STATE OF WASHINGTON
Daniel J. Evans, Governor

DEPARTMENT OF WATER RESOURCES
H. MAURICE AHLQUIST, Director

Water Supply Bulletin No. 22

GROUND-WATER OCCURRENCE AND STRATIGRAPHY OF UNCONSOLIDATED DEPOSITS, CENTRAL PIERCE COUNTY, WASHINGTON

By
KENNETH L. WALTERS and GRANT E. KIMMEL

Prepared in cooperation with
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STATE PRINTING PLANT 3 OLYMPIA, WASHINGTON

Price $5.00, Department of Water Resources, Olympia, Wn.

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OF

UNCONSOLIDATED DEPOSITS,

CENTRAL PIERCE COUNTY, WASHINGTON

By

Kenneth L. Walters and Grant E. Kimmel

ABSTRACT

This report describes an area of about 660 square miles in west-central Washington, extending from Puget Sound on the northwest to the foothills of the Cascade Range on the southeast. The area includes much of the populated part of Pierce County.

The average annual precipitation at Tacoma is about 38½ inches, about 85 percent of which occurs in the 8 months of September through April.

Consolidated rocks in the project area are of Eocene and Miocene age and are exposed only in the eastern and southern parts, near the foothills of the Cascade Range. The general structure of the consolidated rocks underlying the southern Puget Sound Lowland, in which central Pierce County is located, is an elongated basin or trough.

The unconsolidated rocks of the area consist of gravel, sand, silt, and clay, or mixtures of these materials. They range in age from Miocene to Recent. Miocene unconsolidated deposits are exposed only in the eastern and southern parts of the area, but may occur at great depth in other parts of the area. Unconsolidated deposits of Quaternary age represent four major glacial intervals.

Consolidated rocks yield water to only a few wells in central Pierce County. Unconsolidated deposits of Miocene age are known to yield moderate quantities of water locally; where these deposits are deeply buried their water-yielding characteristics are not known. Unconsolidated deposits of Quaternary age include the most important aquifers of central Pierce County, although the yield of these deposits varies greatly. The most productive Quaternary aquifers are in the Salmon Springs Drift, Vashon deposits, and Recent alluvium. Flowing wells occur at several places in central Pierce County. The most important areas of flowing wells are in the Puyallup River valley and the Tacoma tidal flats. Locally, the depth to water is more than 300 feet.

The greatest use of ground water in central Pierce County is for public supply. Thirty-six public-supply systems use about 43,000 acre-feet of ground water annually. About 32,000 acre-feet of ground water is used for all other purposes. Withdrawal of ground water could be increased severalfold without serious depletion.

Chemical analyses of samples of ground water indicate that, in general, it is of good quality and satisfactory for most uses. Ground water in the uplands is primarily of the calcium bicarbonate type, although in the northeast Tacoma upland contamination by sea water causes the ground water locally to be of the sodium chloride type. In the Puyallup River valley ground water is of the sodium bicarbonate type.

INTRODUCTION

PURPOSE AND SCOPE

Water from wells and springs in central Pierce County has been used in progressively increasing quantities since 1884, when the city of Tacoma began its development of a citywide water-supply system. The expansion of Tacoma and neighboring cities, the growth of industries and military installations, and the continued construction of large numbers of suburban homes have resulted in increased ground-water withdrawal and have brought about the need for data on the occurrence of ground water in the entire populated area of Pierce County. The importance of evaluating the ground-water resources of the Tacoma area has long been realized, and this area was selected in 1937 for one of the first ground-water investigations in the State of Washington in which the U. S. Geological Survey cooperated financially with local government agencies. One published report and two open-file reports have resulted from cooperative projects in this area.

This investigation was made by the Geological Survey in cooperation with the Washington State Department of Water Resources, as part of a continuing program for the collection and interpretation of data concerned with ground-water supplies in the state. It was made under the direct supervision of A. A. Garrett of the Geological Survey, and Robert H. Russell of the Department of Water Resources.

This report describes the geologic features that have a direct bearing on the occurrence of ground water and discusses the occurrence, movement, chemical character, and use of the water. Included in tabular form are data on 1,508 wells and drillers' logs of 525 wells. Many of the wells are of special significance and have some particular feature that makes them valuable in interpreting the occurrence, movement, or quality of ground water in the area.

LOCATION AND EXTENT OF THE AREA

The area of investigation, about 660 square miles, is in the central part of the Puget Sound Lowland, adjacent to the southeren part of Puget Sound. It is approximately between latitude 46°50' and 47°20' north and longitude 122°00' and 122°42'30" west (pl. 1). The area includes virtually all the populated part of Pierce County; the insular and peninsular parts are not included.

PREVIOUS INVESTIGATIONS

Geologic features of the area were first described by Willis (1898) and by Willis and Smith (1899). Willis recognized deposits of two glaciations in the Tacoma area; those of the older glaciation he named the Admiralty Till and Clay and those of the younger, the Vashon Drift. Most of the deposits between the Admiralty Till and Clay and the Vashon Drift were considered by Willis to belong to a single interglacial interval, which he named Puyallup. This sequence was used by Willis and Smith (1899) in geologic mapping of the Tacoma area and by Bretz (1913) in a discussion of the glaciation of the Puget Sound region. In Snohomish and Kitsap Counties, Newcomb (1952) and Sceva (1957) continued to use this sequence with only minor modifications.

The existence of more than two glaciations in the Puget Sound Lowland is currently recognized. Deposits of at least three glaciations were recognized in northwestern King County (Liesch and others, 1963), but formal names were applied only to deposits of the latest glaciation. At least four glaciations of the southeastern part of the Puget Sound Lowland were recognized by Mullineaux and others (1957), and named the Orting, Stuck, Salmon Springs, and Vashon by Crandell and other (1958). They also named two intervening nonglacial intervals, the Alderton and the Puyallup. The name Fraser has subsequently been adopted for the last major glaciation during which glaciers occupied the mountains and lowlands of southwestern British Columbia and western Washington (Armstrong and others, 1965). These authors applied the name Vashon Stade to "the last major climatic episode during which drift was deposited by continental ice originating in the mountains of the mainland of British Columbia and occupying the lowlands on both sides of the Strait of Georgia and the Puget Lowland." In central Pierce County, deposits of the Vashon Stade constitute most of the deposits of the Fraser Glaciation, and the name Fraser is not extensively used in this report.

The geology of the Buckley quadrangle was prepared by Crandell and Gard (1959), and a comprehensive report on the surficial geology and geomorphology of the Lake Tapps quadrangle was prepared by Crandell (1963).

Reports dealing primarily with the hydrology of the Tacoma area were prepared by Piper and LaRocque (1938), by LaRocque and Piper (1938), and by Griffin and others (1962).

ACKNOWLEDGMENTS

Acknowledgment is made to the residents of Pierce County who assisted in the collection of field data by supplying well information and allowing access to their property. Special appreciation is expressed to Robinson and Roberts, ground-water geologists of Tacoma, to well drillers in the area, and to city officials, who have made data available. Stratigraphic problems were discussed and geologic information exchanged with John B. Noble, Eugene F. Wallace, and

Dee Molenaar, of the Washington Department of Water Resources, who were concurrently working on similar projects in contiguous areas of Thurston County and the Kitsap Peninsula, respectively.

WELL-NUMBERING SYSTEM

In this report wells are designated by symbols that indicate their location according to the rectangular-grid system for subdivision of public land. For example, in the symbol 20/2-11R1 the part before the hyphen indicates successively the township and range (T. 20 N., R. 2 E.) north and east of the base line and Wilamette meridian. Because all townships in the central Pierce County project area are north of the base line and east of the Willamette meridian, the letters "N" and "E" are omitted. The first number after the hyphen indicates the section (11) in which the well is located; the letter denotes the 40-acre subdivision of the section according to the following diagram. The last number is the serial number of the well in the 40-acre subdivision. For example, well 20/2-11R1 is in the SE¼SE¼ sec. 11, T. 20 N., R. 2 E., and is the first well in that tract to be listed.

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Springs are numbered in the same manner, except that the lowercase letter "s" is added after the location number. Thus, the first spring recorded in that 40-acre tract would have the number 20/2-11R1s.

GEOGRAPHY

TOPOGRAPHY AND DRAINAGE

Most of central Pierce County is a poorly drained upland drift plain of moderate relief, ranging in altitude from about 200 to 900 feet above sea level and gradually increasing in altitude to the southeast. The plain is a product of glacial and glaciofluvial processes of the latest glaciation, consisting chiefly of ground moraine traversed by outwash channels. It contains numerous subparallel elongate hills, or drumlins, and locally is dotted with small lakes or swamps that occupy depressions formed by wasting blocks of glacial ice buried in the drift. These depressions are called kettles.

The drift plain is terminated by Puget Sound on the northwest. It extends into Thurston County southwest of the project area, but is bisected by the Nisqually River valley along the southwest project boundary. It is bordered by Ohop Valley on the southeast and by the Puyallup River between Electron and Orting on the east. The northeast boundary of the drift plain is not well defined. In the extreme eastern part of the project area the drift plain merges with the Osceola mudflow plain; northwest of Buckley it is bordered by the White River, and along the north boundary of the project area, it extends into King County without a physiographic break.

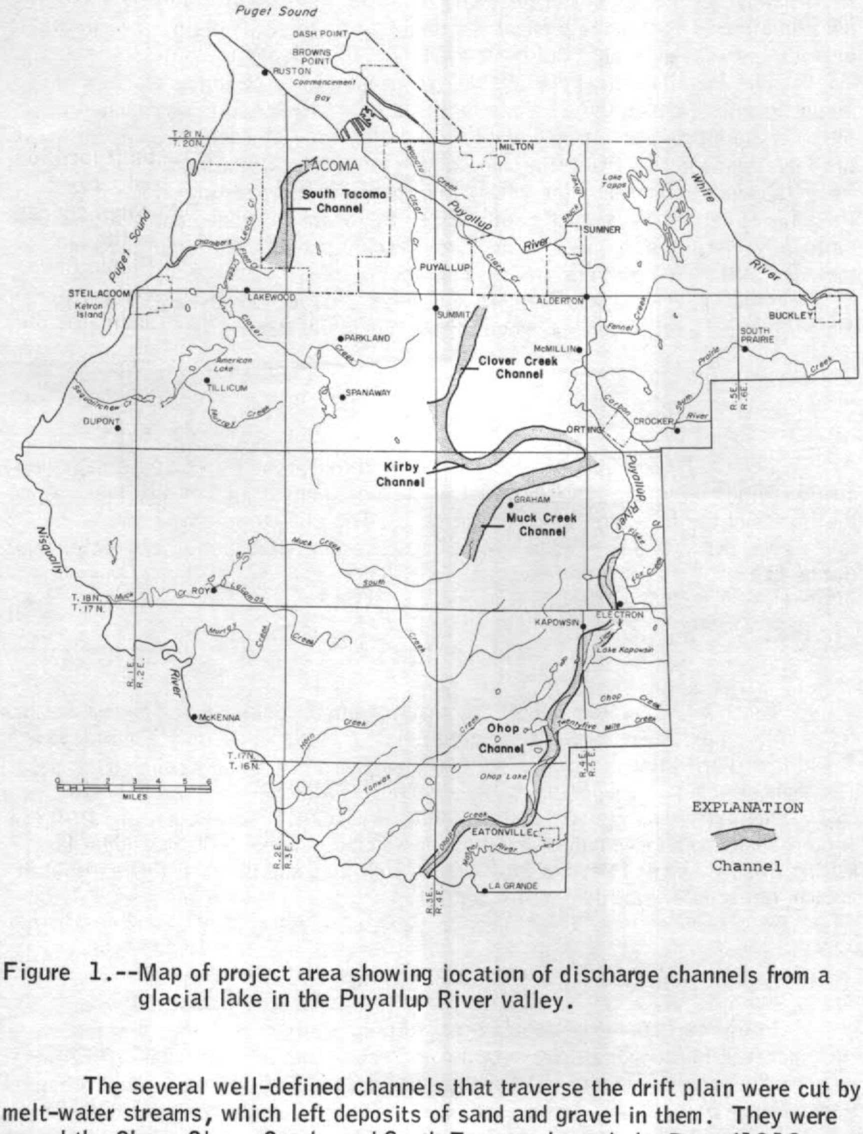

Figure 1.--Map of project area showing location of discharge channels from a glacial lake in the Puyallup River valley.

The several well-defined channels that traverse the drift plain were cut by melt-water streams, which left deposits of sand and gravel in them. They were named the Ohop, Clover Creek, and South Tacoma channels by Bretz (1913, p. 126-132). Robinson and Piper (written communication, 1946 [?]) named two additional channels, the Muck Creek and Kirby channels (fig. 1), which are intermediate in altitude between the Ohop and Clover Creek channels. The channels were formed when successively lower outlets from an ice-dammed lake were exposed by the northward-receding ice margin.

The project area extends a short distance into the foothills of the Cascade Range along its southeast margin. The foothills area is well drained, and dissection there is much more pronounced than that on the drift plain. Locally the bedrock is exposed or only thinly mantled by glacial deposits.

The Puyallup River, which has its principal source in the glaciers of Mount Rainier, leaves the Cascade foothills near Orting and is entrenched into the drift plain between Orting and Commencement Bay at Tacoma. The valley of the Puyallup River is a flat-bottomed trench ranging in width from 1 to 2 miles. Near its mouth at Tacoma, the valley floor becomes a broad tidal flat. The Puyallup River valley, with its tributaries, the Stuck, Carbon, and White River valleys, constitutes the only major physiographic part of the project area not included in the drift plain or the Cascade foothills.

Minor physiographic features within the area are the Osceola mudflow plain, and the tidal flat at the mouth of the Nisqually River.

CLIMATE

Central Pierce County is part of a humid belt, which lies between superhumid regions along the Pacific Coast to the west and, at higher altitudes, along the flanks of the Cascade Range to the east. The climate is characterized by fairly even temperatures, and by pronounced seasonal distribution of precipitation (table 1).

TEMPERATURE

From 1898 through 1960 the yearly mean temperature at Tacoma has been 51.4°F. The daily maximum temperature has exceeded 90° only about 1 year in 3 and from April through October the daily maximum has been between 70° and 85° during most years. Temperatures lower than 15° also have occurred about 1 year in 3. The daily range in temperature rarely exceeds 30° in summer and 20° in winter. The average length of the growing season is about 250 days; the last killing frost of spring rarely is later than March 11, and the first killing frost of autumn rarely is earlier than November 18.

PRECIPITATION

In Pierce County the average annual precipitation increases progressively with increase in altitude. Precipitation at Tacoma has averaged 38.40 inches a year for the period of record, 1884 through 1961. The average annual precipitation at Alder Dam, about 2 miles south of La Grande, for the period 1918-52, was about 45 inches, and that at Paradise Ranger Station, altitude 5,550 feet, is about 100 inches. Within most of central Pierce County, however, precipitation is distributed rather uniformly, and the 38.40 inches at Tacoma is a useful average for the project area.

Table 1.--Monthly and yearly temperature and precipitation at Tacoma (Data in part from U. S. Weather Bureau)

Month	Temperature, °F			Precipitation, inches		
	Average 1898-1960	Highest of record 1898-1960	Lowest of record 1898-1960	Monthly average 1884-1961	Highest of record 1884-1961	Lowest of record 1884-1961
January	38.9	67	9	5.70	11.51	0.66
February	41.8	73	9	4.10	8.68	.34
March	45.6	77	18	3.62	8.23	.65
April	49.8	86	24	2.61	7.63	.37
May	55.3	91	30	1.90	4.62	.16
June	59.8	98	37	1.50	5.60	.02
July	64.0	98	42	.63	3.00	.00
August	63.7	95	44	.79	3.44	T
September	59.1	90	35	1.94	4.70	.03
October	52.3	82	29	3.44	8.80	.13
November	45.6	70	8	5.84	14.73	.78
December	41.5	65	7	6.33	18.87	1.62
The year	51.4	98	7	38.40	54.67a/	16.96b/

a/ Highest yearly precipitation, 1902
b/ Lowest yearly precipitation, 1952

About 85 percent of the yearly precipitation at Tacoma occurs in the 8 months from September through April, and only about 15 percent during the principal growing season from May through August. Figure 2 shows the yearly precipitation at Tacoma and the cumulative departure from the average for the period of record. On the graph of cumulative departure, segments inclined upward to the right indicate periods during which rainfall has exceeded the average, and segments inclined downward to the right indicate periods during which rainfall has been below average.

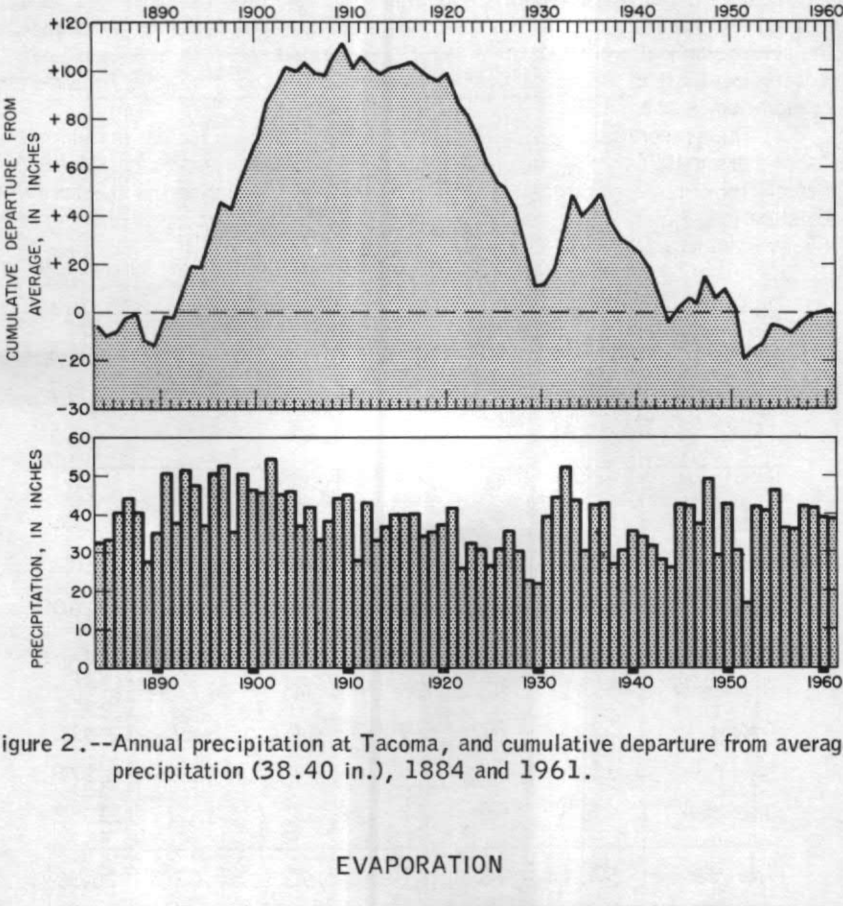

Figure 2.--Annual precipitation at Tacoma, and cumulative departure from average precipitation (38.40 in.), 1884 and 1961.

EVAPORATION

The Geological Survey maintained an evaporation station during a 2-year period ending September 30, 1940, at the State Game Farm near Tacoma, in the $S\frac{1}{2}$ sec. 27, T. 20 N., R. 2 E. The station was at the west edge of the Chambers Creek valley, at an altitude of about 230 feet above sea level. It included as part of its equipment a land pan 6 feet in diameter and 24 inches deep, its bottom 20 inches below the land surface. The water level in the pan was maintained approximately at land surface and was measured each day at about 7 a.m. by means of a hook gage suspended in a stilling well. Table 2 gives the monthly evaporation as measured.

For the 2 years of record, precipitation at Tacoma was about 85 percent of the long-term average, and the mean temperature was about 103 percent of the long-term average. Measured evaporation was 80 percent of concurrent precipitation.

At Seattle's Maple Leaf Reservoir, 20-year evaporation records taken by the Weather Bureau show that the annual evaporation rate there averages about 34 inches. At Tacoma, the average annual temperature is about 3° or 4° higher, and the average annual precipitation is about 6 inches greater than at Maple Leaf Reservoir. Most of Tacoma's additional precipitation occurs in the winter when evaporation is at a minimum.

The evaporation rates for Maple Leaf Reservoir and for the station near Tacoma are valid only for evaporation from a body of water, and cannot be used directly for computing evaporation from the land surface; during the summer the soil moisture is deficient and evaporation from the land surface is much lower than from a body of water.

Table 2.--Monthly evaporation, in inches, from land pan at the State Game Farm near Tacoma, in the years ending September 30, 1939 and 1940.

