UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER RESOURCES OF THE GIG HARBOR PENINSULA AND ADJACENT AREAS, WASHINGTON

By B. W. Drost

U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS

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Tacoma, Washington
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GEOLOGICAL SURVEY
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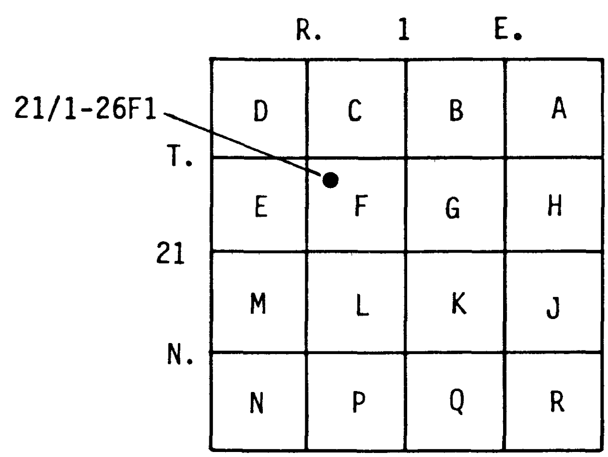
METRIC (SI) CONVERSION FACTORS

Multiply	By	To obtain
inchs (in.)	25.4	millimeters (mm)
feet (ft)	0.3048	meters (m)
miles (mi)	1.609	kilometers (km)
square miles (mi^2)	2.59	square kilometers (km^2)
cubic feet per second (ft^3/s)	28.32	liters per second (L/s)
	0.02832	cubic meters per second (m^3/s)
tons	907.18486	kilograms (kg)
gallons per minute (gal/min)	0.06309	liters per second (L/s)
degrees Fahrenheit (°F)	0.5556, after subtracting 32	degrees Celsius (°C)

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Mean Sea Level." NGVD of 1929 is referred to as sea level in this report.

WELL- AND AREA-LOCATION NUMBERING SYSTEM

The well- and area-location numbers used in this report give the location of wells and areas according to the official rectangular public-land survey. For example, in well number 21/1-26F1, the part preceding the hyphen indicates successively the township and range (T.21 N., R.1 E.) north and east of the Willamette base line and meridian, respectively. The number following the hyphen indicates the section (sec. 26), and the letter (F) indicates the 40-acre subdivision of the section as shown in the sketch below. Last is a sequence number used to distinguish wells in the same 40-acre tract. Thus, well 21/1-26F1 is in the SE¼ of the NW¼ of sec.26, T.21 N., R.1 E. An "s" following the sequence number indicates that the site is a spring.



Section 26

In computer-printout tables the same well is given the number 21N/01E-26F01. On plate 1, which shows numbered sections, only the 40-acre subdivision, and sequence number identify each well. Thus, well 21/1-26F1 is shown as F1.

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ABSTRACT

The study area lies west of Tacoma, Wash., and includes the Gig Harbor peninsula (44 square miles) and 15 square miles of adjacent areas, all of which are experiencing rapid population growth.

Average inflow to the hydrologic system of the study area is 254 cubic feet per second (ft^3/s). Outflow consists of evapotranspiration (88 ft^3/s), surface-water outflow (132 ft^3/s), and subsurface outflow (34 ft^3/s). Recharge to the ground-water reservoir from precipitation is 93 ft^3/s.

The study area is a remnant of a glacial-drift plain nearly surrounded by marine embayments. Three main water-bearing units exist; the Colvos Sand Member of the Vashon Drift, the Salmon Springs(?) Drift, and the pre-Salmon Springs(?) deposits.

As of 1978, water use was negligible. Average rate of use was 2.4 ft^3/s, all from ground-water sources. Much of this water (1.4 ft^3/s) was discharged to septic systems.

Mean annual flows in streams show a close relationship to basin size, ranging from 1.4 to 2.0 ft^3/s per square mile of basin. Low flows are very consistent; 7-day low flows for 50- and 1-percent probabilities differ by 25 percent or less at each site.

The only significant lake in the area, Crescent Lake, is probably at a later stage of eutrophication than average lakes in the surrounding area. Crescent Lake may have experienced increased eutrophication from 1970 to 1978.

Dissolved-solids concentrations in the fresh ground-water reservoir increase with depth, from about 80 to 95 mg/L (milligrams per liter) and average about 290 mg/L in wells tapping the freshwater-saltwater zone of diffusion. The use of water has apparently had little effect on its quality, although nitrate-plus-nitrite concentrations were slightly greater in shallow ground water than in deep ground water.

Ground-water quality is generally within the acceptable limits of the Federal Safe Drinking Water Act. The maximum contaminant levels for fluoride, turbidity, coliform bacteria, cadmium, lead, mercury, and selenium have been exceeded in a few samples. Recommended limits have been exceeded for iron, manganese, chloride, dissolved solids, pH, and color.

The ground-water reservoir can be developed to a greater extent. A system of properly spaced wells would probably yield at least 11 ft^3/s, about five times the 1978 rate of ground-water use.

INTRODUCTION

Purpose and Scope

The Geological Survey, in cooperation with the Pierce County Planning Department, conducted a water-resources-appraisal study of the Gig Harbor peninsula and adjacent area. The area is hydrologically sensitive, in a marine environment subject to rapid population growth and change in land use. The purpose of the study was to: (1) define the occurrence, movement, quality, availability, and potential sources of contamination of the ground-water resources; (2) appraise the quantity and quality of streamflow and the quality and trophic conditions of lakes; (3) identify problem areas that may require further study; and (4) develop a hydrologic data base for the study area. The study included collection, compilation, and analysis of hydrogeologic, streamflow, and water-quality data, which are described in this report.

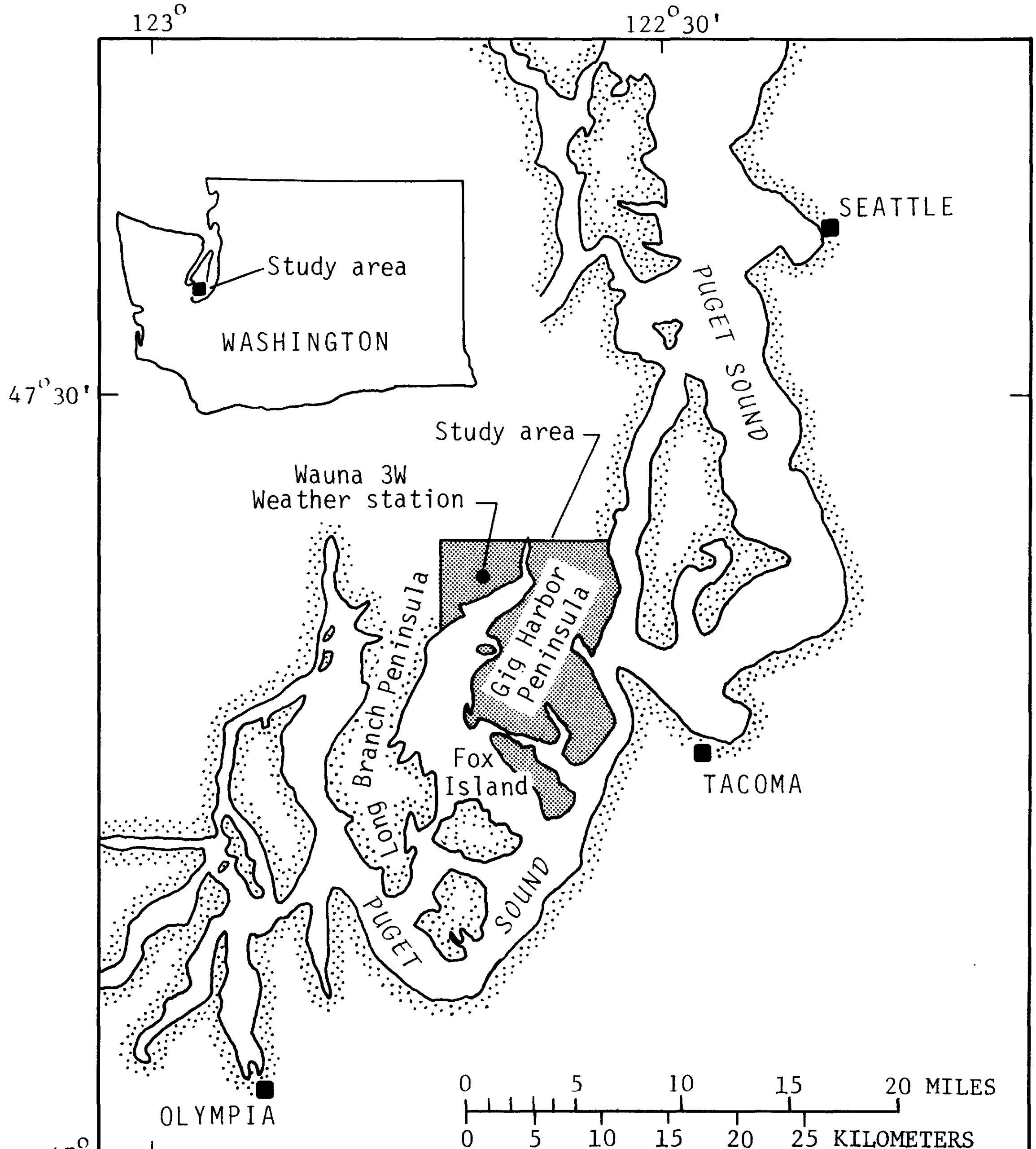
Previous Investigations

Two earlier general appraisal investigations of the water resources of the Gig Harbor peninsula and adjacent area were made as part of larger studies. Garling, Molenaar, and others (1965) and Hansen (1980) appraised the water resources of the Kitsap Peninsula and neighboring islands, a total area of about 670 mi^2. The fieldwork for the Garling study was completed in June 1963, when ground-water development in the Gig Harbor peninsula and adjacent area was about one-third of that in 1978. Hansen made a generalized study of the same area as Garling, Molenaar, and others.

Description of the Area

The study area (fig. 1) is a part of northwestern Pierce County, Washington, immediately west of Tacoma and about 20 mi southwest of Seattle. It totals about 59 mi^2 and includes all of the Gig Harbor peninsula (44 mi^2), Fox Island (5 mi^2), and part of the Long Branch peninsula (10 mi^2).

The study area is a dissected remnant of a glacial-drift plain nearly surrounded by marine embayments. It has low, rather flat-topped hills and ridges that reach a maximum altitude of about 400 ft. Slopes along most of the shoreline and in some stream valleys are steep, commonly greater than 45 percent. Inland areas have mostly gentle slopes, generally 15 percent or less.



Base from U.S. Geological Survey
State base map, 1962, 1:500,000

FIGURE 1.--Location of the study area.

A maritime climate prevails, with cool, dry summers, and mild, wet winters. Winds are generally from the southwest in fall and winter and from the northwest in spring and summer. Afternoon temperatures are typically in the 70's (°F) in summer and in the 30's (°F) in winter. Temperatures exceed 83°F on about 10 days per year, and freezing temperatures occur during about 45 nights per year. Relative humidity ranges from 50 to 85 percent in summer and from 75 to 90 percent in winter.

The area's population increased from 6,720 in 1960 to 17,250 in 1978. Population projections for 1980 and 2000 (Pierce County Planning Department) are 18,800 and 35,500, respectively.

No detailed land-use data for the study area were available at the time of this study. The area is probably 75-80 percent undeveloped. Developed areas consist primarily of single-family residences and roads (perhaps 10-20 percent of the area). Commerce, industry, and agriculture uses about 5 percent of the area. Development is concentrated along the shoreline.

Acknowledgments

This study was made in cooperation with the Pierce County Planning Department. Unpublished data not contained in U.S. Geological Survey files were obtained from Harbor Water Co., Town of Gig Harbor, Harbor Pump and Drilling Co., Richardson Well Drilling, and Olympic West Well Drilling[1]. Harbor Water Co. provided access to many of its wells for water-level measurements and water-quality sampling. Many residents of the area supplied information and granted access to their wells.

[1]The mention of commercial operators in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

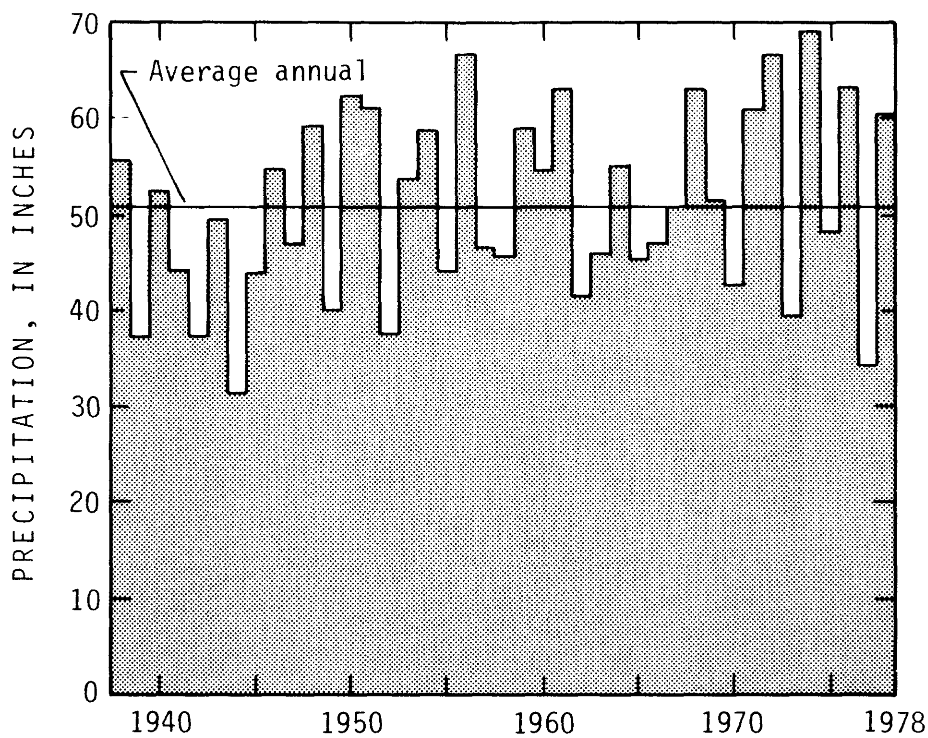


FIGURE 2.--Annual precipitation, 1938-78 water years (U.S. Weather Bureau, 1938-65; U.S. Department of Commerce, 1966-73; [U.S.] National Oceanic and Atmospheric Administration, 1974-78).

PRECIPITATION

Precipitation is the source of all naturally occurring freshwater in the study area. Estimates of annual precipitation were determined from data collected at the only weather station in the study area (Wauna 3W), 13 mi west of Tacoma (fig. 1). The station has been in operation since 1938, and during the 1938-78 water years[1] the average annual precipitation was 51.1 in., with a minimum of 31.6 in. in 1944 and a maximum of 69.2 in. in 1974 (fig. 2).[2]

The probability that a specific amount of precipitation will occur in any single year can be estimated from historical data shown in figure 3. For example, the figure shows that for the period of record annual precipitation exceeded 63 in. only 10 percent of the time, and that 90 percent of the time it exceeded 40 in.

Average monthly precipitation is shown in figure 4. The figure shows a distinct October-April wet season and a May-September dry season. The average monthly precipitation is about 4.3 in., and monthly average precipitation ranges from 8.5 in. in December to 0.8 in. in July. The greatest monthly precipitation on record was 20.3 in., in January 1953, and the least was 0.00 in. in August 1942 and July 1958.

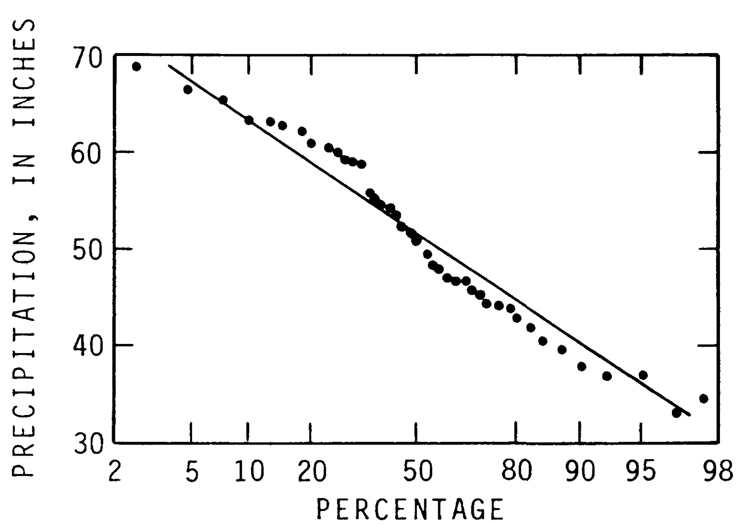


FIGURE 3.--Percentage of time various values of annual precipitation were equaled or exceeded, 1938-78 water years (U.S. Weather Bureau, 1938-65; U.S. Department of Commerce, 1966-73; [U.S.] National Oceanic and Atmospheric Administration, 1974-78).

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[1] A water year extends from October 1 through September 30, and is designated by the calendar year in which it ends.

[2] Average annual precipitation varies greatly in the region around the study area, tending to decrease toward the east (Tacoma, 37 in.) and increase toward the west (Shelton, 64 in.).

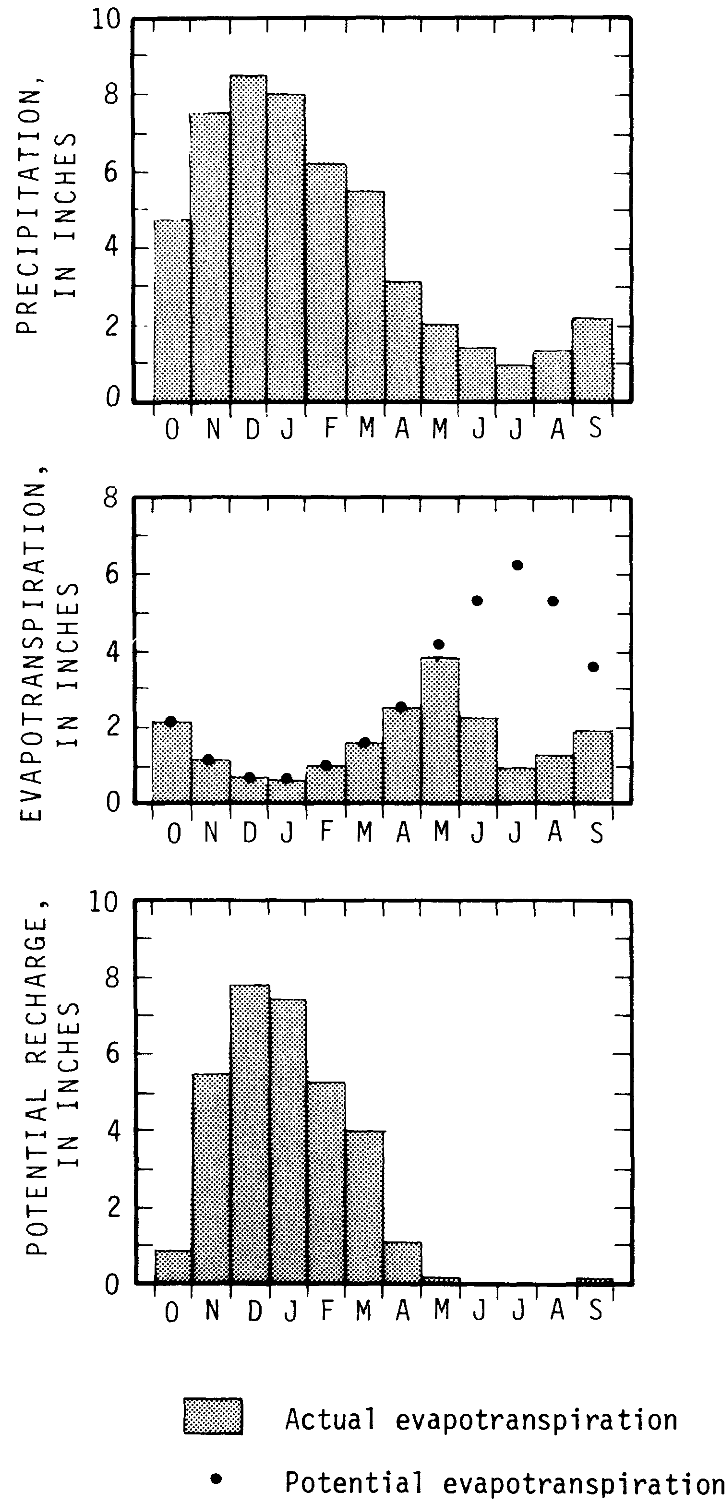


FIGURE 4.--Mean monthly distribution of precipitation (U.S. Weather Bureau, 1938-65; U.S. Department of Commerce, 1966-73; [U.S.] National Oceanic and Atmospheric Administration, 1974-78), evapotranspiration, and potentially available water, 1938-78 water years.

EVAPOTRANSPIRATION

Evapotranspiration refers to the transfer of water, in the form of vapor, from land areas and bodies of water to the atmosphere. In the study area, evapotranspiration occurs primarily as evaporation from surface-water bodies and from vegetation and land surfaces that have been wetted by precipitation, and as transpiration from the unsaturated zone by vegetation. Evapotranspiration directly from the ground-water reservoir, where it intersects or is near the land surface, is insignificant in the study area.

The amount of evapotranspiration from an area depends primarily on solar radiation, air temperature, wind velocity, vegetation type, and the availability of water. No direct measurements of evapotranspiration from the study area are available, but reasonable estimates can be made from a modified Blaney-Criddle calculation (U.S. Department of Agriculture, 1970). This method yields a value for potential evapotranspiration -- the amount of water that would be evapotranspired if an unlimited source of water were available.

In the area, two evapotranspiration regimes exist at different times: (1) a wet-period regime, when precipitation is greater than potential evapotranspiration, during which the actual rate of evapotranspiration equals the potential rate; and (2) a dry-period regime, during which potential evapotranspiration is greater than precipitation and the actual rate of evapotranspiration is generally less than the potential rate, being equal to precipitation plus available soil moisture accumulated during the previous wet period. Figure 5 shows the position of evapotranspiration in the hydrologic system. During wet periods (generally October-April), there is an excess of water which is either stored in the soil (soil-moisture recharge) to remain available for evapotranspiration or is removed from the evapotranspiration environment as surface runoff or as recharge to the ground-water reservoir (water surplus). On the average, the soil in the study area has the ability to store about 3 in. of water (Zulauf, 1979).

During dry periods (generally May-September) there is a shortage of water and most of the stored soil moisture is rapidly evapotranspired (soil-moisture utilization), usually by early June. From this time until precipitation once again exceeds potential evapotranspiration, the actual rate of evapotranspiration is less than the potential rate (water deficit).

The calculated average annual potential evapotranspiration in the study area is 34.4 in. However, calculated average annual actual evapotranspiration is only 19.2 in., because, as seen in figure 5, the periods of greatest potential evapotranspiration coincide with the periods of least precipitation. During 1938-78 the calculated annual actual evapotranspiration ranged from a maximum of 25.7 in. in 1968 to a minumum of 14.9 in. in 1952 (fig. 6). Figure 7 shows the probability, based on the data in figure 6, that a specific amount of actual evapotranspiration will take place in any single year. Actual evapotranspiration will probably exceed 16 in. in 9 of 10 years, but 23 in. in only 1 of 10 years.

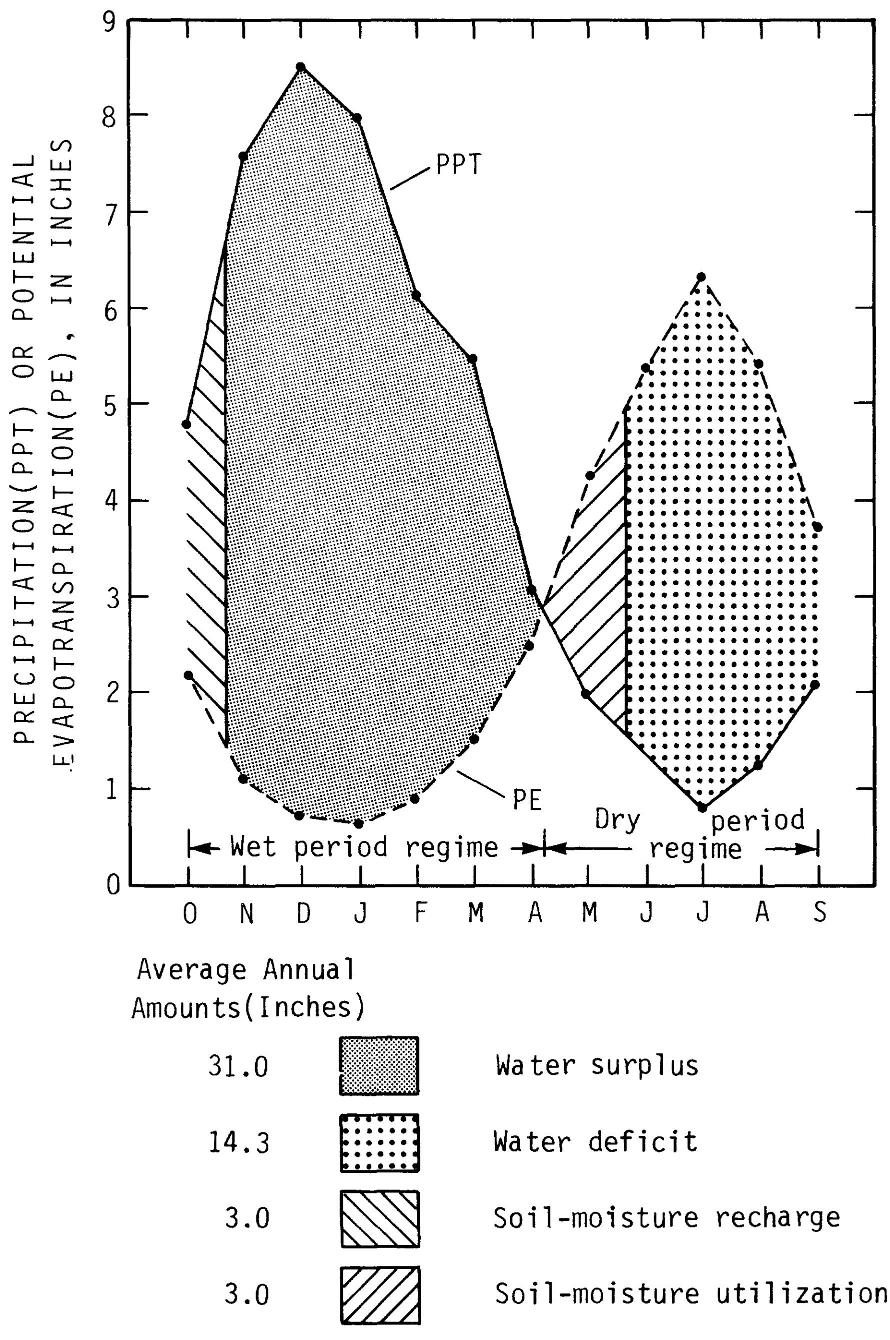


FIGURE 5.--Average annual water balance, at the Wauna 3W weather station, 1938-78 water years.

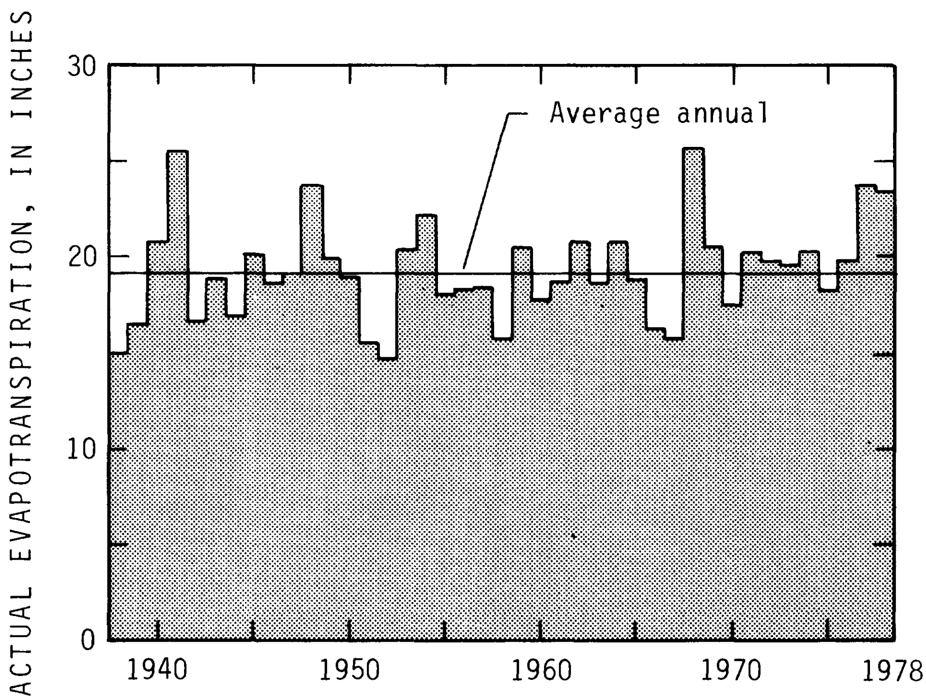


FIGURE 6.--Annual actual evapotranspiration, 1938-78 water years.

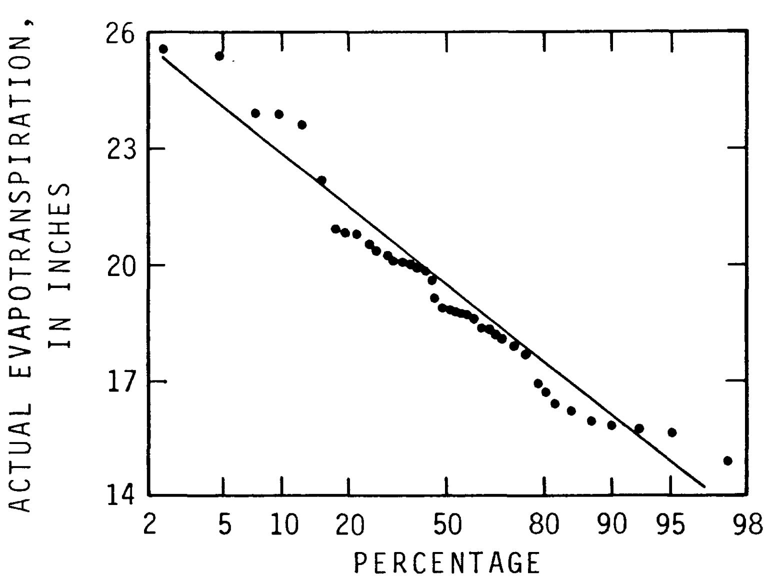


FIGURE 7.--Percentage of time various values of annual actual evapotranspiration were equaled or exceeded, 1938-78 water years.

POTENTIALLY AVAILABLE WATER

The part of precipitation not lost as evapotranspiration or stored as soil moisture recharges the ground-water reservoir or leaves the study area as direct runoff. Figure 8 shows potentially available water (direct runoff plus ground-water recharge) calculated for the 1938-78 water years. During this period, it averaged 31.7 in. per year and ranged from a minimum of 8.4 in. in 1977 to a maximum of 49.0 in. in 1974. Figure 9 shows the probability of occurrence of a particular amount of potentially available water in any single year. Potentially available water will probably exceed 23 in. 90 percent of the time and 42 in. 10 percent of the time.

A summary of the monthly disposition of precipitation is shown in figure 4. The figure shows the long-term (1938-78) average distribution of precipitation between evapotranspiration and potentially available water. Not directly shown in the figure, but affecting the amounts of evapotranspiration and potentially available water, is the amount of water stored as soil moisture at any particular time. (See figure 5 for soil-moisture distribution.)

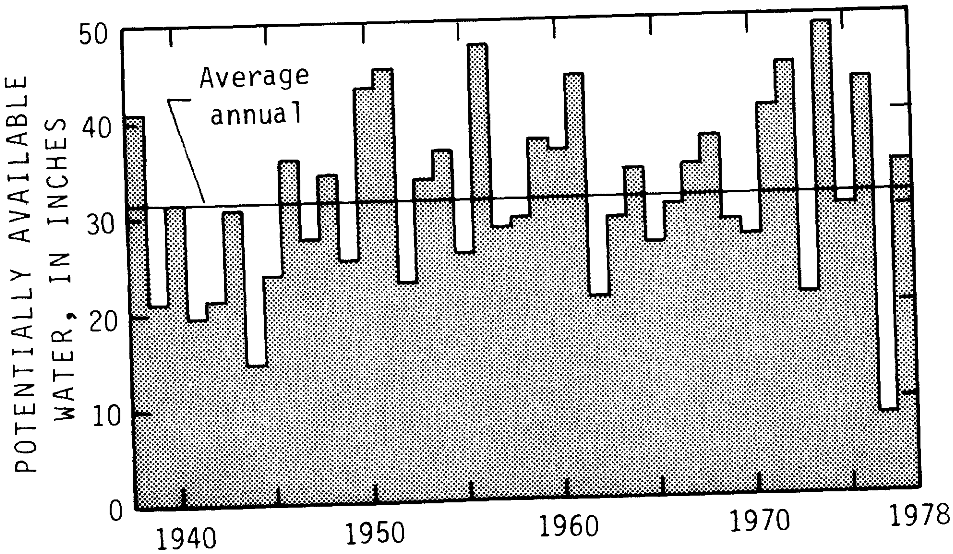


FIGURE 8.--Annual potentially available water, 1938-78 water years.

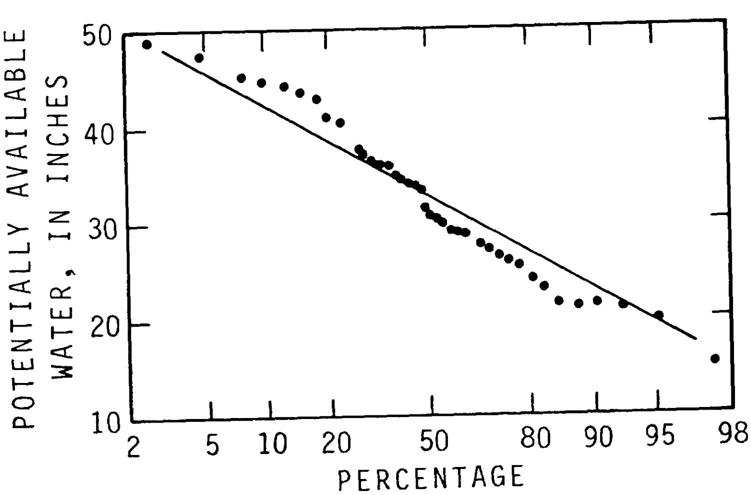


FIGURE 9.--Percentage of time various values of annual potentially available water were equaled or exceeded, 1938-78 water years.

SURFACE WATER

Data Collection

A surface-water discharge-monitoring network was operated February 1978-January 1979 to provide data for appraisal of streamflow in the study area. It consisted of one continuous-record gaging station and six monthly measurement sites. These data were supplemented by 23 years of record from two continuous-record gaging stations and 188 measurements (January 1929-October 1974) at 28 miscellaneous measurement sites. All sites are shown on plate 1, and all measurements are in tables 9 and 10 (p. 52 and 53).

Mean and Low Flows

Some streamflow characteristics often defined in the planning and development of surface-water resources are mean monthly and mean annual flows and the frequencies and durations of selected floodflows and low flows. The data for each selected site were correlated against long-term data from the Huge Creek station (site 25). Correlations between Huge Creek and the seven selected miscellaneous sites were generally very good. Standard errors of estimate ranged from 0.0428 to 0.1242, and correlation coefficients ranged from 0.8833 to 0.9549 (except for Minter Creek, site 23, with a coefficient of 0.6414).

For the seven selected sites, the "log-Pearson Type III" distribution method was used to estimate mean monthly, mean annual, and low flows. Mean annual and monthly flows are listed in table 1. By definition, mean flows have a 50-percent probability of not being exceeded in any year. Low flows were calculated for intervals of 7, 30, and 90 consecutive days at 1-, 10-, and 50-percent probabilities of not being exceeded in any year (table 2). Low flows calculated in an earlier report (Cummans, 1977) show excellent agreement ($\pm$2 percent) with the calculations in this report for Huge Creek (site 25), but the previous low-flow calculations for sites 15, 17, 21, and 23 were substantially less than the calculations in this report (7 to 58 percent less). These low-flow calculations have been revised upward because more data are now available. Most of these sites had been measured only five or six times when the earlier calculations were made (Cummans, 1977). The present calculations include 12 additional measurements at each site.

The low flows for specific periods and nonexceedence probabilities are used as follows: For example, at site 5 a 7-day low flow of 2.6 ft^3/s at the 10-percent probability level means that during any year the minimum flow for any 7 consecutive days has a 10-percent-probability (chance of 1 in 10) of not exceeding 2.6 ft^3/s; similarly, a 30-day mean flow of 3.2 ft^3/s at a 50-percent probability of nonexceedence means that the chance is one in two that the minimum mean flow for any 30 consecutive days in any year will be less than 3.2 ft^3/s.

TABLE 1.--Calculated mean monthly and mean annual flows at selected sites

Station number	Stream name and site number	Calculated mean monthly flows (ft^3/s)												Calculated mean annual flow (ft^3/s)	Calculated mean annual flow/mi^2 of drainage basin (ft^3/s)
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.		
12072681	Crescent Cr - site 5	4.4	8.9	17	27	23	15	8.8	6.1	4.6	3.8	3.5	3.6	10.5	2.0
12072685	North Cr - site 6	1.4	2.3	3.5	4.9	4.4	3.2	2.2	1.7	1.4	1.3	1.2	1.2	2.4	1.4
12072710	Artondale Cr - site 9	1.8	3.9	7.9	13	11	6.8	3.9	2.7	2.0	1.6	1.4	1.5	4.5	1.5
12072750	Carr Inlet Trib. No. 3 - site 15	1.2	1.7	2.2	2.7	2.5	2.1	1.7	1.4	1.3	1.2	1.1	1.1	1.8	12.0
12072770	McCormick Cr site 17	1.7	3.5	6.6	10.4	9.0	5.8	3.5	2.4	1.8	1.5	1.4	1.4	3.9	1.7
12072800	Purdy Cr - site 21	2.9	5.3	9.2	13	12	8.1	5.3	3.9	3.1	2.6	2.4	2.5	5.9	1.7
12073000	Minter Cr - site 23	7.0	9.1	12	14	13	11	9.0	7.9	7.1	6.6	6.4	6.5	9.5	1.7
12073500	Huge Cr - site 25	5.8	10	18	27	23	16	10	7.7	6.1	5.2	4.8	4.9	11.6	1.8
	Total flow	26.2	44.7	76.4	112.0	97.9	68.0	44.4	33.8	27.4	23.8	22.2	22.7	50.1	1.8
	Flow/mi^2 of drainage basin	.9	1.6	2.7	4.0	3.5	2.4	1.6	1.2	1.0	.8	.8	.8	1.8	--

TABLE 2.--Average daily low flows for selected probabilities of nonexceedance at selected sites

Station number	Stream name and site number	Number of consecutive days	Average daily low flows (ft³/s) for indicated probability of nonexceedance 50 pct	10 pct	1 pct	Correlation coefficient	Standard error of estimate
12072681	Crescent Cr - site 5	7	3.0	2.6	2.3	0.9215	0.0926
		30	3.2	2.7	2.5		
		90	3.4	2.9	2.6		
12072685	North Cr - site 6	7	1.1	1.0	.9	.9436	.0531
		30	1.1	1.0	.9		
		90	1.2	1.0	1.0		
12072710	Artondale Cr - site 9	7	1.2	1.0	.9	.8835	.1242
		30	1.3	1.1	1.0		
		90	1.4	1.2	1.1		
12072750	Carr Inlet Tributary 3 - site 15	7	1.1	1.0	.9	.8833	.0491
		30	1.1	1.0	1.0		
		90	1.1	1.1	1.0		
12072770	McCormick Cr - site 17	7	1.2	1.0	.9	.9549	.0662
		30	1.3	1.1	1.0		
		90	1.4	1.2	1.1		
12072800	Purdy Cr - site 21	7	2.1	1.9	1.7	.9297	.1087
		30	2.3	2.0	1.8		
		90	2.4	2.1	1.9		
12073000	Minter Cr - site 23	7	6.1	5.7	5.4	.6414	.0428
		30	6.2	5.8	5.6		
		90	6.4	6.0	5.7		
12073500	Huge Cr - site 25	7	4.3	3.7	3.4	--	--
		30	4.5	3.9	3.6		
		90	4.8	4.2	3.8		

Mean flows generally show a close relation to drainage basin size. With the exception of site 15, all sites with sufficient record to calculate mean annual flows have flows of 1.4 to 2.0 ft^3/s per square mile of drainage basin. Site 15 is in a very small basin that is dominated by a large amount of ground-water discharge from a series of springs and has a mean annual flow of 12.0 ft^3/s per square mile, much of which may represent recharge outside the surface drainage basin.

Calculated low flows in the area are extremely consistent for each site. The 7-day low flows for 50-percent probability (2 years) and for 1-percent probability (100 years) differ by 25 percent or less at all sites. The 50-percent probabilities for 7 and 90 days differ by 14 percent or less at all sites.

Floodflows

Maximum peak discharges (floods) were calculated for exceedence probabilities of 1, 10, and 50 percent in any year. Flood frequencies were calculated for 14 sites (table 3) based on regression equations defined by Cummans, Collings, and Nassar (1975). Flood discharges for specific exceedence probabilities are used as follows: For example, at site 5 a flood discharge of 82 $\pm$ 34 ft^3/s at the 50-percent-probability level means that during any year the peak flow has a 50-percent-probability (chance of 1 in 2) of exceeding 82 $\pm$ 34 ft^3/s; similarly, a flood discharge of 219 $\pm$ 133 ft^3/s at the 1-percent-probability level means that during any year the peak flow has a 1-percent-probability (chance of 1 in 100) of exceeding 219 $\pm$ 133 ft^3/s.

Lakes

Lakes make up less than 0.15 mi^2 (about 0.25 percent) of the study area. Crescent Lake (22/2-20A) is the only sizable natural lake (0.08 mi^2). Some physical data on the area's lakes are shown in table 4.

Crescent Lake was included in an earlier study (Collings, 1973), in which its general state of eutrophication (as of October 1970) was discussed. It was determined at that time that the eutrophication rate was probably quite high because of the lake's low altitude and swampy environment. It was designated as a lake with moderately high biologic productivity as evidenced by the abundance of macrophytes, the moderately high winter nutrient content, the summer oxygen deficit near the bottom, and the increasing sources of nourishment from development in the basin.

TABLE 3.--Discharges for selected flood frequencies at selected sites

Station number	Stream name and site number	Calculated flood discharge (ft^3/s) for indicated probability of exceedance 50 pct	10 pct	1 pct	Measured peak discharge
12072681	Crescent Cr - site 5	82±34	137±62	219±133	--
12072685	North Cr - site 6	32±13	54±25	86±52	--
	Sullivan Gulch Cr - site 7	30±12	51±23	80±49	--
12072710	Artondale Cr - site 9	51±21	86±39	137±83	--
	Warren Cr - site 12	17±7	29±13	45±28	--
	Carr Inlet Tributary No. 2 - site 14	36±15	62±28	98±60	--
	Lay Inlet Tributary - site 16	11±5	19±9	30±18	--
12072770	McCormick Cr - site 17	42±17	70±32	112±68	--
	Henderston Bay Tributary - site 18	29±12	49±22	78±47	--
12072800	Purdy Cr - site 21	57±24	97±44	154±94	113
12073000	Minter Cr - site 23	88±37	148±67	237±144	--
12073500	Huge Cr - site 25	99±41	166±75	266±161	391
	Minter Cr Tributary - site 26	41±17	70±32	111±67	--
	Minter Cr - site 27	204±85	339±154	548±332	--

TABLE 4.--Physical data on lakes

Lake name	Location	Surface area (acres)	Maximum depth (ft)	Approximate volume (acre-ft)	Remarks
Unnamed	21/1-3C	2.4	--	--	--
Unnamed	21/1-11M	11.6	15	67.0	Man made (earth-fill dam); locally known as Lake Sylvia
Maloney	21/1-12F	5.3	--	--	--
Unnamed	21/1-15G	1.5	15	7.5	Man made (earth-fill dam).
Unnamed	22/1-32F	17.0	--	--	Intermittent
Unnamed	22/2-19C	1.9	--	--	Intermittent
Crescent	22/2-20A	50	29	780	--
Unnamed	22/2-30D	3.1	--	--	--
Unnamed	22/2-33N	2.8	--	--	Winchester Swamp.

All data, except Crescent Lake (Bortleson and others, 1976), from Wolcott (1973).

In August 1978, Crescent Lake was resampled in order to compare its condition with that in 1970. Measurements of nutrients (nitrogen and phosphorus) generally showed higher concentrations in 1978. This may indicate an increased state of eutrophication, but the data are not conclusive. Annual fluctuations of nutrient levels may be as great as the differences seen in the 1970 and 1978 samples. Table 5 compares the two sets of samples to the median values for 91 lakes in the region around the study area. Crescent Lake shows higher concentrations of nutrients and much lower concentrations of dissolved oxygen, indicating that it probably is at a later stage of eutrophication than typical lakes in the surrounding area.

TABLE 5.--Comparison of characteristics of Crescent Lake with median values for lakes in the region around the study area.

Lake characteristics	Median values for lakes[1]	Crescent Lake				
		10/5/70			8/9/78	
Land use in drainage basin:						
Undeveloped (primarily forested)	78%	89%			85%[2]	
Developed (primarily residential)	22%	11%			15%[2]	
Altitude	400 ft	166 ft			166 ft	
Mean depth	12 ft	16 ft			16 ft	
		Sample depth (ft)				
		4	15	25	6	25
Total inorganic nitrogen ($NO_3+NO_2+NH_3$, as N)						
Shallow	70 ug/L	90 ug/L	130 ug/L	--	120 ug/L	--
Deep	110 ug/L	--		200 ug/L	--	350 ug/L
Total organic (kjeldahl-NH_3, as N)	240 ug/L	190 ug/L	--	--	390 ug/L	--
Total phosphorus (as P)						
Shallow	11 ug/L	10 ug/L	10 ug/L	--	30 ug/L	--
Deep	18 ug/L	--		30 ug/L	--	90 ug/L
Specific conductance (micromhos)	44	57	--	--	54	--
Water temperature	17°C	--	--	13°C	--	11°C
Dissolved oxygen	7.3 mg/L	--	--	0.5 mg/L	--	0.4 mg/L
Secchi-disc visibility	5 ft	5 ft			4.5 ft	
Fecal coliform (mean)	2 col/100 mL	--			24 col/100 mL	

[1] Median values for 91 lakes in the region around the study area (Bortleson and others, 1976).

[2] Rough estimates only.

GROUND-WATER RESERVOIR

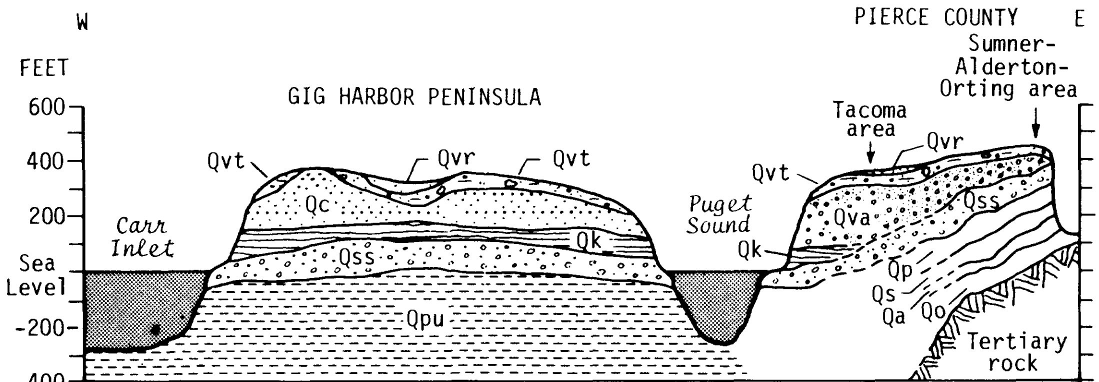
Data Collection

Information on about 860 wells in the area was collected and analyzed during this study (table 11, p. 57). The locations of 425 of these wells have been field checked by U.S. Geological Survey personnel either during this study (about 275 wells) or during earlier studies (about 150 wells). About 20 springs also were visited. Locations of the field-checked wells and springs are shown on plate 1.

Most of the data in table 11 were supplied by the drillers who constructed the wells. Much information on quantity and quality of water was obtained from well owners. Some well depths and water levels were measured by U.S. Geological Survey personnel. Water levels were measured in about 20 wells once a month from March 1978 to March 1979 (table 12, p.80). Land-surface altitudes were determined from 1:24,000-scale topographic maps and are probably accurate within ± 25 ft for most field-checked wells. Altitudes of wells not field checked may be much less accurate, depending upon the accuracy of the locations supplied by the drillers. Discharge and specific-capacity (discharge of well divided by drawdown of water level) data are based on tests made by the drillers, usually at the time of completion of the well. These tests are usually short-duration (1-2 hours) bailer tests and give only an approximation of a well's true specific capacity. Selected representative logs are shown in table 13. (Drillers' logs for the majority of wells are on file in the Tacoma office of the U.S. Geological Survey.)

