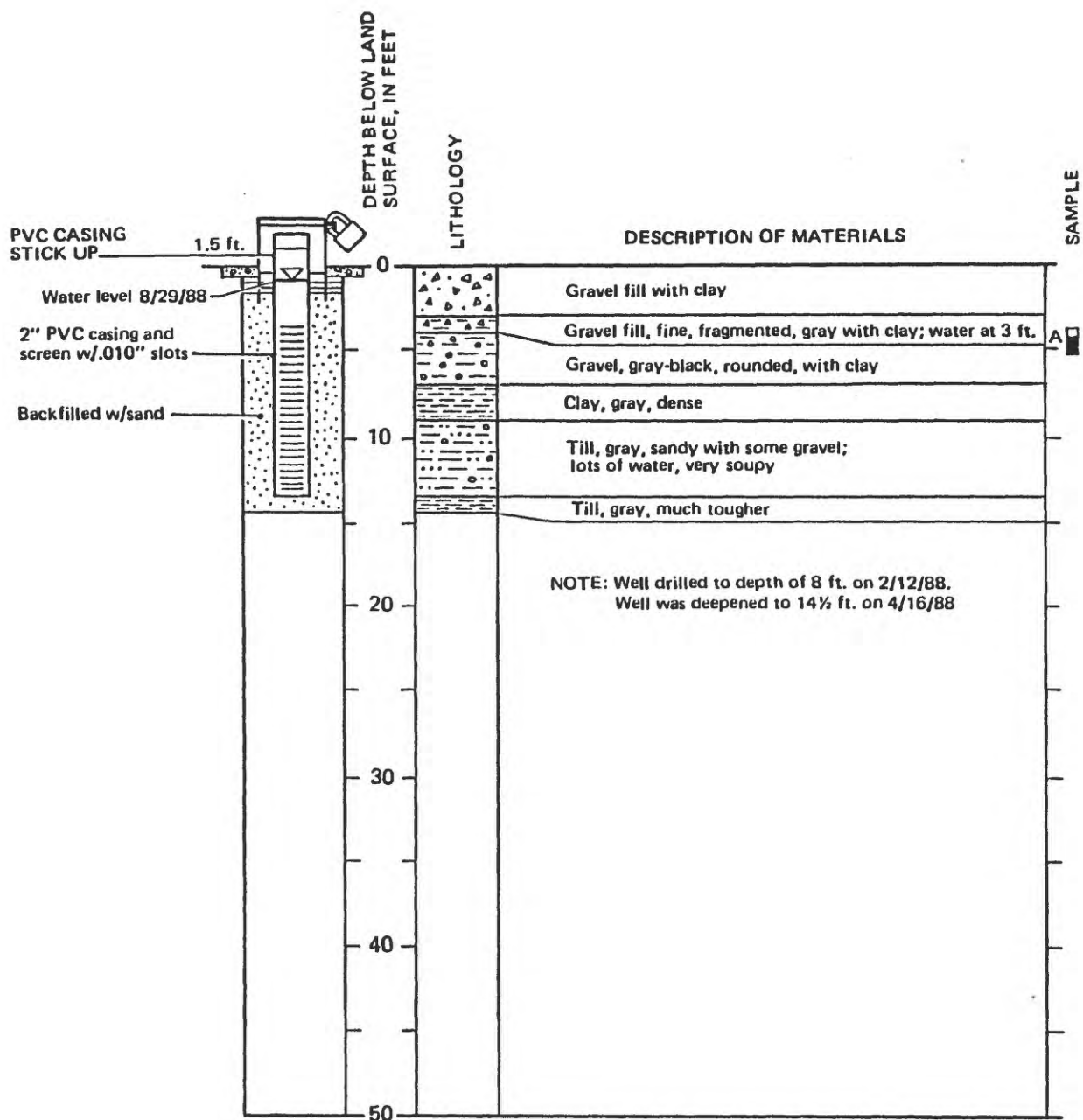
LATITUDE 57° 43' 42" LONGITUDE 152° 30' 43"

ELEVATION OF TOP OF WELL CASING 13.0 ft.

GROUND SURFACE ELEVATION 10.2 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-45.



USGS SITE ID No. 574340152304401

DATE WELL DRILLED 2/12/88

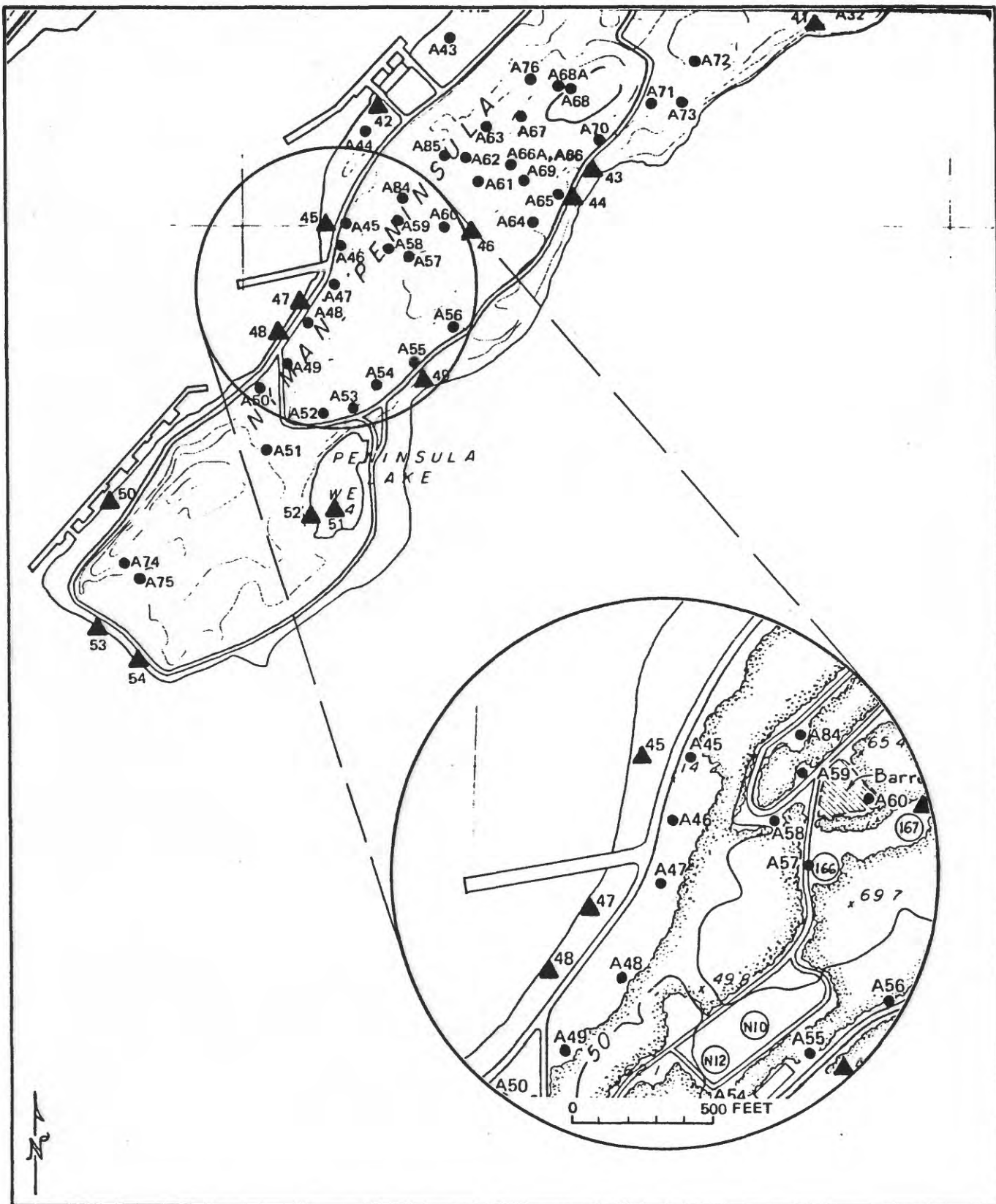
LATITUDE 57°43' 40" LONGITUDE 152°30' 44"

ELEVATION OF TOP OF WELL CASING 12.4 ft.

GROUND SURFACE ELEVATION 10.9 ft.

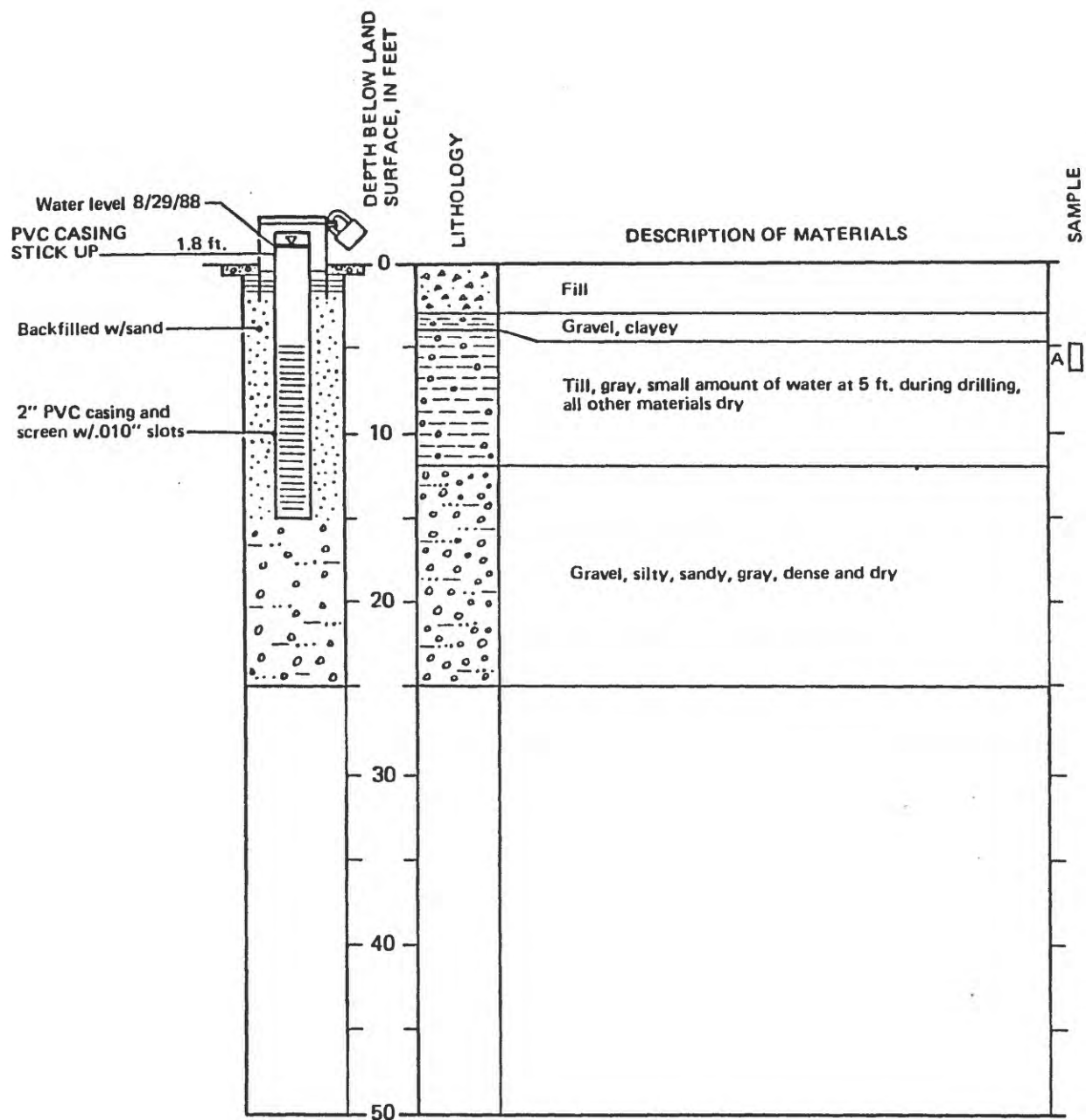
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-46.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-47.



USGS SITE ID No. 574339152304401

DATE WELL DRILLED 2/7/88

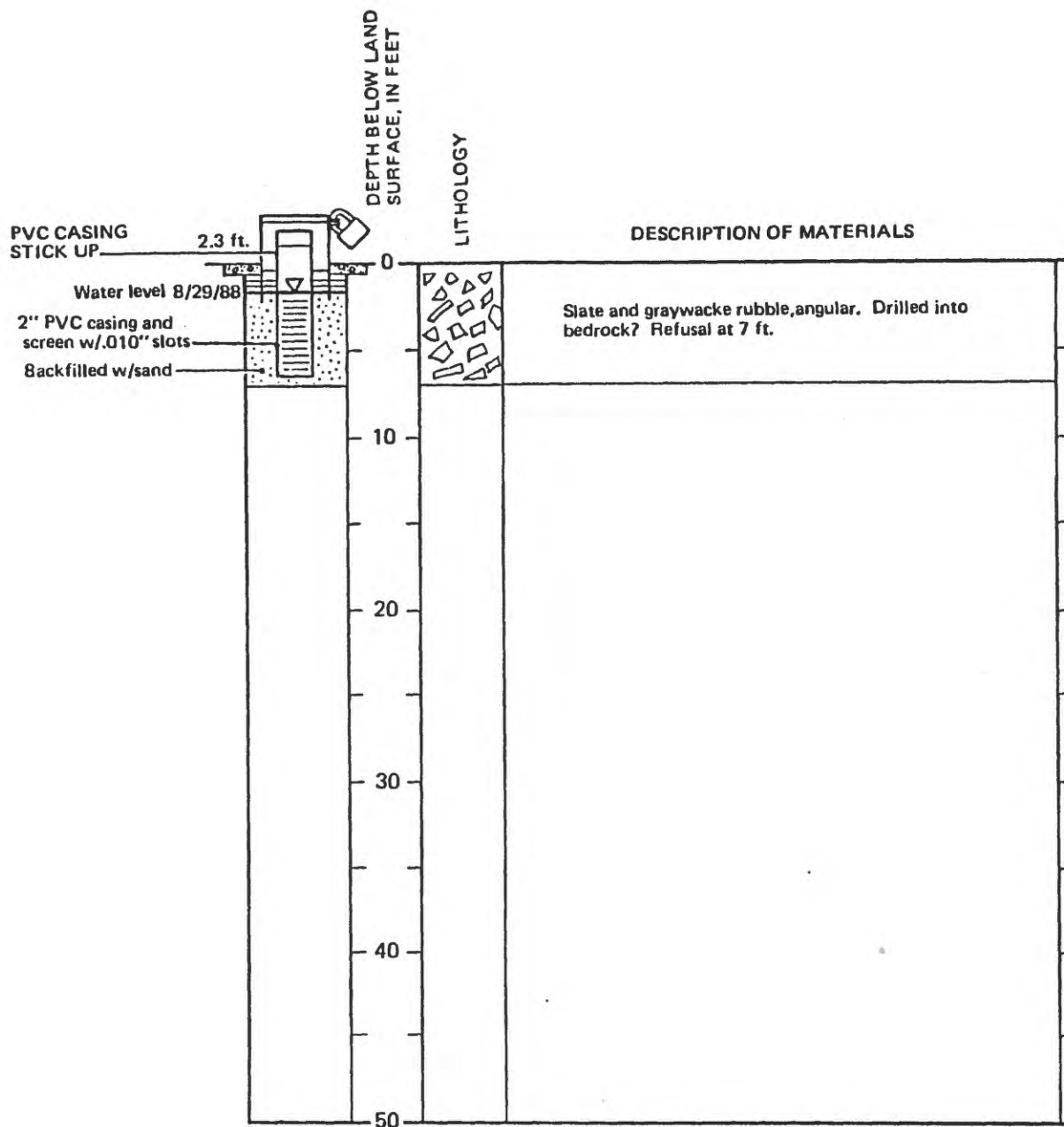
LATITUDE 57° 43' 39" LONGITUDE 152° 30' 44"

ELEVATION OF TOP OF WELL CASING 14.3 ft.

GROUND SURFACE ELEVATION 12.5 ft.

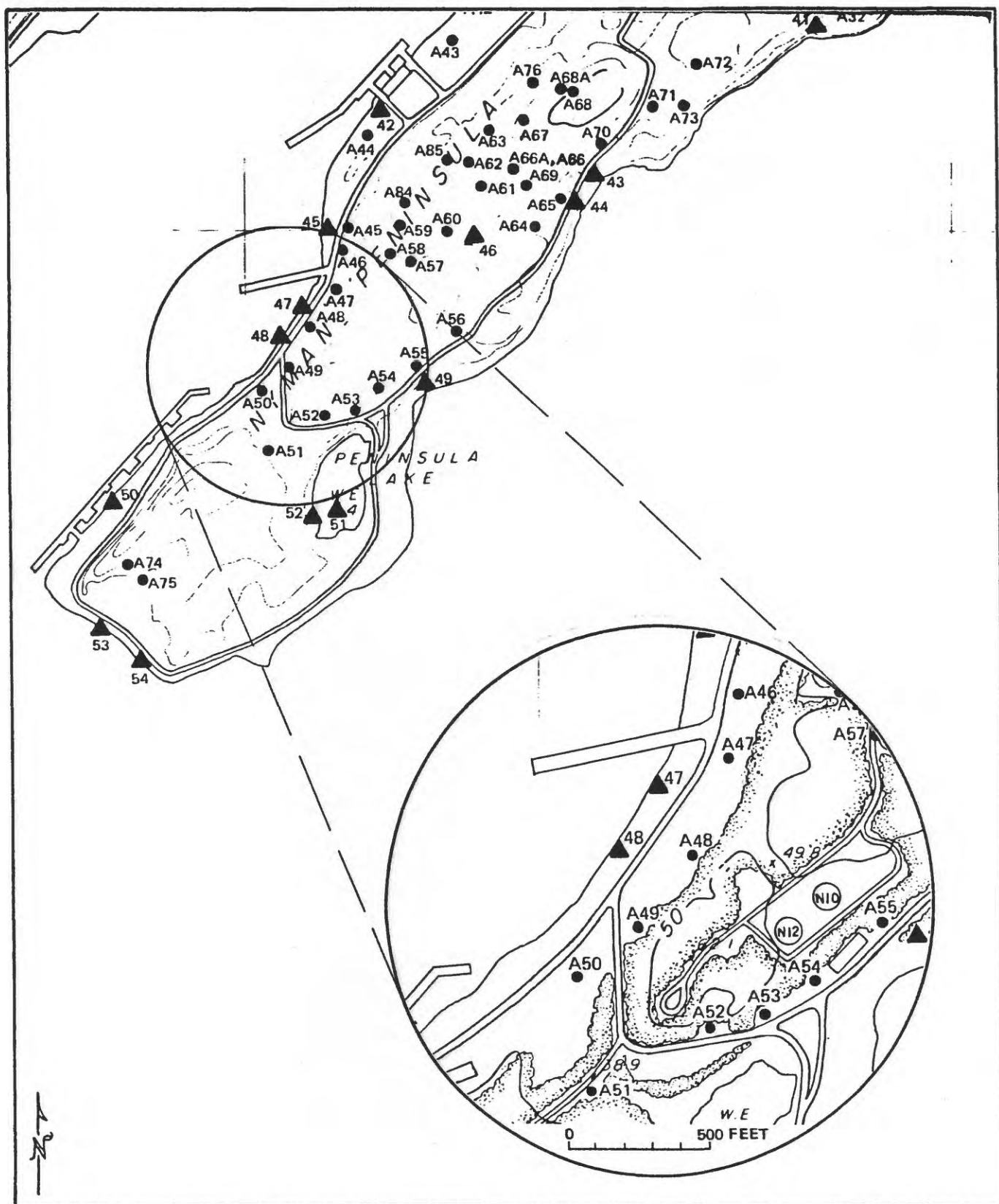
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-47.

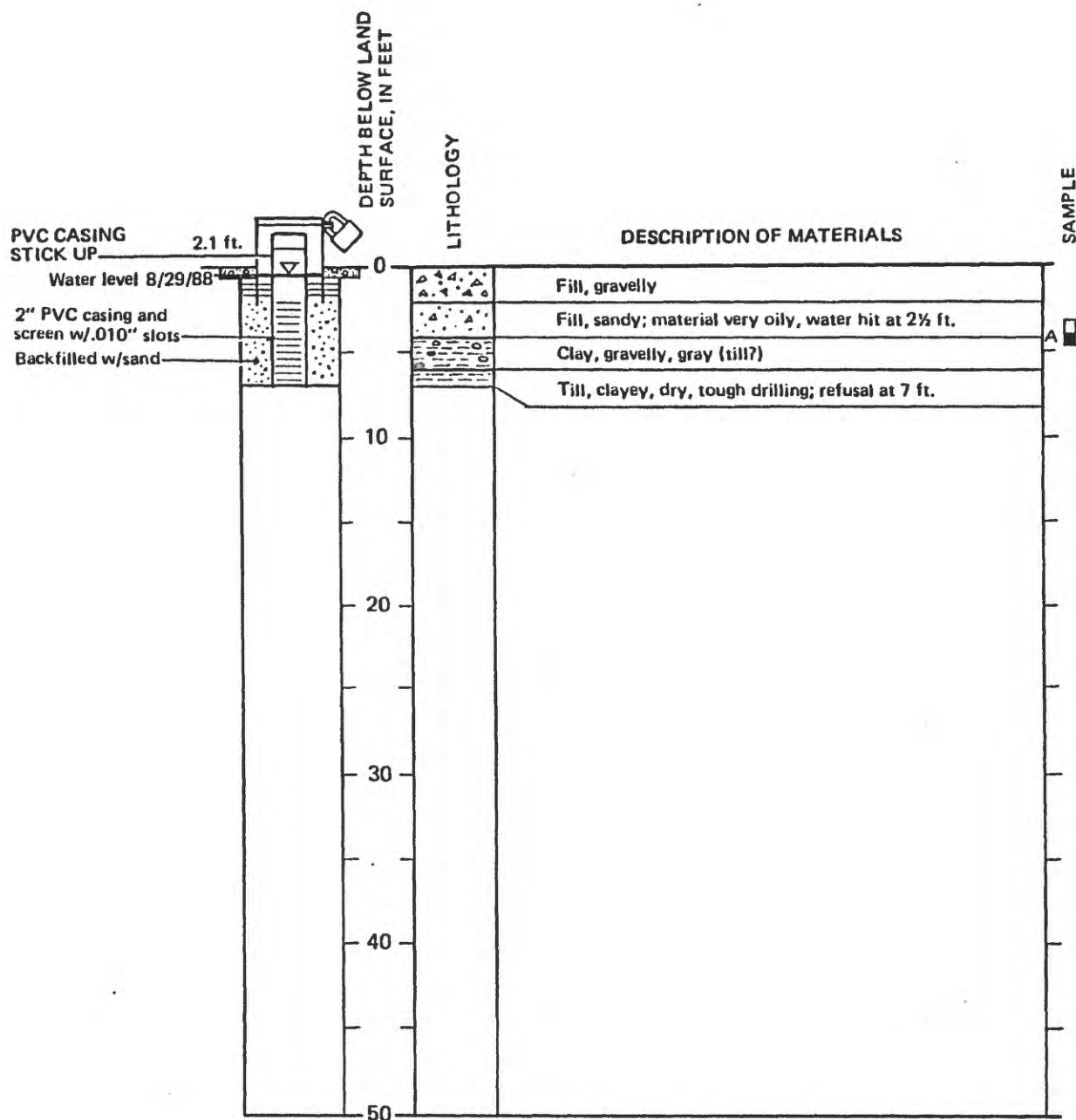


USGS SITE ID No. 574335152304801
 DATE WELL DRILLED 2/6/88
 LATITUDE 57° 43' 35" LONGITUDE 152° 30' 48"
 ELEVATION OF TOP OF WELL CASING 16.0 ft.
 GROUND SURFACE ELEVATION 13.7 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-48.

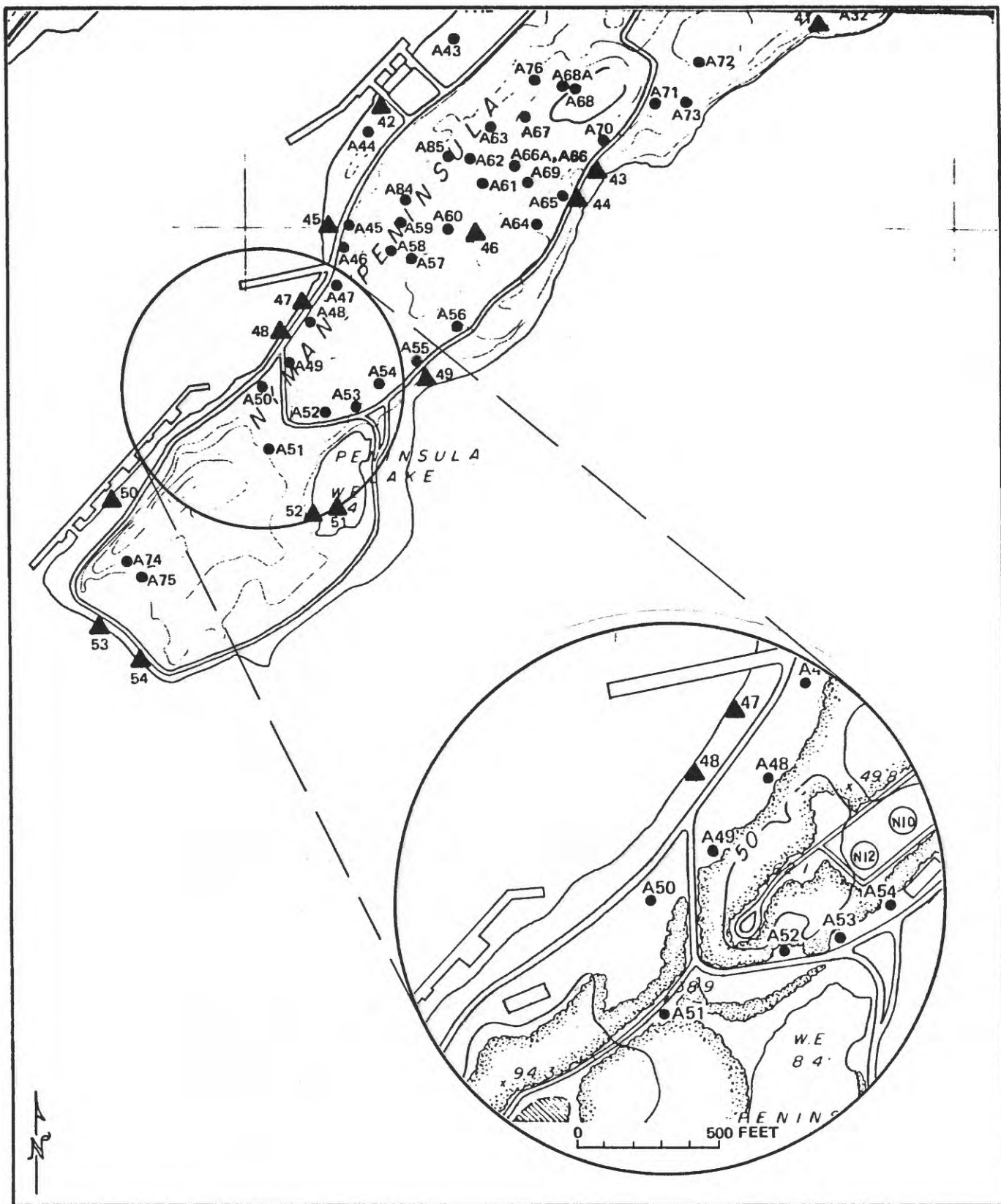


Location of well A-49.



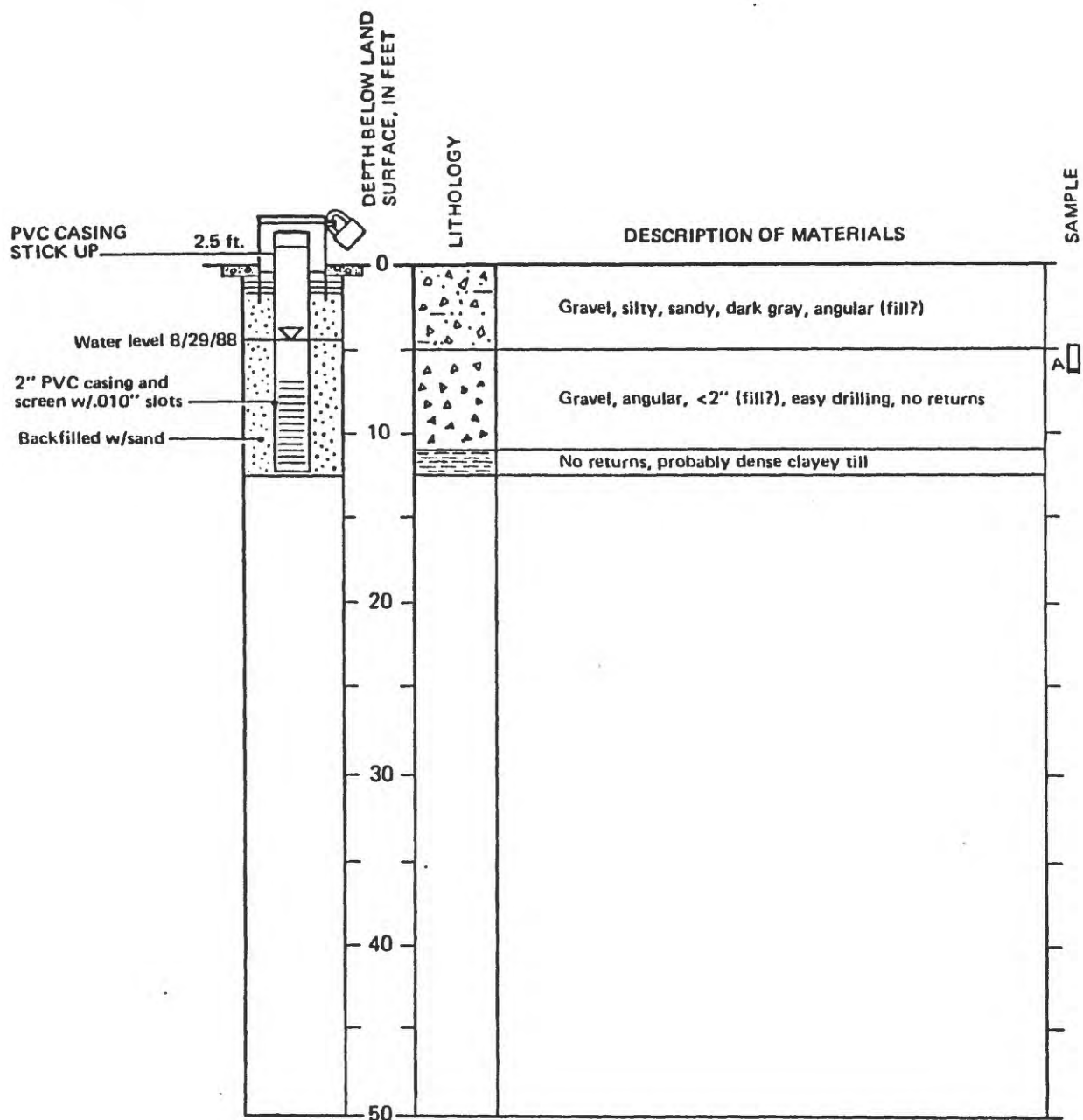
USGS SITE ID No. 574332152305101
 DATE WELL DRILLED 2/8/88
 LATITUDE 57° 43' 32" LONGITUDE 152° 30' 51"
 ELEVATION OF TOP OF WELL CASING 12.1 ft.
 GROUND SURFACE ELEVATION 10.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-49.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-50.



USGS SITE ID No. 574331152305601

DATE WELL DRILLED 2/7/88

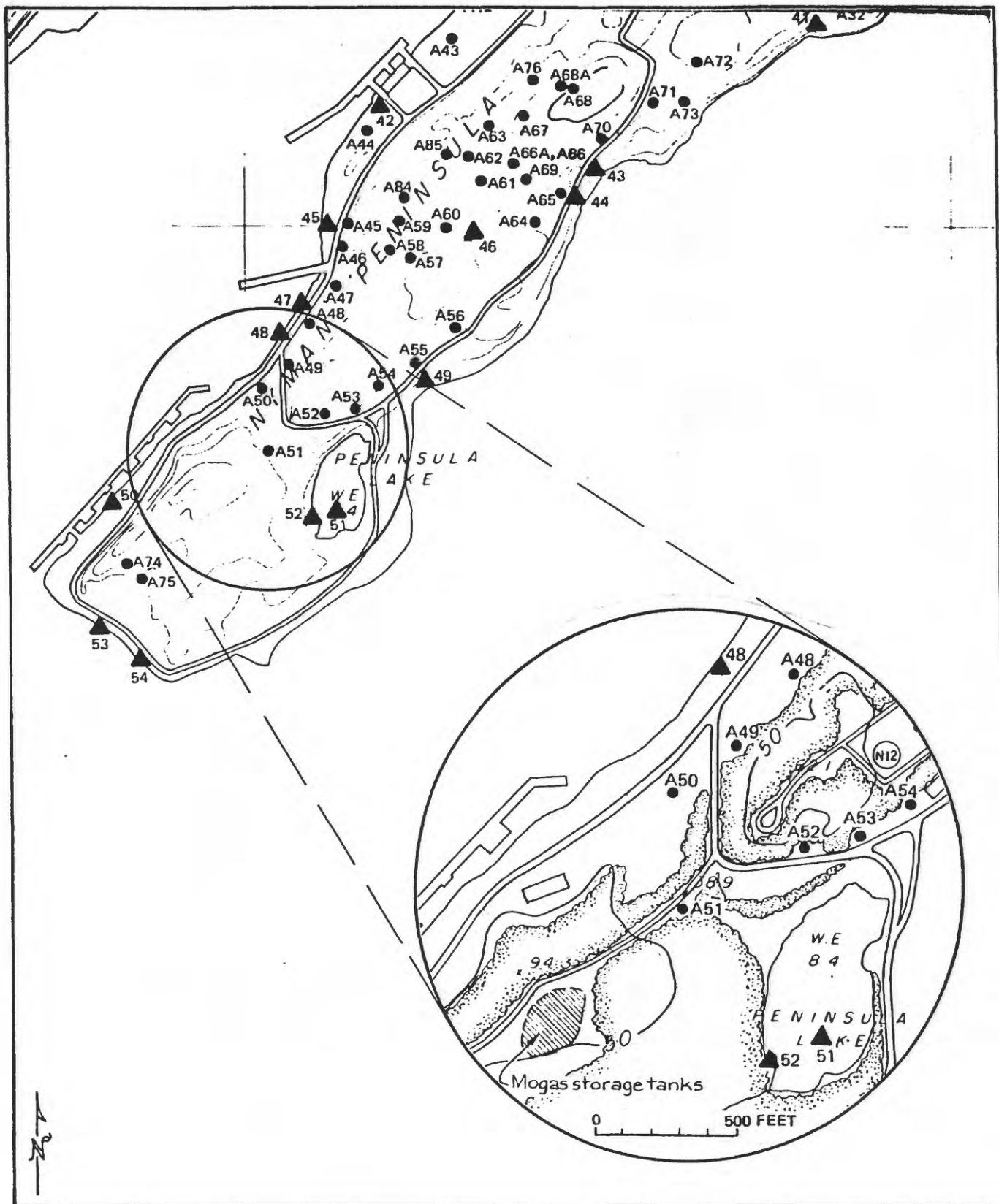
LATITUDE 57° 43' 31" LONGITUDE 152° 30' 56"

ELEVATION OF TOP OF WELL CASING 10.7 ft.

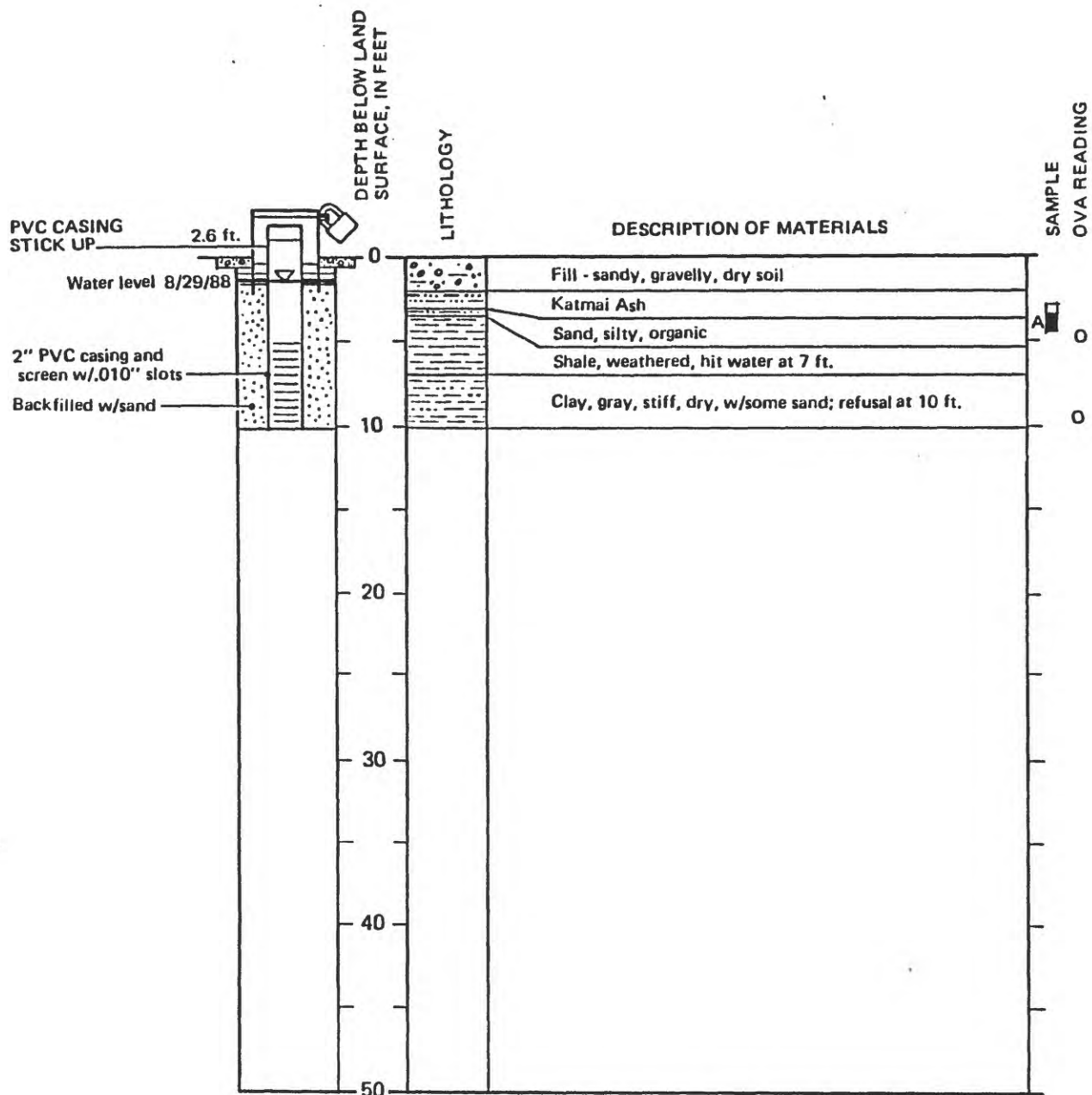
GROUND SURFACE ELEVATION 8.2 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-50.

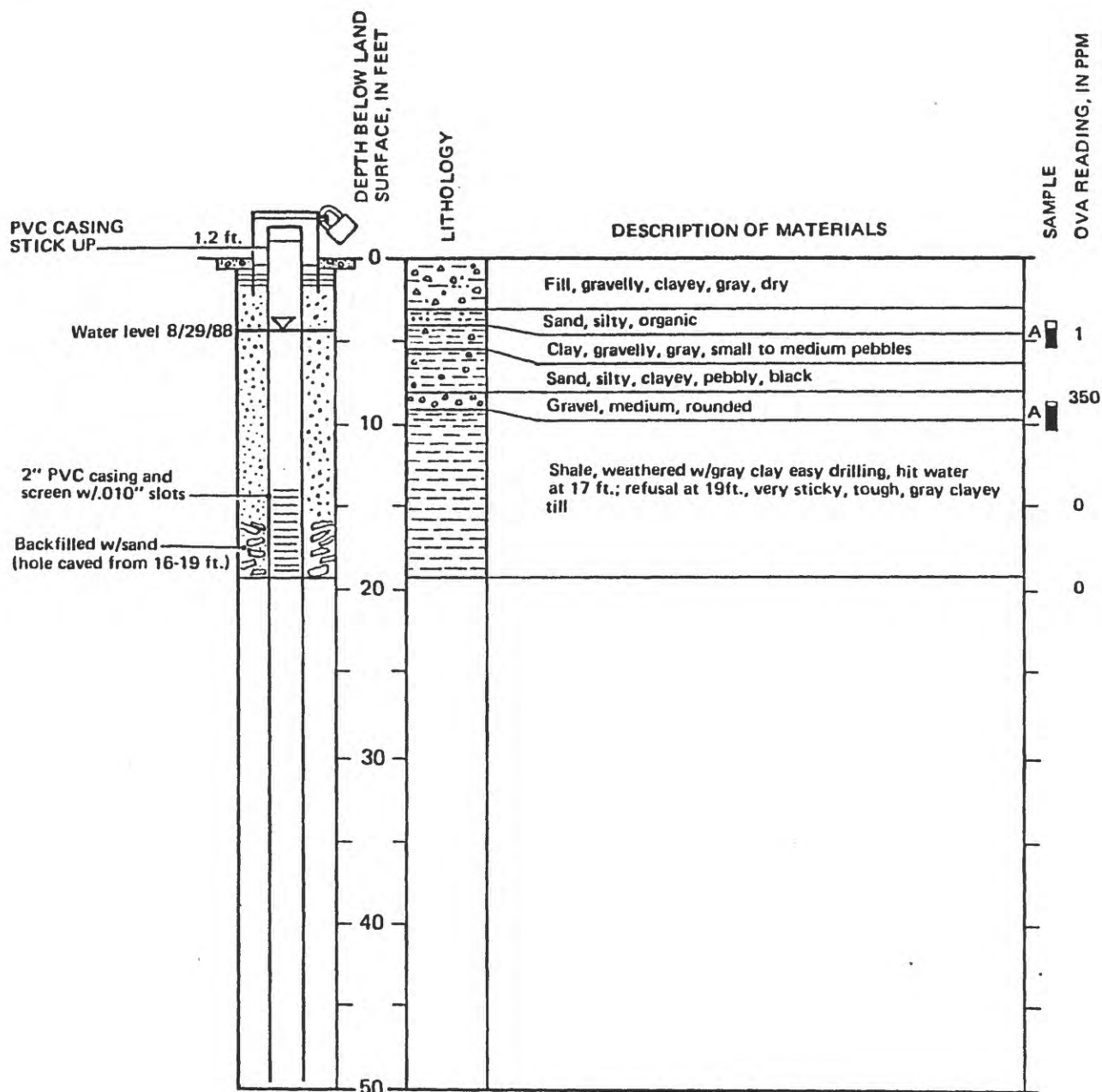


Location of well A-51.