Month	1938-39	1939-40
October	0.84	1.25
November	.18	.54
December	.02	.15
January	.22	.36
February	.40	.39
March	1.01	1.22
April	2.60	2.15
May	3.74	3.87
June	3.53	5.38
July	5.48	5.33
August	5.18	4.55
September	2.75	2.26
Year	25.95	27.45
Rainfall, in inches, at Tacoma	29.28	36.49
Percent of long-term average	76	95
Mean temperature at Tacoma, °F	52.0	54.5
Percent of long-term average	101	106

GEOLOGY

GENERAL CHARACTER AND AGE OF THE ROCKS

The rocks exposed within the project area are of two general classes, consolidated and unconsolidated. They are of several types that have vastly different characteristics and origin. The consolidated rocks, for the most part, are the oldest of the area--Eocene to Miocene in age--and constitute the bedrock upon which younger, unconsolidated rocks were deposited.

The structure of the consolidated bedrock underlying the southern Puget Sound lowland is, in general, that of an elongated basin or trough. The foothills of the Cascade and Olympic Mountains form the eastern and western walls of the trough. Puget Sound occupies the central part of the trough.

Consolidated rocks are exposed at the surface only along the eastern and southern margins of the project area near the Cascade foothills. Deep wells in the northern and western parts of the area (for example 19/2-22N1, which is more than 2,000 feet deep) have not encountered consolidated rocks.

Nearly all the landforms of central Pierce County are developed on unconsolidated rocks, which range in age from Miocene to Recent. They consist principally of gravel, sand, silt, and clay, or mixtures of these materials.

GEOLOGIC UNITS AND THEIR WATER-BEARING PROPERTIES

Consolidated Rocks

Consolidated rocks crop out in the valley of South Prairie Creek, south of Buckley, in the valley walls of the Puyallup River south and west of Orting, along the Ohop Valley between Electron and Eatonville, in the upland area southwest of Eatonville, and discontinuously in the valley walls of the Nisqually River for several miles downstream from La Grande (pl. 1).

Middle to late Eocene sedimentary rocks of the Puget Group (Crandell and Gard, 1959) in the southern part of the Buckley quadrangle contain beds of coal that have been extensively mined. Andesite of Tertiary age is exposed along Ohop Valley, Puyallup Valley, and in the vicinity of Eatonville. Where the andesite has been exposed for long periods of time but has not been extensively eroded, it has been weathered to clay of varying colors and textures and is extensively worked as a source of ceramic material. Descriptions and firing properties of such clay deposits near La Grande and Clay City are given by Glover (1941, p. 206-214). On plate 1, neither the weathered and unweathered rocks nor the various types of consolidated rocks have been differentiated; all are grouped simply as bedrock.

The few wells in central Pierce County that tap consolidated rocks yield only small amounts of water. For example, test hole 16/4-14P1, drilled by the city of Eatonville, penetrated mostly consolidated rock to a depth of 750 feet and produced only about 50 gpm (gallons per minute). In general, these rocks have such a low permeability that they should not be considered a potential source of ground-water supplies.

Unconsolidated Deposits of Tertiary Age

The unconsolidated deposits of Tertiary age in central Pierce County crop out in two general areas. Crandell and Gard (1959) discussed their occurrence in the valley walls of South Prairie Creek and Gale Creek a few miles southwest of Buckley, and during the course of this investigation Tertiary unconsolidated deposits were mapped along the Nisqually River and its tributaries in the southern and southeastern parts of the project area. The physical characteristics of the Tertiary unconsolidated deposits in the two areas differ somewhat, and the relation between the two is not known. The thick sequence of unconsolidated deposits tapped by some wells in the Tacoma area may include materials correlative with the deposits at one or both of these localities, but sufficient data are not available to establish a correlation.

Mashel Formation

The name Mashel Formation (from the Mashel River) proposed by Sceva (written communication, 1955) for a sequence of unconsolidated fluvial and lacustrine deposits of Miocene age that underlie Pleistocene deposits and overlie consolidated rock in the southern part of the project area has been adopted. The formation is typically exposed in secs. 20 and 29, T. 16 N., R. 4 E., along a logging road descending from Mashel Prairie to the Mashel River.

Character and thickness.--The Mashel Formation consists of a predominantly fine-grained upper part and a coarse-grained lower part. The upper part is composed mostly of clay, sand, and lignite. The clay commonly contains plant material ranging in degree of preservation from unidentifiable fragments to whole leaves and sections of logs. The sandy phases of the upper part of the formation contain tuffaceous material, pumice, and volcanic ash (fig. 3).

The lower part of the formation is composed mostly of medium- to coarse-grained, poorly cemented gravel of predominantly dark volcanic rock types. Where granitic pebbles are present they generally are badly decomposed and crumble when struck with a hammer.

The Mashel Formation is believed to have been deposited in a piedmont environment after the uplift of the ancestral Cascade Range. The lower (gravel) part of the formation, exposed near river level at the mouths of the Mashel River and Ohop Creek, was deposited as the result of a great reduction in gradient of debris-laden streams near the point where they flowed from an upland onto a relatively flat lowland area. The lateral distribution of the lower part of the formation is not known, but it is likely that the deposition of gravel was limited somewhat to areas marginal to the upland, except along northwest-trending drainage lines that may have been in existence on the lowland before the uplift took place. Early in the development of the piedmont plain underlain by the Mashel, sand was deposited in the area midway between the upland and the center of the lowland; silt and clay were deposited near the center of the lowland. As the upland area was eroded and the lowland was aggraded, the area in which gravel was being deposited was reduced in size, and fine-grained material was deposited closer to the upland front.

The streams that deposited the Mashel Formation shifted laterally across the piedmont plain, and basins or lakes were formed between individual alluvial fans. These lakes and swampy basins were places of accumulation of vegetal material.

Volcanic activity in the area during Mashel deposition is attested by the presence of volcanic ash and tuffaceous material in the formation.

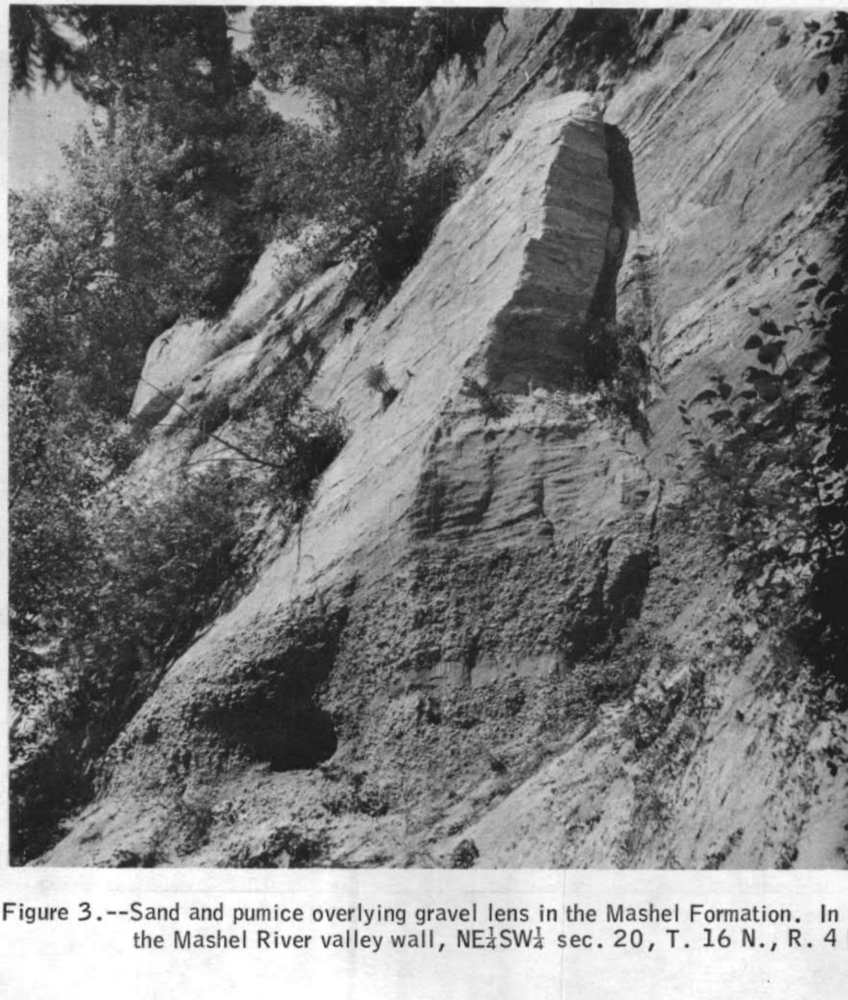

Figure 3.--Sand and pumice overlying gravel lens in the Mashel Formation. In the Mashel River valley wall, NE$\frac{1}{4}$SW$\frac{1}{4}$ sec. 20, T. 16 N., R. 4 E.

Measured type section of Mashel Formation along Weyerhaeuser Road descending from Mashel Prairie to Mashel River secs. 20 and 29, T. 16 N., R. 4 E.

Materials	Thickness (feet)
Vashon Drift:	
Gravel, coarse-grained	--
Mashel Formation:	
Clay, massive, rusty, weathers white to cream-colored; contains organic material. Lower few inches contains streaks of fine-grained sand	7
Sand, medium-grained, angular to subangular, tan. Composed of clear quartz, biotite, muscovite, and miscellaneous dark rock fragments. Includes thin beds of silty clay that contain a small amount of organic materials and lenses of partially decomposed pebbles having a purple hue	14
Clay, massive, cream-colored to white with rusty streaks. Contains bits of organic material. Becomes silty and sandy near base	7
Sand, medium-grained, angular to subangular; contains bits of organic material	2
Clay, massive, cream-colored to white; contains organic material	1.5
Sand	1.9
Clay, cream-colored to white; contains wood and leaves near base (fossil locality 4)	3
Sand, gray when wet; contains silt and clay. Grades laterally into coarse-grained sand and gravel	3.8
Lignite	0.7
Clay, massive, waxy appearance on fractures. Contains scattered organic materials and fragments of tuff. Some thin sand beds	14
Covered	22
Gravel, coarse, and boulders, rusty. Contains interstratified lenses of sand and blocks of clay up to 5 feet across. Some granitic boulders, badly decomposed (base not exposed)	75

Measured section of Mashel Formation in north bluff of Mashel River near the center of sec. 20, T. 16 N., R. 4 E. Measured 9/12/53 by J. E. Sceva and B. A. Liesch.

Materials	Thickness (feet)
Mashel Formation:	
Sand, silty, stratified, light-brown	32
Sand and fine-grained gravel, stratified	4

Measured section of Mashel Formation: continued

Materials	Thickness (feet)
Mashel Formation--continued:	
Sand, fine-grained, cemented, light-brown	15
Conglomerate, composed of small white pumice pebbles	6
Sand, stratified, rusty-red	6
Clay and silt, gray	12
Sand, crossbedded, gray; contains many streaks of white pumice pebbles	25
Sand, silty, brown	5
Sand and gravel, rusty; pink and gray andesite predominate	10
Sand, silt, and ash	2
Ash, hard, brittle, brown	1
Tuff, hard, green	4
Sand, rusty, brown	10
Clay, and fine-grained sand, silty, laminated	5
Clay, gray, and fine-grained sand	12
Silt, sand, and clay	5
Lignite	1
Sand, silt, and clay, stratified, gray	44
Gravel, basaltic, cemented, rusty (base not exposed)	15

The Mashel Formation appears to have been slightly deformed along the Nisqually River; it dips west at an angle slightly greater than the gradient of the valley floor. This results in successively younger strata in the formation passing beneath the valley floor, westward down the valley. The northwest slope of the upper surface of the Mashel Formation, however, is probably due primarily to post-Miocene erosion.

Floras from the Mashel at the following four localities were identified by Jack A. Wolfe of the U. S. Geological Survey.

Locality 1. Tanwax Lake quadrangle, SW¼SE¼ sec. 22, T. 17 N., R. 4 E., on east shoulder of Clear Lake highway, 478 feet north of Golden Road junction. Altitude about 675 feet.

Locality 2. Eatonville quadrangle, SE¼NE¼ sec. 25, T. 16 N., R. 3 E. on southeast side of Weyerhaeuser logging road, in bluff southeast of Ohop Creek, 260 feet northeast of bend in road at creek level. Altitude about 525 feet.

Locality 3. Eatonville quadrangle, NW¼SE¼ sec. 18, T. 16 N., R. 4 E., on west side of State highway 5, in bluff west of Ohop Valley.

Locality 4. Eatonville quadrangle, NW¼NW¼ sec. 29, T. 16 N., R. 4 E., on northwest shoulder of Weyerhaeuser logging road, in bluff west of Mashel River. Altitude about 525 feet.

Flora	Locality 1	2	3	4
Pinus ponderosa Lawson			X	
Populus trichocarpa Torrey and Gray			X	
Salix hesperia (Knowlton) Condit		X	X	
Salix sp., n. sp.				X
Carya simulata (Knowlton) Brown		X		
Pterocarya mixta (Knowlton) Brown	X	X		
Pterocarya sp., n. sp.	X	X		
Alnus relata (Knowlton) Brown				X
Alnus sp., n. sp.		X		
Alnus sp., cones		X		X
Betula lacustris MacGinitie		X		
Fagus sanctieugeniensis Hollick		X		
Quercus chrysolepis Liebmann		X	X	
Ulmus speciosa Newberry		X		
Zelknova oregoniana (Knowlton) Brown		X		
Mahonia reticulata (Macginitie) Brown		X		
Cinnamomum sp., n. sp.		X		
Persea lanceolata (Berry) Brown	X	X	X	
Platanus dissecta Lesquereux			X	
Platanus sp., n. sp.	X			
Acer sp., n. sp.		X		X
Acer macrophyllum Pursh			X	
Paulownia columbiana Smiley			X	
Cornus sp., n. sp.		X		
Fraxinus sp.				X

Wolfe (written communication, 1961) assigned the flora from localities 1 and 2 to a probable late middle Miocene age. He considered the flora from locality 3 to be no older than late Miocene, and that from locality 4 to be either late middle Miocene or late Miocene.

The climate at the time of deposition of the Mashel Formation, according to Wolfe, was probably warmer than at present, and there may have been at least as much precipitation. The flora from locality 3 represents a climate somewhat cooler than that represented by the flora from locality 2.

According to Wolfe, a flora comparable to that from locality 2 is found in the Miocene Wilkes Formation (Roberts, 1958, p. 36) of the Toledo-Castle Rock district of Washington.

Distribution.--The Mashel Formation is well exposed in the bluffs along the lower Mashel River, the Ohop Valley, the south valley wall of Tanwax Creek, and the Nisqually River valley from near La Grande to the mouth of Tanwax Creek. An excellent but rather inaccessible exposure of the formation is in the north bluff of the Mashel River about 1,350 feet east of a power transmission line, near the center of sec. 20, T. 16 N., R. 4 E. Near McKenna, in the Nisqually River valley, the Mashel disappears under younger formations.

Water supply.--According to information obtained from well logs, the top of the Mashel Formation is about 20 to 150 feet below the land surface in Tps. 16 and 17 N., Rs. 3 and 4 E. The upper, fine-grained part of the formation yields small quantities of water to wells. The water-bearing properties of the gravel in the lower part of the formation are not well known because few wells have been constructed in the areas where gravel is near enough to the land surface to be tapped by ordinary domestic or stock wells. In well 17/3-2R1, a small artesian flow was reported from fine-grained sand at a depth of 205 feet. The well was drilled to a depth of 578 feet to obtain sufficient water for domestic and stock use. Well 16/3-22A2, 426 feet deep, penetrated mostly fine-grained deposits of the Mashel Formation. Water-bearing sand and gravel from 410 to 426 feet produces about 40 gpm.

Miocene Unconsolidated Deposits, Undifferentiated

Crandell and Gard (1959) described unconsolidated deposits of Miocene age exposed in the valley walls of South Prairie and Gale Creeks but did not apply formal names to them. In this report these deposits are referred to as Miocene unconsolidated deposits, undifferentiated. The following discussion of their character, distribution, and thickness is based on the report by Crandell and Gard.

Character and thickness.--The oldest unconsolidated unit of Miocene age recognized in the valleys of South Prairie and Gale Creeks is lacustrine sand, silt, and clay. The greatest observed thickness of this unit is 6 feet, at a place where the base is not exposed.

The lacustrine unit is overlain by a layer of volcanic ash, which is overlain in turn by three volcanic mudflows. The assignment of a Miocene age to these deposits was based on the age of fossil leaves in the volcanic ash bed. The two lower mudflows, having a combined thickness of about 28 to 48 feet, are in contact with each other; the highest mudflow is separated from the lower two by about 10 feet of crossbedded sand and pumice gravel. About 75 percent of the stones in the lowest mudflow are of central Cascade type. The remainder are of white pumice and gray andesite. The pebble-size rock fragments in the two overlying mudflows are almost entirely of light-gray and pinkish-gray hornblende andesite. The upper mudflow is about 9 feet thick and is overlain by sand and silt of possible lacustrine origin. The maximum known thickness of Miocene unconsolidated deposits in the South Prairie Creek-Gale Creek area is about 160 feet.

Distribution.--Undifferentiated Miocene unconsolidated deposits may be present in the area north or northwest of South Prairie and Gale Creek valleys where they were mapped by Crandell and Gard; however, they probably occur at great depth.

Water supply.--No wells are known to tap the undifferentiated Miocene unconsolidated deposits, and the water-bearing characteristics of these deposits are not known. The mudflows in the Miocene unconsolidated deposits somewhat resemble till, and it is possible that they are tapped by some wells in the Buckley area and have been mistakenly identified as glacial deposits. The exposed undifferentiated deposits of Miocene age are of low to moderate permeability; it is unlikely that they are capable of yielding more than small quantities of water to wells. Their base is not exposed, and materials of higher permeability possibly underlie the exposed section.

Unconsolidated Deposits of Quaternary Age

The close of the Tertiary Period and the beginning of the Quaternary Period commonly are placed at the time when glaciation, or the climatic conditions which led to glaciation, left a record in the area. The four recognized glaciations of central Pierce County, from oldest to youngest are: Orting, Stuck, Salmon Springs, and Fraser. Each of these glaciations probably included major or minor retreats and readvances.

After each major glacial interval, the area was free of ice for a time and fluvial and lacustrine sediments accumulated on the glacial deposits. Each of the ice-free intervals is represented at least locally by a formation of nonglacial origin.

In this report, deposits of Quaternary age are related, where possible, to the glaciation or to the nonglacial interval during which they were deposited. In some cases it was possible to determine only that a deposit is older than a certain glaciation, and in these cases the deposits are referred to informally, as for example, undifferentiated pre-Salmon Springs or undifferentiated pre-Vashon deposits.

Pre-Salmon Springs Unconsolidated Deposits, Undifferentiated

Beds of predominantly stiff, evenly bedded, hard blue to blue-gray clay are exposed near sea level at many places on the shores of Puget Sound and in deep valleys tributary to Puget Sound. Previous workers have reported that the clay is interstratified with, or grades laterally into, sandy clay, sand, gravel, till, and peat. The unit was named the Admiralty Till and Clay by Willis (1898, p. 152), who applied the name to all deposits of what he termed the Admiralty glacial epoch. Willis and Smith (1899) mapped extensive deposits of Admiralty Till in Tacoma. Bretz (1913) used the designation of Admiralty Till and sediments. He, however, defined the Admiralty as including nearly all the Pleistocene deposits of pre-Vashon age. In his discussion of the geology of Snohomish County, Newcomb (1952, p. 14), used the name Admiralty Clay for "a series of hard, evenly bedded gray and blue silt and clay, sand and gravel beds, and thin, woody peat strata." Newcomb recognized till in his Admiralty, but attributed it to local mountain or distant piedmont glaciers rather than to an ice sheet in the Puget Sound Lowland.

In Kitsap County, Sceva (1957, p. 14) applied the name Admiralty Drift to blue-gray clay containing strata of sand, gravel, lignite, volcanic ash, and discontinuous pods or lenses of till. Liesch and others (1963) did not apply formal geologic names to the older Pleistocene deposits in northwestern King County. Their "lower clay unit" is stratigraphically comparable to the Admiralty of earlier workers in the Puget Sound area. The "older unconsolidated deposits" of Liesch and others, and to a lesser extent their "unnamed gravel," may be in part comparable to the Admiralty of earlier reports dealing with nearby areas. Crandell, Mullineaux, and Waldron (1958, p. 396) were unable to determine the field relationship between the Admiralty of the Tacoma area described by Willis and the stratigraphic section exposed in the Puyallup Valley. They stated, however, that at two localities the deposits described by Willis as being of Admiralty age were probably part of their Puyallup Formation or Salmon Springs Drift. Because the Admiralty till and clays of Willis could not be assigned to a single stratigraphic interval, they did not use that name in their paper on Pleistocene sequence in the southeastern part of the Puget Sound Lowland.