Geologic Characteristics

The study area is underlain by 1,200 to 2,000 ft of unconsolidated sediments (Hall and Othberg, 1974). At least the upper several hundred feet are of glacial and interglacial origin and of Quaternary age. The deepest well in the area (21/2-17F2; 909 ft) extends about 568 ft below sea level and apparently penetrates only Quaternary materials. Only the materials extending to 200 ft or less below sea level are well known, because most existing wells tap these materials. The character of the underlying bedrock is not known. Figure 10 is a diagrammatic geologic section across the Gig Harbor Peninsula that shows the general stratigraphic relationships described in table 6.



GIG HARBOR PENINSULA	DEPOSITIONAL INTERVAL	PIERCE COUNTY MAINLAND (Crandle & Others, 1958; Walters & Kimmel, 1968)
Vashon Drift: Qvr-recessional outwash; Qvt-till; Qva-advance outwash; Qc -Colvos Sand Member	Fraser Glaciation	Vashon Drift: Qvr-recessional outwash; Qvt-till; Qva-advance outwash
Qk-Kitsap Formation	Olympia Interglaciation	Qk-Kitsap Formation
Qss-Salmon Springs(?) Drift	Salmon Springs Glaciation	Qss-Salmon Springs Drift
Qpu-Pre-Salmon Springs(?) deposits, undifferentiated	Puyallup Interglaciation	Qp-Puyallup Formation
	Stuck Glaciation	Qs-Stuck Drift
	Alderton Interglaciation	Qa-Alderton Formation
	Orting Glaciation	Qo-Orting Drift

FIGURE 10.--Diagrammatic west-east geologic section of the Gig Harbor Peninsula showing a tentative correlation by Molenaar (1965) the Pleistocene stratigraphic units of the peninsula and the Pierce County mainland. The Sumner-Alderton-Orting area was studied by Crandell and others (1958), and the Tacoma area was studied by Walters and Kimmel (1968).

TABLE 6.--Summary of known stratigraphic units in the study area (modified from Molenaar, 1965)

Symbol (table 17)	Stratigraphic unit		Character and extent	Average thickness (ft)	Water-bearing properties and water quality
Qvr	Vashon Drift	Recessional outwash	Discontinuous bodies of unconsolidated silt, sand, and gravel. Deposited by meltwater of Vashon glacier.	10	May yield small to moderate supplies of ground water for domestic purposes where deposits have considerable thickness.
Qvt	Vashon Drift	Till	Extensive till sheet which mantles most of upland areas. Till varies greatly in compaction and composition.	40	Essentially impervious, but may yield small supplies of perched ground water.
Qc[1]	Vashon Drift	Colvos Sand	Principally stratified sand. Contains irregular lenses of fine gravel, and thin strata of clay and silt. In some places the sand is overlain by discontinuous silt, sand, and gravel. Deposited by meltwater streams from advancing Vashon glacier.	60	Where base below water table, sand yields domestic quantities; gravel strata yield moderately large quantities. Average dissolved-solids concentration of 80 mg/L, and average nitrate plus nitrite concentration of 0.33 mg/L.
Qk	Kitsap Formation		Principally well-bedded silt and clay, with occasional lenses of sand and gravel. In places contains peat beds.	65	Sand and gravel lenses yield small quantities of water, but formation normally of low permeability and yields little or no ground water.
Qss	Salmon Springs(?) Drift		Principally stratified sand and gravel. May be stained buff or orange-colored in outcrop. Contains some silt, clay and till strata.	50	Yields large quantities of ground water, frequently under artesian pressure. Average dissolved-solids concentration of 90 mg/L and average nitrate plus nitrite concentration of 0.21 mg/L.
Qpu	Pre-Salmon Springs(?) deposits, undifferentiated		Principally massive blue clay and silt in upper portions. Deformed in most places. Contains till, volcanic ash and peat or lignite. Clay is generally underlain by sand and gravel strata. Top of formation usually below sea level.	>1,000	Clay, silt and till strata yields little or no ground water. Sand and gravel yield small to very large quantities, usually under artesian pressure. Average dissolved-solids concentration of 95 mg/L and average nitrate plus nitrite concentration of 0.11 mg/L.

[1] This unit was separated into two units by Molenaar (1965); Qva (advance outwash) and Qc (Colvos Sand).

Identification of the Quaternary deposits in the region and their correlation from one location to another are extremely difficult. Correlations over large areas have not been conclusively established, and disagreement as to the identification of individual units is common among investigators.

Five major units in the unconsolidated material have been identified at land surface and in drillers' logs. Stratigraphic names and correlations used below are modified from Molenaar (1965). Not all units occur at all locations. The uppermost major unit is the till of the Vashon Drift, which covers most of the area. This unit is generally less than 80 ft thick, averages 40 ft, and is composed primarily of till (unsorted and unstratified glacially derived material of clay-to-boulder size).

Below the till is the Colvos Sand Member of the Vashon Drift, which is composed primarily of sand, with sand-and-gravel lenses and some thin strata of clay and silt. The Colvos occurs throughout most of the area, but ranges from a few feet to 200 ft or more in thickness, and averages 60 ft. The bottom of the Colvos is generally 100-200 ft above sea level. Although the Colvos was probably originally continuous, or nearly continuous over the area, subsequent erosion has dissected it in many places. In most locations where the present land-surface altitude is 150 ft or less, the Colvos is not found.

The Kitsap Formation underlies the Colvos Sand Member. The Kitsap is more than 150 ft thick in places and averages 65 ft. It is nearly all silt and clay with some peat and scattered lenses of sand and gravel. The Kitsap is generally found at altitudes between sea level and 150 ft above sea level. Available drillers' logs indicate that the Kitsap Formation is not continuous over the study area.

The Salmon Springs(?) Drift, which underlies the Kitsap Formation, is composed primarily of iron-stained sand and gravel with inclusions of till, silt, and clay. The average thickness of the Salmon Springs is 50 ft, and it is more than 150 ft thick in some locations. The top of the formation is generally at altitudes of 75 to 175 ft above sea level in the northern part of the study area, and near or below sea level in the south. The drift apparently underlies most of the study area, with the major exception being the west-central shoreline area of the Gig Harbor peninsula.

All the unconsolidated materials below the Salmon Springs(?) Drift are collectively referred to here as pre-Salmon Springs(?) deposits. The upper portions are clay and silt in most locations. Sand-and-gravel strata generally underlie the clay, and there are inclusions of till and peat. These materials extend downward to bedrock, for a total thickness greater than 1,000 ft. Only the uppermost 100-200 ft are well known. The top of the unit is generally below sea level.

Hydrologic Characteristics

All the major unconsolidated units are water bearing to some degree. However, only the Colvos Sand Member of the Vashon Drift, Salmon Springs(?) Drift, and pre-Salmon Springs(?) deposits yield significant amounts of fresh water. The water-bearing properties of the unconsolidated materials 200 or more feet below mean sea level are virtually unknown.

The Colvos is the uppermost and least productive of the three major water-bearing units. The greatest concentration of wells tapping the Colvos is in the north-central portion of the Gig Harbor peninsula. The Colvos probably exists beneath about 75 percent of the area, primarily in the uplands (at altitudes of 150 ft or more above sea level). The median altitude of well bottoms in this unit is about 175 ft, and the median altitude of water levels in these wells is about 220 ft. Wells tapping the Colvos average 95 ft in depth. Estimated potential yield (see table 17 for method of calculation) of an average well in the Colvos Sand Member is 15 gal/min.

The Salmon Springs(?) Drift is below the Colvos Sand Member and, in most places, separated from it by clay and silt of the Kitsap Formation. Wells tap the Salmon Springs(?) Drift throughout most of the area. The greatest concentrations of these wells occur in the central and southern parts of the Gig Harbor peninsula. The drift probably exists beneath about 85 percent of the area. The median altitude of well bottoms is about 35 ft, and the median altitude of water levels in these wells is about 85 ft. Wells tapping this unit average 135 ft in depth. Estimated potential yield of an average well in the Salmon Springs(?) Drift is 35 gal/min.

There are not enough data presently available to allow identification of the various water-bearing units underlying the Salmon Springs(?) Drift. Therefore, the pre-Salmon Springs(?) deposits will be treated here as a single unit. The upper parts of the pre-Salmon Springs(?) deposits are generally silt and clay, which separate the deeper water-bearing materials from the overlying Salmon Springs(?) Drift. Most wells tapping the pre-Salmon Springs(?) deposits are located within a mile of the shoreline. The greatest concentrations of these wells occur along the west-central shoreline of the Gig Harbor peninsula. The median altitude of well bottoms in the unit is about 50 ft below sea level, and the median altitude of water levels in these wells is about 20 ft above sea level. Wells tapping these deposits average 200 ft in depth. Estimated potential yield of an average well in the pre-Salmon Springs(?) deposits is 40 gal/min.

Water-table conditions exist in most parts of the Colvos Sand Member. In wells that penetrate more than a few feet below the water table, water levels generally stand below the water table, indicating the existence of a downward component of ground-water flow. In the process of drilling a well in the Colvos, after the water table has been reached, the water level in the well generally declines as the well becomes open to progressively deeper parts of the aquifer. Figure 11 shows the general flow pattern beneath the Gig Harbor peninsula.

Artesian conditions exist in the Salmon Springs(?) Drift and the pre-Salmon Springs(?) deposits. Water levels in wells tapping the Salmon Springs(?) Drift rise above the top of the unit, normally to altitudes within the Kitsap Formation. In wells tapping the pre-Salmon Springs(?) deposits, water levels generally rise above the top of the unit, to altitudes within the Salmon Springs(?) Drift, but in some cases are within the clay and silt beneath the top of the pre-Salmon Springs(?) deposits.

Ground-water flow in the Colvos Sand Member is generally in the same direction as topographic slope. This unit is recharged by water that seeps through the Vashon till or, in some locations, by precipitation that falls directly on the unit. Recharge areas are primarily the high-altitude areas (particularly 20/1-2; 21/1-1,12,14; 21/2-32; 22/1-15; and 22/2-17,18,19,33), 250 ft or more above sea level. These areas are characterized by broad, gently sloping uplands where the soils can hold water until it percolates downward into the Colvos Sand Member (either directly or through the Vashon till). Some water from this unit discharges at springs and seeps, which supply most of the surface-water flow, and some leaks downward to the deeper water-bearing units, mostly through the Kitsap Formation to the Salmon Springs(?) Drift.

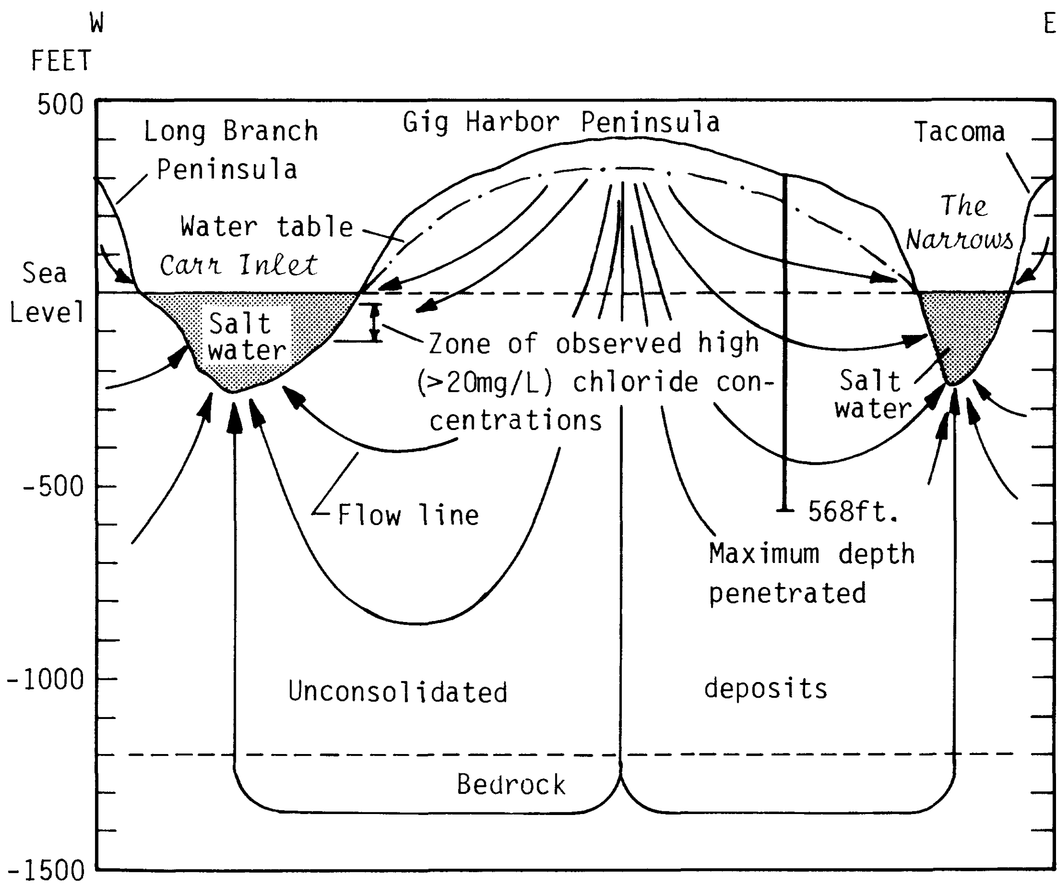


FIGURE 11.--Generalized flow pattern in a west-east section through the study area.

In the Salmon Springs(?) Drift, ground-water flow is complex. Local flow patterns follow the existing topography, but existing water-level data indicate that these local patterns are superimposed on a general areal pattern that indicates flow from northeast to southwest. This general flow pattern is interrupted in locations where the unit is intersected by the land surface and water is discharged as spring flow. This condition occurs primarily in the northern part of the area in the Crescent Creek valley. The Salmon Springs(?) Drift is recharged by seepage from overlying units, primarily from the Colvos Sand Member through the Kitsap Formation. Discharge from this unit moves laterally to Puget Sound, downward to the pre-Salmon Springs(?) deposits, and, in a few places, to springs at land surface.

No general flow pattern is presently discernible in the pre-Salmon Springs(?) deposits due to lack of data. The unit is recharged by seepage from overlying units, primarily from the Salmon Springs(?) Drift. Some discharge from the unit moves laterally to Puget Sound. However, much of this unit lies below the bottom of the Sound, and lateral hydraulic connections beneath the Sound to the east, west, and south probably exist. In a completely natural state (no pumping from the ground-water reservoir), it can be assumed that all flow in the pre-Salmon Springs(?) deposits beneath the study area would be outward toward the Sound. However, pumping (either in the study area or in adjacent areas) may have disturbed this flow pattern, resulting in freshwater movement beneath the Sound either into or out of the study area. The direction of this lateral flow (if it presently exists) is unknown.

The boundaries of the fresh ground-water reservoir are the water table at the top, the bedrock surface at the bottom, and the freshwater-seawater interface at the sides. The freshwater-seawater interface probably extends several hundred feet below sea level in most of the area, but the nature of the lateral boundaries at depths below the bottom of the Sound surrounding the area are unknown. The upper boundary, the water table, is not a static boundary. Its position changes continuously, reflecting changes in rates of recharge to and discharge from the ground-water reservoir or changes--near the shoreline--due to tidal fluctuations. The water table is a recharge boundary throughout most of the study area and a discharge boundary along the shoreline.

For practical purposes the bedrock surface is the bottom of the fresh ground-water reservoir. It is probably virtually impermeable relative to the unconsolidated material above it, and most water reaching the bedrock surface flows parallel to it.

The fresh ground-water reservoir is bounded laterally, along the shorelines, by salty ground water. There is not a distinct change from freshwater to seawater, but there is a transition zone from freshwater (characterized by a chloride concentration of 20 mg/L or less), through salty ground water (chloride concentrations of 20-19,000 mg/L), to seawater (chloride concentration of about 19,000 mg/L). The existence of this boundary is evident from chloride concentrations (greater than 20 mg/L) in some coastal wells open from 10 to 125 ft below sea level. However, the boundary is not a simple one. Chloride concentrations exceed 300 mg/L in some wells extending less than 50 ft below sea level but are less than 20 mg/L in other wells open at depths of more than 125 ft below sea level. Where the freshwater-seawater boundary is present, it is a discharge boundary.

The nature of the lateral boundaries below the Sound is not known. In most places, there are probably 900-1,000 ft of unconsolidated materials beneath the bottom of the Sound. The deepest existing well (21/2-17F2; drilled and cased to 560 ft below sea level) extends about 320 ft below the bottom of the Sound and produces freshwater (0.9 mg/L of chloride). It is possible that much of the unconsolidated material below the Sound contains freshwater (fig. 11).

WATER USE AND DISPOSAL

Public and private wells in the study area supply practically the entire population of 17,250. The only significant surface-water use is nonconsumptive, at a fish hatchery on Minter Creek.

Records of water use for 1978 are available for the town of Gig Harbor and for the Harbor Water Co. These two water systems supplied 5,700 people in 1978. Ungaged public systems (a public system is considered here as supplying 5 or more homes) supplied 6,400 additional people. The remaining 5,150 people were supplied by domestic wells (less than 5 homes per well).

The available records indicate an average per capita use of 89 gal/day. This gives an annual rate (for 1978) of 560 million gallons (2.4 ft^3/s) for the study area. Domestic use (including watering of lawns and gardens) probably accounted for 95 percent of the use, while commercial, industrial, irrigation, and other uses accounted for the remaining 5 percent.

Data are available for about 860 of the estimated 1,500 wells in the study area. About 78 percent of the wells are used for domestic supplies and 16 percent for public supplies. About 4 percent are unused, 1 percent supplies institutions, and 1 percent supplies commercial establishments. Additional uses (all representing less than 1 percent of the wells) include recreation, industry, irrigation, air conditioning, and stock supply.

About 48 percent of the wells tap the Salmon Springs(?) Drift, and they supply 39 percent of the water used. The pre-Salmon Springs(?) deposits are tapped by 42 percent of the wells and supply 54 percent of the water used. Most of the remaining 10 percent of the wells tap the Colvos Sand Member, and they supply about 7 percent of the water used.

Water disposal takes one of three courses: (1) to the unsaturated zone (septic systems), (2) to the Sound (Gig Harbor sewer-system outfall), and (3) to the land surface (irrigation, mostly lawns and gardens). Assuming an average per capita discharge to septic systems of 60 gal/day (the average rate of water use during the nonirrigation season), 330 million gallons (1.4 ft^3/s) were discharged in 1978. Gaged records for the Gig Harbor sewer system indicate an annual (1978) discharge of about 60 million gallons (0.3 ft^3/s). If the remaining water is assumed to be used for irrigation of lawns and gardens and pipeline leakage, then this disposal accounts for 170 million gallons (0.7 ft^3/s) per year.

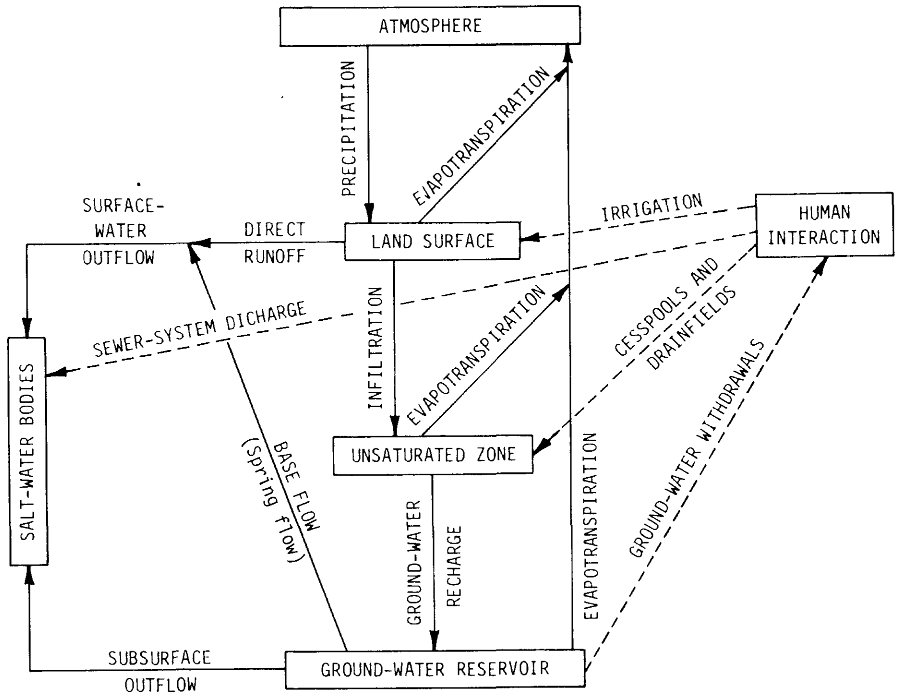
WATER BUDGET

Under natural conditions the hydrologic system is in a state of dynamic equilibrium. On a long-term basis, inflow to the system (precipitation, subsurface inflow, and surface-water inflow) is equal to outflow (evapotranspiration, subsurface outflow, and surface-water outflow). There is little or no change in the amount of water in storage at land surface, in the unsaturated zone, or in the ground-water reservoir.

Precipitation falling on the land surface may (1) run off directly to Puget Sound via streams, (2) be evapotranspired at land surface, or (3) infiltrate to the unsaturated zone. Some water in the unsaturated zone percolates downward to recharge the ground-water reservoir and some moves back toward land surface by capillary action and is evaporated or transpired by plants.

Water that reaches the ground-water reservoir flows slowly toward the surrounding seawater. Some water flows deeply into the reservoir, moves beneath the margins of the study area, and eventually discharges (below sea level) to the Sound. Where the water table is within reach of rooted plants, some water is transpired, and where it intersects the land surface, springflow (base flow) occurs. Together, base flow and direct runoff constitute the surface-water outflow from the hydrologic system.

An annual water budget for the 59 mi^2 in the study area under natural conditions is shown in figure 12 (making the assumptions listed in the figure). Natural inflow to the hydrologic system is in the form of precipitation, at a rate of about 222 ft^3/s, surface-water inflow (25 ft^3/s), and ground-water inflow (7 ft^3/s), for a total inflow of 254 ft^3/s. Natural outflow occurs primarily as evapotranspiration, at a rate of about 88 ft^3/s, and as surface-water outflow, about 132 ft^3/s. These forms of outflow total 220 ft^3/s. Because the budget must be in balance (assuming the hydrologic system is in a state of equilibrium), there must be an additional 34 ft^3/s of outflow. To balance the budget this additional outflow is designated as subsurface outflow. This budget ignores the possibility of any ground-water inflow occurring beneath the Sound.



WATER BUDGET UNDER NATURAL CONDITIONS[1]

		ft³/s
INFLOW		
Precipitation		222
Surface water[2]		25
Ground water[3]		7
Total		254
OUTFLOW		
Evapotranspiration:		
From land surface and unsaturated zone	84	
From ground-water reservoir[4]	4	88
Surface-Water:		
Direct runoff[5]	52	
Base flow[5]	55	
Through flow[6]	25	132
Subsurface[7]		34
Total		254
CHANGE IN STORAGE		
Inflow-outflow		0

HUMAN INTERACTION WITH THE HYDROLOGIC SYSTEM

	ft³/s
WATER USE	
Ground water	2.4
Surface water	negligible
Total	2.4
WATER DISPOSAL	
To unsaturated zone (septic systems)	1.4
To saltwater bodies (sewer-system discharge)	.3
To land surface (irrigation; mostly lawns and gardens)	.7
Total	2.4

[1]These calculations ignore the possibility of ground-water inflow at depth beneath the adjacent saltwater bodies.

[2]Average discharge of 1.8 $ft^3/s/mi^2$ of basin for 14 mi^2 north and west of study area, which drain through study area.

[3]Assuming ground-water divides coincide with surface-water divides. Assuming ground-water flow equals potentially available water [(2.3 $ft^3/s)/mi^2$] - surface-water inflow [(1.8 $ft^3/s)/mi^2$].

[4]Assuming areas of shallow ground-water supply the equivalent of 1 inch of available soil moisture over the entire study area.

[5]Assuming June mean monthly flow as estimate of base flow. Remainder of mean annual flow equals direct runoff.

[6]Assuming all surface-water inflow from adjoining areas simply flows through the study area and discharges to saltwater bodies.

[7]Assuming no change in storage, 34 ft^3/s are required to balance the budget.

FIGURE 12.--Flow diagram and annual water budget of the hydrologic system in the study area, showing natural conditions and those involving human interaction.

The amount of water that flows through the ground-water reservoir can be estimated from the overall budget. Of the 222 ft^3/s of precipitation, 84 ft^3/s is evapotranspired from the land surface or unsaturated zone and 52 ft^3/s becomes direct runoff. Thus, 136 ft^3/s never enters the ground-water reservoir. The remaining 86 ft^3/s flows through the ground-water system. Also, about 7 ft^3/s of ground water enters from adjacent areas to the north and west giving a total ground-water flow of 93 ft^3/s. About 59 ft^3/s of this flows only through the upper part of the ground-water reservoir (primarily the Colvos Sand Member) and is discharged as base flow to streams (55 ft^3/s) or is evapotranspired (4 ft^3/s). The remaining 34 ft^3/s flows deeper and is presumably discharged to the Sound from the Salmon Springs(?) Drift and the pre-Salmon Springs(?) deposits.

There is a large potential error associated with this type of water budget calculation. An estimate of the expected error can be made (taking the square root of the sum of the squares of the probable errors involved with each component of the budget) by assuming the following percentages of error: precipitation, surface-water inflow and throughflow, 10 percent each; evapotranspiration, 15 percent; surface-water direct runoff, 20 percent; surface-water base flow, 25 percent; and ground-water inflow, 50 percent. The ground-water outflow figure, 34ft^3/s (which was assumed in order to balance the budget), is dependent upon all the other component errors and therefore has a large expected error ($\pm$31 ft^3/s). The total ground-water flow figure, 93 ft^3/s (ground-water outflow plus surface-water base flow), is more reliable, with an expected error of $\pm$28 ft^3/s.

Some of the effects of monthly variations in direct runoff plus ground-water recharge (potentially available water) on streamflow and ground-water levels are shown in figure 13. During the period of observation, the study area received recharge during February-April 1978, in September 1978, and during November 1978-March 1979. Streamflows and ground-water levels responded in a predictable fashion. The potentially available water in February-April 1978 produced streamflows greater than those in June-October 1978 when there was no potentially available water. Although there was no potentially available water in May 1978, streamflows remained fairly high due to the release of ground water that was stored from the February-April 1978 recharge period. The small amount of potentially available water in September 1978 resulted in slightly increased streamflows and a slower rate of decline of ground-water levels. The potentially available water in November 1978-January 1979 increased streamflows only slightly because much of the water was used to replace the soil moisture depleted during the summer months. Water levels in the shallower wells (Colvos Sand Member) began rising in February 1979, indicating a 2- or 3-month delay from start of recharge. The shallower wells had much more pronounced changes in water levels due to short-term changes in potentially available water than the deeper wells.

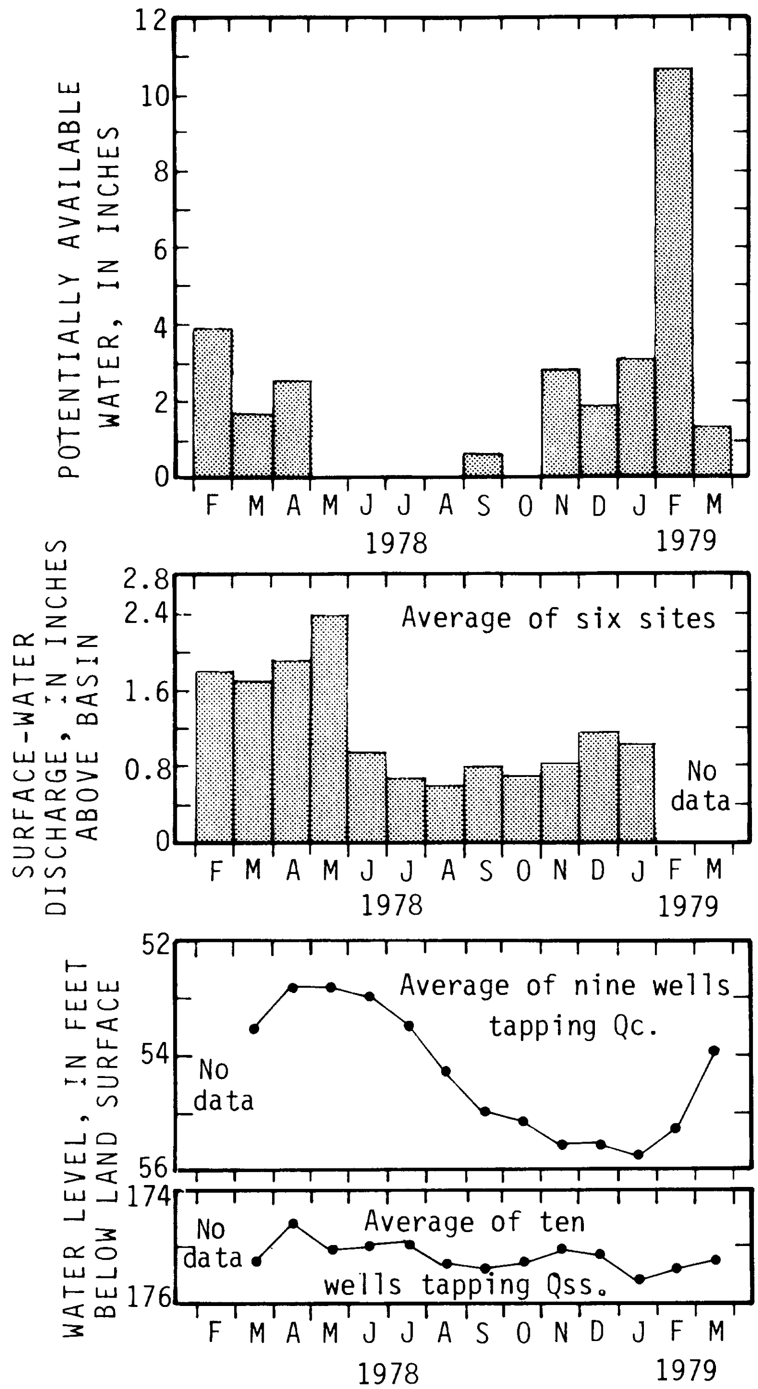


FIGURE 13.--Streamflow and ground-water level responses to potential recharge, February 1978-March 1979.

It is important to remember that the hydrologic system is in balance only relative to a long-term average. It is a dynamic system, constantly undergoing changes in inflow, outflow, and internal distribution of water in response to fluctuations in climatic and other factors.

As of 1978, ground-water development had no apparent significant effect on the water budget. The rate of water use was about 2.4 ft^3/s, less than 1 percent of the natural rate of flow through the system (fig. 12). Ground-water withdrawals accounted for all water use and represented less than 3 percent of the flow through the ground-water reservoir.

Water was discharged to the unsaturated zone through septic systems, to the Sound through sewer-system discharges from the town of Gig Harbor, and to the land surface by irrigation. Water discharged from septic tanks to the unsaturated zone (at an estimated rate of 1.4 ft^3/s) and water applied to the land surface (0.7 ft^3/s) infiltrated to the ground-water reservoir or was evapotranspired, and thus it was recycled through the land portion of the hydrologic system. Water discharged directly to the Sound (0.3 ft^3/s) was not recycled.

WATER QUALITY

Water flowing through the hydrologic system undergoes natural changes in quality. Precipitation generally contains a small amount of dissolved substances (probably less than 10-20 mg/L of dissolved solids). After precipitation reaches the land surface, evapotranspiration concentrates the dissolved substances. This increases the dissolved-solids concentration to 15-35 mg/L in the study area.

Water that is not evapotranspired becomes direct runoff or infiltrates into the unsaturated zone; in either case, it is the direct contact with the soil that causes water-quality changes to take place. Water that moves through the soil and the remainder of the unsaturated zone to reach the ground-water reservoir is in contact with more soluble materials for a much longer time than is direct runoff. This results in a dissolved-solids concentration of about 80 mg/L in water near the top of the ground-water reservoir (average for five wells in the Colvos Sand Member), as compared to an average dissolved-solids concentration of less than 65 mg/L in direct-runoff water (average for six surface-water sites).

As water moves deeper into the ground-water reservoir it generally dissolves greater concentrations of minerals. The concentration of dissolved solids increases to about 90 mg/L in the Salmon Springs(?) Drift (average for 26 wells) and about 95 mg/L in the pre-Salmon Springs(?) (average for 31 wells).

Water collected from wells in the landward part of the freshwater-seawater zone of diffusion shows only slight changes, mostly small increases in chloride and sodium concentrations. However, water deeper in the zone of diffusion shows large water-quality changes, including chloride concentrations in excess of 500 mg/L.

Analyses indicate differences in the quality of water from the different water-bearing units (tables 7, 14, and 15, p. 48-49 and 124-139). Concentrations of dissolved magnesium, sodium-plus-potassium, and bicarbonate, are greater (24, 45, and 22 percent, respectively) in the pre-Salmon Springs(?) deposits than in the Salmon Springs(?) Drift, whereas dissolved iron-plus-manganese, sulfate, chloride, and nitrate-plus-nitrite are greater (86, 125, 54, and 91 percent, respectively) in the Salmon Springs (?) Drift. Nitrate-plus-nitrite concentrations appear to be greatest in the Colvos Sand Member (based on only five samples). Not enough is known about the chemistry of the individual units to determine the causes of the differences in water quality. However, the relatively large concentrations of iron-plus-manganese in the Salmon Springs(?) Drift are probably related to the reddish-stained sand-and-gravel portions of the units.

The quality of water in the study area can be affected by (1) introducing materials to the land surface and atmosphere, and (2) by various types of water use. However, as of 1978, readily measurable changes from natural conditions were not observed in the study area.

The domestic use of water can significantly change water quality. About 1.7 ft^3/s of the water used for domestic purposes becomes sewage. Of this, 0.3 ft^3/s is collected in sewer systems, treated, and released to the Sound. The remaining 1.4 ft^3/s of domestic sewage is discharged to septic systems. The quality of this sewage is markedly different from that of the water before use, including greater concentrations of sodium-plus-potassium, sulfate, chloride, nitrogen, and dissolved solids (table 7). As of 1978, domestic sewage discharge probably had little effect on the average water quality in the hyrologic system. An estimate of the magnitude of the effect can be made by calculating the change in concentration of dissolved solids caused by the sewage. Assuming a straight mixing of sewage and natural ground water -- 1.4 ft^3/s of sewage with a dissolved-solids concentration of 290 mg/L, and 91.3 ft^3/s of natural ground water (average rate of flow through the ground-water reservoir minus the amount of water withdrawn and discharged as sewage) with a dissolved-solids concentration of about 90 mg/L (concentration in Salmon Springs(?) Drift used as an average value) -- the mixture would have a concentration only 3 mg/L greater than that of the natural ground water. However, this calculation assumes total mixing within the system. At any point where sewage is released, the ground water would have a dissolved-solids concentration between that of the sewage and a total mixture.

An important potential contaminant in domestic sewage is nitrate. In March 1979, 45 wells were sampled and tested for nitrate-plus-nitrite concentrations (fig. 14). The greater nitrate concentrations were found in the shallower wells (less than 200 ft deep). It cannot be determined from the data whether or not these greater concentrations are related to discharge from septic systems. The total annual (based on 1978 data) load of nitrate-plus-nitrite discharged into septic systems can be estimated at 38,000 kg (1.4 ft^3/s average flow with a concentration of 30 mg/L). The estimated annual (1978) amount of nitrate-plus-nitrite moving through the shallow ground-water system (Colvos Sand Member) is 27,000 kg (93 ft^3/s average flow with a concentration of 0.33 mg/L). However, this cannot be used as evidence that the observed nitrate levels result from septic-system discharges. This calculation does not consider other potential sources of nitrate-plus-nitrite (such as fertilizer and domestic animals) or any change in nitrate-plus-nitrite concentrations produced within the septic systems.

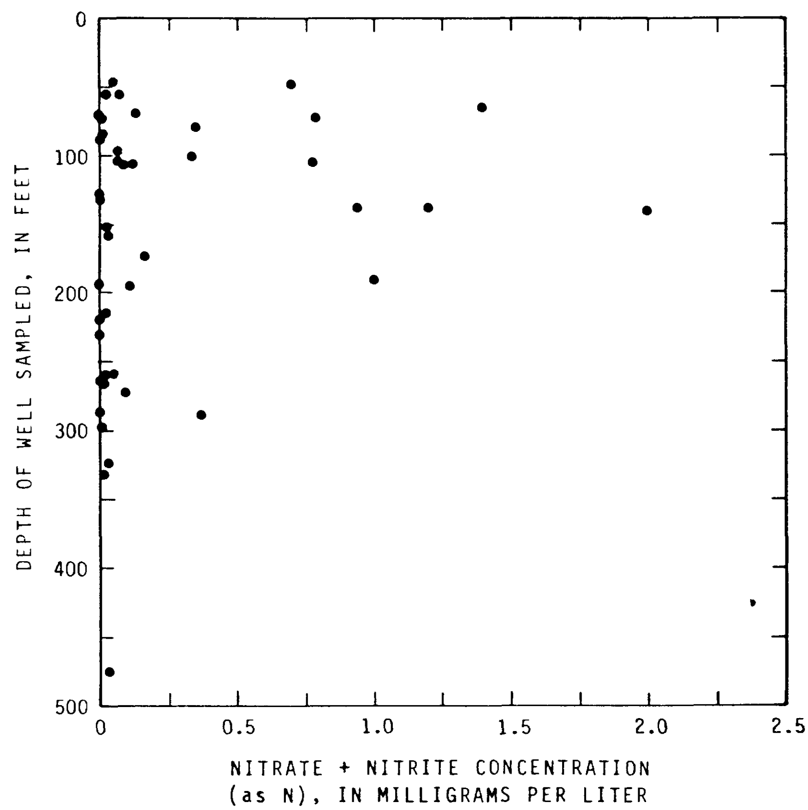


FIGURE 14.--Relationship between well depths and nitrate-plus-nitrite concentrations.

COMPARISON OF WATER IN THE STUDY AREA WITH DRINKING-WATER STANDARDS

The water-quality data indicate that most of the water in the study area meets or exceeds drinking-water standards. Table 8 lists the chemical, physical, and biological standards for drinking water that went into effect in June 1977, in accordance with the Federal Safe Drinking Water Act (Public Law 93-523). Table 8 also gives the number of sites and samples in the study area for which these standards have been exceeded.

The maximum contaminant levels listed refer to concentrations of constituents which, if exceeded, may affect the health of consumers. The secondary recommended limits refer to concentrations of constituents which may affect the esthetic quality of the water but are not health hazards.

Isolated high values of fluoride, cadmium, lead, mercury, and selenium may represent short-term contamination of individual wells or errors in laboratory analyses. (The samples were not analyzed by the U.S. Geological Survey and were not available for retesting.)

The maximum contaminant level for turbidity has been exceeded in 10 wells. Water with high turbidity is hazardous primarily because it may reduce the effectiveness of chlorination processes. Most high turbidity in the ground water is probably related to oxidation of dissolved iron after pumping or to silt and clay particles in poorly sorted glacial deposits.

Coliform bacteria are a major water-quality problem in the study area. Water obtained from 15 public-supply wells and the 7 surface-water sites tested contained coliform bacteria on at least one occasion at each site (ground-water data from Washington State Department of Social and Health Services). In the wells tested, the bacteria probably enter the water in the distribution systems or by seepage down the outside of the well casing and, in most cases, do not represent a widespread contamination of the ground water itself. Coliform bacteria in the area's surface water are not a major problem because virtually no surface water is used for domestic purposes. Surface-water analyses are listed in table 16 (p. 140).

The secondary recommended limits for iron, manganese, chloride, dissolved solids, pH, and color have been exceeded in the study area. At the sites tested, iron and manganese were the most common problems, exceeding recommended limits in 16 and 29 percent of the samples, respectively. Large concentrations of either constituent often create a bad taste, stain plumbing fixtures and laundry, and cause clogging of pumps and pipes.

The recommended limits for chloride and dissolved solids were exceeded in water from five wells tapping the freshwater-seawater zone of diffusion. About 20-25 other wells have moderately high chloride concentrations that suggest penetration into the zone of diffusion. Most of the wells with high chloride concentrations are along the western shoreline of the Gig Harbor peninsula (primarily the Horsehead Bay area) and on Fox Island. The data collected are insufficient to determine if there is seawater intrusion in these areas. However, 75 percent of the wells sampled in 1968 and again in 1978 showed significant increases in chloride concentrations.

Color (platinum-cobalt units) and pH at a few sites were above the recommended limit; both can make water esthetically undesirable for domestic use and economically undesirable for some industrial uses.

Of the 190 well owners questioned about the quality of their well water, about 25 percent complained about staining of fixtures, 5 percent about unpleasant odor, and 4 percent about unpleasant taste.

POTENTIAL FOR FURTHER DEVELOPMENT

Of primary concern to water managers in the study area is increased ground-water withdrawal and the associated consequences.

Because the hydrologic system has never been significantly stressed, its reaction to future hydrologic stresses can be estimated only qualitatively. Any stress will produce a response in the system that is consistent with the hydrologic equation,

$$\text{Inflow} = \text{outflow} \pm \text{change in storage.}$$

A change in any item in the equation will cause one or both of the other items to change. Although the equation is simple, the type and magnitude of response may be complex. The only significant inflow to the ground-water reservoir enters through the unsaturated zone (ignoring the possibility of induced ground-water inflow beneath the Sound). Under the existing "near-natural" conditions, annual ground-water flow through the system averages about 93 ft^3/s -- equal to precipitation and subsurface inflow, minus direct runoff and evapotranspiration from the land surface and unsaturated zone.

A maximum rate of withdrawal equal to the average annual flow is obviously unattainable; not all the flow can be captured by any practical development of the ground-water system. However, a significant increase in the rate of ground-water withdrawal would be possible with a system of properly spaced wells. For example, wells spaced about 1,000 ft apart (about 25 per square mile) and pumped at 10 gal/min each for 8 hours each day would result in a yield of 11 ft^3/s. This is about five times the 1978 rate of withdrawal and 12 percent of the flow through the ground-water system. This example is not meant to be a guideline for developing the ground water of the area. It is not possible, with the available data, to estimate accurately the optimum rate for ground-water withdrawal or the effects on the hydrologic system. The calculation is a conservative one, assuming a wide spacing of wells (1,000 ft, to insure no interference between wells), a low pumping rate (10 gal/min, instead of the 15-40 gal/min estimated average rate for existing wells), and a 16-hour rest period per day (only 8 hours of daily pumping).

Withdrawals of ground water are accompanied by decreases in the natural outflow from the ground-water reservoir (subsurface outflow, base flow, and ground-water evapotranspiration). These decreases in outflow might adversely affect other parts of the hydrologic system. Perhaps the most undesirable effects would be: (1) decrease in base flow of streams, which presently averages about 55 ft^3/s and is about 42 percent of the total streamflow, (2) lowering of water level in some wells, and (3) landward migration of the freshwater-seawater zone of diffusion. Thus, it is important to consider the maximum average rate of withdrawal that can be attained without producing undesirable results.

The above discussion of ground-water withdrawal is based on the assumption that all water pumped from the ground-water reservoir is removed from the hydrologic system, such as water discharged to the Sound through sewer systems. However, if the withdrawn water follows the other available paths shown in figure 12, some of the water becomes ground-water recharge, thus making the net withdrawal from the ground-water reservoir less than the actual amount pumped. Assuming that water discharged via septic systems becomes ground-water recharge, only 42 percent of the water used (as of 1978) was permanently removed from the ground-water reservoir. Therefore, about 1.0 of the 2.4 ft^3/s pumped from the ground-water reservoir was the actual rate of use in 1978.

When water is recycled in this manner changes in water quality must be considered. Each time the water is pumped from the ground-water reservoir, used, and returned, its quality probably deteriorates. The types of water use, methods of treatment (if any), and methods of disposal are factors that cause changes in water quality.

Listed below are some general considerations regarding development of the ground-water reservoir. These considerations, both favorable and unfavorable, are based primarily on hydrologic factors and do not take into account economic or legal factors. Table 17 (p. 142) contains a summary of selected data on the principal water-bearing units. The data are subdivided into regions (pl. 1) and further divided into 1 mi^2 sections in order to be of the most use to planners and developers; the median values shown are based on the available data in each section, which range considerably in density and quality from section to section. The numbers in the table are not an absolute definition of the water-bearing units, but are meant to be used as a general guide.

1. The best areas for development of wells are in the inland parts of the study area. The best aquifer for development is the Salmon Springs(?) Drift.

   a. By developing inland areas, well bottoms are generally above sea level and the chances of inducing seawater are greatly reduced.
   b. This inland development might slightly increase the rate of recharge by capturing previously rejected recharge.
   c. Development may result in decreases in streamflow, either by directly decreasing base flow from the Salmon Springs(?) Drift to streams or by inducing flow from the Colvos Sand Member of the Vashon Drift to the Salmon Springs(?) Drift, thereby decreasing the base flow from the Colvos.

2. A greater total ground-water withdrawal is possible if the used water is discharged to the unsaturated zone via septic systems.

   a. This should increase recharge and reduce net withdrawal.
   b. This may cause some deterioration of water quality.

3. Waste water discharged to the land surface, unsaturated zone, or ground-water reservoir may require treatment before being discharged.

   a. This will help maintain good water quality.
   b. Waste water discharged near the recharge areas will generally require the most treatment because this water may be recycled several times through the ground-water system. Waste water discharged near areas of outflow will generally require the least treatment, or possibly no treatment.

Alterations to land surface may alter the rates of direct runoff, ground-water recharge, and evapotranspiration. For example, paving large areas might increase direct runoff and decrease ground-water recharge, whereas removal of large areas of natural vegetation might decrease evapotranspiration and increase ground-water recharge.

The use of some substances and facilities may affect water quality. For example, (1) herbicides, insecticides, and fertilizers may infiltrate and contaminate the ground-water reservoir, and (2) pipelines carrying petroleum products, sewage, and other substances may leak, and contaminate the ground water.

Therefore, any major development of the ground-water resources should be accompanied by planned programs of data collection to monitor the effects of the development:

1. In conjunction with large rates of withdrawal, water levels should be measured periodically in pumped wells and unpumped observation wells to determine any changes in the water-table configuration.

2. Chloride concentrations should be checked periodically in coastal areas, particularly in areas that experienced increased concentrations during 1968-78.

3. In conjunction with major discharges of waste water to the land surface, unsaturated zone, or ground-water reservoir, periodic water samples should be collected from nearby wells and analyzed to identify detrimental water-quality changes. In particular, nitrate concentrations should be monitored.

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SELECTED REFERENCES

Anderson, Darrel, 1978, Gig Harbor bacteriological survey: State of Washington, Department of Ecology, Project Report, DOE PR-2, 15 p.

Bortleson, G. C., Dion, N. P., McConnel, J. B., and Nelson, L. M., 1976, Reconnaissance data on lakes in Washington, volume 3, Kitsap, Mason, and Pierce Counties: State of Washington Department of Ecology Water-Supply Bulletin 43, vol. 3, 259 p.

Collings, M. R., 1973, Data on selected lakes in Washington, Part I: U.S. Geological Survey Open-File Report, 179 p.

Crandell, D. R., Mullineaux, D. R., and Waldren, H. H., 1958, Pleistocene sequence in southeastern part of the Puget Sound lowland, Washington: American Journal of Science, v. 256.

Cummans, J. E., 1977, Low-flow characteristics of streams on the Kitsap Peninsula and selected adjacent islands, Washington: U.S. Geological Survey Open-File Report 76-704, 19 p.

Cummans, J. E., Collings, M. R., and Nassar, F. G., 1975, Magnitude and frequency of floods in Washington: U.S. Geological Survey Open-File Report 74-336, 46 p.

Hall, J. B., and Othberg, K. L., 1974, Thickness of unconsolidated sediments, Puget Lowland, Washington: State of Washington, Department of Natural Resources, Division of Geology and Earth Resources, Geologic Map GM-12, 3 p.

Hansen, A. J., Jr., and Bolke, E. L., 1980, Ground water in the Kitsap Peninsula and selected adjacent islands, Washington: U.S. Geological Survey Water Resources Investigations Open-File Report 80-1186, 65 p.

Mason, Brian, 1966, Principles of geochemistry (3d ed.): New York, John Wiley and Sons, Inc., 329 p.

Miller, D. W., DeLuca, F. A., and Tessier, T. L., 1974, Groundwater contamination in the northeastern states: Environmental Protection Agency Technology Series, EPA-0660/2-74-056, 325 p.

Molenaar, Dee, 1965, Geology and ground-water resources of the Kitsap Peninsula and certain adjacent islands: in Water Resources and Geology of the Kitsap Peninsula and certain adjacent islands by Garling, M. E., and others; State of Washington Department of Conservation Water-Supply Bulletin 18, 309 p.

U.S. Department of Agriculture, 1970, Irrigation water requirements: U.S. Soil Conservation Service, Engineering Division, Technical Release no. 21, 79 p.

U.S. Department of Commerce, 1966-73, Climatological data, Washington: v.70-77.

[U.S.] National Oceanic and Atmospheric Administration, 1974-78, Climatological data, Washington: v.78-82.

U.S. Environmental Protection Agency, 1975, National interim primary drinking water regulations: Federal Register, v. 40, no. 248, p. 59566-59588.

-----1977, National secondary drinking water regulations: Proposed regulations: Federal Register, v. 42, no. 62, p. 17143-17146.

U.S. Weather Bureau, 1938-65, Climatological data, Washington: v.42-69.

Walters, Kenneth L., 1971, Reconnaissance of sea-water intrusion along coastal Washington, 1966-68: State of Washington Department of Ecology Water-Supply Bulletin 32, 208 p.