USGS SITE ID No. 574327152305501
 DATE WELL DRILLED 2/9/88
 LATITUDE 57° 43' 27" LONGITUDE 152° 30' 55"
 ELEVATION OF TOP OF WELL CASING 40.7 ft.
 GROUND SURFACE ELEVATION 38.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-51.

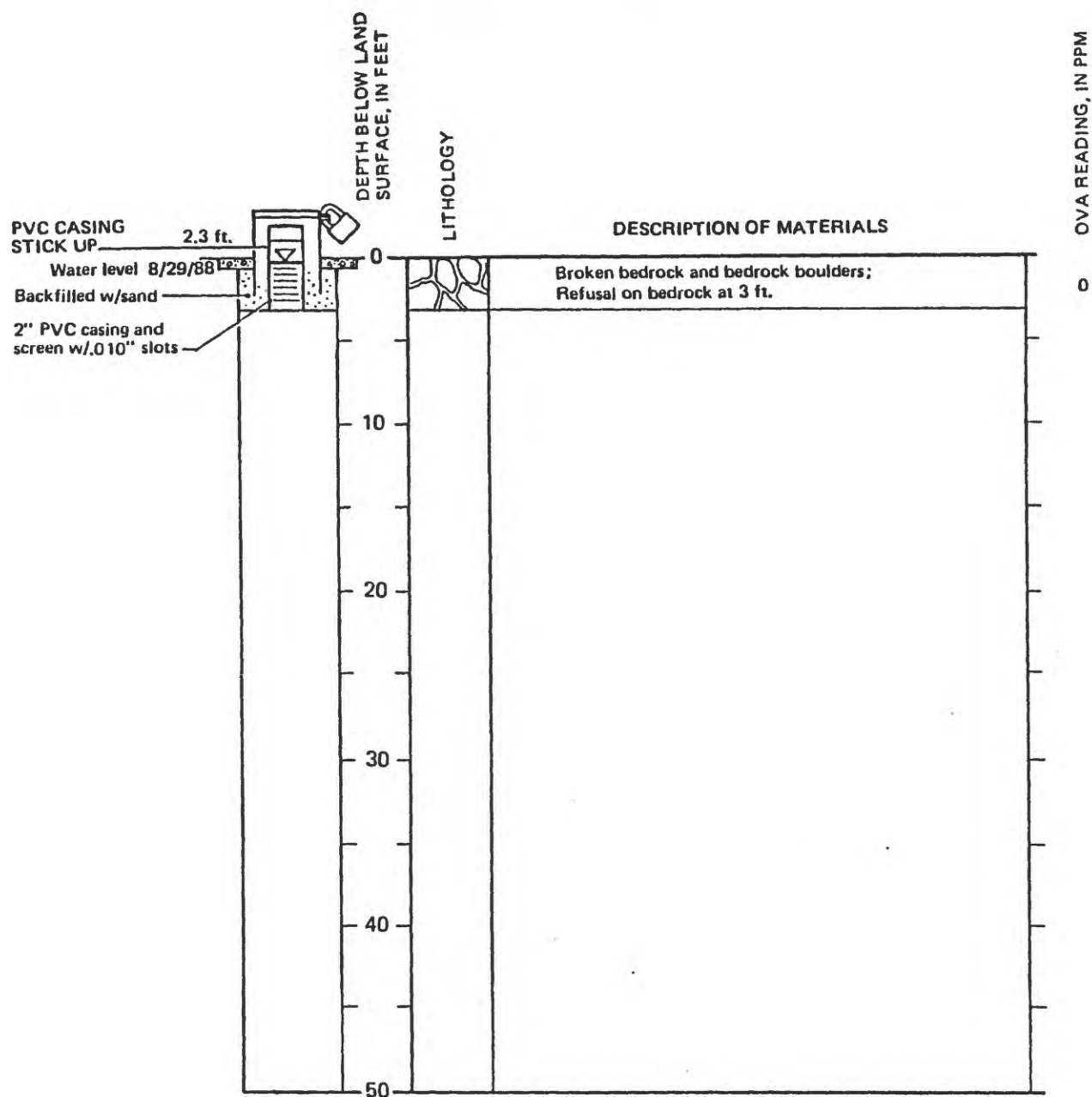


USGS SITE ID No. 574329152304701
 DATE WELL DRILLED 2/9/88
 LATITUDE 57° 43' 29" LONGITUDE 152° 30' 47"
 ELEVATION OF TOP OF WELL CASING 43.1 ft.
 GROUND SURFACE ELEVATION 41.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-52.

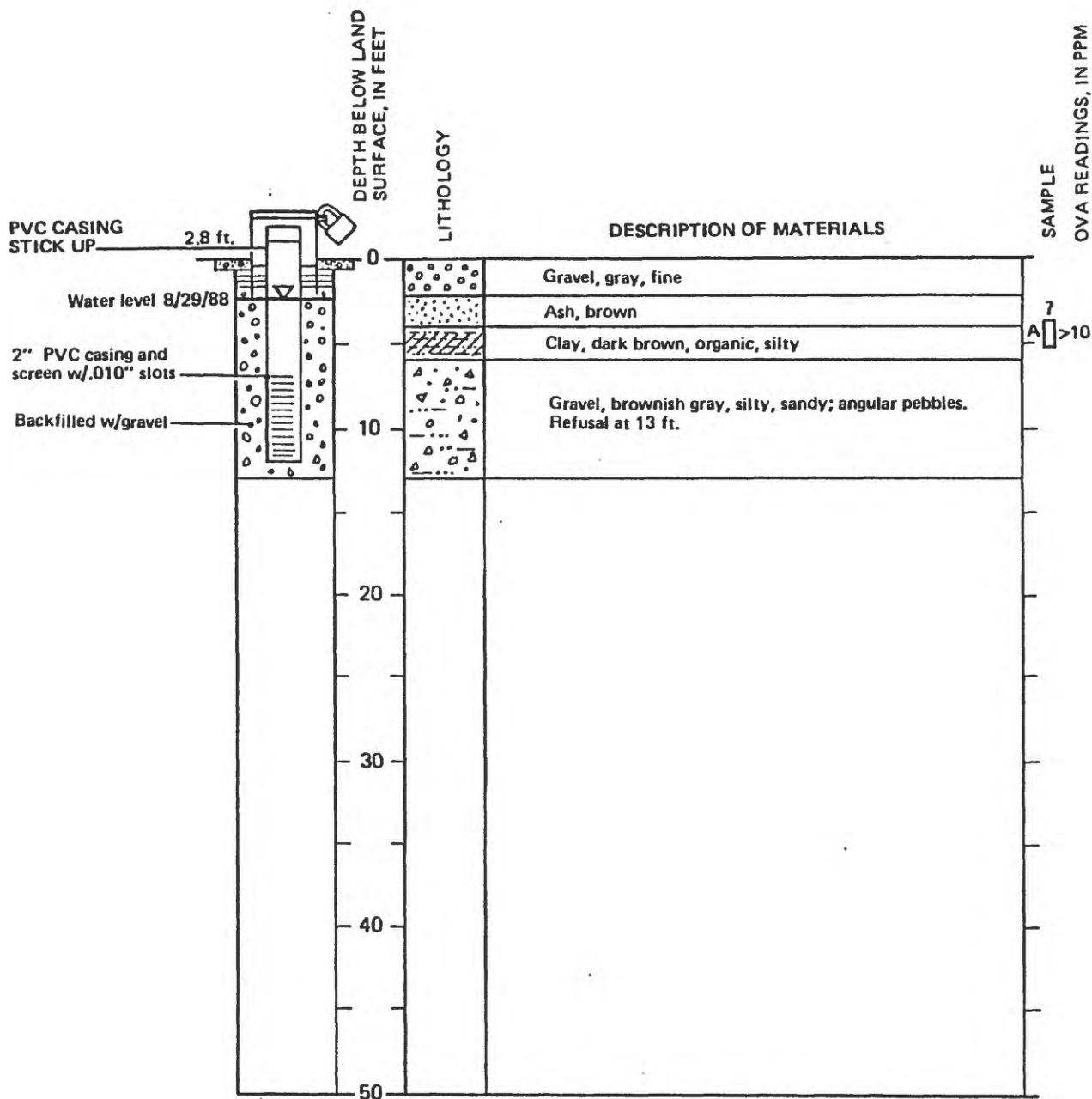


Location of well A-53.



USGS SITE ID No. 574329152304301
 DATE WELL DRILLED 2/9/88
 LATITUDE 57° 43' 29" LONGITUDE 152° 30' 43"
 ELEVATION OF TOP OF WELL CASING 31.7 ft.
 GROUND SURFACE ELEVATION 29.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-53.



USGS SITE ID No. 574330152304001

DATE WELL DRILLED 2/3/88

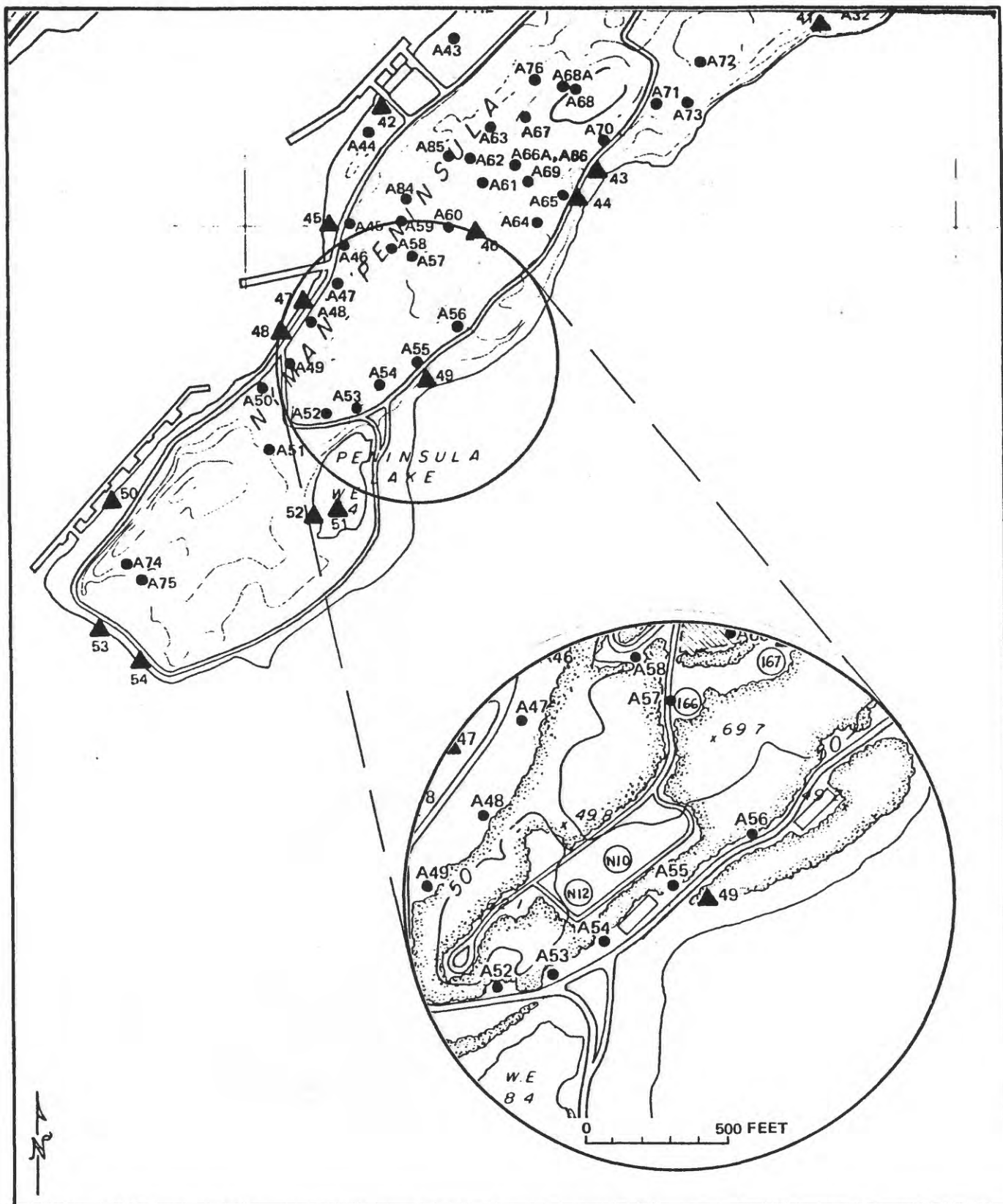
LATITUDE 57° 43' 30" LONGITUDE 152° 30' 40"

ELEVATION OF TOP OF WELL CASING 33.3 ft.

GROUND SURFACE ELEVATION 30.5 ft.

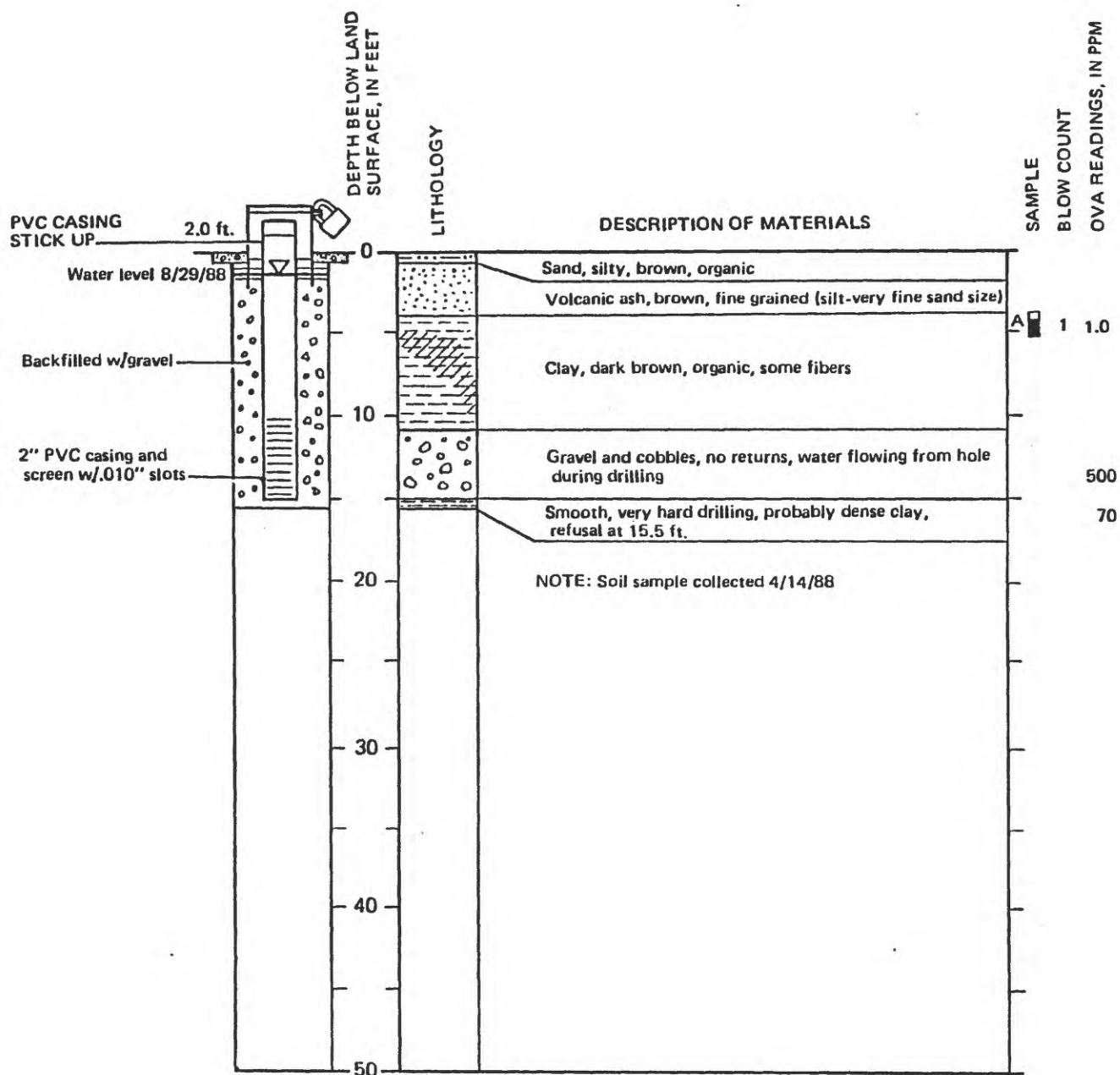
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-54.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-55.



USGS SITE ID No. 574332152303601

DATE WELL DRILLED 2/2/88

LATITUDE 57° 43' 32" LONGITUDE 152° 30' 36"

ELEVATION OF TOP OF WELL CASING 27.4 ft.

GROUND SURFACE ELEVATION 25.4 ft.

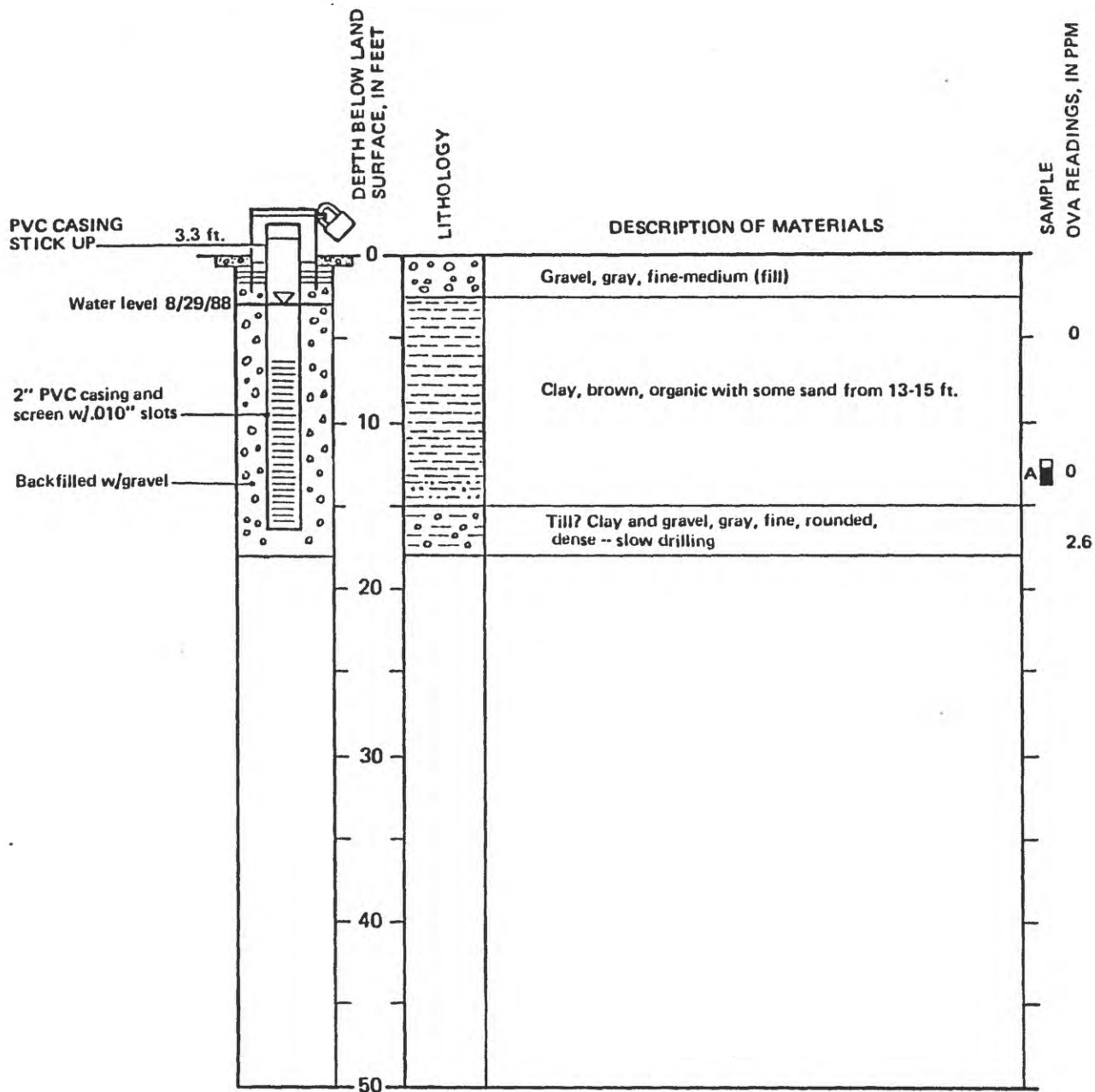
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-55.



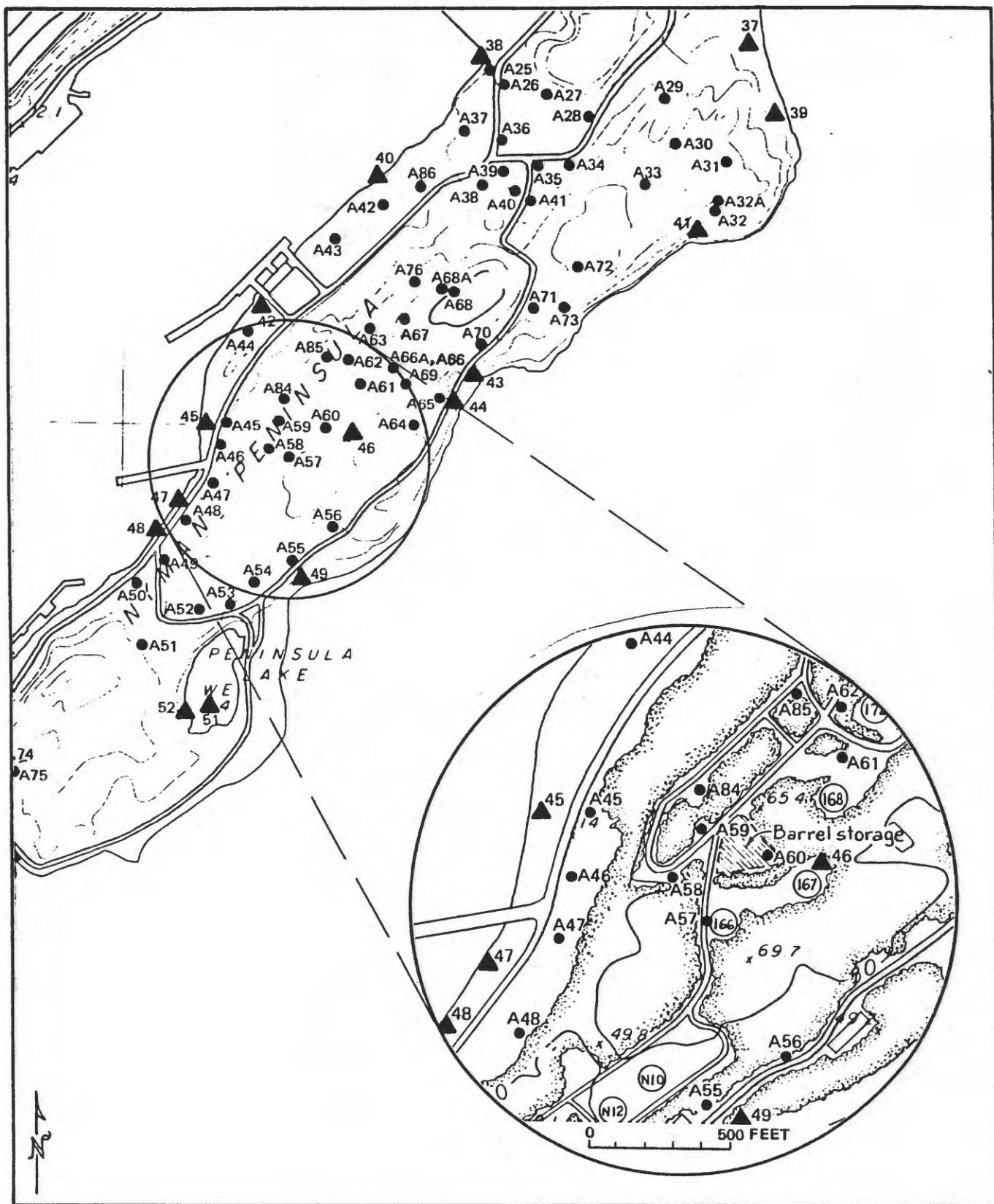
0 1000 2000 FEET
0 200 400 METERS

Location of well A-56.

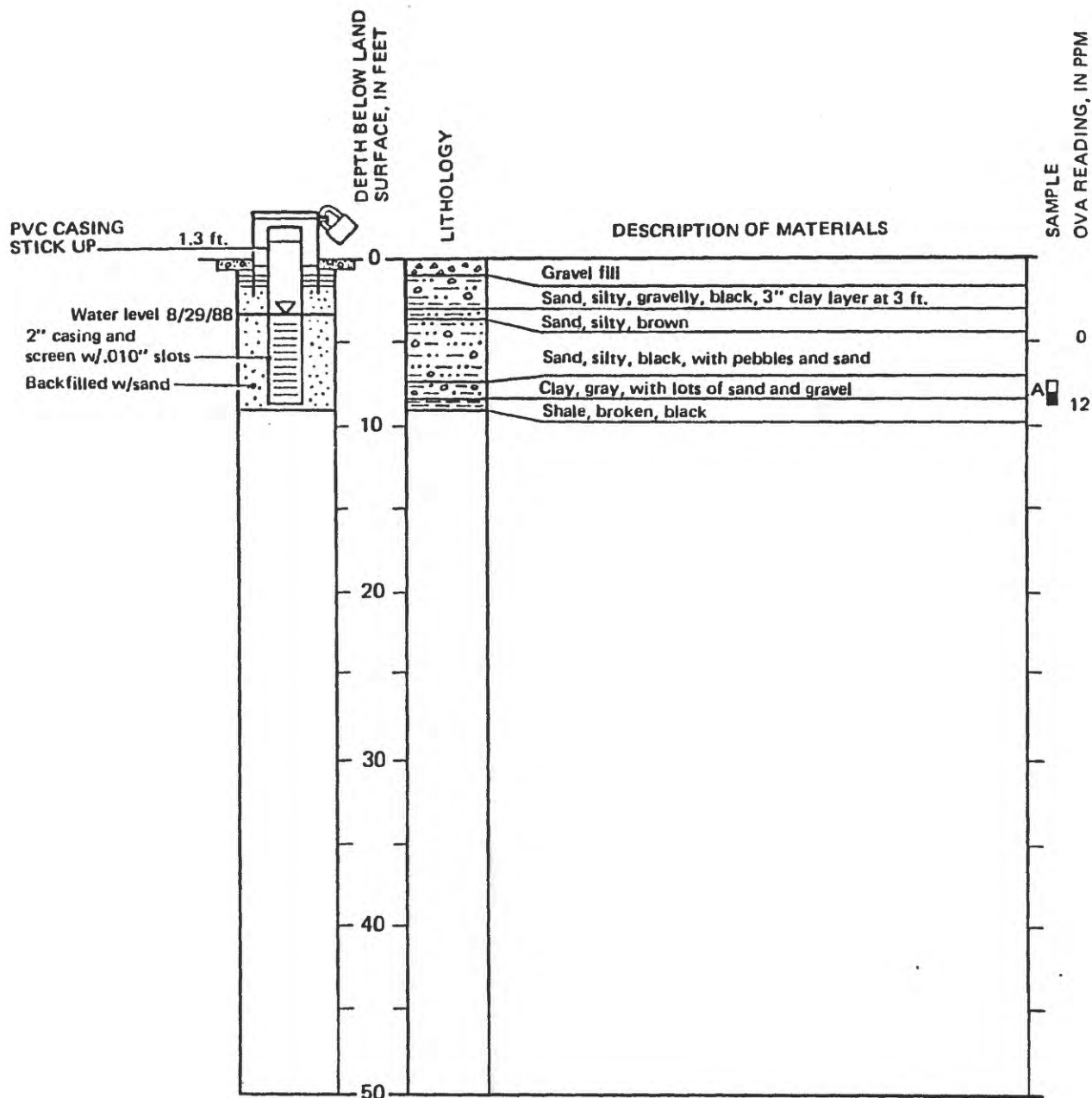


USGS SITE ID No. 574334152303101
 DATE WELL DRILLED 2/2/88
 LATITUDE 57°43' 34" LONGITUDE 152°30' 31"
 ELEVATION OF TOP OF WELL CASING 31.1 ft.
 GROUND SURFACE ELEVATION 27.8 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-56.

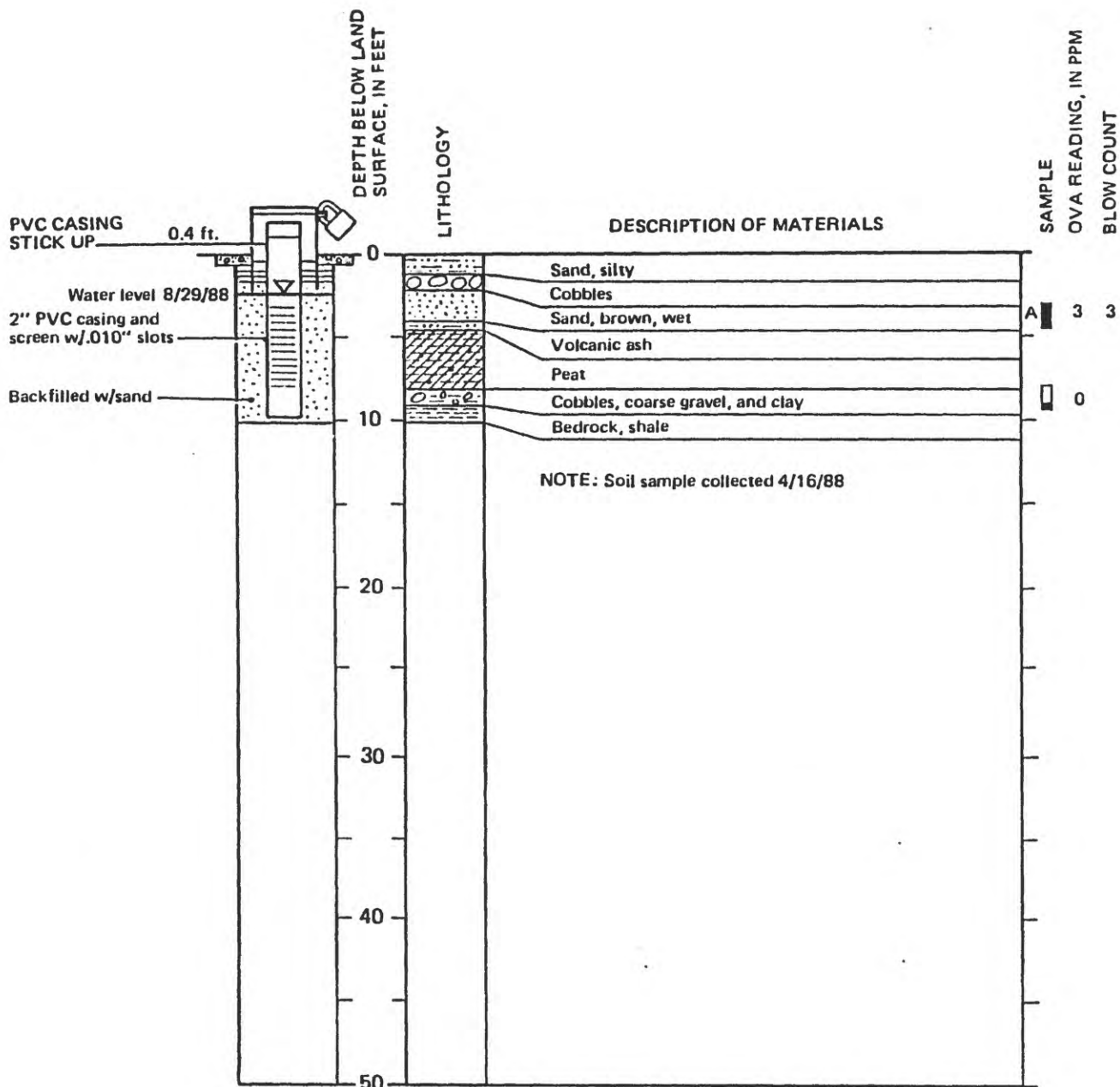


Location of well A-57.



USGS SITE ID No. 574339152303601
 DATE WELL DRILLED 2/10/88
 LATITUDE 57°43' 39" LONGITUDE 152°30' 36"
 ELEVATION OF TOP OF WELL CASING 58.0 ft.
 GROUND SURFACE ELEVATION 56.7 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-57.



USGS SITE ID No. 574340152303801

DATE WELL DRILLED 2/10/88

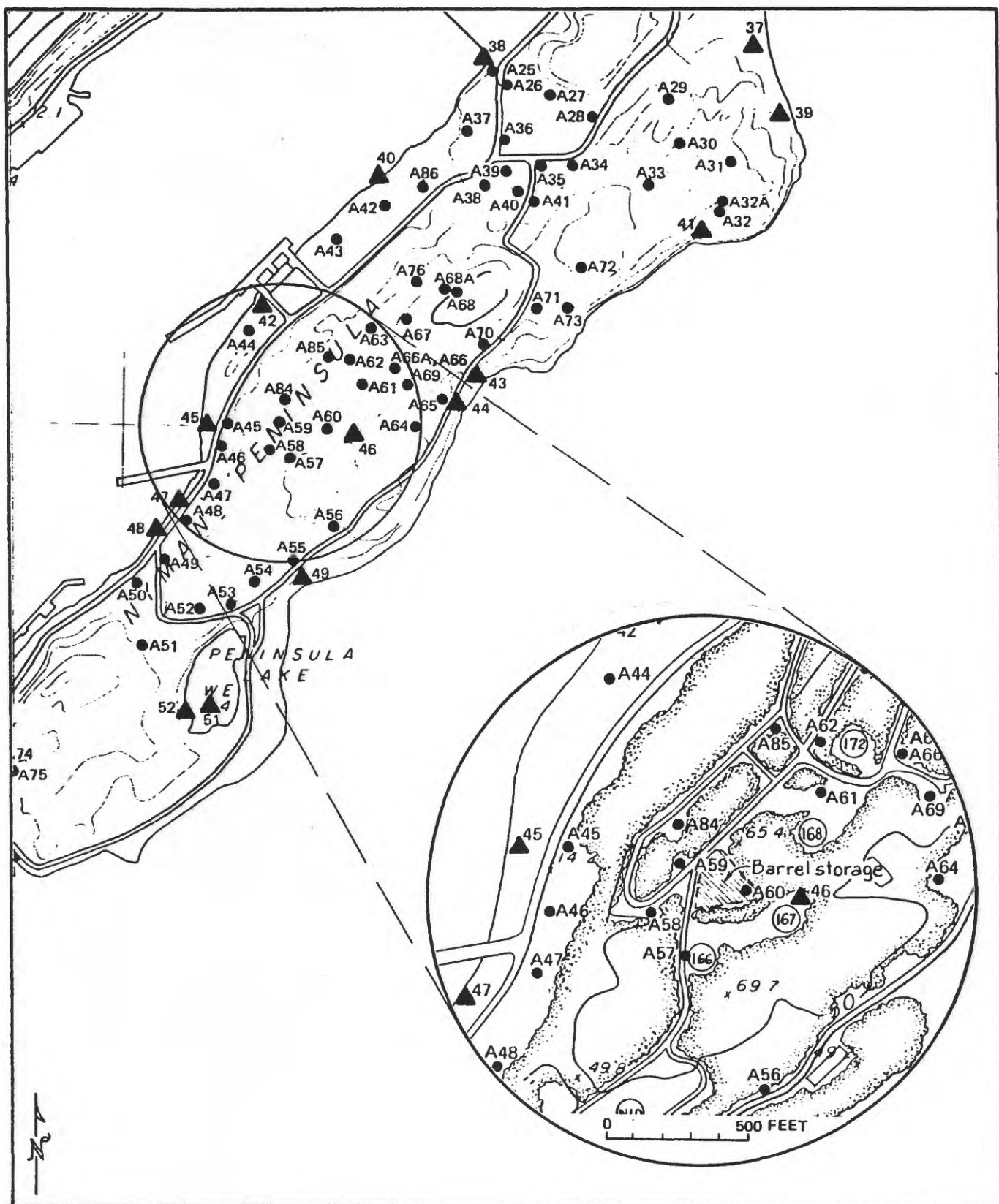
LATITUDE 57° 43' 40" LONGITUDE 152° 30' 38"

ELEVATION OF TOP OF WELL CASING 53.1 ft.

GROUND SURFACE ELEVATION 52.7 ft.

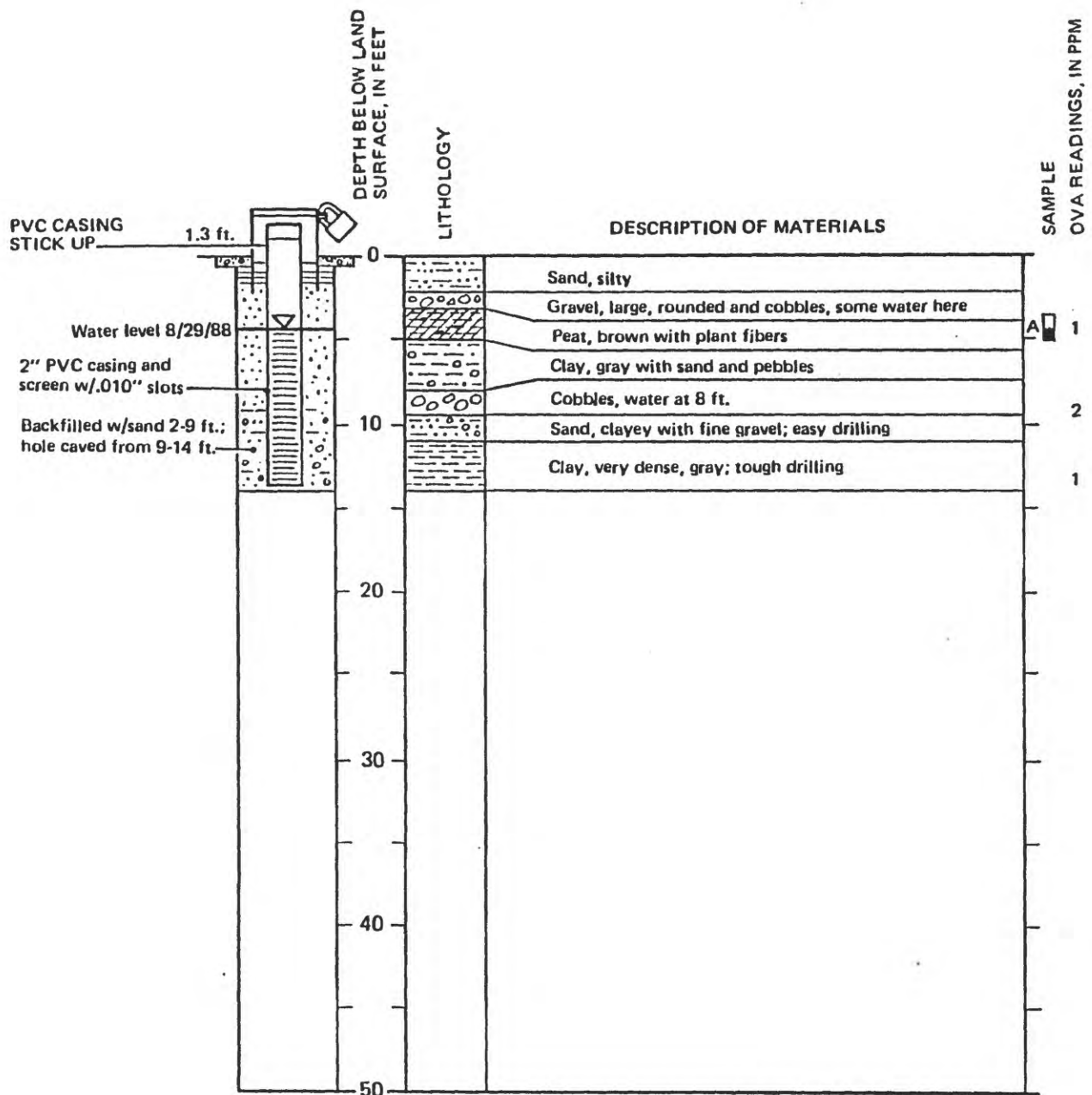
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-58.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-59.