During the course of this investigation, a detailed study was made of the exposures in the northern part of Tacoma that were mapped as Admiralty Till by Willis and Smith (1899), and of nearby exposures for which radiocarbon ages are available. The authors found that exposures mapped as Admiralty Till by Willis and Smith do not represent the earliest glaciation of the area (Willis and Smith, p. 4), but are related to the latest glaciation and to the interglaciation that immediately preceded it.

Because of the varied usage of the name Admiralty and the confusion that has resulted from the name having been applied to deposits of more than one glacial stage, the name Admiralty is not used in this study. It is suggested that future use of the name in the Puget Sound Lowland be discontinued. In this report, the evenly bedded, stiff blue clay and associated materials of pre-Salmon Springs age are referred to informally as pre-Salmon Springs unconsolidated deposits. Wherever observed in central Pierce County, the top of these deposits is marked by an erosional unconformity, and the oldest unit overlying the unconformity is at least as old as the Salmon Springs Drift.

Character and thickness.--Pre-Salmon Springs unconsolidated deposits consist of evenly bedded, stiff lead-blue clay. The clay commonly contains carbonaceous material; lignite was seen in it at the Ketron Island exposures. Thin beds of fine sand are commonly interbedded with the clay, and unweathered stones as much as several inches in diameter locally are scattered throughout. The pre-Salmon Springs unconsolidated deposits, where observed in central Pierce County, are characterized by many small faults having displacements of a few inches to several feet. Pre-Salmon Springs unconsolidated deposits are exposed up to only a few feet above sea level, and their thickness is not known.

Distribution.--In central Pierce County, exposures of pre-Salmon Springs unconsolidated deposits were recognized only near Point Defiance and on Ketron Island.

Water supply.--Pre-Salmon Springs unconsolidated deposits are undoubtedly penetrated by many deep wells in the Tacoma area, but they cannot be recognized in well logs. Moderate to large yields of water are obtained from wells extending several hundred to as much as 2,000 feet below sea level in the area southwest of Tacoma, on the Tacoma tidal flat, and in the Sumner area. Some of the deeper materials penetrated by these deep wells may be of Tertiary age, but it is likely that materials comparable to the pre-Salmon Springs unconsolidated deposits also are penetrated and may yield significant quantities of water.

Orting Drift

The oldest glacial deposit exposed in central Pierce County is the Orting Drift of Crandell, Mullineaux, and Waldron (1958, p. 387-389). Most of the exposures of Orting Drift are in the valley walls of the Puyallup and Carbon Rivers and South Prairie Creek; these exposures were mapped by D. R. Crandell (1963). The following discussion is based on his description of the Orting Drift.

Character and thickness.--According to Crandell (p. 13), "The formation includes a thick basal gravel of central Cascade provenance and overlying till and gravel deposited by the Puget lobe. Because no unconformity has been recognized between these two major units, both are included here in the Orting Drift."

Stratified sand and gravel make up most of the Orting Drift. In most exposures, the sand and gravel is intensely oxidized; the degree of oxidation is generally greatest in coarse-grained materials. The color of gravel exposures ranges from yellowish brown to rusty red. Individual coarse clasts are commonly encased in a matrix of fine- to medium-grained yellowish sand. Individual stones in some gravel beds have a coating of grayish yellow plastic clay.

Thin, discontinuous horizons of stony till occur in the Orting Drift. The till is very compact at most places, and many of the joint surfaces are coated with iron oxides. The till ranges in color from yellowish gray to yellowish brown.

According to Crandell (1963, p. 15), the greatest known thickness of Orting Drift in the Carbon River valley is about 260 feet. At many places, as much as 200 feet of the formation consists of gravel.

Distribution.--In central Pierce County, exposures of Orting Drift occur only in the drainage of the Carbon River and South Prairie Creek, and in the Puyallup River valley about as far downstream as McMillin. Near McMillin the Orting Drift disappears under younger formations.

The northern and western subsurface extent of Orting Drift could not be determined from well logs, but it is probably present at least locally beneath the surface in all but the southern part of the project area. If the drainage pattern during Orting time were virtually the same as today, gravel of the Orting Drift would be present beneath the uplands only along the margins of the present major drainage lines, and in buried tributary channels which have no surface expression. However, if the thick gravel of the Orting Drift were deposited by streams discharging onto a plain of slight relief, as inferred by Crandell (1963, p. 16) this gravel would underlie large areas of the project as more or less continuous sheets. The thin and discontinuous nature of till sheets in the area where Orting Drift is exposed indicates that possibly the ice did not advance far beyond Orting; the gravel in the upper part of the Orting Drift may be largely an ice-marginal deposit. Much of the area northwest of the outcrop area of the Orting Drift may have been occupied by ice when the drift exposed near Orting was being deposited. If so, the Orting deposits north and west of McMillin may consist of a larger proportion of till.

Water supply.--Gravel in the Orting Drift is of fairly high permeability and is capable of yielding moderately large quantities of water where it extends below the level of the valley floors. Along the margins of the upland areas near the valleys, the water table slopes very steeply toward the valleys and at least the upper part of the Orting Drift is not saturated. Deep wells, mostly in the area southwest of Tacoma, the Tacoma tidal flat, and near Sumner, no doubt penetrate deposits of the Orting Glaciation. The deposits were not recognized in well logs, however, and the amount of water yielded by them is not known.

Lily Creek Formation

The Lily Creek Formation occurs only in a very small area in the southeastern part of Pierce County. The following description is based on work by Crandell (1963, p. 17). According to Crandell, the unit probably was deposited in part during the Alderton interglacial interval, and in part during the Puyallup interglacial interval. He inferred (1963, p. 20) that the Lily Creek deposits within the central Pierce County project area are of Puyallup age. He felt, however, that evidence of age equivalency was inclusive and that a distinction should be made between the Lily Creek, Alderton, and Puyallup Formations.

Character and thickness.--Although sand and gravel deposits are common near the base of the formation, the bulk of the Lily Creek consists of volcanic mudflows that originated on Mount Rainier. These are unsorted mixtures of stones in a matrix of sand, silt, and clay. They resemble till but can be distinguished from it on the basis of the presence of Mount Rainier rock types, which do not occur in till in this area. It can also be identified on the basis of extreme angularity of included boulders, and the decrease in size of rock fragments from the base toward the top.

Crandell (1963) states that in some localities the Lily Creek Formation is so extensively weathered that stones as large as 4 inches in diameter can be easily cut through with a knife. Deeply weathered deposits of this type crop out in a highway cut in secs. 25 and 36, T. 16 N., R. 4 E. Crandell also states that units within the Lily Creek Formation typically consist of lenticular fills resting within channels cut into older units of the formation. This relationship is well demonstrated in a road cut near the center of the west side of sec. 20, T. 17 N., R. 5 E.

The maximum exposed thickness of the Lily Creek Formation in the project area was not determined. Crandell states that about 273 feet of the formation is exposed in sec. 8, T. 18 N., R. 6 E.--only a few miles east of the project area. Some of the exposures of Lily Creek in secs. 17 and 20, T. 17 N., R. 5 E., may be somewhat thicker than the figure cited by Crandell.

Distribution.--In central Pierce County the Lily Creek Formation is present only east of Ohop Valley. The formation is exposed principally in T. 17 N., R. 5 E., along the upland bench northeast of Ohop Creek. It probably is present also south and east of the Ohop Valley in the Eatonville area, but it is included with deposits of undifferentiated pre-Vashon age in that area.

Water supply.--Mudflows in the upper part of the Lily Creek Formation probably retard the downward movement of ground water and cause perched water-table conditions near the top of the formation and in the materials that locally overlie it along the eastern margin of the project, in T. 17 N., R. 5 E. No wells penetrate the Lily Creek Formation in central Pierce County, but small springs issuing from outcrops of sand and gravel layers in the formation indicate that wells of sufficient yield for domestic and stock use could be constructed locally.

Alderton Formation

The Alderton Formation, probably of early and middle Pleistocene age, consists of a succession of sediments of Mount Rainier provenance deposited during the nonglacial interval that followed the Orting Glaciation (Crandell and others, 1958, p. 22). The formation, exposed chiefly in the walls of the Puyallup River valley, was mapped by Crandell. The following discussion is based on Crandell's (1963) description of the Alderton Formation in the Lake Tapps quadrangle, which is in the northeastern part of the project (pl. 1).

Character and thickness.--The formation was deposited on a broad alluvial plain or on the floor of a very wide valley. Elongate bodies of gravel were deposited in stream channels, but the major part of the alluvial deposit consists mostly of sand, silt, and interbedded peat. The finer grained materials represent slack-water deposits adjacent to the stream channels. As in the Lily Creek Formation, the most abundant deposits in the Alderton Formation are volcanic mudflows derived from Mount Rainier. These occur as fairly continuous sheets overlying both the channel gravel and the finer grained materials. The Alderton also contains pumice and volcanic ash. The Alderton Formation is separated from the overlying Stuck Drift by a slight erosional unconformity. However, Crandell found no evidence of deep valley cutting between deposition of the Alderton Formation and the Stuck Glacitation.

The thickness of the Alderton Formation in the Lake Tapps quadrangle is at least 100 feet.

Distribution.--The northern and western subsurface extent of the Alderton Formation in central Pierce County is not known. Were the formation to occur north or west of the outcrop area, those occurrences would be more distant from the source area, and alluvial material probably would be finer grained and less permeable. The bulk of the Alderton Formation probably is localized along drainage lines that existed during Alderton time. Contemporary deposits of peat, volcanic ash, or pumice could have accumulated in upland depressions on the Orting Drift and may locally underlie much of the northwestern part of the project area.

Water supply.--It is unlikely that the Alderton Formation yields significant quantities of water in central Pierce County. Channel gravel deposits may yield water to a few wells, but the occurrence of these deposits is extremely unpredictable. Some of the mudflows in the formation are impermeable and act as barriers to vertical movement of ground water.

Stuck Drift

Deposits of the second glaciation of the Puget Sound Lowland are represented in central Pierce County by the Stuck Drift. Where Crandell (1963) did not differentiate Stuck Drift from the Alderton and Puyallup Formations in the Puyallup Valley, these three units are shown on plate 1 as undifferentiated pre-Vashon deposits.

Character and thickness.--Where exposed, the Stuck Drift is composed of till, lacustrine silt and fine sand, and glaciofluvial sand and gravel.

The till ranges from about 5 to 30 feet in thickness where exposed. The total thickness of the drift rarely exceeds 40 feet.

Distribution.--The Stuck Drift is exposed in the walls of the Puyallup River valley, from south of Orting to Sumner, and in the valley walls of the White River. It was not recognized in well logs, and its distribution beneath the uplands is not known.

Water supply.--The fine-grained lacustrine beds of the Stuck Drift can yield very little water to wells. Gravel of the Stuck Drift commonly contains lenses of sand, or is a matrix of fine sand and, except locally, will not produce large quantities of water.

Puyallup Formation

The Puyallup Formation as defined by Crandell and others (1958, p. 392-394) consists only of the deposits lying between the Stuck Drift and the Salmon Springs Drift. Although it includes the Puyallup sand of Willis (1898), it consists of a greater variety of sediments.

Character and thickness.--The Puyallup Formation typically consists of alluvial and lacustrine sand, gravel, mudflows, volcanic ash, and minor amounts of peat. The depositional environment of the formation was the same as for the Alderton, and as in that formation, gravel deposits are restricted to elongate channel fillings. Finer grained slack-water deposits and mudflows occur as continuous sheets containing scattered lenses of peat and volcanic ash. Locally, as in the Fennel Creek valley, mudflows (Crandell, 1963) represent more than half the total thickness of the formation. Elsewhere, mudflows occur in the upper part of the formation and sand is the principal material in the formation. The maximum observed thickness of the formation is about 135 feet.

Distribution.--The Puyallup Formation is exposed in the valley walls of the Stuck River and in the Puyallup River valley as far downstream as the eastern part of the city of Tacoma. The type of deposits that make up the formation in the walls of the Puyallup Valley probably underlies much of the upland area of central Pierce County west of the Puyallup Valley. This area is somewhat farther from Mount Rainier--the principal source area of the Puyallup Formation--than is the Puyallup Valley, and the materials are probably finer grained. A prominent erosional unconformity occurs between the Puyallup Formation and the overlying Salmon Springs Drift; locally the Puyallup may be very thin or absent.

Water supply.--Where exposed, the Puyallup Formation contains only thin beds of material that are permeable enough to yield a significant amount of water; it is unlikely that the formation is an important source of water anywhere in central Pierce County.

Salmon Springs Drift

Drift of a third glaciation has been recognized in the east valley wall of the Stuck River near Sumner (Crandell and others, 1958) and named Salmon Springs Drift, probably of middle to late Pleistocene age. Near Sumner, two drift sheets of this glaciation are separated by nonglacial sediments deposited during a temporary recession of the Salmon Springs glacier. Elsewhere in central Pierce County, the nonglacial sediments have not been recognized in drift believed to be Salmon Springs and, consequently, it is not known whether this drift is of the earlier or later glacial advance.

Character and thickness.--The drift consists mostly of stratified sand and gravel, containing thin, discontinuous beds of silt and clay. Lenses of till are present but no extensive single till sheet has been found.

The unit is derived principally from the central Cascades, but sediments of northern derivation are common, and sediments of Mount Rainier provenance are abundant locally in some horizons. The unit is commonly oxidized to a yellowish or reddish brown in the zone of aeration and locally is oxidized in the zone of saturation. Where oxidized in the zone of saturation the unit is compact, and springs occur as a result of the low permeability of the compacted materials and the greater permeability of the overlying materials.

Salmon Springs Drift is especially well exposed in the bluff bordering the northeast Tacoma upland, where it consists almost wholly of gravel. Here, the contact between it and the overlying Vashon advance deposits is at an altitude of about 220 feet (fig. 4). Logs of wells in the Hyada Park area adjacent to northeast Tacoma indicate that the Salmon Springs Drift may extend to 150 feet below sea level, suggesting a possible thickness of about 390 feet in this area. The drift thins eastward and is reported by Crandell (1963) to consist of till underlain and overlain by gravel in the White River valley. He reported till underlain by 75 feet of gravel in the west wall of the White River, and elsewhere 60 feet of gravel

Figure 4.--Salmon Springs Drift overlain by Vashon advance deposits in NE$\frac{1}{4}$SW$\frac{1}{4}$ sec. 25, T. 21 N., R. 3 E. Approximate location of contact is marked by prominent boulder horizon.

overlying the till. Probably the deposit also thins in a southerly direction. However, Noble and Wallace (1965) in Thurston County and Molenaar (1965) in the southern part of his project area have mapped considerable thicknesses of materials that are probably correlative with the Salmon Springs Drift.

Undifferentiated sand and pebble to cobble gravel deposits of central Cascade and Mount Rainier provenance, perhaps as much as several hundred feet thick, crop out in the north wall of the Nisqually River as far downstream as sec. 9, T. 18 N., R. 1 E. The age of these deposits was not determined, and the base was not seen in this investigation, although it is presumed to rest upon the Salmon Springs Drift(?) or older deposits. The deposits are overlain in most places by advance outwash gravel of Vashon age. These deposits were described by Mundorff and others (1955) as "indurated and compact sand, gravel, and till, with occasional lenses of clay." Till was not observed in this unit by the authors, although a pre-Vashon till-like mudflow derived from Mount Rainier, exposed in sec. 35, T. 17 N., R. 2 E., on the south side of the Nisqually, might easily be mistaken for till. A glaciofluvial origin was proposed by Mundorff and others for the sand and gravel, chiefly because of the presence of till. It is not known whether the gravel is outwash of an alpine glacier or is a nonglacial stream deposit. Although the bulk of the deposits are unoxidized, in some places they have a weathering profile at their top (Mundorff and others, 1955, p. 7).

Distribution.--Correlation with Salmon Springs Drift of the type area is somewhat tenuous in the western part of the project area. For that reason, the formation name here is followed by a query. Because the drift is similar to other drift sheets, its identification in well logs in subject to doubt and its areal extent in Pierce County cannot be determined.

Water supply.--In the northeast Tacoma upland where the Salmon Springs Drift is thickest, a large part of the drift is in the zone of aeration and only small amounts of water are obtained from it. On the upland in and south of Tacoma, it may locally provide large quantities of water, but it is not known how much of this upland is underlain by water-bearing Salmon Springs Drift. Salmon Springs Drift underlying the Buckley upland is believed to be relatively impermeable, but the extent and yield of the drift are unknown. The unit acts as a barrier to downward ground-water percolation, and lateral movement of ground water along its upper surface is responsible for Salmon Springs, northeast of Sumner, and for the springs at the edge of the upland south and west of Puyallup.

Kitsap Formation

The Kitsap Formation was originally named the Kitsap Clay Member of the Orting gravel by Sceva (1957, p. 17). Recent mapping in the southeastern part of Puget Sound Lowland, however, has shown that the Orting gravels of Willis (Orting Drift of this report) are probably of early Pleistocene age (Crandell and others, 1958), whereas radiocarbon dating of organic matter in the Kitsap Formation indicates a late Pleistocene age. The Kitsap Clay Member was raised to formational rank by Molenaar (1965). Sceva described his Kitsap Clay Member at three type sections in the vicinity of Maplewood in peninsular Pierce County adjacent to Kitsap County, and not within the project area of this report. Two of these sections include massive and laminated clay and peat, which are of great areal extent in Kitsap, Thurston, and Pierce Counties. The following composite section located about 18,000 to 1,500 feet south of the Kitsap-Pierce County line at Maplewood is representative.

Composite section near Maplewood, Pierce County

Unit	Thickness (feet)	Description of material
Colvos Sand	±100	Fine sand to coarse gravel of northern Cascade (glacial) provenance, pods of gray clay
		erosional unconformity
	20	Clay, laminated, gray to gray-green
Kitsap Formation	1-2	Peat, compact, brown to black
	60	Clay, massive and laminated, gray
		erosional unconformity
Salmon Springs(?) Drift	>20	Gravel, compact, red-brown

A third section described by Sceva includes three tills in a section of clay, sand, gravel, and peat. The exposure at which this section was measured by Sceva could not be located by the writers, and the occurrence of till in the section is not understood, inasmuch as all other evidence indicates that the Kitsap is of nonglacial origin.

In the area west of central Pierce County the Kitsap Formation described by Noble and Wallace and by Molenaar is almost entirely silt and clay; it lacks the large amounts of sand and gravel found in central Pierce County.

Character and thickness.--In central Pierce County the Kitsap Formation is composed of beds of fluvial and marsh deposits derived principally from older Pleistocene deposits and from Mount Rainier sources.

In most of the area, this formation consists of three parts (fig. 5), unoxidized sand and gravel at the base, fine-grained material in the middle, and oxidized sand and gravel at the top. The formation unconformably overlies drift of probable Salmon Springs age. The basal gravel is brownish black, and of unknown thickness. Overlying this deposit are beds of clay, silt, and fine sand that contain, near the top, discontinuous peat layers. In the bluff in secs. 29 and 32, T. 21 N., R. 3 E., gravel is interstratified with the fine-grained deposits (see measured section, p.).