Walters, Kenneth L., and Kimmel, G. E., 1968, Ground-water occurrence and stratigraphy of unconsolidated deposits, central Pierce County, Washington: State of Washington Department of Water Resources Water Supply Bulletin 22, 428 p.

Wolcott, E. E., 1973, Lakes of Washington, Vol. 1, Western Washington: State of Washington Department of Ecology Water-Supply Bulletin 14, Vol. 1, 619 p.

Zulauf, Allen S., 1979, Soil survey of Pierce County area, Washington: U.S. Department of Agriculture, Soil Conservation Service, 131 p.

TABLE 7.--Median values of selected chemical constituents in various parts of the hydrologic system

Source of water	Milligrams per liter						
	Dissolved iron plus manganese (Fe+Mn)	Dissolved calcium (Ca)	Dissolved magnesium (Mg)	Dissolved sodium plus potassium (Na+K)	Bicarbonate (HCO_3)	Dissolved sulfate (SO_4)	Dissolved chloride (Cl)
Precipitation	--------------------no data available--------------------						
Surface water:							
Direct runoff plus baseflow	--	--	--	--	--	--	--
Base flow	--	--	--	--	--	--	--
Ground water:							
Colvos Sand Member of Vashon Drift	--	--	--	--	--	--	4.1
Salmon Springs(?) Drift	0.26	12	6.8	6.4	64	7.2	4.0
Pre-Salmon Springs(?)	.14	12	8.4	9.3	78	3.2	2.6
Freshwater-saltwater zone of diffusion	.73	13	16	31	138	3.5	90
Seawater	.01	400	1,300	11,000	140	2,600	19,000
Domestic sewage	--	23	11	72	--	30	39

Dissolved fluoride (F)	Dissolved nitrate plus nitrite (NO_3+NO_2) (N)	Dissolved solids (residue at 180°C)	Remarks
-------no data available-----			All concentrations probably low. Dissolved solids probably <20 mg/L.
--	0.26	64	Average of six sites sampled on 4/17/78.
--	.14	82	Average of six sites sampled on 7/13/78 and 10/16/78.
--	.33	79	Average of five wells.
0.1	.21	90	Average of 26 wells
.1	.11	95	Average of 31 wells.
.1	.39	288	Average of 12 wells.
1.3	.5	34,000	From Mason (1966).
--	30	290	Calculated average for domestic wastes. Used average increases in inorganic salts in domestic wastes (Miller and others, 1974), and applied increases to ground water from Salmon Springs(?) Drift.

TABLE 8.--Comparison of ground-water quality in the study area with standards established by the Federal Safe Drinking Water Act

Constituent	Number of wells sampled	Number of samples tested[1]	Water-quality standards: Maximum contaminant level[2]	Water-quality standards: Proposed secondary recommended limit[3]	Number of wells at which standard was exceeded
Iron	37	45	--	0.3 mg/L	6
Manganese	39	45	--	0.05 mg/L	13
Sulfate	17	20	--	250 mg/L	0
Chloride	65	80	--	250 mg/L	5
Fluoride[4]	34	41	1.4 to 2.4 mg/L	--	1
Nitrate[5]	75	93	10 mg/L	--	0
Dissolved solids	60	71	--	500 mg/L	2
pH	59	69	--	<6.5 or >8.5	5
Color	33	40	--	15 platinum-cobalt units	1
Turbidity[6]	32	37	1 JTU	--	10
Detergents[7]	49	49	--	0.5 mg/L	0
Coliform bacteria[8]	30	221	1 col/100 mL	--	15
Arsenic	21	22	0.05 mg/L	--	0
Barium	19	19	1 mg/L	--	0
Cadmium	20	20	0.010 mg/L	--	1
Chromium	20	20	0.05 mg/L	--	0
Lead	22	22	0.05 mg/L	--	1
Mercury	20	20	0.002 mg/L	--	2
Selenium	19	21	0.01 mg/L	--	1
Silver	19	19	0.05 mg/L	--	0

[1] Samples tested by U.S. Geological Survey, or Washington Department of Social and Health Services, or by commerical laboratories.

[2] U.S. Environmental Protection Agency, 1975, National interim primary drinking water regulations are those which deal with constituents that may affect the health of consumers.

[3] U.S. Environmental Protection Agency, 1977, National secondary drinking water regulations. Secondary regulations are those which deal with the esthetic quality of drinking water, and are guidelines only.

[4] The maximum contaminant level for fluoride is dependent upon the annual average of the maximum daily air temperature at the location in which the water-supply system is situated; the mean air temperature at the nearest weather station (Tacoma, 1938-79) was 52.2°F, and the average maximum daily air temperature was about 60*F. At temperatures of 58.4° to 63.8°F, the maximum contaminant level is 2.0 mg/L.

Number of samples exceeding standard	Maximum value observed	Sites which have exceeded chemical standards
7	2.4 mg/L	20/1-1K1; 21/1-35D1; 21/2-28P1, 30L2; 22/1-23C1, 23M1.
13	0.67 mg/L	20/1-2K1; 21/1-16F1, 28D5; 21/2-8C1, 17F2, 18E1, 28K2, 28P1; 22/1-13E1, 23M1, 36R1; 22/2-32P2, 33F1.
0	83 mg/L	--
9	645 mg/L	21/1-16F1, 28D5, 28F2, 34A4; 21/2-28K2.
1	4.4 mg/L	22/1-25F2.
0	6.8 mg/L	--
2	718 mg/L	21/1-16F1; 21/2-28K2.
5	6.3, 9.4	20/2-18E2; 21/1-12D3, 35D1; 22/1-14Q2, 15Q1.
2	70 units	21/1-35D1.
12	18 JTU	20/1-1K1; 21/1-11R1, 15E1, 35D1; 21/2-7L1, 17D3, 18E1, 30L2; 22/1-23C1, 23M1, 25F2.
0	0.1	--
27	32 col/100 mL	--
0	0.04 mg/L	--
0	<0.3 mg/L	--
1	0.010 mg/L	21/1-28D5.
0	0.018 mg/L	--
1	0.53 mg/L	22/1-32F2.
2	0.026 mg/L	21/2-7L1; 22/1-32F2.
1	0.031 mg/L	21/1-28D5.
0	0.013 mg/L	--

[5]Includes data for nitrate + nitrite concentrations.

[6]Although the maximum contaminant level for turbidity applies only to surface water, the relatively high turbidities in ground-water samples in the area warrant inclusion in this summary.

[7]Foaming agents (methylene blue active substances).

[8]The maximum contaminant level depends upon the number of samples taken and the method of determination. The 1 col/100 mL level in the table is a convenient value for evaluating the small public and private systems in the study area. Data identifying individual wells which have exceeded the standard are not available.

TABLE 9.--Discharges at gaged sites

Site No. 21 - Purdy Creek at Purdy

Drainage Area: 3.44 mi^2

Extremes: **Maximum discharge, 113 ft^3/s, 12-15-59.**
Minimum discharge, 1.3 ft^3/s, 7-27-62 and 8-2-62.

Remarks: No known regulation or diversion above station.

Water year	Oct.	Nov.	Dec.	Jan.	Mean discharges Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1960	--	--	12.9	14.5	11.9	8.11	8.96	7.61	4.02	2.43	2.54	2.61	--
1961	4.2	9.0	6.2	19	26	14.2	6.69	6.15	3.24	2.71	2.06	2.24	8.34
1962	3.37	6.48	9.73	6.28	4.76	6.00	4.36	4.06	2.21	1.75	1.94	2.29	4.44

Site No. 25 - Huge Creek near Wauna

Drainage Area: 6.47 mi^2

Extremes: Maximum discharge, 391 ft^3/s, 2-9-51.
Minimum discharge, 3.2 ft^3/s, 9-1-50.

Remarks: No known regulation or diversion above station.

Water year	Oct.	Nov.	Dec.	Jan.	Mean discharges Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1947	--	--	--	--	--	--	--	--	--	4.28	4.24	4.36	--
1948	6.95	5.94	9.25	17.2	16.1	14.0	9.87	11.2	6.20	4.56	4.54	5.90	9.30
1949	4.92	9.24	21.8	10.3	28.6	13.6	8.77	6.83	5.17	4.44	4.20	4.30	10.1
1950	5.13	11.4	17.6	e29.5	e35.4	38.9	14.0	8.25	6.99	5.55	4.50	4.30	e15.0
1951	6.50	15.1	34.1	34.5	51.8	17.7	e9.30	e7.55	e6.71	5.79	4.82	5.09	e16.4
1952	6.47	7.80	12.2	13.1	18.7	8.93	6.17	4.77	4.62	4.45	4.32	4.21	7.95
1953	4.09	4.13	4.97	43.4	25.9	10.8	8.16	6.10	5.15	4.50	4.44	4.72	10.5
1954	6.00	10.1	24.4	37.0	36.7	13.4	10.3	7.08	6.03	5.20	4.65	4.59	13.7
1955	4.55	13.8	11.8	e10.9	e12.9	9.74	10.7	6.15	4.90	4.67	4.35	4.49	8.20
1956	5.91	23.0	36.9	43.4	13.5	32.2	13.8	8.89	8.25	5.94	5.48	5.37	10.9
1957	8.91	10.0	20.9	10.5	17.1	21.4	10.4	7.25	6.45	6.03	5.64	5.30	10.8
1958	5.57	5.74	9.76	23.8	23.2	10.3	9.65	6.34	4.59	4.44	4.56	4.57	9.30
1959	5.36	9.52	15.3	37.2	15.6	10.2	16.5	12.4	7.27	5.76	4.83	5.39	12.1
1960	5.69	12.1	22.2	21.8	25.3	16.0	15.6	9.76	7.25	5.73	5.33	e5.00	12.6
1961	7.23	13.9	10.5	37.9	54.6	33.1	12.7	11.0	8.38	7.31	6.07	5.55	17.1
1962	6.46	7.22	13.2	12.0	8.07	9.96	7.35	6.61	5.11	4.68	4.81	4.73	7.53
1963	6.05	17.5	18.3	14.5	17.2	8.79	11.3	6.74	5.58	4.94	4.54	4.29	9.92
1964	5.45	15.3	11.9	38.9	15.9	13.2	7.64	6.54	6.56	5.29	5.16	4.93	11.4
1965	5.05	8.31	19.4	19.9	17.6	8.43	7.67	6.48	4.82	4.31	4.17	3.79	9.13
1966	4.23	5.66	9.27	47.1	9.97	22.3	8.07	5.98	5.67	4.62	4.22	4.26	11.0
1967	4.51	6.06	26.2	35.2	16.9	14.0	9.16	7.32	5.89	5.05	4.38	4.47	11.6
1968	6.53	6.03	14.0	30.6	35.3	22.5	12.4	8.59	8.01	5.82	6.18	5.75	13.4
1969	6.19	7.91	21.3	24.3	24.6	11.5	10.6	7.34	5.96	5.27	4.44	5.44	11.2
1978	6.05	15.1	29.9	20.3	16.5	8.93	9.18	8.59	5.06	4.80	4.41	6.68	11.3
Maximum	8.91	23.0	36.9	47.1	54.6	38.9	16.5	12.4	8.38	7.31	6.18	6.68	17.1
Minimum	4.09	4.13	4.97	10.3	12.9	8.43	6.17	4.77	4.59	4.28	4.17	3.79	7.53
Mean	5.82	10.5	18.0	26.7	23.4	16.1	10.4	7.73	6.11	5.14	4.76	4.90	11.6

e = estimated (partial record).

TABLE 10.--Discharge measurements at miscellaneous sites

Site number	Station name	Drainage area[1] (mi²)	Date	Dis-charge (ft³/s)	Date	Dis charge (ft³/s)
1	Crescent Lake tributary	0.48 (0.40)	9- 2-69	e0.1	10- 5-70	e0.15
			2-11-70	.64		
2	Crescent Creek	1.18 (1.10)	9- 2-69	0	10- 5-70	.29
3	Crescent Creek	3.86 (3.78)	2-11-70	3.75	6-19-70	.40
4	Crescent Creek	4.64 (3.56)	7- 9-47	1.56	7-17-58	1.85
			7-31-47	1.27	7-28-58	1.29
			8-14-47	1.75	8-18-58	1.97
			8-29-47	1.49	7- 8-59	2.74
			9-20-47	1.81	7-31-59	1.91
			7- 1-58	1.99	8-14-59	1.75
5	Crescent Creek	5.18 (5.10)	2-17-78	9.06	8-14-78	2.28
			3-15-78	7.87	9-15-78	3.51
			4-17-78	8.69	10-16-78	2.62
			5-15-78	9.89	11-14-78	3.44
			6-15-78	3.91	12-18-78	5.23
			7-13-78	2.74	1-18-79	4.52
6	North Creek	1.74	2-17-78	2.24	8-14-78	1.20
			3-15-78	2.07	9-15-78	1.13
			4-17-78	2.06	10-16-78	1.01
			5-15-78	2.86	11-14-78	1.26
			6-15-78	1.21	12-18-78	1.31
			7-13-78	1.06	1-18-79	1.10
7	Sullivan Gulch Creek	1.61	8-20-58	.08		
8	Wollochet Bay tributary No. 2	2.52	7-15-74	.50	8-27-74	.15
			7-31-74	.18	10-16-74	.13
9	Artondale Creek	2.99	8-29-47	.92	7-13-78	1.06
			8-20-58	.76	8-14-78	.85
			2-17-78	3.79	9-15-78	1.86
			3-15-78	2.91	10-16-78	1.31
			4-17-78	4.02	11-14-78	1.65
			5-15-78	4.80	12-18-78	2.09
			6-15-78	1.70	1-18-79	2.16

TABLE 10.--Discharge measurements at miscellaneous sites--Continued

Site number	Station name	Drainage area[1] (mi^2)	Date	Dis-charge (ft^3/s)	Date	Dis charge (ft^3/s)
10	Hale Passage tributary	.10	8-29-47	0	8-20-58	0
11	Hale Passage tributary No. 2	.19	8-20-58	.03		
12	Warren Creek	.83	8-20-58	.06		
13	Carr Inlet tributary	.14	8-29-47	.14	8-20-58	0.06
14	Carr Inlet tributary No. 2	2.03	8-29-47	0.84	7-31-74	0.85
			8-20-58	.64	8-27-74	.84
			7-15-74	1.38	10-16-74	.92
15	Carr Inlet tributary No. 3 (Meyer Creek)	.15	8-29-47	1.05	5-15-78	1.68
			8-20-58	.96	6-15-78	1.23
			7-15-74	1.29	7-13-78	1.03
			7-31-74	1.01	8-14-78	.90
			8-27-74	1.16	9-15-78	1.09
			10-16-74	1.06	10-16-78	.99
			2-17-78	1.79	11-14-78	1.22
			3-15-78	1.55	12-18-78	1.36
			4-17-78	1.62	1-18-78	1.41
16	Lay Inlet tributary	.52	8-22-58	.08		
17	McCormick Creek	2.36	8-29-47	.93	5-15-78	4.64
			8-18-58	.98	6-15-78	1.82
			7-15-74	1.84	7-13-78	1.26
			7-31-74	1.45	8-14-78	1.15
			8-27-74	1.31	9-15-78	1.34
			10-16-74	1.36	10-16-78	1.21
			2-17-78	3.02	11-14-78	1.38
			3-15-78	3.13	13-18-78	1.60
			4-17-78	3.36	1-18-78	1.59
18	Henderson Bay tributary	1.55 (1.54)	8-29-47	.39	8-21-58	.02
19	Purdy Creek at Pierce-Kitsap County line	2.52 (0.00)	4-17-78	3.65	1-18-79	1.80
			10-16-78	1.09		
20	Purdy Creek	3.18 (0.40)	1-24-29	e4.5		

TABLE 10.--Discharge measurements at miscellaneous sites--Continued

Site number	Station name	Drainage area[1] (mi²)	Date	Discharge (ft³/s)	Date	Discharge (ft³/s)
21	Purdy Creek at Purdy	3.44 (0.66)	8- 4-47	1.78	2- 5-64	8.79
			8-14-47	1.66	2-28-64	5.10
			8-28-47	1.44	4-13-64	4.54
			9-19-47	1.97	5-18-64	2.85
			7- 1-58	2.56	6-22-64	2.69
			7-17-58	1.94	2-17-78	7.23
			7-28-58	1.83	3-15-78	5.40
			8-11-58	2.51	4-17-78	7.29
			8-29-58	2.48	5-15-78	8.67
			6-19-59	2.52	6-15-78	3.42
			7- 8-59	2.49	7-13-78	2.16
			7-17-59	2.23	8-14-78	1.86
			7-31-59	1.75	9-15-78	2.54
			8-17-59	1.76	10-16-78	2.28
			10-15-63	2.45	11-14-78	2.64
			11-21-63	7.88	12-18-78	4.36
			12-31-63	8.14	1-18-79	3.50
			1-17-64	33.8		
22	Minter Creek at Pierce-Kitsap County line	4.56 (0.17)	7-13-78	3.80		
23	Minter Creek	5.67 (0.97)	7-11-47	6.65	6-19-59	8.18
			7-30-47	5.84	7- 8-59	7.86
			8-13-47	5.90	7-17-59	7.06
			8-29-47	5.76	7-31-59	6.03
			9-19-47	6.42	8-14-59	6.28
			10- 3-47	10.0	9-15-66	5.53
			10-24-52	6.48	9- 8-68	6.89
			7- 1-58	6.52	8-12-69	7.03
			7-17-58	5.30	5- 7-70	10.1
			8-11-58	6.25	8-13-70	6.43
			8-29-58	6.31	5-12-71	11.8
24	Huge Creek at Pierce-Kitsap County line	5.73 (0.05)	4-17-78	6.70	10-17-78	2.45
			7-13-78	3.68		
25	Huge Creek near Wauna	6.47 (0.68)	8-29-73	4.10		
26	Minter Creek tributary	2.34 (1.95)	8-29-47	0	8-14-59	.02
			8-11-58	0		

TABLE 10.--Discharge measurements at miscellaneous sites--Continued

Site number	Station name	Drainage area[1] (mi^2)	Date	Discharge (ft^3/s)	Date	Discharge (ft^3/s)
27	Minter Creek above diversion to State Fish Hatchery	15.0 (4.12)	10-24-52 7-15-74 7-31-74	18.4 26.0 22.7	8-27-74 10-16-74	21.2 14.7
28	Minter Creek below diversion to State Fish Hatchery	15.6 (4.67)	10-24-52	9.80		

e = estimated

[1]For sites with two areas listed, the value in parentheses indicates the number of square miles of the drainage basin which are in the project area.

TABLE 11.--Records of selected wells and springs

Use of water: A, air conditioning; C, commercial; H, domestic; I, irrigation; N, industrial; P, public supply; R, recreation; S, stock; T, institution; U, unused.

Water level: below land surface unless accompanied by a +, which indicates above land surface; F, flowing; R, recently pumped.

Finish: F, perforated and gravel-packed; O, open end; P, perforated; S, screened; W, walled.

Discharge: F, flowing.

Other data available: LG, G indicates driller's log is on file; CK, C indicates well has been field checked; U, indicates unchecked.

Water-bearing unit: Qvr, recessional outwash; Qvt, till of Vashon Drift; Qc, Colvos Sand Member of Vashon Drift; Qk, Kitsap Formation; Qss, Salmon Springs(?) Drift; Qpu, pre-Salmon Springs(?) deposits.

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)		ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)	
20N/01E-01C01	FOX ISLAND, WATER-8	P	148.00	--		50	144	S	15	
20N/01E-01G01	MCAFFEE	U	93.00	71.00		116	--	--	9.0	
20N/01E-01K01	FOX ISLAND, WATER-4	P	181.00	129.00		210	170	S	38	
20N/01E-01K02	FOX ISLAND, WATER	P	189.00	139.00		210	179	S	35	
20N/01E-01K03	FOX ISLAND, WATER	P	182.00	144.70	R	210	178	S	20	
20N/01E-01Q01	NEIMAN, GARY	U	318.00	254.00		319	304	S	33	
20N/01E-01R01	WOODRUFF, ROBERT C	--	195.00	145.00		150	--	--	12	
20N/01E-02A01	FOX ISLAND, WATER-6	P	132.00	116.00		119	--	--	4.0	
20N/01E-02A02	SMITH, PAUL	H	116.80	74.00		80	113	S	20	
20N/01E-02C01	RAY, DIXY LEE	H	128.75	85.00		90	126	S	30	
20N/01E-02C01S	U.S.NAVY	U	--	--		70	--	--	8.6	F
20N/01E-02K01	MADSEN, M S	H	99.00	17.00		20	90	S	35	
20N/01E-02K02	LOBEDA, KEN	H	133.00	55.00		90	128	S	40	
20N/01E-02R01	YANITY, ALLEN	H	100.50	81.00		320	96	S	6.0	
20N/01E-12C01	ODGEN, ERVING	H	103.00	88.00		310	--	O	[illegible].0	
20N/01E-12D01	ANDERSON, ROGER E	H	298.00	--		320	--	S	20	
20N/01E-12J01	PETERSON, KARL	H	323.00	290.00		305	318	S	10	
20N/01E-13A01	FLEMING, GEORGE	H	78.00	35.00		280	73	S	40	
20N/02E-05D01	BOWLES, GLEN	H	50.00	--		23	--	--	--	
20N/02E-05D02	SUNNYVIEW, TERRACE	P	224.50	170.00		180	221	S	25	
20N/02E-05D03	MILLER	H	68.50	40.00		40	--	--	20	
20N/02E-05D04	DENNISON, LEWIS	H	69.00	17.00		20	64	S	40	
20N/02E-05D05	BERGQUIST, WILLIAM	H	65.00	31.00		40	60	S	10	
20N/02E-06A01	JACKSON	--	83.00	35.00		40	--	--	20	
20N/02E-06N01	FOX ISLAND, WATER-1	P	119.00	70.00		75	--	O	65	
20N/02E-07B01	DAHL, H E	H	113.00	29.00		35	--	--	16	
20N/02E-07B02	SCHWENGER	H	60.00	35.00		35	--	--	20	
20N/02E-07D01	CLEMENT	H	129.00	65.00		70	--	--	20	
20N/02E-07F01	FOX ISLAND, WATER-5	P	152.00	79.00		100	142	S	85	
20N/02E-07F02	MCLEOD	H	42.50	15.00		20	--	--	14	
20N/02E-07F03	TIMMEL, R	H	123.00	52.00		55	--	--	15	
20N/02E-07J01	BROWNE, FRANCIS	H	88.00	55.00		60	--	S	35	
20N/02E-07J02	ROBERTS, J S	H	78.00	37.00		50	--	P	45	
20N/02E-07Q01	BENTLEY, GEORGE	P	200.00	144.00		150	185	S	60	
20N/02E-07R01	HARTMAN, H G	H	86.00	65.00		70	--	--	16	
20N/02E-07R02	LISTER, W HAROLD	H	101.00	56.00		60	--	O	30	
20N/02E-07R03	CHAPMAN, JAMES R	H	87.00	52.00		55	--	O	20	
20N/02E-18A01	CALLENTINE	H	86.00	62.00		65	82	S	30	
20N/02E-18A02	REYNOLDS, VIDA E	H	62.00	49.00		60	--	O	10	
20N/02E-18B03	BENTLEY, GEORGE	H	208.00	--		190	204	S	4.0	
20N/02E-18E01	GRAYBEAL	H	266.00	228.00		240	261	S	10	
20N/02E-18E02	HOLTE, E J	P	325.00	262.00		270	311	S	175	
20N/02E-18L01	WAGSTAFF, JOE	H	239.00	172.00		195	234	S	18	
21N/01E-01C01	PENINSULA PRK, MOBILE HMS	P	84.50	26.00		340	75	S	50	
21N/01E-01F01	ROBBINS CONST.	H	80.00	43.00		335	75	S	12	
21N/01E-01F02	ROBBINS CONST.	U	213.00	--		335	--	O	17	
21N/01E-01K01	JOHNSON, ROBERT	H	69.00	40.00		300	64	S	12	
21N/01E-01L01	BALLES, RICHARD W	H	86.00	29.00		337	82	S	30	
21N/01E-01L02	COSSINS, DAN	H	121.00	--		338	--	--	20	
21N/01E-01N02	VELES, ALBERT	H	55.00	35.00		305	50	S	10	
21N/01E-01N03	BESTER, CAM	H	46.00	23.00		300	43	S	7.5	
21N/01E-01N04	KNUTSON, DENNY	H	98.00	74.00		305	94	S	10	
21N/01E-01P01	CANTRELL, CHARLES	H	93.00	57.00		395	89	S	15	
21N/01E-01Q01	HALL, ROBERT D	H	85.00	56.00		280	80	S	10	
21N/01E-01R01	BECKSTEAD, CLIFF	H	192.00	157.00		290	--	O	20	
21N/01E-01R02	LEWIS, RONALD	H	90.50	66.00		310	86	S	10	
21N/01E-02A02	HODDER, LYNN	H	93.00	50.00		200	88	S	20	
21N/01E-02B01	GILLMER, WARREN G	H	98.00	7.00+		100	94	S	60	
21N/01E-02B02	HOWE, AL	H	56.00	14.00		140	53	S	35	
21N/01E-02B03	WILLIAMSON, TED	H	72.00	16.00		130	68	--	20	
21N/01E-02C01	ANDERSON, A S	H	20.00	4.00		60	--	--	--	
21N/01E-02C02	REED, CHUCK	H	51.00	21.00		60	46	S	30	
21N/01E-02D01	ZIEGLER, W. G	H	68.00	42.00		70	--	--	--	
21N/01E-02D02	WALBURN, R. K	H	123.00	41.00		60	120	S	40	
21N/01E-02D03	BEAL	H	88.00	29.00		60	83	S	7.0	
21N/01E-02D04	SQUELCH, RUSSELL	H	191.00	55.00		90	186	S	10	
21N/01E-02E01	MILLER, ERNEST	H	126.50	3.00		20	121	S	20	
21N/01E-02F01	RODNEY ET. AL.	U	285.00	68.00		75	--	O	40	
21N/01E-02G01	NG, MILTON	H,I	100.00	46.00		118	95	S	30	
21N/01E-02G02	KEMP, JACK	H	88.00	5.00		110	83	S	20	
21N/01E-02H01	JACOBS, FRITZ	H	141.00	117.00		200	--	O	15	
21N/01E-02H02	FRISTAD&MITTON	H	117.00	56.00		200	107	S	40	
21N/01E-02K01	WASHBURN	H	145.00	104.00		200	142	S	20	
21N/01E-02K02	TUELL, TOM	H	126.50	99.00		200	122	S	20	
21N/01E-02L01	GARDNER, W M	H	12.00	5.00		80	--	--	--	
21N/01E-02L03	COLE, M D	H	135.00	15.00		85	132	--	15	
21N/01E-02M01	BOEHM, CLARENCE	H	67.00	10.00		100	64	P	20	
21N/01E-02N01	ROSEDALE COMMUN, CENTER	P	217.00	54.00		64	210	S	60	
21N/01E-02P01	COFFINS, C. W	H	106.75	17.00		65	--	O	15	
21N/01E-02P01S	--	S	--	--		80	--	--	40	F

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
0.8	--		C	P	--
1.1	--	G	C	S	--
7.5	8.0	G	C	S	DRILLED TO 185 FT.
8.8	8.0	G	C	S	--
2.0	3.0	G	C	S	DRILLED TO 192 FT.
4.1	1.0	G	C	S	DRILLED TO 320 FT. PLANNED USE 24 UNIT CONDOMINIUM.
12.0	--		U	P	DRILLED TO 201 FT. PARTIAL DRILLER'S LOG ON FILE.
--	--		C	S	--
2.9	4.0	G	C	S	DRILLED TO 118 FT
1.3	1.0	G	C	S	--
--	--		C	C	--
2.1	8.0	G	C	S	PLANNED USE: 10 HOMES SPECIFIC CAPACITIES: 1.5 AND 10.0 (GAL/MIN)/FT AT 76 and 90 FT, RESPECTIVELY.
1.6	1.0	G	U	S	--
0.7	1.5	G	U	C	--
2.4	1.0	G	U	S	--
0.2	1.0	G	U	K	--
0.7	1.0	G	U	S	--
3.1	1.0	G	U	C	--
--	--		C	P	--
2.1	2.0	G	C	P	--
4.0	--	G	C	P	--
5.7	--	G	C	P	DRILLED TO 57 FT (1953), SPECIFIC CAPACITY 1(GAL/MIN)/FT. DEEPENED (1966).
0.5	1.0	G	U	P	--
4.0	--	G	U	P	--
2.7	2.0	G	C	S	--
4.0	1.0	G	U	S	--
4.0	--	G	C	S	--
0.9	--	G	U	S	DEEPENED EXISTING 20 FT DUG WELL IN 1958.
2.1	3.5	G	C	S	DRILLED TO 154 FT.
0.9	--	G	U	S	DEEPENED EXISTING 12 FT DUG WELL IN 1958.
0.9	0.5	G	U	S	--
--	--	G	U	S	--
11.3	4.0	G	U	S	--
3.8	2.0	G	U	S	--
2.7	--	G	U	S	--
6.0	2.0	G	C	S	--
1.5	1.0	G	U	S	--
30.0	4.0	G	C	S	DRILLED TO 188 FT.
10.0	1.0	G	C	S	--
4.0	3.0	G	U	S	--
0.8	3.0	G	C	S	--
8.3	3.0	G	U	S	--
1.8	1.0	G	U	S	--
--	1.0	G	U	C	--
0.4	1.0	G	U	C	--
2.1	1.0	G	U	S	--
0.6	2.0	G	U	C	--
0.8	2.0	G	C	C	--
--	--	G	C	C	--
2.5	1.0	G	U	C	--
0.7	1.0	G	U	C	--
1.7	1.0	G	U	C	--
1.4	1.0	G	C	C	--
0.8	1.0	G	U	C	--
1.7	1.0	G	U	S	--
1.1	2.0	G	U	C	--
1.3	3.0	G	U	S	--
2.5	1.0	G	U	S	--
1.9	1.0	G	U	S	--
1.5	4.0	G	C	S	DRILLED TO 37 FT (MAY 1972). DEEPENED (OCTOBER 1972).
--	--		C	S	--
15.0	1.0	G	U	S	--
--	--		C	S	--
0.6	2.0	G	U	P	--
0.1	1.0	G	U	P	--
0.2	4.0	G	U	P	--
0.4	--	G	U	P	AT 97 FT, WATER LEVEL WAS 12 FT. DRILLED IN 1963, ACID TREATED IN 1965.
1.0	--	G	U	P	--
0.6	--	G	U	S	SPECIFIC CAPACITIES, 0.9 AND 0.8 (GAL/MIN)/FT AT 10 AND 20 GAL/MIN, RESPECTIVELY.
1.3	4.0	G	U	S	--
3.8	1.0	G	U	S	--
1.5	3.0	G	U	S	DRILLED TO 112 FT (MARCH 1979); WATER LEVEL WAS 55 FT, SPECIFIC CAP. 1.5 (GAL/MIN)/FT. DEEPENED (AUG 1979).
1.0	1.0	G	U	S	--
20.0	2.0	G	U	S	--
--	--		C	S	--
0.2	2.0	G	C	P	DRILLED TO 91 FT (FEB 1974); WATER LEVEL WAS 15 FT, SPECIFIC CAP. WAS 0.4 (GAL/MIN)/FT. DEEPENED (APRIL 1974).
10.0	2.0	G	U	S	--
4.0	--	G	C	P	--
1.4	1.0	G	U	P	--
--	--		C	S	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
21N/01E-02Q01	CALDWELL, AUDLEY F	--	122.00	62.00	210	--	--	40
21N/01E-02Q02	GOEMMER, JAMES H	H,I	76.00	30.00	170	--	0	20
21N/01E-02Q03	GILMORE, B. W	H	86.00	52.00	170	--	0	10
21N/01E-02Q04	STORRAR, BOB	H	148.00	98.00	220	143	S	8.0
21N/01E-03A01	GRIFFITH, H E	H	11.00	1.00	60	--	--	--
21N/01E-03A02	REED	H	139.00	54.00	65	135	S	15
21N/01E-03A03	ANDERSON, JOHN	H	140.00	70.00	70	135	S	30
21N/01E-03D01	YATES	H	75.00	20.00	22	75	W	--
21N/01E-03D02	HARRISON, BARBARA	H	82.00	17.00	20	77	S	15
21N/01E-03F01	JARDENE	H	73.00	42.00	45	75	P	8.0
21N/01E-03F02	HARRISON, BARBARA	H	149.00	72.00	75	144	S	40
21N/01E-03F03	SPROUL	H	118.00	34.00	50	113	S	40
21N/01E-03G01	PHILLIPS, JOHN W	H	56.00	12.00	35	--	--	30
21N/01E-03G02	SETTLE, RICHARD	H	81.50	20.00	30	--	0	15
21N/01E-03H01	PRICE, CLARENCE	H	28.00	8.60	20	--	--	--
21N/01E-03H02	RACE, ELIZABETH	H	76.00	47.00	65	--	0	10
21N/01E-03J01	PALWORTH, BRUCE	H	--	7.11	10	--	--	--
21N/01E-03J02	CHAM, ELLERY	H	67.00	14.00	20	--	P	20
21N/01E-03J03	MCCORMICK, MARSHAL	H	70.00	--	20	--	0	--
21N/01E-03J04	EVANS, ROBERT	H	79.00	4.00	26	--	0	30
21N/01E-03J05	HAMAN, FRED	H	92.00	7.00	15	88	S	60
21N/01E-03J06	LARSEN, JOHN S	H	75.00	15.00	25	71	S	32
21N/01E-03J07	GRADNER, PHIL	H	90.00	0.00	15	85	S	16
21N/01E-03J08	NOLTE	H	90.00	0.00	15	85	S	10
21N/01E-03J09	HERTZBERG, FRED	H	90.40	0.50*	15	85	S	12
21N/01E-03K01	GROTH, G.	H	93.00	--	10	--	--	--
21N/01E-03K02	METZKER, C T	H	100.00	15.00	20	--	P	15
21N/01E-03K03	FLEMING, BILL	H	87.00	20.00	20	85	S	10
21N/01E-03K04	SCHNEIDER, PAUL D	H	79.00	25.00	25	74	S	40
21N/01E-03R01	ABEL, E H	H	22.00	5.00	30	--	--	--
21N/01E-03R02	ROSEDALE CHURCH	H	88.00	--	30	--	P	--
21N/01E-03R03	MCCABE, HARVEY	H	125.00	17.00	23	--	--	--
21N/01E-03R04	HILL, W. C	H	76.00	2.00	20	--	0	22
21N/01E-03R05	GAFFNEY, THEO. B	H	101.00	27.00	30	97	S	10
21N/01E-05D01	COLLINS	H	75.00	--	25	--	--	--
21N/01E-05D02	CASE, WILLIAM	H	86.00	--	25	--	0	--
21N/01E-09J01	HOGAN, CHARLES	H	100.00	--	15	--	--	--
21N/01E-09R01	WOODWORTH, H. S	H	79.00	--	15	--	--	--
21N/01E-09R02	RUSH, BILL	H	229.00	34.00	40	224	S	45
21N/01E-09R03	MCALEXANDER, ROBERT	H	177.00	52.00	75	172	S	25
21N/01E-10A01	RAUGHT, A. L	H	164.00	--	20	--	--	--
21N/01E-10A02	GARNETT, W. R	H	90.00	30.00	35	--	P	-
21N/01E-10A03	ROLLE-, J. J	H	--	--	23	--	--	--
21N/01E-10A04	SCORNAIENCHI, AL	H	241.00	5.00	15	237	S	20
21N/01E-10A05	THROCKMORTON	H	104.00	20.00	25	--	--	--
21N/01E-10A06	THOMPSON, R. L	H	258.00	27.00	30	255	S	20
21N/01E-10A07	MEACHAM, PATRICIA D	H	124.00	2.00	5	120	S	40
21N/01E-10B01	CYO-CAMP BENCHT	H	190.00	100.00	105	--	0	--
21N/01E-10C01	RAFT ISLAND DEV	P	307.00	154.00	155	302	S	[illegible]
21N/01E-10C02	PARISH, MERRILL	H	268.00	154.00	155	259	S	[illegible]
21N/01E-10F01	MORSE, DAN	H	--	--	45	--	--	--
21N/01E-10F02	WALDRON, DR.F. [illegible]	H	85.00	20.00	25	81	S	13
21N/01E-10G01	WHEELER, G.	H	100.00	8.84	20	--	--	--
21N/01E-10G02	RYLE, GENE	H	118.00	18.00	30	--	0	20
21N/01E-10H01	LAMBING, J.	H	--	--	20	--	--	--
21N/01E-10H02	NELSON, R W	H	76.00	11.21	20	--	--	15
21N/01E-10H03	DAY, ROLAND, JR.	H	65.00	--	18	--	--	--
21N/01E-10H04	MCGUIRE, D P	H	68.00	4.00	10	--	0	30
21N/01E-10H05	BLAZEVICH, A. V	H	89.00	--	20	--	--	--
21N/01E-10H06	PEARSON, RALPH	H	104.50	0.00	5	101	S	10
21N/01E-10H07	BEVIS, CHARLES M	H	161.00	34.00	40	--	0	20
21N/01E-10H08	ENACHS, JAMES N	H	65.00	18.00	20	62	P	20
21N/01E-10J01	LARSEN, CECIL K	H	66.00	35.00	40	--	0	15
21N/01E-10J03	THOMPSON, WILLIAM F	H	59.00	22.00	35	--	--	15
21N/01E-10J04	KNOLL&HARKNESS	H	278.00	50.00	60	--	0	30
21N/01E-10J05	FUCHS, PATRICK	H	91.00	38.00	45	86	S	20
21N/01E-10K01	TAYLOR, J E	H	330.00	38.00	59	--	--	--
21N/01E-10K02	SIMPSON, G. C	-	75.00	--	30	--	--	--
21N/01E-10K03	NYSEN, JULES C	H	68.00	26.00	35	--	--	[illegible]
21N/01E-10K04	SAVENETTI, NICK	H	104.00	41.00	60	99	S	10
21N/01E-10K05	WALLACE, DONALD E	H	131.00	75.00	100	127	S	15
21N/01E-10K06	HATT, GARY L	H	197.00	130.00	140	192	S	10
21N/01E-10M01	ROEDER, O. A	H	40.00	--	30	--	--	--
21N/01E-10M02	TOWNE, GERRY	H	90.00	41.00	50	55	S	12
21N/01E-10R01	POGREBA, N O	H	64.00	35.00	60	62	S	15
21N/01E-10R02	LAIRD, BRIAN	H	72.00	44.00	120	67	S	20
21N/01E-11A01	DOTSON, BILL	H	52.66	18.00	285	48	S	10
21N/01E-11A02	MCCALLY	H	117.50	75.00	280	113	S	20
21N/01E-11A03	SCOTT	H	105.00	75.00	270	100	S	15
21N/01E-11B01	CLARK, CHARLES	H	163.00	60.00	270	--	0	18

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
2.7	--	G	U	S	--
1.7	1.0	G	U	S	--
0.5	1.0	G	U	S	--
0.3	1.0	G	U	S	--
--	--		C	T	--
0.2	2.0	G	C	P	--
1.3	4.0	G	C	P	--
--	--		C	P	--
0.6	1.0	G	U	P	--
0.5	--	G	C	P	DRILLED THROUGH EXISTING 34 FT WELL IN 1953.
1.0	1.0	G	U	P	--
0.6	5.5	G	U	P	--
1.6	3.0	G	C	P	--
0.8	4.0	G	U	P	--
--	--		C	P	--
0.7	1.0	G	U	P	--
--	--		C	P	--
0.7	--		C	P	--
--	--		C	P	--
3.0	1.0	G	C	P	--
2.4	2.0	G	U	P	--
2.0	5.0	G	C	P	--
1.0	3.0	G	U	P	--
0.3	4.0	G	U	P	--
0.7	4.0	G	U	P	--
--	--		C	P	--
0.3	--		C	P	--
0.2	1.0	G	U	P	--
1.6	1.0	G	U	P	DRILLED TO 83 FT.
--	--	G	C	P	--
--	--		C	P	--
--	--		C	P	--
1.1	1.0	G	U	P	DRILLED TO 90 FT THROUGH EXISTING 13 FT WELL IN 1956.
0.5	3.0	G	U	P	--
--	--		C	P	--
--	--		C	P	--
--	--		C	P	--
--	--		C	P	--
1.0	2.0	G	C	P	--
0.3	1.0	G	U	P	--
--	--		C	P	--
--	--		C	P	--
--	--		C	P	--
0.2	3.0	G	U	P	--
--	--		C	P	--
0.2	1.0	G		P	--
0.6	3.0		[illegible]	P	--
--	--	[illegible]		P	--
3.5	--	G	[illegible]	P	--
3.5	5.0	G	C	P	AT 35 GAL/MIN. FOR 5 HOURS, SPECIFIC CAPACITY WAS 3.5 (GAL/MIN)/FT.
--	--		C	P	--
0.5	2.0	G	[illegible]	P	--
--	--		C	P	--
[illegible]	1.0	G	U	P	--
--	--		C	P	--
--	--		C	P	--
--	--		[illegible]	P	--
3.	--		U	P	--
--	--		C	P	--
	2.0	G	[illegible]	P	--
0.[illegible]	2.0	G	U	P	[illegible]
0.9	2.0	G	U	P	--
1.5	2.0	G	U	P	--
0.5	2.0	G	C	P	DRILLED TO 77
1.1	1.0	G	U	P	--
0.8	1.0	G	U	P	--
--	--		C	P	--
--	--		C	P	--
1.[illegible]	2.0	G	U	P	--
0.2	2.0	G	U	P	--
0.4	1.0	G	U	P	--
0.3	2.0	G	U	P	--
--	--		C	P	--
0.3	1.0	G	U	P	--
1.5	3.0	G	U	S	--
1.[illegible]	1.0	G	U	S	--
0.	1.0	G	C	C	--
1.0	1.0	G	C	C	--
1.0	2.0	G	[illegible]	C	--
0.9	1.0	G	U	C	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)		ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)	
21N/01E-11D01	SPADONI BROS	P	46.00		F	60	--	S	75	
21N/01E-11G01	HASH, ROBERT E	H	50.00	17.00		130	--	O	14	
21N/01E-11H01	SMALLING, DOROTHY E	H	194.00	163.00		300	189	S	35	
21N/[illegible]-11L01	MCMACKINS, FRANCES	H	130.00	78.00		140	125	S	40	
21N/01E-11N01	SCHULDT	H	270.00	148.00		160	--	S	12	
21N/01E-11N04	POST, WILLIAM	H	215.00	170.00		205	210	S	15	
21N/01E-11P02	JOHNSON, EVERETT	H	46.00	22.00		105	--	O	15	
21N/01E-11Q01	LYLE, DONALD,JR.	H	177.50	149.00		230	175	S	30	
21N/01E-11R01	HARBOR WATER CO, ROSEMOUNT	P	200.00	128.00		220	181	S	159	
21N/01E-11R02	WYCOFF, JANE	H	128.00	85.00		201	123	S	6.0	
21N/01E-12A01	HERBER, EDWARD	H	80.00	--		312	--	--	--	
21N/01E-12A02	HIFIC GROUP E	P	210.00	185.00		290	195	S	68	
21N/01E-12B01	KJELLESVIK, LEONARD	H	157.00	124.00		278	154	S	20	
21N/01E-12D01	SQUANCE	U	37.00	25.00		300	--	--	--	
21N/01E-12D02	SQUANCE, ELIZABETH	H	71.00	40.00		305	65	S	20	
21N/01E-12D03	PEN WEST DEVELP	P	258.00	197.00		320	244	S	80	
21N/01E-12G01	EVANS, KENNETH	H	44.00	16.00		270	39	S	19	
21N/01E-12G02	PRINCE, DELBERT	H	167.00	115.00		260	162	S	22	
21N/01E-12G03	FOX, JAY	H	50.00	18.00		250	40	S	10	
21N/01E-12H01	UDDENBERG INC.	P	192.00	125.00		270	183	S	80	
21N/01E-12J01	COLLIER, ROBERT	H	171.00	107.00		265	167	S	40	
21N/01E-12J02	DOVE, FRED R	H	60.00	24.00		270	55	S	10	
21N/01E-12P01	TERRY	H	134.00	67.00		205	--	S	25	
21N/01E-12Q01	PACKARD, GREG A	H	140.00	90.00		240	135	S	20	
21N/01E-12Q02	HARRISON &, SANDERS	H	[illegible]	76.00		240	130	S	30	
21N/01E-12R01	HALE, RALPH	H	62.00	34.00		160	54	P	20	
21N/01E-12R02	HARBOR WATER CO, HUNTWICK	P	139.00	69.00		180	[illegible]	S	22	
21N/01E-13B01	WILLIAMSON, ALBERT B	H	157.00	72.00		195	--	O	20	
21N/01E-13D01	ARNOLD, A H	H	165.00	135.00		190	--	--	--	
21N/01E-13K01	FARMER, PHILIP	H	221.50	198.00		250	217	S	7.5	
21N/01E-13K02	CLARK, DUANE	H	203.00	182.00		240	--	O	20	
21N/01E-13N01	ARTONDALE GOLF, & COUNTRY	H	53.80	15.00		75	--	O	20	
21N/01E-13Q02	ROGERS	H	127.17	103.00		180	--	--	10	
21N/01E-13R01	CRABTREE, RICHARD E	H	97.00	76.00		140	--	--	15	
21N/01E-13R02	NELSON, B D	H	64.67	16.00		70	--	--	15	
21N/01E-13R03	TARBET, RICHARD	H	123.00	100.00		160	--	O	15	
21N/01E-14C01	BRAND, GARY	H	89.50	73.50		130	87	S	9.0	
21N/01E-14C03	SWINNEY, RICHARD L	H	108.00	84.00		140	104	S	10	
21N/01E-14C04	MALIK, LENA B	H	113.00	12.00		100	109	S	20	
21N/01E-14F02	BACKHOFF, BERNARD	H	173.00	128.00		180	--	O	30	
21N/01E-14F03	SDRAN CONSTRUCT	P	205.00	180.00		240	200	S	25	
21N/01E-14K01	NEBEKER, WALTER	H	90.00	67.00		110	--	O	13	
21N/01E-14L01	WHITBECK	H	194.00	175.00		220	193	S	5.0	
21N/01E-14L02	CRAWFORD, BOBBY D	H	138.00	121.00		170	--	O	10	
21N/01E-14N01	COLEMAN, DENNIS	H	78.00	41.00		265	73	S	7.5	
21N/01E-14Q01	HOWELL, J H	H	8.00	1.00		100	--	--	--	
21N/01E-14Q02	DAVENPORT, DENNIS	H	49.00	8.00		90	44	S	16	
21N/01E-14Q03	WALKER, KEN	H	33.00	10.00		60	--	O	15	
21N/01E-14R01	ESTEP, DEAN	H	116.00	92.00		130	111	S	12	
21N/01E-14R02	CHIPMAN, MEL	H	72.00	57.00		90	67	S	7.0	
21N/01E-15B01	BUTLER, EDWIN W	H	63.00	24.00		45	--	O	30	
21N/01E-15B02	SEHMEL, HERMAN	H	65.00	20.00		62	--	O	30	
21N/01E-15D01S	--	U	--	--		180	--	--	25	F
21N/01E-15E01	HARBOR WATER CO, KOPACHUCK	P	351.00	256.00		280	348	S	32	
21N/01E-15F01	RAPP, RICHARD	H	88.00	41.00		105	--	O	15	
21N/01E-15J01	TALBERT, JOHN	H	215.00	170.00		210	--	O	15	
21N/01E-15K01	PETERSON, HANS	H	154.00	104.00		140	143	S	40	
21N/01E-15M01	BUTLER'S, HAI YATCH	P	381.00	--		316	--	--	--	
21N/01E-15P01	SOVEREIGN, JUNIOR W	H	57.00	12.00		110	52	S	15	
21N/01E-15Q01	PETERSON, HANS	H	8.00	2.00		150	--	--	--	
21N/01E-15Q02	SCHAFER, DEAN W	H	102.00	68.00		110	98	S	15	
21N/01E-16A01S	--	U	--	--		150	--	--	150	F
21N/01E-16B01	OLSEN	H	142.00	52.00		60	138	S	30	
21N/01E-16B02	PURDY REALTY	H	139.00	60.00		70	134	S	30	
21N/01E-16F01	KOPACHUCK PARK	P	131.00	91.00		110	--	O	110	
21N/01E-16L01	LARSEN, E	H	126.00	86.00		100	--	--	10	
21N/01E-16Q01	BUSCH, WILLIAM	H	60.00		F	20	--	--	--	
21N/01E-16Q02	BUSCH, WILLIAM	H	66.00		F	20	57	S	60	
21N/01E-21A01	COLEMAN CAMP	P	45.00	31.00		100	--	--	--	
21N/01E-21B01	FARQUHAR, ROBERT	H	58.00		F	20	55	S	20	
21N/01E-21B02	BELFOY, DEL	--	57.00		F	20	--	O	16	
21N/01E-21H01	HORSEHEAD WATER	P	95.00	38.00		60	86	S	60	
21N/01E-21H02	MCKINLEY, L.	H	105.50	23.00		50	101	S	30	
21N/01E-21K02	GORDON, C. D	H	90.00	--		19	--	--	--	
21N/01E-21K03	DAVIS, LES	H	82.00	19.00		30	78	S	38	
21N/01E-21K04	CARBONE, JOHN R	H	84.00	29.00		40	--	O	15	
21N/01E-21L01	FOREST BEACH-1	P	157.00	39.54		50	--	O	--	
21N/01E-21M01	FOREST BEACH	P	75.00	--		50	--	--	--	
21N/01E-21M03	FOREST BEACH-2	P	168.00	--		93	--	S	--	
21N/01E-21P01	LARSEN, C W	H	52.00	--		15	45	S	--	