USGS SITE ID No. 574342152303601

DATE WELL DRILLED 2/10/88

LATITUDE 57°43' 42" LONGITUDE 152°30' 36"

ELEVATION OF TOP OF WELL CASING 56.9 ft.

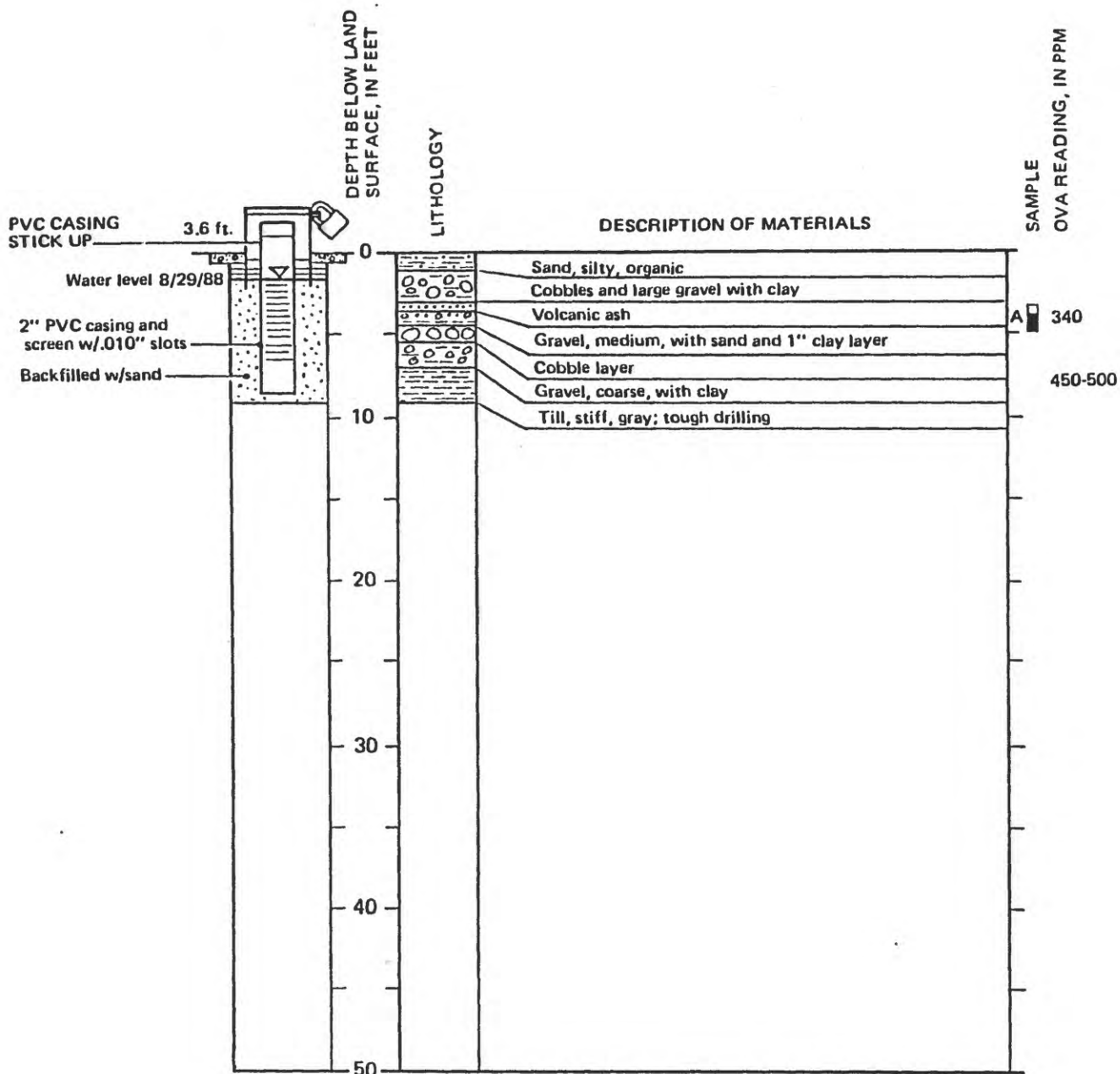
GROUND SURFACE ELEVATION 55.6 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-59.

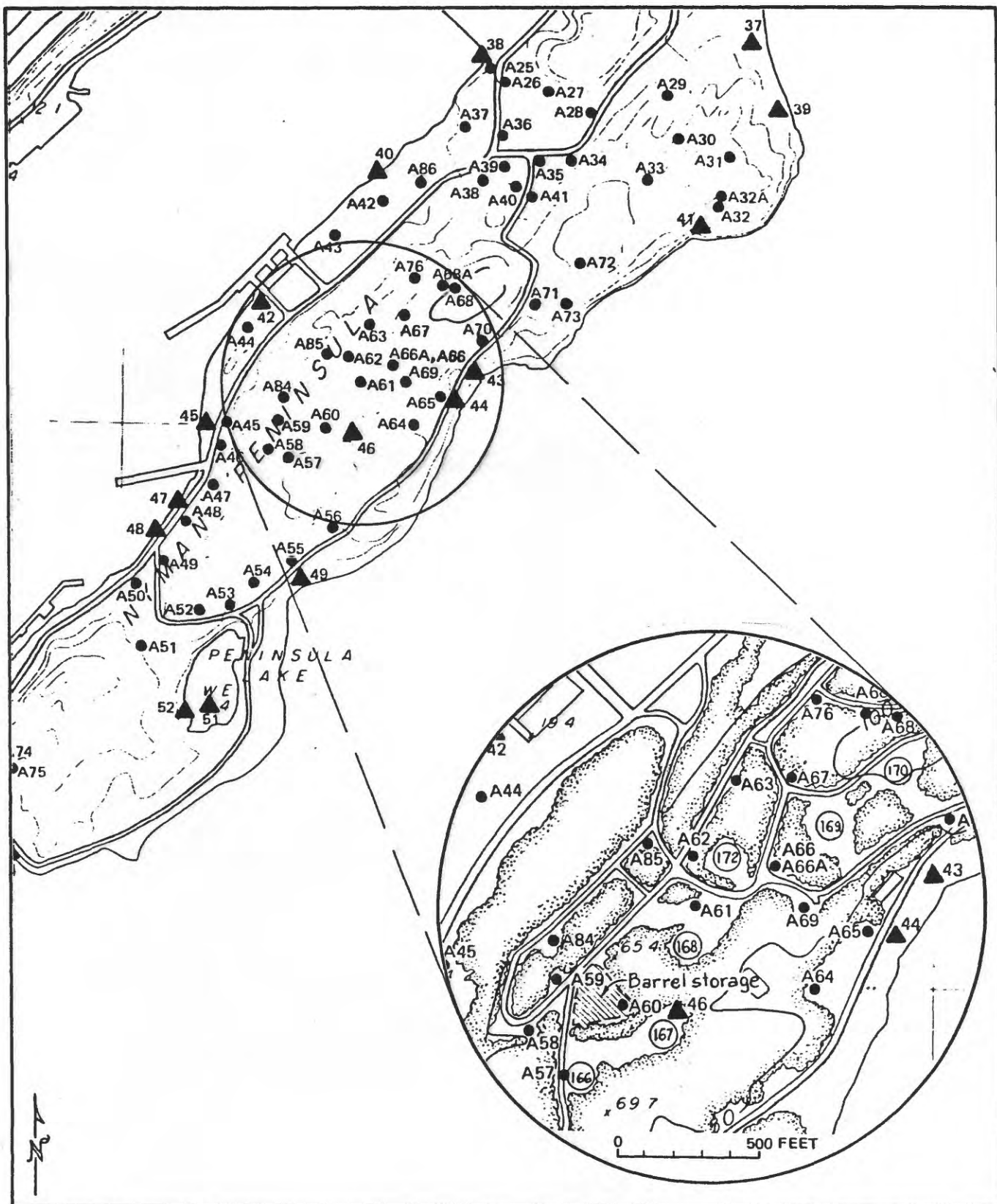


Location of well A-60.

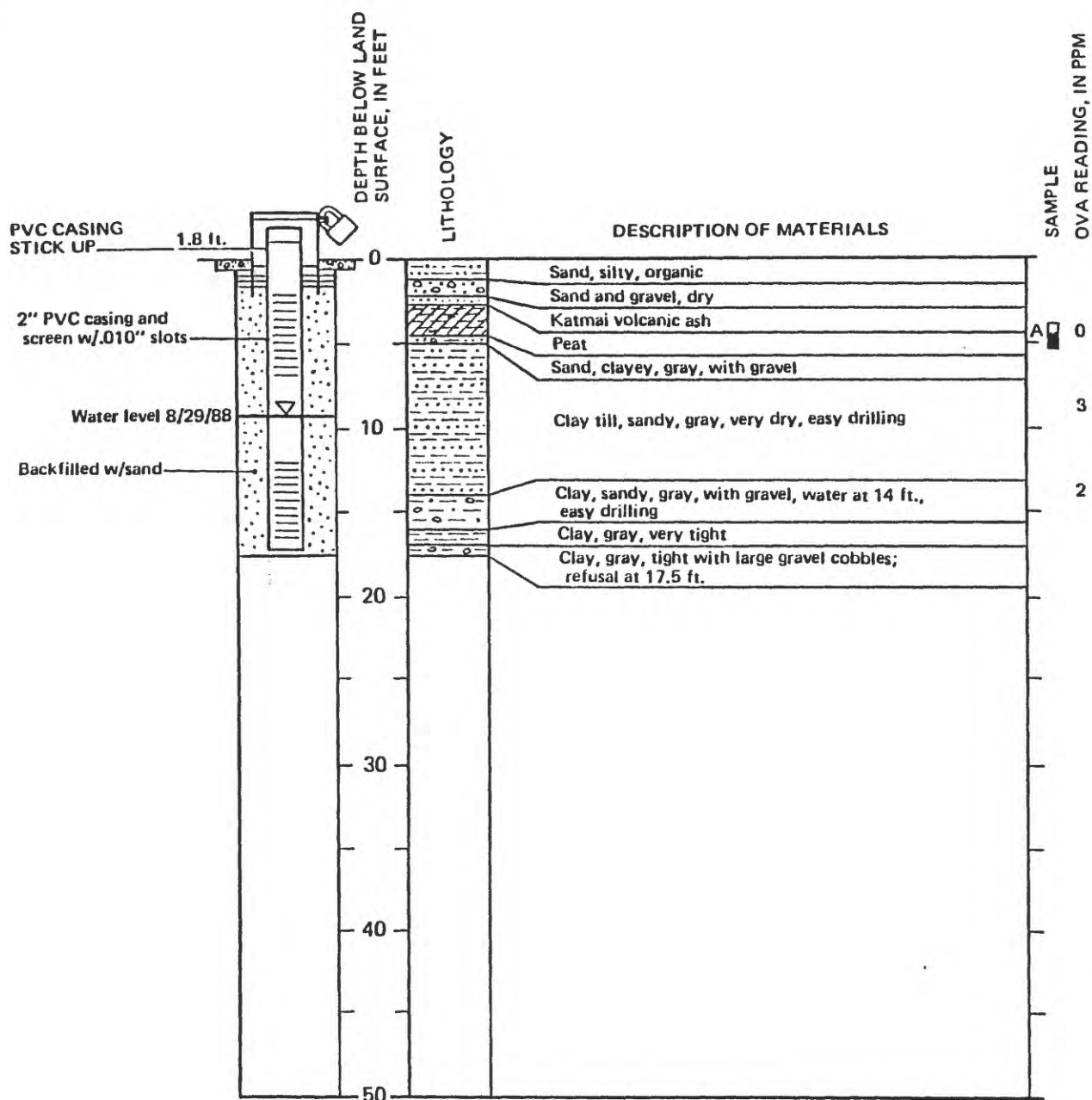


USGS SITE ID No. 574340152303101
 DATE WELL DRILLED 2/10/88
 LATITUDE 57° 43' 40" LONGITUDE 152° 30' 31"
 ELEVATION OF TOP OF WELL CASING 60.7 ft.
 GROUND SURFACE ELEVATION 57.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-60.



Location of well A-61.



USGS SITE ID No. 574344152302601

DATE WELL DRILLED 2/11/88

LATITUDE 57° 43' 44" LONGITUDE 152° 30' 26"

ELEVATION OF TOP OF WELL CASING 67.9 ft.

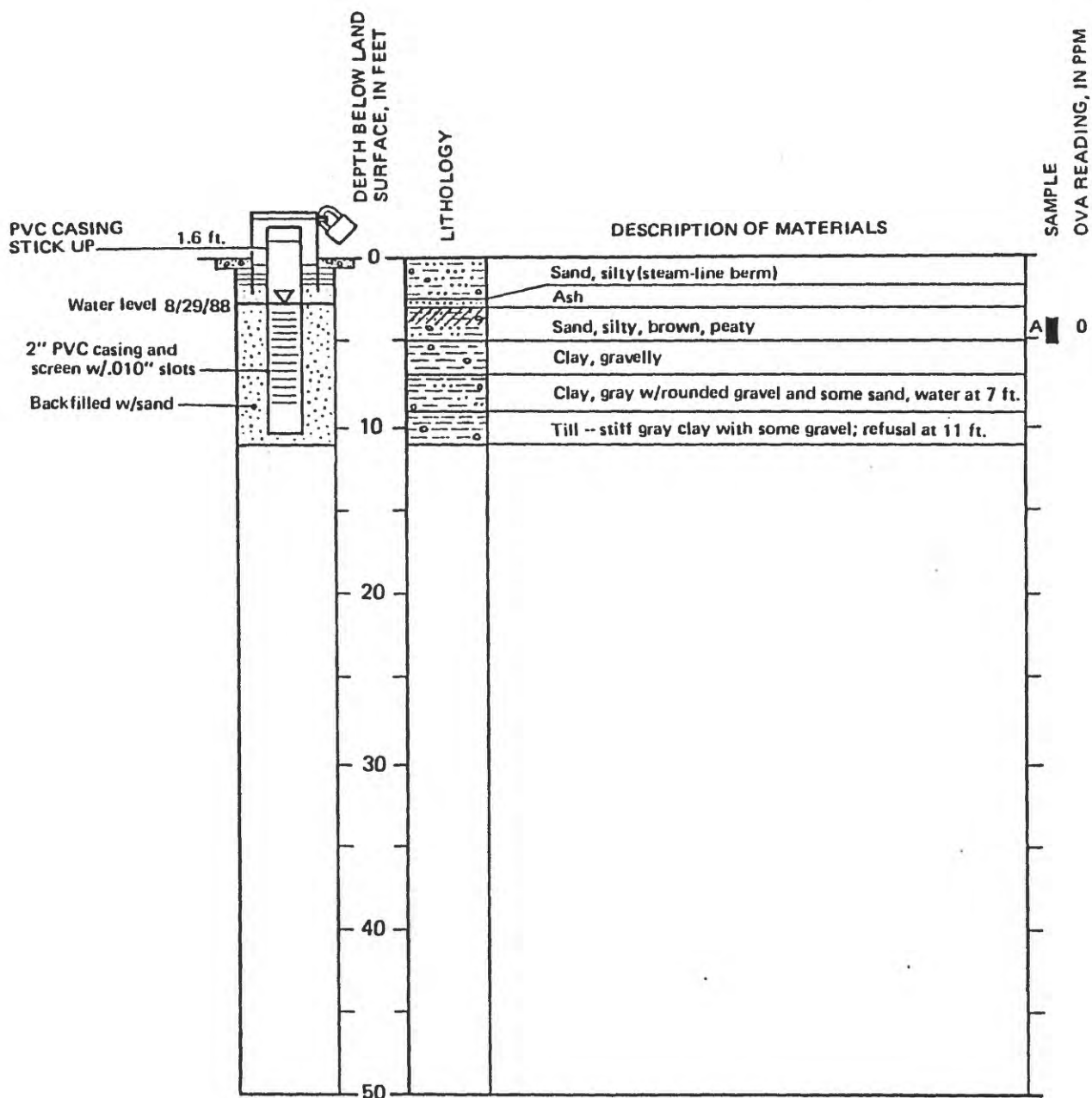
GROUND SURFACE ELEVATION 66.1 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-61.



Location of well A-62.



USGS SITE ID No. 574346152302601

DATE WELL DRILLED 2/13/88

LATITUDE 57°43' 46" LONGITUDE 152°30' 26"

ELEVATION OF TOP OF WELL CASING 63.1 ft.

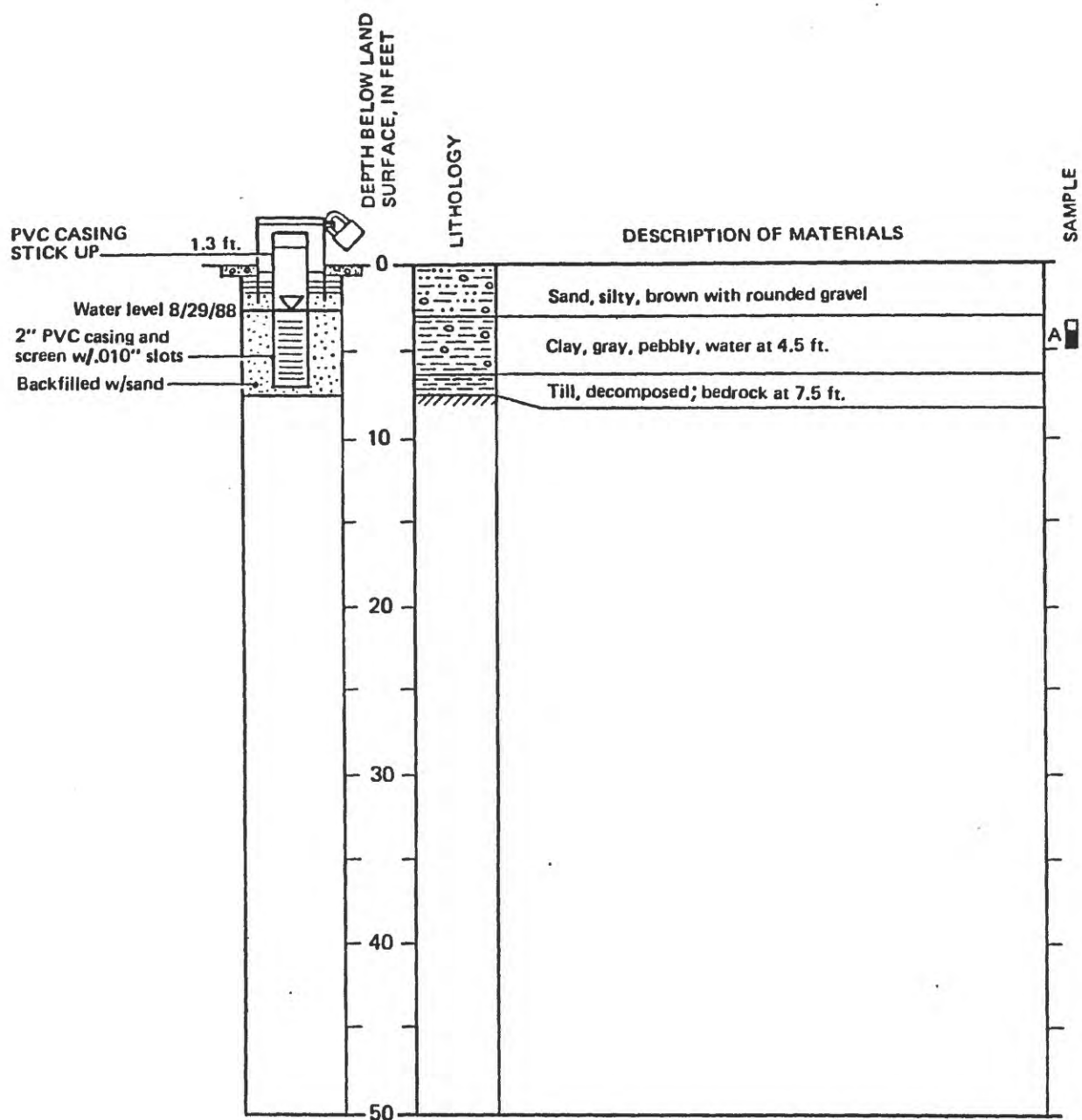
GROUND SURFACE ELEVATION 61.5 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-62.



Location of well A-63.



USGS SITE ID No. 574348152302301

DATE WELL DRILLED 2/12/88

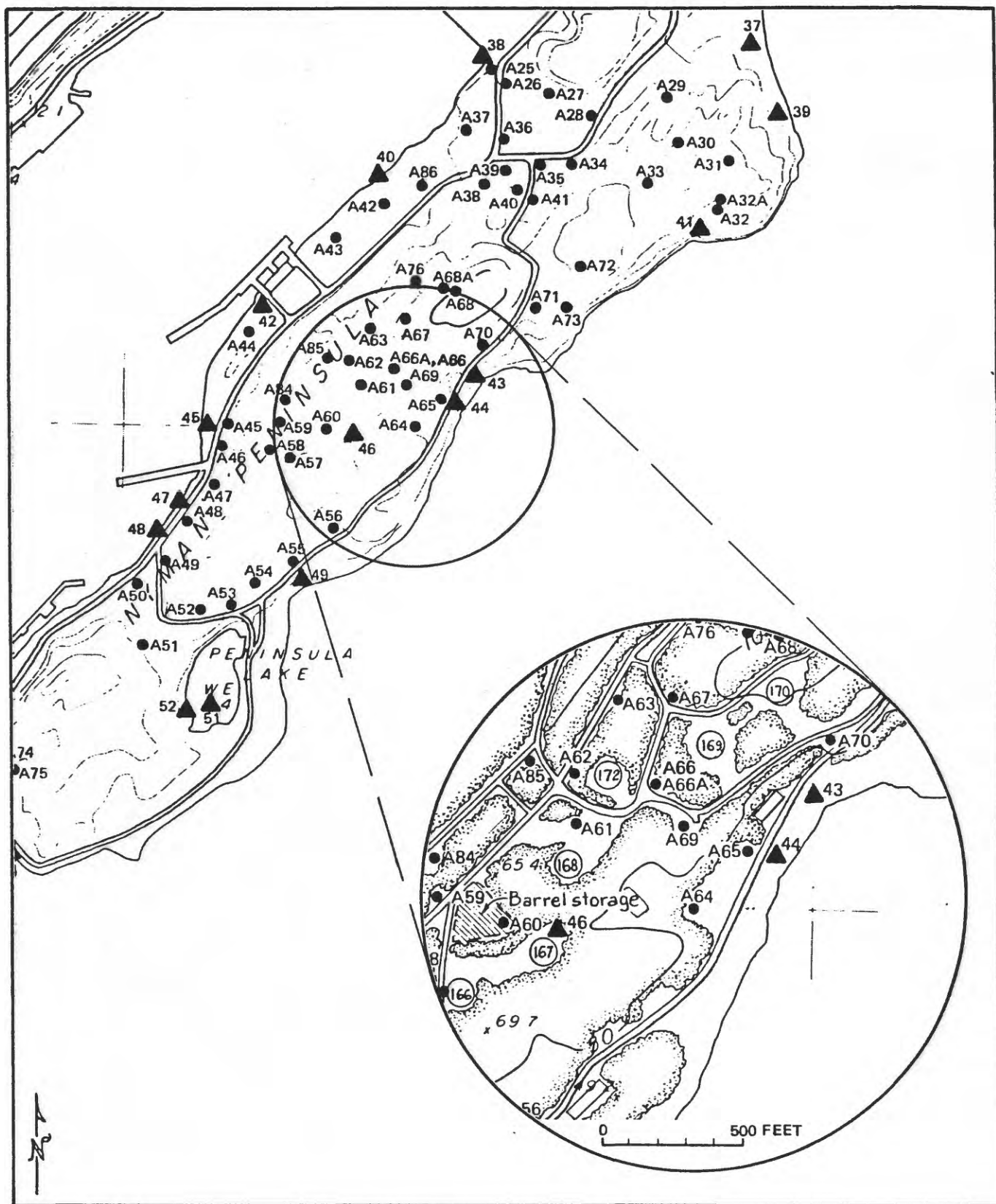
LATITUDE 57° 43' 48" LONGITUDE 152° 30' 23"

ELEVATION OF TOP OF WELL CASING 62.5 ft.

GROUND SURFACE ELEVATION 61.2 ft.

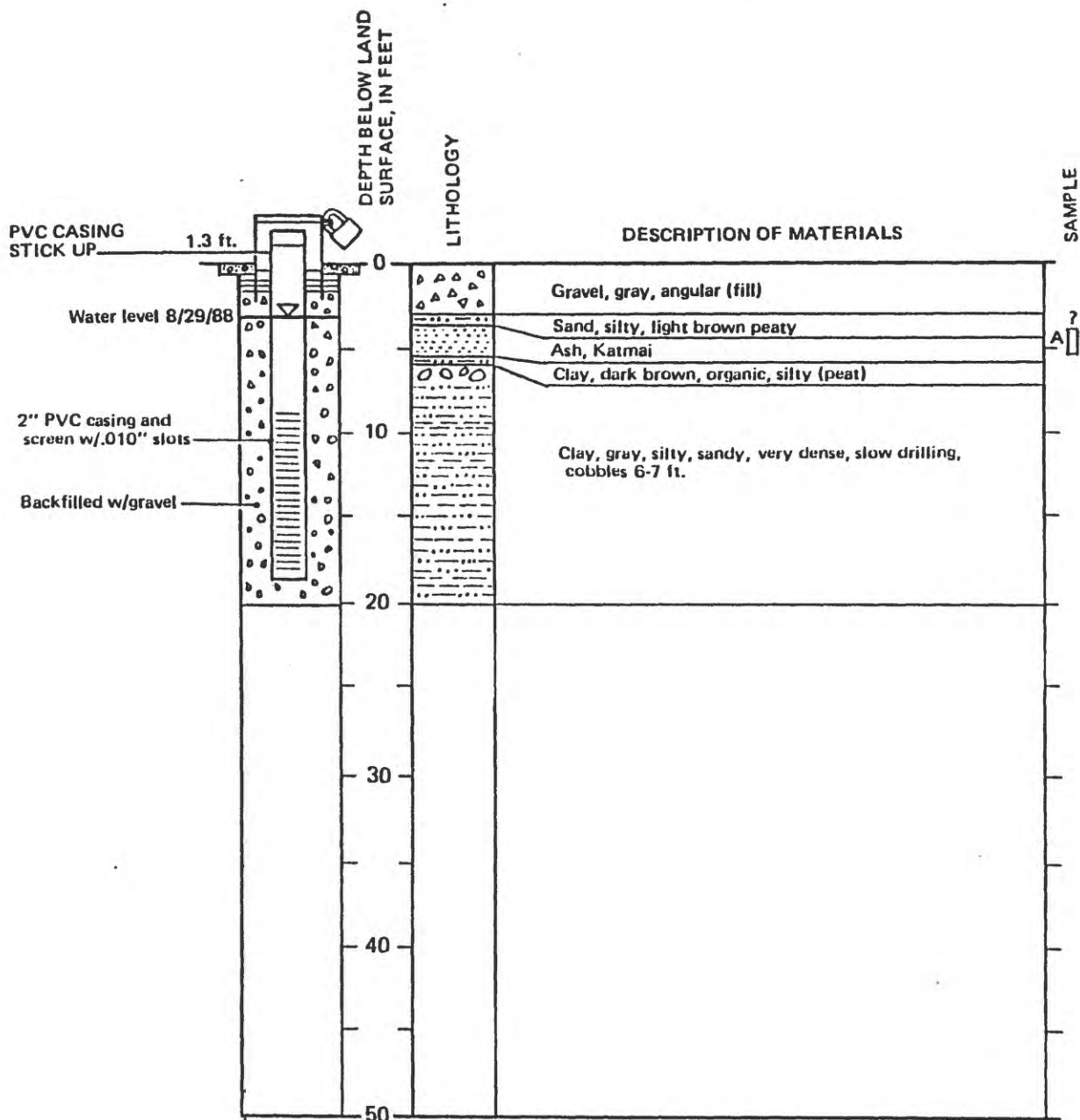
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-63.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-64.

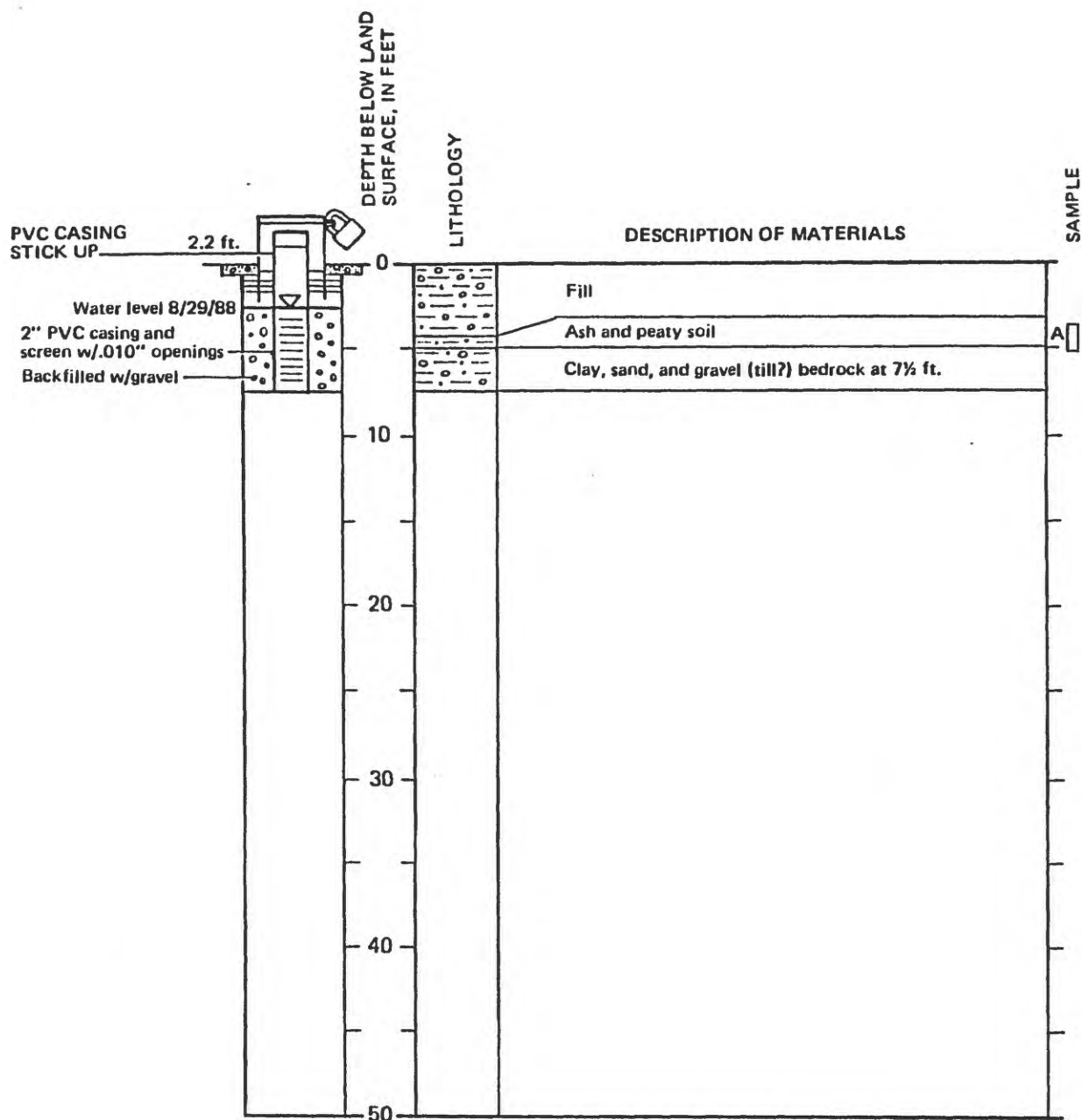


USGS SITE ID No. 574342152301801
 DATE WELL DRILLED 2/3/88
 LATITUDE 57° 43' 44" LONGITUDE 152° 30' 15"
 ELEVATION OF TOP OF WELL CASING 35.3 ft.
 GROUND SURFACE ELEVATION 34.0 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-64.



Location of well A-65.

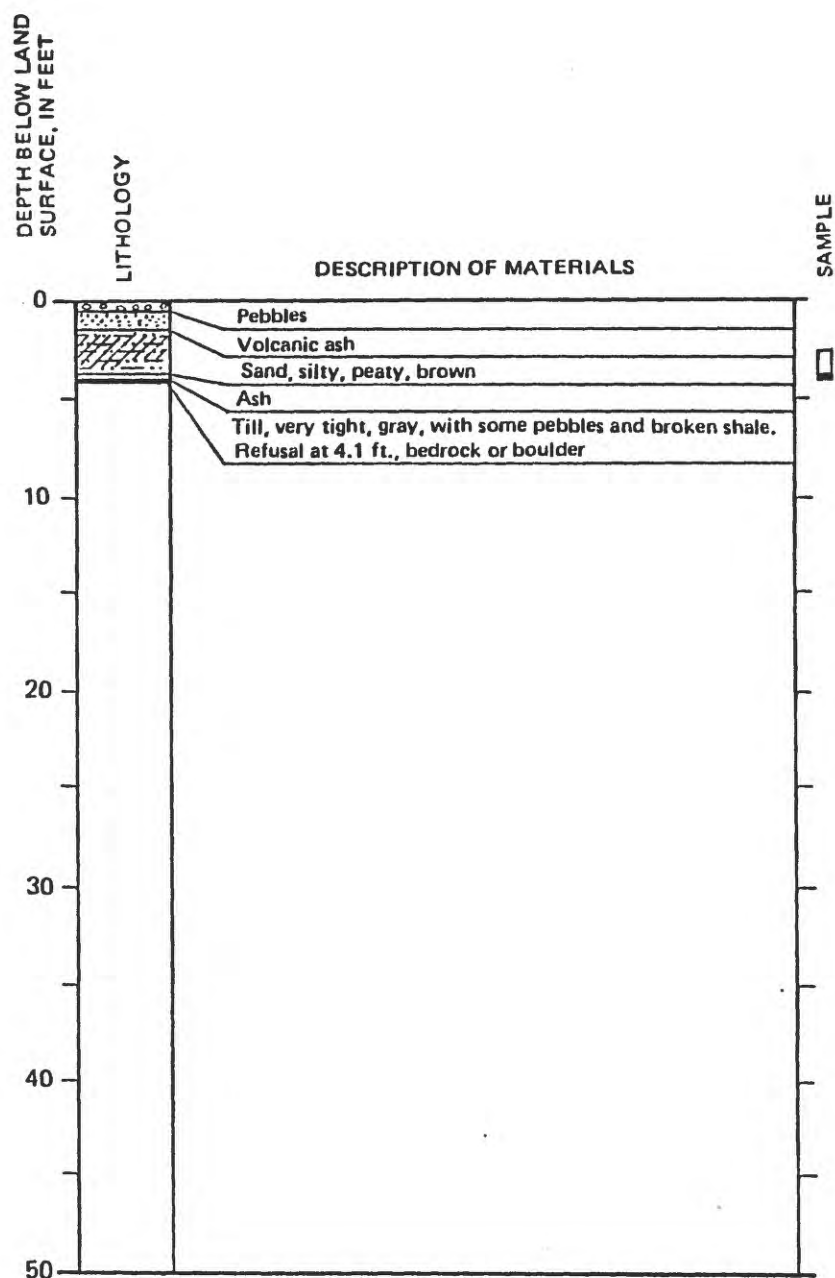


USGS SITE ID No. 574344152301501
 DATE WELL DRILLED 2/1/88
 LATITUDE 57° 43' 44" LONGITUDE 152° 30' 15"
 ELEVATION OF TOP OF WELL CASING 32.9 ft.
 GROUND SURFACE ELEVATION 30.7 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-65.



Location of borehole A-66.



USGS SITE ID No. 574347152302101

DATE WELL DRILLED 2/11/88

LATITUDE 57° 43' 47" LONGITUDE 152° 30' 21"

GROUND SURFACE ELEVATION (ESTIMATED) 70 ft.

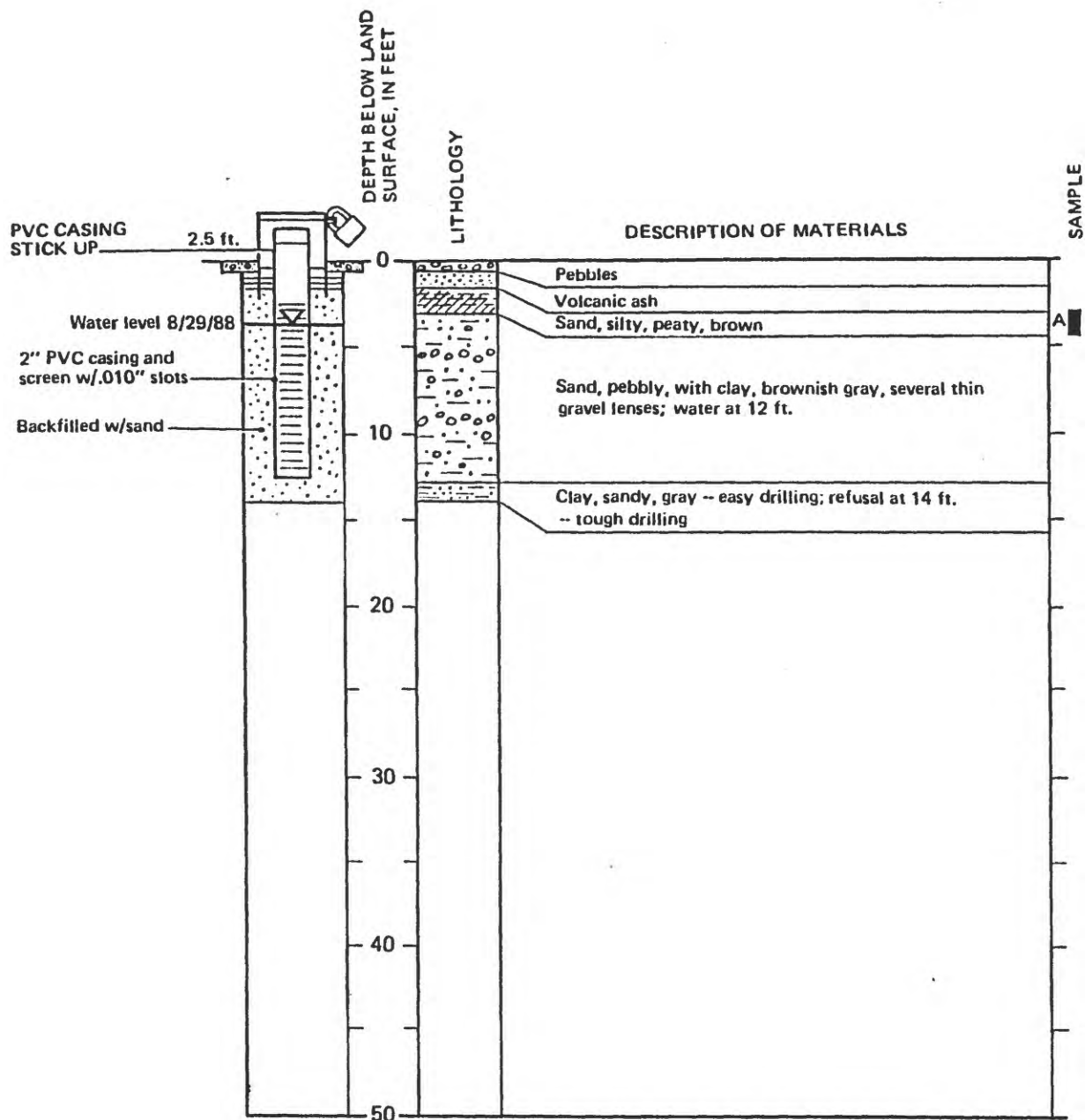
DATUM IS MEAN SEA LEVEL

Log of borehole A-66.