The color of most of the clay and silt deposits is yellowish brown or yellowish orange; some silty, sandy clay is a grayish blue green. The sand and silt deposits commonly are brownish black where unoxidized and yellowish brown where oxidized. Locally, however, they are a pale red purple comparable to the color noted by Crandell (1963) in fine-grained material of Mount Rainier provenance in

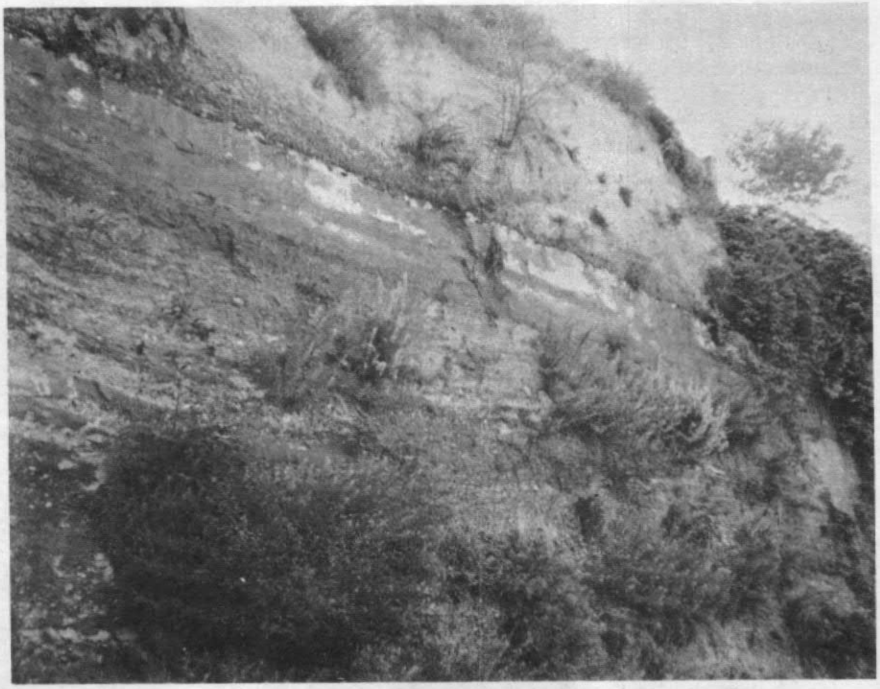

Figure 5.--Kitsap Formation in $NW\frac{1}{4}NE\frac{1}{4}$ sec. 32, T. 21 N., R. 3 E., about 200 feet southeast of Sperry mill. The fine-grained section at this point is free of vegetation.

the Lake Tapps quadrangle. The upper unit of the Kitsap Formation is chiefly a yellowish brown or yellowish orange gravel. However, the material is not as well oxidized as its color might indicate, because when washed most of the gravel and sand appears fresh.

Many of the pebbles of northern Cascade and central Cascade provenance and the sand grains, especially quartz, have a yellow oxide coating that does not wash off in panning. These stained pebbles and grains are also in the unoxidized parts of the formation. They are believed to have been derived from the erosion of older drift, possibly Salmon Springs, extensive deposits of which are on the northeast side of Commencement Bay. The deposit is indurated throughout, and the degree of compaction increases downward.

The Kitsap Formation was deposited in a nonglacial climate during an interval between glaciations. Evidence of both alluvial and lacustrine environments is present in most exposures of the formation. The presence of sediments derived from Mount Rainier indicates that the Puget Sound Lowland was free of ice, thus permitting northward drainage toward the Strait of Juan de Fuca during accumulation of the materials that compose the formation.

The two measured sections of the Kitsap Formation that follow show typical variations in grain size and content. Throughout most of the formation, minerals and rocks of central Cascade, northern Cascade, and Mount Rainier origins can be found, although the proportion of each varies. Euhedral to subhedral hypersthene is regarded as characteristic of Mount Rainier provenance, and is abundant in every part of the formation coarser than fine sand.

Section in west side of gulch in SW¼SW¼ sec. 29, T. 21 N., R. 3 E.

Materials	Thickness (feet)
Kitsap Formation:	
Gravel, cobble, yellowish-brown, compact; Mount Rainier, central Cascade, and northern Cascade provenance	7
Clay, silty, yellowish-brown, with thin, fine, sand beds	1.5
Peat	.2
Clay, organic-rich and black at top, grades downward into dark-yellowish-orange	1.5
Sand, pale-yellowish-brown; mainly of Mount Rainier provenance	1.2
Gravel and sand, dark-yellowish-orange, compact; contains rocks of Mount Rainier, central Cascade, and northern Cascade provenance. Sand mainly of Mount Rainier provenance	24
Covered	6
Probable erosional unconformity	
Clay, dark-yellowish-orange, contains thin sand beds	2
Sand, pale-yellowish-brown and moderate-yellowish-brown, mainly of Mount Rainier provenance	4.5
Clay, pale-yellowish-brown to grayish-orange	1.0
Sand, fine, pale-yellowish-brown	.8
Sand, silty and clay, grayish-blue-green, black at top, massive	2.4
Clay, dark-yellowish-orange, massive	1.7
Gravel, pebble to cobble, containing sand lenses near top, generally unoxidized and brownish-gray, Mount Rainier, central Cascade, and northern Cascade provenance; contains many reworked stained pebbles	20+
Exposed thickness of Kitsap Formation	74+

Section at Solo Point, Fort Lewis in SW¼NE¼ sec. 14, T. 19 N., R. 1 E.

Materials	Thickness (feet)
Kitsap Formation:	
Sand and gravel, yellowish-brown, compact, more oxidized at base, central Cascade, Mount Rainier, and northern Cascade provenance	50
Erosional unconformity	
Clay, yellowish-gray, contains peat and sand beds	6
Sand, coarse, brownish-black, unoxidized; mainly of Mount Rainier provenance	3
Sand and gravel, brownish-black, unoxidized, contains reworked, stained pebbles; mainly of Mount Rainier provenance	20
Clay, silty, yellowish-orange; contains sandy interbeds	15
Exposed thickness of Kitsap Formation	94
Bottom of section is about 30 feet above sea level	

The erosional unconformity between the fine-grained middle unit of the formation and the overlying indurated sand and gravel unit is exposed in sec. 29, T. 21 N., R. 3 E., in the bluff at the northwest side of a gulch entrant from Commencement Bay in sec. 1, T. 19 N., R. 1 E., in a gulch entrant from Cormorant Passage, and southwestward along the 4th Infantry Bluff. In exposures of the Kitsap Formation immediately south of Point Defiance (pl. 1) the upper gravel and sand unit is not present and the top of the Kitsap is in the fine-grained unit. The amount of erosion into the fine-grained unit has not been determined in central Pierce County. Work in adjacent Thurston County to the south (Noble and Wallace, 1965) and on the Kitsap Peninsula (Molenaar, 1965) has shown that there may be as much as 50 to 60 feet of peat-bearing clay and silt in the middle unit of the Kitsap there, as compared to a few feet of this material in central Pierce County. Those authors have reported a conformable relationship between the Kitsap and overlying materials in some exposures.

The total thickness of the Kitsap Formation is unknown, because it extends below sea level and the base cannot be recognized in well logs. The highest outcrops of the oxidized gravel and sand unti occur at an altitude of about 150 feet. The greatest inferred thickness is consequently about 150 feet.

Distribution.--In central Pierce County the Kitsap Formation was deposited in a northward-trending valley that lay along the west side of the project area. Its eastern edge is mantled by deposits younger than the Kitsap Formation and its western margin was removed by erosion that formed the channel of Puget Sound at the west edge of the project. In Kitsap time the valley was about 5½ miles wide between Point Defiance and the business district of Tacoma. It probably extended northward along the west side of Vashon Island and into Kitsap County. The formation occurs intermittently in the bluffs at the west margin of the project area. Sediments that probably are part of the Kitsap Formation have been noted in the logs of wells 20/2-24E1 and 20/3-30N1, about 4 miles inland from the west margin of the project area. Logs of other wells, for example 19/2-18H2, -19B1, -22N1, and -31J1, indicate that the thickness of the fine-grained section of the of the Kitsap is much greater inland than it is in the outcrops along the bluffs, and is comparable to the thickness in Thurston County (p.).

Water supply.--The lower unit of the Kitsap Formation contains some beds of relatively clean sand and gravel that appear to be very permeable and, where saturated, probably contain a large amount of water. Well 20/2-34E1 probably taps the unit between 188 and 282 feet in depth. The middle unit of the formation is too fine grained to be a good aquifer, and the upper is too indurated and clayey. The induration of the upper part of the formation causes its low permeability and locally, near the margin of the upland, perched water occurs in the overlying deposits. Springs such as 20/2-32H1s and 19/1-R1s issue from the base of the overlying deposits.

Vashon Drift

Glacial deposits resulting from the last advance of the Puget glacier lobe into the southern Puget Sound Lowland were named Vashon Drift by Willis (1898, p. 126) from deposits on Vashon Island. Willis believed that the glacier originated mainly in the Cascade Range and Olympic Mountains. Subsequent work has shown, however, that the Puget lobe invaded the foothills of the Cascade Range and the eastern edge of the lowland, and that there was no contribution of alpine ice from the Cascades (Cary and Carlson, 1937; Mackin, 1941). Bretz, (1913, p. 29) found that the Vashon glacier reached almost to Bucoda in Thurston County, about 27 miles south of Tacoma.

Bretz (1913, p. 188) described the Vashon Drift as consisting of till overlain by sand and gravel. Sediments beneath the till were referred by him to a preceding glaciation named Admiralty by Willis (1898). Newcomb (1952, p. 18) and Sceva (1957, p. 23) interpreted sand and gravel immediately beneath the till as outwash deposited during the advance of the Puget lobe and included it in the Vashon Drift. In this report, sand and gravel deposited as the Vashon glacier advanced, as well as till and the material that was deposited as the glacier retreated, are considered as Vashon Drift.

Colvos Sand

A post-Kitsap deposit of sand and gravel of northern origin on the west side of Vashon Island in King County was named Colvos Sand by Noble and Wallace (1965) from Colvos Passage. The Colvos Sand is equivalent to the Puyallup Sand of Sceva (1957). Sceva regarded the sand as pre-Vashon and correlated it with the Puyallup Sand of Willis (1898). Sceva's Puyallup Sand, however, is of northern derivation and is not correlative with the Puyallup Sand of Willis, which was derived principally from Mount Rainier (Crandell and others, 1958, p. 392). Willis' Puyallup Sand has been redefined (idem) and is called the Puyallup Formation. The Colvos Sand occupies the same stratigraphic position as the Esperance

Sand Member of the Vashon Drift in Snohomish County described by Newcomb (1952). It also is probably correlative with the unnamed sand of Liesch and others (1963). Inasmuch as the Colvos Sand is proglacial and is similar in character of weathering and origin to deposits of Vashon age, the authors have included it with deposits of the Vashon Drift.

Character and thickness.--The Colvos Sand consists of sand with included gravel beds and a basal blue-gray silty clay. In secs. 24, 25, 27, and 34, T. 21 N., R. 2 E., the basal clay occurs from below sea level to 50 to 100 feet above sea level. It was deposited in a north-trending channel cut into the Kitsap Formation. At a few places the clay is thin bedded. It lacks the compaction and weathered surface characteristics of older clays in the area, and tends to slump. The clay grades upward into well-sorted, loose sand containing beds and lenses of gravel (fig. 6).

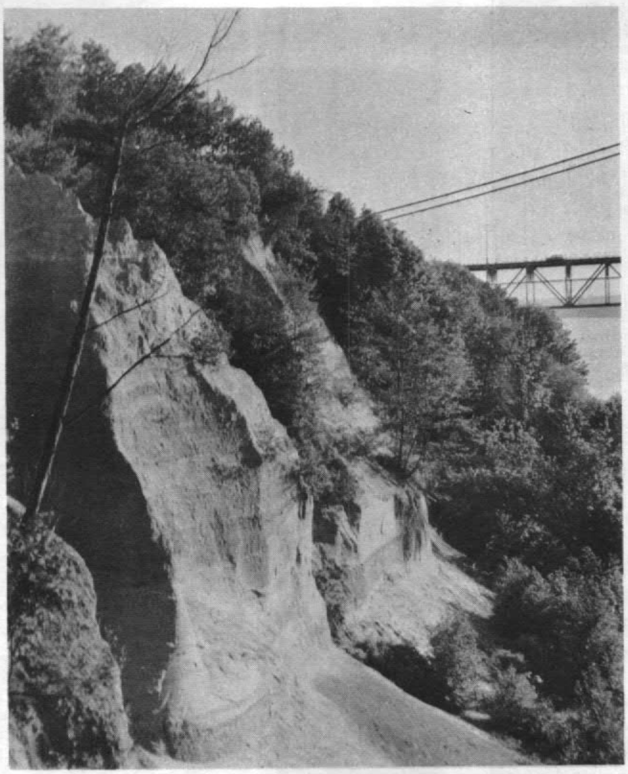

Figure 6.--Colvos Sand overlain by Vashon advance gravel, which is overlain in turn by Vashon till. The local clay is in the nearly vertical face above the talus accumulation. Tacoma Narrows Bridge in background.

The authors believe that the clay at the base of the Colvos Sand was deposited in a proglacial lake formed when the advancing ice blocked the north end of the Puget Sound Lowland. Subsequently, southward-flowing, aggrading streams deposited several hundred feet of sand and some gravel in the central part of the Puget Sound Lowland. After the aggradation, erosion by streams cut trenches which, after some modification by the Vashon glacier, formed the depressions now occupied by Puget Sound.

The Colvos Sand is generally unweathered and unoxidized, but it may have a pale-orange cast due to iron-oxide stains. In small areas where the precipitation of iron has been great, the unit has a dark-yellowish-orange or red-brown color.

The thickness of the Colvos Sand in central Pierce County is unknown but is in excess of 150 feet. The unit appears to be thickest in secs. 24 and 27, T. 21 N., R. 2 E.

Distribution.--The Colvos Sand underlies the western part of the Tacoma area from Point Defiance to the vicinity of Fircrest and southwestward to Sunset Beach. It unconformably overlies the Kitsap Formation, the contact between the two ranging from below sea level to probably about 100 feet above sea level.

Water supply.--The grain size and sorting of the unit suggest that, where saturated, the Colvos will yield plentiful supplies. Little is known about the water-bearing capacity, however, because few wells tap it. Small seeps and springs issue from the Colvos in bluffs where the downward percolation of water is impeded by tight material. This suggests that it contains some water, possibly enough to be of economic importance.

Advance gravel

Advance gravel was deposited in front of the advancing ice sheet by melt-water streams. This unit locally overlies the Colvos Sand and was probably deposited when the ice front was only a short distance away.

Character and thickness.--The advance gravel unit consists mostly of stratified, gray, well-sorted pebble to cobble gravel; it contains some sand, silt, and lenses of clay. Locally deltaic and glaciolacustrine sediments were deposited by melt-water streams discharging into lakes formed in front of the ice. Advance gravel is more compact than recessional gravel that was not overriden by ice.

The thickness of advance gravel varies greatly, but generally ranges from 25 to 50 feet.

Distribution.--Advance gravel is well exposed in the north wall of the Puyallup Valley between Sumner and Milton, and north of Center Street in Tacoma from Sprague Avenue to South M Street. Thinner but nearly continuous exposures occur along the west boundary of the project, near Commencement Bay, and in the west wall of the Stuck River valley. Drillers' logs indicate that the unit is present in most of the upland areas.

Water supply.--Advance gravel is the most important source of supply for domestic wells in central Pierce County. Its water-bearing character varies throughout the project area, however. Water in this unit locally discharges in springs around the margins of the upland areas where it is underlain by a relatively impermeable deposit. Adjacent to Puget Sound, and along the north side of the Puyallup Valley west of Sumner, the deposit is drained and will not yield water to wells. In the upland north of Fennel Creek, in the upland southwest of Puyallup, and in a small area just south of the Kirby Channel, water in the advance deposits is unconfined and yields are low. Throughout the remaining part of the area adequate supplies for domestic use and a few large supplies are obtained from this unit.

Till

Till of Vashon age is the most widespread geologic unit in central Pierce County. In much of the area it has been subjected to only minor erosion and many of the original topographic features are still evident. Terrain directly underlain by till exhibits two characteristic forms, drumlinized topography made up of elongate hills about 100 feet high whose long axes are parallel to the direction of ice flowage (fig. 7), and irregular, undulating topography of low rounded hills and swales.

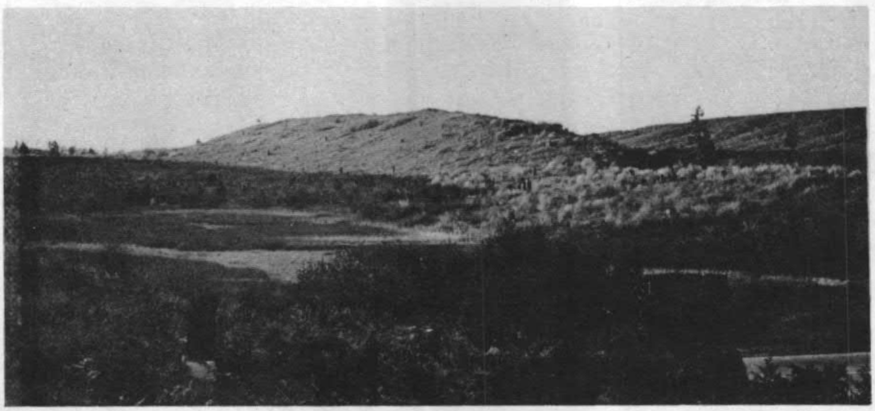

Figure 7.--Drumlins on Vashon till, sec. 12, T. 19 N., R. 2 E.

Character and thickness.--Till in central Pierce County is of two principal types--lodgment and ablation till. Lodgment till is a compact deposit of various-sized stones in a matrix of sand, silt, and clay. It is very tough and drillers frequently log it as hardpan. Lodgment till was deposited under the glacier and compacted by the weight of the ice. In some localities it is fissile, possibly as a result of the glacier having moved over it. The till is gray at depth, but weathering has penetrated 1 or 2 feet into the surface so that the weathered part is somewhat softer and is stained yellow.

Lodgment till forms continuous sheets over much of the area, broken only by subsequent stream erosion. At most places it ranges in thickness from 5 to 30 feet; locally its thickness may be much greater. A well drilled in a drumlin in sec. 4, T. 19 N., R. 2 E., encountered 150 feet of till-like material. In the upland north of Fennel Creek and in the upland southwest of Puyallup, drillers report till-like material to addepth of about 100 feet below the surface.

Ablation till consists of loose, unstratified sand and gravel derived from the sediment load in and on the ice when it melted. It was deposited on top of the lodgment till. It may be as much as several feet thick but is of local distribution. It may serve a useful function in retaining ground water by providing more permeable material at the surface for the infiltration of precipitation than does the underlying lodgment till.

Distribution.--Vashon till at one time probably blanketed nearly all the central Pierce County area. It is now at the surface over nearly half the project area, and probably underlies recessional gravel and Steilacoom Gravel in most places where they are exposed.

Water supply.--Some water is obtained from Vashon till but is a most inadequate source. Large-diameter dug wells will yield small supplies but are subject to failure and contamination, because most are shallow and tap small perched ground-water bodies.

Recessional outwash

All deposits of sand and gravel, clay, and silt, deposited by melt water from the receding Puget lobe are classified as recessional outwash.

Character and thickness.--Recessional outwash consists chiefly of stratified sand and gravel deposited in, along, or in front of the glacier by melt-water streams. Some of the recessional deposits that mantle the uplands consist of sand and silt deposited in proglacial lakes.

Fluvial sand and gravel, deposited at the ice margin, forms kame terraces along valley walls. Kame terraces typically consist of fine to coarse gravel, and some boulders. In some, the bedding is distorted and the surface is irregular because of collapse of the gravel after melting of the marginal ice.

Fluvial deposits in and on top of the melting ice form hummocky kame fields and eskers and they floor outwash channels leading from successive ice margins. Most of the deposits of this type consist of poorly sorted sand and gravel.

Lacustrine deposits of recessional outwash consist of stratified sand containing scattered pebbles and cobbles. Lenses of till or silt occur in some of these deposits. Lacustrine deposits formed in ice-enclosed lakes commonly have collapse features similar to those found in kame terrace deposits.

Three deltas were formed in the area by melt-water streams discharging into proglacial lakes. One was formed near the mouth of Fennel Creek on the west side of the Buckley upland (Crandell, 1963). Two others were formed on the west side of the Tacoma upland.

Kame terraces vary greatly in thickness and may be from several feet to several hundred feet in thickness where they mantle the valley wall. Recessional deltas range in thickness from a few feet to as much as 200 feet. Other recessional outwash deposits rarely exceed a few tens of feet in thickness.

Distribution.--Deposits of recessional outwash occur discontinuously over the project area. The most extensive occur on the upland from Puyallup southward to Graham and from the Puyallup River valley westward to Frederickson. Kame-terrace deposits occur along the walls of the Puyallup and Carbon River valleys, along South Prairie Creek, and at the west side of the City of Tacoma. Glacio-lacustrine sand occurs intermittently along the upland areas near the Puyallup Valley and in the north part of Tacoma. Kame fields, eskers, and interfingering outwash channels are abundant in the south-central part of the project area between Roy and the Mountain Highway.

Water supply.--Supplies of ground water can be obtained from shallow wells tapping some recessional deposits, especially in outwash channels floored with permeable material. Many domestic wells in the south-central part of the area tap these deposits. In most of the remaining part of the area, little ground water is found in recessional deposits. Most of the kames, eskers, and deltas are well drained and consequently will not serve as aquifers.