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CH	AQUIFER	REMARKS
4.4	3.0	G	U	S	--
1.5	1.0	G		S	--
35.0	--	G	[illegible]	S	--
4.4	--	G	[illegible]	F	--
0.1	1.5	G	U	P	--
0.7	5.0	G	C	F	--
3.0	3.0	G	C	S	--
15.0	4.0	G	C	S	--
4.0	4.0	G	C	S	AT 70 GAL/MIN. FOR 1 HOUR. SPECIFIC CAPACITY WAS 4.7 (GAL/MIN)/FT.
0.2	4.0	G	U	S	--
--	--		C	C	--
1.5	4.0	G	U	S	--
20.0	--	G	U	S	--
--	--		C	C	DRY IN APRIL-MAY 1977, REPLACED BY WELL 21/1-12D2 RECOVERED PRIOR TO MARCH 1978.
2.0	1.0	G	C	C	--
3.2	4.0	G	C	S	AT 30 GAL/MIN. FOR 1 HOUR, SPECIFIC CAPACITY WAS 8.6 (GAL/MIN)/FT.
2.1	2.0	G	C	C	--
22.0	4.0	G	C	S	--
1.0	2.0	G	U	[illegible]	--
16.0	--	G	U	S	--
2.0	1.0	G	U	S	--
0.7	3.0	G	U	C	--
1.0	1.0	G	U	S	--
2.0	1.0	G	[illegible]	S	DRILLED TO 143 FT.
3.0	1.0	G	U	S	--
0.6	1.0	G	C	S	--
5.8	4.0	G	U	S	AT 80 AND 156 GAL/MIN. FOR 1 AND [illegible] HOURS, RESPECTIVELY, SPECIFIC CA[illegible] WERE [illegible] AND [illegible] (GAL/MIN)/FT, RESPECTIVELY.
0.8	--	G	C	S	DRILLED TO 158 FT.
--	--		U	S	--
0.[illegible]	2.[illegible]	G	C	S	--
20.0	1.0	G	U	S	--
0.6	2.0	G	C	S	--
[illegible].7	1.5	G	C	S	--
7.5	1.0		C	[illegible]	--
0.6	1.5	G	U	S	--
7.5	1.0	[illegible]	U	S	--
2.[illegible]	3.0		U	S	--
1.7	1.0	G	U	S	--
0.3	1.0	G	C	[illegible]	ATTEMPTED DEVELOPMENT AT 44-48 FT; UNSUCCESSFUL.
1.8	1.[illegible]	G	U	S	--
7.[illegible]	1.0	G	U	S	--
2.2	1.0	G	[illegible]	S	--
0.5	2.5	G	C	S	DRILLED TO 195 FT.
5.0	1.0	G	[illegible]	S	--
0.[illegible]	6.0	G	C	C	DRILLED TO 80 FT.
--	--		C	R	--
0.7	1.0	G	U	S	--
15.0	3.0	G	U	S	--
1.2	2.0	G	U	S	--
0.7	1.0	G	U	S	--
6.0	1.0	G	C	S	--
2.0	2.0	G	U	S	AT 15 GAL/MIN, FOR 2 HOURS, SPECIFIC CAPACITY WAS 3.8 (GAL/MIN)/FT.
--	--		C	[illegible]	--
0.6	0.7	G	C	E	AT 20 GAL/MIN, FOR 2 HOURS, SPECIFIC CAPACITY WAS 0.[illegible] (GAL/MIN)/FT.
1.1	1.0	G	C	S	--
3.0	1.0	G	C	[illegible]	--
6.7	1.0	G	U	S	DRILLED TO 158 FT.
--	--	G	U	P	--
1.3	4.0		C	[illegible]	DRILLED TO 60 FT.
--	--		C	T	--
3.0	1.0	G	U	S	--
--	--		C	C	FORMERLY USED FOR PUBLIC SUPPLY?
4.3	1.0	G	C	S	--
10.0	1.0		C	S	--
5.2	4.0	G	C	S	CASING PERFORATED FROM 100 TO 130 FT?
--	--	G	C	S	--
--	--		C	S	--
1.5	4.0	G	U	S	--
--	--		C	C	--
0.5	2.0	G	C	S	--
0.4	--	G	U	S	--
3.3	2.0	G	U	S	--
0.8	3.0	G	U	S	--
--	--		C	S	--
0.9	2.5	G	C	S	--
0.7	2.0	G	U	S	--
--	--	G	C	F	--
--	--		C	S	--
--	--		C	S	--
--	--		C	S	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
21N/01E-21P02	GRAFF, GORDON	--	63.00	34.00	45	--	--	20
21N/01E-21Q01	DRISKELLS, J. M	H,I	60.00	16.00	35	--	O	40
21N/01E-21Q02	DAMIERER, F	H	92.00	--	40	92	S	--
21N/01E-21R01	MURPHY, D P	H	135.00	--	40	--	--	--
21N/01E-21R02	REDHL, JACK	H	80.00	32.00	45	--	O	40
21N/01E-21R03	POE	H	63.00	14.00	30	59	S	7.0
21N/01E-21R04	PETERSON, MARVIN	H	89.00	51.00	70	--	O	15
21N/01E-22A01	HARBOR WATER CO, LOCKER RD	P	275.00	211.00	275	266	S	25
21N/01E-22B01	HENDERSON, JIM	H	215.00	178.00	240	210	S	89
21N/01E-22B02	MORIN, JEFF	H	120.00	75.00	260	115	S	18
21N/01E-22E01	IVERSEN, ROBERT	H	139.00	112.00	125	--	--	10
21N/01E-22E02	BEST, FREDERICK L	H	160.00	135.00	150	--	O	15
21N/01E-22E03	DESURE, MARTIN	H	238.00	165.00	205	233	S	25
21N/01E-22F01	TOGSTAD, ROBERT	H	116.00	91.00	115	111	S	12
21N/01E-22J01S	--	U	--	--	100	--	--	75 F
21N/01E-22L01	DULIN, E. D	H	15.00	--	85	--	--	--
21N/01E-22L02	ARNOLD, BRUCE	H	71.50	35.00	62	--	O	30
21N/01E-22N01	SINDING, C	H	35.00	27.00	35	--	--	--
21N/01E-22N02	HEDBERG, E E	H	75.00	--	30	--	--	--
21N/01E-22R01	ECKLER, THANE G	H	129.00	105.00	130	--	O	15
21N/01E-23A01S	--	U	--	--	145	--	--	7.0 F
21N/01E-23E01	HENDRICKSON, C	H	18.00	2.00	220	--	--	--
21N/01E-23E02	SETHER, A.	H	235.00	147.00	225	230	S	10
21N/01E-23E03	CRAIG, BRIAN	H	159.00	65.00	210	154	S	7.0
21N/01E-23F01	TONNEMAKER, ROBIN B	H,I	132.00	75.00	265	127	S	10
21N/01E-23K01	RICHARDSON WTR.	P	308.00	253.00	265	298	S	330
21N/01E-23L01	FARRINGTON, ROY	H	243.00	203.00	245	238	S	60
21N/01E-23L01S	--	--	--	--	100	--	--	300 F
21N/01E-23N01	SHAWNEE HILLS, ESTATE	P	249.00	198.00	210	239	S	40
21N/01E-23R01	JACOBSON, H	H	54.00	38.00	200	--	--	--
21N/01E-24A01	HOFBAUER, CLARENCE	H	50.00	--	30	--	--	--
21N/01E-24C01	ARTONDALE CNTRY, ESTATES	P	175.00	141.00	160	165	S	70
21N/01E-24C02	ARTONDALE CNTRY, ESTATES	P	164.00	127.00	140	160	S	30
21N/01E-24D01	CLARK, GEOFFRY T	H	70.00	43.00	75	65	S	30
21N/01E-24F02	ARTONDALE ELEM., SCHOOL	T	271.60	186.00	202	--	D	130
21N/01E-24G01	AUSTIN, F E	H	75.00	61.00	140	--	O	--
21N/01E-24H01	ANDERSON, M D	H	38.00	5.00	10	38	S	--
21N/01E-24H02	GOODRIDGE, BOB	H	62.00	F	20	58	S	18
21N/01E-24H03	WARNER, HERBERT O	H	39.00	10.00	30	--	O	20
21N/01E-24H04	SCHMITZ, DAVE	H	38.00	14.00	40	35	S	15
21N/01E-24H05	CARTWRIGHT, GLEN T	H	50.00	F	40	46	S	10
21N/01E-24H06	CARLSON, WILLIAM SR	H	37.00	6.00	10	32	S	15
21N/01E-24J01	WHITON, KEN	H	--	--	30	--	--	--
21N/01E-24J02	BASNAW, RICK	H	59.00	33.00	50	54	S	20
21N/01E-24K01	GRAHAM, GRANT	H,I	177.00	122.00	140	172	S	40
21N/01E-24P01	BLOCK, MIKE	P	260.00	194.00	205	240	S	500
21N/01E-24P02	--	U	--	191.40	205	--	--	--
21N/01E-24R01	HARVIK, JOHN	H	27.00	14.00	120	--	O	--
21N/01E-24R02	BLOCK, MYER	H	32.00	F	20	--	O	7.5
21N/01E-25A01	IVERSON, WADE	H	137.00	104.00	120	133	S	20
21N/01E-25B01	FREED, ELAINE	H	114.00	64.00	190	109	S	15
21N/01E-25B02	BAUER, HENRY	H	237.00	182.00	190	232	S	25
21N/01E-25C01	GREEN, JAMES	H	276.00	218.00	225	--	O	30
21N/01E-25C01S	--	U	--	--	145	--	--	15 F
21N/01E-25D01	OUR SCHOOL, BOB CLARK	T	103.00	56.00	195	93	S	90
21N/01E-25E01S	--	U	--	--	130	--	--	10 F
21N/01E-25F01	GRYTTEN, JOHN	H	46.00	32.00	240	--	O	--
21N/01E-25G02	FOSNESS, ELMER	H,I,S	253.00	215.00	240	--	D	14
21N/01E-25J01	NEFF, JOHN	H	127.50	97.00	265	123	S	10
21N/01E-25K01	HARBOR WATER CO, CROMWELL	P	195.00	164.00	190	185	S	25
21N/01E-25L01	STALLING, HERMAN	H	247.00	225.00	240	241	P	8.0
21N/01E-25L02	SOBOLEFF, SIMON M	H	169.00	--	190	165	S	15
21N/01E-25M01	KLOEPPEL, MARIE	H	74.00	F	30	--	O	30
21N/01E-25P01	MORUD, ELMER	H	80.00	--	45	--	--	--
21N/01E-25P02	FALCONER, TED	H	166.00	87.00	100	161	S	15
21N/01E-25R01	KNUTH, DONALD W	H	273.00	252.00	270	--	O	15
21N/01E-25R02	MILLEN, DAN	H	235.00	200.00	210	230	S	20
21N/01E-26E01	BLANCHARD, GEORGE	H	--	5.40	20	--	--	--
21N/01E-26E01S	--	U	--	--	75	--	--	5.0 F
21N/01E-26E02	OLDFIELD, W C	H	40.00	--	15	--	--	--
21N/01E-26E05	JACOBSEN, RICHARD E	H	48.50	25.00	40	--	O	15
21N/01E-26F01	BORHEK, R E	H	93.00	24.00	40	--	--	--
21N/01E-26F01S	--	U	--	--	70	--	--	25 F
21N/01E-26F02	TYLER & MCFARLD	H	46.00	0.00	40	33	S	30
21N/01E-26F03	LEE, TOM	H	113.00	28.00	50	108	S	10
21N/01E-26G02	FEST, LOUIS	H	143.00	111.00	120	138	S	10
21N/01E-26H01	SAMUELSON	H	--	--	115	--	--	--
21N/01E-26J01	SEABLOOM, O R	H	60.00	F	20	--	--	--
21N/01E-26J02	KLEMME, C. P	H	83.00	32.00	40	--	--	16
21N/01E-26J03	BENNETT, DAVID	H	120.00	68.00	80	115	S	25

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
1.8	--	G	C	S	--
1.7	--	G	C	S	--
--	--		C	S	--
--	--		C	S	--
2.2	--	G	C	S	--
0.2	1.0	G	U	S	DRILLED TO 193 FT.
0.7	1.0	G	U	S	--
1.5	12.0	G	C	S	DRILLED TO 279 FT.
2.7	1.0	G	U	C	DRILLED TO 218 FT.
0.6	2.0	G	U	S	--
0.6	1.0	G	C	S	--
3.0	1.0	G	C	S	DRILLED TO 164 FT.
0.7	1.0	G	U	S	--
1.2	1.0	G	U	S	--
--	--		C	C	--
--	--		C	T	--
1.5	2.0	G	C	S	AT 20 GAL/MIN, FOR 2 HOURS, SPECIFIC CAPACITY WAS 2.0 (GAL/MIN)/FT.
--	--		C	S	--
--	--		C	S	--
2.5	2.0	G	U	S	--
--	--		C	C	--
--	--		C	T	--
0.2	8.0	G	C	S	--
0.1	1.0	G	U	C	DRILLED TO 189 FT.
0.5	1.0	G	U	C	--
[illegible].1	4.0	G	U	S	DRILLED TO 310 FT.
5.5	2.0	G	C	S	--
--	--		C	C	--
2.[illegible]	1.0	G	[illegible]	S	--
--	--		C	[illegible]	--
--	--		C	S	--
3.2	6.0	G	U	S	--
[illegible].0	6.5	G	C	S	ATTEMPTED TO DEVELOP AT 154 FT; UNSUCCESSFUL.
10.0	1.0	G	U	S	--
18.1	1.0	G	C	S	AT 78 and 105 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 20.7 and 1[illegible] (GAL/MIN)/FT, RESPECTIVELY.
--	--		C	C	--
--	--		C	S	--
1.2	1.0	G	U	S	DRILLED TO 64 FT.
1.3	2.0	G	U	S	--
3.8	1.0	G	U	S	--
[illegible].3	2.0	G	C	[illegible]	--
[illegible].3	1.0	G	U	S	--
--	--		C	S	--
[illegible].5	4.0	G	U	S	--
[illegible]0.0	--	G	U	S	--
12.9	9.0	G	C	S	--
--	--		C	[illegible]	--
--	--		C	C	--
[illegible].3	1.[illegible]	G	U	S	--
[illegible]	1.[illegible]	G	[illegible]	S	--
[illegible]	[illegible]	G	U	C	DRILLED TO 115 FT.
[illegible].5	[illegible]	G	U	S	--
[illegible].4	1.[illegible]	G	U	[illegible]	--
--	--				--
[illegible]	[illegible].5	G	C		AT 60 GAL/MIN, FOR [illegible] HOURS, SPECIFIC CAPACITY WAS 6.7 [illegible] (GAL/MIN)/FT.
--	--		[illegible]	[illegible]	--
--	--		[illegible]	[illegible]	--
[illegible].7	2.0	G	C	S	--
[illegible].7	2.0	G	C	C	--
[illegible].3	1.0	G	U	S	-
[illegible].0	--	G	[illegible]	S	--
[illegible].9	4.0	G	C	S	--
[illegible]	3.0	G	[illegible]	S	--
--	--		C	S	-
[illegible].2	5.0	G	U	P	--
[illegible]5.0	1.0	G	C	S	--
[illegible].0	3.0	G	U	S	DRILLED TO 236 FT.
--	--		C	S	--
--	--		C	C	--
--	--		C	S	--
[illegible].0	1.0	G	C	S	--
--	--		C	S	--
--	--		C	[illegible]	--
[illegible].4	1.0	G	U	[illegible]	--
	2.0	G	U	S	--
[illegible]	2.0	G	C	[illegible]	--
--	--		C	S	--
--	--		C	S	--
	--	G		S	--
[illegible]	1.0	G	U	S	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
21N/01E-26J04	KERR	H	67.00	50.00	70	--	--	10
21N/01E-26J05	MILGARO, JIM	H	90.00	15.00	30	--	--	15
21N/01E-26J06	BENNETT, DAVE	H	122.00	62.00	80	118	S	30
21N/01E-26K01	TEAL, RAY	--	366.00	0.00	45	--	--	--
21N/01E-26K02	PRICE, G J	H	52.00	--	43	--	--	--
21N/01E-27A01	STRICKLAND, W R	H	--	16.00	35	--	--	--
21N/01E-27A02	WILDMAN	H	58.00	F	35	--	S	25
21N/01E-27A03	GARLAND, GEORGE	H	65.00	4.00	20	--	O	16
21N/01E-27A04	HOLT, RALPH J	H	68.00	17.00	40	--	O	15
21N/01E-27A05	BURTON, GERALD N	H	68.00	19.00	40	63	S	20
21N/01E-27B01	HARTLEY, JOHN M	H	--	--	50	--	--	--
21N/01E-27B02	ROGERS, D R	H	--	--	55	--	--	--
21N/01E-27C01	OLSON, H C	H	30.00	--	5	--	--	--
21N/01E-27P01	DEMOLAY, BOYS CAMP	R	161.00	110.00	120	--	--	7.0
21N/01E-27R01	BOGGESS, LONNIE	H	100.00	60.00	75	95	S	20
21N/01E-28B01	SIMPSON, C.	H	90.00	--	30	--	--	--
21N/01E-28B03	COCHRUM, ELMER	H	104.50	26.00	37	101	S	20
21N/01E-28B04	TUCCI, JOE G	H	67.00	25.00	35	64	S	30
21N/01E-28C01	GREISSLER, G	H	--	--	40	--	--	--
21N/01E-28C02	LOTHROP, RICHARD	H	69.00	46.00	60	--	--	20
21N/01E-28C03	OHRT, OTTO	H	56.00	41.00	55	52	S	25
21N/01E-28C04	LOONEY, RAYMOND E	H	67.00	36.00	43	--	O	20
21N/01E-28C05	ACKLEY	H	52.83	40.00	50	--	--	15
21N/01E-28D01	CORKERY, J V	H	98.00	70.00	95	--	--	--
21N/01E-28D02	HELBIG	H	87.00	52.00	70	--	O	25
21N/01E-28D03	BURKHART, E. A	U	124.00	80.00	90	--	O	40
21N/01E-28D04	BURKHART, E. A	H	111.00	90.30	105	--	O	10
21N/01E-28D05	HYDE, WILLIAM B	H	128.00	97.00	105	--	O	20
21N/01E-28E02	MCLEOD, HAROLD	H	143.00	100.00	110	138	S	20
21N/01E-28F01	MOORELANDS CORP	P	140.00	20.00	40	--	--	--
21N/01E-28F02	MOORELANDS CORP	P	98.00	47.00	60	94	S	60
21N/01E-28F03	WIDNEY	H	85.00	45.00	60	--	--	30
21N/01E-28F04	STRICKER, GEORGE	H	104.00	79.00	100	--	--	30
21N/01E-28G02	MOORE, MCALLESTER	--	604.00	--	11	--	--	8.0 F
21N/01E-34A01	FOX ISLAND, WATER-2	P	96.00	67.[illegible]	70	90	S	40
21N/01E-34A02	FOX ISLAND, WATER-10	P	105.00	74.00	90	95	S	30
21N/01E-34A04	PHILLIPS, WILLIAM P	U	258.00	--	135	--	O	--
21N/01E-34A05	DOBLER, ALLEN	H	128.00	80.00	95	118	S	20
21N/01E-34B01	FOX ISLAND, VILLA TRCT	U	248.00	212.00	220	239	S	30
21N/01E-34B02	FOX ISLAND, VILLA TRCT	P	--	--	170	--	--	--
21N/01E-34G01	GRIFFIN, PAUL	H	162.00	139.30	155	152	S	15
21N/01E-34G02	ELLIOTT, MERTON	H	67.00	--	20	63	S	30
21N/01E-34J01	MCHUGH	--	42.00	24.00	30	--	O	20
21N/01E-35D01	SHOREWOOD BEACH	P	432.00	14.37 P	25	358	O	35
21N/01E-35E02	SCHMIDT, HOWARD	H	55.00	28.00	40	--	--	12
21N/01E-35J01	FOX ISLAND, WATER-7	--	100.00	42.00	45	95	S	--
21N/01E-35L01	GARRETT [illegible]	H	83.00	58.00	160	--	--	30
21N/01E-35M01	COSTELLO&MCHUGH	H	93.00	73.00	80	--	O	25
21N/01E-35M[illegible]	--	U	--	--	90	--	--	8.0 F
[illegible]/01E-35P01	FOX ISLAND, WATER	P	193.00	127.[illegible]	250	181	S	40
21N/[illegible]E-35R01	RANKIN, FRANK	H	102.00	55.00	66	--	O	20
21N/01E-36B01	HORSEMAN, G. [illegible]	H	250.00	--	20	--	--	--
21N/02E-04E01	MCDONALD, GEORGE	H	146.00	83.00	100	--	O	40
21N/02E-04E02	SCHMIDTKE, [illegible]ULIAN [illegible]	H	67.00	26.00	215	--	[illegible]	15
21N/[illegible]E-05C01	CONEN, B. L	H	--	--	20	--	--	--
21[illegible]-05C02	DOBLER, JOHN D	P	126.60	1.00	18	[illegible]	S	120
2[illegible]-05E01	METZGER, F. O	H	[illegible]	18.00	25	[illegible]	O	40
21[illegible]-05F03	LILE, KEITH	H	109.00	75.00	95	--	O	15
21N[illegible]5G01	DEEDS, DENNIS	H	123.00	87.00	95	121	S	20
21[illegible]2E-05K01	HARBOR SPRINGS, WATER CO.	P	156.00	46.00	70	[illegible]51	P	40
21N/02E-05L01	FOOTE, DON	H	61.00	[illegible]0.00	20	57	S	27
21N/02E-06A01	HEMLEY, KEN	P	107.00	48.00	175	97	S	40
21N/02E-06B03	FEATHER, TROY	H	61.00	F	120	57	S	20
21N/02E-06B04	WILCOX, DON	H	121.50	4.00	100	117	S	20
21N/02E-06C01	JOHNSON WTR.CO.	P	111.00	87.00	195	107	S	100
21N/02E-06C02	WRIGHT, WESLEY A	P	135.00	35.00	95	120	S	36
21N/02E-06D01	HEMLEY'S, SEPTIC TNK	H	298.00	246.00	310	288	S	30
21N/02E-06L01	HAVEN OF REST, FUNERAL HM	C	320.00	165.00	290	[illegible]77	P	27
21N/02E-06L02	HARBOR WATER CO. SHCK-DRHMN	P	301.00	227.00	315	2[illegible]	[illegible]	30
21N/02E-06N01	NORD, W. M	H	203.50	176.00	310	--	O	10
21N/02E-06P01	PENINSULA SCH., DIST. 401	A	307.00	180.00	310	287	S	500
21N/02E-06P02	PENINSULA SCH., DIST.401	U	337.00	--	310	--		0.00
21N/02E-06P03	PENINSULA SCH., DIST.401	--	315.00	162.00	310	295	S	500
21N/02E-06P04	HEMELY, LAWRENCE	H	59.00	22.00	285	--	S	[illegible]
21N/02E-07B01	ST.JOHNS CHURCH	[illegible]	219.00	147.00	260	214	[illegible]	20
21N/02E-07B02	HARBOR WATER CO, MCDOUGAL-1	P	400.00	200.00	225	370	P	40
21N/02E-07F01	WHITLEY	H	176.00	136.00	275	--	O	20
21N/02E-07F02	EDWARDS REALTY, ALLEN C	P	180.50	115.00	260	154	[illegible]	53
21N/02E-07F03	MANLY, MARVIN	I,H	173.00	154.00	27[illegible]	--	[illegible]	50
21N/02E-07F04	FISK, ROY	H	157.00	134.00	270	--	O	15

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
2.5	1.0	G	U	S	--
0.4	2.0	G	C	S	DRILLED TO 95 FT.
2.3	2.0	G	U	S	--
--	--		C	P	--
--	--		C	S	--
--	--		C	S	--
0.6	1.0	G	U	S	--
0.5	1.5	G	C	S	--
0.5	1.0	G	L	S	--
0.7	--	G	U	S	--
--	--		C	S	--
--	--		C	S	--
--	--		C	S	--
1.0	--	G	U	S	--
1.0	1.0	G	U	S	--
--	--		C	S	--
0.9	1.0	G	C	S	DEEPENED EXISTING 74 FT WELL IN 1966.
2.0	1.0	G	U	S	--
--	--		C	S	--
4.0	1.5	G	U	S	--
50.0	1.0	G	U	S	--
2.9	1.0	G	C	S	DPILLED TO 71 FT.
5.0	1.0	G	U	S	--
--	--		C	S	--
8.3	1.0	G	U	S	--
8.0	1.0	G	U	S	WELL WAS PLUGGED AFTER ENCOUNTERING SALTY WATER.
10.0	1.0	G	U	S	--
4.0	1.5	G	U	S	--
1.3	1.0	G	U	S	--
--	--		C	S	--
6.0	--	G	U	S	DRILLED TO 99 FT.
1.9	1.0	G	L	S	--
30.0	2.5	G	U	S	--
--	--		C	P	--
20.0	2.0	G	C	S	--
10.0	2.0	G	U	S	--
--	--	G		P	WELL WAS CAPPED AFTER ENCOUNTERING SALTY WATER.
2.2	4.0	G	U	S	AT 28 GAL/MIN. FOR 3 HOURS, SPECIFIC CAPACITY WAS 2.3 (GAL/MIN)/FT.
30.0	4.0	G		S	CASING WAS PULLED AFTER ENCOUNTERING SALTY WATER.
--	--		C	S	--
15.0	1.0	G	C	S	--
1.5	--	G	U	S	--
3.3	--	G	L	S	--
0.7	--	G	C	S	PERFORATED FROM 358 TO 378 FT.
0.8	1.5	G	C	S	--
--	--		C	S	--
3.8	--	G	C	C	--
3.6	0.5	G		S	--
--	--		C	S	--
3.6	4.0	G	C	C	--
4.0	2.0	G	C	S	--
--	--		C	P	--
5.7	--		C	P	--
0.7	1.5	G	C	S	DRILLED TO 69 FT.
--	--		C	P	--
2.9	--	G	C	P	DRILLED TO 136 FT.
1.5	4.0	G	U	P	--
1.0	2.0	G	C	P	--
1.5	1.0	G	U	P	--
1.7	--	G	U	P	--
1.2	3.0	G	C	P	--
1.0	3.0	G	C	S	NO CHANGE IN SPECIFIC CAPACITY BETWEEN 1 AND 3 HOURS PUMPING.
0.4	1.0	G	L	S	DRILLED TO 63 FT.
0.5	1.0	G	U	P	--
11.0	3.0	G	U	S	DRILLED TO 112 FT. AT 40 AND 68 GAL/MIN, FOR 1½ HOURS, SPECIFIC CAPACITIES WERE 18.4 and 14.6(GAL/MIN)/FT, RESPECTIVELY.
0.8	4.0	G	C	P	--
1.1	3.0	G	C	P	DRILLED TO 136 FT. KOA CAMPGROUND.
2.7	--	G	C	S	PERFORATED FROM 177-182 FT. MOST OF PRODUCTION IS FROM THIS ZONE?
1.8	5.0	G	U	P	DRILLED TO 304 FT.
2.0	--	G	U	S	--
5.0	8.0	G	U	S	DRILLED TO 310 FT.
--	--	G	U	P	DRILLED TO 460 FT.
9.1	4.0	G	U	S	DRILLED TO 323 FT.
1.0	4.0	G	U	C	--
1.0	2.0	G	C	S	--
40.0	1.0	G	C	P	PERFORATED FROM 370 TO 380 FT.
6.7	2.0	G	C	S	--
3.5	1.5	G	U	S	--
10.0	1.0	G	U	S	AT 15 GAL/MIN, FOR 2 HOURS, SPECIFIC CAPACITY WAS 15.0 (GAL/MIN)/FT.
1.2	2.0	G	C	S	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
21N/02E-07G01	MYERS	H	194.00	--	315	190	S	15
21N/02E-07L01	HARBOR WATER CO, DRONMAN	P	159.00	118.00	250	155	S	40
21N/02E-07P01	WRIGHT, W. A	H	138.50	99.00	214	134	S	20
21N/02E-07Q02	HARBOR WATER CO, SUNY BRAE	P	141.00	115.00	250	137	S	40
21N/02E-08A01	ROBINETTE	H	158.00	--	40	--	S	--
21N/02E-08A02	ADAMS, BRECK	H	117.00	33.00	40	112	S	45
21N/02E-08B01	ALLGOOD, HENRY C	H	66.00	22.30	25	--	--	--
21N/02E-08C01	GIG HARBOR, TOWN OF	P	265.00	28.80	55	73	P	340
21N/02E-08Q01	SHORE WATER CO	U	193.00	--	185	183	--	--
21N/02E-17D02	SHAW, DONALD L	P	292.00	250.00	300	282	S	27
21N/02E-17D03	STROH, FRED-1	P	290.00	254.00	300	285	S	30
21N/02E-17F01	HARBOR WATER CO, PEACOCK	P	320.00	259.00	310	312	S	20
21N/02E-17F02	GIG HARBOR, TOWN OF	P	908.85	316.70	341	749	S	708
21N/02E-17J01	PENIN WATER CO	P	350.00	207.00	270	217	S	30
21N/02E-17J02	ANTON, PAUL	H	236.00	177.00	180	232	S	20
21N/02E-17J03	HARBOR WATER CO, RUSHMORE	P	241.80	--	180	--	--	--
21N/02E-17K01	OLYMPIC VILLAGE	C	397.00	220.00	310	387	S	100
21N/02E-17L01	REHN	--	808.00	--	330	--	--	--
21N/02E-18B01	HARBOR WATER CO, FIRGLADE	P	217.00	161.00	210	212	S	30
21N/02E-18C01	RICHARDSON, WATER-2	P	268.00	178.00	200	248	S	200
21N/02E-18D01	KING, PHILIP O	H	148.50	112.00	240	143	S	15
21N/02E-18D02	BOSNICK, DONALD	H	180.00	125.00	250	175	S	40
21N/02E-18D03	JACKSON, GARTH	H	144.00	114.00	225	--	--	22
21N/02E-18E01	GREENWOOD ESTAT	H	215.00	90.00	128	210	S	50
21N/02E-18E02	KIRK	H	114.00	50.00	130	--	O	5.0
21N/02E-18E03	SOUND COUNTRY, LIVING INC	P	158.00	87.00	140	153	S	67
21N/02E-18J01	STROH, FRED-2	P	316.00	244.00	280	310	S	48
21N/02E-18J02	STROH, FRED	P	319.00	244.00	280	312	S	60
21N/02E-18N01	BUCK TRACTOR CO	P	106.00	65.00	90	101	S	107
21N/02E-18Q01	KOENIG, THEODORE	H	107.00	69.00	100	104	S	15
21N/02E-18R02	TAIT, JOHN E	--	197.00	171.00	210	192	S	30
21N/02E-19E01	SMART, R. B	--	--	--	10	--	--	--
21N/02E-19F01	SCHULTZ, DALE W	H	132.00	93.00	105	127	S	30
21N/02E-19G01	KILBORN	H	269.00	204.00	205	--	--	20
21N/02E-19G02	PHILLIPS, WILLIAM	H	136.00	120.00	130	131	S	9.0
21N/02E-19H01	SAFFEELS	H	142.00	111.00	155	137	S	30
21N/02E-19H02	HULBERT, EUGENE	H	180.00	145.00	180	175	S	15
21N/02E-19J01	PETERSON, ERIC	H	200.00	173.00	230	--	O	20
21N/02E-19K01	REIERSON, WALT	H	233.00	203.00	245	230	S	20
21N/02E-19M01	BOWERS, W H	H	67.00	15.00	15	67	S	--
21N/02E-19M03	FORSYTHE, GENE	H	97.00	F	12	93	S	15
21N/02E-19P01	MILLER, PAUL	H	173.00	114.00	150	163	S	30
21N/02E-19Q01	BUCHER, CHARLES	H	183.00	161.00	220	--	--	20
21N/02E-19Q02	K.T. DAVIS, CONSTRUCT.	H	132.70	44.00	220	130	S	49
21N/02E-19R02	KNOLL, WAYNE	H	107.00	67.00	230	--	O	10
21N/02E-20A01	MILLER, ED	P	350.00	255.00	275	330	S	80
21N/02E-20B01	GIG HARBR MTR IN	C	35[illegible].00	220.00	245	343	S	205
21N/02E-20F01	ALLEN C EDWARDS, REALTY CO	P	388.00	209.00	230	383	S	60
21N/02E-20J01	MADRONA LINKS, GOLF COURS	I,C	388.00	278.00	285	351	S	425
21N/02E-20K01	FAIRWAY LAND, DVLP.CRP.	P	292.00	199.00	220	282	S	255
21N/02E-20L01	ANTONSON, ELMER M	H	83.00	58.00	100	--	--	14
21N/02E-20L02	[illegible]UNZ, GEORGE	H	80.00	45.00	90	75	S	45
21N/02E-20L03	ANTONSEN, ELMER M	H	159.00	133.00	180	--	O	15
21N/02E-20M01	LUCKY, MILTON	H	173.00	133.00	195	165	S	10
21N/02E-20[illegible]01	[illegible]USEL, TONY	H	205.00	178.00	220	202	S	15
21N/02E-21C01	WESTBRIDGE EST[illegible]	P	255.00	195.00	212	250	S	35
21N/02E-21E01	SCALE HOUSE, ST. OF WA.	U	287.00	246.00	275	--	--	15
21N/02E-21G01	BEAUSOLEIL	H	257.00	192.00	195	247	S	50
21N/02E-21K01	NIXON, R [illegible]	H	316.00	300.00	305	--	O	--
21N/02E-21N01	TOWN&CNTRY, TENNIS CLB	C	313.00	269.00	280	308	S	50
21N/02E-21N02	FAGERNESS, MICHAEL	H	247.00	155.00	315	240	S	70
21N/02E-28B01	COTTESMORE, NURSNG HM	U	371.00	241.00	250	363	S	20
21N/02E-28B02	COTTESMORE, NURSNG HM	T	375.00	[illegible]	255	365	S	60
21N/02E-28B03	PEACOCK, WILLIAM	-	392.00	[illegible]	290	--	S	310
21N/02E-28C01	LOG SYSTEMS, SALES OFFC	H	324.00	276.90	320	316	S	20
21N/02E-28F02	MEYERS, TOM	H	153.00	141.00	240	--	--	--
21N/02E-28F03	WEST ANCHOR PRK	U	125.00	120.00	255	--	--	8.0
21N/02E-28F04	WEST ANCHOR PRK	P	297.00	244.00	260	--	O	20
21N/02E-28F06	QUINSEY, DENNIS	H	208.30	177.00	230	205	S	30
21N/02E-28K01	SOUTHWELL, ERNA	--	--	4.00	4	--	--	--
21N/02E-28K02	AQUA DEVELOP CO	P	358.00	238.10	240	343	S	83
21N/02E-28K03	WELLING, TED	H	185.00	163.00	165	--	O	20
21N/02E-28P01	WEATHERS	P	569.00	155.00	195	159	P	20
21N/02E-28P02	WEATHERS	P	172.00	140.00	190	162	S	25
21N/02E-28P03	WASH.STATE	U	230.00	--	137	--	--	--
21N/02E-28P04	WASH.STATE	U	165.00	--	140	--	--	--
21N/02E-28P05	WASH.STATE	U	166.00	--	140	--	--	--
21N/02E-28P06	WASH.STATE	U	127.00	--	143	--	--	--
21N/02E-28Q01	WASH.STATE	U	20.00	--	5	--	--	--
21N/02E-28Q02	WASH.STATE	[illegible]	134.[illegible]	--	100	--	--	--

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG CK	AQUIFER	REMARKS
1.7	3.0	G U	S	DRILLED TO 200 FT.
4.4	5.0	G C	S	--
1.7	1.0	G C	S	DRILLED TO 140 FT.
8.0	2.0	G C	S	AT 25 GAL/MIN, FOR 2 HOURS, SPECIFIC CAPACITY WAS 25.0 (GAL/MIN)/FT.
--	--	G C	P	--
4.5	--	G C	P	--
--	--	U	P	--
11.0	5.5	G C	P	DRILLED TO 375 FT. PERFORATED FROM 73 TO 83, 148 TO 156, AND 260 to 265 FT.
--	--	G C	S	--
27.0	6.0	G C	S	SUPPLIES MOBILE HOME PARK.
30.0	--	G C	S	DEEPENED EXISTING 210 FT WELL IN 1964. PARTIAL DRILLER'S LOG ON FILE.
20.0	2.0	G C	S	--
25.0	43.0	G C	P	DRILLED TO 920 FT. TOTAL SCREEN LENGTH, 66½ FT, BETWEEN 749 AND 901 FT.
2.0	40.0	G U	S	DRILLED TO 555 FT. SCREEN FROM 217 TO 227 FT. MOST OF PRODUCTION IS FROM THIS ZONE?
1.1	1.0	G C	P	--
--	--	U	P	--
20.0	--	G U	P	--
--	--	C	P	--
1.5	6.0	G U	P	AT 20 GAL/MIN, FOR 2 HOURS, THE SPECIFIC CAPACITY WAS 2.0 (GAL/MIN)/FT.
5.7	4.0	G U	P	--
1.7	1.0	G U	S	--
2.0	1.0	G C	S	--
2.2	2.0	G U	S	--
3.1	4.0	G C	P	DRILLED TO 216 FT. PLANNED USE: 25-30 HOMES.
0.8	1.0	G U	P	--
3.5	4.0	G U	P	--
16.0	--	G C	P	--
3.8	1.0	G U	P	--
3.0	4.0	G U	P	DRILLED TO 119 FT.
1.1	1.0	G U	P	--
7.5	3.0	G U	P	--
--	--	C	P	--
30.0	1.5	G C	P	--
5.7	1.0	G U	P	ATTEMPTED DEVELOPMENT AT 73 FT; UNSUCCESSFUL.
4.5	1.0	G U	S	--
5.0	4.5	G C	S	DRILLED TO 144 FT.
1.5	1.5	G	S	--
[illegible]	1.0	G C	S	--
[illegible]	2.0	G C	S	--
--	--	C	P	--
0.5	--	G C	P	--
4.3	1.6	G U	[illegible]	--
10.0	1.0	G U	[illegible]	--
0.8	4.0	G U	[illegible]	AT 30 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 1.5 (GAL/MIN)/FT.
[illegible].5	4.0	G U	[illegible]	--
[illegible].3	2.0	G U	P	--
2.1	4.0	[illegible]	P	AT 100 AND 160 GAL/MIN, FOR 1 AND 2 HOURS, RESPECT., SPECIFIC CAP. WERE 2.5 AND [illegible].4 (GAL MIN)/FT. - SPECT.
3.3	1.0	G U	P	DRILLED TO 392 FT.
19.3	4.0	G [illegible]	P	NO CHANGE IN SPECIFIC CAPACITY BETWEEN 2 AND 4 HOURS PUMPING.
4.[illegible]	4.0	G U	P	AT 50 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 5.6 (GAL/MIN)/FT.
[illegible]	--	G	S	--
[illegible]	[illegible]	G	S	--
2.[illegible]	[illegible]	G U	S	--
[illegible]	1.0	G [illegible]	S	--
[illegible]	--	G [illegible]	[illegible]	DEEPENED EXISTING 67 FT WELL IN 1979.
[illegible]	--	G U	P	--
[illegible]	4.0	G [illegible]	P	--
	4.0	[illegible] C	P	DRILLED TO 260 FT. PLANNED USE: 7 HOMES.
--	--	[illegible]	P	--
2.4	4.0	G [illegible]	P	DRILLED TO 314 FT. AT 25 GAL/MIN, FOR 1½ HOURS, SPECIFIC CAPACITY WAS 6.3 (GAL/MIN)/FT.
[illegible]	4.0	G U	[illegible]	AT 30 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 6.0 (GAL/MIN)/FT.
	2.0	G [illegible]	P	DRILLED TO 373 FT.
[illegible]	4.0	G [illegible]	P	--
22.[illegible]	[illegible]	G [illegible]	P	AT 50 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 50.0 (GAL/MIN)/FT.
[illegible]	[illegible]	G C	S	--
--	--	[illegible]	C	--
4.[illegible]	4.0	G [illegible]	C	DRILLED TO 129 FT.
[illegible]	2.0	G [illegible]	P	--
15.[illegible]	5.0	G U	S	DRILLED TO 209 FT.
--	--	C	P	--
[illegible]	8.0	G [illegible]	P	AT 30 GAL/MIN, FOR 4 HOURS, SPECIFIC CAPACITY WAS [illegible].0 (GAL/MIN)/FT.
[illegible].0	[illegible]	G [illegible]	P	--
2.0	4.0	G C	S	PERFORATED FROM 159 TO 166 FT. NO PRODUCTION BELOW 166 FT?
1.0	--	G U	S	--
--	--	G C	-	--
--	--	G C	-	--
--	--	G [illegible]	-	--
--	--	G C	-	--
--	--	G C	-	--
--	--	G [illegible]	-	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
21N/02E-28Q03	WASH.STATE	U	216.00	--	117	--	--	--
21N/02E-28Q04	WASH.STATE	U	166.00	--	130	--	--	--
21N/02E-29C01	KIRBY	H	79.00	18.00	105	74	S	30
21N/02E-29C02	HERNANDEZ, JUAN DIAZ	H	78.00	36.00	105	73	S	18
21N/02E-29K01	BRIG O'DUNE, KENNELS	C	118.00	86.00	170	114	S	8.0
21N/02E-29L02	HOPPER	H	120.00	99.00	160	114	S	20
21N/02E-29M01	BLAKE, LEIGHTON	H	75.00	26.87	45	--	--	--
21N/02E-29M02	STRATTON, JAMES	H	102.00	29.00	50	97	S	20
21N/02E-29N01	MARTIN, ART	H	68.00	43.00	130	--	O	30
21N/02E-29N02	BUCHANAN, DON	H	114.00	65.00	145	111	S	30
21N/02E-30A01	MCDONELL, JOHN L	H	105.00	6.00	25	100	S	20
21N/02E-30B01	JONES, CHET	H	21.00	11.00	15	--	O	--
21N/02E-30C01	HOLSINGER, RON	H	--	--	35	--	--	--
21N/02E-30C02	CARLSON, RUSSELL E	H	90.00	F	15	65	S	--
21N/02E-30C03	RATKO&SCHUMAKER	H	96.00	F	20	--	--	30
21N/02E-30C04	HOOVER, V. WAYNE	H	50.00	25.00	30	45	S	24
21N/02E-30C05	ARNESON, WOODROW W	--	112.00	F	20	77	P	15
21N/02E-30D01	WOL HARBOR CLUB	--	193.00	125.00	130	188	S	80
21N/02E-30D02	ROWLAND, DEWITT C	--	66.00	28.00	40	--	O	20
21N/02E-30E02	FIELDS, FERROL M	H	71.00	37.00	135	67	S	15
21N/02E-30F01	CARSTENS, TOM	--	168.00	--	50	--	--	--
21N/02E-30F02	DAVIS	H	260.00	11.00	35	--	--	--
21N/02E-30F03	FALER, PHILIP R	H	65.00	35.00	40	--	--	66
21N/02E-30H02	BUCHANAN, D S	H	85.00	F	25	--	--	--
21N/02E-30L01	HUGG, MELVIN	H	205.00	15.00	20	201	S	38
21N/02E-30L02	STENCIL	H	245.00	26.00	30	240	S	20
21N/02E-30L03	STRODE, BOB	H	325.00	115.00	120	320	S	5.0
21N/02E-30M01	DAGASSO, BERNARD M	P	215.00	69.00	170	73	P	25
21N/02E-30M02	VADHEIM, JAMES	H	208.00	192.00	200	203	S	12
21N/02E-30N01	BURNETT, JACK	H	118.00	29.00	40	114	S	10
21N/02E-30N02	PERELLI, JACK	P	268.00	213.00	225	263	S	32
21N/02E-30N03	LOBEDA, DONALD	H	97.00	24.00	50	94	S	10
21N/02E-30N04	PAIGE, FRANK	H	96.75	34.00	60	94	S	10
21N/02E-30P02	HARRIS, C. H	H	--	--	60	--	--	--
21N/02E-30P03	SEGLEM, HERB	H	216.00	118.00	122	213	S	20
21N/02E-30P04	UNGER, EDWARD	H	142.50	120.00	130	139	S	15
21N/02E-30P05	O'CONNOR, THOMAS	H	216.00	148.00	180	212	S	15
21N/02E-30R01	GAYTON	H	76.00	58.00	60	71	S	8.0
21N/02E-31A01	ALLEN, E P	H	85.00	--	63	--	--	--
21N/02E-31A02	HAGENESS, MARIA	P	105.00	70.00	82	96	S	50
21N/02E-31D01	--	H	--	--	35	--	--	--
21N/02E-31D02	COONAN	--	47.00	--	30	--	O	10
21N/02E-31G01	DOBLER, JOHN	H	65.00	--	5	--	--	--
21N/02E-31H01	HOFFMAN, AL	H	86.50	63.00	100	82	S	14
21N/02E-31K01	BALL, FRANK W	P	37.00	2.00	40	32	S	25
21N/02E-31K02	RINGO, R. T	--	725.00	--	90	--	--	--
21N/02E-31K03	RINGO, R. T	--	53.00	--	90	--	O	20
21N/02E-31K04	ROSCH	--	50.00	38.00	90	--	O	10
21N/02E-31K05	PAZARUSKI, ANDY	H	78.00	49.00	70	74	S	18
21N/02E-31Q01	WISENBURG, RICHARD B	H	80.00	33.00	105	75	S	15
21N/02E-31Q02	HALLEY	--	49.00	32.00	105	--	O	--
21N/02E-32D0-	HANSEN	H	75.50	45.00	160	71	S	14
21N/02E-32E03	BAKER WTR SYSTEM	P	155.00	55.00	150	--	O	20
21N/02E-32F05	KIMBROUGH, ROBERT A	H	81.00	55.00	135	76	S	30
21N/02E-32E06	ANDERSON, ALLEN	H	101.00	68.00	130	98	S	15
21N/02E-32E07	LAYCHICK, THOMAS	[illegible]	97.00	60.00	135	92	S	20
21N/02E-32F01	HOWICH, E. J	H	120.00	83.00	190	117	S	15
21N/02E-32F03	ENDSLEY, GENE R	H	100.00	64.00	180	95	S	15
21N/02E-32F04	ALVINS, LLOYD	H	155.00	134.00	190	152	P	10
21N/02E-32M01	RAYMOND, DICK	H	105.00	--	200	--	--	40
21N/02E-32M02	JOHNSON, GARY	H	107.00	32.00	240	--	O	30
21N/02E-32M03	RHODES, WES	H	100.00	70.00	160	95	S	25
21N/02E-32M04	PARRISH, FLETCHER	H	86.50	40.00	170	82	S	15
21N/02E-32M05	MILDON, LEWIS	H	164.00	142.00	260	--	O	12
21N/02E-32N01	SCHEIBEL	H	100.00	73.00	250	--	O	15
21N/02E-33B01	WASH.STATE	U	212.50	--	0	--	--	--
21N/02E-34M01	WASH.STATE	U	240.00	--	0	--	--	--
22N/01E-13B01	MCCULLOUGH, GEORGE	H	75.00	5.00	100	--	O	20
22N/01E-13C01	HAYWOOD, STUART B	P	92.00	40.00	80	87	S	30
22N/01E-13C02	HADFIELD, STEVE	H	174.50	60.00	80	172	S	20
22N/01E-13D01	HARBOR WATER CO, HOLLY TOS	H	75.00	0.00	20	66	S	80
22N/01E-13D02	JONES, LEO	H	188.00	F	20	--	--	20
22N/01E-13D03	HANSON, PHILLIP L	H	35.00	20.00	40	25	F	30
22N/01E-13E01	RICHARDSON, WATER CO	P	109.00	5.00	30	105	S	100
22N/01E-13F01	LIND, JERRY	H	76.00	25.00	110	71	S	9.0
22N/01E-13F02	BENNETT, ALPHERE	P	60.00	47.00	80	57	S	15
22N/01E-13L01	CROOKS, S. H	H	58.00	32.00+	80	53	S	60
22N/01E-13N01	CHRISTENSEN, E A	H	180.00	F	5	--	--	--
22N/01E-13N02	BREWER, HUD	H	38.25	F	35	36	S	20
22N/01E-13N03	MALESKEY, STAN	H	40.00	6.00	25	--	--	20