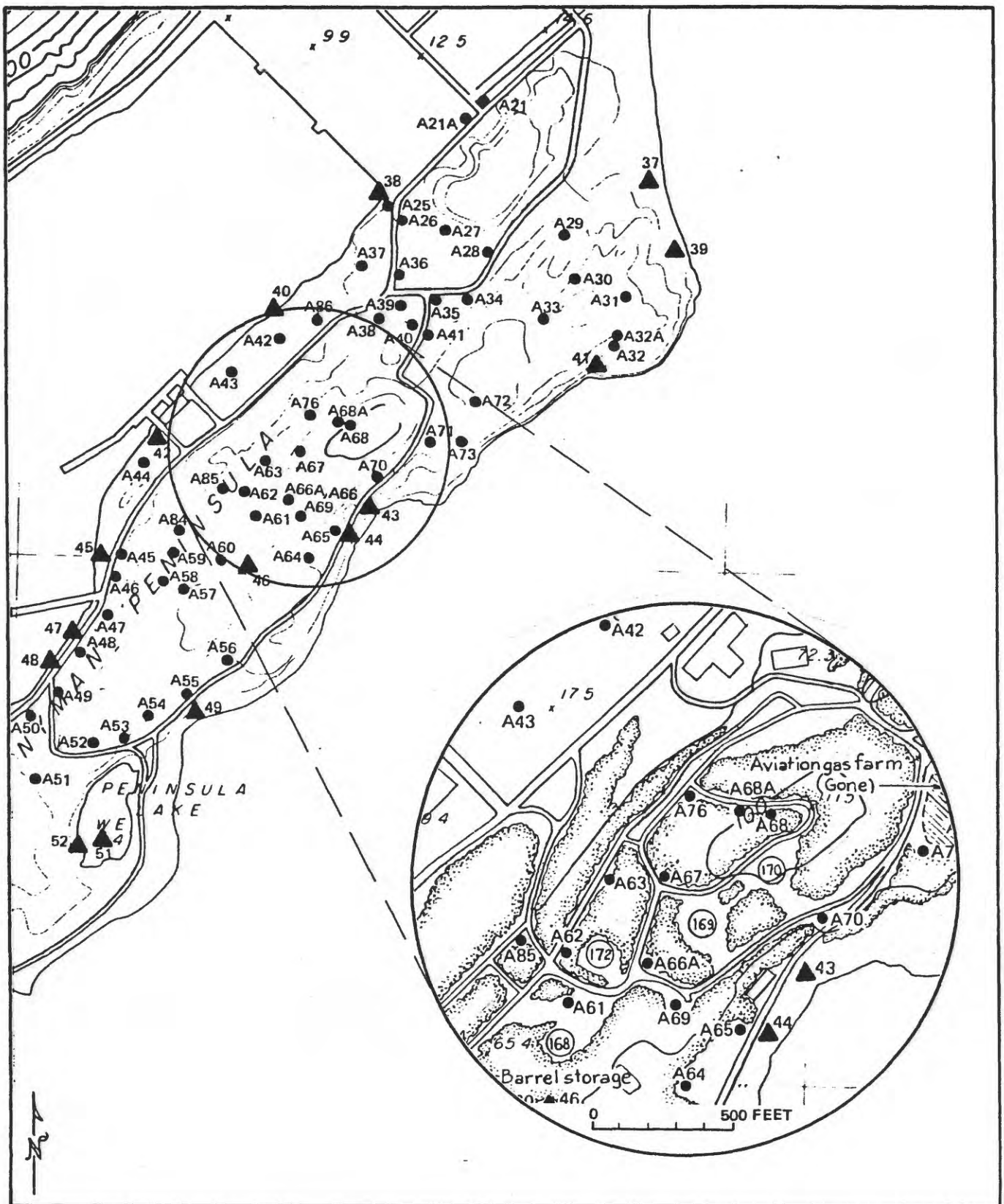
0 1000 2000 FEET
0 200 400 METERS

Location of well A-66-A.

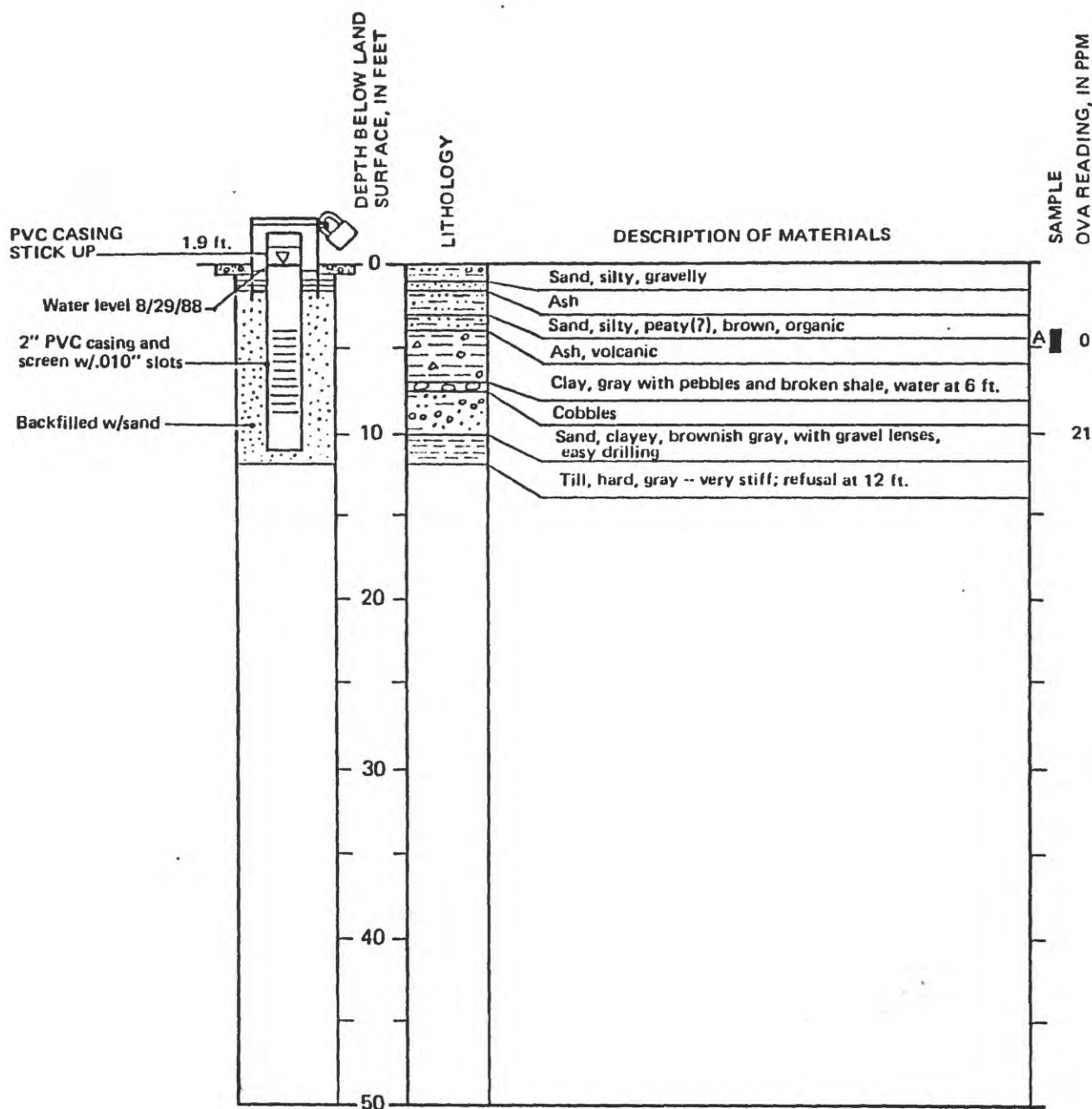


USGS SITE ID No. 574347152302102
 DATE WELL DRILLED 2/11/88
 LATITUDE 57° 43' 47" LONGITUDE 152° 30' 21"
 ELEVATION OF TOP OF WELL CASING 72.7 ft.
 GROUND SURFACE ELEVATION 70.2 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-66-A.

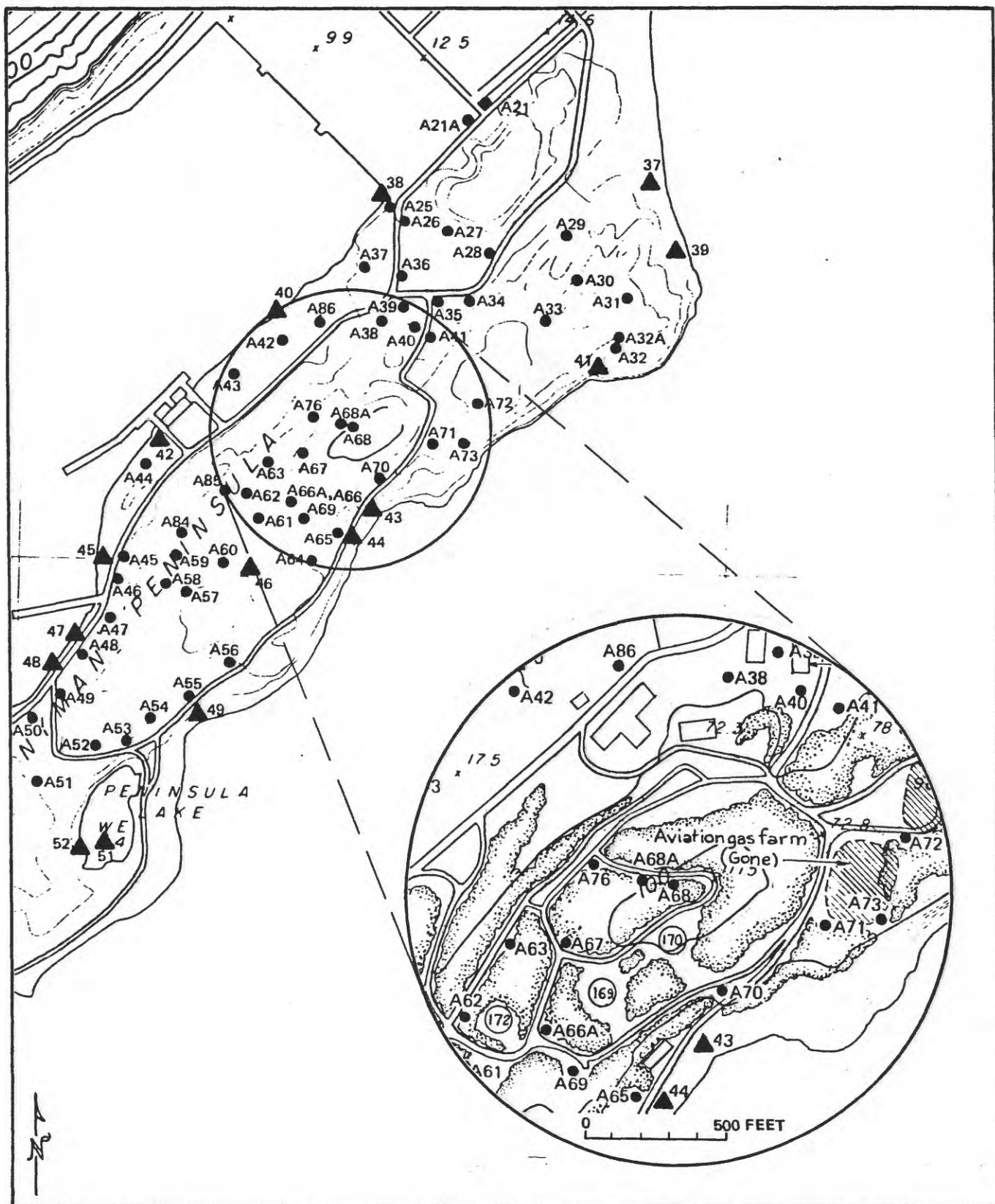


Location of well A-67.

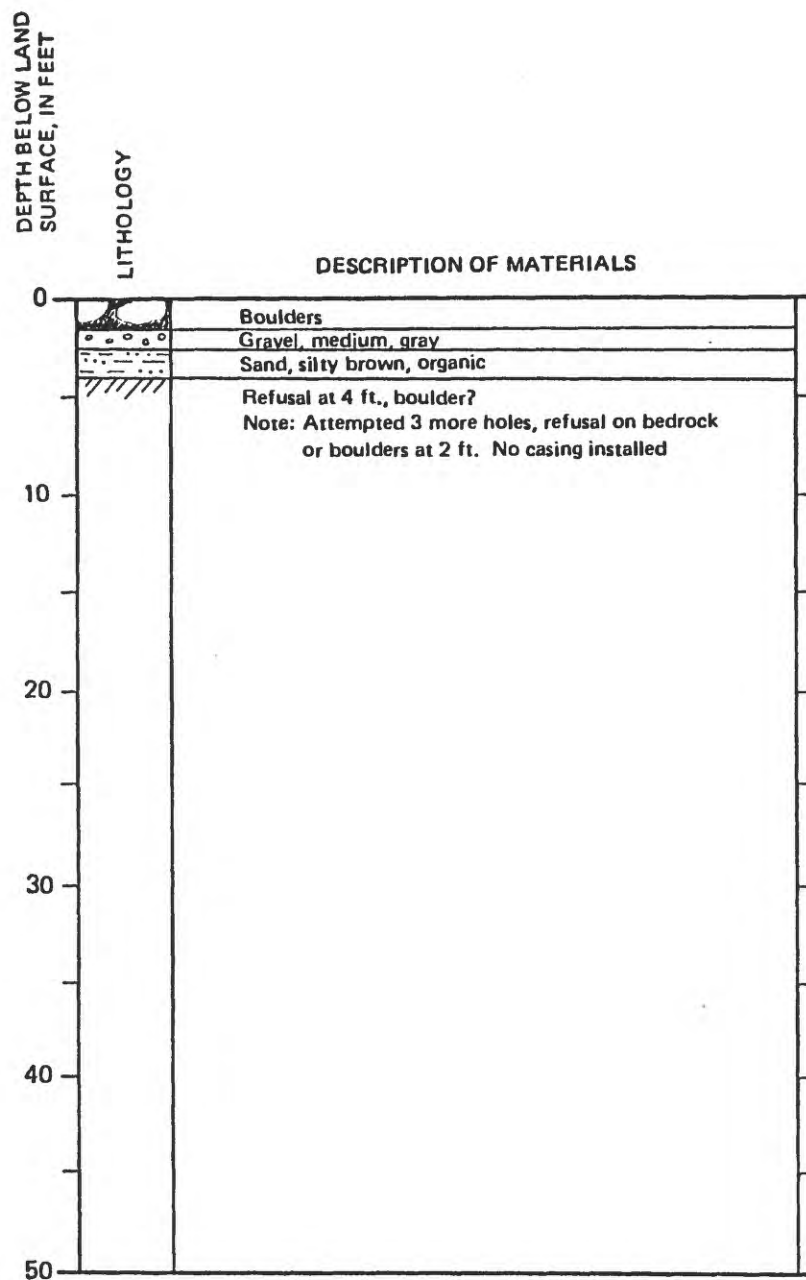


USGS SITE ID No. 574349152302001
DATE WELL DRILLED 2/11/88
LATITUDE 57° 43' 49" LONGITUDE 152° 30' 20"
ELEVATION OF TOP OF WELL CASING 76.9 ft.
GROUND SURFACE ELEVATION 75.0 ft.
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-67.



Location of borehole A-68.



USGS SITE ID No. 574351152301401

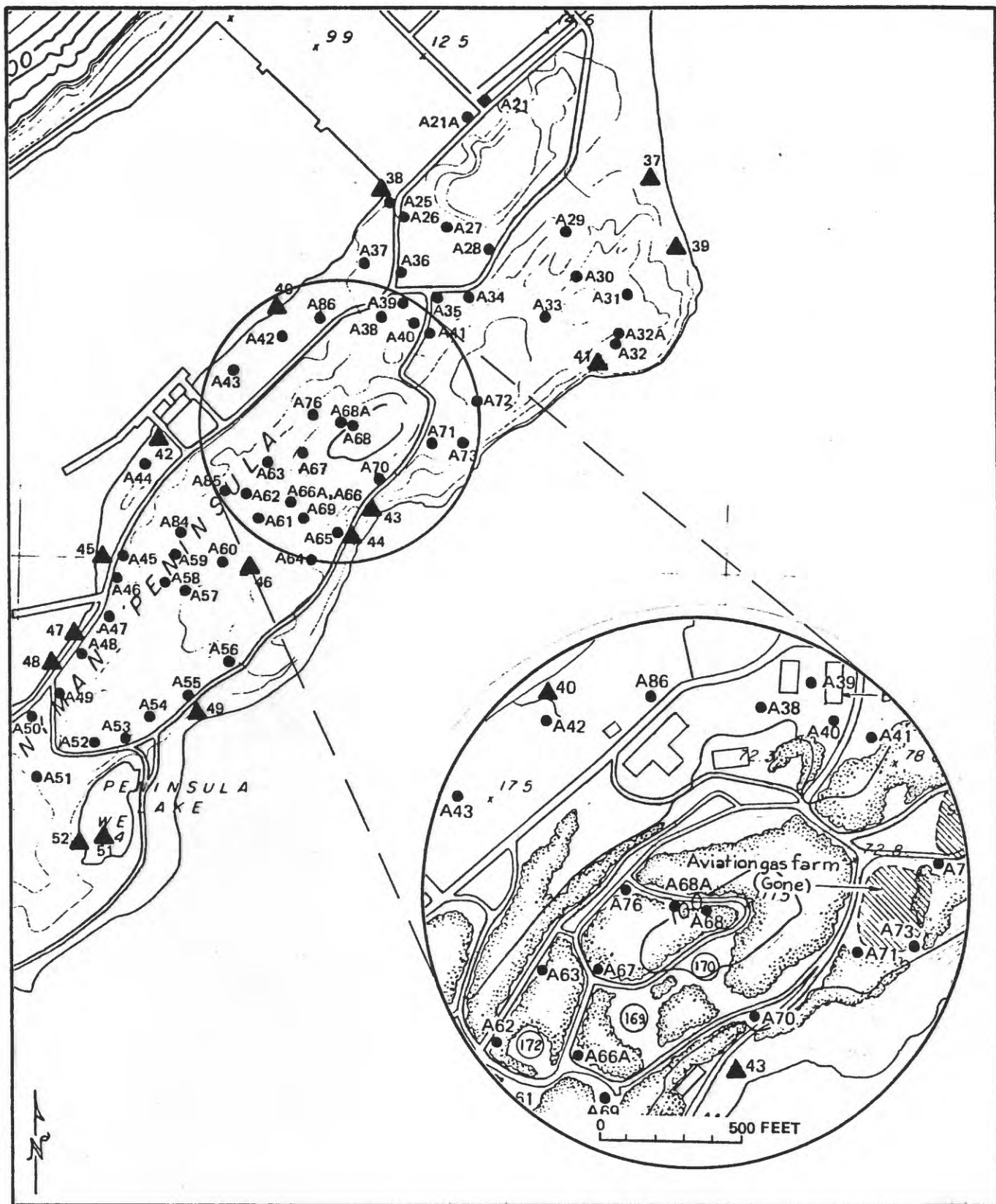
DATE WELL DRILLED 2/12/88

LATITUDE 57° 43' 51" LONGITUDE 152° 30' 14"

GROUND SURFACE ELEVATION (ESTIMATED) 102 ft.

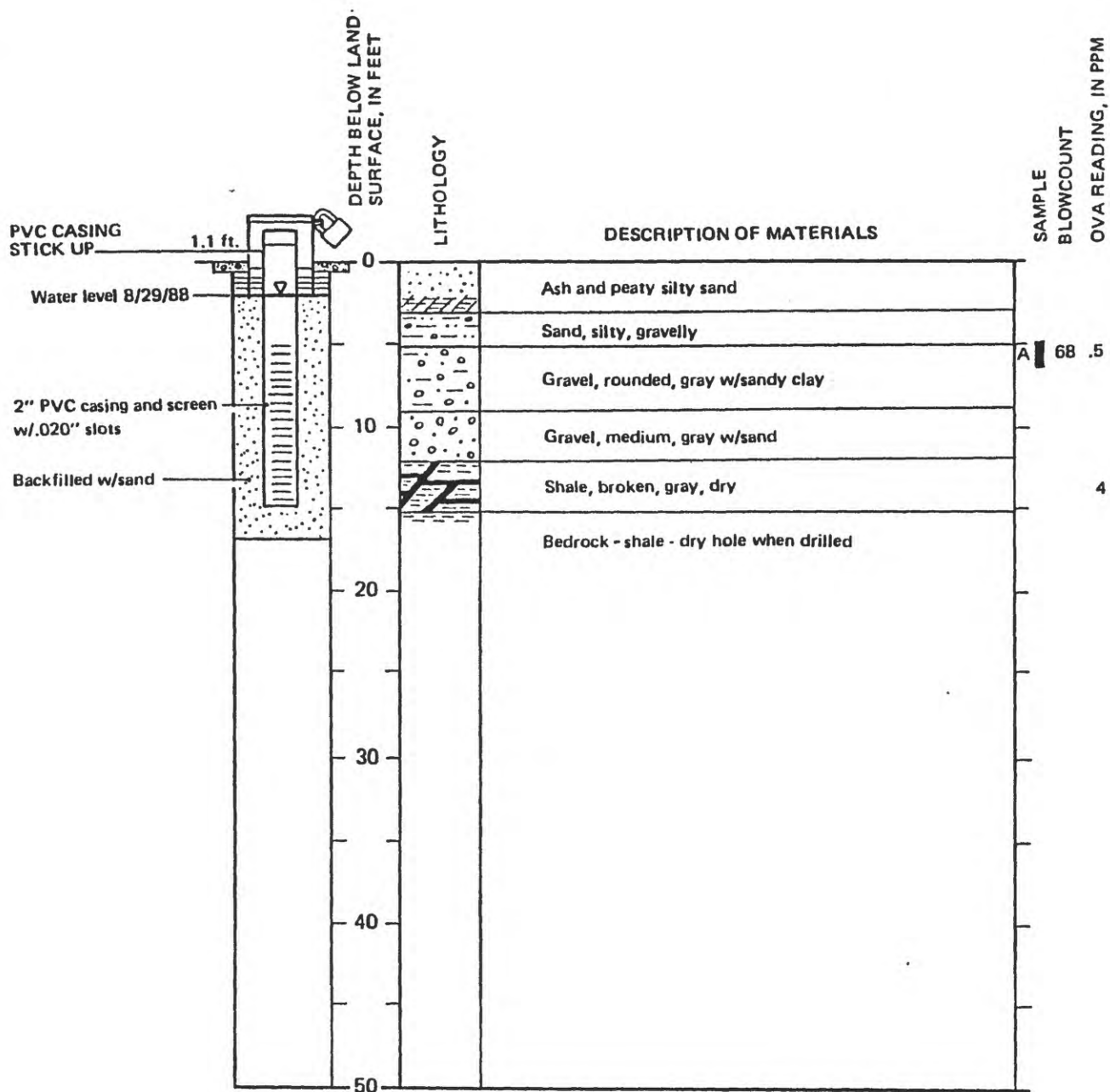
DATUM IS MEAN SEA LEVEL

Log of borehole A-68.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-68-A.



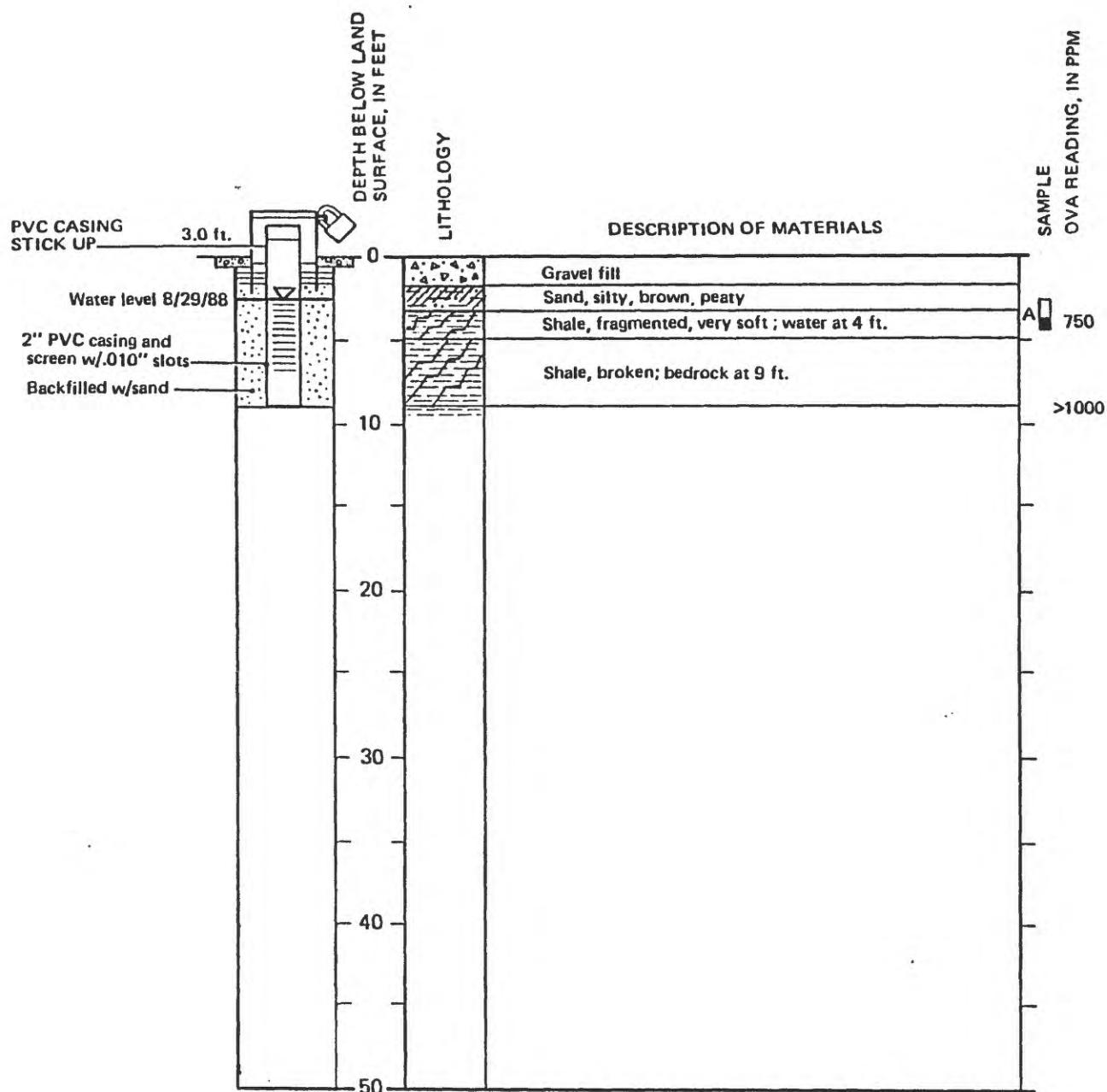
USGS SITE ID No. 574351152301501
 DATE WELL DRILLED 4/13/88
 LATITUDE 57° 43' 51" LONGITUDE 152° 30' 15"
 ELEVATION OF TOP OF WELL CASING 83.7 ft.
 GROUND SURFACE ELEVATION 82.6 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-68-A.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-69.

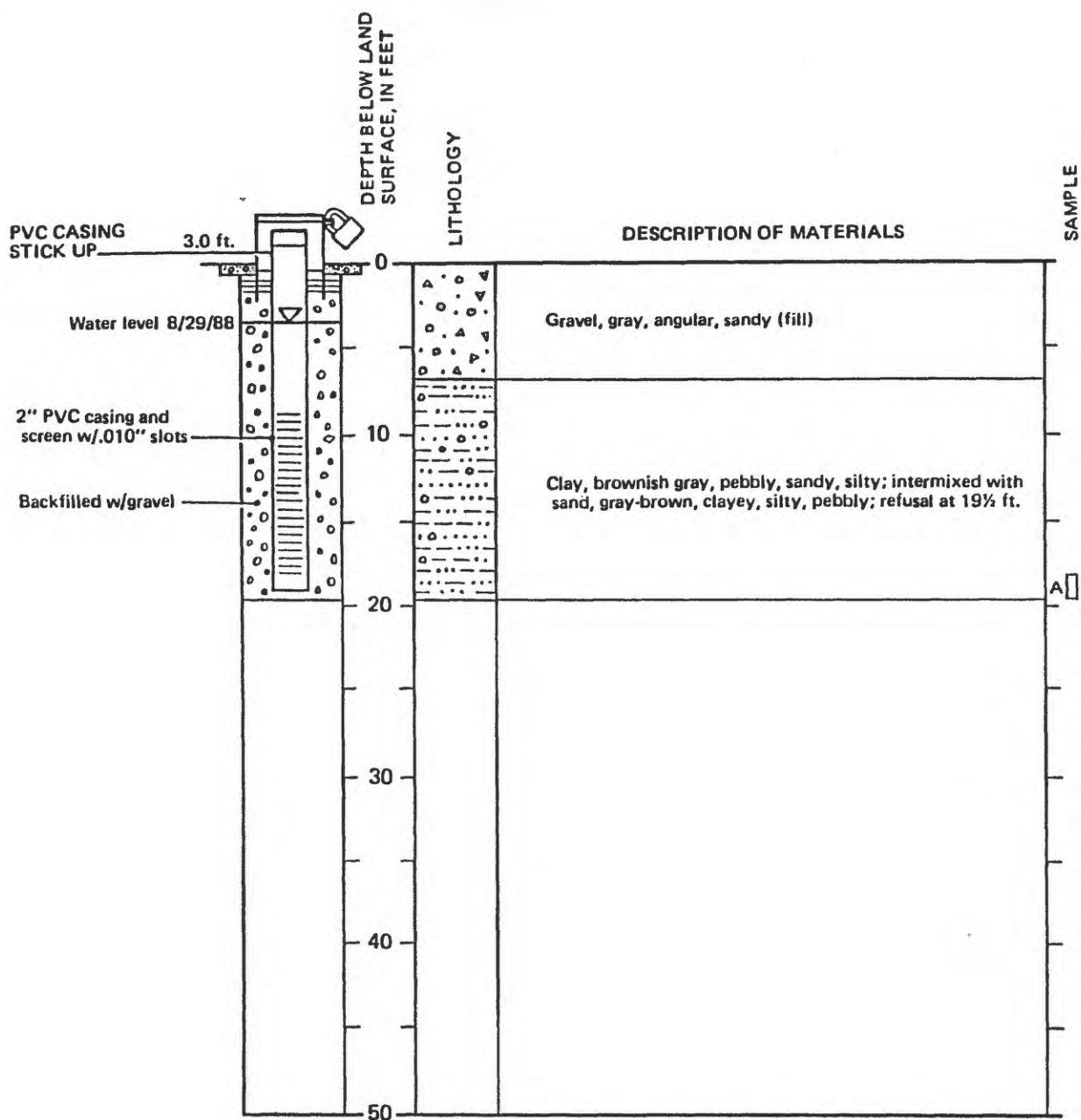


USGS SITE ID No. 574345152301901
DATE WELL DRILLED 2/12/88
LATITUDE 57°43' 45" LONGITUDE 152°30' 19"
ELEVATION OF TOP OF WELL CASING 63.5 ft.
GROUND SURFACE ELEVATION 60.5 ft.
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-69.

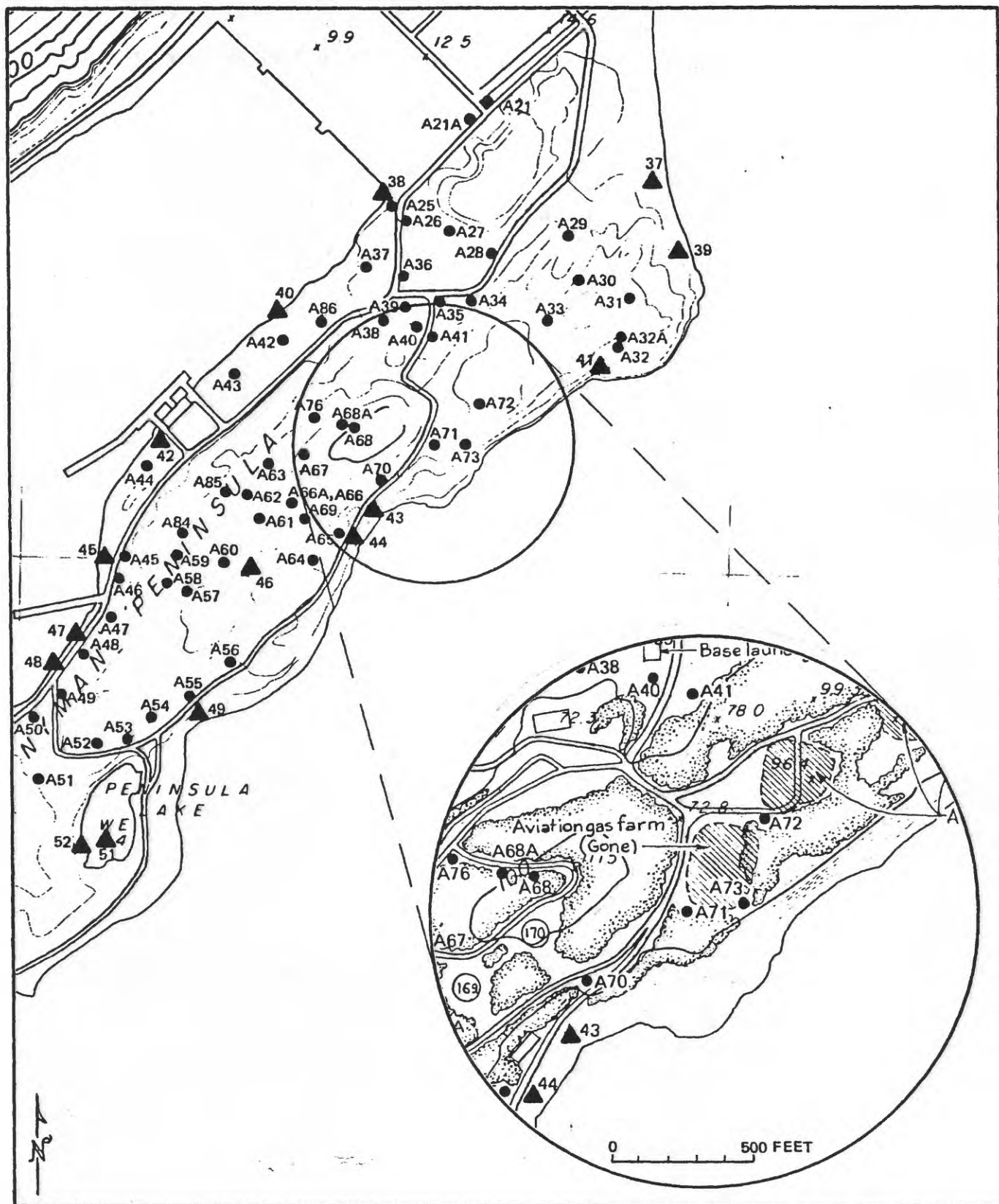


Location of well A-70.

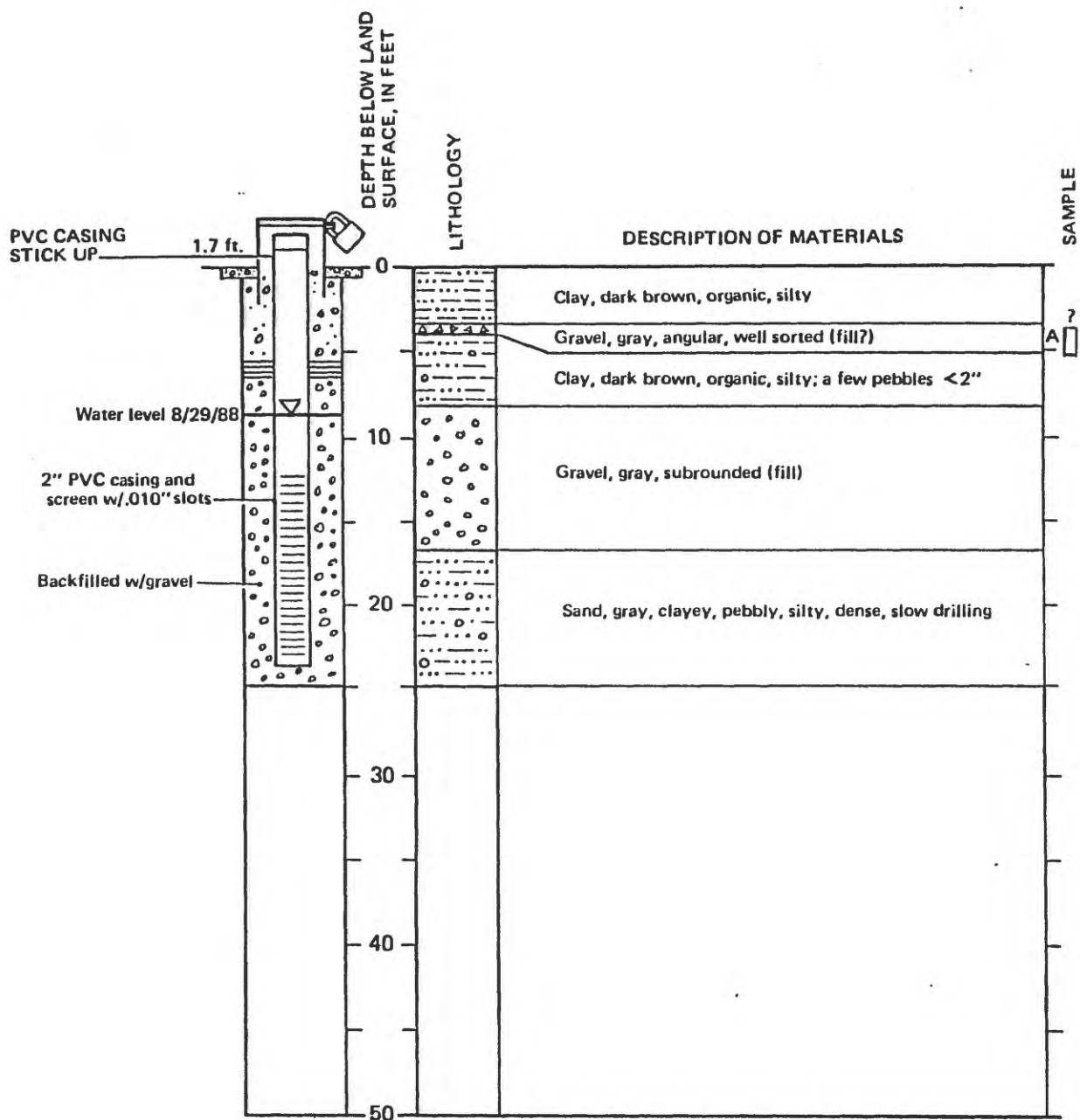


USGS SITE ID No. 574348152301001
 DATE WELL DRILLED 2/4/88
 LATITUDE 57°43' 48" LONGITUDE 152°30' 10"
 ELEVATION OF TOP OF WELL CASING 54.2 ft.
 GROUND SURFACE ELEVATION 51.2 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-70.



Location of well A-71.



USGS SITE ID No. 574349152300501

DATE WELL DRILLED 2/4/88

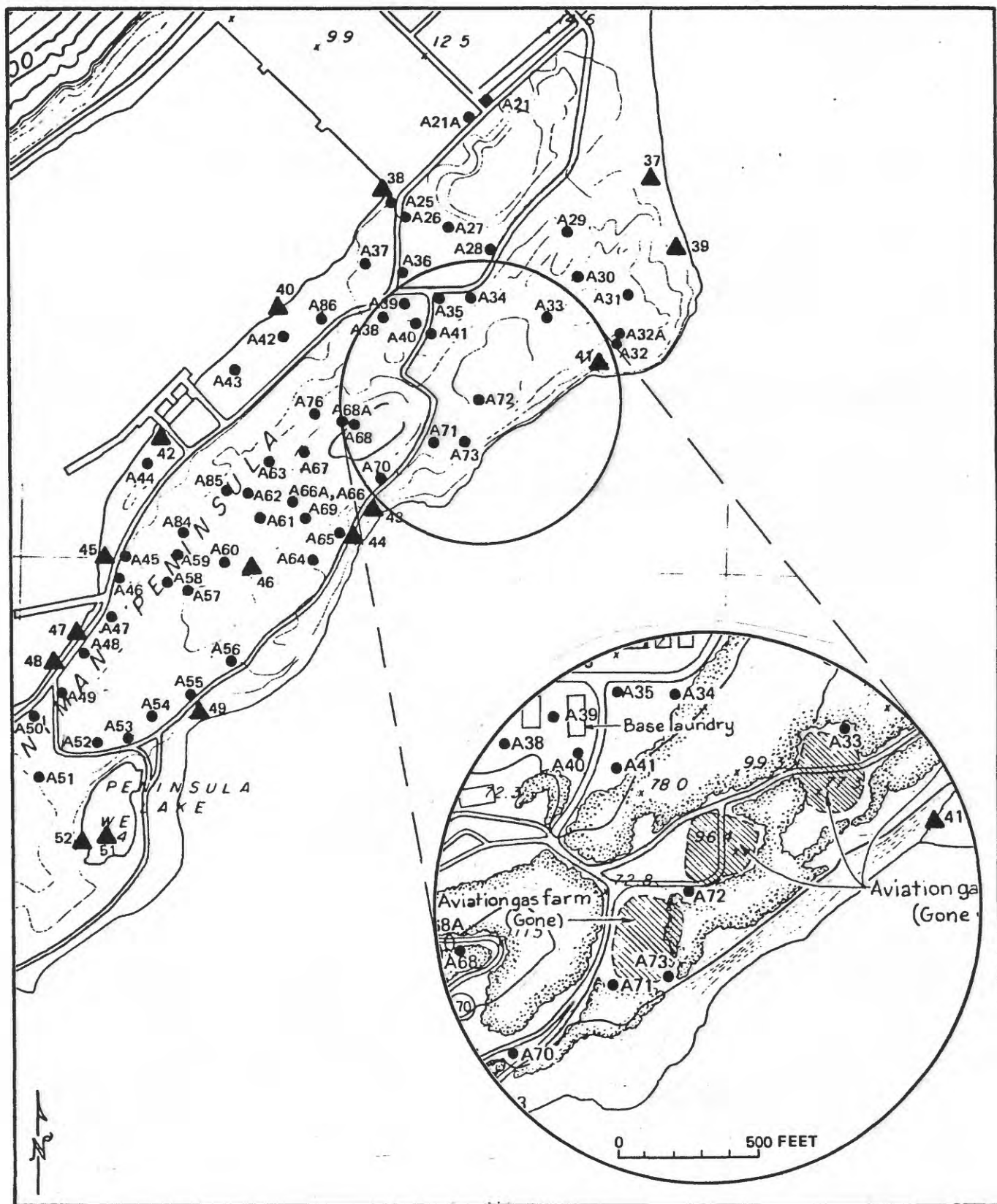
LATITUDE 57° 43' 49" LONGITUDE 152° 30' 05"

ELEVATION OF TOP OF WELL CASING 63.2 ft.