Steilacoom Gravel

Willis (1898, p. 135-146) described the Steilacoom Gravel as a facies of outwash that underlies the Steilacoom plains "which extend for many miles south and southwest from Tacoma," and certain areas in King County. He believed the deposit consisted of deltas formed in ponded water.

Bretz (1913, p. 136) recognized that the broad expanse of gravel on the Steilacoom plain was deposited by several rivers which (1) originated in the discharge of a large proglacial lake in the Puyallup River valley, (2) cut channels into the upland west of the Puyallup River, and (3) spread over the central and western parts of the upland.

Because of the singular origin of this gravel deposit, the writers believe that the name Steilacoom Gravel should be applied only to deposits clearly formed from or reworked by the discharge of Lake Puyallup, a proglacial lake in the Puyallup River valley, during retreat of the glacier. Locally, near the Puyallup River valley, recessional outwash was deeply channeled during Steilacoom time but the outwash that remains is not noticeably reworked and is not classified as Steilacoom Gravel.

Glacial Lake Puyallup initially discharged southward through the Ohop Channel (fig. 1), but as the ice front retreated, lower gaps (Muck Creek and Kirby channels), in the valley wall west of Orting were uncovered. Still further retreat uncovered lower channels (Clover Creek and South Tacoma) south of Puyallup and at Tacoma. The presence of kettles in the Steilacoom deposits indicate that although the ice had retreated far enough to uncover several successively lower outlets, large residual masses of ice still remained on the upland south of Tacoma when the gravel was deposited.

Character and thickness.--The Steilacoom Gravel is unusual because it is consistently coarse over a large area. The stones in this gravel unit are predominantly 1-inch pebbles but larger stones predominate locally. Boulders 1.5 feet in diameter have been noted, but most large stones do not exceed 3 inches (fig. 8).

Individual beds have an irregular top and bottom, and at some places cross-bedding occurs. The gravel is well exposed in pits in the NE¼ sec. 1, T. 19 N., R. 2 E. and in the NW¼SE¼ sec. 6, T. 19 N., R. 3 E.

The upper part of the Steilacoom Gravel characteristically displays 1 to 2 feet of dark-brown to black soil which has been named Spanaway gravelly sandy loam (Anderson and others, 1955. A similar soil has been noted on gravel deposits in Thurston County.

Figure 8.--Steilacoom Gravel in abandoned pit, NE¼NE¼ sec. 1, T. 19 N., R. 2 E.

The gravel surface is characterized by swales produced by the intersecting channels of braided streams. Many kettles or ice-contact depressions of irregular shape occur in the gravel. They range in width from about 50 feet to 2 miles. The larger and deeper of these are occupied by ground-water lakes. Notable among these are American, Steilacoom, and Gravelly Lakes.

Streams carrying gravel discharged into a proglacial lake at the west margin of the gravel plain and formed two deltas (Bretz, 1913, p. 136-141) about 200 feet thick. One delta is located at the mouth of Sequallitchew Creek and is called the Sequallitchew delta, the other is located north of the mouth of Chambers Creek and the city of Steilacoom and is called the Steilacoom delta. The maximum observed thickness of Steilacoom Gravel exclusive of the Steilacoom and Sequallitchew deltas is about 60 feet. However, in many areas the gravel is 20 feet thick or less.

Distribution.--This unit covers about 17 percent of the total land surface of central Pierce County. It occupies much of the area southwest of a line between Graham and South Tacoma and extends west to the Nisqually River and Puget Sound. Only minor occurrences are found in the northeast part of the Tacoma upland. Many "islands" of Vashon till and unaltered recessional outwash occur in the gravel.

Water supply.--Large quantities of water of good quality can be obtained from this unit when the water table occurs within it. Well 19/3-25L1 is reported to have a specific capacity of 133 gpm per foot of drawdown. Specific capacities of 10 to 20 gpm per foot of drawdown are more common however. Water in the Steilacoom Gravel is susceptible to contamination from the land surface.

Recent Deposits

Mudflows

The Osceola Mudflow was first described by Willis (1898, p. 143), but was named the Osceola till. The deposit was believed by Willis to have been formed by glaciers flowing west from the Cascade Range into the Puget Sound Lowland. Later work has disclosed that the Osceola is a volcanic mudflow of Recent age from Mount Rainier (Crandell and Waldron, 1956). Radiocarbon age determinations of wood in the mudflow indicate that it is about 4,800 years old. A similar but smaller mudflow from Mount Rainier about 500 years old, which occurs in the Puyallup Valley, was named the Electron Mudflow by Crandell (1963, p. 50).

Character and thickness.--The mudflows are unsorted mixtures of boulders and pebbles in a fine-grained matrix. Although they resemble till in broad aspect, they differ from the tills in the lowlands, according to Crandell, in the following respects:

1) They are exclusively of Mount Rainier and central Cascade provenance.
2) The larger stones are concentrated near the bottom, and there is an upward decrease in grain size.
3) They have a purplish or pinkish cast.
4) Pebbles are more angular.
5) They have a flattish topography in contrast to the irregular topography formed by till.

The thickness of the Osceola Mudflow is as much as 75 feet but is highly variable because the mudflow covered an irregular surface. The Electron Mudflow is reported by Crandell to be less than 26 feet thick in the Puyallup Valley in sec. 30, T. 18 N., R. 5 E., and is estimated to be at least 30 feet thick at the north end of the Ohop Valley, where the mudflow dammed the valley to form Lake Kapowsin. Crandell further reports that the mudflow thins northward in the Puyallup Valley and is only about 9 feet thick at Alderton.

Distribution.--In central Pierce County the Osceola Mudflow underlies the plain adjacent to Buckley and extends down south Prairie Creek and Fennel Creek. Crandell and Waldron traced the mudflow to headwaters of the White and West Fork Rivers on Mount Rainier. The Electron Mudflow underlies broad areas of the Puyallup Valley floor from Electron to McMillin.

Water supply.--The permeability of the mudflows is unknown but is undoubtedly very low. Wells dug into these deposits are even less successful than wells tapping till. The Osceola Mudflow probably serves as a barrier to the direct recharge of potential shallow aquifers of gravel or sand which underlie the mudflow.

Peat

Character and thickness.--Some depressions and poorly drained areas are occupied by partly decayed organic material of varying thickness. Some of these deposits have been accumulating since glacial ice disappeared from the area.

Rigg and Gould (1957, p. 561) computed the average thickness of 151 peat deposits in the Puget Sound Lowland to be 24 feet. The greatest known thickness of peat in Pierce County, on the west side of Silver Lake, is more than 48 feet (Rigg, 1958, p. 140).

Distribution.--The peat deposits in central Pierce County commonly border or underlie swamps and lakes, but they also occur along the banks of rivers and streams. The largest deposits of peat are along Lacamas Creek and in the Stuck River valley. The total area covered by peat in central Pierce County is probably about 2,000 acres.

Extensive deposits of tidal muck occur at the mouths of the Puyallup and Nisqually Rivers; these are not shown on plate 1.

Water supply.--Peat is noted for its ability to absorb and retain water, but because of certain adverse conditions it is not used for water supply. Rigg (1958) found that the maximum water content of peat is 95.5 percent by weight. He also found that the peat deposits were acidic, and had a minimum pH of 3.1. The lowest pH was always near the top of the deposit. Although the pH increased with depth, deposits in central Pierce County, with one exception, were acidic throughout. Because iron is most soluble in acid water, these deposits may cause conditions which favor the presence of iron in ground water.

Alluvium and Recent marine sediments

Sediments of Recent age deposited by streams are called alluvium. Some of the material mapped as alluvium locally may be older than Recent, but because it lies in the flood plain of recent streams it could not be differentiated from alluvium. Some of the smaller stream valleys of central Pierce County contain alluvium of considerable thickness, but it is restricted practically to the streambed and has not been shown on plate 1.

Character and thickness.--The character of alluvium varies greatly with depth at a given locality, and also from one stream to another. Most of it consists of stratified silt, clay, muck, sand, and gravel. Generally, beds of a specific lithology are discontinuous.

In the valleys of the larger streams of central Pierce County, the upper part of the alluvium consists of silt, clay, and fine sand. Accumulations of decomposed vegetal material resembling peat or muck occur locally. The alluvium of the larger streams commonly contains a middle layer or zone of clay which rests on a basal gravel unit.

At the mouths of larger streams, the alluvium grades into marine deposits. Until the recession of the Vashon glacier the Puyallup River valley from Tacoma to about Sumner was an estuary of Puget Sound. Sediments transported by the Puyallup River were thus deposited under marine conditions in that reach of the valley. Most of the marine deposits are fine grained, locally contain abundant marine shells, and occur as a wedge-shaped mass thickening toward Commencement Bay. In the vicinity of Sumner the marine deposits possibly extend to a depth of more than 200 feet and at Commencement Bay to more than 500 feet below sea level. (See logs of wells 21/3-26N1, 20/3-3L1, 20/3-4J3, 21/3-36L1, 21/3-36T1, table 7.) Fine-grained sediments predominate to about 600 feet; however, not all these may be alluvial or marine, as some lacustrine deposition undoubtedly occurred during Vashon deglaciation.

Marine deposits may also be present in the Stuck River valley and in the Puyallup River valley upstream from Sumner, but the presence of shells in wells upstream beyond well 20/4-35D1 (pl. 2) has not been reported. Throughout most of the valleys the thickness of alluvium probably does not exceed 100 feet. Near the mouth of the Puyallup Valley and the Nisqually Valley the alluvium thickens and forms a delta in Puget Sound.

Distribution.--Alluvium is most abundant in the valleys of the Puyallup, Stuck, White, Nisqually, and Carbon Rivers. Less extensive deposits occur in the valleys of Ohop, Muck, and Chambers Creeks and in small upland depressions.

Water supply.--On the Thurston County side of the Nisqually Valley a few wells about 100 feet deep in coarse-grained deposits have specific capacities as great as 150 gpm per foot (Wallace and Molenaar, 1961, p. 71, 107). It is presumed that the same conditions exist on the Pierce County side of the valley.

In the upper part of the Puyallup Valley, beds of sand and gravel are fairly common at depth in the alluvium and will yield moderate supplies of water; they are probably too discontinuous to yield large supplies. In the tidal flats area somewhat higher yields may be obtained, but the water may be brackish.

GROUND WATER

OCCURRENCE OF GROUND WATER BY REGIONS

For the purpose of discussing the occurrence of ground water, the project area is divided into regions of roughly similar geologic and ground-water conditions. By taking into consideration the geologic units that are believed to underlie a region, the character of these units, where they are exposed or have been penetrated by wells, and the yield characteristics of existing wells in the area, it is possible to make usable generalizations as to the occurrence of ground water in specific regions. Local conditions, however, may result in significant and unforeseeable variations in the availability of water. The regions, designated by geographic features within them, are Fircrest-North Tacoma, lower Puyallup Valley, northeast Tacoma, Tacoma-Fort Lewis, Summit, southern, Puyallup-Stuck River valley, eastern, and foothills (fig. 9).

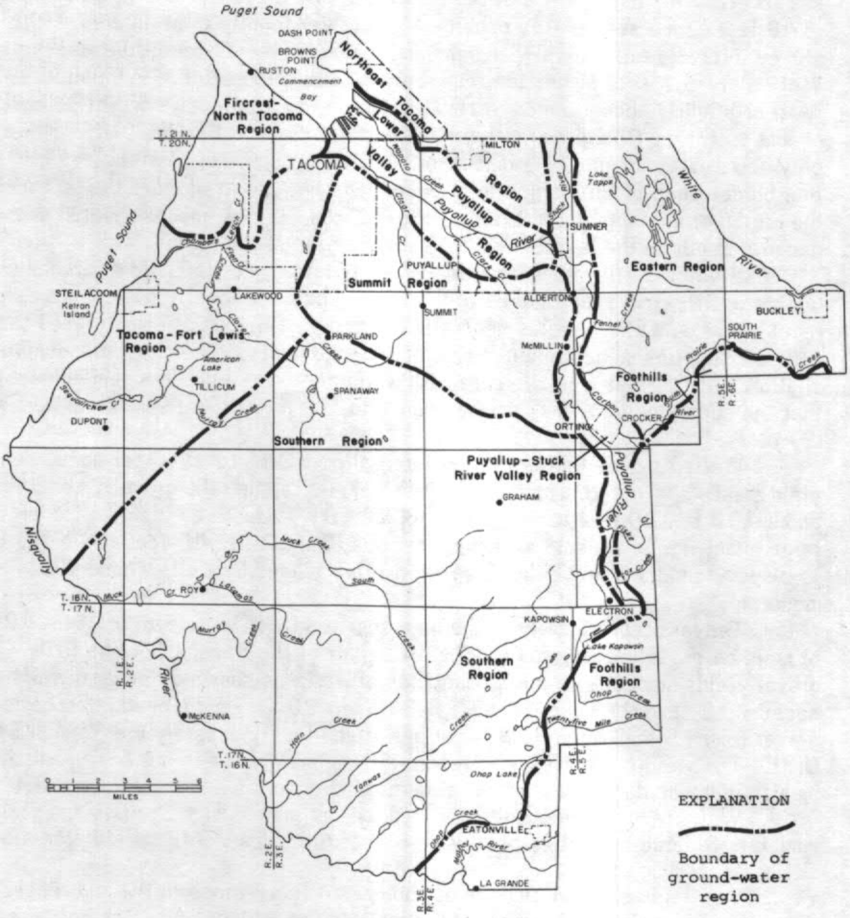

Figure 9.--Ground-water regions within the project area.

Fircrest-North Tacoma Region

The region north of Chambers Creek and west of the South Tacoma channel is referred to in this report as the Fircrest-North Tacoma region (fig. 9). For the most part, it is mantled with till of Vashon age, which contains or is overlain locally by thin sand and gravel deposits. Fairly extensive deposits of Vashon recessional outwash occur near the margins in the northern part of the region.

Vashon advance gravel and Colvos Sand, consisting of sand, gravel, and a minor amount of clay, occur from 240 to 190 feet above sea level. A gravel zone that may be a part of the Colvos Sand appears to exist from 190 to 120 feet above sea level. Well logs show that the amount of clay present in the interval from 120 to 40 feet above sea level is considerably greater than in other intervals; this clayey interval, although higher than most sea-cliff exposures of the fine-grained section of the Kitsap Formation, may belong to that formation. From about sea level or slightly above to more than 100 feet below sea level a gravelly sequence occurs locally. This gravel may be a part of the Salmon Springs Drift. However, only one small exposure of Salmon Springs Drift was observed in the sea cliffs that border much of this region (pl. 1) and it is not known whether the unit underlies the region of an appreciable extent. Pre-Salmon Springs unconsolidated deposits occur at depth on the northern and western margins of the region.

Shallow wells, such as well 20/2-10K1, yield water from perched water bodies in till, from sandy facies of the till, or from the locally overlying Vashon recessional outwash. Yields generally are small, although at some places the outwash supplies moderate quantities of water to wells. The chief disadvantage of shallow wells, aside from the ease with which they could become contaminated, is that the supply of water may not be enough to last through the summer of particularly dry years.

Wells tapping aquifers in the interval from 240 to 190 feet above sea level yield small to moderate amounts of water. Wells tapping the gravelly zone from about 190 to 120 feet above sea level are very productive, yielding moderate to large quantities of water. Although the zone from 120 to 40 feet above sea level is clayey, sand and gravel bodies within it are tapped by wells whose yields are moderate.

Gravel occurs locally in the unit from sea level to a depth of about 100 feet or more below sea level, and may be all or part of the Salmon Springs Drift. This gravel yields moderate to large quantities of water as shown by several wells in secs. 7, 8, and 9, T. 20 N., R. 3 E. Well 20/2-15M1 penetrated cemented gravel from 75 feet above to 30 feet below sea level, possibly the Salmon Springs Drift. The yield of the well was reported to be small, but is not known whether the small yield was due to faulty well construction or to the nature of the aquifer.

Wells tapping unconsolidated deposits of pre-Salmon Springs age yield moderate to large quantities of water; some of them flow. All are situated along the shore, or near sea level.

Aquifers above an altitude of about 240 feet--those in till and recessional outwash--are recharged by precipitation within the region. Aquifers below 240 feet are recharged by water that moves laterally into the region from the south, by precipitation within the region, and to a small extent by vertical percolation from the overlying shallow aquifers. The permeability of the separating till, though slight is still significant.

Several springs or groups of springs discharge on the margins of the region. Most commonly, springs occur where Colvos Sand, Vashon advance, or Vashon recessional gravel is underlain by impermeable clay beds, and where these deposits are truncated by sea cliffs or outwash channels. The two largest springs are Mason Gulch Spring (table 6)--used by Tacoma until about 1930--and an unnamed spring about half a mile southeast of Mason Gulch Spring. These two, discharging from sand and gravel underlain by clay, constitute the principal points of natural ground-water discharge for the northern part of the region. Many small springs, such as 20/2-11K1s and -14A1s, occur south of Fircrest. The total known discharge of ground water from the region by springs is about 3,000 to 4,000 gpm--about 5,000 to 6,500 acre-feet per year. There may be submarine springs on the floor of Puget Sound, but if so, their location and yield are unknown.

Lower Puyallup Valley Region

The lower Puyallup Valley region not only includes the lowland adjacent to Commencement Bay but extends up the Puyallup River valley to the vicinity of Sumner.

The surface of the lower Puyallup Valley is underlain by Recent alluvium ranging in aggregate thickness from a few feet to about 100 feet. The upper 20 to 30 feet of alluvium is mostly silt, muck, and fine sand, and, locally, gravel. Underlying this rather heterogeneous assortment of materials at many places is a clay stratum 20 to 30 feet thick. This stratum rests on a basal gravel, at places fairly sandy, which in turn overlies marine deposits of which at least the upper part also is of Recent age. Except for local sand and gravel lenses, the marine deposits are generally very fine grained. These continue to depth of as much as 500 feet below land surface.

Underlying the marine beds are alternating layers of fine- and coarse-grained materials, which may represent the sequence of glacial and nonglacial sediments exposed elsewhere in the project area. However, none were correlated with the mapped geologic units of central Pierce County. These materials extend to depths greater than 1,200 feet (wells 21/3-27J1 and 20/3-4H2). The depth to bedrock is unknown. A part of this material may be of Tertiary age but no criterion was found by which Pleistocene deposits could be distinguished from unconsolidated Tertiary deposits in well logs.

The uppermost gravel that occurs locally in the Recent alluvium is above the water table at most places and is not an important source of water. The basal gravel atop the marine deposits yields as much as 150 gpm to wells. The marine deposits are too fine grained to yield more than small amounts of water. However, a few wells (20/3-11C1, 21/3-26N1, and 21/3-36L1) penetrate sand and gravel lenses in these deposits. Their yields are substantial. As a result of their fine-grained nature, the marine deposits act as confining beds. Wells tapping the thick sequence of alternating fine- and coarse-grained materials that underlie the marine deposits yield as much as 2,400 gpm (well 20/4-24F3, for example); yields of about 1,000 gpm are common. Specific capacities of as much as 300 gpm per foot of drawdown have been reported; the average is probably about 25 gpm. Levels in most wells tapping this sequence are higher than those in wells that tap the basal gravel of the alluvium. Levels in some are above the land surface, and of these a few (wells 20/3-4H2 and 21/3-36Q1 for example) flow at a rate of several hundred gallons a minute.

Some encroachment of sea water into the aquifers of the lower part of the region has occurred, but the situation is not likely to become critical unless large-scale development and continuous heavy pumping is carried on in the area within a mile of Commencement Bay. As of 1961, there was sufficient hydrostatic head in most aquifers underlying the tidal flat near Commencement Bay to prevent significant encroachment. A continuous water-stage recorder was maintained on unused well 20/3-4G1 from August 26, 1960, to April 27, 1961. During this time the range of fluctuation was from 2.8 feet below to 9.9 feet above the land surface. The land surface at this well is about 25 feet above mean sea level. Most of the fluctuation in water level was probably due to tides, but some was due to pumping of nearby wells. A water sample taken from well 20/3-4G1 on October 31, 1960, contained only 3 ppm of chloride (table 9).

Shallow aquifers in the lower Puyallup River valley region are recharged principally by local precipitation. Deep aquifers are recharged by water that moves laterally into the area. Few springs are known in this region, but some ground water is no doubt discharged into the Puyallup River.

Northeast Tacoma Region

The northeast Tacoma region is the southern part of an elongate upland that extends about 24 miles northward to the vicinity of Seattle. The northern border of the northeast Tacoma region is the Pierce-King County line, which is also the project boundary. The region ranges in altitude from sea level to about 520 feet. Its west side lies along the deep (600 feet below sea level) channel of Puget Sound, and its south and east sides border, respectively, the Puyallup and Stuck River valleys. Many homes have been built in this region and it is an important area for future residential development. The region is separated by the canyon of Hylebos Creek into east and west sections.