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
--	--	G	C	-	--
--	--	G	C	-	--
0.9	1.0	G	C	S	DRILLED TO 80 FT.
1.0	1.0	G	U	S	--
0.7	--	G	C	S	--
4.0	1.0	G	U	S	--
--	--		C	P	--
0.6	1.0	G	C	P	--
6.0	1.0	G	U	S	AT 20 GAL/MIN, FOR 8 HOURS, SPECIFIC CAPACITY WAS 6.7 (GAL/MIN)/FT.
1.2	1.0	G	U	S	--
0.5	--	G	U	P	DRILLED TO 106 FT.
--	--		C	P	--
--	--		C	P	--
--	--		C	P	--
--	--	G	C	P	--
8.0	2.0	G	U	P	--
0.2	--	G	U	P	--
--	--	G	U	P	--
3.3	--	G	U	P	--
0.9	2.0	G	U	C	--
--	--		U	P	--
--	--		C	P	--
2.6	--	G	U	P	DRILLED TO 177 FT.
--	--		C	P	--
0.6	2.0	G	C	P	--
2.5	4.0	G	C	P	DEEPENED EXISTING 115 FT WELL IN 1973.
0.0	1.0	G	C	P	DRILLED TO REPLACE 65 FT WELL THAT WENT DRY IN 1979.
8.3	--	G	U	C	PERFORATED FROM 73 TO 81, and 209 TO 210 FT. MOST OF PRODUCTION FROM UPPER ZONE.
5.0	1.0	G	U	P	--
0.2	5.0	G	U	P	--
0.9	16.0	G	C	P	--
0.2	2.5	G	U	P	--
0.2	1.0	G	[illegible]	P	--
--	--		C	P	--
0.7	2.0	G	C	P	--
3.0	2.5	G	U	P	--
0.6	1.0	G	U	P	--
0.7	1.0	G	U	P	DRILLED TO 30 FT.
--	--		C	P	--
5.2	1.0	G	[illegible]	P	--
--	--		C	P	--
--	--	G	U	P	--
--	--		C	P	--
[illegible]	1.0	G	U	P	--
[illegible]	1.0	G	U	P	DRILLED TO 40 FT.
--	--	G	U	P	SOME (OR ALL?) OF CASING REMOVED AFTER DRILLING (1950).
--	--	G	U	S	DEEPENED EXISTING 31 FT WELL IN 1950.
--	--	G	U	S	--
[illegible]	1.0	G	U	P	--
1.3	1.0	G	C	S	
--	--	[illegible]	[illegible]	[illegible]	--
[illegible]	1.0	G	C	S	--
[illegible]	[illegible]	G	U	S	--
[illegible]	3.0	G	U	S	--
[illegible]	2.0	G	U	S	DRILLED TO 102 FT
2.0	1.0	G	[illegible]	S	DEEPENED EXISTING 59 FT WELL IN 1977.
[illegible]	4.0	G	U	S	DEEPENED EXISTING 107 FT WELL IN 1974. DRILLED TO 121 FT.
	1.0	G	U	[illegible]	--
[illegible]		G	U	S	--
2.7		G	U	S	AT 20 GAL/MIN, FOR [illegible] HOURS, SPECIFIC CAPACITY WAS 6.7 (GAL/MIN)/FT.
1.5	[illegible]	G	C	[illegible]	AT 20 GAL/MIN, FOR 5 HOURS, SPECIFIC CAPACITY WAS 2.0 (GAL/MIN)/FT.
[illegible]	1.0	G	U	S	--
[illegible]	4.0	G	U	S	--
[illegible]	[illegible]	G	U	S	--
[illegible]	1.0	G	U	[illegible]	DRILLED TO 105 FT.
--	--	G	C	-	--
--	--	G	C	-	--
[illegible]	1.0	G	U	S	--
[illegible]	1.0	G	U	P	--
0.3	2.0	G	U	P	--
[illegible]	1.0	G	U	P	--
[illegible]	--	G	C	P	--
[illegible]	1.0	G	U	P	--
2.4	--	G	U	P	--
[illegible]	1.0	G	U	P	--
[illegible]	1.0	G	C	P	WELL #2 AT CEDARS MOBILE HOME PARK.
[illegible]	4.0	G	C	S	DRILLED TO 63 FT.
--	--		C	P	--
[illegible]	1.0	G	U	P	--
[illegible]	1.0	G	C	P	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)		ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
22N/01E-14A01	WOOD, E L	H	--		F	10	--	--	--
22N/01E-14B01	KILMER, JERRY	H	132.00	23.00		60	127	S	30
22N/01E-14B02	GORDON, DAVE	H	78.00		F	60	74	S	30
22N/01E-14B03	DILLON, JAMES	H	126.50	28.00		90	--	--	30
22N/01E-14C02	OLSEN, TOM	H	134.00	88.00		220	129	S	30
22N/01E-14C03	HARTUNG, A. J	H	130.00	60.00		220	126	S	15
22N/01E-14D01	EASLEY, WALTER S	H	140.00	73.00		220	135	S	40
22N/01E-14E01	HARBOR WATER CO	U	397.00	250.00		260	388	S	16
22N/01E-14F01	KENNEDY, MATTHEW J	H	145.00	104.00		230	140	S	--
22N/01E-14G01	ILES, MERL	H,I	35.00	14.00*		80	30	S	30
22N/01E-14H01	CAMPBELL, RICHARD	H	58.00	0.00		15	--	O	15
22N/01E-14K01	ELLIOTT, E. H	H	63.00	5.00		35	--	O	8.0
22N/01E-14M01	HARBOR WATER CO, WAN VST-2	P	177.00	139.00		240	168	S	40
22N/01E-14N01	LAMB, JOY	H	189.00	165.00		270	184	S	15
22N/01E-14P01	WORLEY, RICHARD M	H,I	201.00	176.00		265	196	S	20
22N/01E-14Q01	TIPTON, ZANE	H	200.00	140.00		150	--	--	20
22N/01E-14Q02	BURCH	H	194.00		F	40	--	O	40
22N/01E-14Q03	DILLON, GORDON L	H	80.00	--		45	--	--	40
22N/01E-15D01	CLINE, CHARLES	H	65.00	33.00		290	60	S	18
22N/01E-15D02	LANIGAN, ROBERT	H	87.00	23.00		290	82	S	30
22N/01E-15F01	MCILVOY, WILLIAM L	H	175.00	50.00		265	--	--	25
22N/01E-15L01	DAVIS, MANSFIELD	H	264.00	176.00		223	259	S	30
22N/01E-15N01	SALANTINO	H	198.00	149.00		260	193	S	25
22N/01E-15Q01	HORSESHOE LAKE	P	260.00	165.00		220	251	S	115
22N/01E-15R01	MEEK, FLOYD	H,I	150.00	80.00		305	145	S	30
22N/01E-16E03	WALKER, MYRTLE	P	63.00		F	120	--	--	25
22N/01E-16G01	TUCCI, TOM	H	121.00	57.00		275	116	S	30
22N/01E-16M01	COX, HOWARD	H	67.50	2.00		115	63	S	40
22N/01E-16N01	BROCKMAN, JOHN M	H	55.00		F	95	50	S	30
22N/01E-16N02	SPEED, ROBERT L	H	53.00	4.00		100	48	S	22
22N/01E-17A01	HUMPHREY, RICHARD	H	75.00	35.00		200	70	S	22
22N/01E-17B01	MCKENZIE, GERALD K	H	90.00	50.00		180	--	O	15
22N/01E-17B02	OSLIN, ROBERT	P	109.00	43.50		180	104	S	45
22N/01E-17C01	KULIGOWSKI	H	104.00	56.00		190	--	--	45
22N/01E-17C02	WHITE, ROBERT	H	118.00	64.00		200	--	O	18
22N/01E-17D01	WILLOUGHBY, WARREN	H	137.00	94.00		250	133	S	40
22N/01E-17F01	DANCEL, C. A	H	124.00	84.00		230	121	S	40
22N/01E-17K01	FENTON, EDWIN W	H	73.00	40.00		205	69	S	40
22N/01E-17N02	PFLUGRAD, LESTER	H	163.00	126.00		310	158	S	15
22N/01E-17R01	FENTON, BRYON	H	45.00	2.00		105	40	S	30
22N/01E-20A01	JONES, BOB	U	107.00	89.00		95	--	--	15
22N/01E-20B01	FINCH, DR JOHN	H	40.00	8.00		120	35	S	20
22N/01E-20B02	STARKEY, HARRY	H	79.50	49.50		170	--	O	20
22N/01E-20J01	WINJUM, FRANK	H	80.00	60.00		100	75	S	30
22N/01E-20R01	GAUTHIER, STANLEY H	H	76.00	44.00		65	71	--	20
22N/01E-20R02	SHAFER, KEITH	H	49.00	17.00		70	44	S	30
22N/01E-21A01	KNUTSON, DENNY	H	123.00	97.00		220	--	--	20
22N/01E-21B01	HOOVER, AL	H	157.00	107.00		200	--	O	20
22N/01E-21B02	CARNEGIE, LEE R	H	110.00	79.00		175	--	[illegible]	20
22N/01E-21B03	MORGAN, LARRY H	H	64.50	42.50		170	--	O	30
22N/01E-21C01	WOOD, STEVEN	H	86.00	50.00		160	--	--	10
22N/01E-21D02	RANISHAW, WILLIAM R	--	116.00	53.00		160	111	S	30
22N/01E-21F01	NOBLE, JACK T	H	60.00	30.00		140	55	S	45
22N/01E-21G01	CRAGUN, MURT[illegible]	H	183.00	153.00		280	179	S	10
22N/01E-21H01	TIETZ, WARREN	H	205.00	177.00		290	203	S	15
22N/01E-21H02	TIETZ, WARREN	U	40.70	36.90		275	--	O	--
22N/01E-21K01	HARBOR WATER CO, MIL.MNTRB	P	232.60	168.00		280	223	S	30
22N/01E-21K02	HARBOR WATER CO, MIL.MNTRB	P	231.00	168.00		280	221	S	225
22N/01E-21M02	RAMSEY, SHAO	H	72.00	36.00		95	--	--	30
22N/01E-21N01	GONZALES, JIM L	H	63.00	--		70	--	O	10
22N/01E-21P01	SIEBOLD, KLAUS	H	258.00	235.00		240	--	--	25
22N/01E-22A01	STEPLETON, LLOYD	H	87.00	50.00		290	82	S	30
22N/01E-22A03	AGATRO WATER SY	P	153.00	80.00		300	--	S	35
22N/01E-22B02	KUPKA, MERLE	H	115.00	75.00		300	110	S	20
22N/01E-22B03	KILGORE, DON	H	106.00	90.00		318	102	S	10
22N/01E-22D01	JESSEN, CARL	H	192.00	174.00		290	--	O	8.0
22N/01E-22J01	JOHNSON, KNUTE	H	228.00	213.00		215	--	O	7.0
22N/01E-22L01	HARBOR WATER CO, WAUNA SHRS	P	296.00	202.00		285	288	S	50
22N/01E-22Q01	HARBOR WATER CO, WAUNA SHRS	P	326.00	274.00		280	316	S	44
22N/01E-22R01	LANE, CHUCK	H	54.00	15.00		40	--	--	20
22N/01E-23B01	MCLAIN	H	125.00	--		80	--	--	--
22N/01E-23B02	BESTWICK, ORVILLE	H	116.00	100.00		110	--	O	10
22N/01E-23B03	JOHNSON, WILLIAM S	H	153.00	61.00		100	--	--	40
22N/01E-23C01	HARBOR WATER CO, WAN VST-1	P	140.00	110.00		225	130	S	35
22N/01E-23D01	MILLER	H	108.00	59.00		260	103	S	18
22N/01E-23D02	ARTIS, RALPH	H	290.00	254.00		270	--	O	10
22N/01E-23K01	BOOTHE, EARL	H	45.00	7.00		15	40	S	7.0
22N/01E-23L02	BROCHNER, R	H	96.00	--		40	--	--	--
22N/01E-23L03	GOLDMAN, E	H	87.00	--		45	--	--	--
22N/01E-23M01	HARBOR WATER CO, EMERALD SH	P	312.00	242.00		250	248	P	250

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
--	--		C	P	--
1.0	1.0	G	C	P	--
1.5	1.0	G	U	P	DRILLED TO 80 FT.
5.0	1.0	G	C	P	--
2.0	1.0	G	U	S	--
0.3	1.0	G	U	S	DRILLED TO 132 FT.
1.5	--	G	U	S	DRILLED TO 141 FT.
0.2	5.0	G	C	P	DEEPENED EXISTING 189 FT WELL IN 1971 IN ATTEMPT TO FIND BETTER QUALITY WATER.
--	--	G	C	S	--
1.0	1.0	G	U	S	FLOWS 12 GAL/MIN.
0.3	1.0	G	C	P	--
0.2	1.0	G	U	P	--
40.0	5.0	G	U	S	DRILLED TO 178 FT.
1.5	1.0	G	U	S	--
2.0	1.0	G	U	S	--
1.0	0.5	G	U	P	--
0.3	1.0	G	C	P	--
--	--	G	U	P	--
0.8	1.0	G	C	C	--
1.7	2.0	G	U	C	--
0.6	--	G	U	C	--
0.6	2.0	G	C	P	--
2.1	4.0	G	U	S	DRILLED TO 214 FT.
1.7	1.5	G	C	P	AT 105 GAL/MIN, FOR 1½ HOURS, SPECIFIC CAPACITY WAS 1.8 (GAL/MIN)/FT.
1.7	1.0	G	U	C	--
3.1	4.0	G	C	S	WATER LEVEL AT LEAST 6 FT ABOVE LAND SURFACE.
5.0	1.0	G	U	[illegible]	--
3.3	1.0	G	U	S	--
3.0	2.0	G	C	[illegible]	--
2.8	4.0	G	[illegible]	S	--
1.1	4.0	G	C	C	AFTER 1 AND 2 HOURS, SPECIFIC CAPACITIES WERE 2.2 AND 1.5 (GAL/MIN)/FT, RESPECTIVELY.
15.0	4.0	G	U	S	--
45.0	1.0	G	U	[illegible]	--
2.9	1.0	G	C	S	--
4.5	1.0	G		S	--
20.0	2.0	G	U	[illegible]	--
3.3	2.5	G	C	S	--
8.0	2.0	G	C	S	--
[illegible]	1.0	G	U	C	--
2.7	1.0	G	U	S	--
15.0	1.0	G	C	P	--
2.5	1.0	G	U	S	--
--	--	G	U	S	--
30.0	1.0	G	[illegible]	P	--
2.0	2.0	G	C	P	--
[illegible]	1.5	G	U	P	--
[illegible]	1.5	G		S	--
2.2	1.5	G	U	S	--
--	--	G	U	S	--
[illegible]		G	U	[illegible]	--
[illegible]	[illegible]	G	C	S	--
15.0	[illegible]	G	U	[illegible]	ATTEMPTED DEVELOPMENT AT [illegible]5 FT; UNSUCCESSFUL
[illegible]	[illegible]	[illegible]	[illegible]	S	--
[illegible]	[illegible]			S	DRILLED TO 185 FT
15.0	3.0		C	S	--
--	--		C	[illegible]	DRY IN 1977; LATER RECOVERED. REPLACED BY WELL 22/1-21H1.
[illegible]	2.0	G	U	[illegible]	--
8.0	3.2	G	[illegible]	S	AT 30 GAL/MIN, FOR 2 HOURS, SPECIFIC CAPACITY WAS 30.0 (GAL/MIN)/FT.
5.0	1.0	G	C	S	--
0.3	1.0	G	U	P	--
--	1.0	G	U	P	--
10.[illegible]	1.0	G	C	[illegible]	DRILLED TO 91 FT.
--	2.5	G	U	[illegible]	DRILLED TO 155 FT.
1.3	1.0	G	U	[illegible]	DRILLED TO [illegible]16 FT.
2.0	1.0	G	C	C	--
1.5	2.0	G	C	S	--
3.5	2.0	G	C	P	--
2.9	1.0	G	C	P	--
2.6	--	G	U	P	AT 24 GAL/MIN, SPECIFIC CAPACITY WAS 3.4 (GAL/MIN)/FT
1.3	1.0	G	C	P	--
--	--		C	P	--
[illegible]	1.0	G	[illegible]	P	DRILLED TO 124 FT.
[illegible]	1.0	G	U	P	--
35.0	1.5	G	C	S	--
0.5	[illegible]	G	U	C	--
[illegible]	[illegible]	G	U	P	--
[illegible]	2.0	G	U	P	--
--	--		C	P	--
--	--		C	[illegible]	--
--	4.0	G	C	[illegible]	PERFORATED FROM 24[illegible] TO 303 FT.

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)		ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)	
22N/01E-23M02	ROBBIN-GUTHRIE	H	163.00	136.00		140	158	S	30	
22N/01E-23P01	NICOLAI, EUGENE R	H,I	65.00	42.00		50	--	O	20	
22N/01E-24A01	KOOLEY, DALE	P	316.00	181.00		300	301	S	220	
22N/01E-24B01	PENINSULA HIGH	T	158.00	45.00		165	154	--	157	
22N/01E-24B02	PENINSULA SCH	T	269.00	152.00		190	245	S	200	
22N/01E-24C01	PENINSULA HIGH	U	153.00	33.00		75	--	--	60	
22N/01E-24C02	PENINSULA SCH	T	105.00	0.00		120	--	--	60	
22N/01E-24D01	WESTERN OYST CO	N	102.00	--		5	--	--	--	
22N/01E-24D02	PETERSON, DON	H	75.13	18.48+		10	--	--	50	F
22N/01E-24D03	JOHNSTON, SARAH	H	64.00	21.00		25	59	S	12	
22N/01E-24K01	CLAWSON, RICH	H	100.50	40.00		140	96	S	10	
22N/01E-24L01	PAGLIA, JOHN A	H	154.00		F	20	--	O	60	
22N/01E-24P01	HILLARD, KEN	H	101.00	46.00		60	97	S	10	
22N/01E-24P02	WILSON, ALEX	H	160.00		F	20	155	S	15	
22N/01E-24Q01	MCGAUGHEY, C. P	P	109.00	19.00		130	--	--	20	
22N/01E-24Q02	ELMORE, ERNEST	P	149.00	30.00		150	140	S	310	
22N/01E-24Q03	FRAME, DAN	H	225.00	187.00		200	220	S	20	
22N/01E-24R01	MCLEES, ZACK	H	159.00	113.00		220	154	S	15	
22N/01E-25C02	HOGEBERG, BART	H	130.00	40.00		50	--	O	--	
22N/01E-25C03	WOODSHORE APTS.	P	475.00		F	80	--	O	28	
22N/01E-25F01	HARBOR WATER CO, QISTORF-1	P	60.00	4.60+		30	53	S	60	
22N/01E-25F02	HARBOR WATER CO, QISTORF-2	P	57.00	4.60+		30	52	S	60	
22N/01E-25K01	MITCHELL, ROBERT R	H	278.00	187.00		200	273	S	18	
22N/01E-25P01	GHP, TOM ORSER	P	234.00	120.00		260	224	S	75	
22N/01E-25Q01	RAMBO, CLARE	H	66.00	18.00		115	--	O	30	
22N/01E-25R01	SAVAGE, BERTHA P	H	153.00	68.00		120	--	O	20	
22N/01E-25R02	PERELLI, JACK	P	240.00	176.00		200	230	S	260	
22N/01E-26Q01	MCDANIEL	H	67.00	41.00		45	--	--	12	
22N/01E-26R02	HIGGENS, LEN	H	102.00		F	5	--	P	--	
22N/01E-26R03	LAGERQUIST, G A	H	70.00		F	15	--	--	--	
22N/01E-26R04	JERMY, FRANCIS	H	128.00	20.00		20	--	O	35	
22N/01E-27D01S	--	U	--	--		170	--	--	10	F
22N/01E-28A01	HENDERSON, LAND CO	P	280.00	182.00		230	270	S	126	
22N/01E-28A01S	--	U	--	--		195	--	--	0.50	F
22N/01E-28C01S	--	U	--	--		150	--	--	15	F
22N/01E-28D02	SEHMEL, CHARLES	U	292.00	207.00		255	289	S	--	
22N/01E-28D03	SEHMEL, CHARLES	U	223.00	30.00		70	--	O	39	
22N/01E-28L01	SMITH, O C	H	104.00	--		40	--	--	--	
22N/01E-28L02	BRAMHALL, J O	H	300.00	--		40	--	--	--	
22N/01E-28N01	LYLE	H	158.00	--		20	--	--	--	
22N/01E-28N02	SEVEREID, BURTON H	H	142.00	127.00		130	--	O	10	
22N/01E-28N03	THOMPSON, ROBERT F	H	124.00	60.00		70	119	S	17	
22N/01E-29A01	TURNBULL, C	H	106.00	15.00		55	104	S	10	
22N/01E-29A03	COLLIER, M.	H	50.00	17.00		50	46	S	7.0	
22N/01E-29A04	ELLIS, DAVID L	H	78.00	12.00		55	73	S	15	
22N/01E-29B01	FINCH, JOHN G	H	115.00	65.00		85	110	--	20	
22N/01E-29E01	WRIGHT, ROBERT C	H	188.00	156.00		230	--	--	14	
22N/01E-29E02	LEWIS, LLOYD A	H	137.00	120.00		185	--	O	15	
22N/01E-29E03	HARBOR WATER CO	P	196.00	160.00		230	193	S	52	
22N/01E-29G01	ENDICOTT	H	85.00	67.00		100	79	S	15	
22N/01E-29G02	EDWARDS, LARRY	H	60.00	44.00		100	--	--	20	
22N/01E-29G03	EYRISH, JACK	H	62.00	5.00		30	57	S	15	
22N/01E-29H01	SULLIVAN, DOUGLAS	H,I	148.00	18.50+		44	143	S	30	
22N/01E-29H02	SEHMEL, WILLIAM	H	135.00	10.00+		40	--	O	60	
22N/01E-29H03	MEDAK, WARREN J	H,I	170.00		F	38	165	S	60	
22N/01E-29J01	MANLEY	H	60.00	25.00		25	--	--	--	
22N/01E-29J02	MEDAK, WARREN J	H	103.00	--		30	99	S	15	
22N/01E-29J03	MILLION&CRAWFRD	H	100.00	--		30	--	--	--	
22N/01E-29J04	GYLLING	H	63.00	--		25	--	--	--	
22N/01E-29J05	MCCONNELL	H	68.00	--		20	--	--	--	
22N/01E-29J06	STROME	H	70.00	--		20	70	S	--	
22N/01E-29J07	SEHMEL	--	140.00		F	25	--	--	--	
22N/01E-29J08	SNOWDEN, DONALD J	H	74.00	50.00		60	71	S	15	
22N/01E-29M01	RUBY, EARL	H	178.00	135.00		210	173	S	35	
22N/01E-29M02	PETERSON, ELISA	H	188.00	158.00		235	183	S	30	
22N/01E-29M03	CANALES, PETE R	H	210.50	149.00		225	207	S	20	
22N/01E-29N01	JOHNSON, LYNNE	H	205.00	95.00		155	201	P	10	
22N/01E-29P01	CUMBIE, GARY	H	151.50	72.00		130	--	O	40	
22N/01E-29Q01	SIBURG, JIM JR	H	135.00	31.00		100	130	S	10	
22N/01E-29Q02	WIKSTEN, HAROLD E	H,I	138.00	63.00		120	133	S	60	
22N/01E-29Q03	CAMERON, WILLIAM	H	102.00	80.00		125	98	S	18	
22N/01E-32A02	TORGESON, K O	H	80.00	--		45	--	--	--	
22N/01E-32A03	FINCH, DR. JOHN	H	80.00	47.00		50	--	O	15	
22N/01E-32F01	ELKINS, V. R	H	119.50	73.00		90	114	S	10	
22N/01E-32F02	MINTER BEACH ES	P	254.00	137.00		150	251	S	30	
22N/01E-32G01	MILLER, ROGER E	P	320.00	134.00		140	247	P	33	
22N/01E-32H01	MINTERBROOK CO	P	173.00	76.00		90	--	--	20	
22N/01E-32H02	CLARK & OWENS, INC	P	194.00	97.00		110	189	S	36	
22N/01E-32P01	HARFST, VIRGIL	H	80.00	--		20	--	--	--	
22N/01E-32P02	VISELL, ALDEN	H	80.00	--		20	--	--	--	

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
30.0	3.0	G	C	P	DRILLED TO 170 FT.
10.0	1.0	G	U	P	--
7.7	5.0	G	C	S	DRILLED TO 317 FT. AFTER 1½ AND 3 HRS., SPECIFIC CAPACITIES WERE 8.5 and 7.7 (GAL/MIN)/FT, RESPECTIVELY. AT 60 GAL/MIN, FOR 4 HOURS, SPECIFIC CAPACITY WAS 12.0 (GAL/MIN)/FT.
2.2	4.0	G	C	S	--
3.2	1.0	G	U	P	--
0.8	--		C	P	--
--	--	G	U	S	--
--	--		C	P	--
2.7	--	G	U	P	DRILLED TO 85 FT.
0.6	1.0	G	U	P	--
0.3	1.0	G	U	S	--
--	--	G	U	P	--
0.3	1.0	G	U	P	--
0.8	2.0	G	U	P	--
1.1	2.0	G	C	S	--
4.9	2.0	G	U	S	AFTER 1½ HOURS, SPECIFIC CAPACITY WAS 5.3 (GAL/MIN)/FT.
1.5	1.0	G	U	P	--
1.2	1.0	G	U	S	--
--	--		C	P	--
1.8	2.0	G	C	P	--
1.9	4.0	G	C	P	FLOWS 10 GAL/MIN.
1.8	4.0	G	C	P	FLOWS 10 GAL/MIN.
4.5	1.0	G	U	P	--
75.0	4.0	G	U	S	--
2.5	1.0	G	U	S	--
0.7	1.0	G	U	P	--
18.6	5.0	G	U	P	--
1.3	1.0	G	[illegible]	P	DRILLED TO 69 FT.
--	--		C	P	--
--	--		C	P	--
35.0	2.0	G	C	P	--
--	--		C	C	--
4.6	2.0	G	C	P	AFTER 1 HR., SPECIFIC CAPACITY WAS 4.7 (GAL/MIN)/FT. AT 50 GAL/MIN, FOR 7 HOURS, SPECIFIC CAPACITY WAS 8.3 (GAL/MIN)/FT.
--	--		C	C	--
--	--		C	C	--
--	--	G	C	P	--
0.8	2.0	G	C	P	--
--	--		C	P	--
--	--		C	P	--
--	--		C	P	--
10.0	1.0	G	U	P	--
0.9	1.0	G	U	P	DEEPENED EXISTING 53 FT WELL IN 1974. AT [illegible]3 FT, WATER LEVEL WAS 12 FT, AND SPECIFIC CAPACITY WAS 1.2 (GAL/MIN)/FT.
0.1	1.5	G	C	P	
0.5	3.0	G	U	P	DRILLED TO 51 FT.
0.4	1.0	G	C	P	--
2.0	1.0	G	U	P	--
7.0	3.0	G	U	S	DRILLED TO 189 FT.
5.0	4.0	G	[illegible]	S	--
9.6	4.0	G	[illegible]	S	AT 20 GAL/MIN, FOR 2 HOURS, SPECIFIC CAPACITY WAS 10.0 (GAL/MIN)/FT.
5.0	1.0	G	U	S	DRILLED TO 87 FT.
[illegible]	1.0	G	U	S	--
0.4	1.0	G	U	P	--
1.0	1.0		U	P	DEEPENED EXISTING 141 FT WELL IN 1976.
6.0	[illegible]	[illegible]	U	P	--
[illegible].3	[illegible]	G	U	P	AT 30 GAL/MIN, SPECIFIC CAPACITY WAS 1.8 (GAL/MIN)/FT. FLOWS 7½ GAL/MIN.
--	--		C	P	--
[illegible]	[illegible].0	G	C	[illegible]	DRILLED TO [illegible] FT.
--	--		C	P	--
--	--		C	P	--
--	--		C	P	--
--	--		[illegible]	P	--
--	--		C	P	--
[illegible]	1.0	G	[illegible]	P	--
3.5	[illegible].0	G	C	S	--
30.[illegible]	1.0	G	U	S	--
0.5	1.0	G	U	S	--
[illegible]	3.0	G	U	P	--
[illegible]	1.0	G	U	P	--
[illegible]	2.0	G	U	P	--
2.[illegible]	1.0	G	U	P	AT 30 and 45 GAL/MIN, SPECIFIC CAPACITIES WERE 2.7 AND 2.4 (GAL/MIN)/FT, RESPECTIVELY.
2.[illegible]	4.0	G	U	P	--
--	--		[illegible]	P	--
[illegible]	1.0	G	U	P	--
[illegible].5	1.0	G	C	P	--
[illegible]	1.0	G	C	P	--
[illegible].0	--	G	U	P	PERFORATED FROM 247 TO 262 FT. MINTERBROOK ESTATE.
[illegible].3	1.0	G	C	P	--
7.2	1.0	G	U	P	--
--	--		C	P	--
--	--		C	P	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
22N/01E-32P03	HALL, JOE	H	90.00	--	20	--	--	--
22N/01E-32P04	PEPPER	H	65.00	--	20	65	S	--
22N/01E-32P05	ZUMHOFF, NORMAN	H	179.00	39.00	50	175	S	20
22N/01E-34J01	HOLMES, ROBERT	H	121.00	35.00	40	--	--	20
22N/01E-34J02	PETERSON	H	--	--	50	--	--	--
22N/01E-34J03	VERGOWE, COYE	H	91.00	11.00	21	--	--	8.0
22N/01E-34J04	THOMAS, DAVID B	H	136.00	34.00	50	--	O	45
22N/01E-34Q01	SCOTT, ROBERT	H	108.00	40.00	80	103	S	25
22N/01E-34Q02	BENEDETTI, AL	H	66.00	24.00	30	--	P	--
22N/01E-34Q03	HURKEY	H	93.00	38.00	40	--	--	20
22N/01E-34Q04	BAKER, GENE	H	95.00	45.00	45	--	O	15
22N/01E-34Q05	CLARKE, JOSEPH	H	117.50	40.00	80	113	S	30
22N/01E-34R01	IVEEN, DAN	H	175.00	--	30	--	--	--
22N/01E-34R02	STANCICH, GLORIA V	H	167.00	110.00	120	162	S	15
22N/01E-34R03	MCGIRK, L R	H	135.00	--	100	132	S	15
22N/01E-34R04	ALLARD, DAVE	H	139.00	64.00	90	135	S	25
22N/01E-35A01	BOSTIAN, MADELIN	H	135.00	40.00	70	--	O	10
22N/01E-35A02	BOCHN, JOHN	H	141.00	99.00	120	--	O	20
22N/01E-35C01	READING, F. W	H	114.00	37.00	70	111	S	40
22N/01E-35G01	PAYSENO, JAMES	H	165.00	132.00	180	162	S	20
22N/01E-35G02	MAYBERRY	H	86.33	71.00	120	--	--	13
22N/01E-35G03	WAINWRIGHT, JAMES	H	161.00	133.00	190	157	S	20
22N/01E-35H02	TODD, GARY	H	48.00	29.00	95	43	S	8.5
22N/01E-35H03	PICK, HOWARD	H	89.50	32.00	115	85	S	15
22N/01E-35J02	NILSEN, LESTER A	H	120.00	87.00	160	111	S	20
22N/01E-35J03	S&I DVLPMT	P	151.00	74.00	155	141	S	50
22N/01E-35L01	MATTERS, MIKE	H	150.00	76.00	150	145	S	30
22N/01E-35L02	MITTON	H	163.00	82.00	115	158	S	30
22N/01E-35L03	ROSE, KEN	H	154.00	126.00	175	149	S	15
22N/01E-35M01	JORDAL, DAVID G	H	154.00	69.00	100	148	S	20
22N/01E-35M02	BENSON, EARL	H	225.00	90.00	120	220	S	15
22N/01E-35N02	RITCHIE, COLIN	H	126.00	62.00	77	121	S	30
22N/01E-35N03	KAUPPILA, JERRY	H	256.50	84.00	90	252	S	30
22N/01E-35P01	YOUNG, DONALD W	H	116.00	71.00	130	112	S	6.0
22N/01E-35P02	NELSON, VINCE	H	146.00	53.00	130	141	S	11
22N/01E-35Q01	SEHMEL, DONALD A	H,I	136.00	28.00	105	126	S	30
22N/01E-36B01	SWEDE HILL WTR.	P	80.00	--	265	80	P	--
22N/01E-36B02	MATTERN, JIM	H	102.00	58.00	250	97	S	--
22N/01E-36E01	LEWIS, H. W	H	163.00	132.00	240	158	S	20
22N/01E-36E02	FLOYD, STEVEN	H	150.50	100.00	210	145	S	10
22N/01E-36F01	ERCK, CURTIS	H	158.00	126.00	280	--	O	8.0
22N/01E-36F03	DAHL, KAARE	H	170.00	142.00	280	165	S	14
22N/01E-36J01	WIRTH, CHARLES E	H	297.00	238.00	310	292	S	25
22N/01E-36M01	WOODKE, CHARLES	H	59.00	16.00	150	52	S	15
22N/01E-36M02	HANSON, BETTY C	H	226.00	175.00	250	221	S	30
22N/01E-36R01	WASH.STATE WMNS. CORRECT CN	T	351.00	235.00	315	338	S	107
22N/01E-36R02	WASH.STATE WMNS. CORRECT CN	T	501.00	262.00	330	444	S	50
22N/02E-16C01	MAST	H	163.00	137.00	265	158	S	10
22N/02E-16C02	WALLER, JOEL A	H	401.00	234.00	268	396	S	12
22N/02E-16D01	LINDER, CARL E	H	58.00	15.00	270	36	S	12
22N/02E-16E01	THOMAS	H	195.00	144.00	250	--	S	20
22N/02E-16F01	VAN RYN, ROBERT	H	155.00	120.00	265	150	S	20
22N/02E-16G01	ELLINGSON, RALPH	H	166.00	133.00	285	162	S	10
22N/02E-16G02	KOPCZICK, DONALD J	H	180.00	152.00	280	175	S	10
22N/02E-16L01	BUNDY, JOHN C	H	92.00	45.00	190	88	S	15
22N/02E-16L02	WARREN CONST.	P	316.00	272.00	315	--	O	20
22N/02E-16M01	HALE, SIG	H	199.00	89.00	180	194	S	30
22N/02E-16N01	KNIGHTON, D [illegible] LL	H	27.00	1.00	170	--	--	7.0
22N/02E-16N02	BISCEGLIA, JOHN	H	131.00	95.00	275	126	S	7.0
22N/02E-16P01	KNOX, ROBERT A	H	130.00	110.00	338	120	S	15
22N/02E-17A01	HART	P	90.00	45.00	360	85	S	40
22N/02E-17A02	BROWN, HARVEY	H	86.00	46.00	365	82	S	10
22N/02E-17E01	DELAPP, PATRICK	H	49.00	20.00	392	--	--	25
22N/02E-17E02	HUCHAFY, JOHN	H	85.00	30.00	385	80	S	18
22N/02E-17E03	WISEMAN, RICHARD	H	53.00	25.00	390	48	S	25
22N/02E-17F01	CHILDERS, DAVID	H	61.00	35.00	400	55	S	10
22N/02E-17G01	HORTON, LLOYD	H	89.00	54.00	340	84	S	10
22N/02E-17J01	FISCHER, WILLI	H	114.00	F	240	68	S	10
22N/02E-17M01	VERNAM, GLORIA	H	153.00	115.00	350	148	S	20
22N/02E-17M02	SPRAGUE, JAMES C	H	155.00	126.00	340	150	S	16
22N/02E-17M03	COOPER, RICK	H	170.00	139.00	360	167	S	10
22N/02E-17N03	ROPER	H	111.00	100.00	310	--	--	10
22N/02E-17N04	FENSTAMAKER, DAVID M	H	133.80	111.00	320	132	S	10
22N/02E-17N05	HOLLAND, JAMES L	H	108.00	94.00	330	103	S	18
22N/02E-17P01	DARLAND, JAMES W	H	72.00	16.00	270	--	--	10
22N/02E-17P02	BLAKE, DAVID	H	75.00	54.00	290	--	O	20
22N/02E-17P03	HALL, RALPH	H	116.00	102.00	340	--	O	15
22N/02E-17Q01	VLALIOVICH, MIKE	H	79.00		210	76	S	5.0
22N/02E-17R01	JOHNSON, ERNEST	H	72.00	27.00	175	58	S	15
22N/02E-17R02	RUDSIT, JIM	H	63.00	0.00	170	58	S	8.0

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
--	--		C	P	--
--	--		C	P	--
0.3	1.0		U	P	--
0.7	--		C	P	--
--	--		C	P	--
0.4	--	G	C	P	--
2.7	1.0	G	U	P	--
0.6	2.0	G	U	P	--
--	--		C	P	--
1.4	--		C	P	--
1.3	3.0	G	C	P	DRILLED TO 97 FT.
1.0	2.0	G	C	P	DRILLED TO 119 FT.
--	--		C	P	--
3.0	1.0	G	U	P	--
0.4	2.0	G	C	P	--
4.2	2.0	G	U	P	--
0.5	1.0	G	U	P	--
2.0	4.0	G	U	P	--
1.1	1.0	G	U	P	--
2.9	6.0	G	U	S	--
13.0	1.0	G	U	S	--
2.0	1.0	G	U	S	--
0.6	1.0	G	C	S	DRILLED TO 53 FT.
0.8	4.0	G	U	S	DEEPENED EXISTING 58 FT WELL IN 1973.
2.0	3.0	G	U	S	DEEPENED EXISTING 46 FT WELL IN 1967. DRILLED TO 121 FT.
3.9	4.0	G	U	S	--
2.7	1.0	G	C	S	DRILLED TO 151 FT.
1.4	1.0	G	U	P	--
1.4	1.0	G	U	S	--
3.3	2.5	G	U	P	--
0.5	1.0	G	U	P	--
1.0	1.0	G	C	P	--
0.5	1.0	G	U	P	DRILLED TO 259 FT.
0.2	8.0	G	U	S	--
0.3	4.0	G	U	S	--
7.5	4.0	G	U	S	DEEPENED EXISTING 49 FT WELL IN 1974. AT 49 FT, WATER LEVEL WAS 27 FT AND SPECIFIC CAPACITY WAS 2.5 (GAL/MIN)/FT.
--	--		C	C	--
--	--	G	U	C	--
1.7	1.0	G	U	S	--
0.4	2.5	G	U	S	DRILLED TO 156 FT.
0.5	4.0	G	C	S	DRILLED TO 300 FT.
4.7	1.0	G	U	S	DRILLED TO 172 FT.
12.5	1.0	G	[illegible]	[illegible]	--
0.5	1.0	G			--
7.5	--	G	U	[illegible]	--
2.0	1.0	G	U	P	DRILLED TO 359 FT.
0.6	4.0	G	U	P	DRILLED TO 511 FT.
2.0	1.0	G	C	S	--
0.1	3.0	G	C	C	--
0.4	2.0	G	C	C	--
[illegible]	[illegible]	G		[illegible]	DRILLED TO 196 FT.
[illegible]	2.0	G	U	[illegible]	DRILLED TO [illegible]4 FT.
[illegible]	[illegible]	[illegible]		S	DRILLED TO 162 FT.
[illegible]	3.5	[illegible]			--
[illegible]	1.0	G	[illegible]		-
1.[illegible]	1.0	G	U	P	--
6.[illegible]	1.0	[illegible]	[illegible]	P	--
0.[illegible]	1.0	G		S	--
0.2	1.0	G		S	--
2.5	1.0	G	C	S	DRILLED TO 133 FT.
1.6	--	G	[illegible]	C	--
0.5	2.0	G	U	C	--
3.1	1.0	G	C	C	--
0.5	1.0	G	[illegible]	C	--
1.6	1.0	G	U	C	-
0.7	1.0	G	U	C	--
1.7	1.0	G	U	C	DRILLED TO 119 FT. PERFORATED FROM 68 TO 78 FT. SCREENED FROM 110 TO 114 FT.
0.1	--	G	C	S	DRILLED TO 154 FT.
1.5	1.0	G	U	S	--
5.3	2.0	G	U	S	--
1.3	1.0	G	U	S	--
10.	1.0	G	U	S	--
2.5	1.0	G	U	S	DEEPENED EXISTING 111 FT WELL IN 1977.
1.5	[illegible]	G	U	S	--
0.2	1.0	G	C	S	--
5.0	1.0	G	U		--
7.5	1.5	G	C	S	--
0.[illegible]	1.0	G	U	[illegible]	DRILLED TO 64 FT
0.5	2.0	G	U	S	ATTEMPTED DEVELOPMENT AT 63 FT; UNSUCCESSFUL.
0.2	2.0	G	[illegible]	[illegible]	--

LOCAL NUMBER	OWNER	USE OF WATER	DEPTH OF WELL (FEET)	WATER LEVEL (FEET)	ALTITUDE OF LAND SURFACE (FEET)	DEPTH TO FIRST OPENING (FEET)	FINISH	DISCHARGE (GALLONS PER MINUTE)
22N/02E-18H01	WALSH	H	249.00	162.00	380	239	S	60
22N/02E-18H02	HORNBAKER, DEAN F	H	260.00	175.00	390	--	O	10
22N/02E-18H03	WIRE, MIKE	H	67.00	28.00	375	62	S	20
22N/02E-18M01	BECK, JAMES A	H	197.00	157.00	345	--	O	3.0
22N/02E-18N01	MURRAY, DAVE	H	274.00	195.00	305	269	S	20
22N/02E-19B01	HARBOR WATER CO, TALMO GRN	P	116.00	--	340	--	--	--
22N/02E-19C01	GROESCHELL, GERHARD	H	138.00	111.00	330	--	O	10
22N/02E-19C02	BURNEY, BILL	P	314.00	195.00	330	304	S	60
22N/02E-19F01	PURDY HILLS	P	162.00	123.00	310	156	S	40
22N/02E-19H01	BENDER, THOMAS	H	146.00	118.00	300	142	S	15
22N/02E-19J01	THOMPSON, STEVEN S	P	125.50	60.00	330	121	S	40
22N/02E-19R01	SHAFF, DONALD C	H	168.00	150.00	343	--	O	15
22N/02E-19R02	MURRAY, WILLIAM J	H	169.00	154.00	343	--	O	15
22N/02E-20C01	BROWN, CLYDE	H	106.00	64.00	320	101	S	30
22N/02E-20E01	HALBERT	H	64.50	27.00	295	60	S	20
22N/02E-20E02	CAIN, CHARLES	H	58.00	31.00	287	--	--	20
22N/02E-20E03	MAC PHERSON, J.	H	60.00	25.00	290	57	S	15
22N/02E-20E04	MILLER, JAMES H	H	100.00	49.00	305	--	--	30
22N/02E-20G01	CARVEY, STEVE	H	70.00	36.00	180	65	S	15
22N/02E-20L01	LINDHOLM, ERIK	H	56.00	15.00	150	51	S	8.0
22N/02E-20M02	KUHN, JOHN J	H	150.00	115.00	305	--	O	20
22N/02E-20N01	HARBOR WATER CO, EVRGRN HT	P	142.50	92.00	300	130	S	40
22N/02E-20Q01	SPADONI BROS.	N,H	128.00	15.00	165	123	S	45
22N/02E-21B01	HARBOR WATER CO, COLVOS HT	P	164.00	134.00	280	154	S	20
22N/02E-21B02	HOLMAS	P	250.00	200.00	310	--	S	50
22N/02E-21Q01	TALMO INC.	U	430.00	300.00	305	416	S	40
22N/02E-22M01	PT RICHMOND DEV	P	--	--	15	--	--	--
22N/02E-22M02	HARBOR WATER CO	P	75.00	31.00	45	70	S	90
22N/02E-27D01	HOGARTH, KEITH	H	214.00	171.00	190	210	S	15
22N/02E-28A01	MEADS, JOHN	H	285.00	258.00	300	--	--	20
22N/02E-28J01	HAYES	H	190.00	--	150	--	--	--
22N/02E-29A02	MURPHY, DOUGLAS	H	160.00	120.00	230	155	S	8.0
22N/02E-29B01	LOESCHE, FRANK	H	85.00	31.00	210	80	S	10
22N/02E-29B02	FAZIO, JIM	H	45.00	15.00	170	41	S	15
22N/02E-29C01S	--	U	--	--	155	--	--	50 F
22N/02E-29E01	HARBOR WATER CO, FIRWOOD	P	303.00	121.00	265	297	S	30
22N/02E-29E02	NEWMAN, STEVE	H	169.00	140.00	330	--	O	13
22N/02E-29G01	NELSON, FRED J	H	61.00	F	150	57	S	30
22N/02E-29G02	MCINTYRE, BILL	H	68.00	33.00	205	65	S	12
22N/02E-29L01	GADBOW, VINCENT	H	56.00	15.00	100	51	S	60
22N/02E-29L01S	--	U	--	--	155	--	--	50 F
22N/02E-29N01	SCANNEL, MIKE	H	136.50	--	310	132	S	30
22N/02E-29N02	KOOLEY, DALE	P	160.50	117.00	310	147	S	83
22N/02E-29Q01	BEAR PRAIRIE	P	85.00	35.00+	70	--	O	125 F
22N/02E-29Q02	SMITH, WESLEY	H	40.00	F	80	30	P	15
22N/02E-30A02	BURGER, LOUIS	H	167.00	148.00	345	--	O	15
22N/02E-30A03	WILLIAMS, ART	H	169.00	--	345	--	O	20
22N/02E-30A04	KERR-MONDE FARM	H	176.67	137.00	345	167	O	40
22N/02E-30G01	HARBOR WATER CO, PCOCK HIL	P	376.00	199.00	295	363	S	60
22N/02E-31H01	HILLCREST, MOBILE PRK	P	197.00	135.00	275	187	S	150
22N/02E-31J01	HARBOR WATER CO, PCOCK HIL	P	324.00	134.00	270	320	S	35
22N/02E-31N01	GRIFFITH, ROBERT E	H	266.00	145.00	210	261	S	20
22N/02E-31P02	JAMIESON, GEORGE C	H	59.00	15.00	130	54	S	15
22N/02E-31Q01	HARBOR WATER CO, DOGWOOD	P	107.00	--	160	--	--	--
22N/02E-31R01	LE DOMAINE RST	C	275.00	145.00	250	--	O	35
22N/02E-32B01	GLACKIN, J B	H	20.00	3.00	80	--	O	--
22N/02E-32B02	PATTERSON, MAURICE W	H	70.00	20.00	80	65	S	13
22N/02E-32D01	HARBOR WATER CO, WOODCREST	P	164.00	125.00	295	156	S	40
22N/02E-32E01	STEVENS	P	165.00	130.00	285	161	S	15
22N/02E-32G01	SEVERTSEN, LLOYD	H	174.00	28.00+	80	--	O	100 F
22N/02E-32K01	LODHOLM, GARY	H	72.00	F	60	--	O	15
22N/02E-32K02	HOLLEY, ROBERT E	H	108.00	37.00	70	--	O	10
22N/02E-32K03	REARDON, DON	H	119.00	40.00	80	114	S	15
22N/02E-32K04	RICHEY, NORM	H	106.00	14.00	100	--	--	20
22N/02E-32K05	RASMUSSEN, HAROLD	H	115.00	22.00	50	--	O	15
22N/02E-32K06	CUTLER, ED	H	100.00	50.00	90	95	S	14
22N/02E-32L01	FORBUSH, KENNETH	H	93.00	F	45	--	O	20
22N/02E-32P01	ALVESTAD, PAUL	H	89.00	--	20	--	O	15
22N/02E-32P02	GIG HARBOR, TOWN OF	P	121.00	F	24	116	S	425
22N/02E-32Q01	HAWKINSON	H	106.00	69.00	80	101	S	20
22N/02E-32Q02	HOOVER & ONEAL	H	76.50	45.00	80	72	S	14
22N/02E-33F01	HARBOR WATER CO, C CLIF	P	331.75	212.00	340	--	S	40
22N/02E-33F02	HARBOR WATER CO, C CLIF UPR	P	351.00	185.00	310	328	O	110
22N/02E-33G01	HYATT, DON	H	58.00	--	30	--	O	--
22N/02E-33G02	HARBOR WATER CO, C CLIF LWR	P	147.00	27.00	30	142	S	33
22N/02E-33N01	TSHIDA, JACK	H	32.50	14.50	340	28	S	12
22N/02E-33N02	SNYDER, HAROLD	H	173.00	152.20	335	--	O	15
22N/02E-33N03	SNYDER, HAROLD	U	39.30	32.60	340	--	O	--
22N/02E-33P01	KRABLER, W H	H	[illegible]	--	340	--	--	--
22N/02E-33P02	SCHUDIN	P	140.[illegible]	[illegible]7.00	25	136	S	50

SPECIFIC CAPACITY (GPM/FT)	PUMPING PERIOD (HOURS)	OTHER DATA AVAILABLE LG	CK	AQUIFER	REMARKS
1.2	1.0	G	C	S	PLANNED USE: PUBLIC SUPPLY
0.3	1.0	G	U	S	--
1.3	1.0	G	U	C	--
0.1	1.0	G	U	S	--
0.8	1.0	G	C	P	LAND RECOVERY INC.; LANDFILL SITE.
--	--		U	S	--
0.6	1.0	G	C	S	DEEPENED EXISTING 53 FT WELL IN 1976.
4.0	1.0	G	C	P	DRILLED TO 315 FT OLYMPIC SUNSET WEST-WILDERNESS CREEK.
40.0	5.0	G	U	S	--
15.0	1.0	G	U	S	--
3.1	2.0	G	C	C	AT 32 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 3.2 (GAL/MIN)/FT.
5.0	1.0	G	U	S	--
15.0	1.0	G	C	S	--
3.3	3.0	G	U	C	--
1.1	1.0	G	C	C	--
1.5	1.0	G	U	C	--
1.1	2.0	G	U	C	--
10.0	2.0	G	C	C	--
1.1	1.0	G	U	S	--
0.2	1.0	G	U	S	--
10.0	2.0	G	U	S	--
2.9	2.0	G	U	S	--
2.3	2.0	G	C	S	--
4.0	2.0	G	C	S	--
1.4	72.0	G	C	S	--
1.1	2.0	G	C	P	DEEPENED EXISTING 286 FT WELL TO 323 FT IN APR 1977. AT 286 FT, WATER USED WAS 229 FT AND SPECIFIC CAP. WAS 13.3 (GAL/MIN)/FT. AT 323 FT, WATER LEVEL WAS 252 FT AND SPECIFIC CAP. WAS 2.9 (GAL/MIN)/FT. DEEPENED IN AUGUST 1977.
--	--		C	P	--
30.0	1.0	G	C	P	--
1.0	1.5	G	U	P	DRILLED TO 215 FT.
4.0	2.0	G	C	P	DRILLED TO 286 FT
--	--		C	P	--
0.4	2.0	G	U	P	--
[illegible].3	1.5	G	U	S	DRILLED TO 89 FT.
[illegible].1	5.0	[illegible]	C	S	--
--	--		C	S	--
0.[illegible]	1.5	G	C	P	--
13.[illegible]	[illegible]	G	C	S	DRILLED TO 170 FT.
1.7	1.0	G	U	S	DRILLED TO 63 FT.
[illegible].8	1.0	G	U	S	--
[illegible].5	1.0	G	U	P	--
--	--		C	S	--
[illegible]	[illegible].5	G	U	S	--
12.9	4.0	G	U	S	AT 40 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 20.0 (GAL/MIN)/FT.
[illegible].6	--	G	C	[illegible]	--
[illegible].5	--		U	P	--
2.5	2.[illegible]	G	C	S	--
[illegible]	1.5	G	C	S	--
[illegible]	1.0	G	[illegible]	S	--
[illegible]	[illegible].0	G		P	DRILLED TO 378 FT.
3.4	[illegible].5	[illegible]	[illegible]	S	AT 76 GAL/MIN, FOR 1 HOUR, SPECIFIC CAPACITY WAS 3.6 (GAL/MIN)/FT
1.2	6.[illegible]	[illegible]	C	[illegible]	--
2.0	[illegible]	G	[illegible]	P	--
0.[illegible]	[illegible]	G	C	S	--
--	--				--
3.[illegible]	--	[illegible]			--
[illegible]				[illegible]	--
	1.0		U	P	--
[illegible]	[illegible]	G	U	S	DRILLED TO 165 FT.
1.[illegible]	[illegible]	G	C	S	--
[illegible]	--	G	U	P	DRILLED TO 175 FT.
[illegible]	4.0	G	U	P	--
	1.5	[illegible]	U	P	--
	3.0	[illegible]	[illegible]	P	DEEPENED EXISTING 179 FT WELL IN 1973.
[illegible]	1.0	G	[illegible]	P	--
0.4	3.0	G	U	P	--
1.2	3.0	G	U	P	--
0.3	3.0	G	U	P	DEEPENED EXISTING 41 FT WELL IN 1977.
1.5	1.0	G	C	P	--
5.6	46.0	G	U	P	FLOWS 20 GAL/MIN.
2.2	1.0	G	U	P	--
1.0	1.0	G	U	P	--
1.5	2.5	G	C	P	DRILLED TO 339 FT.
1.5	72.0	G	C	P	PERFORATED FROM 328 TO 337 FT.
--	--		C	P	--
[illegible].4	--	G	[illegible]	P	DRILLED TO 149 FT.
[illegible].2	4.0	G	C	C	--
15.[illegible]	2.0	G	[illegible]	S	--
--	--		C	C	DRY IN 197[illegible], RECOVERED PRIOR TO APRIL 1978. REPLACED BY WELL 22/2-33N2
--	--		C	S	--
1.1	2.5	G	C	P	DRILLED TO [illegible]

TABLE 12.--Water levels in selected wells (P, pumping; R, recently pumped)

WELL 21N/01E-12D01 SITE NUMBER 471945122374501

HIGHEST WATER LEVEL 22.12 FEET BELOW LAND SURFACE DATUM MAR 05, 1959.