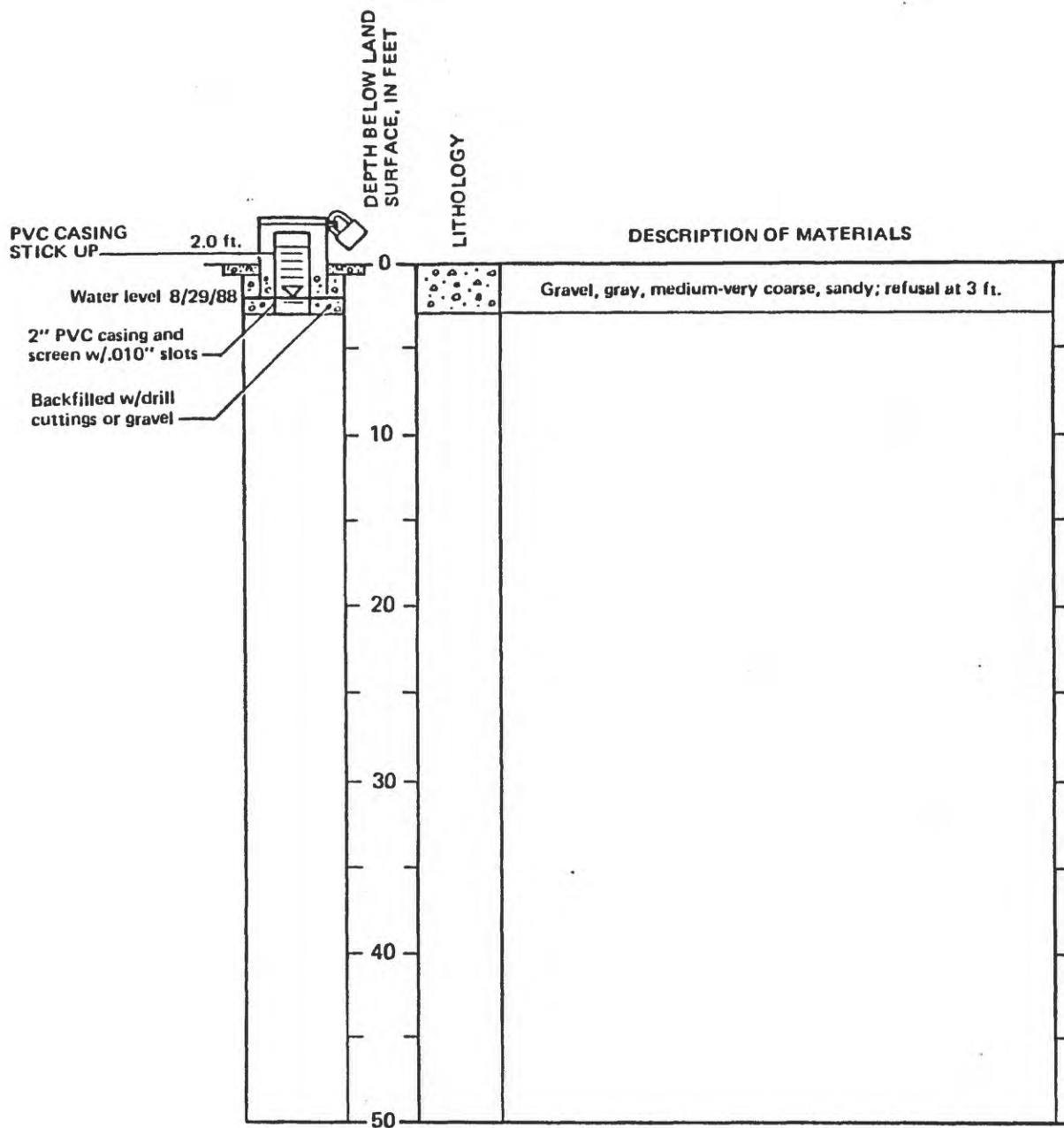
GROUND SURFACE ELEVATION 61.5 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-71.

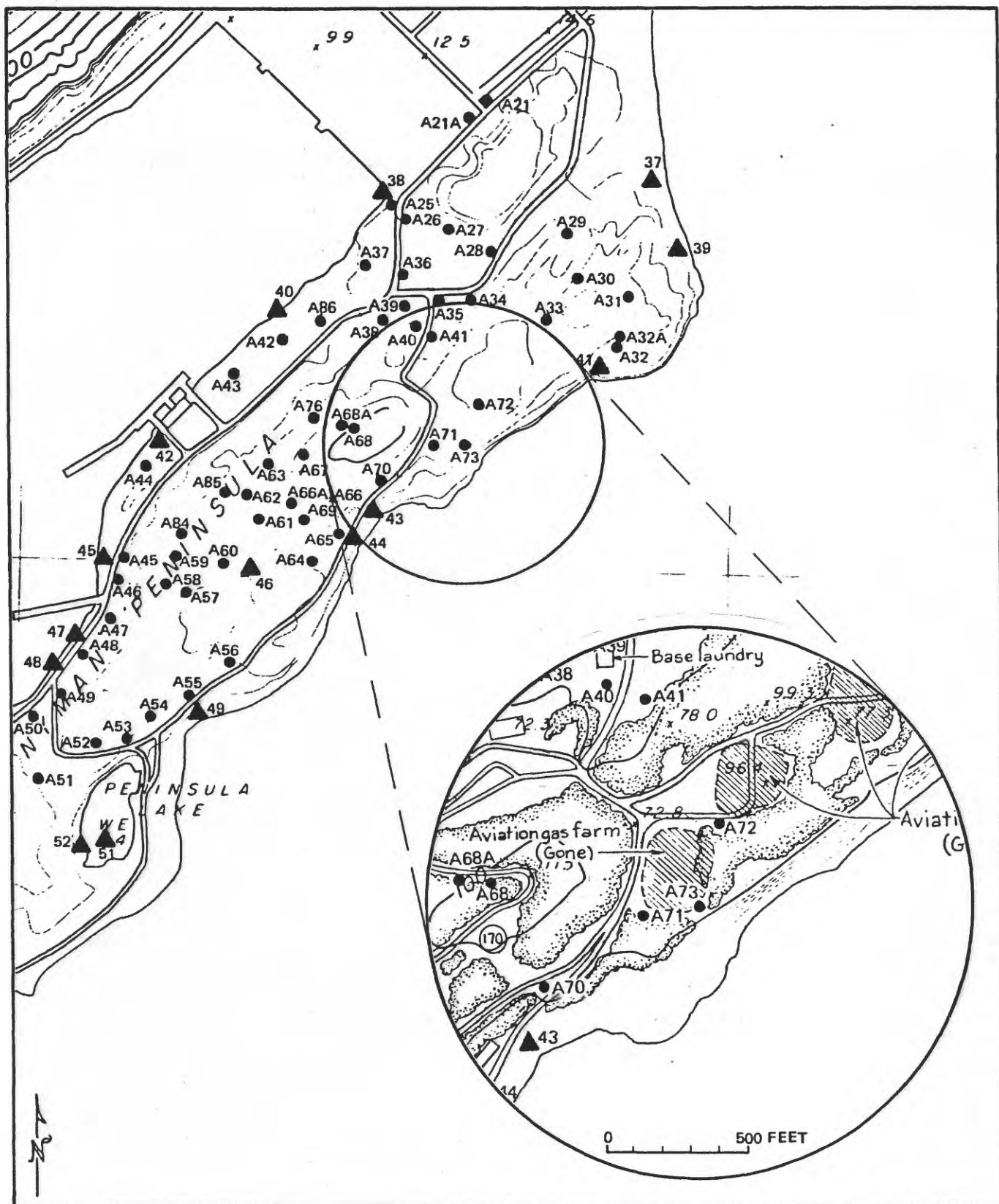


Location of well A-72.

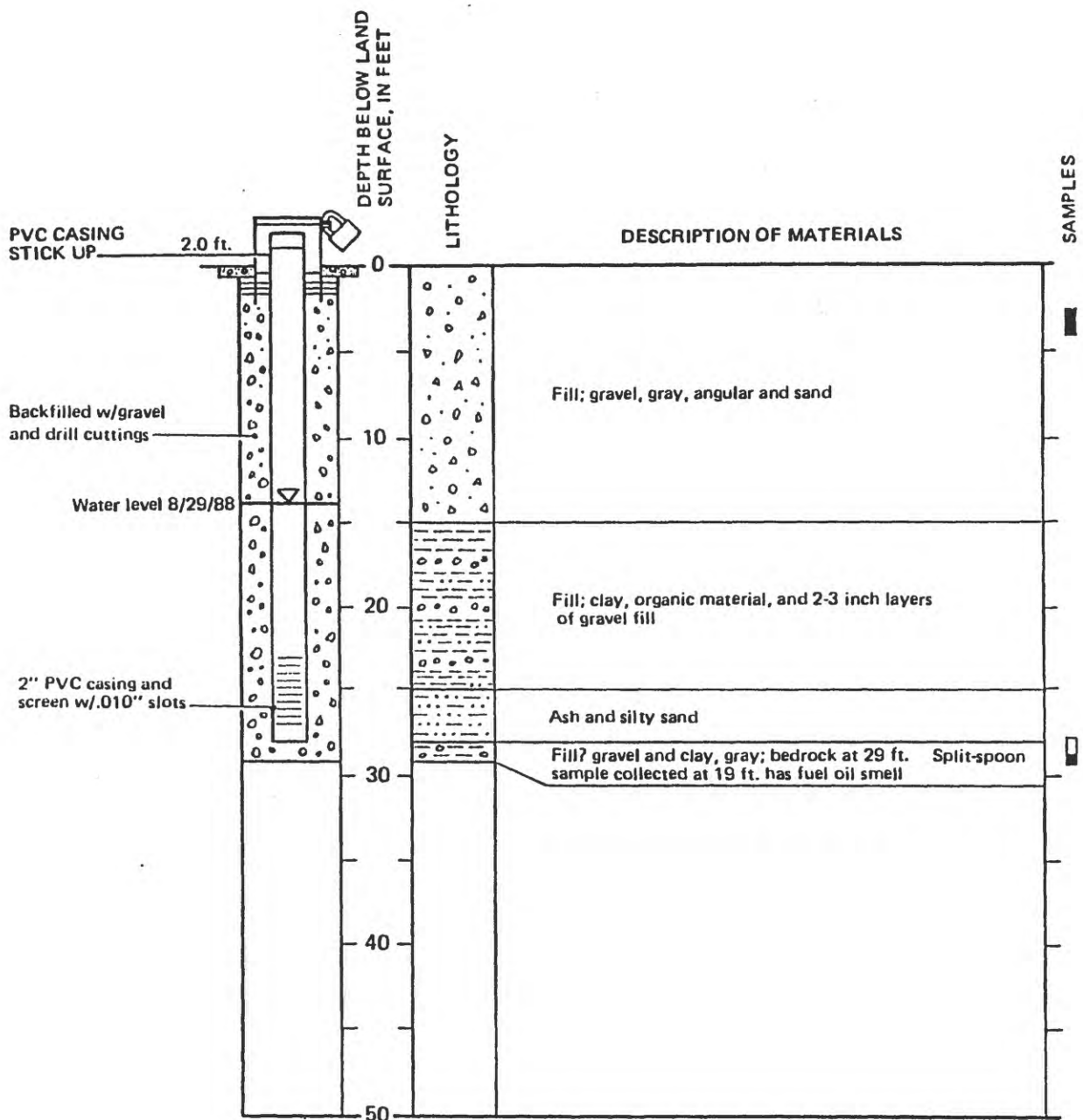


USGS SITE ID No. 574352152300101
 DATE WELL DRILLED 2/4/88
 LATITUDE 57° 43' 52" LONGITUDE 152° 30' 01"
 ELEVATION OF TOP OF WELL CASING 85.6 ft.
 GROUND SURFACE ELEVATION 83.6 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-72.

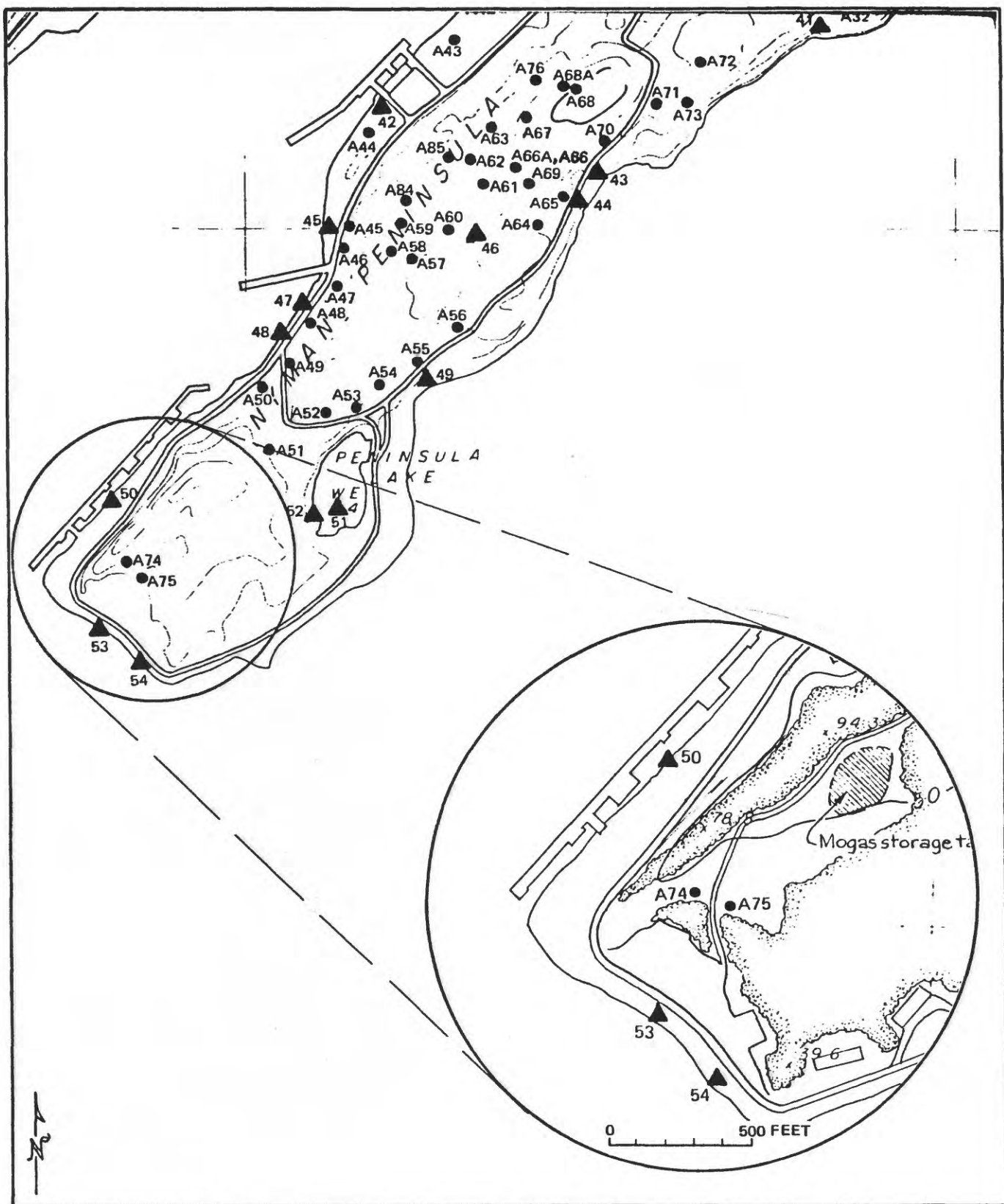


Location of well A-73.

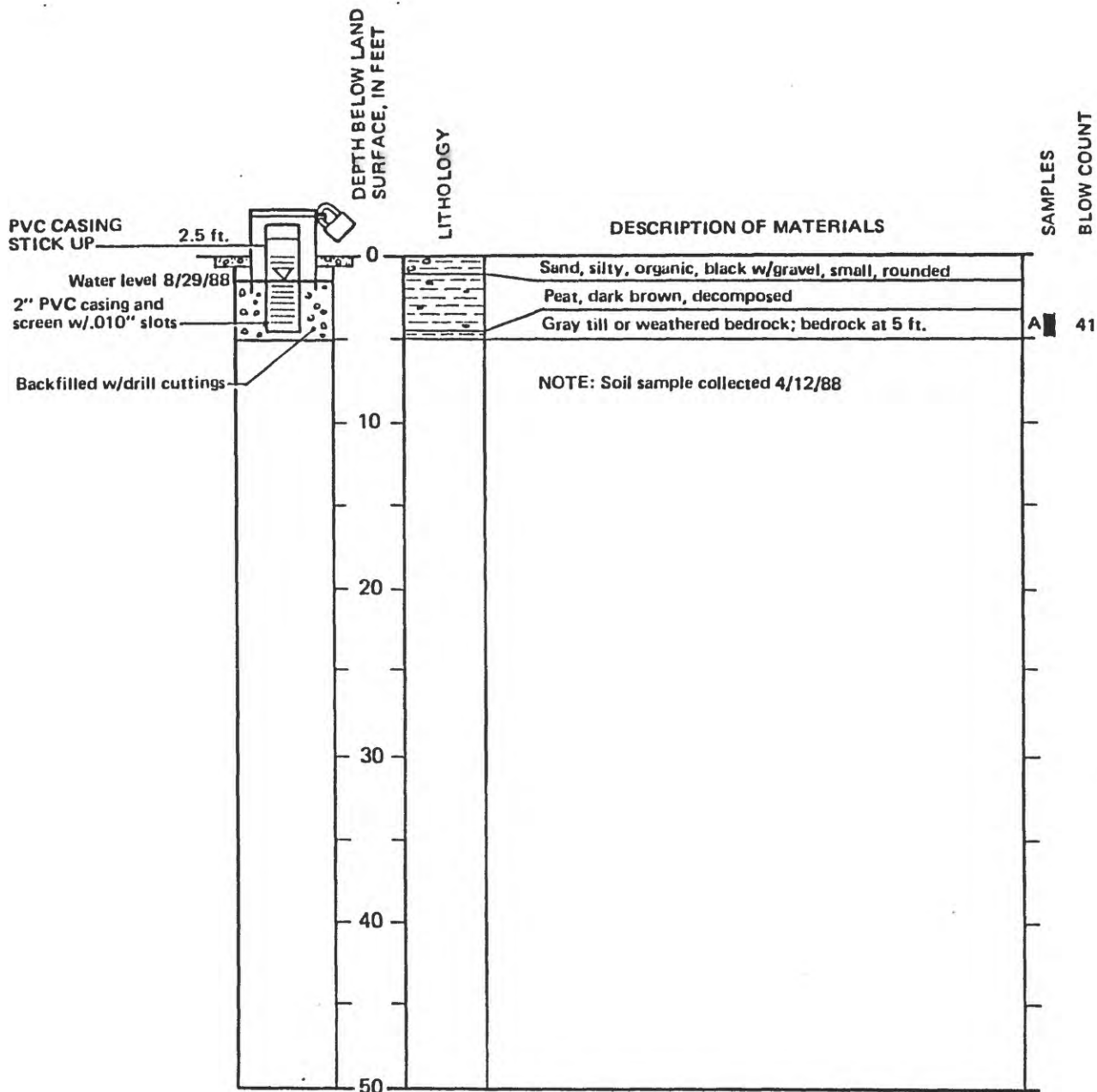


USGS SITE ID No. 574348152300101
 DATE WELL DRILLED 2/1/88
 LATITUDE 57° 43' 48" LONGITUDE 152° 30' 01"
 ELEVATION OF TOP OF WELL CASING 60.9 ft.
 GROUND SURFACE ELEVATION 58.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-73.



Location of well A-74.



USGS SITE ID No. 574319152311501

DATE WELL DRILLED 1/28/88

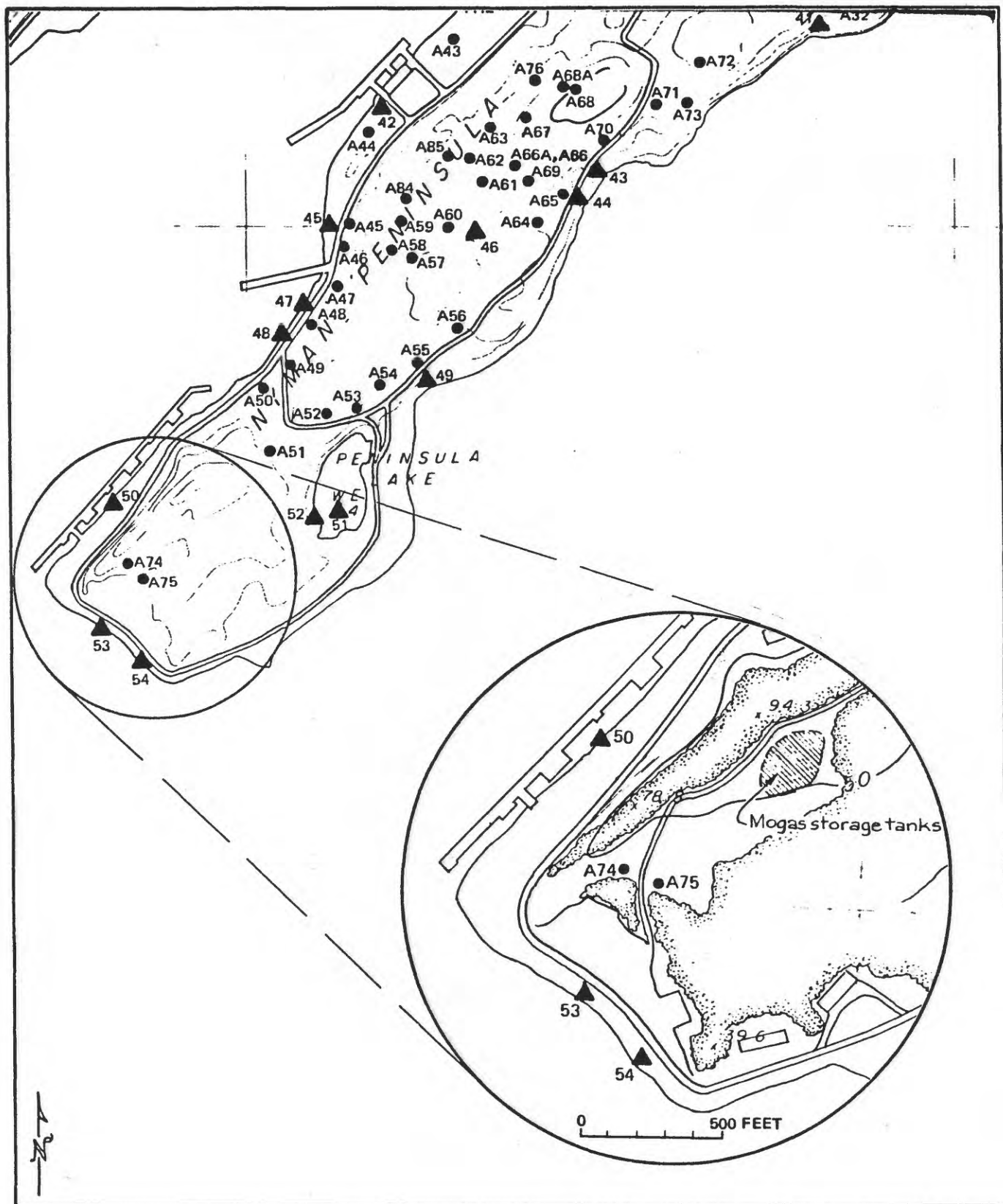
LATITUDE 57°43' 19" LONGITUDE 152°31' 15"

ELEVATION OF TOP OF WELL CASING 29.8 ft.

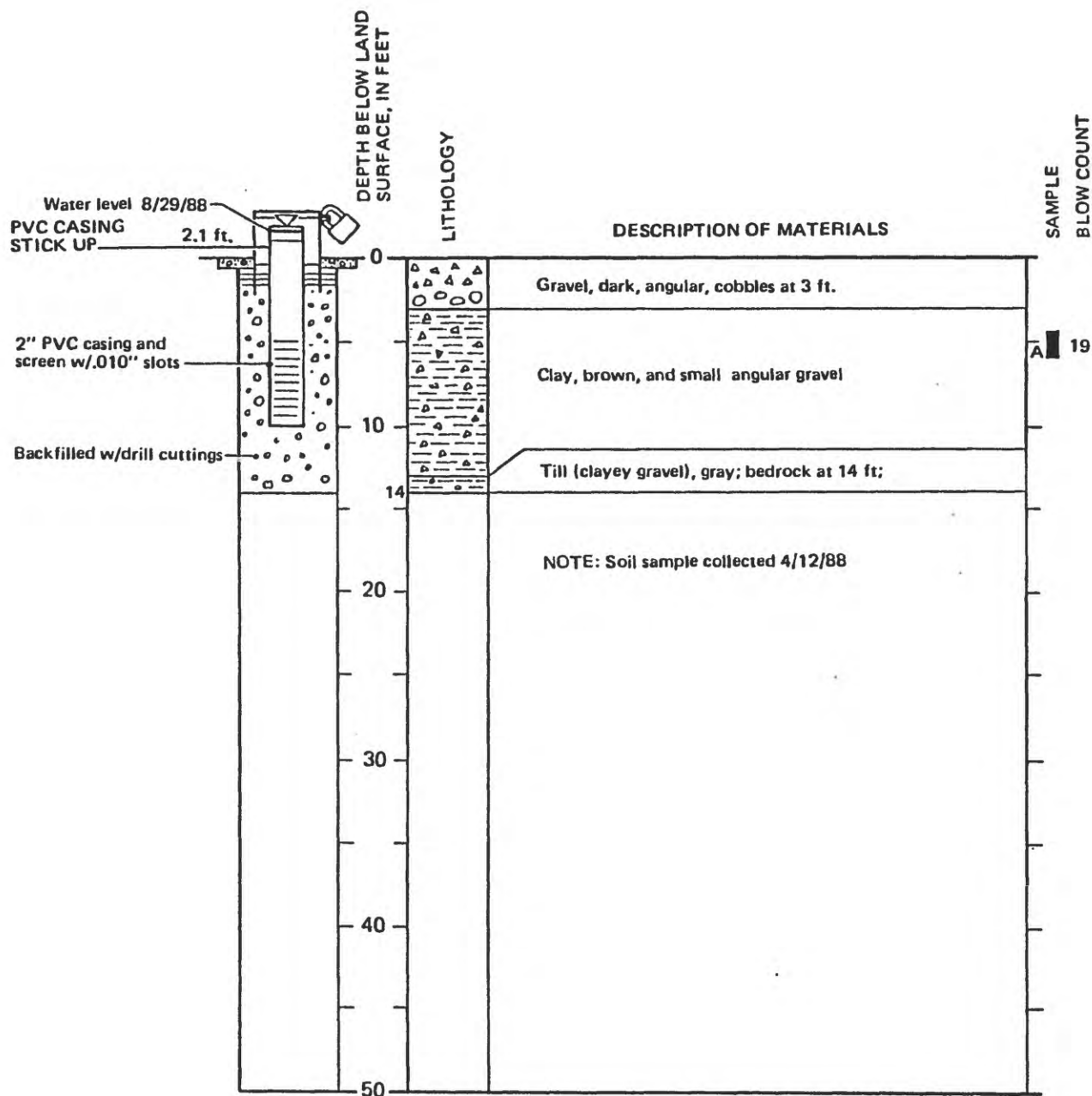
GROUND SURFACE ELEVATION 27.3 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-74.



Location of well A- 75.



USGS SITE ID No. 574318152311101

DATE WELL DRILLED 1/28/88

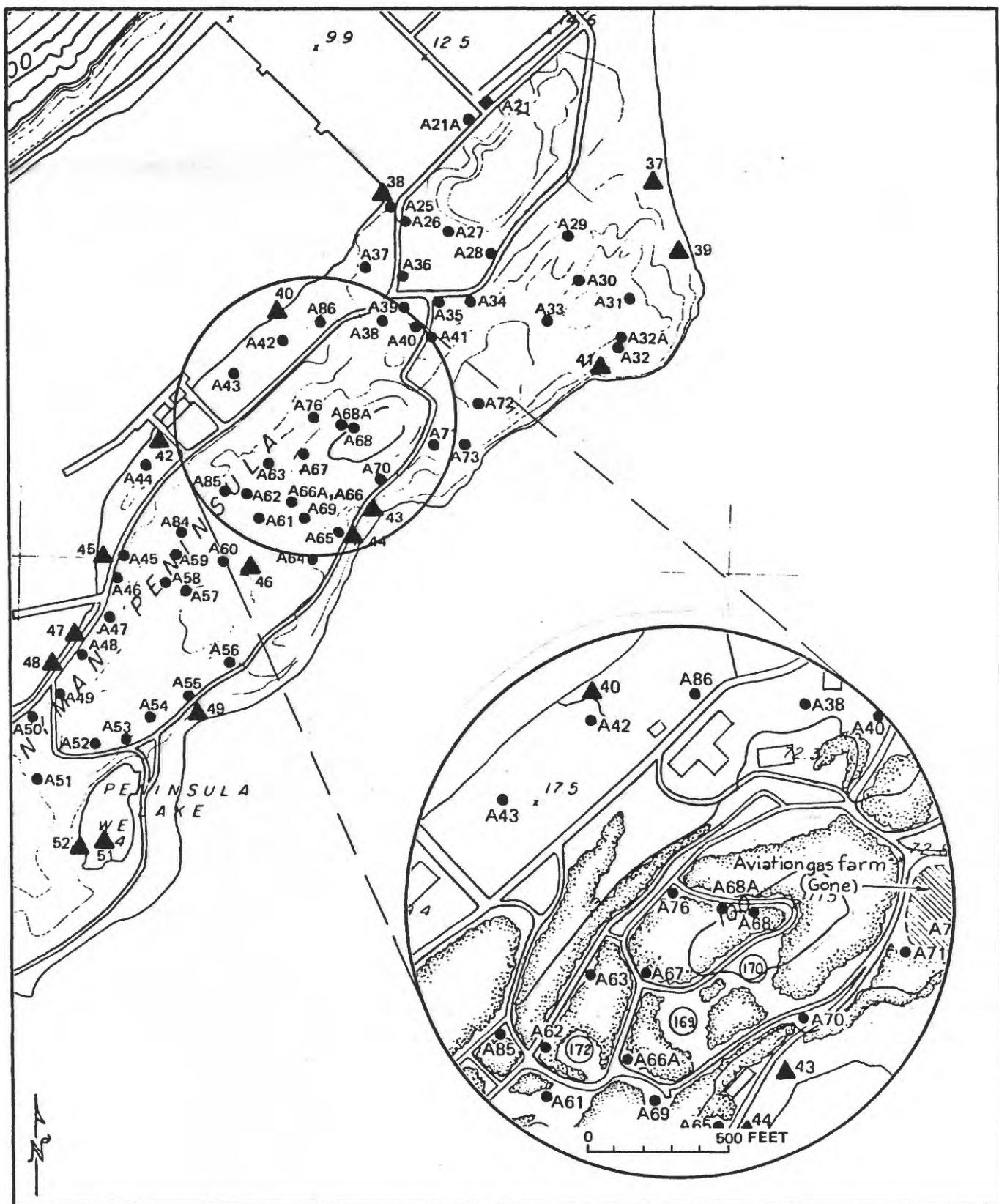
LATITUDE 57°43' 18" LONGITUDE 152°31' 11"

ELEVATION OF TOP OF WELL CASING 16.4 ft.

GROUND SURFACE ELEVATION 14.3 ft.

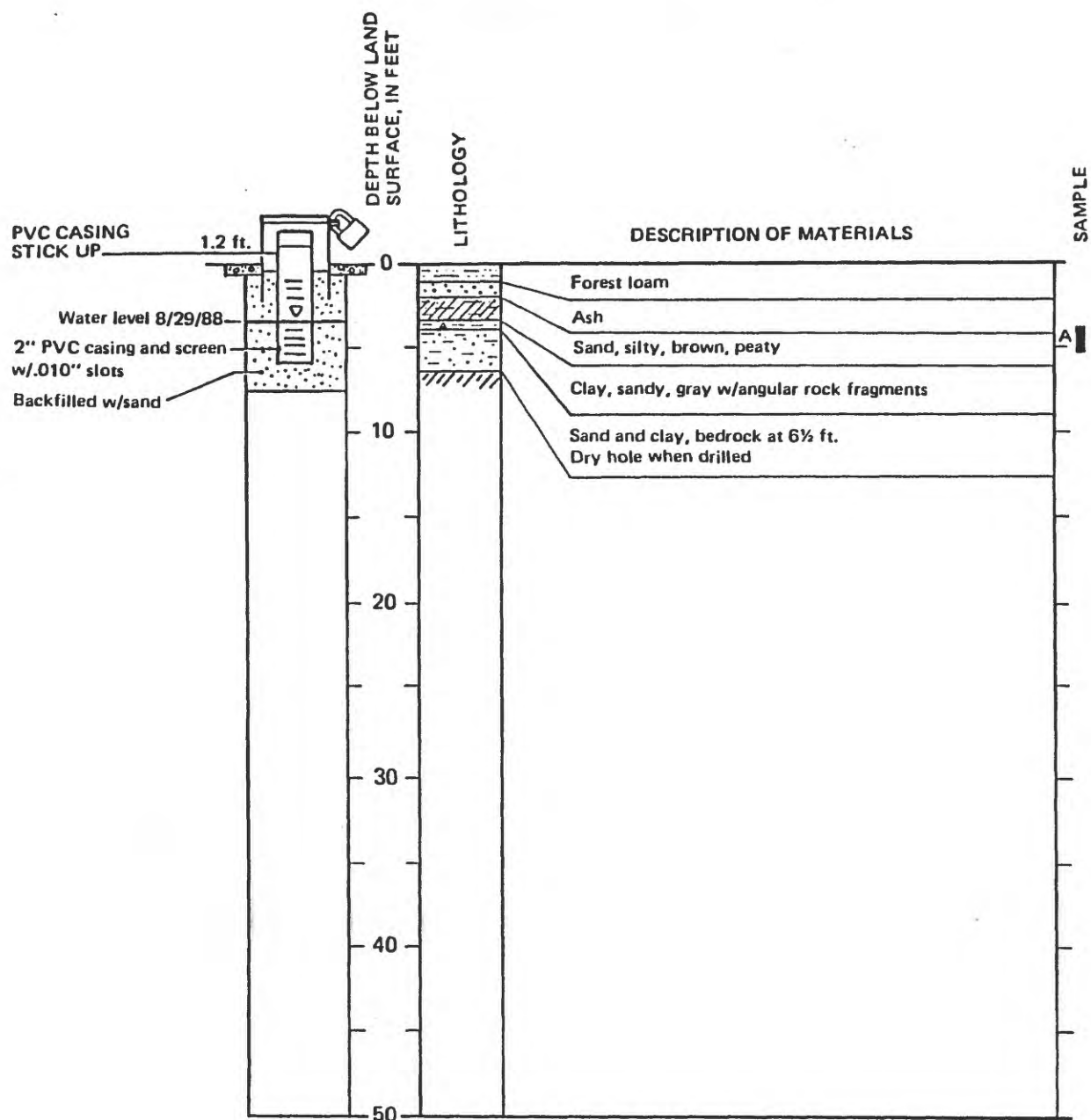
DATUM IS MEAN SEA LEVEL

Log and construction details of well A-75.



0 1000 2000 FEET
0 200 400 METERS

Location of well A-76.



USGS SITE ID No. 574351152301801

DATE WELL DRILLED 2/12/88

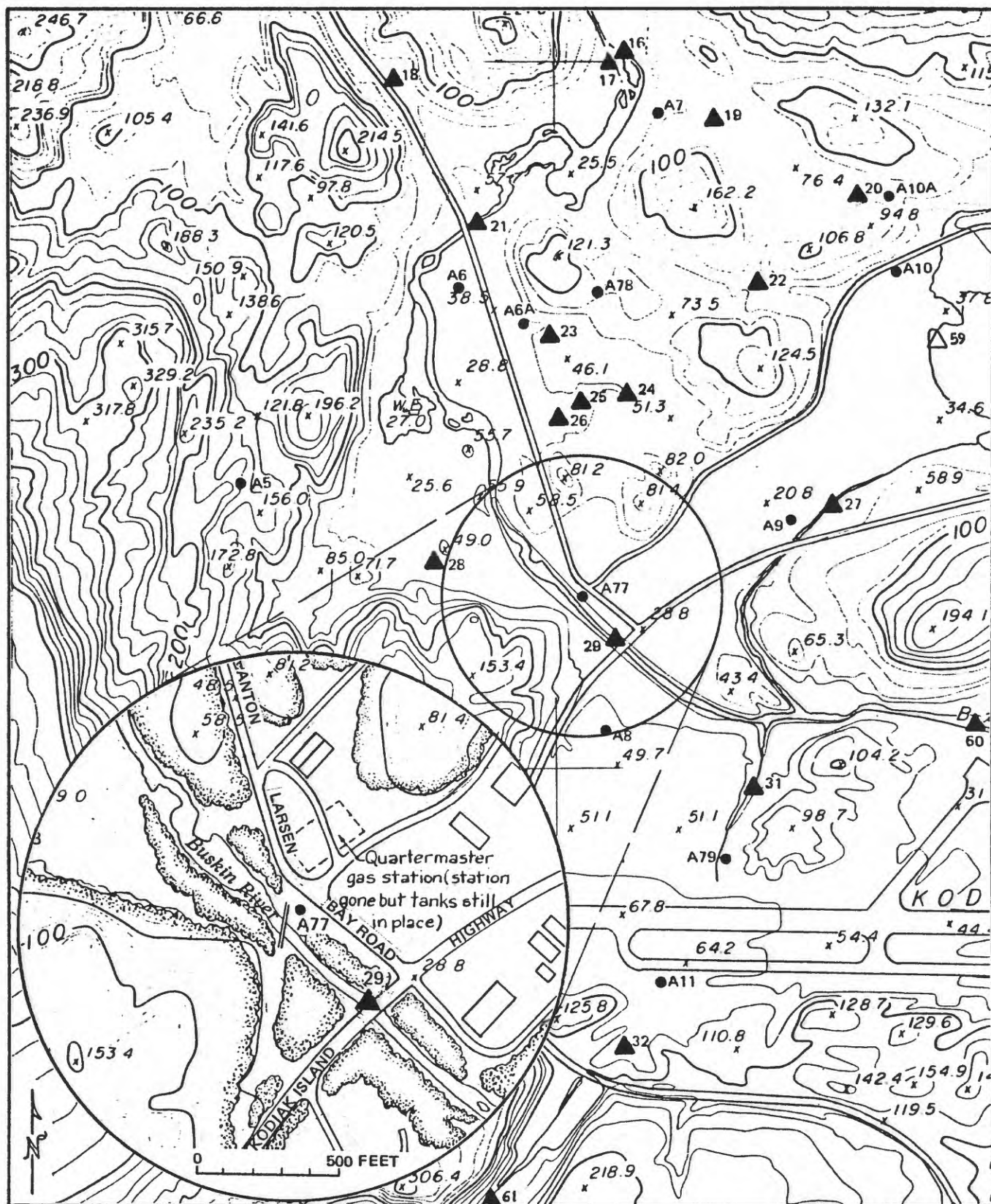
LATITUDE 57° 43' 51" LONGITUDE 152° 30' 18"

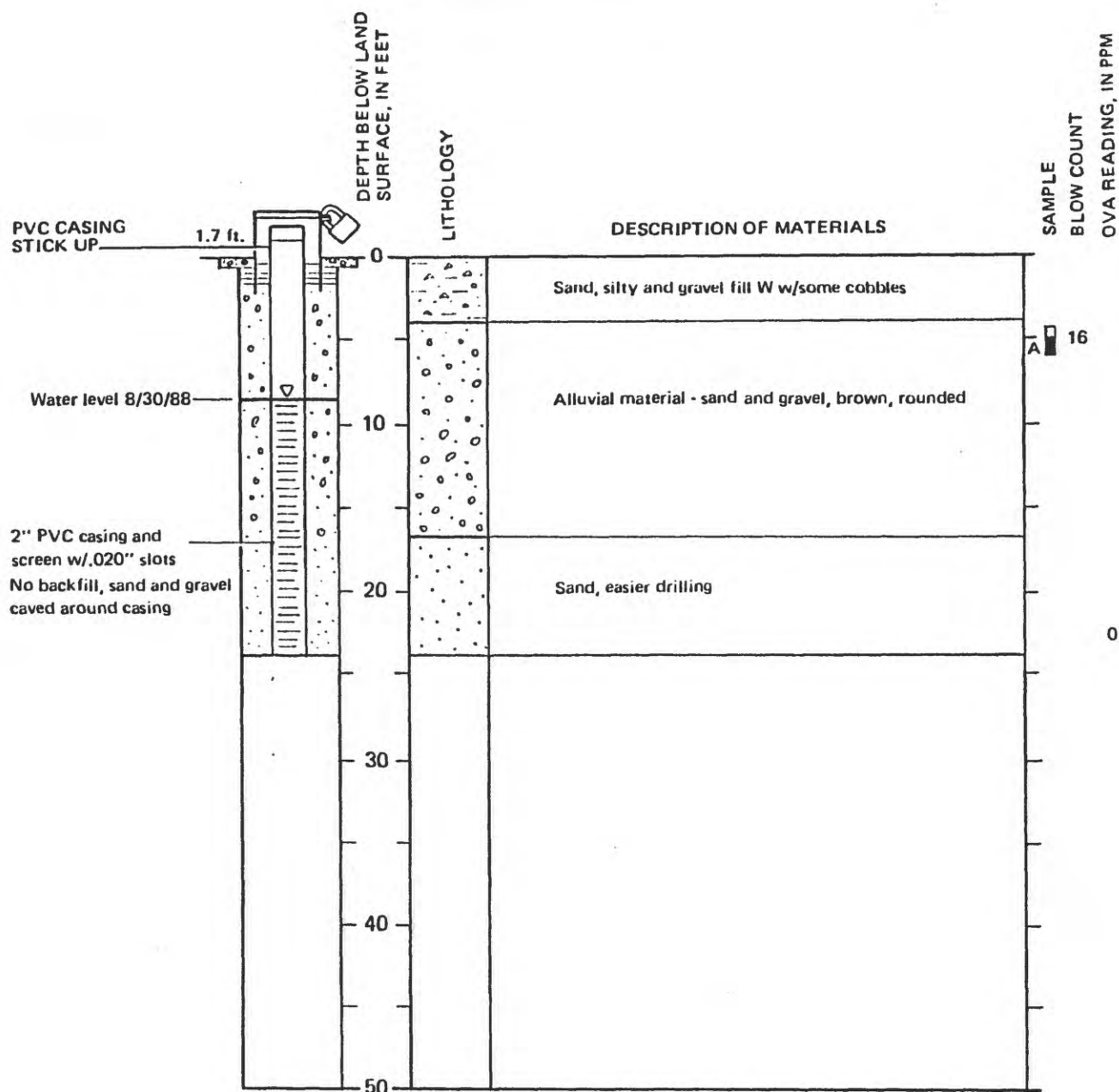
ELEVATION OF TOP OF WELL CASING 69.0 ft.