Much of the region is mantled by till. Local bodies of recessional outwash rest on the till, especially along the western edge. Locally, the Salmon Springs Drift is exposed at land surface. At the south margin of the section east of Hylebos Creek extensive deltaic deposits of advance outwash gravel are exposed. This deltaic facies apparently extends northward less than a mile.

In the west section of the region, the till mantle is underlain by a deposit of Vashon advance gravel that is about 70 feet thick. A thick clay stratum underlies the Vashon advance in the Dash Point area; its lateral extent is not known. Elsewhere in the west section the Vashon advance gravel is underlain by an unusually thick section of Salmon Springs Drift, which extends below sea level. It consists of permeable gravel and sand. The nature of the strata below the base of the Salmon Springs Drift in this section is not known.

In the east section of the region, till and recessional and deltaic gravel are underlain by the Salmon Springs Drift. In this section, the Salmon Springs appears to consist of less gravel and sand and more fine material than in the west section. As in that section, the nature of the pre-Salmon Springs deposits is not known.

The west section is served by the Caledonia Water Company, the Hyada Mutual Water Company, the Dash Point Cooperative Water Association, and the City of Tacoma. The wells of the Dash Point Cooperative Water Association tap perched water in the Vashon advance gravel and yield moderate amounts of water. It is unlikely that much water can be developed from advance gravel at other places in the northeast Tacoma region. The underlying clay that acts as a perching bed in the Dash Point area is not continuous, and much of the water that percolates through the overlying till normally is not retained but ultimately finds its way to the Salmon Springs deposits, or is lost to the formation through lateral movement to the periphery of the region. The wells of the Caledonia and Hyada Mutual Companies tap permeable zones in the Salmon Springs and yield moderate amounts of water.

The east section of the northeast Tacoma region is supplied with water by the Mountain View-Edgewood Water District and by the town of Milton. There has been little ground-water development by other than these two agencies. The recessional gravel in the easternmost part of the section is largely devoid of water because of lateral drainage to the valley farther east. The deltaic deposits along the south margin, also partly drained, yield moderate to large quantities of water where saturated. Wells 20/4-5Q1-6 and 20/4-15N1-3, on the margin of the upland, tap these deposits and have specific capacities as high as 180 gpm per foot of drawdown.

Wells in the east section that tap the Salmon Springs Drift yield only small amounts of water; the specific capacities of the several wells for which information is available are only 1 to 2 gpm per foot.

Aquifers higher than about 50 feet above sea level are recharged entirely by precipitation within the region or by lateral migration of water from the area immediately to the north. Lower aquifers are in contact with the materials that underlie the Puyallup and Stuck River valleys, and may be recharged by water migrating from them.

At the west side of the region, at Browns Point, the water table is near sea level. Caution must be used in pumping to prevent encroachment of salt water. Well 21/3-16N1 is readily contaminated when pumped, and well 21/3-16N2 penetrated zones containing contaminated water when drilled (Kimmel, 1963).

Some springs discharge along the southern margin of the upland near the Hylebos Waterway where the water table intersects the bluff. Large quantities of water may be discharged into Puget Sound by submarine springs, but if springs are present their locations are unknown.

Tacoma-Fort Lewis Region

The Tacoma-Fort Lewis region includes much of Tacoma and the area immediately southwest of the city. This region has large supplies of ground water, though it is bounded by regions whose aquifers produce relatively small supplies--the Fircrest-North Tacoma region on the north and the Summit and southern regions on the east and south.

A large part of the region is mantled by Steilacoom Gravel; locally, Vashon recessional gravel is at the surface. Vashon till, usually 20 to 30 feet thick, underlies the Steilacoom Gravel in most places. In that part of the region where the Steilacoom Gravel or Vashon recessional gravel is absent, Vashon till is exposed at the surface. Colvos Sand and Salmon Springs Drift underlie the region at about sea level.

Shallow wells in the Tacoma-Fort Lewis region tap Vashon recessional gravel or Steilacoom Gravel. In most places these gravel units are too thin to be important aquifers, but locally, large yields can be obtained from them. The permeability of the sand and gravel beneath the Vashon deposits varies from place to place and at a few places is so high that large yields are possible. Wells drilled to depths near sea level tap water-bearing zones probably in the Colvos Sand and Salmon Springs Drift, but in many cases the formation in which the water-bearing zone occurs cannot be distinguished. In the area of South Tacoma, the Water Division of the Tacoma Department of Public Utilities has drilled 34 wells, 13 of which were in use in 1963. Their yields range from 920 gpm (well 20/3-30L5) to 9,350 gpm (well 20/2-13J1). The well field is thought to obtain water from the Salmon Springs Drift, but the high yields are not typical of this formation. They may be the result of a fortuitous combination of the deposition of permeable materials and a lack of weathering. This combination is peculiar to the area in which the wells occur.

Most of the Tacoma-Fort Lewis region is underlain, below sea level, by extensive and thick deposits of fine-grained material containing relatively thin beds of gravel and sand, which yield large supplies of water at some places. Scattered water-bearing zones from which large yields have been obtained are reported to occur as deep as 1,090 feet below sea level (well 20/2-32B1). The deepest well, 19/2-22N1, extends 1,981 feet below sea level, but in the lowermost 1,765 feet it penetrated principally clay. The lateral extent of this clay sequence is unknown because of the scarcity of deep wells in the upland outside the region. In Pierce County, the channels of Puget Sound have been cut since Salmon Springs time. Near Browns Point the Sound is about 600 feet deep. If other channels were similarly cut and filled by alluvium in post-Salmon Springs episodes, then it is possible that the clay section is dissected and intermittent.

In this region, the nonuniform character of the Vashon deposits creates a marked difference in recharge characteristics. The till has been eroded in places, permitting more rapid recharge in some parts of this region than in the other regions that are more uniformly till mantled. In addition, the highly permeable Steilacoom Gravel overlying the till locally permits maximum infiltration of precipitation.

Natural discharge of ground water occurs through springs, many of which are along the margin of the upland adjacent to Puget Sound (pl. 2); others are scattered over the upland. Many springs discharge in an elongate belt along a cliff or into a swampy area at the base of a cliff, and for this reason it is difficult to estimate the total discharge. The flow of many other springs has been estimated, and the flow of a few (for example, 19/1-22G1s and 20/2-36E1s) is known with fair accuracy. The total discharge by all springs in this region is estimated to be 42,000 gpm or 68,000 acre-feet per year. This estimate is probably low because some water undoubtedly escapes directly into Puget Sound through submarine springs.

Summit Region

The Summit region is east and northeast of the Tacoma-Fort Lewis region and the southern region. It is separated from them by arbitrary lines that are based on differences in the availability of water. The northern and eastern boundary is the edge of the Puyallup Valley.

In this region, adequate ground-water supplies occur at a greater depth and are more difficult to find than elsewhere in the north half of the project area. The region is underlain by till of Vashon age, which may be as much as 200 feet thick, and well drillers have reported several hundred feet of non-water-bearing cemented gravel and sand below the till in much of the region. Vashon advance gravel underlies the till in the north part of the region, but is saturated only in the area south of Puyallup.

Shallow bodies of ground water, perched by till of Vashon age, are found near the land surface. Water in wells tapping these perched bodies is subject to contamination and to depletion in dry years, and is generally unsatisfactory as a dependable domestic supply. Perched ground-water bodies may be responsible for the "blowing and sucking" of air by some of the deeper wells in the area. This phenomenon can be caused by any of several different conditions, but it often occurs when a well penetrates and is open to permeable but unsaturated deposits that are capped by tight, impermeable materials. The tight material, in this case till of Vashon age, prevents air trapped in the permeable deposits from attaining equilibrium with atmospheric air during changes in barometric pressure. Thus, air trapped in the voids of the permeable deposit undergoes compression or expansion during changes of atmospheric pressure. The well acts as a tube through which the unbalanced pressure can be adjusted and the air is sucked in or blown out.

The upper limit of the deeper water-bearing materials is at an altitude of about 250 feet above sea level on the west side of the region and as high as about 300 feet in the middle part. It is about 200 feet above sea level in the east part of the region. However, many wells have been drilled below this upper limit without finding enough water for domestic use, and some of the deep wells are reported to yield only 7 or 8 gpm. The best aquifer seems to be in the central part of the region. One well in this area, 19/4-6L1, is reported to have a specific capacity of 975 gpm per foot of drawdown.

Few of the wells extend below sea level, and consequently little is known of the deposits at depth. Well 20/4-34G1, reported to have a specific capacity of 4.2 gpm per foot of drawdown, was drilled to a depth of 424 feet below sea level. It taps an aquifer consisting of sand and gravel, thought to be of Tertiary age, from 400 to 424 feet below sea level. This aquifer may have greater textural uniformity and lateral extent than most Pleistocene deposits.

An average of 16,500 gpm, 26,500 acre-feet per year, is estimated to discharge from springs in the bluff at the north edge of the region. Many of the springs discharge from Vashon advance gravel, which in this region overlies the Salmon Springs Drift. Maplewood Springs (20/4-32J1s, pl. 2), the largest springs in central Pierce County, are reported to discharge 12,500 gpm.

Southern Region

The southern region, the largest subdivision of central Pierce County (fig. 9), lies south of the Tacoma-Fort Lewis and Summit regions, and is bounded on the south and east by the Nisqually, Ohop, and Puyallup Valleys.

Vashon recessional gravel or Steilacoom Gravel mantles large areas within this region. These gravel units are underlain by till of Vashon age, which is underlain locally by Vashon advance gravel. In the southern part of the region, Vashon deposits rest on the Mashel Formation.

In most of the southern region there has been very little development of ground water. Nearly all the wells are used for domestic supply and the demand is small. Most supplies are obtained from shallow wells, and the potential yield of deep wells in most of the region is unknown.

Perched water occurs in or above till of Vashon age south of Graham in secs. 21, 22, 27, 28, T. 18 N., R. 4 E. The perched water is in a belt several miles wide which extends from Graham to South Creek and borders the Muck Creek channel. Many wells tapping the perched water body in this belt are adequate for domestic supply.

Of the wells that penetrate Vashon deposits, the most productive generally tap advance sand and gravel. Few of them are more than 100 feet deep. Most range in yield from 10 to 50 gpm, but the unit is thought to be capable of greater yields. Up to 400 gpm is obtained from many of the wells tapping Vashon deposits in the 100- to 200-foot range. In T. 17 N., R. 2 E., several flowing wells probably tap advance gravel.

In the southern part of the region, from T. 16 N., R. 3 E., to T. 17 N., R. 4 E., many wells tap only the Mashel Formation. Where it is saturated this formation provides adequate water for domestic and irrigation use. Near Tanwax and Rapjohn Lakes flowing wells are believed to tap the Mashel Formation.

Relatively few springs occur in this region. Most are small, discharging only 5 to 10 gpm; many are dry in the summer and fall. Total flow from springs is estimated at 1,900 gpm, or 3,100 acre-feet per year; however, some of this discharge probably returns to the ground-water body.

Puyallup-Stuck River Valley Region

The Puyallup-Stuck River valley region includes nearly all the major alluvial valleys of the project area in which there has been significant development of ground water. There has been no development of ground water in the Carbon River valley east of Orting, in the White River valley, or in the Nisqually River valley in Pierce County, and very little in the Ohop Valley. The occurrence of ground water in the lower reach of the Puyallup Valley--below Sumner--has been discussed earlier.

Individual beds in alluvial deposits are discontinuous and most cannot be correlated from one well to another. However, in the Stuck River valley and the northern part of the Puyallup Valley, the principal water-bearing zone is coarse gravel and sand about 80 to 150 feet below the land surface. A second water-bearing zone occurs in the Puyallup-Sumner area at a depth of about 400 feet, but the upvalley extent of this aquifer is unknown.

Ground-water development is moderately intensive in the Stuck River valley and in the Puyallup River valley north of Alderton. Wells range in depth from about 20 to more than 550 feet, and average about 175 feet. Most of the wells that are more than 150 feet deep flow; the average depth to water, however, is about 5 feet. Yields of wells in this part of the valley range from a few gallons per minute to as much as 2,400 gpm, and average about 285 gpm. The average specific capacity of all the wells in this part of the valley for which data are available is about 50 gpm per foot of drawdown. The average specific capacity of wells that are less than 100 feet deep is about 35 gpm per foot of drawdown.

In the Puyallup River valley between Alderton and a point about 1 mile south of Orting--where the Carbon River enters the Puyallup River valley--wells average about 105 feet in depth. The average depth to water is about 11 feet. Only one flowing well is reported in this reach of the valley; this well, 19/4-25G1, is near the west valley wall and may tap pre-Vashon deposits that underlie the valley fill. Yields of wells range from about 10 to almost 500 gpm, and average about 140 gpm. The specific capacities of these wells average about 20 gpm per foot of drawdown. Well logs (table 7) indicate that this part of the valley is underlain by as much as 80 feet of clay, sand, and boulders, at least 30 feet of which may be Electron Mudflow deposits. In the aggregate, these deposits produce only small amounts of water. Nearly all deep wells penetrate gravel about 80 feet below the surface. The thickness of this gravel is not known because most wells extend into it only far enough to produce the required supplies.

The Puyallup River valley becomes very narrow about 1 mile south of Orting, and there is very little development of ground water in the valley south of that point. Most of the wells there range from 50 to 80 feet in depth, and many yield about 125 gpm. The principal aquifer in the narrow part of the valley is a gravel bed about 40 to 70 feet below the surface, probably just below the Electron mudflow. Specific capacities of the wells for which data are available average about 7 gpm per foot of drawdown.

Eastern Region

The eastern region includes the part of central Pierce County east of the Puyallup and Stuck River valleys, and north of Township 18 North. The valleys of the Carbon River, White River, Fennel Creek, and South Prairie Creek are included in this region, but only in the valley of South Prairie Creek has there been significant ground-water development.

Most of the region is mantled by till of Vashon age and by the Osceola Mudflow. Except locally, wells in the upland areas must be drilled through these materials into underlying deposits if more than a few gallons per minute is required. Most of the wells that range in depth from a few feet to about 100 feet are capable of yielding only 10 gpm, or less. In the area north of Fennel Creek, wells 100 to 400 feet deep tap Salmon Springs Drift or older Pleistocene deposits and yield as much as 200 gpm.

In the walls of the Puyallup River valley south of Fennel Creek, Vashon recessional gravel rests upon Orting Drift. Considerable difficulty in obtaining ground-water supplies in the area south of Fennel Creek has been reported, and it is likely that the Orting Drift and, possibly, Miocene unconsolidated deposits are the only aquifers that underlie the Vashon deposits in this area.

In the valley of South Prairie Creek, wells range in depth from a few feet to more than 70 feet. Yields chiefly from gravel of Vashon and Recent age range from a few gallons to as much as 100 gpm. South of South Prairie Creek there has been very little development of ground water. Consolidated bedrock (pl. 1) crops out in this area and only small supplies of ground water probably could be developed.

Several large springs and groups of springs discharge on the margin of the uplands. The most notable of these are Salmon Springs about 1 mile northeast of Sumner. These springs, which are used for municipal water supply, discharge at the top of Salmon Springs Drift. Several smaller springs in the eastern region discharge from gravel in the Vashon Drift or from the Orting Drift. The total spring discharge in this region is about 7,000 gpm (11,300 acre-feet per year).

Foothills Region

The foothills region is a long, narrow, north-trending strip along the east margin of the central Pierce County project area. It lies east of Ohop Valley in the southern part of the project area, and east of the Puyallup River valley and south of South Prairie Creek in the east-central part of the project area.

There has been very little development of ground water in this region, except near Eatonville. Bedrock is widely exposed or is near the surface, and only meager ground-water supplies are available. Extensive gravel deposits--principally Vashon recessional stratified drift--occur on the west margin of the foothills region. Because they occur in areas of intensive dissection, these gravel deposits are generally well drained and only the lower part yields water to wells. Locally, along the west margin of the region, the Mashel Formation is probably capable of yielding small to moderate quantities of water to drilled wells. In much of T. 17 N., the Lily Creek Formation prevents the downward percolation of water, and a perched ground-water body exists in the overlying materials. No wells are known in this area, but dug wells probably would produce enough water for domestic use.

There are many springs in the foothills region, most of which are at the contact of the Mashel Formation and the overlying gravel along the walls of Ohop, Nisqually, and Mashel River valleys. Many of these springs discharge only a few gallons per minute. The total discharge of the known springs in the area probably does not exceed 3,000 gpm or 4,800 acre-feet per year.

USE OF GROUND WATER

During this investigation, data on 1,508 wells and 128 springs in Pierce County were obtained (tables 5, 6). Most of the wells were constructed for domestic and stock supply, but the greatest use of ground water in the project area is for public supply.

Public Supplies

Table 3 contains data on 39 public-supply systems, which supply water to an estimated population of 307,000. Of these systems, 35 use ground water exclusively, 1 uses both surface water and ground water, and 3 use only surface water.

The population figures given in table 3 are from the 1960 census, or were estimated on the basis of 3.3 persons per service connection. In those cases where accurate figures on water use were not available, the usage was calculated on the basis of 10,000 gallons per month per service connection.

Except at Tacoma, where 65 to 70 percent of the city's public supply is used by industry, virtually all the water furnished by public-supply agencies in central Pierce County is used for domestic purposes.

About 43,000 acre-feet of ground water and 57,000 acre-feet of surface water are used annually in central Pierce County for public supply. The greatest development of ground water for public supply is in the South Tacoma-Fort Lewis region, where about 32,500 acre-feet is pumped annually from an area of a little less than 90 square miles.

Table 3.--Public water supplies

Organization or community served	Population served 1/	Source of supply: Ground water	Source of supply: Surface water	Average yearly use (millions of gallons) 2/	Remarks
Alderton-McMillin	625*	2 springs	--	103*	
Bonney Lake Water Co.	1,200	1 spring, 3 wells	--	22*	
Buckley	2,000*	--	S. Prairie Creek	73*	
Caledonia Water Co.	400*	2 wells	--	17*	
Crystal Springs Water Co.	825*	1 spring	--	54*	Serves rural area near Sumner.
Dash Point	700*	6 wells	--	20.1	
Day Island	440*	2 wells	--	7.1*	
Dupont	350	2 wells	--	25*	
Eatonville	900	--	Mashel River	135	
Elhi Water Co.	325*	1 spring	--	22*	Do.
Fife	100*	1 well	--	8.6	
Fircrest	3,500	3 wells	--	375	
Firgrove Mutual Water Dist.	335	2 wells	--	15	
Fort Lewis	35,000	9 wells	1 spring	2,397.7	Minimum monthly use 2,232,000 gallons.
Fruitland Mutual Water Co.	1,700*	2 wells	--	42	Maximum monthly use 6,480,000 gallons.
Graham Hill Mutual Water Co.	40*	1 well	--	.8*	
Hyada Mutual Water Co.	660*	3 wells	--	24*	
Kapowsin	100*	1 spring	--	1.8*	
Lake Tapps Water Co.	500*	1 well	--	30*	

Table 3.--Public water supplies.--Continued

Organization or community served	Population served 1/	Source of supply: Ground water	Source of supply: Surface water	Average yearly use (millions of gallons 2/	Remarks
Lakewood	35,000	18 wells	--	1,395	Maximum daily use approximately 30,000,000 gallons.
Marion Water Dist.	375*	1 well	--	24	Serves rural area.
McChord Field	6,000	6 wells	--	516.2	Maximum daily use 85,836,000 gallons. Minimum daily use 2,605,000 gallons.
McKenna	220*	1 well	--	3.5*	
Milton	2,200	3 wells	--	143	Maximum daily use approximately 865,000 gallons.
Mountain View-Edgewood Water Dist.	3,000	3 wells	--	96.6	
Orting	1,500	1 well, 2 springs	--	46*	
Parkland Light & Water Co.	6,000	6 wells, 1 spring	--	349	
Puyallup	11,850	2 springs	--	610*	Maximum daily use about 2,400,000 gallons.
Rainier State School	2,375	1 well	S. Prairie Creek	110	1 well used for emergency supply. About 825,000 gallons total yearly use is for irrigation.
South Prairie	200	1 well	--	11	
Southeast Tacoma Mutual Water Co.	3,250	5 wells	--	178	Maximum daily use about 1,200,000 gallons.