LOWEST WATER LEVEL 32.03 FEET BELOW LAND SURFACE DATUM DEC 04, 1958.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 12, 1951	25.34	MAR 05, 1959	22.12	JAN 19, 1961	28.	SEP 14, 1978	30.
JUL 09, 1958	31.49	APR 03	22.86	OCT 05	30.18	OCT 17	30.7
SEP 04	30.02	JUL 09	28.13	MAR 16, 1978	26.9	NOV 16	31.4
OCT 03	30.95	OCT 20	30.96	APR 14	26.1	DEC 18	31.8
NOV 04	32.01	DEC 16	31.09	MAY 15	26.2	JAN 19, 1979	31.9
DEC 04	32.03	MAR 31, 1960	22.94	JUN 16	26.7	FEB 14	31.5
31	30.40	JUN 03	24.32	JUL 14	27.6	MAR 14	27.7
JAN 27, 1959	24.64	SEP 27	30.00	AUG 14	28.9		

WELL 21N/01E-12D02 SITE NUMBER 471946122374701

HIGHEST WATER LEVEL 30.8 FEET BELOW LAND SURFACE DATUM MAY 16, 1978.

LOWEST WATER LEVEL 36.1 FEET BELOW LAND SURFACE DATUM JAN 19, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14, 1978	31.7	JUL 14, 1978	32.1	NOV 16, 1978	35.6	MAR 14, 1979	31.7
APR 14	30.9	AUG 14	33.3	DEC 18	35.9		
MAY 16	30.8	SEP 14	34.3	JAN 19, 1979	36.1		
JUN 16	31.3	OCT 17	34.9	FEB 14	35.7		

WELL 21N/01E-12D03 SITE NUMBER 471943122373201

HIGHEST WATER LEVEL 197.5 FEET BELOW LAND SURFACE DATUM APR 14, 1978.

LOWEST WATER LEVEL 198.2 FEET BELOW LAND SURFACE DATUM MAR 16, 1978.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 16, 1978	198.2	JUL 14, 1978	197.6	NOV 16, 1978	197.7	MAR 14, 1979	197.8
APR 14	197.5	AUG 14	197.8	DEC 18	197.7		
MAY 16	197.8	SEP 14	198.	JAN 19, 1979	198.1		
JUN 16	197.8	OCT 17	197.9	FEB 14	197.8		

TABLE 12.--Water levels in selected wells (P, pumping; R, recently pumped)--cont.

WELL 21N/01E-13Q02 SITE NUMBER 471825122370301

HIGHEST WATER LEVEL 100.4 FEET BELOW LAND SURFACE DATUM APR 14, 1978.

LOWEST WATER LEVEL 101.8 FEET BELOW LAND SURFACE DATUM SEP 14, 1978; JAN 19, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 20, 1978	100.6	JUL 14, 1978	101.2	NOV 16, 1978	101.7	MAR 14, 1979	100.7
APR 14	100.4	AUG 14	101.6	DEC 18	101.5		
MAY 16	100.6	SEP 14	101.8	JAN 19, 1979	101.8		
JUN 16	100.8	OCT 17	101.6	FEB 14	101.3		

WELL 21N/01E-14N01 SITE NUMBER 471815122384701

HIGHEST WATER LEVEL 44.6 FEET BELOW LAND SURFACE DATUM MAY 16, 1978.

LOWEST WATER LEVEL 47.9 FEET BELOW LAND SURFACE DATUM FEB 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 16, 1978	46.0	JUN 16, 1978	44.8	SEP 14, 1978	46.6 R	DEC 18, 1978	47.5
APR 14	44.9 R	JUL 14	44.9	OCT 17	46.7	FEB 14, 1979	47.9
MAY 16	44.6	AUG 14	45.7	NOV 16	47.2	MAR 14	47.1

WELL 21N/01E-24G01 SITE NUMBER 471738122370301

HIGHEST WATER LEVEL 59.84 FEET BELOW LAND SURFACE DATUM MAR 31, 1960.

LOWEST WATER LEVEL 70.53 FEET BELOW LAND SURFACE DATUM JUL 09, 1958.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 16, 1951	60.94	DEC 04, 1958	67.01	JUL 10, 1959	62.51	JAN 19, 1961	65.85
JUL 09, 1958	70.53	31	69.05	OCT 20	64.78	OCT 05	60.61
SEP 04	62.99	JAN 27, 1959	60.36	MAR 31, 1960	59.84		
OCT 03	65.81	MAR 05	61.78	JUN 03	59.89		
NOV 04	66.51	APR 03	61.13	SEP 27	62.76		

TABLE 12.--Water levels in selected wells (P, pumping; R, recently pumped)--cont.

WELL 21N/01E-35P01 SITE NUMBER 471543122384701

HIGHEST WATER LEVEL 126.4 FEET BELOW LAND SURFACE DATUM MAY 16, 1978.

LOWEST WATER LEVEL 129.2 FEET BELOW LAND SURFACE DATUM FEB 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL		DATE	WATER LEVEL		DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 16, 1978	127.3		JUL 14, 1978	126.6		NOV 16, 1978	128.2	MAR 14, 1979	128.4
APR 14	126.6	R	AUG 14	127.		DEC 18	128.6		
MAY 16	126.4		SEP 14	127.4	R	JAN 19, 1979	129.		
JUN 16	126.6	R	OCT 17	127.7		FEB 14	129.2		

WELL 21N/02E-07B01 SITE NUMBER 471942122355201

HIGHEST WATER LEVEL 147.4 FEET BELOW LAND SURFACE DATUM APR 14, 1978; JUL 14, 1978.

LOWEST WATER LEVEL 148.4 FEET BELOW LAND SURFACE DATUM MAR 14, 1978; FEB 14, 1979; MAR 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL		DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14, 1978	148.4		JUL 14, 1978	147.4	NOV 16, 1978	147.7	MAR 14, 1979	148.
APR 14	147.4		AUG 14	147.5	DEC 18	147.7		
MAY 16	148.	R	SEP 14	147.8	JAN 19, 1979	148.1		
JUN 16	147.6		OCT 17	147.7	FEB 14	148.		

WELL 21N/02E-07F04 SITE NUMBER 471925122355201

HIGHEST WATER LEVEL 135.8 FEET BELOW LAND SURFACE DATUM APR 14, 1978; NOV 16, 1978.

LOWEST WATER LEVEL 136.7 FEET BELOW LAND SURFACE DATUM MAR 14, 1978; FEB 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL		DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	
MAR 14, 1978	136.7		JUN 16, 1978	136.1	SEP 14, 1978	136.1	DEC 18, 1978	135.9	R
APR 14	135.8		JUL 14	135.9	OCT 17	135.9	FEB 14, 1979	136.	
MAY 16	136.4	R	AUG 14	136.	NOV 16	135.8	MAR 14	136.1	

TABLE 12.--Water levels in selected wells (P, pumping; R, recently pumped)--cont.

WELL 21N/02E-17D03 SITE NUMBER 471852122361801

HIGHEST WATER LEVEL 248.7 FEET BELOW LAND SURFACE DATUM APR 14, 1978.

LOWEST WATER LEVEL 249.7 FEET BELOW LAND SURFACE DATUM SEP 14, 1978.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14, 1978	249.6	JUL 14, 1978	249.4	NOV 16, 1978	249.2	MAR 14, 1979	249.6
APR 14	248.7	AUG 14	249.5	DEC 18	249.2		
MAY 16	249.2	SEP 14	249.7	JAN 19, 1979	249.7		
JUN 16	P	OCT 17	249.6	FEB 14	249.5		

WELL 21N/02E-19K01 SITE NUMBER 471734122354401

HIGHEST WATER LEVEL 203.6 FEET BELOW LAND SURFACE DATUM JUL 14, 1978.

LOWEST WATER LEVEL 205.2 FEET BELOW LAND SURFACE DATUM JAN 19, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 17, 1978	203.9	JUL 14, 1978	203.6	OCT 17, 1978	204.2	JAN 19, 1979	205.2
MAY 16	203.9	AUG 14	204.1	NOV 16	204.3	FEB 14	205.
JUN 16	203.7	SEP 14	204.3	DEC 18	204.5	MAR 14	204.6

WELL 21N/02E-28C01 SITE NUMBER 471711122334101

HIGHEST WATER LEVEL 278.3 FEET BELOW LAND SURFACE DATUM APR 14, 1978.

LOWEST WATER LEVEL 279.8 FEET BELOW LAND SURFACE DATUM AUG 14, 1978; SEP 14, 1978;
NOV 16, 1978; DEC 18, 1978.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14, 1978	279.1	JUL 14, 1978	279.5	NOV 16, 1978	279.	MAR 14, 1979	279.2
APR 14	278.3	AUG 14	279.8	DEC 18	279.		
MAY 16	279.	SEP 14	279.8	JAN 19, 1979	279.3		
JUN 16	279.3	OCT 17	279.5	FEB 14	279.3		

TABLE 12.--Water levels in selected wells (P, pumping; R, recently pumped)--cont.

WELL 21N/02E-28F03 SITE NUMBER 471656122332401

HIGHEST WATER LEVEL 109.3 FEET BELOW LAND SURFACE DATUM MAR 20, 1978; APR 14, 1978.

LOWEST WATER LEVEL 111. FEET BELOW LAND SURFACE DATUM FEB 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 20, 1978	109.3	JUL 14, 1978	109.7	NOV 16, 1978	110.3	MAR 14, 1979	110.8
APR 14	109.3	AUG 14	109.8	DEC 18	110.7		
MAY 16	109.6	SEP 14	110.1	JAN 19, 1979	110.7		
JUN 16	109.6	OCT 17	110.2	FEB 14	111.		

WELL 22N/01E-14F01 SITE NUMBER 472451122394301

HIGHEST WATER LEVEL 105.1 FEET BELOW LAND SURFACE DATUM APR 14, 1978; JUN 16, 1978.

LOWEST WATER LEVEL 105.9 FEET BELOW LAND SUPFACE DATUM FEB 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14, 1978	105.8 R	JUL 14, 1978	105.2	NOV 16, 1978	P	MAR 14, 1979	105.6
APR 14	105.1	AUG 14	105.3	DEC 18	105.6		
MAY 16	105.4	SEP 14	105.4	JAN 19, 1979	105.8		
JUN 16	105.1	OCT 17	105.3	FEB 14	105.9		

WELL 22N/01E-21H01 SITE NUMBER 472302122402701

HIGHEST WATER LEVEL 176.6 FEET BELOW LAND SURFACE DATUM APR 14, 1978.

LOWEST WATER LEVEL 177.5 FEET BELOW LAND SURFACE DATUM JAN 19, 1979; JAN 19, 1979;
FEB 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 16, 1978	177.3	JUL 14, 1978	177.	NOV 16, 1978	177.	MAR 14, 1979	177.4
APR 14	176.6	AUG 14	177.3	DEC 18	177.1		
MAY 16	177.3	SEP 14	177.4	JAN 19, 1979	177.5		
JUN 16	177.1	OCT 17	177.2	FEB 14	177.5		

TABLE 12.--Water levels in selected wells (P, pumping; R, recently pumped)--cont.

WELL 22N/01E-21H02 SITE NUMBER 472302122402901

HIGHEST WATER LEVEL 36.1 FEET BELOW LAND SURFACE DATUM JUN 16, 1978; JUL 14, 1978.

LOWEST WATER LEVEL 38.1 FEET BELOW LAND SURFACE DATUM FEB 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 16, 1978	37.3	JUL 14, 1978	36.1	NOV 16, 1978	37.1	MAR 14, 1979	37.9
APR 14	36.6	AUG 14	36.3	DEC 18	37.5		
MAY 16	36.4	SEP 14	36.6	JAN 19, 1979	37.7		
JUN 16	36.1	OCT 17	36.8	FEB 14	38.1		

WELL 22N/01E-22A01 SITE NUMBER 472314122391501

HIGHEST WATER LEVEL 54.2 FEET BELOW LAND SURFACE DATUM JUL 14, 1978.

LOWEST WATER LEVEL 56.6 FEET BELOW LAND SURFACE DATUM MAR 14, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 16, 1978	56.4	JUL 14, 1978	54.2	NOV 16, 1978	55.2	MAR 14, 1979	56.6
APR 14	55.4	AUG 14	54.3	DEC 18	55.7		
MAY 16	54.9	SEP 14	54.6	JAN 19, 1979	56.1		
JUN 16	54.4	OCT 17	54.8	FEB 14	56.5		

WELL 22N/02E-17E01 SITE NUMBER 472353122351301

HIGHEST WATER LEVEL 11.2 FEET BELOW LAND SURFACE DATUM MAR 14, 1979.

LOWEST WATER LEVEL 20.6 FEET BELOW LAND SURFACE DATUM SEP 14, 1978.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14, 1978	12.7	JUL 14, 1978	17.	NOV 16, 1978	20.1	MAR 14, 1979	11.2
APR 14	13.1 R	AUG 14	19.4	DEC 18	16.4		
MAY 16	13.4	SEP 14	20.6	JAN 19, 1979	16.3		
JUN 16	15.9 R	OCT 17	19.8	FEB 14	11.6		

TABLE 12.--Water levels in selected wells (P, pumping; R, recently pumped)--cont.

WELL 22N/02E-33N02 SITE NUMBER 472046122335401

HIGHEST WATER LEVEL 152.7 FEET BELOW LAND SURFACE DATUM APR 14, 1978.

LOWEST WATER LEVEL 154. FEET BELOW LAND SURFACE DATUM JAN 19, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14, 1978	153.4	JUL 14, 1978	153.4	NOV 16, 1978	153.	MAR 14, 1979	153.7
APR 14	152.7	AUG 14	153.7	DEC 18	153.7		
MAY 16	153.5	SEP 14	153.6	JAN 19, 1979	154.		
JUN 16	153.4	OCT 17	153.7	FEB 14	154.		

WELL 22N/02E-33N03 SITE NUMBER 472045122335401

HIGHEST WATER LEVEL 32.5 FEET BELOW LAND SURFACE DATUM MAY 16, 1978.

LOWEST WATER LEVEL 36.4 FEET BELOW LAND SURFACE DATUM JAN 19, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 14, 1978	32.9	JUL 14, 1978	33.1	OCT 17, 1978	35.1	JAN 19, 1979	36.4
MAY 16	32.5	AUG 14	33.7	NOV 16	35.7	FEB 14	36.4
JUN 16	32.7	SEP 14	34.4	DEC 18	36.2	MAR 14	33.4

TABLE 13.--Drillers' logs of selected wells

Geologic unit	Material	Thickness (ft)	Depth (ft)
20/1-1K3. Fox Island Water Co. Drilled by Harbor Pump and Drilling Co., Inc., August 1977. Altitude 210 ft.			
Qvt	Soil and rocks, powdery, dry	4	4
	Hardpan, sandy and gravelly, brown	18	22
	Sand, brown	49	71
Qc	Gravel, brown	22	93
	Sand, with binder, brown	19	112
	Clay, blue	8	120
Qk	Hardpan, gray	9	129
	Hardpan, brown	13	142
	Hardpan, gray	20	162
	Sand and small gravel, gray, some seepage	2	164
	Hardpan	2	166
	Sand, heaving, seepage	6	172
Qss	Sand, coarse	1	173
	Sand, heaving, gray	3	176
	Sand, clean	2	178
	Sand, with binder	3	181
	Clay, with layers of sand and gravel	10	191
Qpu	Vegetation	1	192
	Clay, gray	at	192

Cased 6-inch diameter to 177½ ft. Screen 177½ to 182 ft. Slot size 0.050 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
20/1-2A2. Paul Smith. Drilled by Harbor Pump and Drilling, Co., Inc., June 1962. Altitude 80 ft.			
Qvt	Hardpan, sandy, soft, brown	50	50
Qk	Clay, silty, blue	42	92
	Hardpan	5.4	97.4
	Sand and gravel, clean, hard-packed, some water	6.6	104
Qss	Sand and gravel, coarse, clean, heaving, water-bearing	8	112
	Gravel, small	6	118
Qpu	Clay, silty, blue	at	118

Cased 6-inch diameter to 113.2 ft. Screen 113.2 to 116.8 ft Slot size 0.035 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
20/2-6N1. Fox Island Water Co. Cedrona Well No. 1. Drilled by Harbor Pump and Drilling Co., Inc., July 1959. Altitude 75 ft.			
--	Fill	1.3	1.3
	Topsoil	1.7	3
Qvt	Hardpan, sand, gravel, and clay	17	20
	Hardpan, sandy, some seepage	10	30
	Sand and gravel, with peat layers, brown	6	36
Qc	Hardpan, sand, and gravel, blue	13	49
	Sand, blue, some gravel, water-bearing	4	53
	Clay, blue	33	86
Qk	Silt, blue	7	93
	Clay, blue	3	96
	Sand, fine, blue, water-bearing	9	105
Qss	Sand and gravel, with clay balls, water-bearing	13	118
	Sand and gravel, coarse, water-bearing	1	119
Cased 8-inch diameter to 119 ft. Open end.			
20/2-7R2. W. Harold Eister. Drilled by Harbor Pump and Drilling Co., Inc., June 1970. Altitude 60 ft.			
Qvt	Hardpan, gray	68	68
Qk	Clay, blue	32	100
Qss	Sand and gravel, coarse	1	101
Cased 6-inch diameter to 101 ft. Open end.			
20/2-18A1. Callentine. Drilled by Harbor Pump and Drilling Co., Inc., October 1962. Altitude 65 ft.			
Qc	Loam, sandy, soft	8	8
	Sand and small gravel, brown	26.8	34.8
Qk	Clay, blue	7.2	42
	Hardpan, gravelly, brown	25	67
Qss	Gravel, hard-packed, water-bearing	21	88
Cased 6-inch diameter to 82 ft. Screen 82 to 86 ft. Slot size 0.030 inch.			

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-1L2. Dan Cossins. Drilled by Tyee Well Drilling Co., November 1969. Altitude 338 ft.			
	Topsoil	5	5
Qvt	Clay, sandy	10	15
	Gravel and clay, hard-packed	38	53
Qc	Sand, water-bearing	67	120
	Gravel, water-bearing	1	121
Cased 6-inch diameter to 121 ft. Open end.			
21/1-2N1. Rosedale Community Center. Drilled by Harbor Pump and Drilling Co., Inc., May 1966. Altitude 64 ft.			
Qvt	Hardpan	90	90
	Sand, blue clay, and gravel	13	103
Qss	Sand, gray, some seepage	5	108
	Sand, gray and brown laminations, some water	13	121
	Sand, silty, gray	9	130
	Sand, fine, brown	2	132
	Sand, fine, gray, heaving	27	159
	Clay	1	160
	Gravel and hardpan, hard	8	168
Qpu	Sand and gravel, with some binder, water-bearing	2	170
	Sand and gravel, heaving slightly	at	170
	Clay, sand, and hardpan	11	181
	Clay, hardpan	5	186
	Sand, heaving, water-bearing	5	191
	Clay, gray, dirty	16	207
	Sand, coarse, hard-packed, water-bearing	3	210
	Sand, coarse, heaving	7	217
Cased 6-inch diameter to 210 ft. Screen 210 to 217 ft. Slot sizes 0.040 inch (210 to 214 ft), 0.050 inch (214 to 217 ft).			

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-3A3. John Anderson. Drilled by Gustin Drilling Co., August 1970. Altitude 70 ft.			
Qvt	Sand, brown, and some gravel	6	6
	Hardpan, gray, sandy and gravelly	50	56
	Sand, loose, brown	2	58
	Hardpan, sandy, gray, some seepage	25	83
Qpu	Sand and gravel, brown, some seepage	35	118
	Sand, brown, heaving, water-bearing	14	132
	Sand, medium-coarse, and some pea gravel, brown water-bearing	8	140

Cased 6-inch diameter to 135 ft. Screen 135 to 140 ft.
Sldot size 0.015 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-9R2. Bill Rush. Drilled by Harbor Pump and Drilling Co., Inc., November 1976. Altitude 40 ft.			
	Topsoil, sandy, brown	4	4
Qvt	Hardpan, coarse, brown, mostly gravel with little binder, some seepage at 28-33 ft	34	38
	Clay, gray	99	137
	Hardpan, gray, seepage at 145-150 ft	13	150
Qpu	Sand, coarse, and gravel, with some dirty fine sand	11	161
	Sand and gravel, hardpacked, dry, with clay binder and some clay balls	6	167
	Sand and gravel, loose	4	171
	Sand and gravel, hard-packed, with seepage	3	174
	Sand and gravel, hard-packed, dry	8	182
	Gravel, coarse, and fine gray sand, loose	2	184
	Sand, and gravel, hard-packed, some seepage	10	194
	Sand and gravel, medium-coarse	4	198
	Sand, fine, brown	31	229

Cased 6-inch diameter to 224 ft. Screen 224 to 229 ft.
Slot size 0.025 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-10C1. Raft Island Development Co. Drilled by Harbor Pump and Drilling Co., Inc., 1959. Altitude 155 ft.			
Qvt	Hardpan, gravelly	15	15
Qc	Sand and clay	32	47
Qk	Clay, brown to blue, with some silt	175	222
?	Sand, silty, water-bearing	3	225
	Clay, gray, blue, and white	12	237
Qpu	Sand, blue, and gravel, water-bearing	1	238
	Sand, gravel, clay, and hardpan, water-bearing	14	252
	Sand, water-bearing	55	307
Cased 8-inch diameter to 302 ft. Screen 302 to 307 ft.			
21/1-11A2. McCally(?). Drilled by Harbor Pump and Drilling Co., Inc., April 1976. Altitude 280 ft.			
	Topsoil, sandy, brown	3	3
Qvt	Hardpan, gray	23	26
	Clay, sandy, gray, with large rocks	18	44
	Sand and gravel, coarse, brown, with some seepage	2	46
	Sand, silty, brown	14	60
Qc	Clay, sandy, brown	5	65
	Sand and gravel, reddish-brown, dry	23	88
	Sand, medium, brown, wet	30	118
Cased 6-inch diameter to 112½ ft. Screen 112½ to 117½ ft. Slot size 0.015 inch.			
21/1-12D3. Pen West (Woodmere). Drilled by Harbor Pump and Drilling Co., Inc., August 1977. Altitude 320 ft.			
	Clay loam, sandy	2	2
	Conglomerate, blue-gray	10	12
Qvt	Rock, large, and sand, loose	6	18
	Boulder conglomerate	12	30
	Sand and gravel conglomerate, blue-gray	30	60
	Sand, hard-packed, brown, dry	20	80

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-12D3--Continued			
Qc	Sand and gravel, water-bearing------------------	6	86
	Sand, muddy, brown, with seepage----------------	81	167
	Sand, fine, brown and blue-gray, water-bearing---	4	171
	Conglomerate------------------------------------	9	180
	Sand, water-bearing-----------------------------	2	182
	Hardpan, conglomerated--------------------------	2	184
Qk	Clay, chocolate-brown---------------------------	6	190
	Sand, fine, brown, dry--------------------------	16	206
	Sand and gravel, clean, water-bearing-----------	1	207
	Conglomerate------------------------------------	3	210
	Sand, chocolate-brown, hard---------------------	5	215
	Sand and gravel, clean, water-bearing-----------	2	217
	Gravel and clay, sandy, conglomerated-----------	3	220
	Sand and gravel, clean, water-bearing-----------	1	221
	Conglomerate------------------------------------	4	225
Qss	Sand and gravel, water-bearing------------------	4	229
	Sand, loose, with rocks, water-bearing----------	9	238
	?, colored water--------------------------------	2	240
	Gravel, clean, water-bearing--------------------	10	250
	Sand, brown, and small gravel, water-bearing-----	8	258

Cased 8-inch diameter to 244 ft. Screen 244 to 258 ft.
Slot size 0.030 inch.

21/1-13K1. Philip Farmer. Drilled by Harbor Pump and Drilling Co., Inc., July 1975. Altitude 250 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Dirt and gravel, dusty, dry---------------------	8	8
	Sand, brown-------------------------------------	13	21
Qvt	Clay, gray--------------------------------------	9	30
	Hardpan, sandy, brown---------------------------	5	35
Qc	Sand, brown-------------------------------------	47	82
	Clay, silty, gray-------------------------------	3	85
Qk	Silt, sand, some binder, gray-------------------	30	115
	Clay, hard, gray--------------------------------	5	120
-?-	Hardpan, gravelly, brown, very hard-------------	72	192
	Hardpan, sandy----------------------------------	15	207
	Sand, dark brown--------------------------------	5	212
	Sand, clean, damp-------------------------------	5	217
Qss	Sand, coarse, heaving, seepage------------------	4.5	221.5
	Sand, gray, no water----------------------------	at	221.5

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-14L1. Whitbeck. Drilled by Harbor Pump and Drilling Co., Inc., April 1973. Altitude 220 ft.			
Qvt	Topsoil, sandy	4	4
	Clay, sandy, brown	14	18
Qc	Sand, brown, some seepage	48	66
	Clay, gray	6	72
Qk	Silt, gray	12	84
	Gravel, hard-packed	5	89
	Shale, clay, and silt	79	168
	Hardpan, hard	21	189
Qss	Sand and gravel, coarse, water-bearing	6	195
Cased 6-inch diameter to 193 ft. Screen 193 to 194 ft. Slot size 0.045 inch.			
21/1-15E1. Harbor Water Co. (Kopachuck). Drilled by Harbor Pump and Drilling Co., Inc., April 1972. Altitude 280 ft.			
	Topsoil	3	3
Qvt	Hardpan, brown	28	31
	Sand, packed	18	49
Qc	Clay, brown	7	56
	Sand, packed	139	195
	Sand, silty, gray	17	212
Qk	Clay, gray	66	278
	Hardpan, gray	5	283
Qss	Sand, gravel, and clay, brown	6	289
	Clay, silty, gray	46	335
	Clay, sandy, brown	5	340
Qpu	Hardpan, brown	6	346
	Sand and gravel, gray, water-bearing	4	350
Cased 6-inch diameter to 348 ft. Screen 348 to 351 ft. Slot size 0.070 inch.			

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-16B1. Olsen. Drilled by Harbor Pump and Drilling Co., Inc., November 1975. Altitude 60 ft.			
-?-	Not reported	18	18
Qc	Sand with clay layers, brown	19	37
	Clay, blue	64	101
Qk	Clay, hardpan, gray	21	122
	Sand, coarse, water-bearing	6	128
	Clay, sandy	2	130
Qss	Sand and gravel, coarse, water-bearing	12	142
Cased 6-inch diameter to 138 ft. Screen 138-142 ft. Slot size 0.040 inch.			
21/1-21L1. Forest Beach, Inc. (Well #1). Drilled by Richardson Well Drilling Co., Inc., 1945. Altitude 50 ft			
Qc	Sand, brown	42	42
	Sand, bright yellow	6	48
	Hardpan	6	54
	Sand, yellow	13	67
	Sand and gravel	41	108
Qss	Sand, fine	4	112
	Sand and gravel	6	118
	Sand, fine	10	128
	Clay, sand, and gravel	7	135
	Clay, yellow	3	138
Qpu	Hardpan	13	151
	Clay, blue	1	152
	Sand and gravel, medium coarse	5	157
Cased 10-inch diameter to 157 ft. Open end.			
21/1-22A1. Harbor Water Co. (Locker Road). Drilled by Harbor Pump and Drilling Co., Inc., January 1971. Altitude 275 ft.			
	Hardpan, brown	18	18
Qvt	Hardpan, with some sand, brown	33	51
	Clay, gray	2	53
	Hardpan, brown	15	68

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-22A1.--Continued			
Qc	Sand, brown	40	108
	Sand, gray	2	110
	Clay, blue	47	157
	Hardpan	41	198
Qk	Sand, with clay binder, hard-packed, brown	13	211
	Sand, dirty, brown, wet	7	218
	Sand, gray, wet	8	226
	Clay, brown	3	229
	Sand and gravel, coarse, some water	2	231
	Hardpan, brown	5	236
	Sand, coarse, brown, some water	10	246
Qss	Sand and pea gravel, hard-packed, gray, water-bearing	7	253
	Sand, dirty, with clay binder, gray	6	259
	Sand and gravel, hard-packed, some water	5	264
	Sand, coarse, water-bearing	15	279

Cased 6-inch diameter to 266 ft. Screen 266 to 275 ft.
Slot size 0.040 inch.

21/1-23L1. Roy Farrington. Drilled by Craig Drilling Co., October 1975. Altitude 245 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Topsoil	2	2
Qvt	Gravel, medium, and hardpan	21	23
	Hardpan	42	65
Qc	Sand and gravel, 8 gal/min water	11	76
	Sand, medium to fine	12	88
	Clay, blue	21	109
	Hardpan	16	125
	Sand and gravel, seepage	5	130
Qk	Hardpan	6	136
	Sand and gravel, seepage	11	147
	Hardpan	49	196
	Sand and gravel	11	207
	Clay, blue	6	213
	Hardpan	8	221

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thick-ness (ft)	Depth (ft)
21/1-23L1.--Continued			
Qss	Gravel, with clay binder------------------------	18	239
	Gravel, water-bearing---------------------------	4	243

Cased 6-inch diameter to 238 ft. Screen 238 to 243 ft.
Slot size 0.030 inch.

21/1-24F2. Artondale Elementary School. Drilled by Harbor Pump and Drilling Co., Inc., November 1958. Altitude 202 ft.

Geologic unit	Material	Thick-ness (ft)	Depth (ft)
Qvt	Topsoil---	3	3
	Sand, brown, dry--------------------------------	23	26
	Clay, brown-------------------------------------	6	32
	Sand, fine, brown, water-bearing----------------	9	41
	Clay, silty, blue-------------------------------	5	46
	Clay, blue--------------------------------------	30	76
Qc	Sand, brown, and some small gravel, brown--------	17	93
	Sand and gravel, coarse, dry--------------------	5	98
	Sand and gravel, cemented-----------------------	33	131
	Clay, sandy, blue-------------------------------	2	133
Qk	Sand and gravel hardpan, gray, some seepage------	39	172
	Clay, blue, with some sand and gravel------------	6	178
	Sand and gravel, cemented, brown-----------------	12	190
Qss	Sand and gravel, water-bearing------------------	60	250
	Clay, blue--------------------------------------	2	252
	Sand, fine, brown-------------------------------	19	271

Cased 8-inch diameter to 271½ ft. Open end.

21/1-25G2. Elmer Fossness. Drilled by Harbor Pump and Drilling Co., Inc., August 1955.

Geologic unit	Material	Thick-ness (ft)	Depth (ft)
Qvt	Loam, sandy-------------------------------------	5	5
	Hardpan---	26	31
	Clay, sandy-------------------------------------	20	51
Qc	Clay, sandy, and some gravel--------------------	37	88
	Sand, some water--------------------------------	8	96
	Sand, water-bearing-----------------------------	29	125
	Clay, blue--------------------------------------	13.5	138.5
	Clay and sand, blue-----------------------------	19.5	158
	Clay, blue--------------------------------------	10.5	168.5

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-25G2.--Continued			
Qk	Silt, sandy, hard, dry	4.5	173
	Hardpan	45	218
	Clay, sandy, gray	17	235
	Sand, fine, water-bearing	14	249
Qss	Sand, coarse, and gravel, water-bearing	3.5	252.5

Cased 6-inch diameter to 253 ft. Open end.

21/1-26G2. Louis Fest. Drilled by Harbor Pump and Drilling Co., Inc., September 1972. Altitude 120 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Topsoil	3	3
Qvt	Sand, brown	11	14
	Hardpan, brown, and boulders	98	112
	Boulders	2	114
	Sand and gravel, brown, some water	19	133
Qss	Sand and gravel, brown	10	143
	Clay, sandy, brown	at	143

Cased 6-inch diameter to 138 ft. Screen 138 to 143 ft. Slot size 0.018 inch.

21/1-27A3. George Garland. Drilled by Ramlo's Sandpoint Service, March 1974. Altitude 20 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
Qvt	Topsoil	2	2
	Hardpan, brown	14	16
Qc	Sand and gravel, brown	16	32
	Clay, blue-gray	22	54
Qk	Hardpan, blue-gray	2	56
	Sand, fine, brown, water-bearing	5	61
Qss	Sand and gravel, brown, water-bearing	4	65

Cased 6-inch diameter to 65 ft. Open end.

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-28C4. Raymond E. Looney. Drilled by Harbor Pump and Drilling Co., Inc., May 1965. Altitude 43 ft.			
Qvt	Clay hardpan, sandy, brown----------------------	14	14
	Sand, brown-------------------------------------	16	30
Qc	Sand, brown, and some gravel, hard--------------	5	35
	Gravel, some seepage----------------------------	.5	35.5
Qk	Clay hardpan------------------------------------	9.5	45
	Concrete--	5	50
Qss	Gravel, sandy, hard-packed, some water----------	16	66
	Sand and gravel, coarse, loose, water-bearing----	5	71

Cased 6-inch diameter to 52 ft. Open end.

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/1-34G1. Paul Griffin. Drilled by Richardson Well Drilling Co., Inc., June 1978. Altitude 155 ft.			
	Fill, sand, and gravel--------------------------	10	10
	Sand, gravel, and clay--------------------------	10	20
Qvt	Sand, wet---------------------------------------	18	38
	Sand, some gravel, dry--------------------------	3	41
	Hardpan---	3	44
	Sand and some gravel----------------------------	1	45
	Hardpan---	2	47
	Sand, and some gravel, dry----------------------	3	50
	Sand and some gravel----------------------------	12	62
	Sand, wet---------------------------------------	17	79
Qc	Sand, and some clay-----------------------------	8	87
	Sand and some gravel----------------------------	11	98
	Sand, gravel, and clay--------------------------	11	109
	Sand--	1	110
	Sand, gravel, and some clay---------------------	5	115
Qk	Hardpan---	6	121
	Sand and gravel, dry----------------------------	2	123
	Sand and some gravel, compact-------------------	5	128
	Sand and gravel, dry----------------------------	12	140

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thick-ness (ft)	Depth (ft)
21/1-34G1.--Continued			
Qss	Sand and gravel, compact	2	142
	Sand and gravel, loose, some water	5	147
	Sand and gravel, tight	5	152
	Hardpan	5	157
	Hardpan, some water	5	162

Cased 6-inch diameter to 152 ft. Screen 152 to 162 ft. Slot size 0.060 inch (152 to 157 ft) and 0.050 inch (157 to 162 ft).

21/1-35D1. Shorewood Beach Water Co., Inc. Drilled by A. P. Graf, 1952. Altitude 25 ft.

Geologic unit	Material	Thick-ness (ft)	Depth (ft)
	Clay, sandy	6	6
Qvt	Gravel	9	15
	Boulders, gravel, and clay	20	35
	Gravel, some water	20	55
Qss	Clay and gravel	10	65
	Sand, fine	18	83
	Gravel, water-bearing	7	90
	Sand and clay	115	205
	Shale, blue	112	317
	Sand, fine	25	342
Qpu	Clay, sandy	8	350
	Gravel, some water	29	379
	Shale, brown	23	402
	Shale, sticky, blue	30	432

Cased 10-inch diameter to 432 ft. Perforated from 358 to 371 and from 372 to 378 ft.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-5F3. Keith Lile. Drilled by Harbor Pump and Drilling Co., Inc., July 1977. Altitude 95 ft.			
Qvt	Clay and hardpan, blue	18	18
Qk	Clay, silty, gray	17	35
	Clay, hard, gray-white	43	78
-?-	Clay hardpan, hard	7	85
	Sand, some binder, gray	9	94
Qpu	Peat clay and gray hardpan	4	98
	Gravel, dirty, hard	10	108
	Gravel, some water	1	109

Cased 6-inch diameter to 109 ft. Open end.

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-6D1. Hemley's Septic Tanks. Drilled by Harbor Pump and Drilling Co., Inc., November 1978. Altitude 310 ft.			
Qvt	Hardpan, sandy, brown	10	10
	Sand, brown	16	26
	Clay, sandy, gray	4	30
Qc	Sand, brown, dry	10	40
	Sand, reddish-brown, dry	17	57
	Sand, brown, seepage	10	67
	Clay, sandy, brown	1	68
	Sand and gravel, heaving	8	76
	Clay, sandy, brown	2	78
Qk	Sand and gravel, hard-packed	5	83
	Hardpan, gray	5	88
	Sand, gray, and small gravel, hard-packed	12	100
	Sand, brown, dry	55	155
Qss	Sand, reddish-brown	10	165
	Sand and gravel, hard-packed	14	179
	Sand and gravel, hard-packed, seepage	6	185
	Sand and gravel, heaving	5	190
	Sand with clay binder, brown, dry	25	215
	Sand, brown, dry	15	230
	Sand with clay binder, gray	20	250
Qpu	Sand, brown, seepage	10	260
	Clay, sandy, brown	6	266
	Silt, gray, dry	9	275
	Sand, gray, seepage	11	286
	Sand, fine, gray, heaving	12	298
	Sand, gray, hard-packed	at	298

Cased 6-inch diameter to 288 ft. Screen 288 to 298 ft.
Slot size 0.015 inch.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-7B2. Harbor Water Co., Inc. (McDougal Road #1). Drilled by Harbor Pump and Drilling Co., Inc., January 1960. Altitude 225 ft.			
Qvt	Gravel hardpan, brown----------------------------	45	45
Qc	Sand, hard--	28	73
	Gravel hardpan, hard----------------------------	39	112
-?-	Gravel, hard, seepage----------------------------	5	117
	Hardpan---	3	120
Qk	Sand, clean, brown, and some gravel, some water--	3	123
	Clay, conglomerated, brown----------------------	4	127
	Sand and gravel, clean, about 10 gal/min water---	10	137
Qss	Sand, fine, with thin coarse layers-------------	28	165
	Sand, with brown binder, hard-------------------	25	190
	Hardpan, sandy, blue, some seepage--------------	32	222
	Clay, blue--	12	234
	Silt(?)---	121	355
Qpu	Sand and gravel, with clay layers, water-bearing-	6	361
	Sand and gravel, coarse, clean, water-bearing----	25	386
	Clay hardpan--------------------------------------	12	398

Cased 6-inch diameter to 400 ft. Perforated 370 to 380 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-8C1. Town of Gig Harbor (#1). Drilled by Pete Sylte, May 1949. Altitude 55 ft.			
	Topsoil---	3	3
	Sand--	2.5	5.5
	Gravel--	.5	6
	Clay, gray--	.5	6.5
	Sand and gravel, compacted----------------------	12.5	19
	Clay, yellow--------------------------------------	2	21
Qvt	Sand, compacted-----------------------------------	7	28
	Gravel--	.5	28.5
	Sand, compacted-----------------------------------	9.5	38
	Clay, blue--	4	42
	Sand and gravel, compacted----------------------	1	43
	Clay, dirty, reddish----------------------------	4	47
	Sand and gravel, compacted----------------------	2	49
	Hardpan---	9	58
	Gravel and clay-----------------------------------	4	62
	Hardpan---	11	73

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-8C1.--Continued			
	Gravel and sand, water-bearing	2	75
	Hardpan	7	82
	Gravel, water-bearing	1	83
	Hardpan	9	92
Qss	Mud and sand	9	101
	Hardpan	17	118
	Sand, and gravel, muddy	10	128
	Sand, coarse	1	129
	Sand and gravel, muddy	19	148
	Sand, gravel, and muddy clay, some water	13	161
	Sand and clay, packed, dry	11	172
	Silt, dry	22	194
	Hardpan	19	213
	Silt, dry	17	230
Qpu	Hardpan	30	260
	Gravel, cemented, some water	3	263
	Gravel, water-bearing	2	265
	Clay	15	280
	Hardpan	5	285
	Sand, fine-coarse	3	288
	Hardpan	33	321
	Sand, heaving	1	322
	Silt, sand, and some gravel, dry	24	346
	Sand, fine	12	358
	Sand, hard-packed	10	368
	Gravel, cemented	7	375

Cased 10-inch diameter to 270 ft. Perforated 72 to 83 ft, 148 to 156 ft, and 260 to 265 ft.

21/2-17F2. Town of Gig Harbor (#3). Drilled by Burt Well Drilling, Inc., September 1978. Altitude 341 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
Qvt	Hardpan, brown	30	30
	Sand and gravel, brown	43	73
	Sand, silty, brown	64	137
	Sand and gravel, brown	18	155
	Sand, brown	14	169
	Sand and gravel, brown	2	171

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-17F2.--Continued			
Qc	Gravel with trace of brown sand	3	174
	Sand, brown	31	205
	Sand, brown, and gray clay	5	210
	Sand, brown	19	229
	Sand and gravel, brown	10	239
	Hardpan, gravelly, brown	5	244
Qk	Clay, gravelly, gray	12	256
	Clay, sandy, brown	51	307
	Sand, brown, and fine gravel, water-bearing	5	312
Qss	Sand, muddy, brown, dry	10	322
-?-	Sand, fine, brown, and gravel, water-bearing	97	419
	Silt, blue	31	450
	Clay, silty, gray	177	627
	Clay, silty, blue, and some sand	55	682
	Sand and silt	23	705
	Sand, medium, and some gravel	21	726
	Clay and sand	3	729
Qpu	Gravel and some sand	5	734
	Sand and gravel	2	736
	Sand and some gravel	18	754
	Clay, with sand and gravel	.5	754.5
	Sand and gravel	35.5	790
	Clay, gray	16	806
	Gravel and sand	95	901
	Clay, brown	8	909

Cased 16-inch diameter to 749 ft. Screen 749 to 766 ft, 772 to 780 ft, 810 to 818 ft, 832 to 836 ft, 839 to 854 ft, 873 to 881 ft, 884 to 901 ft. Slot size 0.080 inch.

21/2-18J1. Fred Stroh (#2). Drilled by Harbor Pump and Drilling Co., Inc., June 1967. Altitude 280 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
Qvt	Hardpan, brown	14	14
	Sand and gravel, brown	21	35
	Clay, blue	9	44
Qc	Hardpan, sandy, gray	6	50
	Sand, hard, gray, seepage	21	71
	Sand, brown, seepage	7	78
	Clay, blue	3	81
	Hardpan, gray, seepage	4	85

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-18J1.--Continued			
Qk	Hardpan, gray	35	120
	Gravel, hard-packed, seepage	3	123
	Sand and gravel, coarse, clean, some water	6	129
	Clay, blue	13	142
	Sand and gravel, brown, some water	3	145
	Hardpan, brown	7	152
Qss	Sand and gravel, brown, some water	3	155
	Sand, brown, and brown hardpan	20	175
	Sand, brown, dry	22	197
	Hardpan, brown	26	223
	Clay, blue	9	232
	Sand, brown, dry	21	253
	Sand, brown, with seepage	26	279
	Sand, coarse, clean	2	281
Qpu	Sand, fine, clean, rust-colored water	26	307
	Sand, coarse, rusty-colored	3	310
	Sand and fine gravel, heaving	6	316
	Sand, fine	2	318

Cased 8-inch diameter to 310 ft. Screen 310 to 316 ft.
Slot size 0.040 inch.

21/2-19K1. Walt Reierson. Drilled by Harbor Pump and Drilling Co., Inc., March 1977. Altitude 245 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
Qvt	Topsoil, brown	2	2
	Hardpan, sandy, brown	46	48
	Sand, brown, dry	19	67
Qc	Sand, fine, gray, wet	4	71
	Clay, silty, gray, with some gravel, wet	12	83
	Sand, medium-fine, wet	9	92
	Clay, silty, gray	7	99
Qk	Peat, brown, with gray clay and some gravel	9	108
	Sand and gravel, gray, hard-packed	12	120
-?-	Hardpan, brown	29	149
	Sand, brown, dry	61	210
Qss	Sand, brown, wet	16	226
	Sand and gravel, medium-coarse	7	233

Cased 6-inch diameter to 230 ft. Screen 230 to 233 ft.
Slot size 0.060 inch.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-20J1. Madrona Links Golf Course. Drilled by Harbor Pump and Drilling Co., Inc., June 1977. Altitude 285 ft.			
Qvt	Dirt, rusty brown	2	2
	Hardpan with rocks, gray-brown	80	82
Qc	Sand, brown	79	161
	Clay, blue	9	170
	Clay, blue and brown, and sand	18	188
Qk	Silt, gray	3	191
	Clay, gray	21	212
	Hardpan, sandy, gray-brown	43	255
	Gravel, brown, dry	15	270
	Sand, coarse, and fine gravel	3	273
	Sand and gravel, loose, seepage	6	279
	Sand, coarse, heaving	3	282
	Sand	8	290
Qss	Sand, with some binder, brown	16	306
	Sand, clean, brown, some seepage	14	320
	Sand, with binder, brown	3	323
	Sand, clean, some water	25	348
	Sand, coarse, and some fine gravel	3	351
	Sand, heaving	7	358
	Sand, coarse, heaving	30	388
	Sand, fine	at	388

Cased 10-inch diameter to 351 ft. Screen 351 to 357 ft and 358 to 388 ft. Slot size 0.025 inch (351 to 357 ft) and 0.060 inch (358 to 388 ft).