GROUND SURFACE ELEVATION 67.8 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-76.





USGS SITE ID No. 574531152304901

DATE WELL DRILLED 4/19/88

LATITUDE 57°45' 31" LONGITUDE 152°30' 49"

ELEVATION OF TOP OF WELL CASING 31.2 ft.

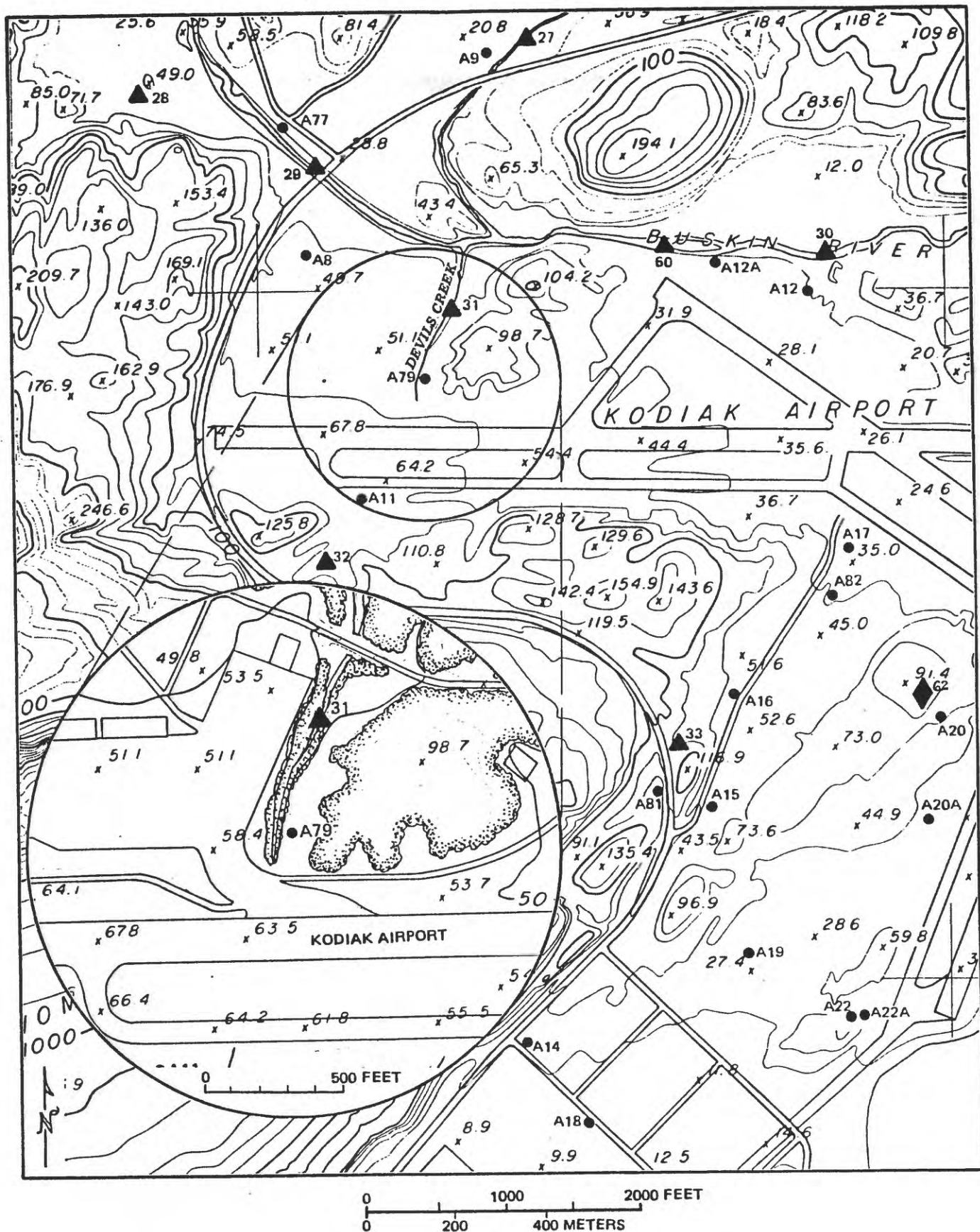
GROUND SURFACE ELEVATION 29.5 ft.

DATUM IS MEAN SEA LEVEL

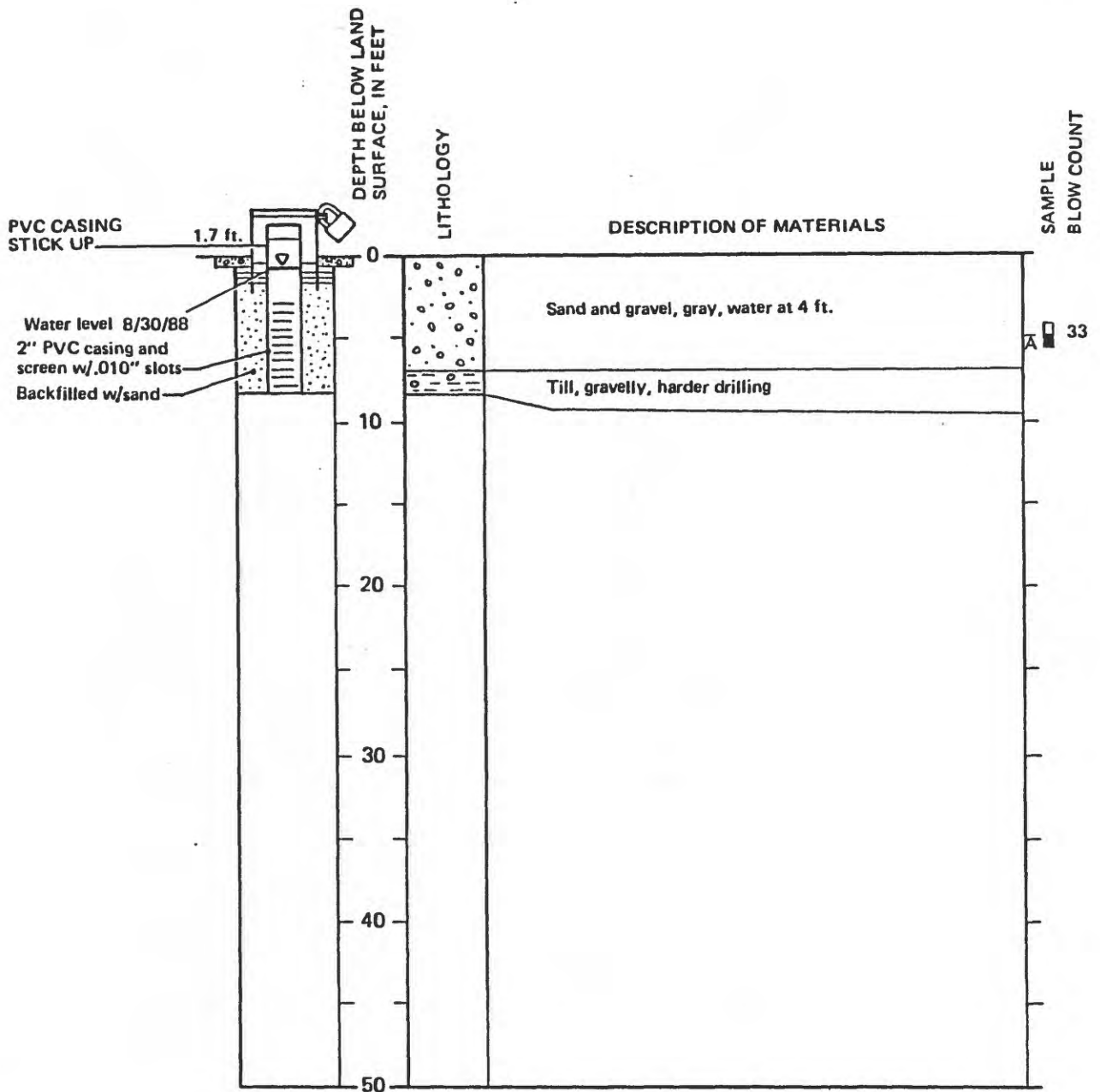
Log and construction details of well A-77.



Location of well A-78.

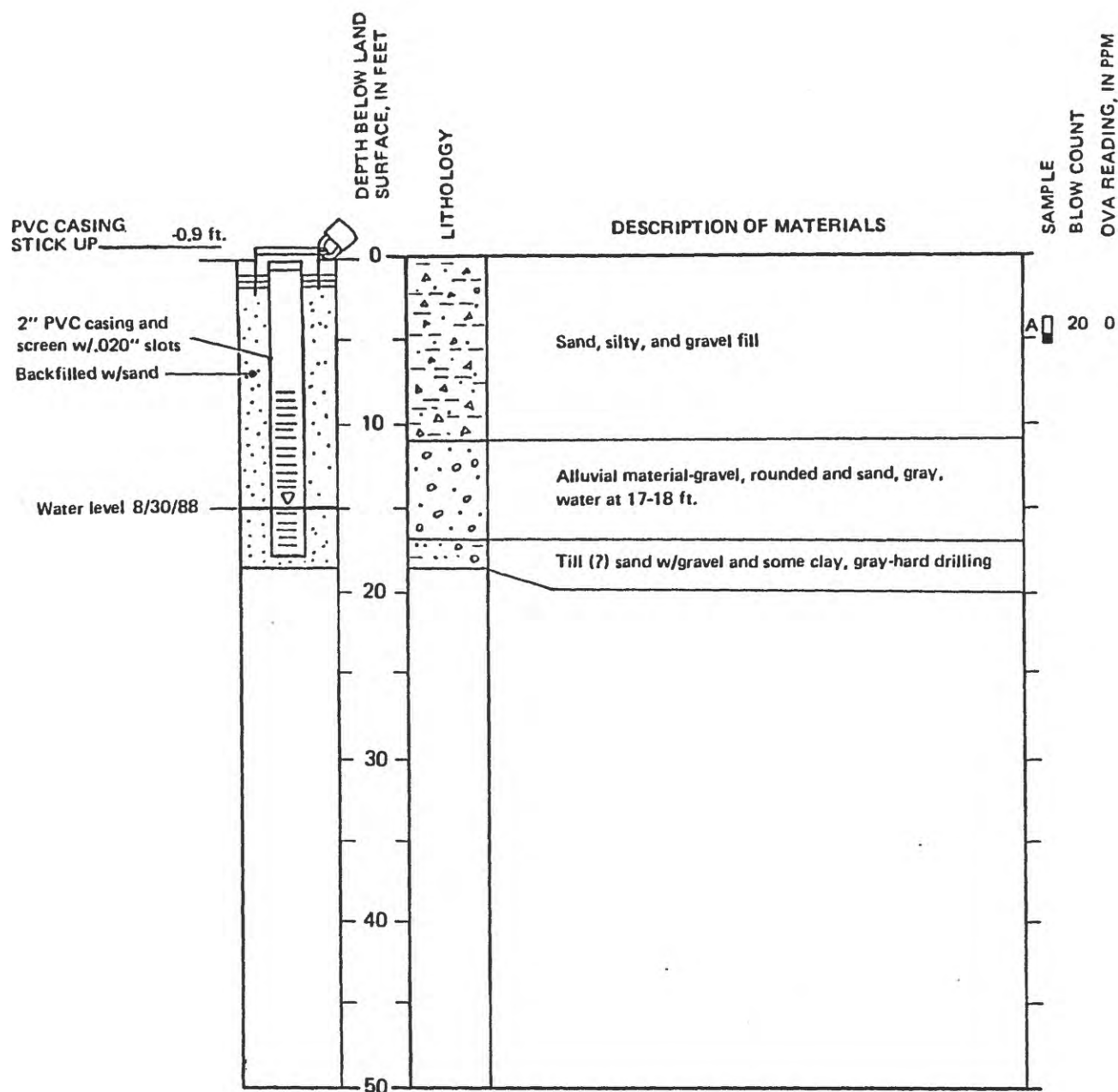


Location of well A-79.



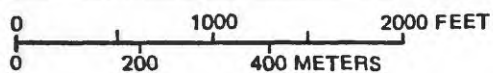
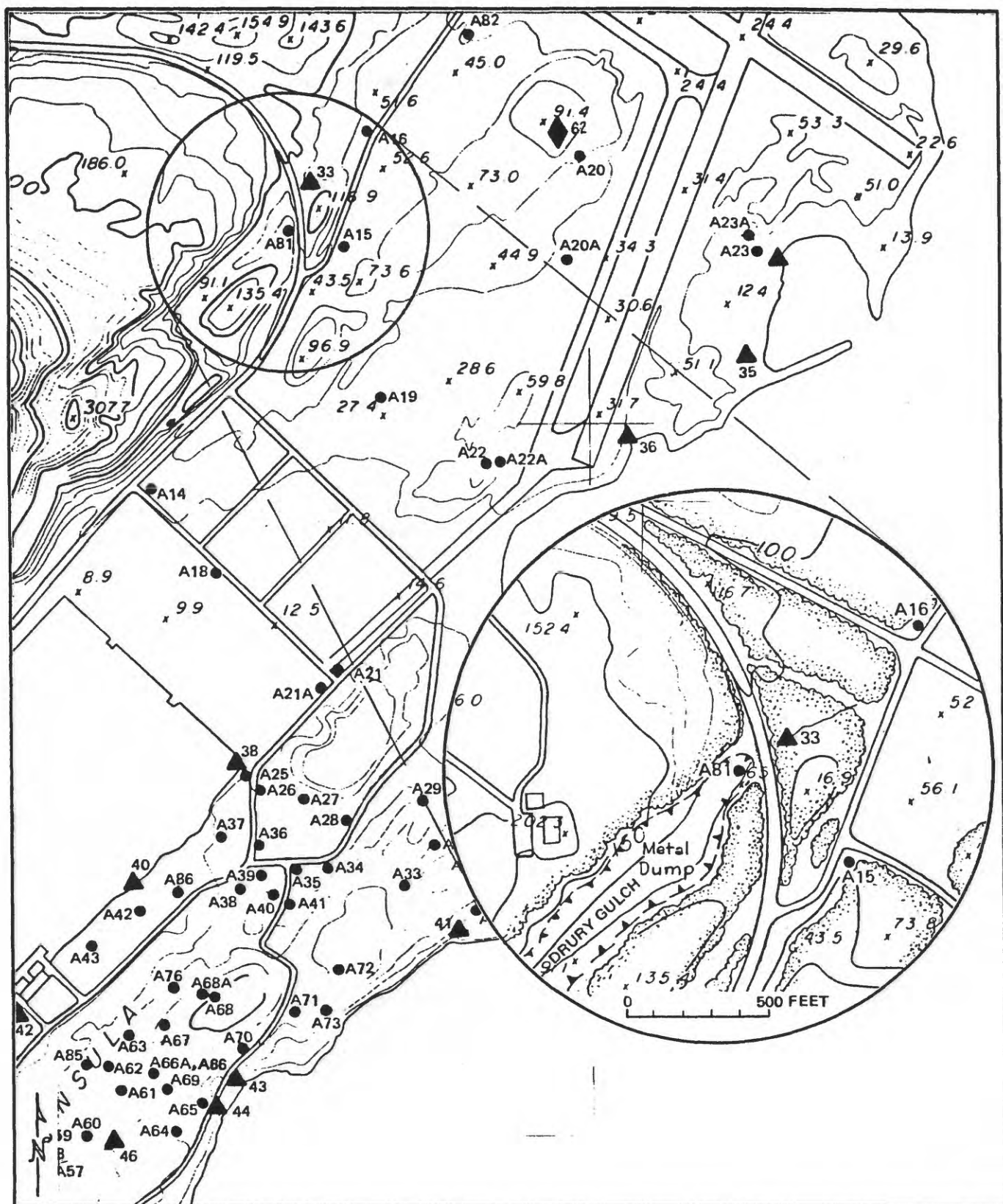
USGS SITE ID No. 573552152304701
 DATE WELL DRILLED 4/19/88
 LATITUDE 57° 45' 52" LONGITUDE 152° 30' 44"
 ELEVATION OF TOP OF WELL CASING 84.8 ft.
 GROUND SURFACE ELEVATION 83.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-78.

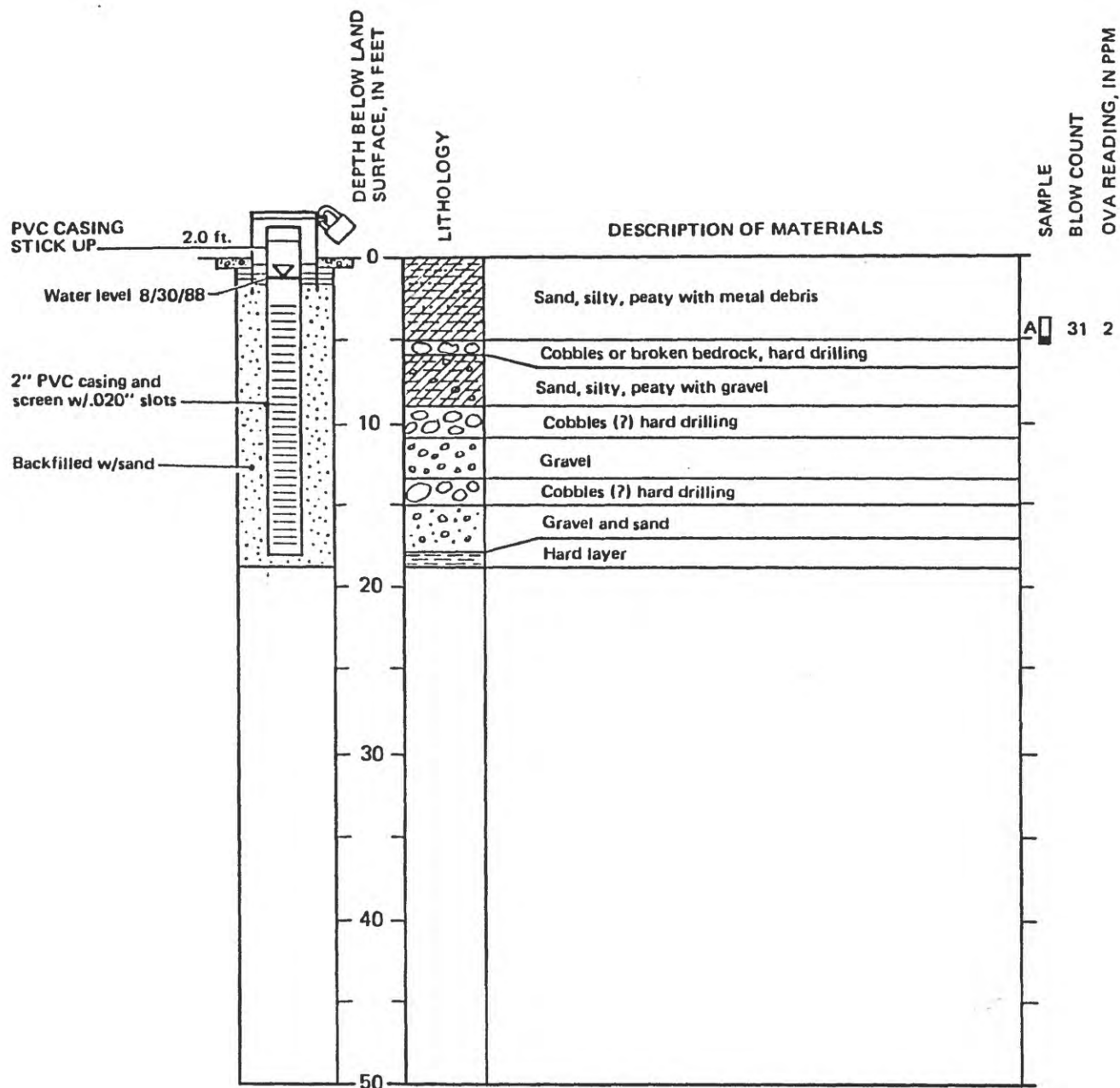


USGS SITE ID No. 574513152303101
 DATE WELL DRILLED 4/18/88
 LATITUDE 57° 45' 13" LONGITUDE 152° 30' 31"
 ELEVATION OF TOP OF WELL CASING 55.7 ft.
 GROUND SURFACE ELEVATION 56.6 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-79.

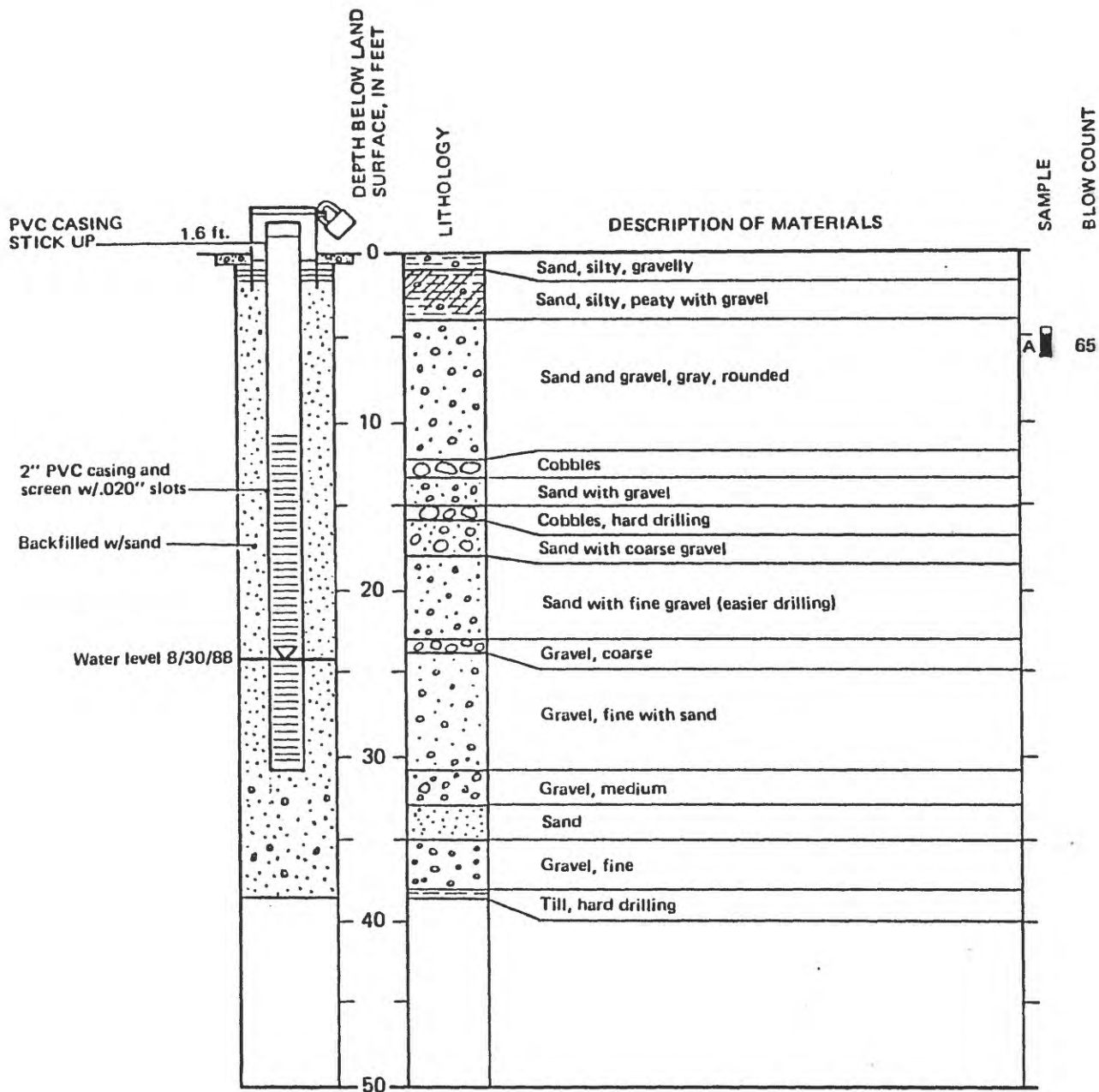


Location of well A-81.



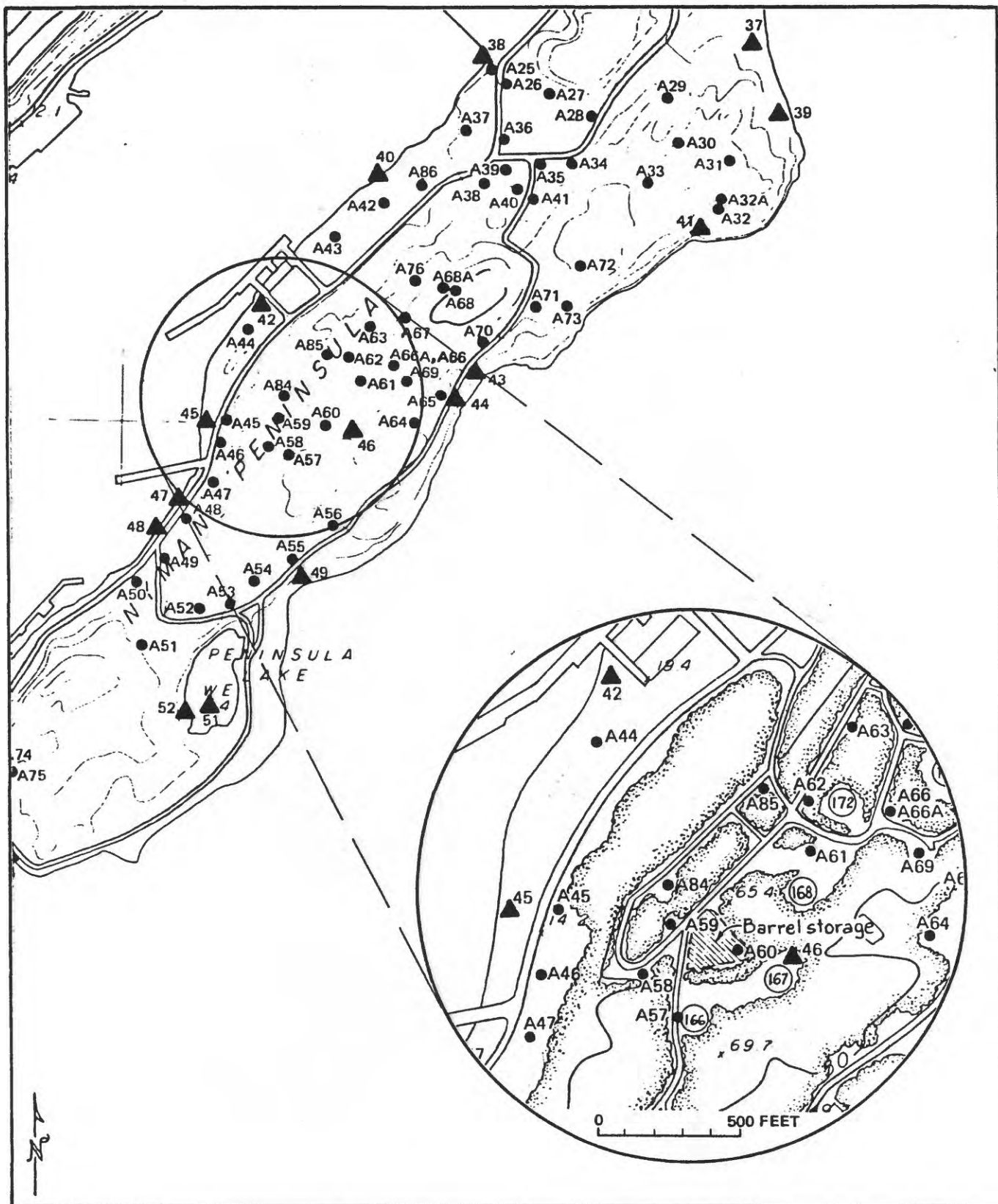
USGS SITE ID No. 574443152300301
 DATE WELL DRILLED 4/21/88
 LATITUDE 57° 44' 43" LONGITUDE 152° 30' 03"
 ELEVATION OF TOP OF WELL CASING 70.1 ft.
 GROUND SURFACE ELEVATION 68.1 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-81.

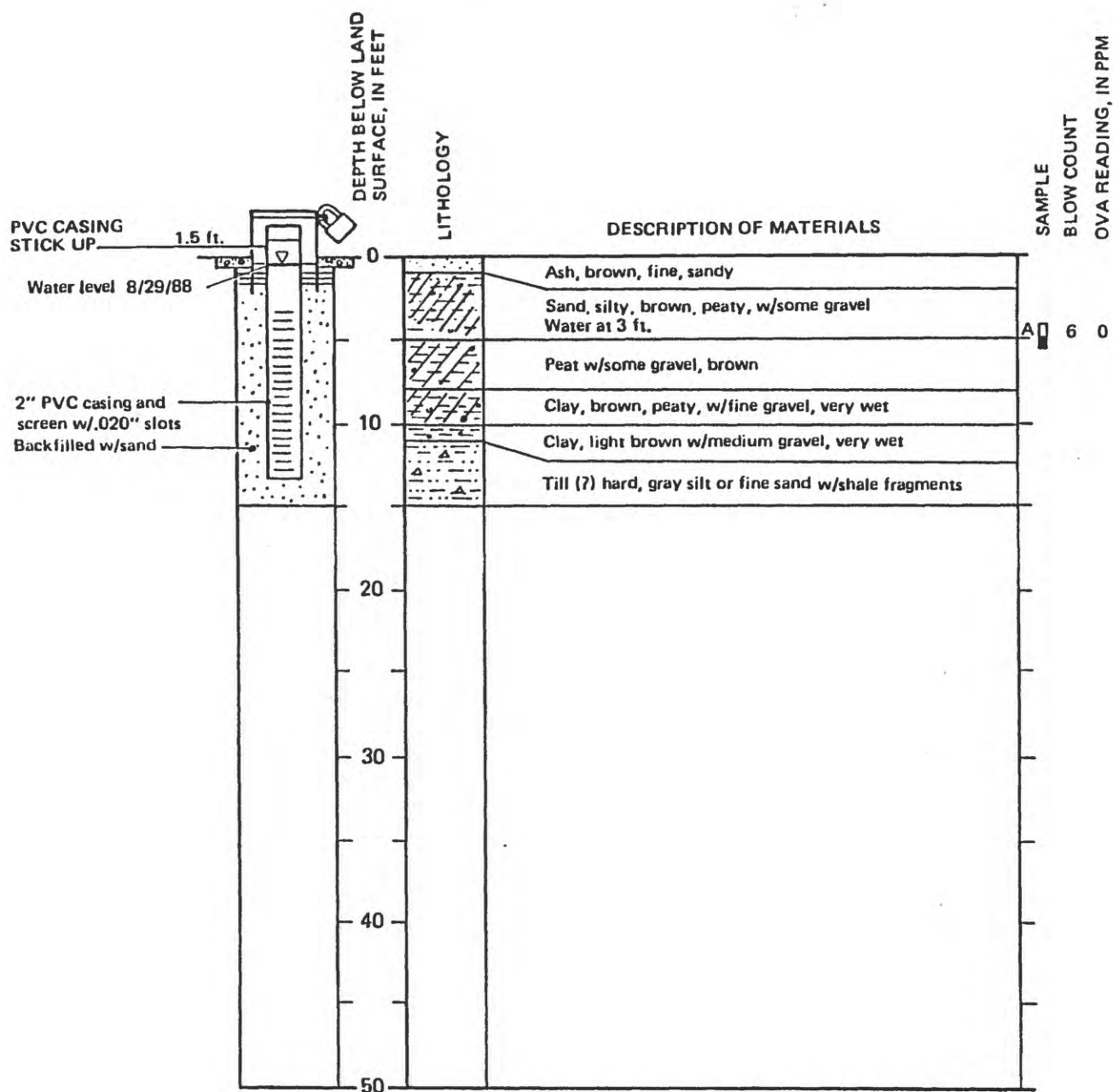


USGS SITE ID No. 574457152293801
 DATE WELL DRILLED 4/20/88
 LATITUDE 57° 44' 57" LONGITUDE 152° 29' 38"
 ELEVATION OF TOP OF WELL CASING 41.0 ft.
 GROUND SURFACE ELEVATION 39.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-82.

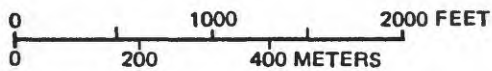


Location of well A-84.

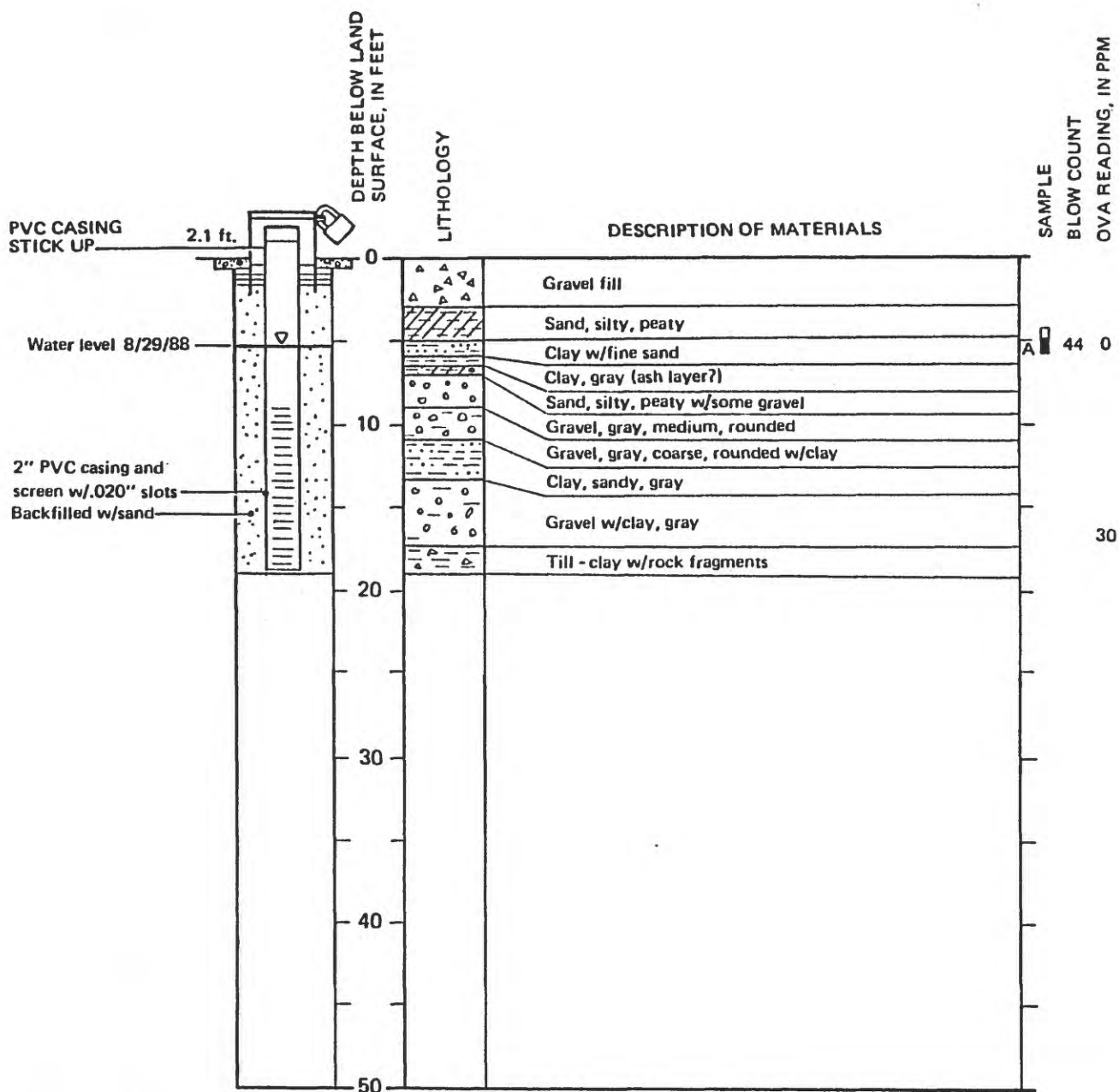


USGS SITE ID No. 574344152303401
 DATE WELL DRILLED 4/14/88
 LATITUDE 57° 43' 44" LONGITUDE 152° 30' 34"
 ELEVATION OF TOP OF WELL CASING 47.4 ft.
 GROUND SURFACE ELEVATION 45.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well A-84.



Location of well A-85.



USGS SITE ID No. 574347152302801

DATE WELL DRILLED 4/13/88

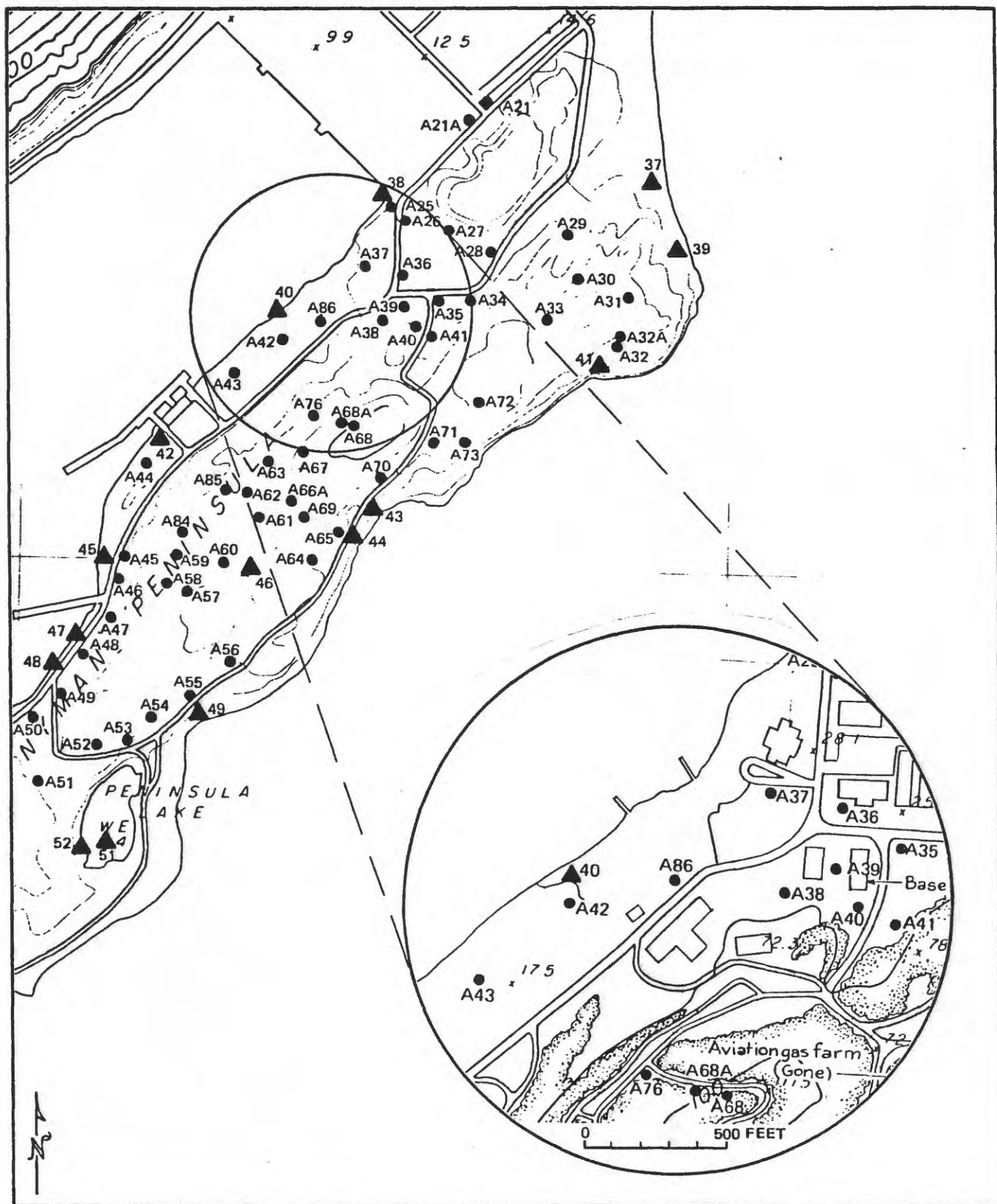
LATITUDE 57° 43' 47" LONGITUDE 152° 30' 28"

ELEVATION OF TOP OF WELL CASING 51.2 ft.