Spanaway	400*	2 wells	--	6.5*	
Steilacoom	1,800	3 wells	--	97.5	
Summit Water & Supply Co.	3,000*	4 wells	--	50*	
Sumner	3,150	1 spring	--	130	Maximum daily use approximately 1,500,000 gallons.
Sunset Beach	100	1 well	--	1.6*	
Tacoma	165,000	13 wells	Green River	25,000	Wells used as supplemental supply. About 6.75 million gallons of ground water used in 1961.
University Place	8,000*	7 wells	--	170*	
Western State Hospital	3,900	2 wells	--	265.5	Springs used as supplemental supply for irrigation.

1/ Estimated values are indicated by "*".

2/ Based largely on figures for 1960, 1961, and 1962.

Industrial Supplies

Industrial use of ground water in central Pierce County is second only to public-supply use. In addition to those firms that are supplied by the City of Tacoma--about 65 to 70 percent of the city's demand is industrial--many firms have their own wells. In 1960, 27 major industries withdrew about 23,600 acre-feet from wells. Table 5 lists numerous industrial wells whose production is not included in the 23,600 acre-feet mentioned above, because the total production from them is not significant.

Irrigation Supplies

Irrigation of farmlands in central Pierce County is limited, for the most part, to the major valleys and to small upland areas where the soil is especially suited to farming. Irrigation is usually necessary only in June, July, and August, and application of 1 to 2 feet of water will greatly increase the yield of most vegetables, berries, nursery stock, and pasture.

As of 1962, according to records of the Washington State Department of Conservation, Division of Water Resources, 167 water rights had been issued for about 6,000 acre-feet of ground water for irrigation of about 3,100 acres in central Pierce County. In addition to this acreage, lawns, gardens, and parks are irrigated from municipal or domestic supplies. Yields of irrigation wells range from about 5 to 700 gpm, and average about 160 gpm. In central Pierce County, the average yield of irrigation wells per irrigated acre is about 10.6 gpm.

Domestic and Livestock Supplies

About 20,000 inhabitants are supplied with water from individual systems. Nearly all the private supplies in central Pierce County are from wells or springs. If the per capita demand is 100 gpd (gallons per day), as determined from public-supply figures, about 2,300 acre-feet of water per year is used for domestic purposes from private-supply systems. It is estimated that an additional 700 acre-feet of water from private-supply systems is used each year for watering livestock.

FLUCTUATIONS OF WATER LEVEL

Water levels in wells in central Pierce County fluctuate in response to seasonal recharge and discharge, tide fluctuations in Puget Sound, and pumping of nearby wells. Water-level observation in wells of the Tacoma area were made in the periods 1907-08, 1925-31, 1934, and 1937 to present, by the Water Division, City of Tacoma. In 1937 the Geological Survey began measuring water levels in wells of the City of Tacoma and since then has expanded the measurement program to cover a large part of central Pierce County. Figures 10 through 15 are hydrographs compiled from the water-level measurements made by the Geological Survey and the Tacoma Water Division from 1941 through 1961. Earlier records are available in Water-Supply Paper 990 (Meinzer and Wenzel, 1946, p. 173-232).

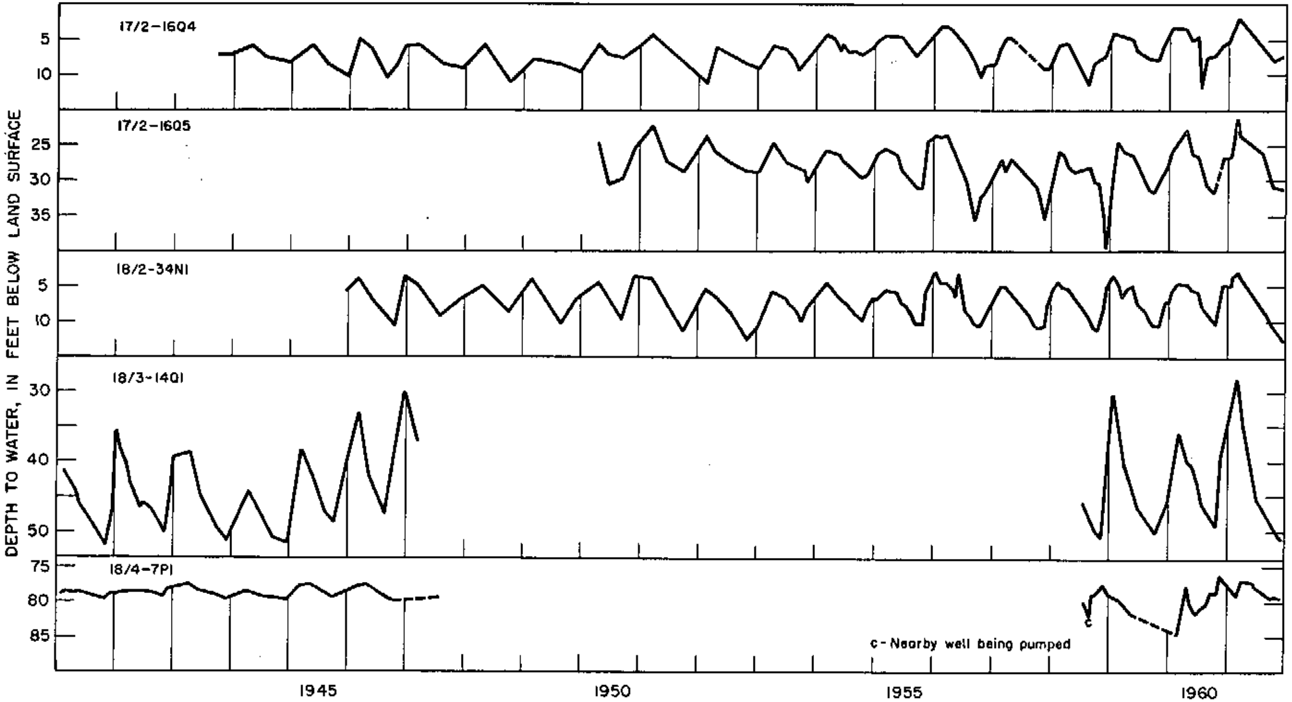

Figure 10.--Hydrographs of wells 17/2-16Q4, 17/2-16Q5, 18/2-34N1, 18/3-14Q1 and 18/4-7P1.

Water-level measurements by the Geological Survey have been made at intervals varying from weekly to trimonthly. Some wells have been equipped with continuous water-stage recording instruments. Others are measured infrequently; their hydrographs are intended to show long-range trends in areas where it is not necessary to determine the magnitude of short-term or seasonal fluctuations.

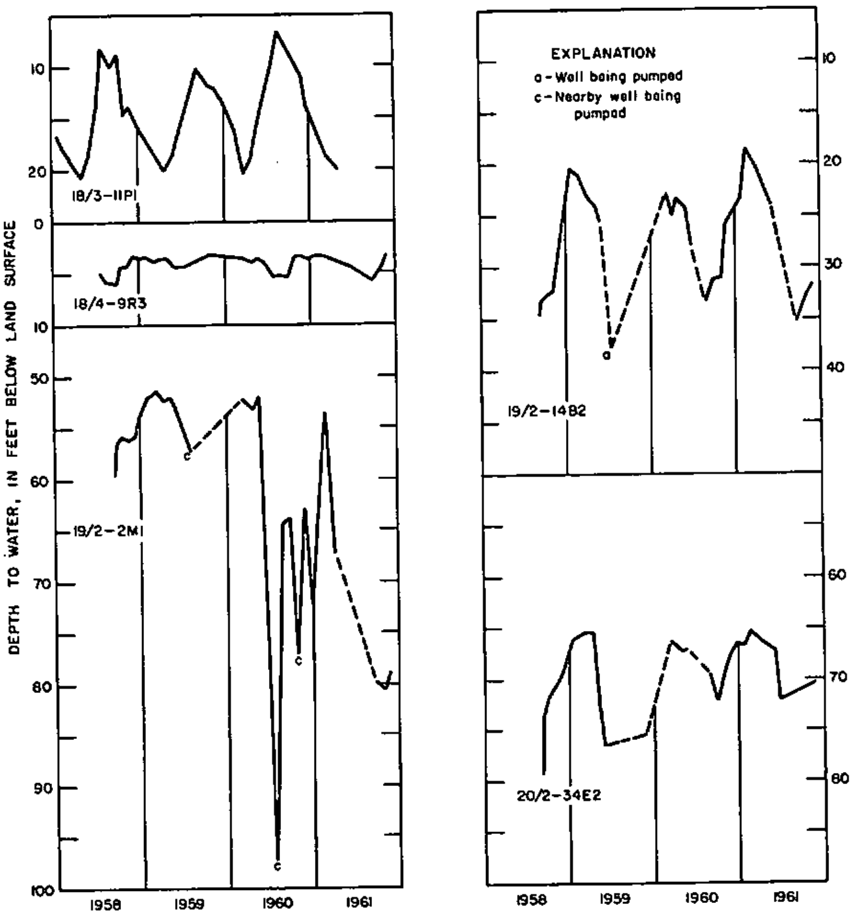

Figure 11.--Hydrographs of wells 18/3-11P1, 18/4-9R3, 19/2-2M1, 19/2-14B2, and 20/2-34E2.

Fluctuations Caused by Recharge

Seasonal ground-water-level fluctuations of a widespread nature usually are indicative of changes in ground-water storage. A rise in water level indicates

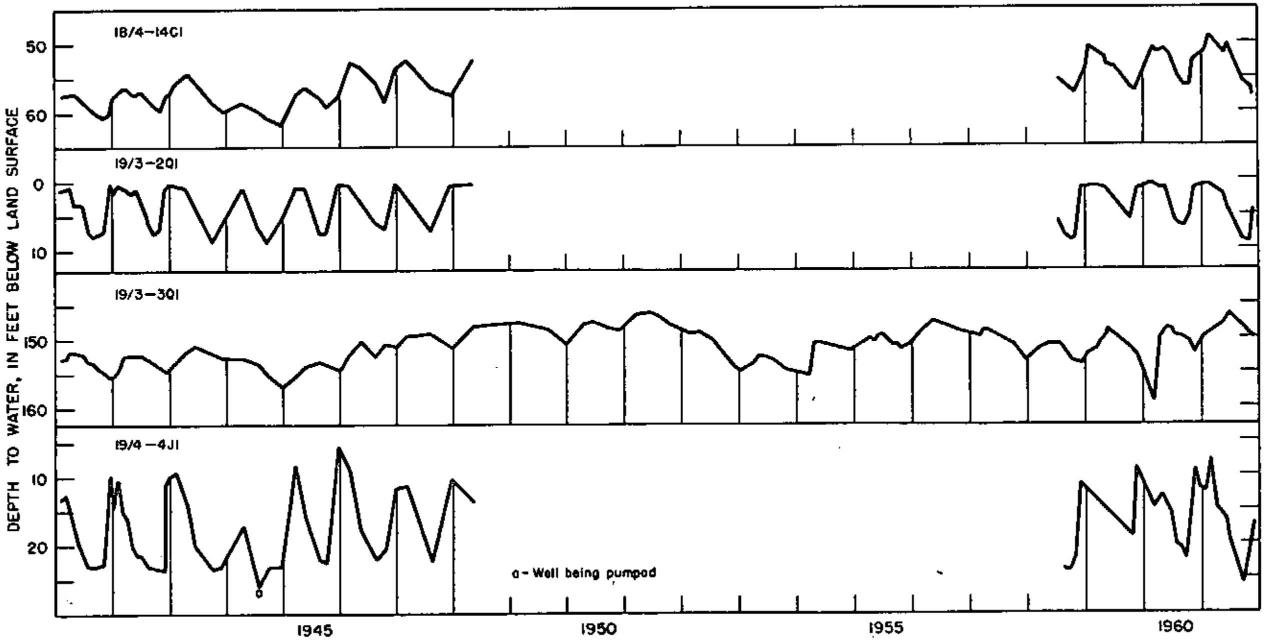

Figure 12.--Hydrographs of wells 18/4-14C1, 19/3-2Q1, 19/3-3Q1, and 19/4-4J1.

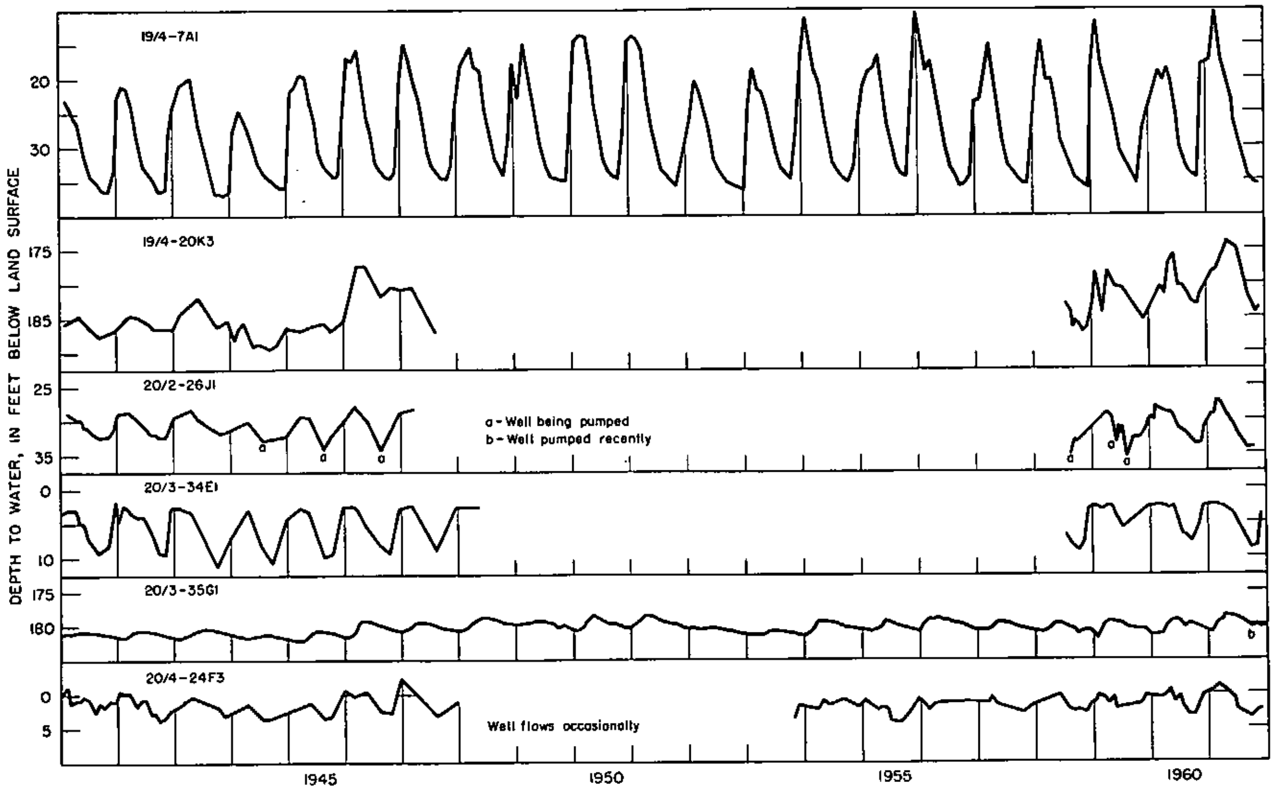

Figure 13.--Hydrographs of wells 19/4-7A1, 19/4-20K3, 20/2-26J1, 20/3-34E1, 20/3-35G1, and 20/4-24F3.

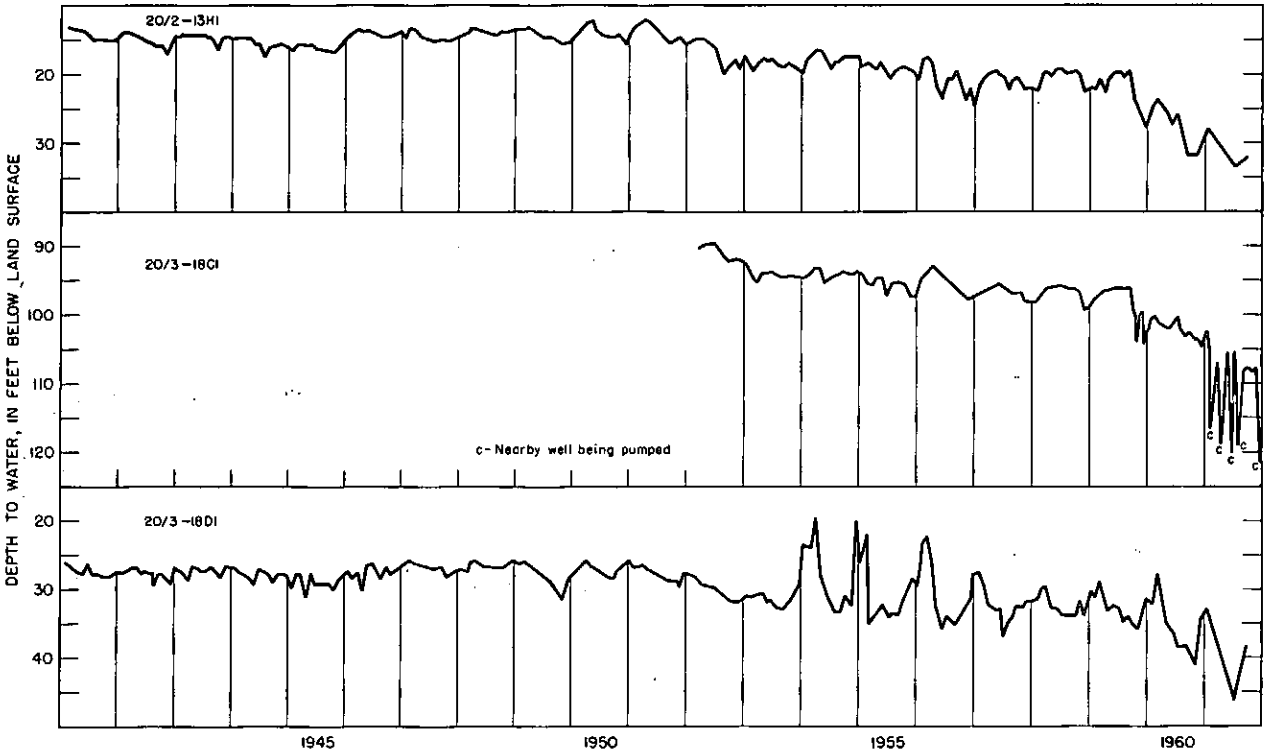

Figure 14.--Hydrographs of wells 20/2-13H1, 20/3-18C1, and 20/3-18D1.

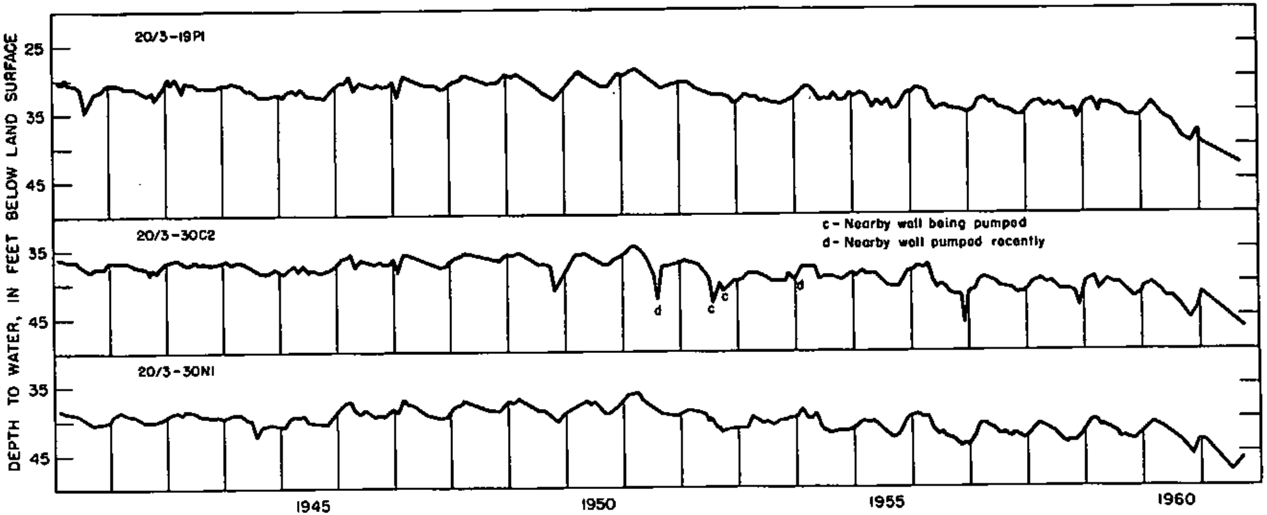

Figure 15.--Hydrographs of wells 20/3-19P1, 20/3-30C2, and 20/3-30N1.

that recharge exceeds discharge; a decline in water level indicates that discharge exceeds recharge. Annual rises of the water level beneath the upland south of Tacoma occur as the result of direct recharge from precipitation on the upland surface (Piper and LaRocque, 1938, p. 98; Robinson and Piper, (1946?) written communication; Griffin and others, 1962, p. 8-17). Direct recharge to the other upland areas in central Pierce County also occurs by precipitation on them. This is inferred from the nature of fluctuations of water levels in those areas, the nature of the geologic formations underlying them, and the lack of other available sources of recharge.