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-21E1. State of Washington, Scale House. Drilled by Northwest Pump and Drilling Co., May 1975. Altitude 275 ft.			
Qvt/Qc	Fill and gravel	12	12
	Sand and gravel, brown, dry	115	127
Qk	Clay, blue	104	231
	Sand and gravel, silty, blue	17	248
Qss	Sand, fine, and some gravel	37	285
	Sand and gravel, water-bearing	2	287

Cased 6-inch diameter to 287 ft. Open end.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-28P1. Doc Weathers. Drilled by Richardson Well Drilling Co., August 1973. Altitude 195 ft.			
Qvt	Clay, sand, and gravel, yellow	7	7
Qc	Clay and sand, some gravel, yellow	78	85
	Clay, blue, gritty	14	99
Qk	Hardpan, blue	15	114
	Clay, brown and blue	25	139
	Clay, sand, and gravel, yellow	11	150
Qss	Hardpan, yellow	11	161
	Sand and gravel, some water	3	164
	Hardpan, yellow	13	177
	Hardpan, blue	13	190
	Clay and gravel, gray	20	210
	Clay, gritty, blue	65	275
	Clay and gravel, blue, some water	6	281
	Clay, gritty, blue	19	300
	Clay, sand, and gravel, blue	20	320
Qpu	Sand and gravel, with blue clay	57	377
	Clay, blue, sand and gravel, water-bearing	3	380
	Hardpan, blue	27	407
	Clay, blue and gray, and some sand and gravel	63	470
	Clay, green and blue, with sand streaks	33	503
	Clay, gray and blue, and sand and gravel	75	578
	Clay, green and blue	7	585
	Clay, gray, with gravel streaks	14	599
	Clay, gray and blue, with sand streaks	35	634

Cased 8-inch diameter to 569 ft. Perforated 159 to 166 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-29K1. Brig O'Dune Kennels. Drilled by Harbor Pump and Drilling Co., Inc., November 1977. Altitude 170 ft.			
Qvt	Topsoil, brown	2	2
	Hardpan	3	5
	Sand, clean, brown	22	27
Qc	Clay and sand, brown	9	36
	Sand, clean, brown, damp	6	42
	Clay, hardpan, sandy	40	82
Qk	Hardpan, gray	4	86
	Hardpan, brown	9	95
	Hardpan, gray	17	112
	Sand, gray, and fine gravel, some water	1	113

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-29K1.--Continued			
Qss	?, hard-packed	1	114
	?, coarser, heaving	4	118
	?, no water	at	118

Cased 6-inch diameter to 114 ft. Screen 114 to 118 ft.
Slot size 0.035 inch.

21/2-30L3. Bob Strode. Drilled by Harbor Pump and Drilling Co., Inc., January 1979. Altitude 120 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Clay, sandy, brown	5	5
	Clay, blue and brown	10	15
Qvt	Clay, gray	10	25
	Hardpan, brown	10	35
	Clay, sandy, brown	16	51
	Sand, brown, dry	19	70
Qc	Sand, gray, with clay binder	9	79
	Sand, silty, gray, seepage	11	90
	Clay, gray	30	120
Qk	Silt, gray, seepage	10	130
	Silt, sandy, and clay, brown	8	138
	Silt, gray, seepage	50	188
-?-	Clay, silty, gray	22	210
	Clay, gray	20	230
	Clay, silty, gray, some water	10	240
Qpu	Clay, gray	78	318
	Sand, fine, gray, heaving	6	324
	Sand, gray, with clay balls, seepage	1	325

Cased 6-inch diameter to 320 ft. Screen 320 to 325 ft.
Slot size 0.012 inch.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-31A2. Maria Hageness. Drilled by Harbor Pump and Drilling Co., Inc., November 1972. Altitude 82 ft.			
Qvt	Topsoil	4	4
	Hardpan, brown	9	13
Qc	Sand and gravel, hard-packed, brown	22	35
	Sand, brown	10	45
Qk	Clay, dark brown, with some sand, packed	8	53
Qss	Sand and gravel, packed, brown	8	61
	Hardpan, brown	3	64
	Clay, brown	2	66
	Hardpan, brown	5	71
Qpu	Sand, very dirty, brown, some water	6	77
	Sand, brown, and some clay, dry	13	90
	Sand and gravel, brown, water-bearing	10	100
	Clay, sandy, brown	5	105
	Clay, gray	at	105

Cased 6-inch diameter to 95½ ft. Screen 95½ to 105 ft. Slot size 0.025 inch (95½ to 100½ ft) and 0.020 inch (100½ to 105 ft).

Geologic unit	Material	Thickness (ft)	Depth (ft)
21/2-32M2. Gary Johnson. Drilled by Gene Battell Well Drilling, December 1975. Altitude 240 ft.			
	Topsoil	2	2
Qvr	Sand	7	9
	Gravel	18	27
Qvt	Hardpan	17	44
	Sand, hard-packed	13	57
Qc	Sand and gravel, cemented	39	96
	Gravel, water-bearing	11	107

Cased 6-inch diameter to 107 ft. Open end.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-13D2. Leo Jones. Drilled by Harbor Pump and Drilling Co., Inc., March 1970. Altitude 20 ft.			
Qvt	Topsoil	4	4
	Hardpan, gray	8	12
	Clay, solid	176	188
Qk/Qpu	Sand, coarse, some fine gravel, water-bearing	at	188
Cased 6-inch diameter to 187½ ft. Open end.			
22/1-14E1. Harbor Water Co. Drilled by Harbor Pump and Drilling Co., Inc., July 1969 (to 189 ft); deepened in August 1971 (to 397 ft). Altitude 260 ft.			
Qvt	Soil, soft	4	4
	Hardpan, brown	38	42
	Sand, brown	42	84
	Hardpan, brown	11	95
Qc	Sand, brown, dry	52	147
	Sand, gray, damp	19	166
	Sand, coarse, and fine gravel, heaving, with clay layers, water-bearing	15.5	181.5
Qss	Sand and gravel, water-bearing	21.5	203
	Clay, sandy, and gravel, gray	10	213
	Hardpan, black, with sand and gravel	7	220
	Clay, blue, sticky	48	268
	Hardpan, brown, with sand and gravel	13	281
	Clay, sandy, brown	6	287
Qpu	Hardpan, brown, with sand and gravel	5	292
	Clay, blue	8	300
	Clay, sandy, brown	81	381
	Sand, loose	2	383
	Clay, sandy, brown	10	393
	Sand, loose	4	397
Cased 6-inch diameter to 388 ft. Screen 388 to 397 ft. Slot size 0.030 inch.			

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-15L1. Mansfield Davis. Drilled by Harbor Pump and Drilling Co., Inc., September 1976. Altitude 223 ft.			
Qvr	Sand, brown	24	24
Qvt	Hardpan, brown	8	32
	Sand and gravel, with clay binder, brown	33	65
Qc	Sand and gravel, gray-brown, seepage	3	68
	Sand and gravel, muddy, water-bearing	5	73
	Clay, gravel, with gravel and peat, gray, some seepage	8	81
Qk	Clay, gray, with some peat, no seepage	15	96
	Hardpan, gray, with seepage at 105, 107, and 114 ft	44	140
	Gravel, hard-packed, dry	4	144
Qss	Gravel, hard-packed, slight seepage	3	147
	Clay, gray, some seepage	45	192
	Clay, sandy, brown, dry	15	207
Qpu	Clay, hardpan, sandy, brown, some seepage	37	244
	Sand and gravel, medium-coarse, heaving, water-bearing	20	264
Cased 6-inch diameter to 259 ft. Screen 259 to 264 ft. Slot size 0.045 inch.			
22/1-17F1. C. A. Dancel. Drilled by Harbor Pump and Drilling Co., Inc., December 1976. Altitude 230 ft.			
Qvt	Hardpan, gray	30	30
	Hardpan, brown	14	44
Qc/Qk	Sand and hardpan (?)	70	114
Qss	Sand and gravel, hard	1	115
	Sand and gravel, coarse, clean	8	123
Cased 6-inch diameter to 121 ft. Screen 121 to 124 ft. Slot size 0.060 inch.			

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-20A1. Bob Jones. Drilled by Harbor Pump and Drilling Co., Inc., June 1976. Altitude 95 ft.			
	Topsoil	2	2
Qvt	Gravel, sandy, with clay	13	15
	Hardpan, gray, and gravel	19	34
-?-	Hardpan, brown	62	96
	Sand and gravel, hard-packed, some seepage	6	102
	Sand and gravel, loose, heaving	4	106
Qpu	Sand and gravel, water-bearing	at	106
Cased 6-inch diammeter to 107 ft. Open end.			
22/1-21H1. Warren Tietz. Drilled by Harbor Pump and Drilling Co., Inc., September 1977. Altitude 290 ft.			
	Topsoil, brown	3	3
	Sand and gravel, brown	37	40
Qvr/Qc	Sand, brown	36	76
	Sand and gravel, brown	9	85
	Sand, brown	5	90
	Sand and gravel, brown	31	121
	Sand, hard-packed	9	130
	Hardpan, sandy, brown	11	141
Qk	Sand, brown, with clay binder, dry	11	152
	Sand, brown, dry	23	175
	Sand and gravel, brown	15	190
Qss	Sand, brown, water-bearing	10	200
	Sand and gravel, brown	5	205
Cased 6-inch diameter to 202½ ft. Screen 202½ to 205 ft. Slot size 0.080 inch.			
22/1-22L1. Harbor Water Co. (Wauna Shores). Drilled by Harbor Pump and Drilling Co., Inc., July 1974. Altitude 285 ft.			
	Topsoil	2	2
Qvt	Clay hardpan	5	7
	Sand and gravel	24	31
Qc	Sand, brown	40	71
	Clay, sandy, brown-blue	18	89
	Hardpan, brown	52	141
	Clay, gravelly, gray	14	155

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-22L1.--Continued			
Qk	Clay and sand, brown----------------------------	32	187
	Gravel hardpan, brown---------------------------	32	219
	Sand, brown-------------------------------------	7	226
	Hardpan, rust-brown-----------------------------	19	245
Qss	Sand, rust-brown, and some fine gravel, seepage--	15	260
	Sand, clean, brown, with clay balls, some water--	9	269
	Clay, gray, and peat----------------------------	18	287
	Sand, brown, some water-------------------------	3	290
Qpu	Sand, hard-packed-------------------------------	3	293
	Sand, coarse, loose, water-bearing--------------	3	296
	Hardpan, gray-----------------------------------	at	296

Cased 8-inch diameter to 288 ft. Screen 288 to 296 ft.
Slot size 0.035 inch (288 to 293 ft) and 0.050 (293 to 296 ft).

22/1-23M1. Harbor Water Co. (Emerald Shores). Drilled by Richardson Well Drilling Co., May 1972. Altitude 250 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Topsoil---	1	1
	Gravel--	37	38
Qvr/Qc	Sand and some gravel----------------------------	50	88
	Gravel, sandy-----------------------------------	11	99
	Sand--	38	137
Qk	Clay, blue--------------------------------------	36	173
	Clay and shale, blue----------------------------	15	188
Qss	Gravel, sandy-----------------------------------	5	193
	Hardpan---	18	211
	Hardpan, sandy----------------------------------	27	238
Qpu	Gravel and sand---------------------------------	35	273
	Gravel and hardpan------------------------------	31	304
	Clay, silty, blue-------------------------------	5	309
	Gravel and sand---------------------------------	3	312

Cased 8-inch diameter to 312 ft. Perforated 248 to 303 ft.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-24A1. Dale Kooley. Drilled by Harbor Pump and Drilling Co., Inc., November 1976. Altitude 300 ft.			
	Soil, sandy, brown	5	5
Qvt	Hardpan, gray, and rocks	49	54
	Hardpan, brown	26	80
	Sand, brown	34	114
Qc	Sand with some gravel, seepage	16	130
	Sand, clean, brown, some water	10	140
	Clay, gray	7	147
	Silt	7	154
	Clay, solid, gray, with silt layers	60	214
Qk	Gravel and hardpan, hard	23	237
	Clay and peat, brown	13	250
	Clay, blue	13	263
	Clay and sand	12	275
	Sand, coarse, and gravel, hard-packed, water-bearing	21	296
Qss	Hardpan, gray	3	299
	Sand and gravel, coarse, loose, water-bearing	18	317

Cased 10-inch diameter to 301 ft. Screen 301 to 316 ft.
Slot size 0.100 inch (301 to 310 ft) and 0.080 (310 to 316 ft).

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-25C3. Woodshore Apartments. Drilled by Harbor Pump and Drilling Co., Inc., June 1969. Altitude 80 ft.			
Qvr	Sand and gravel, seepage	23	23
	Hardpan with water-bearing gravel layers	45	68
Qvt	Hardpan, brown	15	83
	Hardpan, gray	2	85
	Sand and gravel, dirty, gray, some water	27	112
Qss	Sand and gravel, hard-packed, brown some water	10	122
	?, very hard	1	123
	Sand and gravel, loose, heaving, with some brown water	1	124
	?, hard-packed	4	128
	Clay	5	133
	Sand, coarse, loose, brown, with clay layers, water-bearing	6	139
	Clay, brown	6	145

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-25C3--Continued			
Qpu	Clay, blue	8	153
	Sand, silty, and clay	311	464
	Sand, dirty, gray	7	471
	Sand, clean, gray	1	472
	Sand and some gravel, hard	.5	472.5
	Sand, coarse, clean, water-bearing	.5	473

Cased 6-inch diameter to 475 ft. Open end.

22/1-26R4. Francis Jermy. Driller unknown, drilled in March 1969. Altitude 20 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Soil, rocky	2	2
	Hardpan, gray	6	8
Qvt	Sand, hard-packed, brown	2	10
	Hardpan, gray	18	28
	Hardpan, sandy, brown, and sand	10	38
Qss	Gravel, coarse	5	43
	Clay, sandy, soft, with water-bearing sand streaks	32	75
	Gravel, hardpan	14	89
Qpu	Clay, blue, and sand	8	97
	Clay, brown, with wood chips and hardpan, seepage	15	112
	Gravel, water-bearing	16	128

Cased 6-inch diameter to 128 ft. Open end.

22/1-28D3. Charles Sehmel. Drilled by Harbor Pump and Drilling Co., Inc., July 1977. Altitude 70 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Soil	4	4
Qvr/Qvt	Gravel, rocky	11	15
	Gravel and boulders	10	25
	Clay, sandy	10	35
Qk	Clay, tan-yellow, and sand	5	40
	Sand and gravel, conglomerated, water-bearing	1	41
	Hardpan, brown	6	47

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-28D3--Continued			
	Sand and gravel, water-bearing	10	57
Qss	Sand, tan-brown, and gravel, water-bearing	1	58
	?, conglomerated	12	70
	Sand, rusty brown	5	75
	Clay, tan-brown	15	90
	Silt	44	134
	Sand, brown, water-bearing	26	160
Qpu	Sand and gravel, water-bearing	9	169
	Sand, clean, loose, water-bearing	1	170
	Sand, muddy, brown	47	217
	Sand, clean, water-bearing	1	218
	Hardpan, gravelly, brown	5	223
	Gravel, clean, water-bearing	at	223

Cased 6-inch diameter to 223 ft. Open end.

22/1-29M1. Earl Ruby. Drilled by Ramlo Well Drilling, March 1976. Altitude 210 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Topsoil	4	4
Qvt	Hardpan, brown	42	46
Qc	Sand, medium, brown, dry	44	90
	Clay, blue	8	98
Qk	Sand, medium, brown, dry	72	170
	Hardpan, brown	1	171
Qss	Sand and gravel, brown, water-bearing	7	178

Cased 6-inch diameter to 173 ft. Screen 173 to 178 ft. Slot size 0.018 inch.

22/1-32F2. Minter Beach Estates. Drilled by Harbor Pump and Drilling Co., Inc., September 1977. Altitude 150 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Topsoil, sandy	3	3
Qvr	Sand and gravel, gray	12	15
Qvt	Hardpan, brown	11	26
Qc	Sand, brown, with binder	36	62
Qk	Hardpan, brown	35	97

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/1-32F2--Continued			
Qss	Sand and gravel, brown	24	121
	Clay, brown	7	128
	Sand, brown, with silt and clay	5	133
	Sand, fine-medium, brown, water-bearing	32	165
	Clay, brown	10	175
Qpu	Clay, gray	5	180
	Clay, brown	34	214
	Hardpan, brown	26	240
	Sand, silty, gray, and gravel	11	251
	Sand and gravel, clean, water-bearing	3	254

Cased 6-inch diameter to 251 ft. Screen 251 to 254 ft.
Slot size 0.080 inch.

22/1-34R3. L. R. McGirk. Drilled by Harbor Pump and 30Drilling Co., Inc., June 1971. Altitude 100 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Clay, sandy, red	8	8
Qk/Qpu	Clay, blue	104	112
	Sand and gravel, brown, water-bearing	23	135

Cased 6-inch diameter to 132 ft. Screen 132 to 135 ft.
Slot size 0.020 inch.

22/1-35L1. Mike Matters. Drilled by P and P Well Drilling, March 1974. Altitude 150 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Clay, brown	18	18
Qvt	Hardpan	14	32
	Sand and gravel, water-bearing (3 gal/min)	8	40
Qc	Clay, brown	12	52
	Clay, sandy	4	56
	Clay, blue	45	101
-?-	Sand, dry	3	104
	Clay, brown	7	111
	Sand and gravel, water-bearing (7 gal/min)	2	113
Qk	Clay, brown	10	123
	Silt	12	135
	Clay, brown	2	137
Qss	Sand and gravel	13	150
	Clay, brown	1	151

Cased 6-inch diameter to 145 ft. Screen 145 to 150 ft.
Slot size 0.025 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-16C2. Joel A. Waller. Drilled by Lewis Well Drilling, April 1977. Altitude 268 ft.			
	Topsoil	3	3
Qvt	Hardpan, brown	22	25
	Hardpan, gray	15	40
Qc	Gravel, loose	25	65
	Clay and gravel, gray	15	80
Qk	Hardpan, brown	5	85
	Gravel, loose	15	100
Qss	Sand and gravel, brown	24	124
	Hardpan, brown	15	139
	Sand, brown	3	142
	Sand and clay, gray	13	155
	Sand, blue	15	170
Qpu	Clay and sand, gray	45	215
	Clay, brown	15	230
	Clay, gray	42	272
	Clay, brown	37	309
	Clay, blue	20	329
	Clay, silt, and fine sand, blue	66	395
	Sand, water-bearing	6	401

Cased 5-inch diameter to 396 ft. Screen 396 to 401 ft. Slot size 0.010 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-17P3. Ralph Hall. Drilled by Harbor Pump and Drilling Co., Inc., December 1975. Altitude 340 ft.			
	Sand, binder, and rocks	24	24
	Hardpan, brown	11	35
Qvt/Qk	Clay and rocks, brown	3	38
	Hardpan, brown	9	47
	Sand, brown, and hardpan	38	85
	Sand, brown, and fine gravel, dry	19	104
	Sand and gravel, medium coarse, hard-packed, seepage	6	110
Qss	Sand, coarse, and fine gravel, loose	5	115
	?, hard, no water	1	116

Cased 6-inch diameter to 116 ft. Open end.

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-18H1. Walsh. Drilled by Harbor Pump and Drilling Co., Inc., May 1977. Altitude 380 ft.			
	Soil, rocky, brown	3	3
Qvt	Hardpan, grayish brown	59	62
	Hardpan, gray	12	74
	Sand and gravel, coarse, loose, brown, some water	6	80
	Clay, brown and gray, with sand and gravel seams	6	86
	Sand and gravel, coarse, wet	3	89
	Sand and gravel, hard-packed, gray, dry	2	91
	Hardpan, gray	39	130
Qc	Sand, medium fine, gray, with some fine gravel, wet	6	136
	Sand and gravel, hard-packed, gray, with clay binder, dry	4	140
	Sand, fine, silty, and coarse gravel, with large balls of cemented sand and gravel, wet	2	142
	Sand and gravel, hard-packed, dry, with streaks of seepage	19	161
	Clay, dark brown	5	166
	Sand, medium-fine, gray, wet	4	170
Qk	Clay, gray	42	212
	Clay, gray, with gravel and some brown and green clay, slight seepage	6	218
	Sand, gray, and some binder	2	220
	Sand, medium-coarse, gray, and some gravel, water-bearing	12	232
Qss	Sand, coarse	4	236
	?, hard-packed	1	237
	Sand, medium-coarse, gray, and some gravel	12	249

Cased 8-inch diameter to 239 ft. Screen 239 to 249 ft. Slot size 0.020 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-19C2. Bill Burney. Drilled by Harbor Pump and Drilling Co., Inc., June 1978. Altitude 330 ft.			
Qvr	Sand, gray, with clay binder	12	12
Qvt	Hardpan, gray	64	76
	Sand and gravel, brown, some seepage	8	84
Qc	Hardpan, brown	6	90
	Sand and gravel, brown	13	103
	Clay, sandy, brown	43	146

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-19C2.--Continued			
Qk	Sand, brown, dry----------------------------------	7	153
	Clay, brown--	61	214
Qss	Sand and gravel, coarse, brown, water-bearing----	3	217
	Clay, blue---	79	296
Qpu	Sand and gravel, coarse, gray, water-bearing-----	8	304
	Sand and gravel, coarse, brown, water-bearing----	11	315

Cased 8-inch diameter to 304 ft. Screen 304 to 314 ft.
Slot size 0.080 inch.

22/2-20Q1. Spadoni Bros. Drilled by Harbor Pump and Drilling Co., Inc., June 1970. Altitude 165 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
Qvt	Rocks and brown hardpan--------------------------	33	33
	Sand and gravel, coarse, seepage-----------------	3	36
Qc	Sand, dirty, brown, wet--------------------------	4	40
	Hardpan, gray------------------------------------	5	45
	Clay, hardpan------------------------------------	15	60
Qk	Clay and silt------------------------------------	31	91
	Sand, coarse, water-bearing----------------------	2	93
	Clay, sandy, blue--------------------------------	18	111
	Sand, fine, gray, water-bearing------------------	8	119
Qss	Sand, coarse, water-bearing----------------------	9	128

Cased 6-inch diameter to 123 ft. Screen 123 to 128 ft.
Slot size 0.040 inch.

22/2-21Q1. Talmo Inc. Drilled by Harbor Pump and Drilling Co., Inc., August 1976 (to 286 ft); deepened to 323 ft in April 1977, and to 430 ft in August 1977. Altitude 305 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Sand, brown--------------------------------------	99	99
	Gravel---	3	102
Qc	Hardpan and gravel-------------------------------	4	106
	Sand, dirty, brown-------------------------------	65	171
	Sand and some gravel-----------------------------	16	187
	Clay, hardpan, sandy, brown----------------------	15	202
	Sand, brown, seepage-----------------------------	1	203

(continued)

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-21Q1--Continued			
Qk	Hardpan	2	205
	Clay, brown	3	208
	Clay, silty, gray	4	212
	Gravel, hard-packed, brown	6	218
	Sand and gravel, loose, some water	1	219
	Gravel, dirty, brown, very little seepage	6	225
	Sand and gravel, loose, some water	1	226
	Gravel, hard-packed	1	227
	Gravel, loose	2	229
	Gravel, hard	12	241
	Sand, coarse, brown	11	252
	Sand and gravel	4	256
Qss	Sand, fine, and rocks	1	257
	Sand and gravel, clean	4	261
	Sand with brown binder	1	262
	Sand and gravel, heaving, some water	3	265
	Sand and large rocks, heaving	2	267
	Sand and gravel, heaving	8	275
	Sand and gravel, gray	11	286
	Sand and gravel, gray, with binder	5	291
	Sand and gravel, heaving, gray	3	294
	Sand and gravel, with clay binder	11	305
	Sand and gravel, coarse, heaving, gray	18	323
	Hardpan, gray	5	328
	Sand and gravel, almost black, water-bearing	17	345
	Clay, gray	7	352
	Silt, gray	5	357
	Clay, sandy, gray	12	369
Qpu	Sand, fine, gray	46	415
	?, water-bearing	7	422
	Sand and gravel, coarse, gray	4	426
	Sand, fine-medium, gray	4	430
	Clay, sandy, gray	at	430

Cased 8-inch diameter to 416 ft. Screen 416 to 430 ft. Slot size 0.030 inch (416 to 423 ft), 0.035 inch (423 to 430 ft).

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-28A1. John Meads. Drilled by Harbor Pump and Drilling Co., Inc., July 1974. Altitude 300 ft.			
Qc	Sand, clean, small amount of binder	87	87
	Hardpan, gravelly	18	105
Qk	Sand, brown, with binders	15	120
	Clay, soft, blue	1	121
-?-	Sand, brown, with binders	69	190
	Hardpan, brown	14	204
	Sand, clean, brown	55	259
	Sand, greenish, wet	10	269
Qpu	Sand, gray, wet	17	286

Cased 6-inch diameter to 285 ft. Open end.

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-29E1. Harbor Water Co. (Firwood). Drilled by Harbor Pump and Drilling Co., Inc., July 1975. Altitude 265 ft.			
	Topsoil, sandy, brown, with some rocks	11	11
Qvt	Sand, greenish brown, with binder and some rocks	36	47
	Sand, brown, and loose hardpan	5	52
	Sand, brown, with binder	17	69
	Sand, brown, with binder, some seepage	7	76
	Sand, brown, wet	10	86
Qc	Sand and gravel, water-bearing	6	92
	Gravel and sand	11	103
	Sand, gray, and clay, with some fine gravel	1	104
	Sand and gravel, hard-packed, with some clay	2	106
	Sand and gravel, loose, with some clay	4	110
	?	4	114
	Clay with gravel and silty sand	2	116
Qk	Clay, gray	25	141
	Clay, gray, with seams of brown clay	53	194
	Clay, with very little sand and gravel	3	197
	Clay	16	213
	Sand, gray, wet	1	214
	Clay, sandy, gray, with some rocks	13	227

(continued)

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-29E1.--Continued			
-?-	Sand and gray clay, some seepage	26	253
	Sand, silty, gray, with clay chunks and wood pieces, some water	17	270
	Sand, silty, gray	6	276
	Clay, sandy, brown	7	283
	Sand, gray, and some gravel, water-bearing	1	284
Qpu	Clay and gravel, some seepage	9	293
	Sand and gravel, gray, water-bearing	10	303

Cased 6-inch diameter to 297 ft. Screen 297 to 303 ft.
Slot size 0.050 inch.

22/2-31J1. Harbor Water Co. (Peacock Hill). Drilled by Harbor Pump and Drilling Co., Inc., July 1974.
Altitude 270 ft.

Geologic unit	Material	Thickness (ft)	Depth (ft)
	Soil, brown	2	2
Qvt	Gravel hardpan, gray	16	18
	Sand, brown	34	52
Qc	Clay, brown, and sand	14	66
	Sand, fine, brown	19	85
-?-	Sand and gravel, hard, brown	25	110
	Hardpan	10	120
	Sand and gravel, brown, dry	12	132
Qss	Sand and gravel, clean, brown, some seepage	12	144
	Sand, fine, loose, brown, some water	41	185
	Sand and clay, silty, gray	21	206
	Sand, clean, brown, some water	4	210
	Clay, solid, blue	52	262
	Clay, dark gray	46	308
	Sand, brown, some gravel, water-bearing	3	311
Qpu	?, hard-packed, some water	2	313
	Sand, coarse, and gravel, heaving	3	316
	Sand, fine, brown	5	321
	Sand, coarse	3	324

Cased 6-inch diameter to 320 ft. Screen 320 to 324 ft.
Slot size 0.080 inch.

TABLE 13.--Drillers' logs of selected wells--Continued

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-32P2. Town of Gig Harbor (#2). Drilled by Harbor Pump and Drilling Co., Inc., September 1962. Altitude 24 ft.			
Qvt	Sand and gravel hardpan	18	18
	Clay, blue	12	30
	Sand and gravel, water-bearing	18	48
	Clay, blue, with sand layers	25	73
	Sand, medium-coarse, water-bearing	11	84
Qpu	Sand and gravel	6	90
	Sand and gravel, hard-packed, water-bearing	9	99
	Gravel, large, loose, water-bearing	10	109
	Peat, clay, and vegetation, brown	2	111
	Sand, coarse, and pea gravel, water-bearing	4	115
	Sand and gravel, coarse, water-bearing	6	121

Cased 10-inch diameter to 116 ft. Screen 116 to 121 ft. Slot size 0.090 inch.

Geologic unit	Material	Thickness (ft)	Depth (ft)
22/2-33F2. Harbor Water Co. (Sea Cliff, upper well). Drilled by Harbor Pump and Drilling Co., Inc., December 1960. Altitude 310 ft.			
Qvt	Topsoil, sandy	2	2
	sand and gravel hardpan	11	13
Qc	Sand and gravel	11	24
	Hardpan, sandy	34	58
	Clay, blue	22	80
	Sand, fine, seepage	6	86
Qk	Clay, blue	1	87
	Sand, brown, seepage	1	88
	Clay, blue	29	117
	Sand and gravel hardpan, brown	33	150
Qss	Sand, gray, and fine gravel, seepage	10	160
	Clay, blue	15	175
	Sand, fine, blue	29	204
	Hardpan and sand, brown	2	206
	Clay, sandy, blue	16	222
	Sand, fine, blue	82	304
	Clay, blue	2	306
	Sand and gravel hardpan	7	313
Qpu	Sand, fine, and gravel, water-bearing	15	328
	Sand, coarse, water-bearing	9	337
	Sand and gravel, compacted	14	351

Cased 6-inch diameter to 351 ft. Perforated 328 to 337 ft.

TABLE 14.—Chemical quality of ground water from selected wells

[Water-bearing unit tapped: C, Colvos Sand Member of Vashon Drift; S, Salmon Springs(?) Drift; P, pre-Salmon Springs(?) deposits. ▭, indicates value which exceeds limit established by Federal Safe Drinking Water Act. *, nitrate + nitrite. T, total concentration.]

Well number	Water-bearing unit tapped	Date sample collected	Silica (SiO_2), dissolved	Iron (Fe), dissolved	Manganese (Mn), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Alkalinity as $CaCO_3$, total	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate, total as N	Nitrite, total as N	Phosphorus, total as P	Phosphorus, dissolved orthophosphate as P	Dissolved solids residue at 180°C	Hardness as $CaCO_3$ (Ca,Mg)	Hardness Noncarbonate	Specific conductance (micromhos at 25°C)	pH (units)
			Milligrams per liter																				
20/1-1K1	S	9- -77	--	0.63	0.04	--	--	--	--	--	--	--	--	0.1	0.06	--	--	--	--	67	--	150	--
-2K1	S	5-13-77	--	.02	.21	--	--	--	--	--	--	--	--	.2	<.1	--	--	--	--	90	--	204	--
20/2-5D2	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	152	--
-5D4	P	3-20-79	--	--	--	--	--	--	--	--	--	--	7.0	--	*.00	--	--	--	94	--	--	154	7.6
-7P1	P	3-21-79	--	--	--	--	--	--	--	--	--	--	3.6	--	*.03	--	--	--	129	--	--	199	7.7
-7R2	S	5-18-78	--	--	--	--	--	--	--	--	--	--	15	--	--	--	--	--	--	--	--	218	--
-18E2	S	10- 6-67	30	.24	.02	--	--	--	--	41	34	--	4.0	--	--	--	--	--	91	41	--	--	6.3
21/1-1L2	C	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	121	--
-2B3	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	130	--
-2N1	P	3-15-79	--	--	--	--	--	--	--	--	--	--	2.4	--	*.02	--	--	--	102	--	--	142	7.9
-3A3	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	156	--
-9R2	P	3-15-79	--	--	--	--	--	--	--	--	--	--	2.9	--	*.00	--	--	--	110	--	--	170	8.0
-10J3	P	3-15-79	--	--	--	--	--	--	--	--	--	--	3.8	--	*.13	--	--	--	120	--	--	185	7.8
-11N4	P	9-25-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	125	--
-11P2	S	3-15-79	--	--	--	--	--	--	--	--	--	--	2.7	--	*.05	--	--	--	71	--	--	101	7.3
-11R1	S	6-12-74	27	.09	.02	12	12	3.0	--	62	51	1.0	2.9	.2	.40	<0.01	0.15	--	98T	--	--	100	7.6
-12D1	C	2-14-79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-12D2	C	3-15-79	--	--	--	--	--	--	--	--	--	--	4.4	--	*.79	--	--	--	78	--	--	97	7.3
-12D3	S	3-15-79	--	--	--	--	--	--	--	--	--	--	3.1	--	*.05	--	--	--	92	--	--	117	9.4
-12G2	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	108	--
-15E1	P	6- 2-72	21	.02	.01	11	16	7.1	2.8	100	82	3.2	4.5	.1	.10	.00	.18	--	116T	96	14	176	7.3
-15F1	S	3-15-79	--	--	--	--	--	--	--	--	--	--	4.8	--	*.00	--	--	--	98	--	--	141	7.8
-15J1	S	9-27-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-16F1	S	3-15-79	--	--	--	--	--	--	--	--	--	--	310	--	*.50	--	--	--	696	--	--	1,220	7.6
	--	3-22-79	--	.15	.58	--	--	--	--	--	--	--	340	--	--	--	--	--	--	--	--	1,434	--
-21K3	S	5- 4-78	--	--	--	--	--	--	--	--	--	--	11	--	--	--	--	--	--	--	--	150	--
-21L1	P	3-21-79	--	--	--	--	--	--	--	--	--	--	130	--	*.36	--	--	--	387	--	--	562	7.3
-21P2	S	9- -65	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	153		--	--
-22E1	S	3-21-79	--	--	--	--	--	--	--	--	--	--	8.3	--	*1.2	--	--	--	131	--	--	199	7.6
-22L2	S	11-16-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	140	--
-23E2	S	10-17-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	134	--
-23K1	S	1-24-79	--	.05	.01	--	--	--	--	--	--	--	--	.1	.2	--	--	--	--	66	--	172	--
-23L1	S	9-12-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	148	--
-24P2	S	3-20-79	--	--	--	--	--	--	--	--	--	--	3.4	--	*.09	--	--	--	83	--	--	144	7.5
-25D1	C	3-21-79	--	--	--	--	--	--	--	--	--	--	4.1	--	*.07	--	--	--	79	--	--	123	7.1
-25K1	S	7-25-78	--	.02	.04	--	--	--	--	--	--	--	--	.1	.1	--	--	--	--	16	--	110	--
-27A3	S	9-13-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	198	--
-28B3	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	198	--
-28C4	S	9-14-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>1,000	--
-28D3	S	4-28-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-28D5	S	8-28-78	--	.01	.00	--	--	--	--	--	--	--	504	--	--	--	--	--	--	430	--	1,310	6.6
	--	3-15-79	--	--	--	--	--	--	--	--	--	--	270	--	--	--	--	--	--	220	--	730	--
	--	8-22-79	--	.26	.05	--	--	--	--	--	--	--	645	.1	.1	--	--	--	--	704	--	2,700	--
-28F1	S	3-21-79	--	--	--	--	--	--	--	--	--	--	4.2	--	*.22	--	--	--	187	--	--	289	8.0
-28F2	S	2- 8-73	--	--	.02	--	--	--	--	--	--	--	565	--	3.5	.02	--	--	--	--	--	--	--

			Milligrams per liter									
Color (platinum-cobalt units)	Turbidity (Jtu)	Carbon dioxide (CO_2)	Methylene blue active substances (detergents)	Arsenic (As), dissolved	Barium (Ba), dissolved	Cadmium (Cd), dissolved	Chromium (Cr), dissolved	Lead (Pb), dissolved	Mercury (Hg), dissolved	Selenium (Se), dissolved	Silver (Ag), dissolved	Remarks
5	4	--	--	<0.01	<0.1	<0.01	<0.01	<0.01	<0.001	<0.005	<0.01	Chloroform = 5.6 mg/L.
0	0	--	--	.012	--	<.01	<.01	<.010	<.001	<.005	<.010	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	0.0	--	--	--	--	--	--	--	--	--Do--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining, odor, and metallic taste reported.
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Bad taste and coliform bacteria reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
4	1	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Sewage odor.
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
7	4	11	--	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining, bad taste, sulfur odor, and coliform bacteria reported.
--	--	--	.1	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	Coliform bacteria reported.
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	--Do--
10	0	--	--	.001	.01	.001	.001	.002	.001	.003	.001	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	Sewage contamination reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
2	0	--	--	.008	.01	.001	.001	.011	.001	.001	.001	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	--Do--
--	--	--	--	--	--	--	--	--	--	--	--	Staining and salty taste reported.
--	--	--	--	--	--	--	--	--	--	--	--	Salty water reported.
--	--	--	--	--	--	--	--	--	--	--	--	Bad taste reported.
--	--	--	--	--	--	--	--	--	--	--	--	--
1	0	--	--	.008	.0	.01	.018	.003	.001	.031	.013	Kills vegetation.
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Salty water reported.

TABLE 14.—Chemical quality of ground water from selected wells—Continued

Well number	Water-bearing unit tapped	Date sample collected	Milligrams per liter																			Specific conductance (micromhos at 25°C)	pH (units)
			Silica (SiO_2), dissolved	Iron (Fe), dissolved	Manganese (Mn), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Alkalinity as $CaCO_3$, total	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate total as N	Nitrite, total as N	Phosphorus, total as P	Phosphorus, dissolved orthophosphate as P	Dissolved solids, residue at 180°C	Hardness as $CaCO_3$ (Ca,Mg)	Hardness Noncarbonate		
21/1-34A1	S	3-21-79	--	--	--	--	--	--	--	--	--	--	21	--	*0.39	--	--	--	106	--	--	144	7.2
-34A4	P	4- 4-78	--	--	--	--	--	--	--	--	--	--	300	--	--	--	--	--	--	--	--	--	--
-34B1	S	9-18-68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-35D1	P	3- 1-61	41	0.62	--	21	15	10	3.4	163	134	0.4	4.5	0.1	.2	--	--	0.39	168	112	--	258	7.7
	--	7-19-70	--	2.4	0.03	18	12	31	7.6	159	130	.0	43	.1	.76	0.09	0.82	--	206T	96	--	360	6.5
	--	7-22-70	44	.24	.00	15	13	13	6.4	134	110	.0	11	.1	.15	.02	.51	--	170T	90	--	260	7.6
	--	8-21-79	--	--	--	--	--	--	--	--	--	--	20	--	*.01	--	--	--	190	--	--	292	7.8
-35E2	S	12- 6-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	169	--
-35P1	C	3-21-79	--	--	--	--	--	--	--	--	--	--	5.0	--	*1.0	--	--	--	97	--	--	166	7.2
21/2-4E2	S	8-20-79	--	--	--	--	--	--	--	--	--	--	4.4	--	*1.4	--	--	--	89	--	--	133	7.2
-5C2	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	155	--
-5P3	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	187	--
-7B1	P	3-15-79	--	--	--	--	--	--	--	--	--	--	3.1	--	*.00	--	--	--	79	--	--	105	7.7
-7L1	S	11- 7-69	15	.16	.02	8.8	7.8	5.6	1.1	61	50	3.5	3.3	.1	.14	.00	.20	--	76	54	4	106	7.4
	--	12- 5-69	5.0	.22	.02	8.0	8.3	10	1.4	66	54	11	5.0	.1	1.4	.02	.72	--	88	54	--	98	7.0
	--	7-25-78	--	.29	.03	--	--	--	--	--	--	--	--	.1	1.6	--	--	--	--	16	--	172	--
-8C1	P	3- 2-61	34	.22	--	12	6.9	5.5	1.8	83	68	.4	2.2	.1	.3	--	--	.87	99	58	--	141	7.8
	--	1- 5-77	--	.20	.08	--	--	--	--	--	--	--	--	.2	.4	--	--	--	--	64	--	132	--
	--	6-14-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	3-20-79	--	--	--	--	--	--	--	--	--	--	2.5	--	*.02	--	--	--	91	--	--	142	7.6
-17D3	S	1- 5-77	--	.00	.01	--	--	--	--	--	--	--	--	.1	3.7	--	--	--	74	--	--	167	--
	--	6-10-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	--	3-19-79	--	--	--	--	--	--	--	--	--	--	2.8	--	*.37	--	--	--	80	--	--	122	7.6
-17F1	S	10-20-77	--	<.20	.010	--	--	--	--	--	--	--	--	<.1	<.1	--	--	--	--	56	--	129	--
-17F2	P	9-21-78	--	.14	.10	--	--	--	--	--	--	--	.9	--	--	--	--	--	182	64	--	--	--
-17J3	P	10-20-77	--	<.20	<.010	--	--	--	--	--	--	--	--	.1	.1	--	--	--	--	44	--	122	--
-18E1	P	2-23-77	--	.19	.16	--	--	--	--	--	--	--	--	.1	.1	--	--	--	--	68	--	128	--
	P	6- 3-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-18J1	P	1- 5-77	--	.00	.00	--	--	--	--	--	--	--	--	.1	.5	--	--	--	--	44	--	105	--
	P	6-10-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-19F1	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	138	--
-21N1	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	125	--
-28K2	P	2-27-78	--	.28	.67	--	--	--	--	--	--	83	263	.1	4.5	--	--	--	402	--	--	1,056	--
	--	3-19-79	--	--	--	--	--	--	--	--	--	--	300	--	*.02	--	--	--	718	--	--	1,240	7.6
-28P1	S	4- -78	--	.30	.06	--	--	--	--	--	--	--	--	<.1	.3	--	--	--	--	60	--	156	--
-29C1	S	3-20-79	--	--	--	--	--	--	--	--	--	--	4.3	--	*.35	--	--	--	87	--	--	147	7.2
-29K1	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	148	--
-29M2	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	146	--
-30C3	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	135	--
-30D1	P	8-16-77	--	.05	.04	--	--	--	--	--	--	--	--	<.1	.8	--	--	--	--	94	--	144	--
-30L2	P	9- 1-69	--	--	--	--	--	--	--	--	--	--	2.5	--	.20	--	--	--	--	--	--	--	8.0
	--	9- 3-69	18	.44	.02	12	9.7	3.8	5.2	98	80	3.2	9.5	.1	.16	.00	.44	--	111T	72	--	128	8.0
-32E3	S	4-22-75	25	.26	.00	8.8	7.3	5.9	--	51	42	12	4.5	.1	.2	.00	.10	--	90T	52	--	135	8.0
-32E7	S	3-20-79	--	--	--	--	--	--	--	--	--	--	5.6	--	*.07	--	--	--	111	--	--	190	7.5
-32M2	C	3-20-79	--	--	--	--	--	--	--	--	--	--	3.4	--	*.08	--	--	--	82	--	--	130	7.4

Color (platinum-cobalt units)	Turbidity (Jtu)	Carbon dioxide (CO_2)	Milligrams per liter: Methylene blue active substances (detergents)	Arsenic (As), dissolved	Barium (Ba), dissolved	Cadmium (Cd), dissolved	Chromium (Cr), dissolved	Lead (Pb), dissolved	Mercury (Hg), dissolved	Selenium (Se), dissolved	Silver (Ag), dissolved	Remarks
--	--	--	0.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Salty water reported
--	--	--	--	--	--	--	--	--	--	--	--	--Do--
10	--	--	--	--	--	--	--	--	-	--	--	--
70	18	108	--	--	--	--	--	-	-	--	--	CO_2 value is doubtful. Large amount of amorphous Fe.
22	2	7.4	--	--	--	--	--	--	--	--	--	threads of Fe-bacteria (Leptothrix sp.).
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Bad odor reported.
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
2	1	4.5	--	--	--	--	--	--	--	--	--	--
0	2	13	--	--	--	--	--	--	--	--	--	--
2	0	--	--	0.002	0.01	0.001	0.001	0.023	0.026	0.000	0.001	--
0	--	--	--	--	--	--	--	--	--	--	--	--
0	0	--	--	.020	.0	.00	.000	.000	<.001	<.030	.000	--
--	--	--	--	--	--	--	--	--	--	<.005	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
0	1	--	--	.010	.0	.00	.000	.000	<.001	<.030	.000	--
--	--	--	--	--	--	--	--	--	--	<.005	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
0	0	--	--	<.010	<.2	<.005	<.01	<.010	<.001	<.005	<.010	--
--	--	--	--	--	--	--	--	--	--	--	--	Slight sulfur odor reported.
0	0	--	--	<.010	<.2	<.005	<.01	<.010	<.001	<.005	<.010	--
0	2	--	--	.040	--	--	--	.020	--	<.005	--	--
--	--	--	--	--	--	--	--	--	--	<.005	--	--
0	0	--	--	.000	.0	.00	.000	.000	<.001	<.030	.000	--
--	--	--	--	--	--	--	--	--	--	<.005	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	--Do---
5	0	--	--	<.010	<.3	<.01	<.01	<.010	<.001	<.003	<.010	--
--	--	--	.1	--	--	--	--	--	--	--	--	--
0	0	--	--	<.01	<.1	<.01	<.01	<.01	<.001	<.005	<.01	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	Staining and sulfur odor reported.
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
0	0	--	--	<.010	<.3	<.01	<.01	<.010	<.001	<.005	<.010	--
--	--	--	--	--	--	--	--	--	--	--	--	Sulfide = 0.05(9/1), 0.01(9/3) mg/L. Both samples were taken
5	2	2.0	--	--	--	--	--	--	--	--	--	when well was 115 ft deep. Later deepened to 245 ft.
4	0	--	--	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--

TABLE 14.—Chemical quality of ground water from selected wells— Continued

Well number	Water-bearing unit tapped	Date sample collected	Milligrams per liter																			Specific conductance (micromhos at 25°C)	pH (units)
			Silica (SiO_2), dissolved	Iron (Fe), dissolved	Manganese (Mn), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Alkalinity as $CaCO_3$, total	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F) dissolved	Nitrate, total as N	Nitrite, total as N	Phosphorus, total as P	Phosphorus, dissolved orthophosphate as P	Dissolved solids, residue at 180°C	Hardness			
																				as $CaCO_3$ (Ca,Mg)	Noncarbonate		
22/1-13D2	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	112	--
-13E1	P	1-23-79	--	0.08	0.20	--	--	--	--	--	--	--	--	0.1	1.9	--	--	--	--	33	--	135	--
-13N3	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	113	--
-14B1	P	2-13-79	--	--	--	--	--	--	--	--	--	--	2.4	--	*.00	--	--	--	84	--	--	128	8.2
-14B3	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	126	--
-14E1	P	8-30-71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-14M1	S	9-21-73	17	.26	.01	14	5.8	5	1.5	76	62	7.2	4.0	.4	2.8	0.01	0.15	--	96T	60	--	108	7.5
-14Q2	P	3-13-79	--	--	--	--	--	--	--	--	--	--	2.1	--	*.00	--	--	--	78	--	--	117	8.7
-15L1	P	3-14-79	--	--	--	--	--	--	--	--	--	--	1.8	--	*.00	--	--	--	82	--	--	120	8.2
-15Q1	P	3- 5-75	20	.04	.04	14	5.3	15	--	77	63	.0	2.5	.1	.5	.03	.88	--	96T	56	--	132	7.2
		3-13-79	--	--	--	--	--	--	--	--	--	--	1.9	--	*.02	--	--	--	91	--	--	142	8.6
-16N1	S	3-13-79	--	--	--	--	--	--	--	--	--	--	2.8	--	*.08	--	--	--	75	--	--	116	7.4
-17C1	S	3-13-79	--	--	--	--	--	--	--	--	--	--	3.4	--	*.78	--	--	--	85	--	--	114	7.4
-20R1	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	96	--
-21M2	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	118	--
-22J1	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	147	--
-22L1	P	10-24-74	22	.13	.04	9.6	15	9.6	--	78	64	.0	6.7	.1	.52	.03	.48	--	102T	--	--	158	7.3
		3-14-79	--	--	--	--	--	--	--	--	--	--	1.8	--	*.01	--	--	--	88	--	--	130	8.0
-23B2	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-23C1	S	9-21-73	8.6	.92	.02	12	6.3	6	.6	78	64	16	5.0	.3	6.8	.01	.28	--	101	56	--	116	7.4
		3-14-79	--	--	--	--	--	--	--	--	--	--	3.7	--	*2.0	--	--	--	98	--	--	140	7.3
-23M1	P	6- 5-72	32	.30	.06	3.2	10	6.8	1.6	56	46	7.7	5.0	.1	.33	.00	.00	--	95T	50	4	120	7.4
		10-11-78	--	.04	.02	--	--	--	--	--	--	--	--	.3	.1	--	--	--	--	50	--	150	--
-23M2	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	141	--
-24B1	S	3-19-79	--	--	--	--	--	--	--	--	--	--	2.5	--	*.03	--	--	--	59	--	--	101	7.5
-25C3	P	9- 1-77	--	<.05	.04	--	--	--	--	--	--	--	--	.2	.7	--	--	--	--	32	--	136	--
		3-14-79	--	--	--	--	--	--	--	--	--	--	1.8	--	*.03	--	--	--	111	--	--	150	8.2
-25P1	P	10-15-68	--	--	--	--	--	--	--	--	--	--	--	.1	--	--	--	--	--	--	--	--	--
-25P2	P	5-12-68	22	.10	.01	16	5.8	1.2	2.0	73	60	7.8	4.0	4.4	1.7	.00	.15	--	107T	44	--	--	7.5
		3-14-79	--	--	--	--	--	--	--	--	--	--	2.5	--	*.03	--	--	--	76	--	--	110	7.5
-26Q1	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	141	--
-26R4	P	3-14-79	--	--	--	--	--	--	--	--	--	--	2.3	--	*.00	--	--	--	96	--	--	123	7.7
-29A1	P	3-13-79	--	--	--	--	--	--	--	--	--	--	2.6	--	*.12	--	--	--	66	--	--	102	8.1
-29A4	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	113	--
-32P2	P	6-22-78	--	--	--	--	--	--	--	--	--	--	--	--	.1	--	--	--	--	--	--	90	--
-32H1	P	3-13-79	--	--	--	--	--	--	--	--	--	--	2.6	--	*.16	--	--	--	74	--	--	107	7.7
-34R3	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	141	--
-35H2	S	3-14-79	--	--	--	--	--	--	--	--	--	--	3.6	--	*.70	--	--	--	99	--	--	147	7.4
-35L1	S	11-15-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	130	--
-36B1	C	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	113	--
-36E2	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	131	--
-36R1	P	1-15-77	--	.00	.05	--	--	--	--	--	--	--	--	.2	.7	--	--	--	--	52	--	117	--
		6- 6-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
22/2-16D1	C	10-10-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	137	--
-17J1	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	110	--
-17P1	S	3-19-79	--	--	--	--	--	--	--	--	--	--	2.5	--	*.01	--	--	--	--	63	--	112	7.8

Color (platinum-cobalt units)	Turbidity (Jtu)	Carbon dioxide (CO_2)	Milligrams per liter: Methylene blue active substances (detergents)	Arsenic (As), dissolved	Barium (Ba), dissolved	Cadmium (Cd), dissolved	Chromium (Cr), dissolved	Lead (Pb), dissolved	Mercury (Hg), dissolved	Selenium (Se), dissolved	Silver (Ag), dissolved	Remarks
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
10	0	--	--	0.001	0.01	0.001	0.002	0.001	0.002	0.002	0.001	--
--	--	--	0.0	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	Poor quality (high in Fe) reported.
4	0	4.8	--	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	0	--	--	--	--	--	--	--	--	--
5	0	--	--	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	--	--	--	--	--	--	--	--	--	--Do---
--	--	--	--	--	--	--	--	--	--	--	--	--Do---
5	0	--	--	--	--	--	--	--	--	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Bad odor and taste reported.
5	1	6.0	--	--	--	--	--	--	--	--	--	--
--	--	--	.1	--	--	--	--	--	--	--	--	--
5	2	4.5	--	--	--	--	--	--	--	--	--	--
2	0	--	--	.004	.17	.001	.001	.002	.001	.002	.001	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
6	0	--	--	<.010	<.3	<.01	<.01	<.010	<.001	--	<.010	--
--	--	--	.1	--	--	--	--	--	--	--	--	Staining, sulfur odor and coliform bacteria reported.
--	--	--	--	--	--	--	--	--	--	--	--	--
5	2	--	--	--	--	--	--	--	--	--	--	Paint odor reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--Do---
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
0	--	--	--	--	--	--	--	.53	.010	--	--	--
--	--	--	.0	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--Do---
--	--	--	--	--	--	--	--	--	--	--	--	--Do---
--	--	--	--	--	--	--	--	--	--	--	--	--Do---
--	--	--	--	--	--	--	--	--	--	--	--	--Do---
0	0	--	--	.016	.0	.00	.000	.000	<.001	<.005	.000	--
--	--	--	--	.016	--	--	--	--	--	<.005	--	--
--	--	--	--	--	--	--	--	--	--	--	--	Staining and extreme hardness reported.
--	--	--	--	--	--	--	--	--	--	--	--	Staining reported.
--	--	--	.0	--	--	--	--	--	--	--	--	--

TABLE 14.—Chemical quality of ground water from selected wells—Continued

Well number	Water-bearing unit tapped	Date sample collected	Silica (SiO_2), dissolved	Iron (Fe), dissolved	Manganese (Mn), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Alkalinity as $CaCO_3$, total	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate, total as N	Nitrite, total as N	Phosphorus, total as P	Phosphorus, dissolved orthophosphate as P	Dissolved solids residue at 180°C	Hardness as $CaCO_3$ (Ca,Mg)	Hardness Noncarbonate	Specific conductance (micromhos at 25°C)	pH (units)
			Milligrams per liter																				
22/2-19B1	S	7- 1-73	9.3	0.28	0.01	31	6.0	5.4	0.85	66	54	4.5	9.5	0.1	0.21	0.08	0.00	--	94	80	--	110	8.1
-19C1	S	3-19-79	--	--	--	--	--	--	--	--	--	--	5.0	--	•.94	--	--	--	64	--	--	115	7.3
-20F4	C	3-19-79	--	--	--	--	--	--	--	--	--	--	2.6	--	•.33	--	--	--	54	--	--	88	--
-20Q1	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	120	--
-21Q1	P	8-12-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-28A1	P	3-19-79	--	--	--	--	--	--	--	--	--	--	2.3	--	•.00	--	--	--	79	--	--	108	7.4
-29B2	S	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	110	--
-29Q1	P	3-19-79	--	--	--	--	--	--	--	--	--	--	2.3	--	•.01	--	--	--	70	--	--	104	7.9
-31H1	S	3-20-79	--	--	--	--	--	--	--	--	--	--	2.5	--	•.06	--	--	--	65	--	--	83	7.4
-31J1	P	10-31-74	12	.04	<.01	7.2	19	38	--	126	103	3.5	49	<.1	.32	.04	.00	--	190T	--	--	325	7.5
		3-20-79	--	--	--	--	--	--	--	--	--	--	8.3	--	•.03	--	--	--	72	--	--	96	7.8
-32K3	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	122	--
-32P1	P	- -78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	174	--
-32P2	P	1- 5-77	--	.00	.07	--	--	--	--	--	--	--	--	.1	.5	--	--	--	--	50	--	108	--
		6-14-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
-33F1	P	8- 9-78	--	.01	.06	--	--	--	--	--	--	--	--	.1	.1	--	--	--	--	53	--	150	--
		3-20-79	--	--	--	--	--	--	--	--	--	--	2.8	--	•.01	--	--	--	97	--	--	138	8.1

Color (platinum-cobalt units)	Turbidity (Jtu)	Milligrams per liter											Remarks
		Carbon dioxide (CO_2)	Methylene blue active substances (detergents)	Arsenic (As), dissolved	Barium (Ba), dissolved	Cadmium (Cd), dissolved	Chromium (Cr), dissolved	Lead (Pb), dissolved	Mercury (Hg), dissolved	Selenium (Se), dissolved	Silver (Ag), dissolved		
4	0	--	--	--	--	--	--	--	--	--	--		--
--	--	--	0.0	--	--	--	--	--	--	--	--		--
--	--	--	.0	--	--	--	--	--	--	--	--		--
--	--	--	--	--	--	--	--	--	--	--	--		Staining, sulfur odor, and bad taste reported.
--	--	--	--	--	--	--	--	--	--	--	--		Very large concentration of Mn(?) reported.
--	--	--	.0	--	--	--	--	--	--	--	--		Staining and large concentrations of Fe + Mn reported.
--	--	--	--	--	--	--	--	--	--	--	--		Staining reported.
--	--	--	0	--	--	--	--	--	--	--	--		Sulfur odor reported.
--	--	--	.0	--	--	--	--	--	--	--	--		--
5	0	--	--	--	--	--	--	--	--	--	--		--
--	--	--	.0	--	--	--	--	--	---	--	--		--
--	--	--	--	--	--	--	--	--	--	--	--		Staining and large concentrations of Fe + Mn reported.
--	--	--	--	--	--	--	--	--	--	--	--		Staining reported.
0	0	--	--	0.010	0.0	0.00	0.000	0.010	<0.001	<0.030	0.000		--
--	--	--	--	--	--	--	--	--	--	<.005	--		--
8	0	--	--	.002	.01	.001	.008	.002	--	--	--		--
--	--	--	.0	--	--	--	--	--	--	--	--		Staining reported.