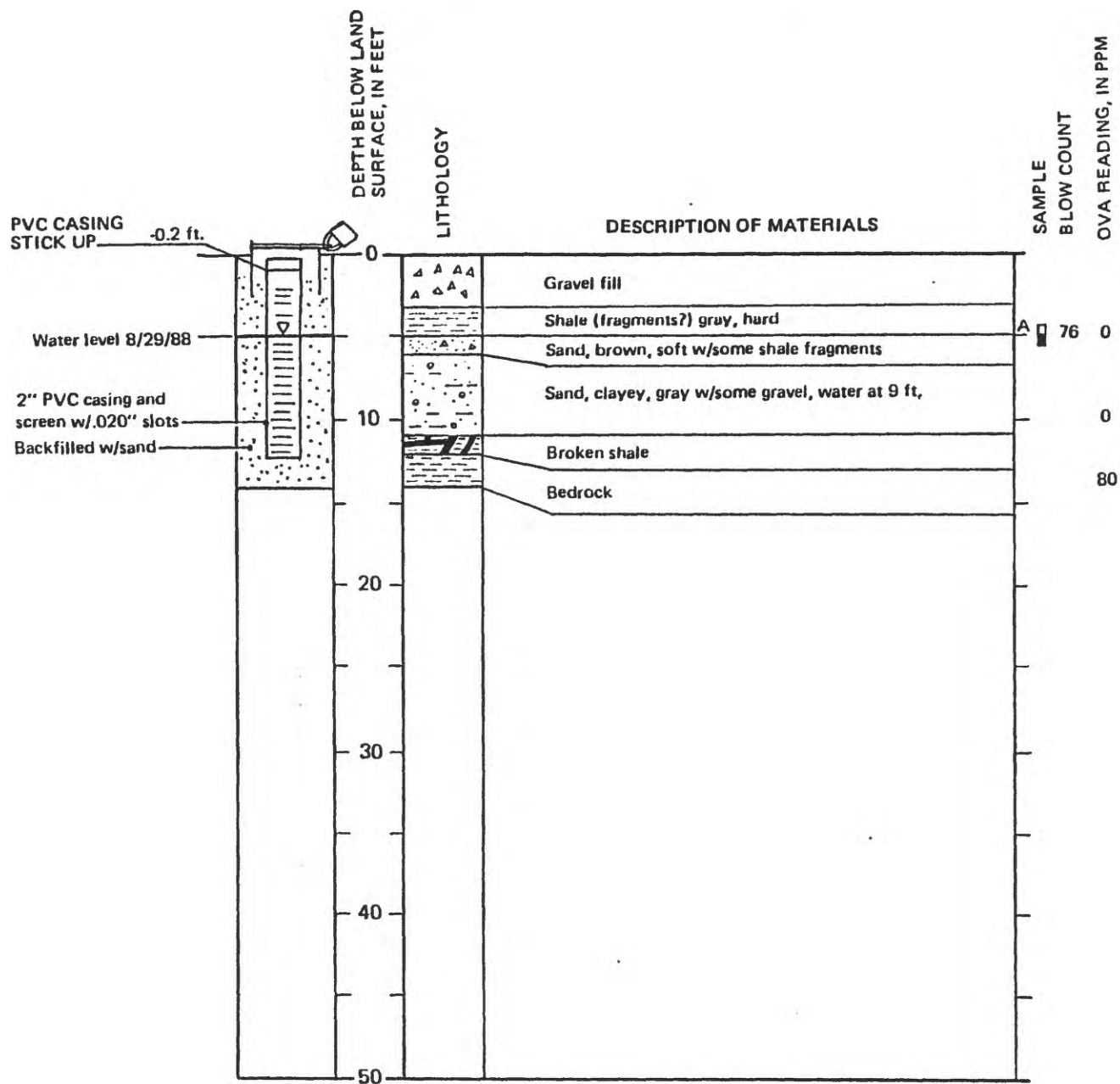
GROUND SURFACE ELEVATION 49.1 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-85.



Location of well A-86.



USGS SITE ID No. 574358152301701

DATE WELL DRILLED 4/17/88

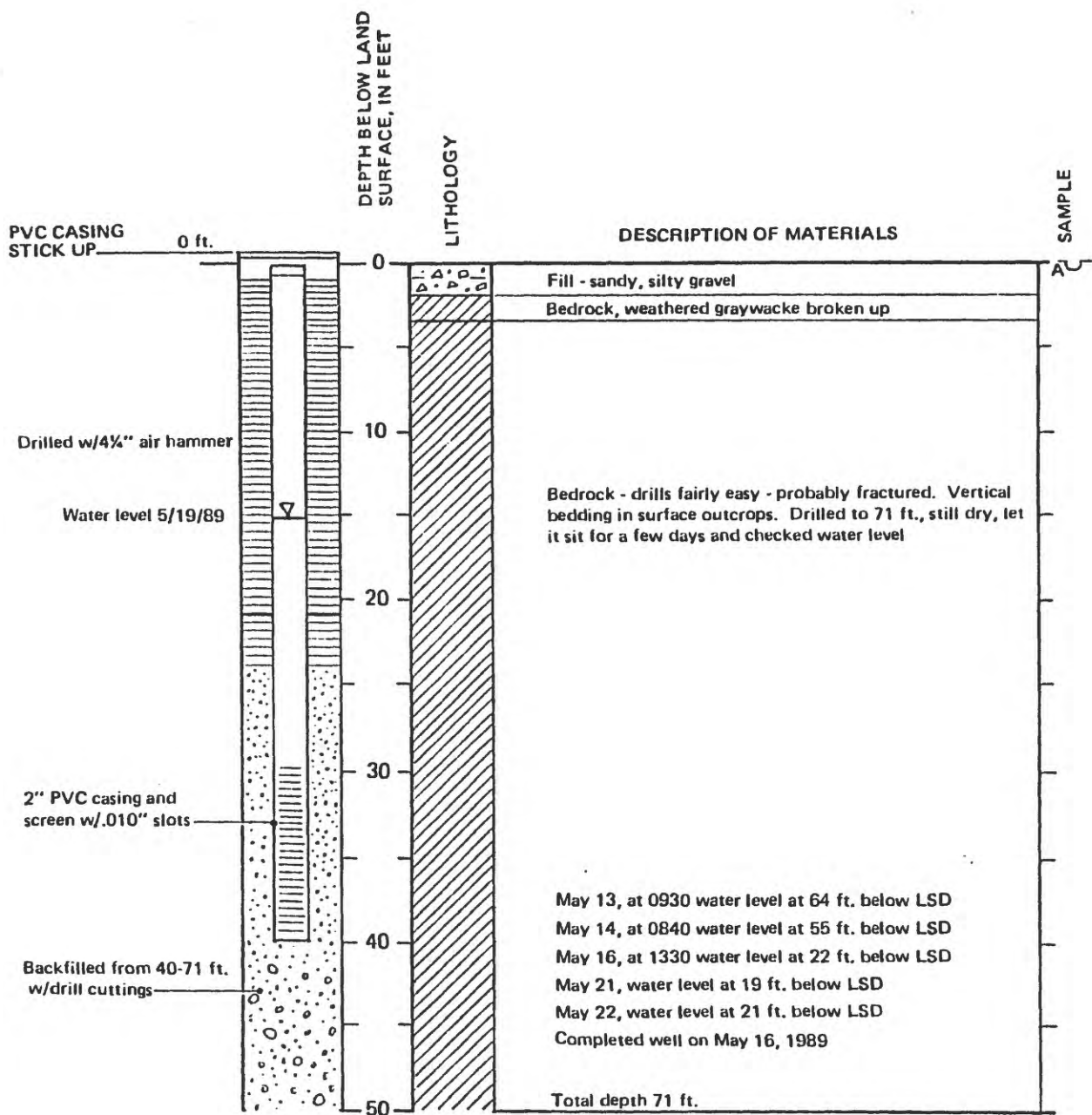
LATITUDE 57° 43' 58" LONGITUDE 152° 30' 17"

ELEVATION OF TOP OF WELL CASING 7.1 ft.

GROUND SURFACE ELEVATION 7.3 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well A-86.

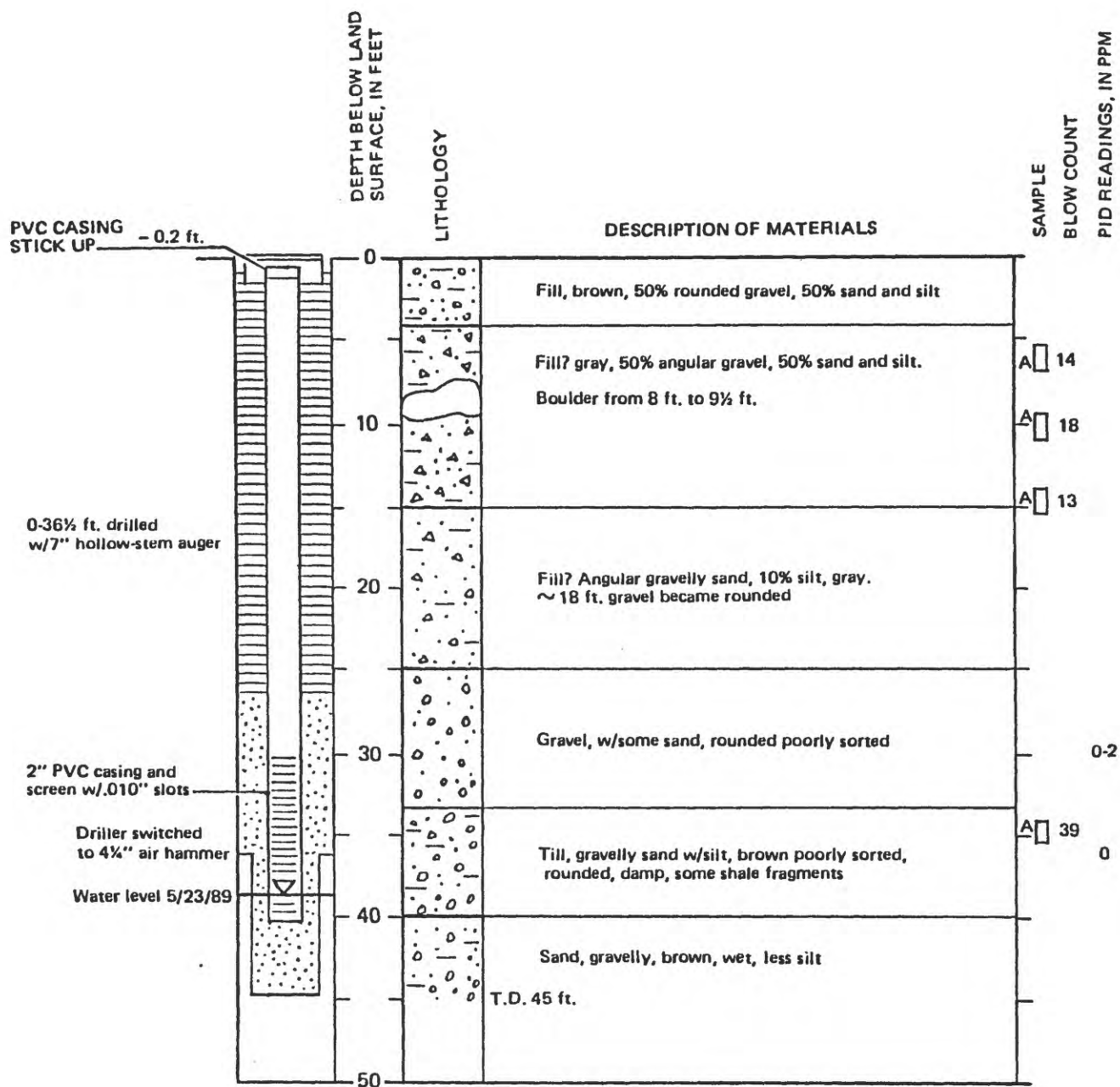


USGS SITE ID No. 574447152285901
 DATE WELL DRILLED 5/12/89
 LATITUDE 57° 44' 47" LONGITUDE 152° 28' 59"
 ELEVATION OF TOP OF WELL CASING 37.7 ft.
 GROUND SURFACE ELEVATION 37.7 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well B-1.



Location of well B-2.

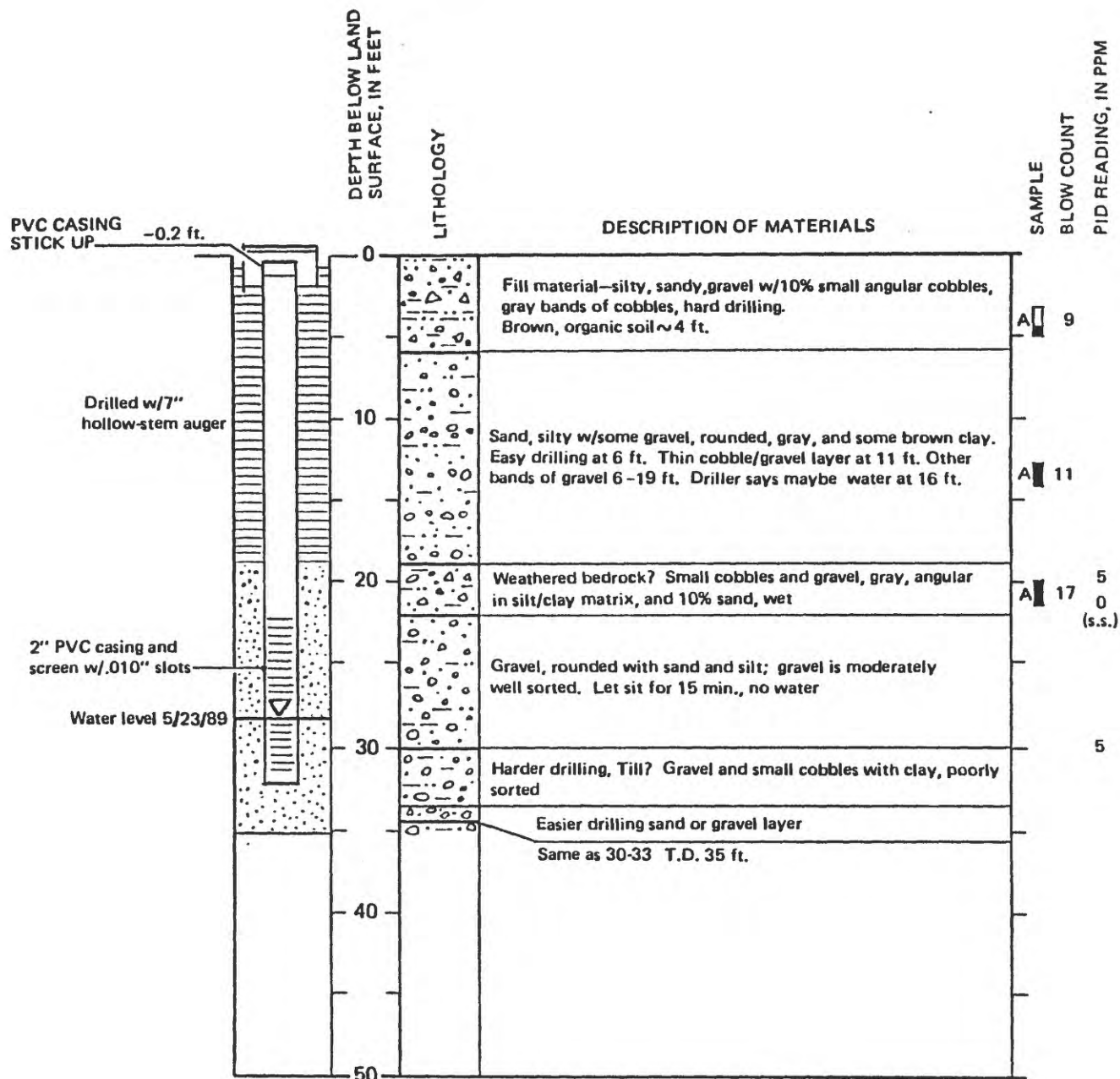


USGS SITE ID No. 574444152290301
 DATE WELL DRILLED 5/13/89
 LATITUDE 57° 44' 44" LONGITUDE 152° 29' 03"
 ELEVATION OF TOP OF WELL CASING 38.2 ft.
 GROUND SURFACE ELEVATION 38.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well B-2.

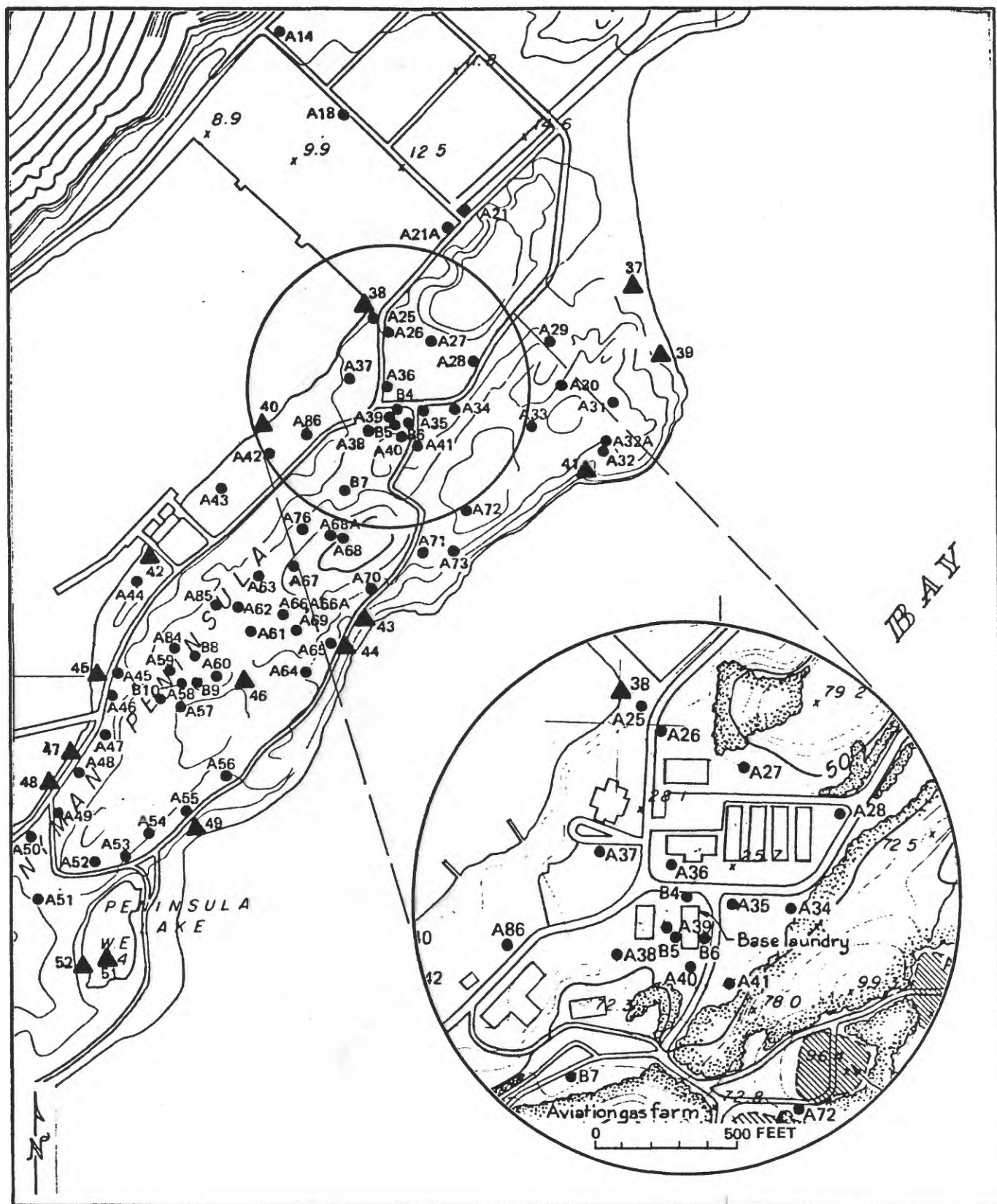


Location of well B-3.

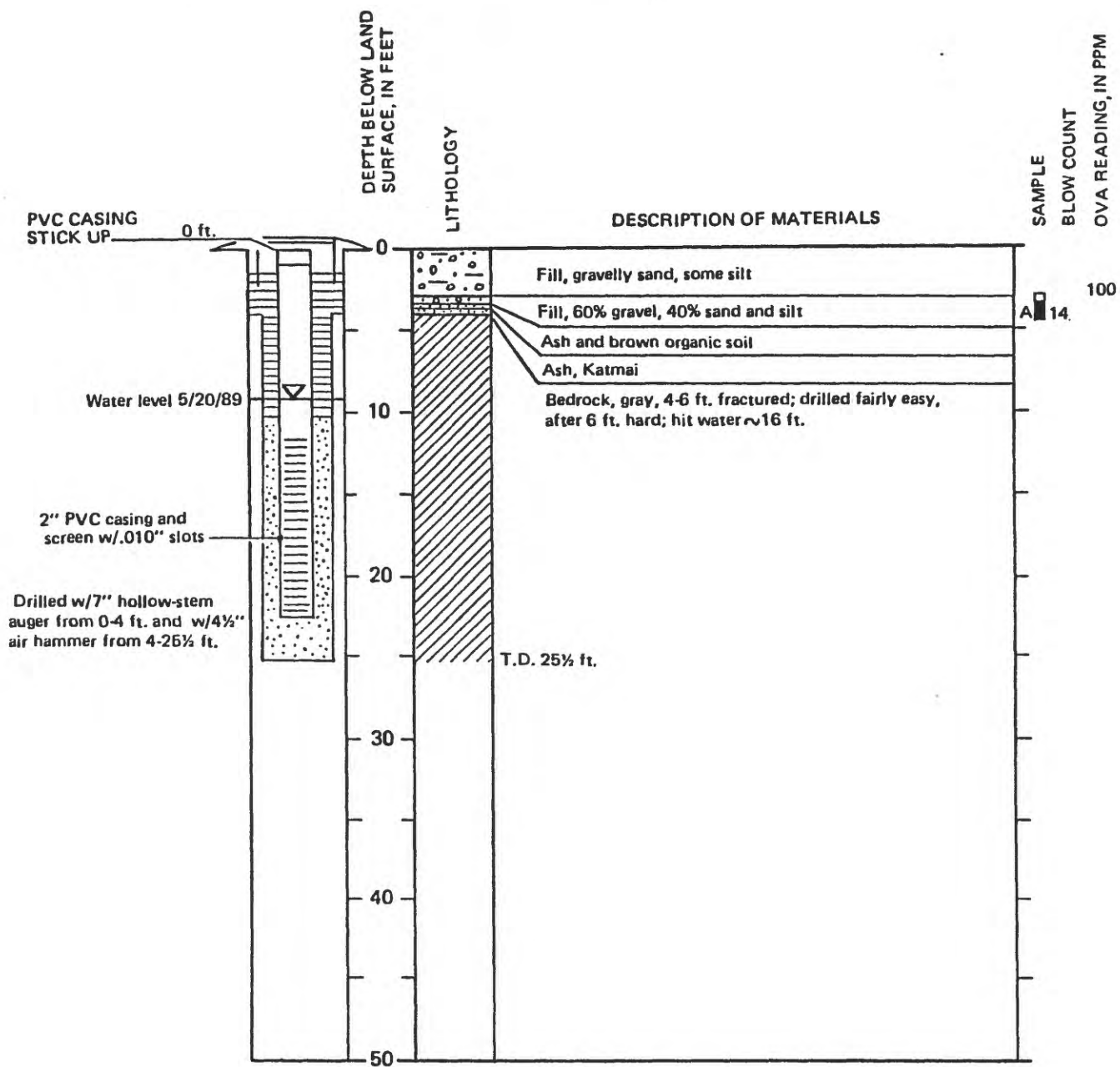


USGS SITE ID No. 574444152290701
 DATE WELL DRILLED 5/16/89
 LATITUDE 57° 44' 44" LONGITUDE 152° 29' 07"
 ELEVATION OF TOP OF WELL CASING 28.2 ft.
 GROUND SURFACE ELEVATION 28.4 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well B-3.

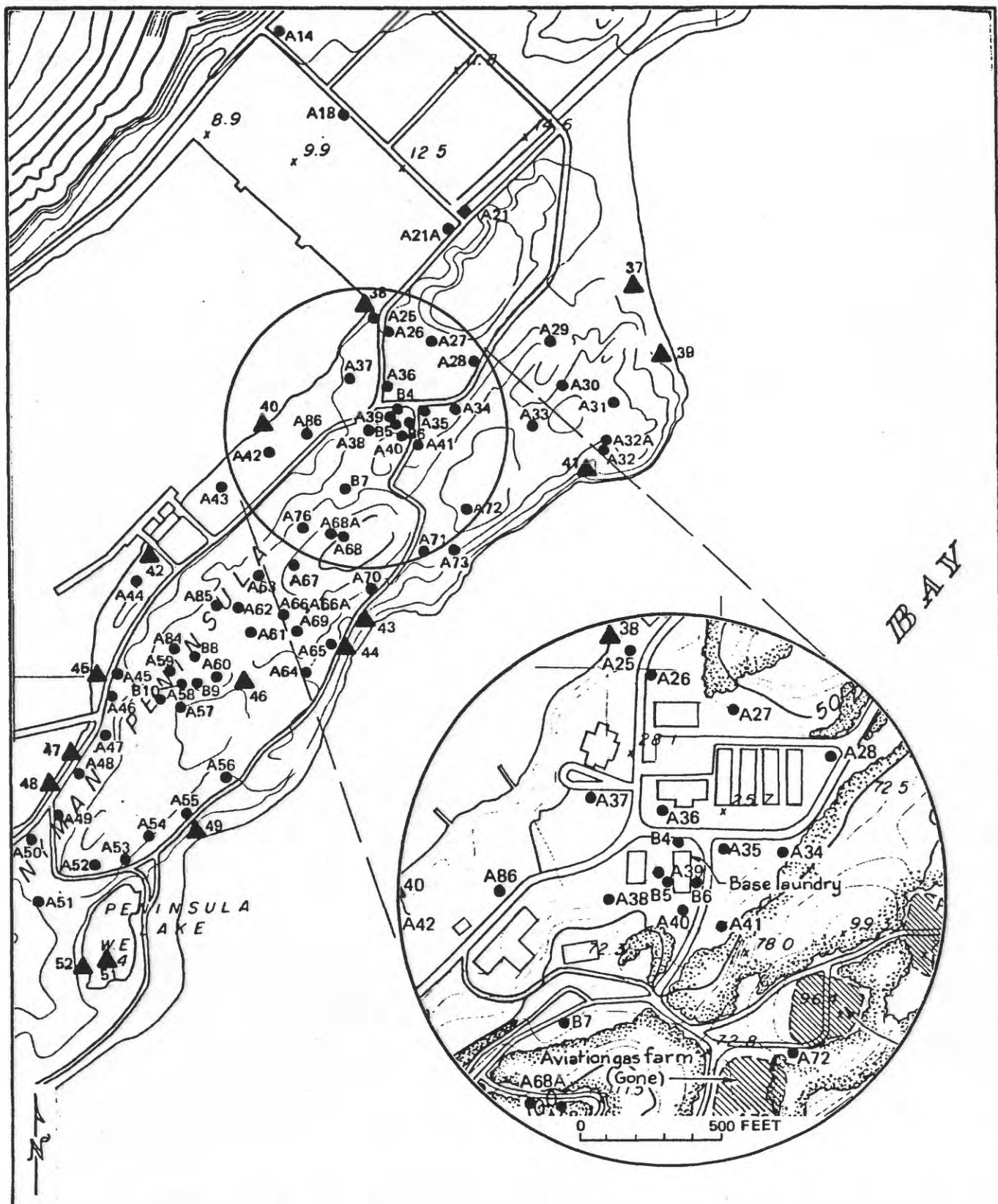


Location of well B-4.



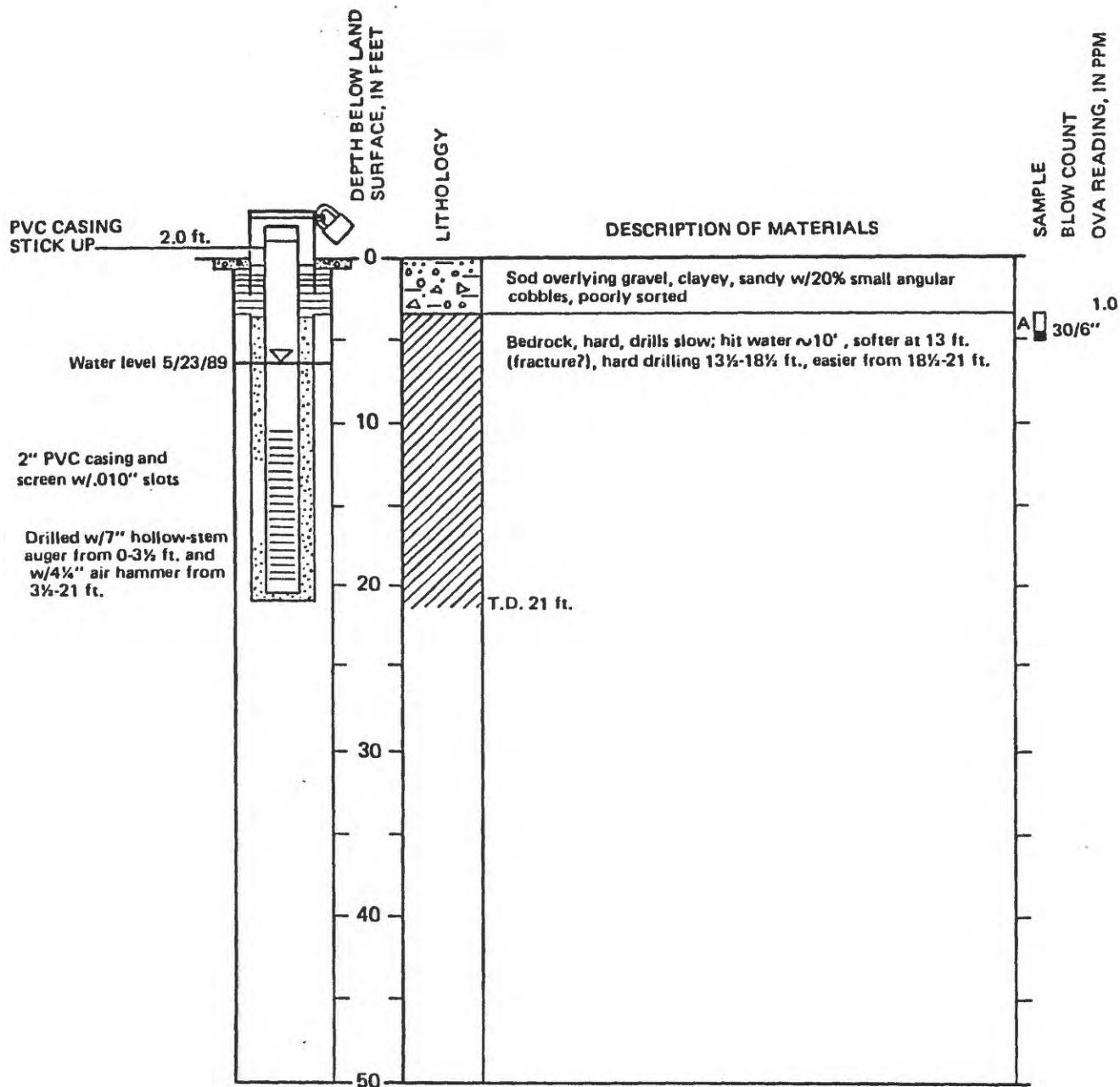
USGS SITE ID No. 574401152300601
 DATE WELL DRILLED 5/14/89
 LATITUDE 57°44' 01" LONGITUDE 152°30' 06"
 ELEVATION OF TOP OF WELL CASING 21.9 ft.
 GROUND SURFACE ELEVATION 21.9 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well B-4.



0 1000 2000 FEET
0 200 400 METERS

Location of well B-5.



USGS SITE ID No. 574359152300501

DATE WELL DRILLED 5/15/89

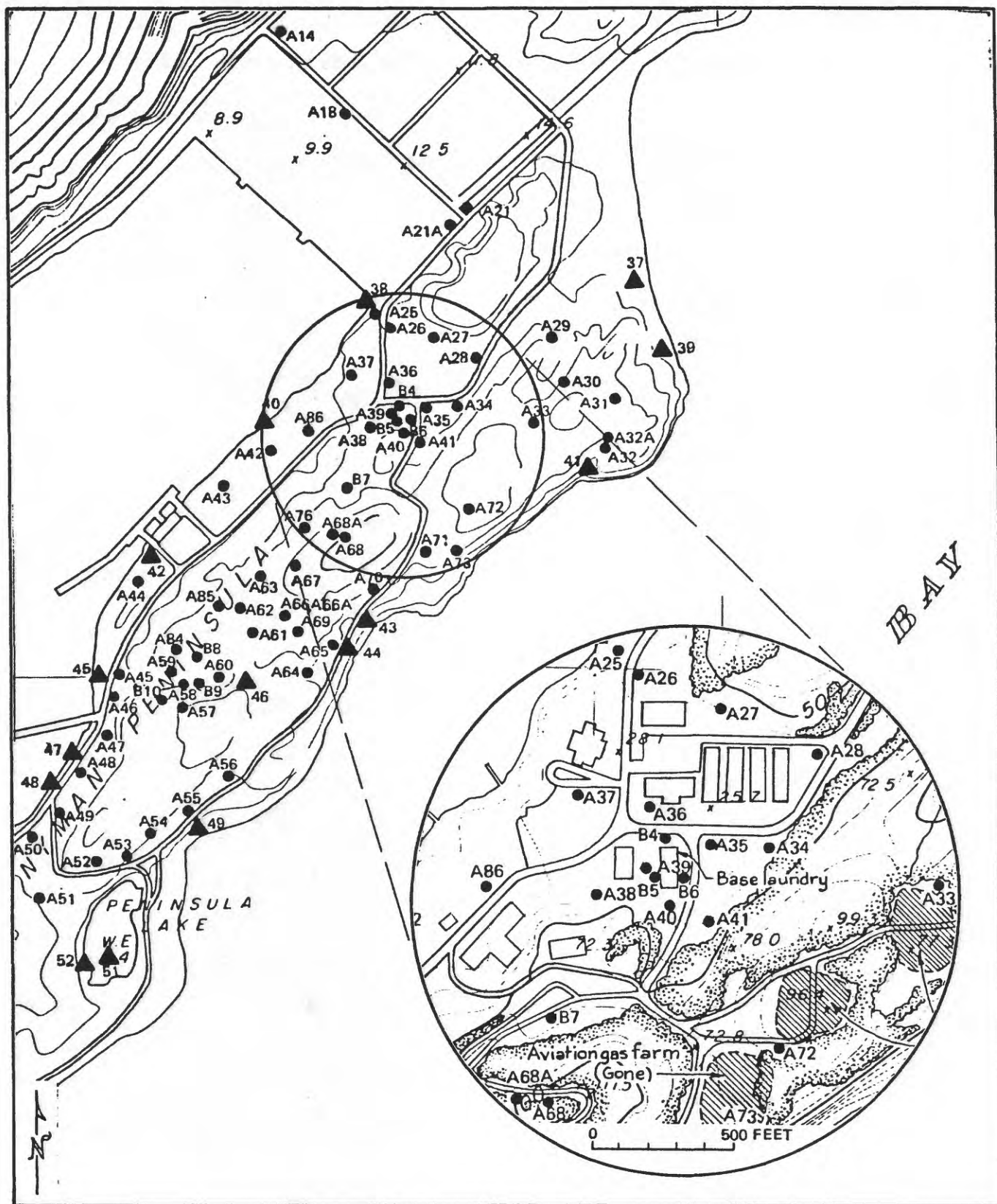
LATITUDE 57° 43' 59" LONGITUDE 152° 30' 05"

ELEVATION OF TOP OF WELL CASING 27.1 ft.

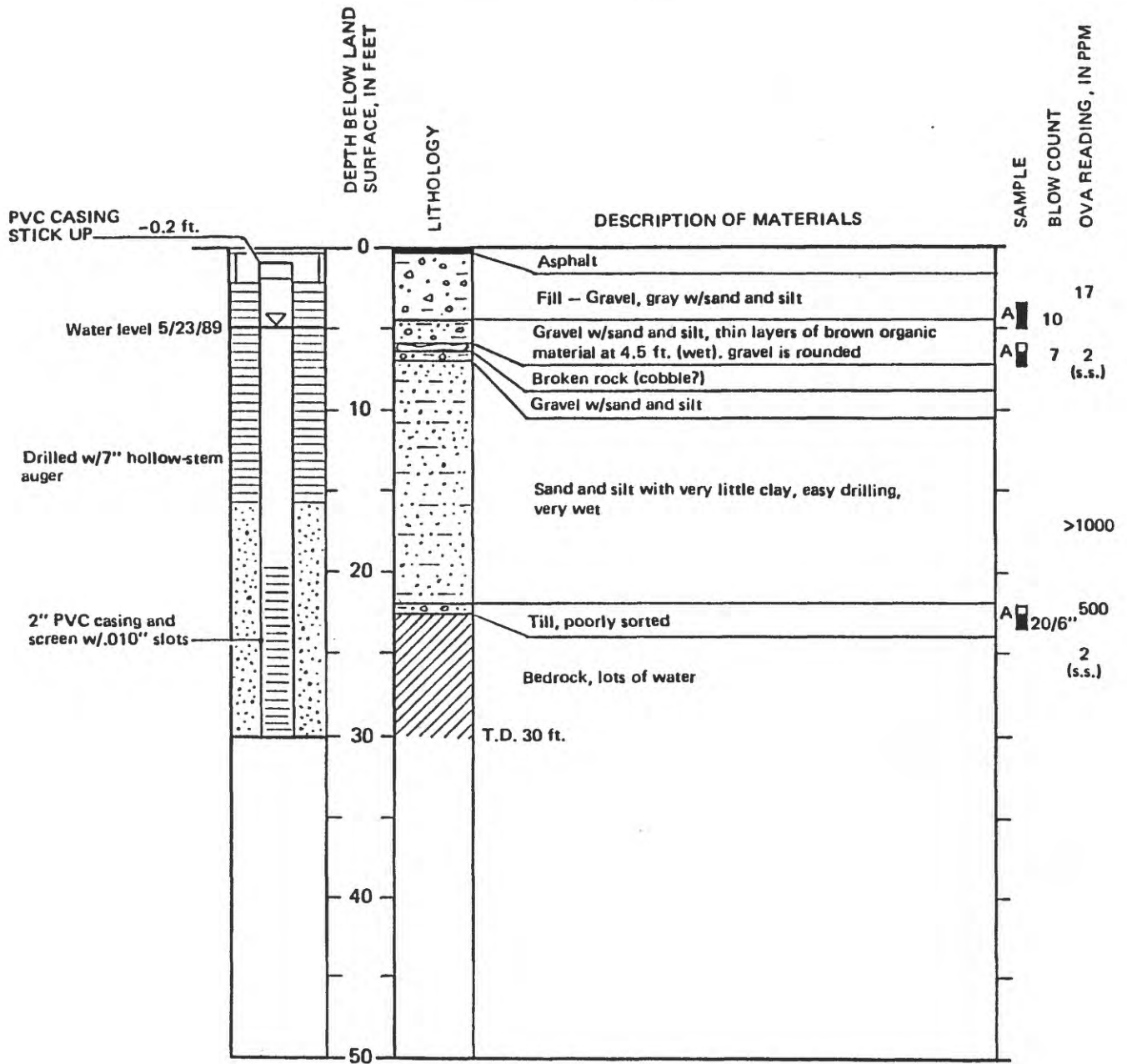
GROUND SURFACE ELEVATION 25.1 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well B-5.

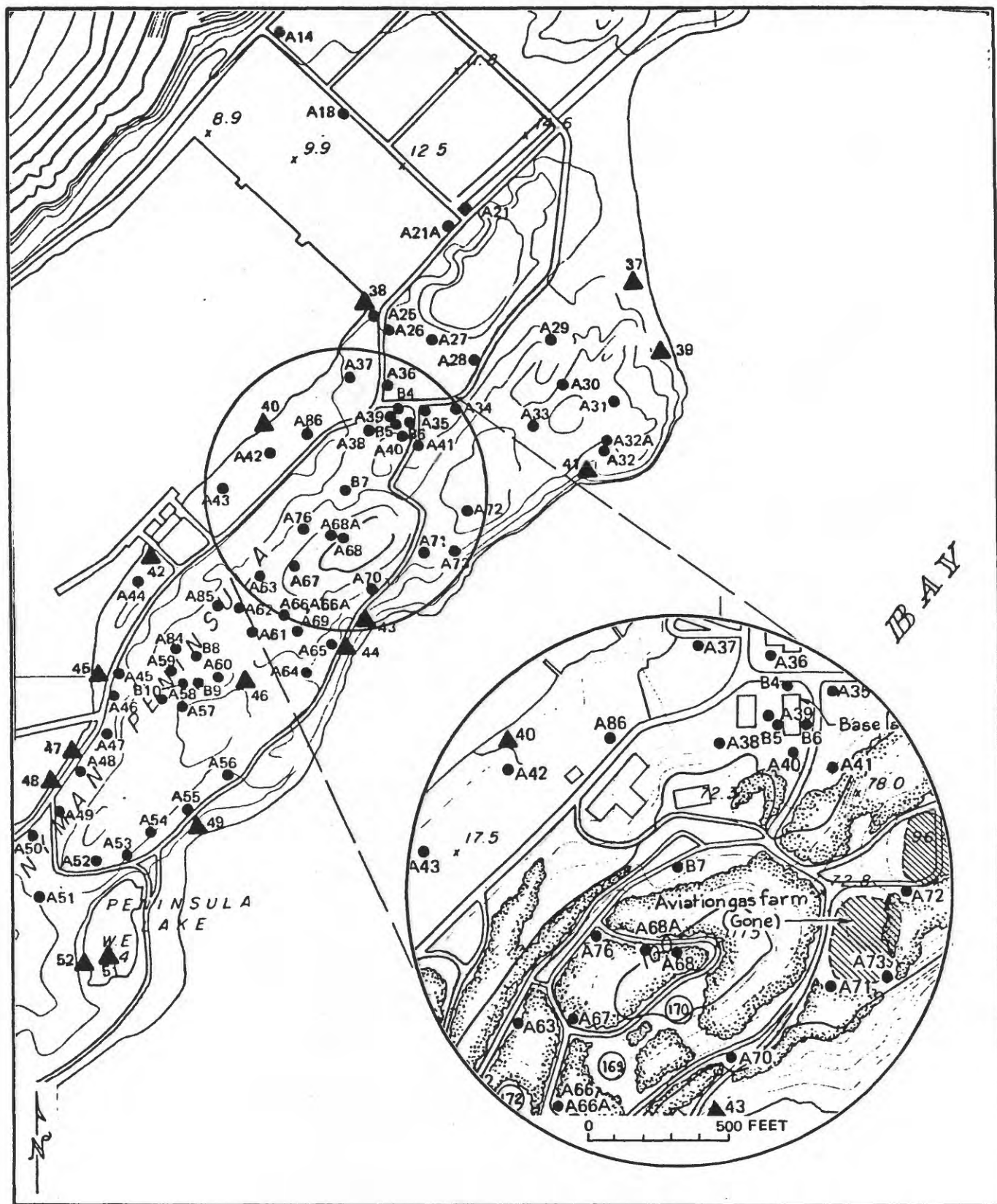


Location of well B-6.

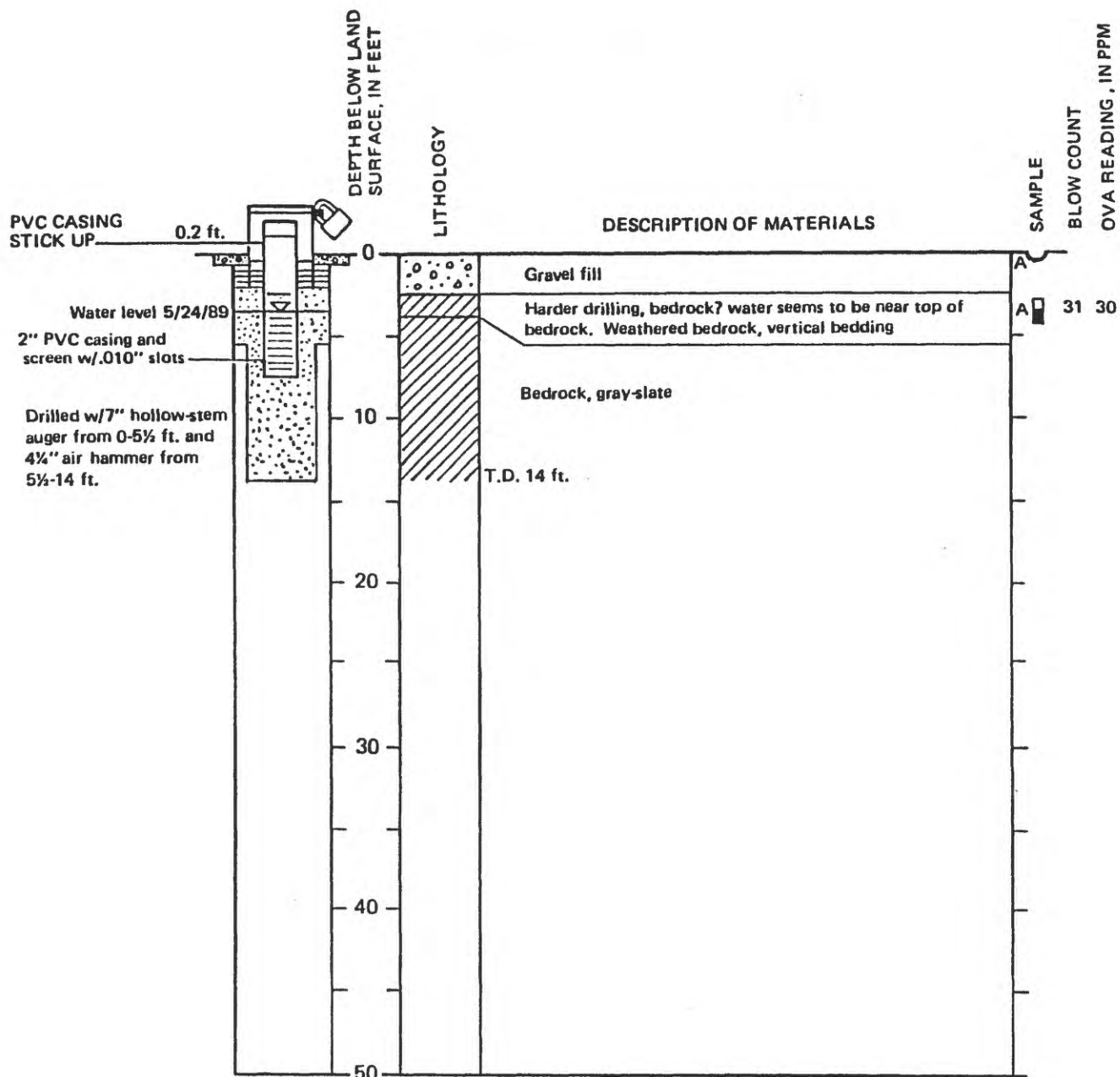


USGS SITE ID No. 574359152300701
 DATE WELL DRILLED 5/14/89
 LATITUDE 57° 43' 59" LONGITUDE 152° 30' 07"
 ELEVATION OF TOP OF WELL CASING 21.3 ft.
 GROUND SURFACE ELEVATION 21.5 ft.
 DATUM IS MEAN SEA LEVEL

Log and construction details of well B-6.



Location of well B-7.



USGS SITE ID No. 574354152301401

DATE WELL DRILLED 5/18/89

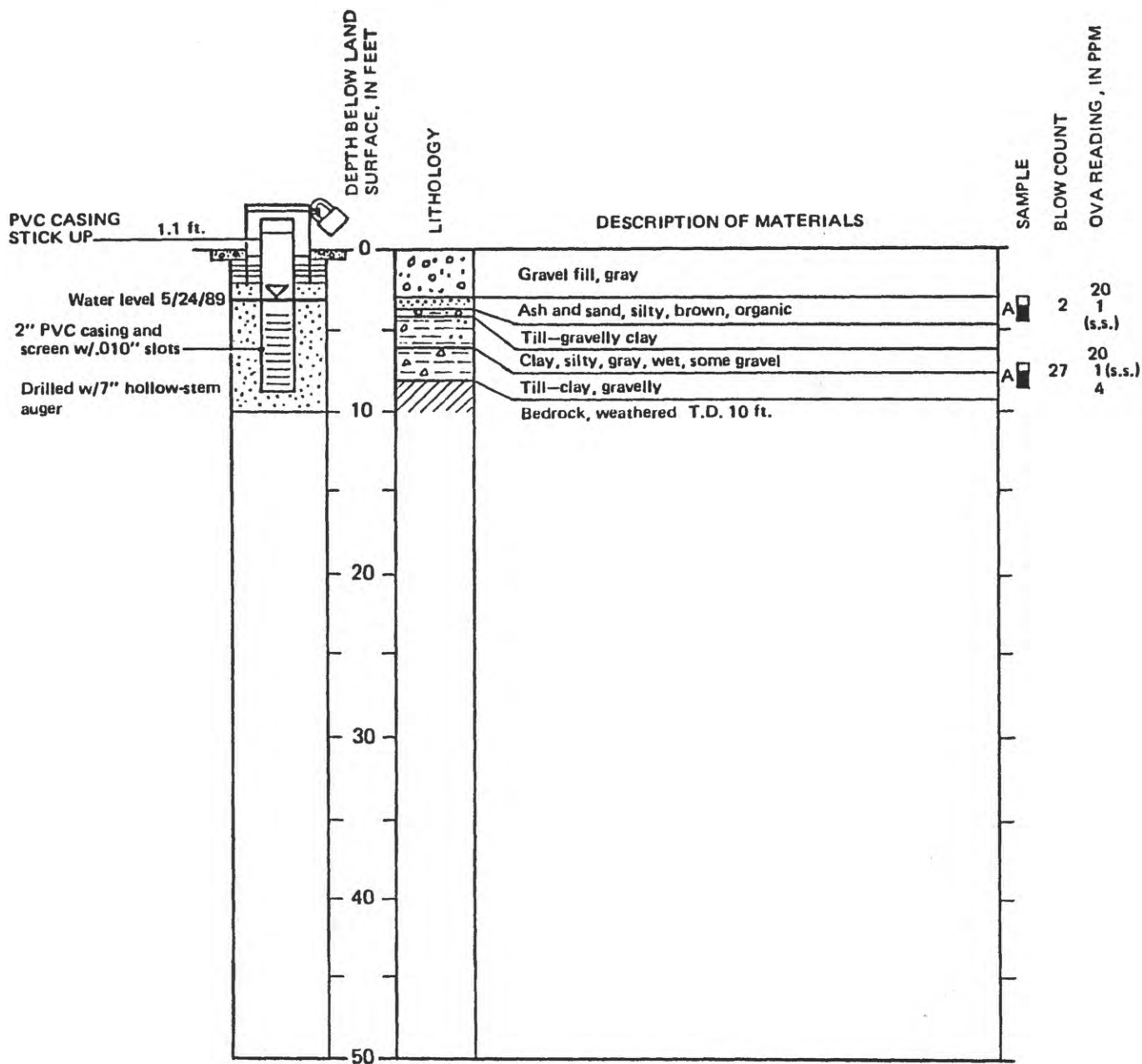
LATITUDE 57° 43' 54" LONGITUDE 152° 30' 14"

ELEVATION OF TOP OF WELL CASING 52.8 ft.

GROUND SURFACE ELEVATION 52.6 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well B-7.



USGS SITE ID No. 574344152303401

DATE WELL DRILLED 5/19/89

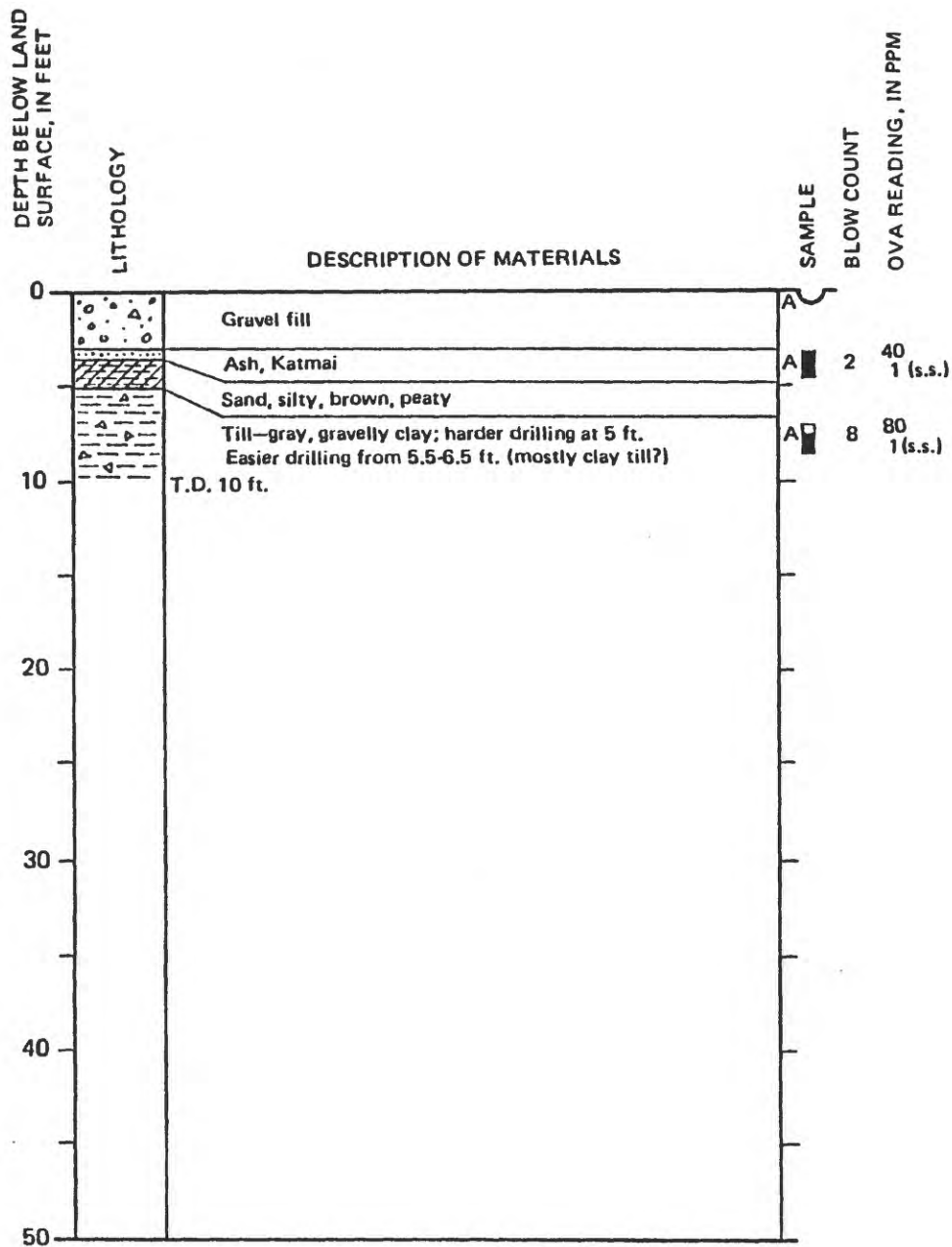
LATITUDE 57° 43' 44" LONGITUDE 152° 30' 34"

ELEVATION OF TOP OF WELL CASING 56.7 ft.

GROUND SURFACE ELEVATION 55.6 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well B-8.



USGS SITE ID No. 574342152303401

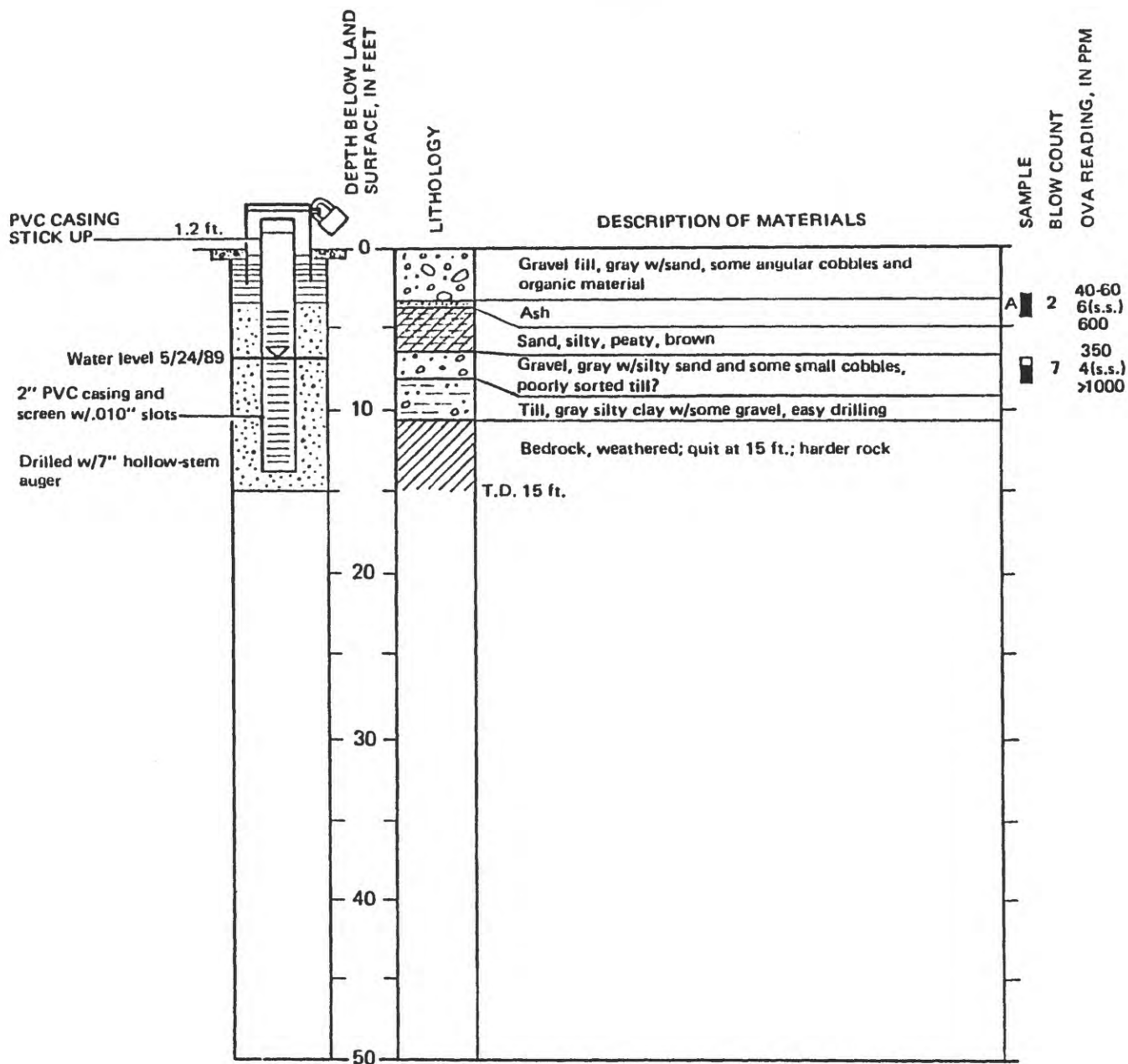
DATE WELL DRILLED 5/19/89

LATITUDE 57° 43' 42" LONGITUDE 152° 30' 34"

GROUND SURFACE ELEVATION 56.3 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of borehole B-9.



USGS SITE ID No. 574342152303501

DATE WELL DRILLED 5/18/89

LATITUDE 57° 43' 42" LONGITUDE 152° 30' 35"

ELEVATION OF TOP OF WELL CASING 57.2 ft.

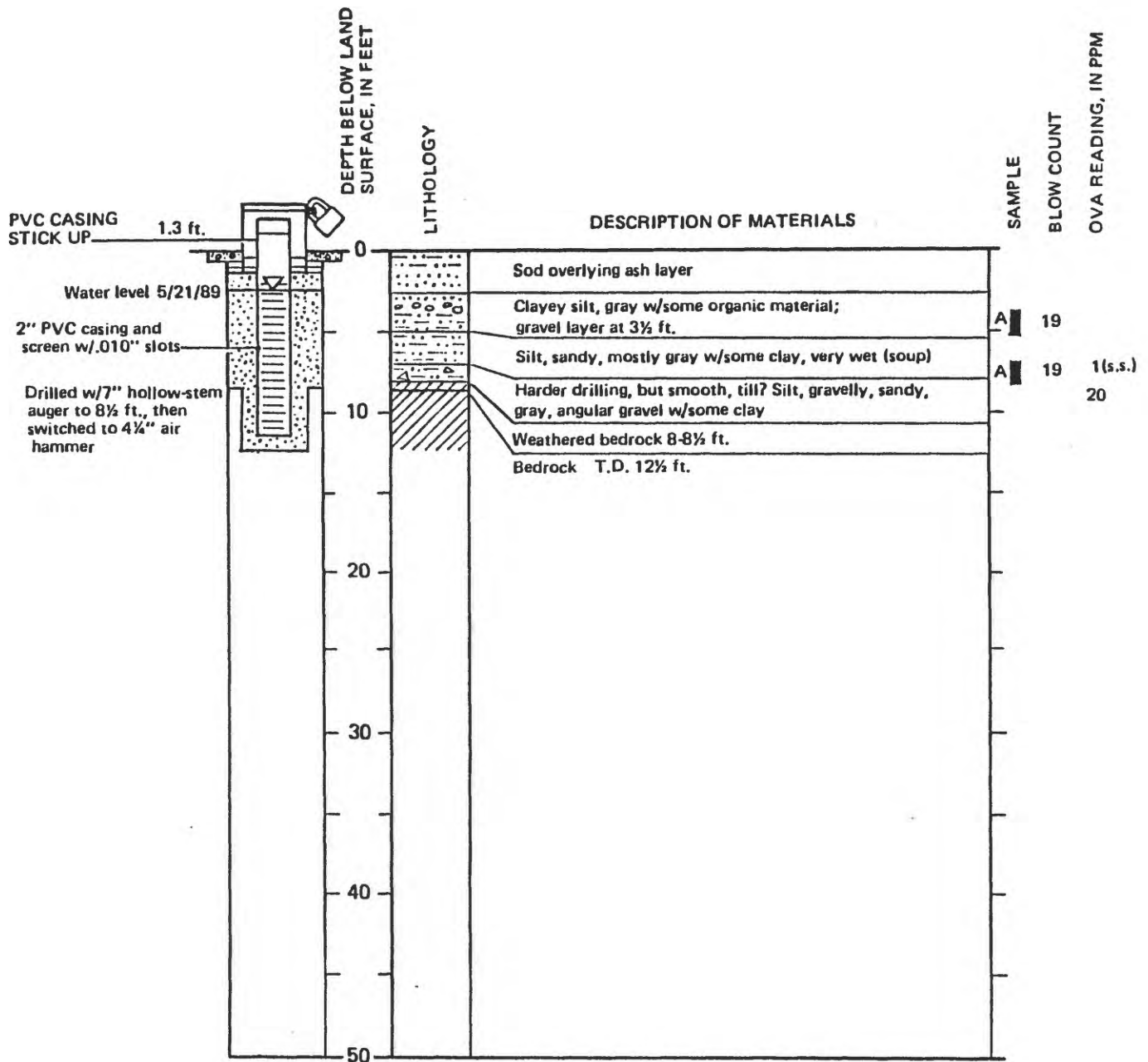
GROUND SURFACE ELEVATION 56.0 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well B-10.



Location of well B-11.



USGS SITE ID No. 574322152310601

DATE WELL DRILLED 5/17/89

LATITUDE 57° 43' 22" LONGITUDE 152° 31' 06"

ELEVATION OF TOP OF WELL CASING 40.9 ft.

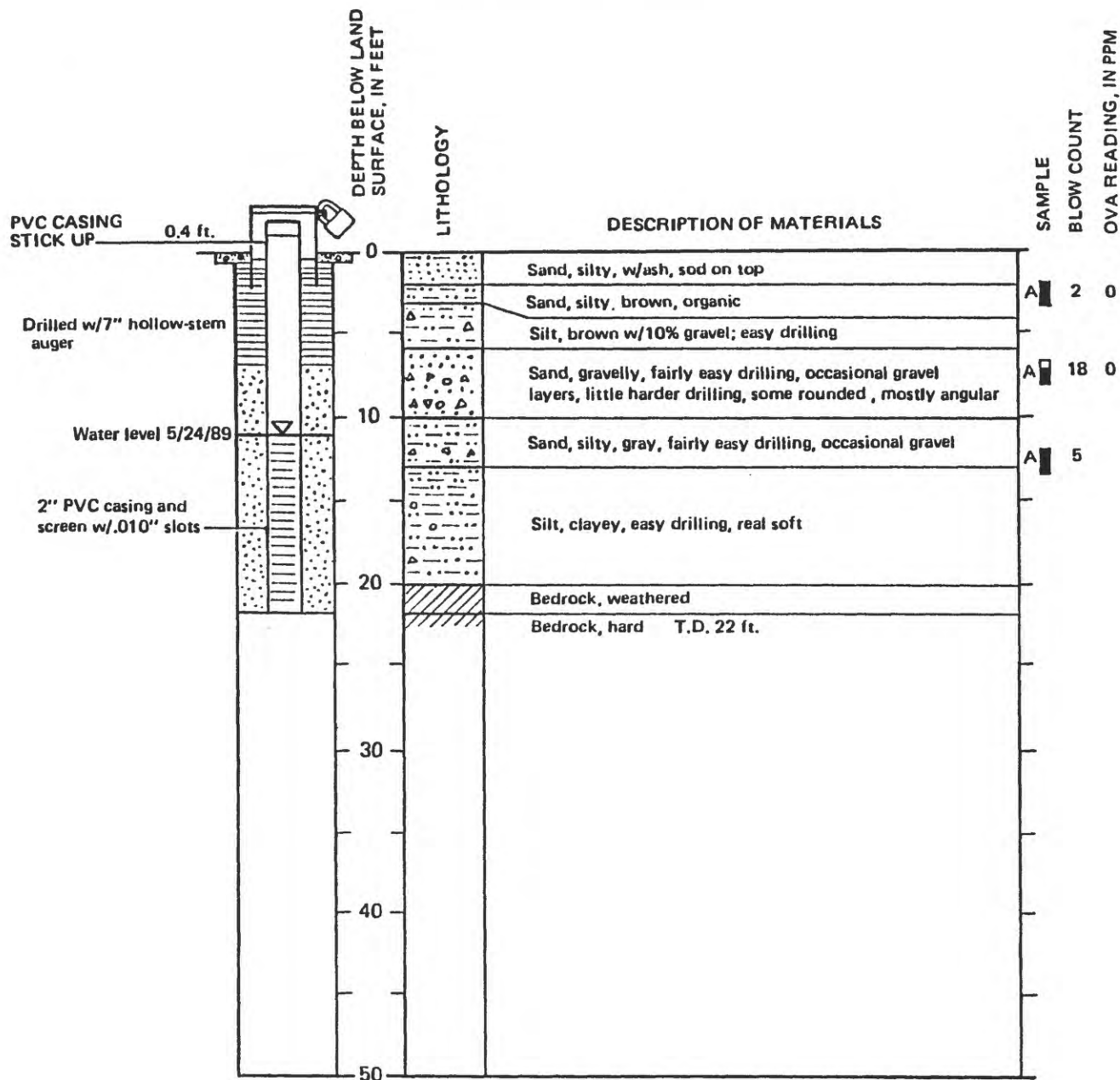
GROUND SURFACE ELEVATION 39.6 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well B-11.



Location of well B-12.



USGS SITE ID No. 574322152310801

DATE WELL DRILLED 5/17/89

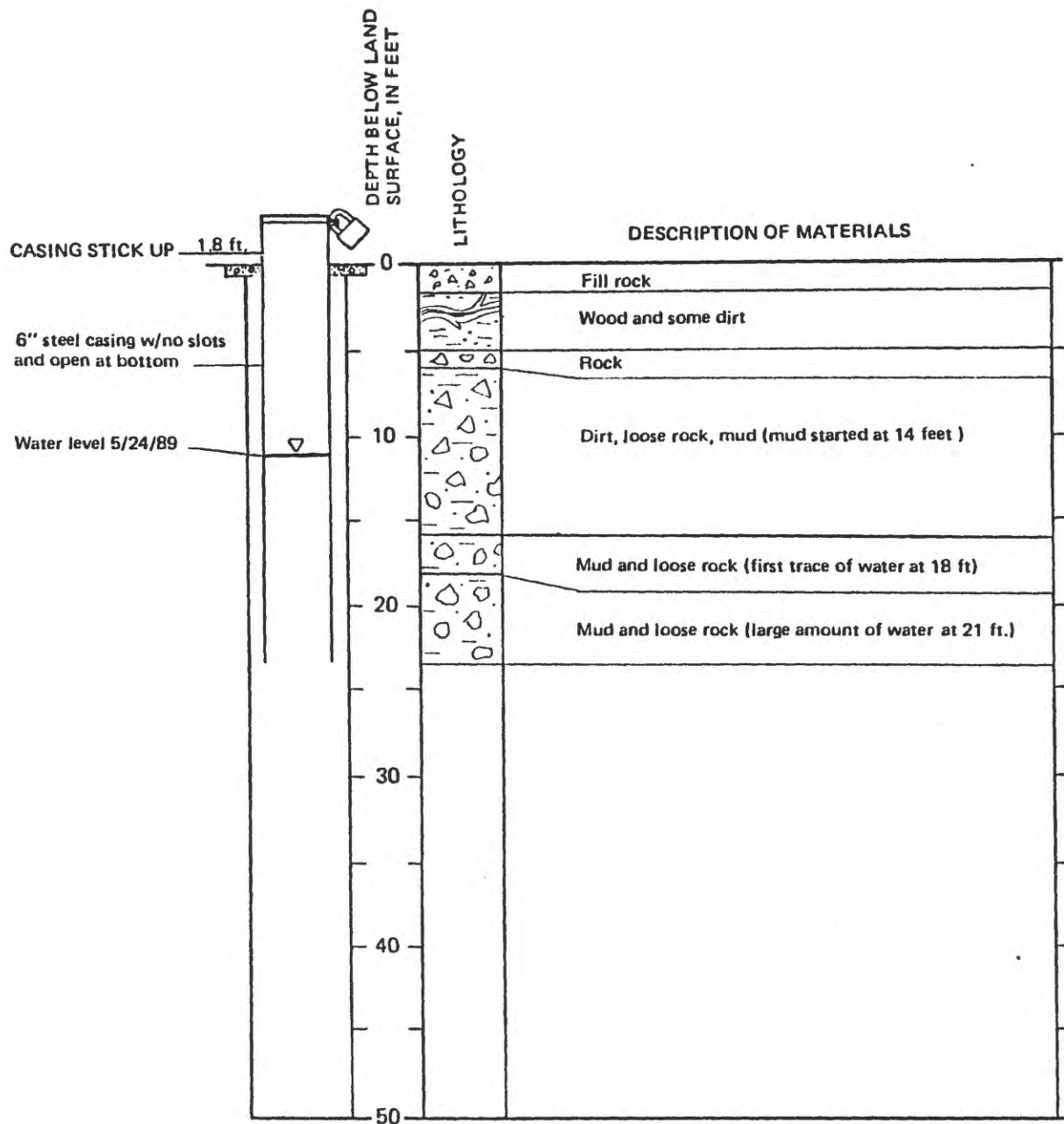
LATITUDE 57° 43' 22" LONGITUDE 152° 31' 08"

ELEVATION OF TOP OF WELL CASING 27.9 ft.

GROUND SURFACE ELEVATION 27.5 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of well B-12.



USGS SITE ID No. 574608152303701

DATE WELL DRILLED 8/5/86

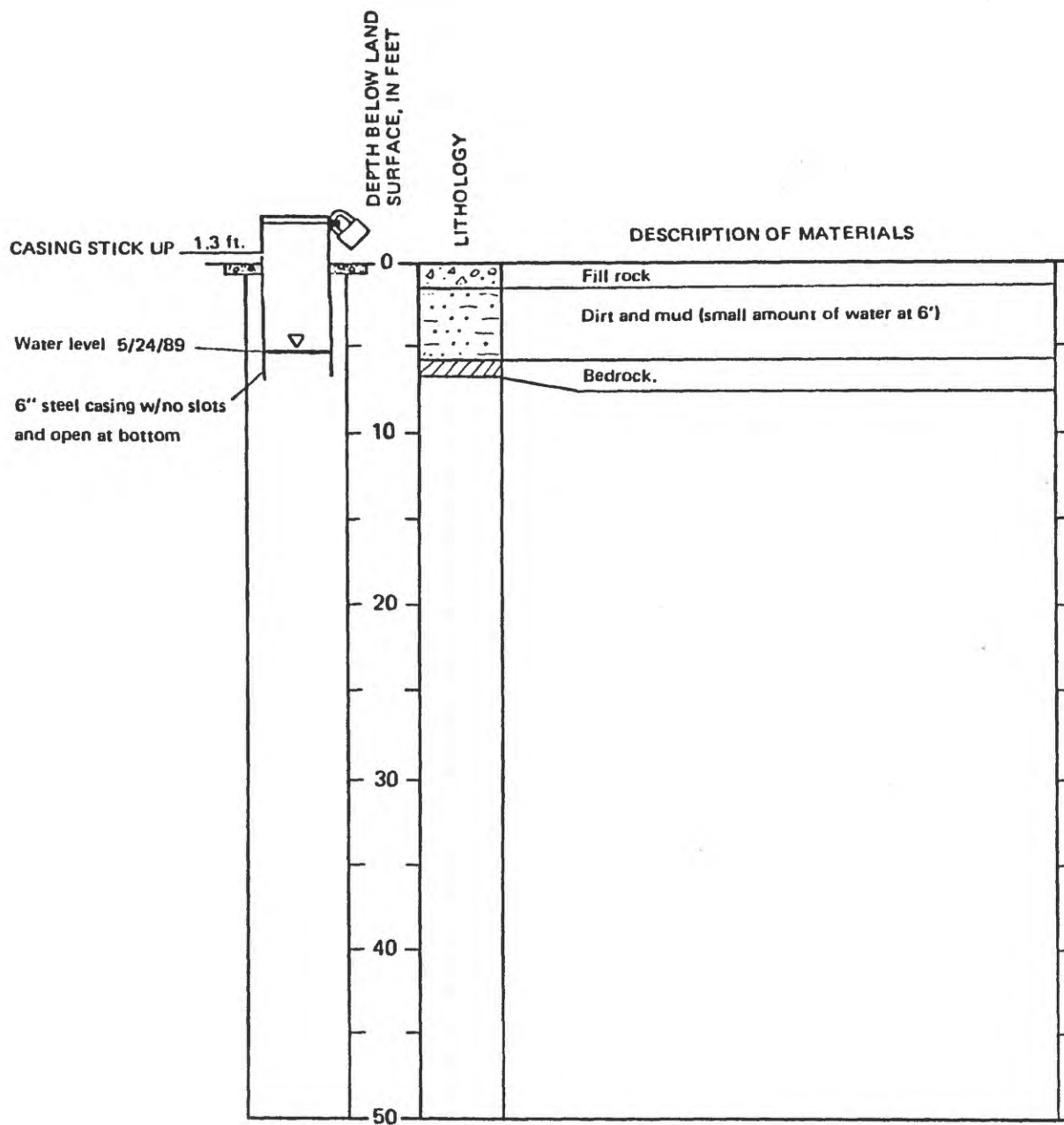
LATITUDE 57° 46' 08" LONGITUDE 152° 30' 37"

ELEVATION OF TOP OF WELL CASING 46.9 ft.

GROUND SURFACE ELEVATION 45.1 ft.

DATUM IS MEAN SEA LEVEL

Log and construction details of Coast Guard Landfill test well no. 1 (CG1).



USGS SITE ID No. 574557152302601

DATE WELL DRILLED 8/5/86

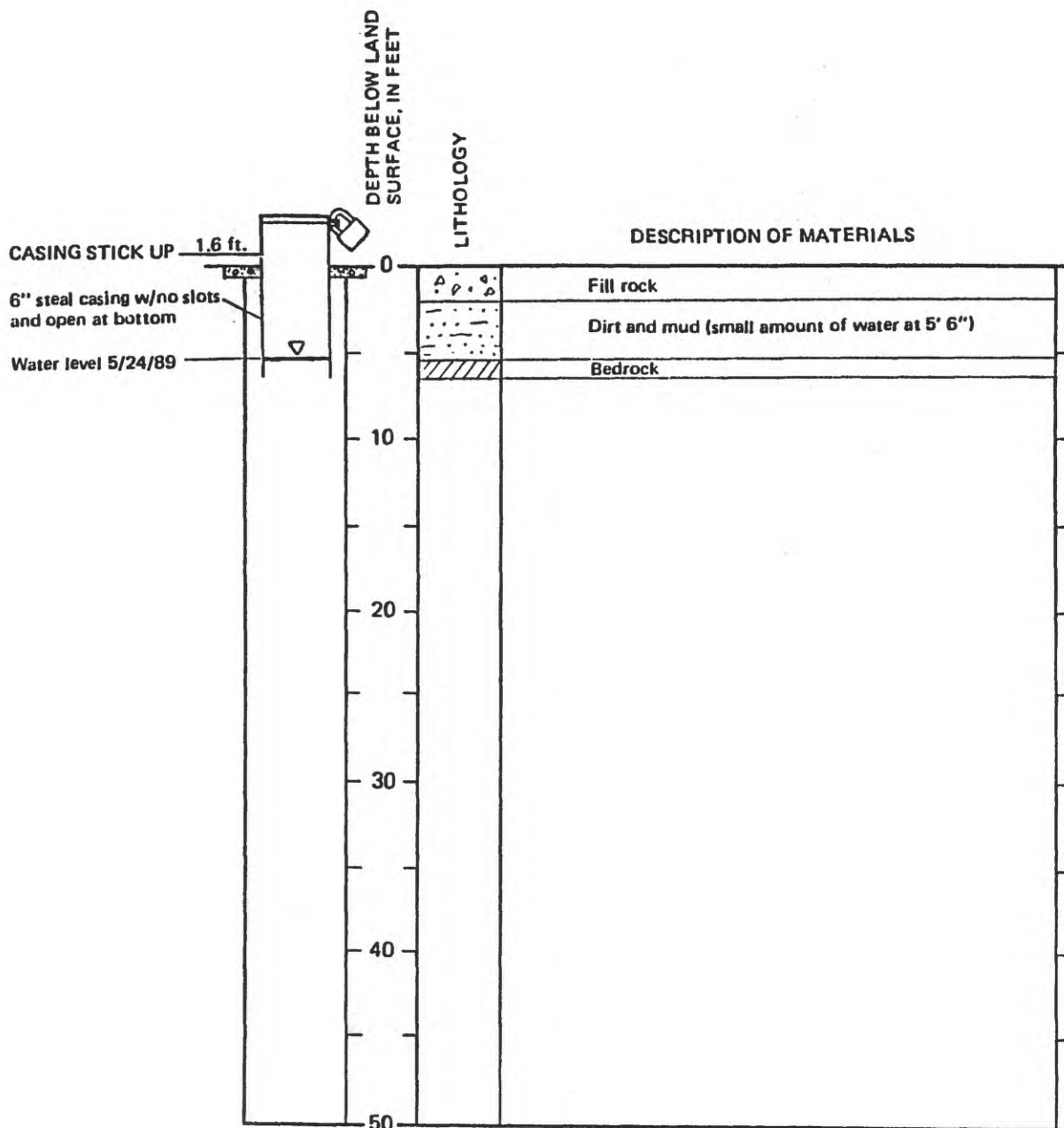
LATITUDE 57° 45' 57" LONGITUDE 152° 30' 26"

ELEVATION OF TOP OF WELL CASING 59 ft. (estimated from map)

GROUND SURFACE ELEVATION 58 ft. (estimated from map)

DATUM IS MEAN SEA LEVEL

Log and construction details of Coast Guard Landfill test well no. 2 (CG2).



USGS SITE ID No. 574603152301701

DATE WELL DRILLED 8/5/86

LATITUDE 57° 46' 03" LONGITUDE 152° 30' 17"

ELEVATION OF TOP OF WELL CASING 79 ft. (estimated from map)

GROUND SURFACE ELEVATION 77 ft. (estimated from map)

DATUM IS MEAN SEA LEVEL

Log and construction details of Coast Guard Landfill test well no. 3 (CG3).