TABLE 15.--Chloride concentrations and specific conductances of ground water from selected wells

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)	Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
20/1- 1C1	5-18-68	2.4	200	21/1- 3J3	5-10-68	2.4	135
	5-19-78	5.5	145	- 3J4	11-15-78	--	131
- 1K1	9- -77	--	150	- 3K1	5-10-68	1.8	164
- 2A1	5-18-68	4.6	176	- 3K2	6-26-67	--	192
	5-19-78	4.7	148	- 3R2	6-27-67	10	216
- 2K1	5-13-77	--	204	- 3R3	5-10-68	2.6	146
	12- 6-78	--	194		5- 5-78	3.3	150
20/2- 5D1	6-27-68	19	197	- 5D1	4- 6-68	3.0	107
	5- 2-78	48	275	- 5D2	4- 6-68	3.2	124
- 5D2	- -78	--	152		5- 9-68	3.2	118
- 5D3	- -78	--	181	- 9J1	5-11-68	2.2	199
- 5D4	- -78	--	213		5- 4-78	3.0	195
	3-20-79	7.0	154	- 9R2	3-15-79	2.9	170
- 6N1	5-18-68	3.7	219	-10A2	6-26-67	9.0	191
	5-19-78	3.5	150	-10A3	5-10-68	2.6	153
- 7B2	5-18-78	6.5	223	-10A5	6-26-67	3.5	153
- 7F1	5-18-68	2.6	217		5- 5-78	2.2	145
	5-18-78	3.2	195	-10C1	6-27-67	6.5	159
	3-21-79	3.6	199		5-11-68	2.4	158
- 7R2	5-18-78	15	218		5- 4-78	2.5	155
-18A1	5-18-78	4.2	128	-10D1	- -78	--	181
-18A2	12-14-78	--	163	-10F1	5-11-68	2.6	180
-18E1	5-18-78	32	233		5- 4-78	3.0	175
-18E2	10- 6-67	4.0	--	-10F2	- -78	--	192
				-10G1	5-11-68	2.2	213
21/1- 1L1	11-15-78	--	99		5- 5-78	3.0	205
- 1L2	- -78	--	121				
- 1P1	- -78	--	95	-10H2	6-27-67	3.0	153
- 2B3	- -78	--	130		5-11-68	2.2	151
- 2L3	- -78	--	146		5- 4-78	2.2	145
				-10H3	5-11-68	1.8	147
- 2N1	11-15-78	--	140	-10H4	6-27-67	6.5	170
	3-15-79	2.4	142				
- 3A2	- -78	--	136	-10H5	5-11-68	2.6	160
- 3A3	- -78	--	156	-10J3	9-25-78	--	200
- 3D1	6-26-67	360	1,420		3-15-79	3.8	185
	5-10-68	401	1,470	-10K2	5-11-68	4.2	181
				-10M1	5-11-68	2.8	220

TABLE 15.--Chloride concentrations and specific conductances of ground water from selected wells -- continued

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
21/1- 3F1	6-26-67	10	177
	5- 5-78	6.6	220
- 3H1	5-10-68	11	171
	5- 5-78	9.7	140
- 3J2	6-27-67	--	152
-11R1	6-12-74	2.9	100
-12D2	3-14-79	--	107
	3-15-79	4.4	97
-12D3	3-14-79	--	125
	3-15-79	3.1	117
-12G1	9-11-78	--	89
-12G2	- -78	--	108
-12R1	8- 1-78	--	207
-13B1	9-11-78	--	135
-13N1	9-11-78	--	151
-13Q2	3-14-79	--	131
-13R1	5- 2-78	3.7	125
-14C4	- -78	--	134
-14K1	9-27-78	--	124
-14L1	10-17-78	--	169
-14N1	3-14-79	--	98
-15E1	6- 2-72	4.5	176
	11-16-78	--	167
-15F1	11-16-78	--	112
	3-15-79	4.8	141
-16B1	5- 5-78	3.3	170
-16B2	9-18-78	--	179
-16F1	6-27-67	190	853
	5- 4-78	370	1,500
	3-15-79	310	1,220
	3-22-79	340	1,434
-16Q1	5-16-68	3.0	164
-21B1	5- 4-78	4.7	195
	10-17-78	--	207
-21K2	5-16-68	4.6	159
-21K3	5- 4-78	11	150
	9-13-78	--	160

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
-11A1	- -78	--	129
-11N4	9-25-78	--	125
-11P2	- -78	--	115
	3-15-79	2.7	101
21/1-21Q2	5-16-68	4.6	135
	5- 3-78	5.2	135
-21R1	5-17-68	2.0	131
-21R2	5- 3-78	7.7	185
-22E1	- -78	--	296
	3-21-79	8.3	199
-22E2	9-18-78	--	194
-22L2	11-16-78	--	140
-22N2	5-17-68	7.6	154
-23E2	10-17-78	--	134
-23L1	9-12-78	--	148
-23N1	- -78	--	329
-24A1	6-24-68	3.5	136
-24C2	9-12-78	--	142
-24F2	9-12-78	--	157
	3-20-79	3.4	144
-24H1	6-25-68	4.2	112
-24H5	5- 2-78	2.2	135
	9-12-78	--	139
-24J1	6-25-68	3.0	131
	5- 2-78	3.7	130
-25D1	- -78	--	145
	3-21-79	4.1	123
-25G2	9-14-78	--	149
-25L2	9-14-78	--	155
-25M1	6-24-68	1.8	162
	5- 2-78	3.2	150
-25P1	6-24-68	1.7	161
-26E2	5-17-68	2.8	137
	5- 3-78	3.0	125
-26E5	9-13-78	--	178
-26G2	2-13-79	--	135

TABLE 15.--Chloride concentrations and specific conductances of ground water from selected wells -- continued

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)	Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
21/1-21L1	5-16-68	66	390	-26J1	5-17-68	6.8	160
	5- 3-78	110	545	-26J5	9-13-78	--	146
	3-21-79	130	562	-26K2	5-17-68	7.8	165
-21M3	5-16-68	54	365		5- 4-78	11	165
	5- 3-78	120	545	-27A1	5-17-68	13	199
					5- 3-78	15	320
-21P1	5-16-68	13	193				
-21P2	5- 3-78	70	395	-27A3	9-13-78	--	198
-21Q1	5-16-68	3.4	137	-27B2	5-17-68	7.2	135
-27C1	5-17-68	7.4	130	21/2- 7F1	- -78	--	114
	5- 3-78	9.0	145	- 7F4	3-14-79	--	117
-28B3	- -78	--	198	- 7L1	11- 7-69	3.3	106
-28C1	5-16-68	1.4	223		12- 5-69	5.0	98
-28C4	9-14-78	--	1,000		- -78	--	156
-28D5	8-28-78	504	1,310	- 7P1	7- 6-78	--	120
	3-15-79	270	730	- 8A1	6-28-68	2	138
	8-22-79	645	2,700		5- 3-78	2.2	125
-28F1	3-21-79	4.2	289	- 8A2	7-29-78	--	179
-28F2	5-17-68	329	1,250				
	2- 8-73	565	--	- 8C1	3- 2-61	2.2	141
					7- 1-68	2.0	140
-28F4	9-13-78	--	348		1- 5-77	--	132
-34A1	5-18-68	3.5	90		5- 3-78	5.0	215
	3-21-79	21	144		- -78	--	144
-34A4	4- 4-78	300	--		3-20-79	2.5	142
-34B2	5-19-78	16	133				
				-17D2	- -78	--	139
-35D1	3- 1-61	4.5	258	-17D3	1- 5-77	--	167
	5-18-68	6.5	262		3-19-79	2.8	122
	7-19-70	43	360	-17F1	10-20-77	--	129
	7-22-70	11	260		- -78	--	131
	3-21-79	20	292				
				-17F2	9-21-78	.9	--
-35E2	12- 6-78	--	169	-17J2	- -78	--	97
-35J1	5-18-68	3.1	170	-17J3	10-20-77	--	122
-35M1	5-19-78	16	188	-18D2	- -78	--	135
-35P1	3-21-79	5.0	166	-18E1	2-23-77	--	128
-36B1	5- 2-78	2.2	145		- -78	--	131

TABLE 15.--Chloride concentrations and specific conductances of ground water from selected wells -- continued

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)	Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
21/2- 4E1	7- 1-68	1.6	144	-18J1	1- 5-77	--	105
	5- 3-78	2.0	135		- -78	--	122
- 4E2	- -78	--	141	-19E1	6-25-68	2.9	160
	3-20-79	4.4	133	-19F1	- -78	--	138
- 5C1	7- 1-68	1.9	118	-19H1	- -78	--	116
	5- 3-78	2.0	110				
				-19K1	3-14-79	--	147
- 5C2	- -78	--	155	-19M1	6-25-68	1.4	136
- 5F3	- -78	--	187	-19M3	5- 3-78	3.0	135
- 5L1	7- 1-68	2.3	148		- -78	--	148
	5- 3-78	2.2	135	-20B1	- -78	--	141
- 6A1	- -78	--	300				
				-20J1	- -78	--	116
- 6C2	- -78	--	101	-20M1	- -78	--	157
- 6L1	- -78	--	147	-21G1	5- 1-78	3.0	130
- 7B1	3-14-79	--	108		- -78	--	140
	3-15-79	3.1	105				
-21K1	5- 4-78	3.0	130	21/2-31Q1	- -78	--	166
-21N1	- -78	--	125	-32D1	- -78	--	129
-28B1	5- 1-78	2.7	125	-32E3	4-22-75	4.5	135
-28B2	- -78	--	144	-32E7	- -78	--	169
-28K1	6-27-68	4.5	156		3-20-79	5.6	190
-28K2	2-27-78	263	1,056	-32M2	- -78	--	139
	5- 1-78	255	1,025		3-20-79	3.4	130
	3-19-79	300	1,240				
-28K3	- -78	--	152	22/1-13D2	- -78	--	112
-28P1	4- -78	--	156	-13L1	- -78	--	111
	- -78	--	159	-13N1	5- 9-68	1.8	125
					5- 8-78	2.2	110
-29C1	- -78	--	161	-13N3	- -78	--	113
	3-20-79	4.3	147				
-29K1	- -78	--	148	-14A1	5- 8-68	1.8	132
-29M1	6-28-68	3.2	150	-14B1	5- 8-78	2.0	105
	5- 1-78	4.2	150		- -78	--	140
					3-13-79	2.4	128
-29M2	- -78	--	146	-14B3	- -78	--	126
-30B1	6-25-68	7.3	123				
-30C1	6-25-68	2.1	150	-14F1	3-14-79	--	96
	5- 2-78	3.0	140	-14H1	5- 8-78	2.7	100

TABLE 15.--Chloride concentrations and specific conductances of ground water from selected wells -- continued

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
21/2-30C2	6-25-68	3.5	131
	5- 1-78	9.0	130
-30C3	- -78	--	135
-30D1	8-16-77	--	144
-30F2	6-24-68	2.8	184
	5- 2-78	2.7	170
-30H2	6-26-68	2.9	126
	5- 2-78	3.2	140
-30L2	9- 1-69	2.5	--
	9- 3-69	9.5	128
-30P2	6-24-68	12	293
	5- 2-78	15	295
-30P3	10-16-78	--	155
-31A1	6-27-68	2.0	136
	5- 1-78	3.0	130
-31A2	7-12-78	--	121
-31D1	6-24-68	6.5	215
-31G1	6-27-68	2.0	134
	5- 1-78	2.7	125
22/1-22B3	- -78	--	116
-22D1	- -78	--	128
-22J1	- -78	--	147
-22L1	10-24-74	6.7	158
	3-14-79	1.8	130
-22R1	5- 8-68	2.0	118
	5- 8-78	3.7	118
-23B1	5- 8-68	2.2	114
	5- 8-78	3.2	105
-23C1	9-21-73	5.0	116
	3-14-79	3.7	140
-23L2	5- 8-68	2.4	121
-23L3	5- 8-68	1.6	125
	5- 4-78	4.0	115
-23M1	6- 5-72	5.0	120
	- -78	--	120

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
-14M1	9-21-73	4.0	108
-14Q2	5- 8-78	2.0	115
	- -78	--	123
	3-13-79	2.1	117
-15L1	- -78	--	115
	3-14-79	1.8	120
-15N1	- -78	--	98
-15Q1	3- 5-75	2.5	132
	3-13-79	1.9	142
-16E3	- -78	--	116
-16N1	- -78	--	119
	3-13-79	2.8	116
-17C1	- -78	--	118
	3-13-79	3.4	114
-17K1	- -78	--	125
-20R1	- -78	--	96
-21C1	- -78	--	108
-21H1	3-14-79	--	105
-21M2	- -78	--	118
22/1-28L2	5- 8-68	3.2	116
-28N1	5- 8-68	1.3	124
	5- 9-78	2.0	123
-29A1	- -78	--	115
	3-13-79	2.6	102
-29A4	- -78	--	113
-29J1	4- 6-68	3.6	128
-29J2	4- 6-68	3.4	130
-29J3	4- 6-68	3.2	134
	5- 8-78	4.7	153
-29J4	4- 6-68	3.5	152
-29J5	4- 6-68	4.5	110
-29J6	4- 6-68	4.8	114
-29J7	4- 6-68	2.0	116
-29M1	- -78	--	102

TABLE 15.--Chloride concentrations and specific conductances of ground water from selected wells -- continued

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
22/1-23M2	- -78	--	141
-24A1	- -78	--	70
-24B1	- -78	--	107
	3-19-79	2.5	101
-24C1	6-20-67	3.5	119
-24D1	6-20-67	4.5	119
	5- 4-78	2.2	105
-24Q1	9- 5-78	--	137
-25C2	5- 9-68	1.8	121
	5- 8-78	2.2	105
-25C3	9- 1-77	--	136
	- -78	--	157
	3-14-79	1.8	150
-25F1	- -78	--	121
-25F2	5-12-68	4.0	--
	3-14-79	2.5	110
-26Q1	- -78	--	141
-26R2	6-26-67	--	156
-26R3	5- 9-68	.6	120
	5- 8-78	2.2	115
-26R4	- -78	--	126
	3-14-79	2.3	123
-28L1	5- 8-68	3.0	119
	5- 9-78	4.0	123
-35H2	7- -78	--	152
	3-14-79	3.6	147
-35L1	11-15-78	--	130
-35N2	11-15-78	--	108
-36B1	- -78	--	113
-36E2	- -78	--	131
-36F1	- -78	--	136
-36R1	1-15-77	--	117
-32A2	4- 6-68	2.6	110
	5- 9-78	2.7	118
-32F1	- -78	--	133
-32F2	- -78	--	125
-32H1	- -78	--	114
	3-13-79	2.6	107
-32P1	4- 6-68	3.6	106
-32P2	4- 6-68	3.1	98
	5- 9-78	3.2	88
-32P3	4- 6-68	3.5	108
-32P4	4- 6-68	4.4	110
-34J1	6-20-67	4.5	143
	5-10-68	2.3	143
-34J2	6-20-67	7.0	147
-34J3	5-10-68	1.7	133
	5- 5-78	2.2	130
-34Q2	6-26-67	--	175
-34Q3	6-26-67	--	220
-34Q4	5-10-68	2.4	166
	5- 5-78	3.0	158
-34Q5	- -78	--	130
-34R1	5-10-68	1.9	128
	5- 5-78	2.5	120
-34R3	- -78	--	141
22/2-22M1	6-28-78	.9	133
-22M2	- -78	--	118
-28A1	- -78	--	110
	3-19-79	2.3	108
-28J1	6-28-68	1.9	132
-29B2	- -78	--	110
-29E2	- -78	--	85
-29Q1	10-10-78	--	137
	3-19-79	2.3	104

TABLE 15.--Chloride concentrations and specific conductances of ground water from selected wells -- continued

Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)	Well number	Date sample collected	Chloride (Cl), dissolved (mg/L)	Specific conductance (micromhos at 25°C)
22/2-16C1	- -78	--	93	-30A3	10-16-78	--	102
-16D1	10-10-78	--	137				
-16P1	- -78	--	126	-31H1	3-20-79	2.5	83
-17E1	3-14-79	--	57	-31J1	10-31-74	49	325
-17J1	- -78	--	110		3-20-79	3.3	96
				-31N1	- -78	--	179
-17P1	- -78	--	130	-31P2	- -78	--	148
	3-19-79	2.5	112				
-17P3	- -78	--	88	-31R1	- -78	--	80
-19B1	7- 1-73	9.5	110	-32E1	- -78	--	109
-19C1	- -78	--	134	-32K3	- -78	--	122
	3-19-79	5.0	115	-32P1	- -78	--	174
				-32P2	1- 5-77	--	108
-19J1	- -78	--	92				
-19R2	- -78	--	99	-33F1	- -78	--	148
-20E1	- -78	--	81		3-20-79	2.8	138
-20E4	- -78	--	85	-33G1	7- 1-68	2.6	168
	3-19-79	2.6	88	-33N2	3-14-79	--	169
-20Q1	- -78	--	120	-33P1	7-17-68	12	200
-21B1	- -78	-	118	-33P2	5- 4-78	2.2	175

TABLE 16.—Chemical quality of surface water from selected sites

Site number or name	Date sample collected	Discharge (ft^3/s)	Milligrams per liter												
			Silica (SiO_2), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Alkalinity as $CaCO_3$, total	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate (NO_3) total as N	Nitrite (NO_2) total as N	Ammonia (NH_3) total as N
Crescent Lake	9- 2-69	--	--	--	--	--	--	--	--	--	--	--	0.01	--	--
	2-11-70	--	6.9	4.1	2.1	2.7	0.5	17	14	4	3.3	0.1	.50	--	--
	6-19-70	--	--	--	--	--	--	--	--	--	--	--	.20	--	--
	10- 5-70	--	--	--	--	--	--	--	--	--	--	--	.02	0.00	0.07
	10- 5-70	--	--	--	--	--	--	--	--	--	--	--	.07	.00	.06
	10- 5-70	--	--	--	--	--	--	--	--	--	--	--	.04	.00	.16
	10- 5-70	--	6.7	4.1	2.3	3.1	.4	24	20	3.4	2.7	.1	.04	.00	.10
	8-27-74	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8- 9-78	--	--	--	--	--	--	--	--	--	--	--	.00	.00	.12
	8- 9-78	--	--	--	--	--	--	--	--	--	--	--	.00	.01	.34
	8- 9-78	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Site 5 (Crescent Creek)	4-17-78	8.69	--	--	--	--	--	--	--	--	--	--	.41	.01	.05
	7-13-78	2.74	--	--	--	--	--	--	--	--	--	--	.23	.00	.03
	10-16-78	2.62	--	--	--	--	--	--	--	--	--	--	.14	.01	.01
	1-18-79	4.52	--	--	--	--	--	--	--	--	--	--	.45	.00	.02
	4-13-79	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Crescent Creek	3- 1-78	--	--	--	--	--	--	--	--	--	--	--	.59	<.02	<.02
Site 6 (North Creek)	4-17-78	2.06	--	--	--	--	--	--	--	--	--	--	.28	.01	.02
	7-13-78	1.06	--	--	--	--	--	--	--	--	--	--	.17	.00	.04
	10-16-78	1.01	--	--	--	--	--	--	--	--	--	--	.12	.01	.01
	1-18-79	1.10	--	--	--	--	--	--	--	--	--	--	.28	.00	.08
	4-13-79	--	--	--	--	--	--	--	--	--	--	--	--	--	--
North Creek	3- 1-78	--	--	--	--	--	--	--	--	--	--	--	.51	<.02	<.02
Site 9 (Artondale Creek)	4-17-78	4.02	--	--	--	--	--	--	--	--	--	--	.23	.01	.05
	7-13-78	1.06	--	--	--	--	--	--	--	--	--	--	.23	.01	.10
	10-16-78	1.31	--	--	--	--	--	--	--	--	--	--	.14	.01	.01
	1-18-79	2.16	--	--	--	--	--	--	--	--	--	--	.38	.02	.02
	4-13-79	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Site 15 (Unnamed Creek at Rosedale)	4-17-78	1.62	--	--	--	--	--	--	--	--	--	--	.16	.00	.03
	7-13-78	1.03	--	--	--	--	--	--	--	--	--	--	.15	.00	.02
	10-16-78	.99	--	--	--	--	--	--	--	--	--	--	.12	.01	.01
	1-18-79	1.41	--	--	--	--	--	--	--	--	--	--	.25	.00	.00
	4-13-79	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Site 17 (McCormick Creek)	4-17-78	3.36	--	--	--	--	--	--	--	--	--	--	.25	.01	.04
	7-13-78	1.26	--	--	--	--	--	--	--	--	--	--	.07	.00	.06
	10-16-78	1.21	--	--	--	--	--	--	--	--	--	--	.12	.01	.00
	1-18-79	1.59	--	--	--	--	--	--	--	--	--	--	.31	.00	.00
	4-13-79	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Site 21 (Purdy Creek)	4-17-78	7.29	--	--	--	--	--	--	--	--	--	--	.30	.01	.05
	7-13-78	2.16	--	--	--	--	--	--	--	--	--	--	.18	.00	.07
	10-16-78	2.28	--	--	--	--	--	--	--	--	--	--	.14	.01	.01
	1-18-79	3.50	--	--	--	--	--	--	--	--	--	--	.44	.00	.00
	4-13-79	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Milligrams per liter														
Kjeldahl nitrogen total as N	Phosphorus, total as P	Phosphorus, dissolved orthophosphate as P	Dissolved solids, residue at 180°C	Hardness as $CaCO_3$ (Ca,Mg)	Hardness Noncarbonate	Specific conductance (micromhos at 25°C)	pH (units)	Water temperature (°C)	Color (platinum-cobalt units)	Dissolved oxygen (mg/L)	Coliform bacteria (colonies per 100 mL) Total	Coliform bacteria (colonies per 100 mL) Fecal	Methylene blue active substances (detergents) (mg/L)	Remarks
—	0.02	0.00	—	—	—	—	—	19	—	8	—	—	—	Sampled 1 ft below surface.
—	.01	.01	48	19	5	53	6.6	5.	50	12	—	—	—	Sampled 14 ft below surface.
—	.19	.00	—	—	—	53	—	11	—	2	—	—	—	Sampled 21 ft below surface.
0.26	.01	.01	—	—	—	57	6.9	14.8	30	9.0	—	—	—	Sampled 4 ft below surface.
.31	.01	.01	—	—	—	57	—	15	—	9	—	—	—	Sampled 15 ft below surface.
.24	.03	.01	—	—	—	75	—	13.0	—	.5	—	—	—	Sampled 25 ft below surface.
.27	.02	.01	57	18	0	63	—	14	—	6	—	—	—	Mean values for three depths.
—	—	—	—	—	—	—	—	—	—	—	4	2	—	Mean of seven samples.
.51	.03	.00	—	—	—	54	—	23.6	—	8.2	—	—	—	Sampled 6 ft below surface.
.75	.09	.01	—	—	—	67	—	11.1	—	.4	—	—	—	Sampled 25 ft below surface.
—	—	—	—	—	—	—	—	—	—	—	28	24	—	Mean of five samples.
.40	.04	.02	59	—	—	75	7.8	8.4	—	11.1	4,800	4,600	—	—
.23	.04	.04	69	—	—	91	7.3	12.2	—	10.0	1,750	290	—	—
.53	.04	.01	52	—	—	92	7.0	11.6	—	9.7	2,400	570	—	—
.27	.05	.01	72	—	—	77	7.2	3.0	—	12.6	340	90	—	—
—	—	—	—	—	—	73	—	7.6	—	—	—	—	0.0	—
—	.04	.03	—	—	—	—	—	—	—	—	1,200	400	—	At Vernhardson St. Bridge (22/2-32P).
.32	.06	.04	68	—	—	95	7.9	7.8	—	11.4	690	65	—	—
.24	.08	.06	81	—	—	117	7.3	11.4	—	7.3	1,260	64	—	—
.36	.07	.04	89	—	—	101	7.2	10.8	—	10.1	540	100	—	—
.27	.08	.02	84	—	—	102	7.3	4.0	—	12.2	32	15	—	—
—	—	—	—	—	—	86		7.6	—	—	—	—	.0	—
—	.04	.03	—	—	—	—	—	—	—	—	10	7	—	Near sewage treatment plant (21/2-6K).
.46	.04	.02	68	—	—	89	7.6	8.6	—	11.0	1,800	160	—	—
.28	.05	.05	91	—	—	160	7.5	14.0	—	9.3	15,000	339	—	—
.43	.03	.01	129	—	—	178	7.3	11.5	—	9.5	4,400	40	—	—
.45	.04	.01	142	—	—	188	7.4	2.7	—	12.3	72	59	—	—
—	—	—	—	—	—	91	—	7.6	—	—	—	—	.0	—
.32	.05	.03	73	—	—	110	8.0	9.5	—	10.4	900	430	—	—
.16	.06	.06	79	—	—	128	7.4	13.2	—	9.3	493	23	—	—
.38	.05	.02	94	—	—	122	7.2	11.4	—	9.6	440	28	—	—
—	.06	.02	88	—	—	113	7.5	5.4	—	11.5	33	9	—	—
—	—	—	—	—	—	111	—	8.6	—	—	—	—	.0	—
.27	.02	.01	56	—	—	85	7.7	8.2	—	11.1	2,200	980	—	—
.25	.03	.03	78	—	—	108	7.3	11.8	—	9.7	510	62	—	—
.34	.02	.01	82	—	—	109	7.0	11.3	—	9.6	450	11	—	—
—	.03	.01	80	—	—	93	7.4	3.6	—	12.4	510	300	—	—
—	—	—	—	—	—	76	—	7.6	—	—	—	—	.0	—
.36	.02	.02	52	—	—	76	7.8	8.2	—	11.0	1,900	63	—	—
.20	.04	.04	83	—	—	99	7.4	12.0	—	10.2	1,100	98	—	—
.39	.02	.01	85	—	—	103	7.2	11.6	—	10.0	91	37	—	—
.56	.03	.01	75	—	—	83	7.2	3.0	—	12.8	340	120	—	—
—	—	—	—	—	—	69	—	7.8	—	—	—	—	.0	—

TABLE 17.--Summary of data on water-bearing units

[Water-bearing unit: Qvr, recessional outwash; Qvt, Vashon Till; Qc, Colvos Sand; Qk, Kitsap Formation; Qss, Salmon Springs(?) Drift; Qpu, pre-Salmon Springs(?)]

Location	Water-bearing unit	Number of wells tapping aquifer	Median well depth (ft)	Median altitude of well bottom (ft)	Median altitude of water level (ft)	Median adjusted specific capacity (gal/min/ft)	Estimated potential yield (gal/min)	Median specific conductance (micromhos)	Remarks
Fox Island									
20/1-1	Qss	6	186	22	65	3.9	85	149	High iron concentrations?
	Qpu	1	148	-98	--	.5	--	145	
-2	Qc	1	101	219	239	.5	5	--	Spring flow ~ 9 gal/min.
	Qss	5	129	-39	5	1.2	25	171	High manganese concentrations?
-12	Qc	1	103	207	222	1.6	10	--	
	Qk	1	298	22	--	.1	--	--	
	Qss	1	323	-18	15	.5	10	--	
-13	Qc	1	78	202	245	2.1	45	--	
10/2-6	Qss	1	119	-44	5	1.8	45	150	
-7	Qss	12	95	-37	5	1.8	40	218	Some evidence of saltwater intrusion.
-18	Qss	6	224	-24	11	4.1	70	146	Some evidence of saltwater intrusion. Low pH?
21/1-27	Qss	2	131	-33	13	.7	15	--	
-34	Qss	8	105	-16	14	6.7	100	139	Some evidence of saltwater intrusion.
	Qpu	1	258	-123	--	--	--	--	--Do---
-35	Qc	2	138	67	113	2.5	60	166	Spring flow ~ 8 gal/min.
	Qss	4	97	-26	9	2.4	40	170	
	Qpu	1	432	-407	16	.5	110	292	Some evidence of saltwater intrusion. Low pH and high iron concentrations.
Long Branch Peninsula									
21/1-5	Qpu	2	81	-56	--	--	--	113	
21/1-14	Qss	8	142	80	116	1.0	35	102	
	Qpu	10	127	-43	30	.4	15	126	Yields highly variable. High pH?
-15	Qc	4	118	179	241	.8	25	--	
	Qss	1	198	62	111	1.4	35	98	High pH?
	Qpu	2	262	-41	51	.8	35	131	
-16	Qc	1	121	154	218	3.4	110	--	Estimated yield is doubtful.
	Qss	4	59	44	105	2.0	60	116	
-17	Qc	2	119	136	175	.6	10	--	
	Qss	8	106	88	136	4.2	100	120	
-20	Qss	2	60	85	116	10.9	170	--	
	Qpu	4	78	-12	30	6.0	130	96	May be Qvr?
-21	Qc	1	41	234	238	--	--	--	
	Qss	12	120	70	111	3.3	70	108	A few wells have very low yields.
	Qpu	2	161	-11	5	.2	5	--	

TABLE 17.--Summary of data on water-bearing units--Continued

Location	Water-bearing unit	Number of wells tapping aquifer	Median well depth (ft)	Median altitude of well bottom (ft)	Median altitude of water level (ft)	Median adjusted specific capacity (gal/min/ft)	Estimated potential yield (gal/min)	Median specific conductance (micromhos)	Remarks
22/1-22	Qc	4	111	194	227	1.3	20	116	
	Qss	1	192	98	116	1.1	10	128	
	Qpu	4	262	-14	16	1.8	25	130	Altitude of water level and specific conductance are highly variable.
-23	Qc	10	108	152	201	.4	10	--	
	Qss	1	140	85	115	23.3	350	140	High iron and manganese concentrations. Estimated yield is doubtful.
	Qpu	1	120	-36	8	3.8	85	120	
-27	Qc	--	--	--	--	--	--	--	Spring flow ~10 gal/min.
-28	Qc	--	--	--	--	--	--	--	Spring flow ~16 gal/min.
	Qpu	8	191	-59	40	1.8	90	123	Altitude of water level and specific conductance are highly variable.
-29	Qc	--	--	--	--	--	--	--	Spring flow ~100 gal/min.
	Qss	9	178	34	70	3.8	70	102	
	Qpu	20	104	-43	40	.5	20	116	Specific conductance and specific capacity are highly variable.
-32	Qpu	12	105	-65	13	.5	20	109	---Do------
Gig Harbor Peninsula									
Area 1									
21/2-4	Qss	1	67	148	189	.5	10	133	
	Qpu	1	146	-46	17	3.8	120	135	
-5	Qpu	7	116	-37	14	1.0	25	145	Specific conductance is highly variable.
-8	Qpu	3	117	-77	5	3.0	120	152	Specific conductance is highly variable. High manganese concentrations.
22/2-16	Qss	4	111	144	175	.4	5	126	
	Qpu	1	316	-1	43	.7	15	--	
-17	Qss	1	72	103	148	.3	5	--	
-20	Qss	2	99	74	147	1.1	40	120	
-21	Qss	2	207	88	128	1.8	35	118	
	Qpu	1	430	-125	5	.7	45	--	High manganese concentrations?
-22	Qpu	2	75	-30	14	20.0	540	126	Estimated yield is doubtful.
-27	Qpu	1	214	-24	19	.7	15	--	
-28	Qpu	2	238	-13	42	2.7	75	120	High iron and manganese concentrations?
-29	Qss	4	65	130	164	.8	15	98	Specific capacity is highly variable.
	Qpu	3	85	40	105	2.0	35	104	---Do-----

TABLE 17.--Summary of data on water-bearing units--Continued

Location	Water-bearing unit	Number of wells tapping aquifer	Median well depth (ft)	Median altitude of well bottom (ft)	Median altitude of water level (ft)	Median adjusted specific capacity (gal/min/ft)	Estimated potential yield (gal/min)	Median specific conductance (micromhos)	Remarks
22/2-32	Qvr	1	20	60	77	--	--	--	
	Qpu	13	106	-38	40	0.3	10	122	Specific conductance and specific capacity are highly variable. Specific conductance tends to be greatest for wells 90 ft or more below sea level. High manganese concentrations?
-33	Qc	2	36	304	316	.8	5	--	
	Qss	2	187	151	183	10.0	160	169	
	Qpu	5	147	-28	68	.9	45	168	Altitude of water level is highly variable.
<u>Area II</u>									
21/2-6	Qss	2	84	64	124	.5	15	300	
	Qpu	2	129	-31	78	.4	20	101	
22/1-13	Qss	3	75	25	95	.3	10	111	
	Qpu	10	84	-38	22	1.5	45	112	
-24	Qss	7	149	15	119	1.1	55	101	Specific capacity and specific conductance are highly variable.
	Qpu	9	153	-78	21	.5	25	112	
-25	Qpu	5	240	-78	24	2.1	110	128	Specific capacity and specific conductance are highly variable.
22/2-16	Qc	1	58	212	255	.3	5	137	
	Qss	5	166	102	128	.9	10	93	
	Qpu	2	300	-76	63	2.0	140	--	Specific capacity is highly variable.
-17	Qc	7	85	200	355	1.1	30	57	
	Qss	12	112	194	228	1.0	15	110	A few wells have very low specific capacities.
-18	Qc	1	67	308	347	.9	20	--	
	Qss	3	249	131	215	.2	10	--	
	Qpu	1	274	31	110	.5	20	--	
-19	Qc	1	126	204	270	2.1	70	92	
	Qss	6	154	164	189	15.0	190	110	Estimated yield is doubtful.
	Qpu	1	314	16	135	2.7	160	--	---Do-----
-20	Qc	5	65	229	256	1.0	15	85	
	Qss	3	143	155	190	1.9	35	--	Specific capacity is highly variable.
-29	Qss	3	161	161	192	12.8	200	85	Specific capacity is highly variable. Spring flow ~100 gal/min.
	Qpu	2	180	3	115	.8	45	--	
-30	Qss	3	169	176	203	2.7	35	102	
	Qpu	1	376	-81	96	3.3	290	--	
-31	Qss	3	107	71	128	1.4	40	116	Specific conductance is highly variable.
	Qpu	2	300	-40	123	3.1	250	88	Estimated yield is doubtful.
-32	Qss	2	165	126	163	3.7	70	109	

TABLE 17.--Summary of data on water-bearing units--Continued

Location	Water-bearing unit	Number of wells tapping aquifer	Median well depth (ft)	Median altitude of well bottom (ft)	Median altitude of water level (ft)	Median adjusted specific capacity (gal/min/ft)	Estimated potential yield (gal/min)	Median specific conductance (micromhos)	Remarks
Area III									
20/2-5	Qpu	5	68	-28	6	2.0	35	168	Some evidence of saltwater intrusion.
-6	Qpu	1	83	-43	5	2.7	65	--	
21/1-1	Qc	11	85	250	274	.5	5	99	Specific capacity and specific conductance are highly variable.
	Qss	2	203	110	133	1.3	15	--	
-2	Qss	19	88	59	105	1.1	25	130	Spring flow ~40 gal/min. Specific capacity is highly variable.
	Qpu	8	131	-82	25	.3	15	144	Specific capacity tends to increase with depth.
-3	Qvt	1	11	49	59	--	--	--	
	Qpu	29	84	-60	9	.5	15	154	Saltwater intrusion in several wells.
-10	Qss	1	72	48	76	.8	10	--	
	Qpu	20	90	-64	6	.6	20	157	Some evidence of saltwater intrusion.
-11	Qc	4	112	164	208	.6	15	129	
	Qss	7	129	36	87	2.8	70	101	
-12	Qc	6	55	229	254	1.0	15	93	
	Qss	11	157	93	145	2.0	50	117	Specific capacity is highly variable. High pH?
-13	Qss	9	127	37	60	.8	10	133	Specific capacity is highly variable.
-14	Qss	3	108	32	56	1.1	15	134	
-24	Qss	1	50	-20	--	--	--	136	
21/2-6	Qc	1	59	226	263	.7	15	--	
	Qss	5	204	84	130	3.4	80	147	
	Qpu	3	301	12	76	.7	20	--	
-7	Qss	9	173	99	134	3.5	60	117	
	Qpu	1	400	-175	25	40.0	4,000	--	Estimated yield is highly doubtful.
-8	Qss	1	193	-8	--	--	--	--	
	Qpu	1	265	-210	16	7.3	820	142	High manganese concentrations?
-17	Qss	4	291	9	51	15.7	330	131	Estimated yield is doubtful.
	Qpu	5	397	-87	24	20.0	1,100	122	High manganese concentrations?
-18	Qss	3	149	81	125	1.3	30	135	
	Qpu	10	206	-17	37	2.2	60	127	High manganese concentrations? Specific capacity is highly variable.
-19	Qc	2	120	105	170	.4	15	--	
	Qss	7	180	12	42	3.4	50	132	
	Qpu	5	115	-58	7	3.8	120	143	Specific capacity is highly variable.
-20	Qss	5	159	17	45	1.3	20	157	
	Qpu	5	356	-103	21	2.2	140	129	

TABLE 17.--Summary of data on water-bearing units--Continued

Location	Water-bearing unit	Number of wells tapping aquifer	Median well depth (ft)	Median altitude of well bottom (ft)	Median altitude of water level (ft)	Median adjusted specific capacity (gal/min/ft)	Estimated potential yield (gal/min)	Median specific conductance (micromhos)	Remarks
21/2-21	Qc	1	247	68	160	4.7	220	--	
	Qpu	5	287	-33	11	1.7	35	130	
-28	Qc	2	139	109	117	2.7	10	--	
	Qss	4	200	20	47	2.3	30	159	High iron and manganese concentrations?
	Qpu	7	365	-110	9	5.3	320	152	Saltwater intrusion in one well. High manganese concentrations?
-29	Qss	6	96	36	82	.7	15	148	Specific capacity is highly variable.
	Qpu	2	89	-41	20	.4	10	148	
-30	Qpu	7	90	-75	19	.3	15	133	Specific capacity is highly variable. High iron concentrations?
-31	Qss	4	52	39	72	.9	15	166	
	Qpu	7	85	-22	29	2.6	65	126	
-32	Qc	2	104	142	193	.8	20	130	
	Qss	13	101	60	92	.7	10	135	
22/1-25	Qss	2	150	38	118	26.0	1,000	--	High fluoride concentrations? Specific capacities highly variable. Estimated yield is in doubt.
	Qpu	2	59	-29	35	1.2	40	116	
-26	Qpu	4	86	-76	5	12.1	490	132	Specific capacity and specific conductance are highly variable. Estimated yield is doubtful.
-34	Qpu	13	120	-50	10	.8	25	143	
-35	Qss	12	141	18	70	1.3	35	139	Specific capacity is highly variable.
	Qpu	8	148	-52	30	.7	30	108	---Do-----
-36	Qc	2	91	167	192	--	--	113	
	Qss	5	158	91	134	.4	10	134	Specific capacity is highly variable. High manganese concentrations?
	Qpu	4	324	-12	74	3.2	140	117	
22/2-31	Qpu	1	266	-56	65	1.3	80	179	
Area IV									
21/1-10	Qss	2	66	26	50	.9	10	--	
-11	Qpu	2	243	-60	24	.3	15	125	
-14	Qvr	1	8	92	99	--	--	--	
	Qc	1	78	187	224	.3	5	98	
	Qss	9	116	26	49	1.2	15	147	Specific capacity is highly variable.
-15	Qvt	1	8	142	148	--	--	--	
	Qss	5	102	-5	40	2.0	45	--	
-22	Qvt	1	15	70	--	--	--	--	
	Qc	1	120	140	185	.4	10	--	Spring flow ~75 gal/min.
	Qss	5	129	0	27	1.0	15	140	

TABLE 17.--Summary of data on water-bearing units--Continued

Location	Water-bearing unit	Number of wells tapping aquifer	Median well depth (ft)	Median altitude of well bottom (ft)	Median altitude of water level (ft)	Median adjusted specific capacity (gal/min/ft)	Estimated potential yield (gal/min)	Median specific conductance (micromhos)	Remarks
21/1-23	Qvt	1	18	202	218	--	--	--	
	Qc	3	132	133	162	.2	5	--	Spring flow ~310 gal/min.
	Qss	4	246	-25	27	2.6	70	148	
-24	Qc	2	51	79	93	--	--	--	
	Qk	1	50	-10	41	.2	5	139	
	Qss	15	62	-24	18	2.3	50	136	
-25	Qc	4	109	115	154	.7	15	123	Specific capacity is highly variable. Spring flow ~ 25 gal/min.
	Qss	11	235	-17	16	2.6	45	153	
	Qpu	1	166	-66	13	.1	5	--	
-26	Qc	--	--	--	--	--	--	--	Spring flow ~30 gal/min.
	Qss	15	83	-40	16	.9	25	160	Specific capacity is highly variable.
	Qpu	1	366	-321	45	--	--	--	Data are suspect.
-27	Qss	8	65	-28	21	.4	10	172	Some evidence of saltwater intrusion.
-36	Qpu	1	250	-230	--	--	--	145	
21/2-30	Qc	2	76	77	100	3.1	35	--	Specific capacity is highly variable.
	Qpu	19	193	-47	9	.5	15	150	Specific capacity is highly variable. Some evidence of saltwater intrusion.
-31	Qpu	2	47	-17	--	--	--	215	
<u>Area V</u>									
21/1-9	Qpu	4	138	-94	15	.4	20	178	
-10	Qpu	12	100	-45	11	.3	10	192	
-15	Qc	1	57	53	98	.9	20	--	May be Qvr? Spring flow ~25 gal/min.
	Qss	1	88	17	64	.7	15	141	
	Qpu	2	366	-68	24	.4	20	167	
-16	Qc	--	--	--	--	--	--	--	Spring flow ~150 gal/min.
	Qss	6	129	-42	17	3.2	95	175	Saltwater intrusion in one well.
-21	Qc	1	45	55	69	--	--	--	
	Qss	13	84	-38	19	.5	15	159	Specific capacity is highly variable. Some evidence of saltwater intrusion.
-22	Qss	5	139	-14	14	1.3	20	194	
-28	Qss	3	90	-60	11	1.0	35	198	Some evidence of saltwater intrusion.

TABLE 17.--Summary of data on water-bearing units--Continued

Location	Water-bearing unit	Number of wells tapping aquifer	Median well depth (ft)	Median altitude of well bottom (ft)	Median altitude of water level (ft)	Median adjusted specific capacity (gal/min/ft)	Estimated potential yield (gal/min)	Median specific conductance (micromhos)	Remarks
Area VI									
21/1-21	Qss	4	69	-31	11	1.2	25	395	Saltwater intrusion.
	Qpu	1	157	-107	10	--	--	562	---Do-----
-28	Qss	15	98	-20	14	3.7	65	348	Saltwater intrusion. Specific capacity is highly variable.
	Qpu	1	500	-480	--	--	--	--	
Area VII (Raft Island)									
21/1-10	Qpu	3	268	-113	1	1.9	110	168	Some evidence of saltwater intrusion.

[1]Areas are shown on plate 1.
[2]Calculated by multiplying drillers' tests (usually short-term) by 0.67.
[3]Calculated by multiplying median adjusted specific capacity by 1/2 of the available drawdown (altitude of water level minus altitude of well bottom).