In central Pierce County, most of the precipitation falls in the period from October through May; the remaining part of the year being comparatively dry. In response to this seasonal variation, the water levels in some wells begin to rise in October or November and continue to rise during the winter. Then, as the precipitation decreases in late spring or early summer, the water levels decline. Fluctuations range from about 25 feet (19/4-7A1, fig. 13) to about 2 feet (20/3-35G1 and 30C2, figs. 13 and 15).

Most wells whose levels show a rapid and early rise and a great range in amplitude tap shallow aquifers that are readily recharged and drained. For example, well 19/3-2Q1 taps till at 12 feet; its water level fluctuates about 7 feet annually. The hydrograph (fig. 12) shows that the water level was near its high point for the year in November or December, whereas the levels in most wells tapping deeper materials are not high until January or February.

A few wells tapping shallow aquifers have small annual fluctuations in level; well 18/4-9R3 (fig. 11) tapping till at 10 feet has a fluctuation of about 4 feet. The small annual fluctuations in level in the deep wells (20/3-35G1, fig. 13, for example) have a more erratic pattern than do the fluctuations in level in the shallower wells.

The height of winter peak and the low fall levels have been found to vary in individual wells from year to year and to reflect the differences and trends in yearly precipitation. Water levels in well 19/3-3Q1 (fig. 12) show annual differences of about 4 feet in some years and also reflect the increase in precipitation from 1945 to 1950 (fig. 2).

Two principal zones of water-bearing materials are known to occur in the Puyallup and Stuck Valleys, and wells tapping them commonly flow or have water levels close to the land surface. The seasonal fluctuations of water level in wells tapping either zone are much like the fluctuations in the deep wells, as discussed in the preceding paragraphs. Observation well 20/4-24F3 (fig. 13) just north of Sumner, one of three in the valley area, taps the deeper zone. Its maximum observed water-level fluctuation is about 5 feet. Levels in the other two observation wells, 19/5-19M1 and 20/4-36H2 (fig. 16), are representative of the shallower zone; they fluctuate 3 to 4 feet. The stage of highest water level may occur at any time from November through March, depending on the rainfall. The water level then declines through September.

Water levels in wells tapping the shallower water-bearing zone in the Puyallup Valley act much the same as do those in wells on the uplands, indicating that precipitation here as elsewhere in central Pierce County is the direct source of recharge to the shallower sediments. Previously, water levels have been thought to correspond closely to (Griffin and others, 1962), and to be regulated by, the Puyallup River (Robinson and Piper, written communication, 1946). Figure

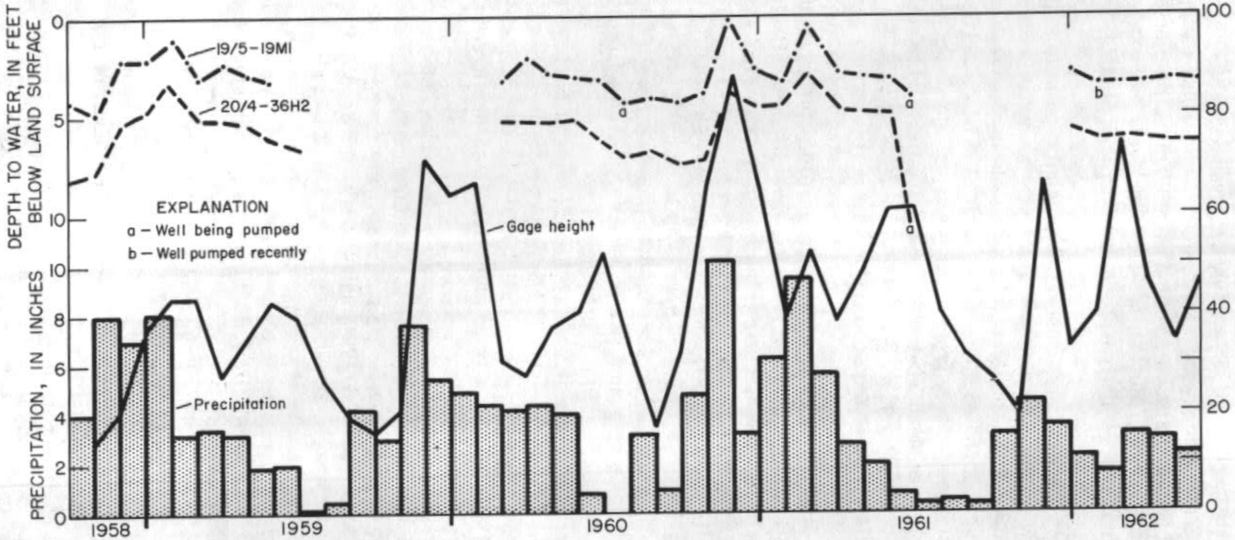

Figure 16.--Relation of water levels in wells 19/5-19M1 and 20/4-36H2 to precipitation at Western Washington Experiment Station in Puyallup and gage height of Puyallup River near Orting, September 1958 to June 1962.

16 is a comparison of the hydrographs of wells 19/5-19M1 and 20/4-36H2 with the precipitation and the mean monthly gage heights of the Puyallup River near Orting.

The lack of response of water level in the wells to the high discharge in the Puyallup River in late spring seems to indicate that the river contributes little, if any, recharge to the ground-water body. Bank storage from high-river stages may retain some ground water but, because the riverbanks contain much fine-grained material downstream from Orting, bank storage from this source is probably not significant.

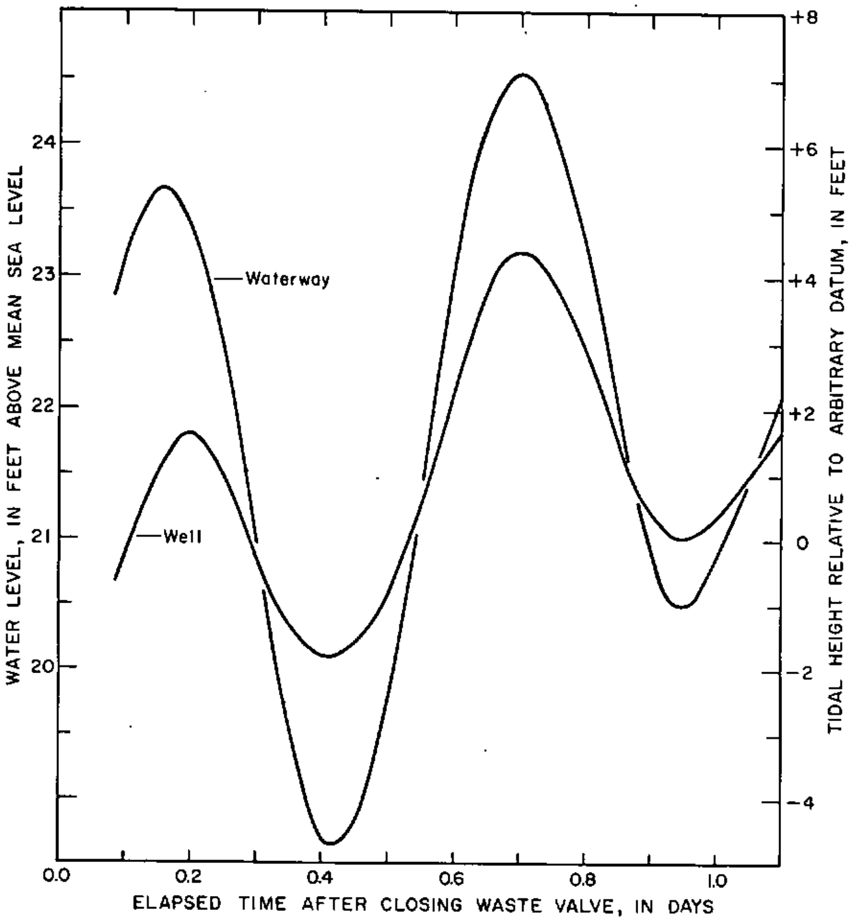

Figure 17.--Relation between static water level in well 21/3-26N1 and tidal height in Hylebos Waterway, February 2-3, 1938.

Fluctuations Caused by Tides

Changes in water level in response to tidal fluctuations in Puget Sound have been noted in wells on the tidal flat at Tacoma and in the Tacoma-Fort Lewis region. LaRocque and Piper (1938, p. 44) showed that on the tidal flat the fluctuation in static level in well 21/3-26N1 caused by tidal loading is about one-quarter the amount of tidal fluctuation (fig. 17). They state, "the static level was determined by a suitable mercury manometer after closing the waste valve to stop the natural flow of the well***. As the figure shows, at least half a day elapsed after the waste valve was closed before the head in the well reached true shut-in pressure. Thereafter, the head fluctuated in very close synchrony with the tide but only about one-fourth as widely."

This diurnal fluctuation of several feet in wells on the tidal flat causes some wells whose water levels are near land surface to flow during part of the day.

Water levels in wells on the uplands also fluctuate with the tide, but the observed range is much smaller than on the tidal flat. The following table shows the range in fluctuation, averaged from recorder charts of four wells in the Tacoma area, and their distances from the nearest shoreline.

Tidal fluctuations in wells on the upland near Tacoma

Well no.	Tidal fluctuation (feet)	Altitude of top perforation (feet)	Altitude of bottom perforation or bottom of well (feet)	Distance from Puget Sound (miles)
20/2-36L1	0.05	--	68	4.3
20/3-18C1	.1	158	135	2.9
20/3-19P1	.6	--	-41	4.5
20/3-30C2	.3	--	22	4.5

Fluctuations Caused by Barometric Changes

Changes in barometric pressure commonly produce changes in level of a few hundredths of a foot in wells tapping artesian aquifers. Such changes in level are different in nature from those that result from pumping or recharge. They are generally of short-term duration, and the effect produced may be a decline in level when the barometric pressure increases and a rise when the pressure decreases. The magnitude of rise or fall, for a given change in barometric pressure, is dependent on the proportion of the pressure increment (either positive or negative) that is supported by the materials composing the aquifer. Where the aquifer materials are not easily compressed, the fluctuation of level in the well (either a rise or fall) is the greatest. Where much of the pressure increment is supported by the water in the aquifer, the fluctuation in the well is small and may be zero.

Fluctuations Caused by Interference from Other Wells

A discharging well lowers the hydrostatic head of the ground-water body for some distance around the well. The factors determining the extent of the drawdown are complex, but generally the effect is related to the rate and duration of pumping, the rate at which water flows through the particular water-bearing deposits, and the distance from the pumped well.

The effect that pumping of a well will have on water levels in a neighboring well is greatest when both wells tap the same aquifer. For example, the water level in well 19/2-2M1 was lowered by about 45 feet in July 1960 (fig. 11) as a result of the pumping in well 19/2-2M2, 70 feet west. Both wells are screened from about 500 to 570 feet below the land surface.

When aquifers are indirectly connected, as is generally the case in the glacial deposits of central Pierce County, observation wells show a complex relationship to the pumped well. When an aquifer test was conducted on well 20/2-36B2, which is perforated at intervals from 92 to 47 feet above sea level, the level was lowered several feet in well 20/2-36L1, 2,180 feet south of B2. Well 20/2-36L1 bottoms at 68 feet above sea level. The level in well 20/2-36F3, 950 feet south of B2 and screened from 93 to 78 feet above sea level was lowered 0.4 foot during the test.

Other examples of well interference are shown on the hydrographs of wells 20/3-18C1 and 20/3-30C2 (figs. 14 and 15). Interference as shown on the hydrographs ranges from 1 to 15 feet. Occasionally, periods of large withdrawals by city wells have widespread effects on the water table. When about 40 million gallons is pumped each day from city wells over a period of several days, the water table is lowered about 1 foot at well 20/2-36G1, about a mile southwest of the city wells.

TRENDS IN WATER LEVELS

It has been stated that ground water in central Pierce County is chiefly derived from precipitation within the area. After infiltration at the surface it percolates downward and laterally, first recharging the shallower aquifers then the deeper aquifers. Individual periods of heavy precipitation tend to cause an abrupt rise in the water level in aquifers near the surface; the effect generally diminishes in deeper aquifers.

The annual precipitation (fig. 2) has varied during the period of record from 54 inches in 1902 to 17 inches in 1952. This variation in precipitation could be expected to be reflected in the water levels in wells. Although no water-level records are available for 1902, most available records for 1952 show slight to definite trends related to the below-normal precipitation. Shallow wells, such as 19/4-7A1 which is 37 feet deep, show the greatest effect. The peak in this well dropped about 6 feet from 1951 to 1952 and, although 1953 was a year of abundant precipitation (42.5 inches), the water level did not regain its former level until 1954. The low points on the hydrograph show a corresponding trend, but are more subdued.

The trend of annual precipitation during the years of water-level record shows that the departure from the average (fig. 2) decreased from 1940 to 1944, was positive again from 1945 through 1951, then fell to a new low in 1952, and generally rose from then through 1961. The low points on the hydrographs (figs. 10-15) agree closely with these variations in annual precipitation and show that there is some cumulative effect from year to year on the ground-water reservoir underlying the upland south of Tacoma. This effect seems to be strongest in well 19/3-3Q1 (fig. 12) and weakest in the Tacoma city wells.

The level in the ground-water body in the area of the Tacoma city wells (South Tacoma) has not fluctuated in the same manner as it has elsewhere in the area south of Tacoma during 1952 through 1961. The hydrographs of Tacoma wells 20/2-13H1, 20/3-18C1, and 20/3-18D1 (fig.14) 20/3-19P1, 20/3-30C2, and 20/3-30N1 (fig. 15) show a general decline in level from 1952 through 1961, which becomes more pronounced from 1958 through 1961. That this decline is the result of pumping in excess of annual recharge is seen by comparing the hydrographs of other wells on the uplands with the precipitation record. During that period, levels in wells 18/2-34N1, 19/4-7A1, and 20/2-35G1 (figs. 10 and 13) showed a general rise, and the cumulative departure from the average became greater.

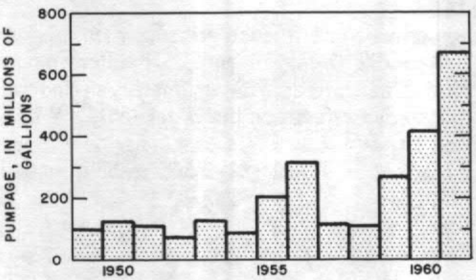

Figure 18.--Annual pumpage from city of Tacoma wells, 1949-61.

The annual pumpage from the Tacoma wells (fig. 18) did not increase markedly until 1955, when about 210 million gallons was pumped. The water level in well 20/2-13H1, especially sensitive to pumping in the area, declined markedly from 1955 through 1956, leveled off in 1957 and 1958 when pumping was reduced and declined sharply through 1961 when pumping was greatly increased. Figure 19 shows the daily pumpage and hydrographs of wells 20/2-36L1 and 20/3-18C1. The effect of pumping is very evident in well 20/3-18C1 and there is a marked drop in the water level of well 20/2-36L1 in October and November of 1960 when the city wells were pumped more heavily than formerly. In 1961 the water level in 20/2-36L1 recovered to its 1959 level after several periods in which the city wells were heavily pumped.

Griffin and others (1962, p. 17) estimate that recharge from precipitation on the Tacoma upland, about 360 square miles in area, ranges from 360,000 to 440,000 acre-feet per year. On the basis of these figures, recharge from precipitation in central Pierce County may be as high as 725,000 acre-feet per year.

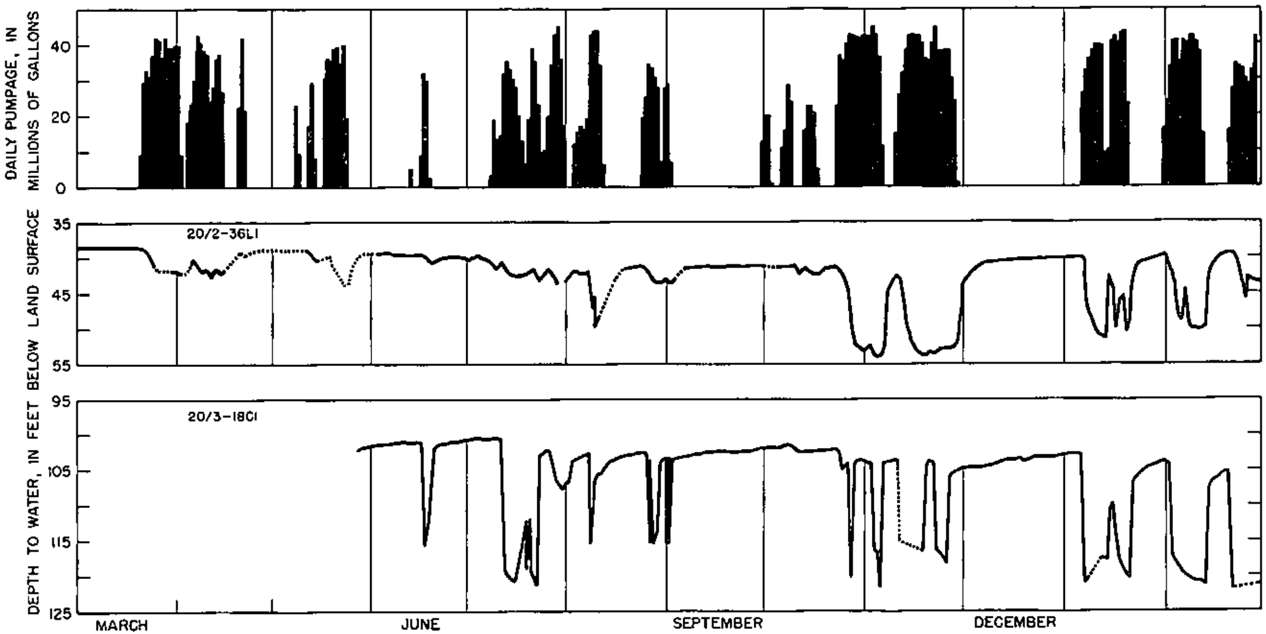

Figure 19.--Relation between daily pumpage from city of Tacoma wells and water-level fluctuation in wells 20/2-36L1 and 20/3-18C1, March 1960 to February 1961.

Ground-water withdrawal could be increased severalfold beyond the current annual usage of about 75,000 acre-feet without serious consequences. However, under normal development the annual withdrawal must be considerably less than recharge, or local ground-water depletion will occur.

MOVEMENT OF GROUND WATER

The water table is defined as the upper surface of the zone of saturation. Where an aquifer is overlain by a relatively impermeable bed the ground water is confined--held under pressure. The altitude or surface to which water will rise in a well is known as the piezometric surface. Ground water moves in the direction of downward slope of the water table or piezometric surface. This movement is slow because of the resistance offered by the small interstices through which the water must pass.

In central Pierce County, the Nisqually River, Puyallup River, Stuck River, Carbon River, South Prairie Creek, Ohop Creek, and Tanwax Creek all gain water from the ground-water body through at least a part of their reach. Muck Creek may gain water from the ground-water body in the area east of Fort Lewis, but within most of the Fort Lewis area it probably loses water to the ground-water body. Clover Creek does not have a strong influence on the water table but it does lose considerable water to the ground-water body upstream from Steilacoom Lake. The lakes in the area of McChord Air Force Base are in approximate balance with the water table and neither gain nor lose water in significant quantities.

The overall direction of movement of ground water in central Pierce County is to the north or northwest toward Puget Sound or Commencement Bay. The most notable exceptions are along the west valley walls of Ohop Creek and the Puyallup River, where the direction of movement is eastward into the valleys. The aquifers of central Pierce County are recharged almost entirely within the project area. The impermeable nature of the consolidated rocks along the south and east margins of the project area precludes the possibility of movement of large quantities of water into central Pierce County from the mountains or foothills beyond the project boundaries.

The slope of the water table in central Pierce County is extremely irregular, ranging from more than 120 feet per mile in areas of great relief or relatively impermeable materials to less than 10 feet per mile in areas of little relief of coarse-grained, highly permeable materials. The average slope is about 50 feet per mile.

Locally, wells may obtain water at altitudes considerably above that of the regional water table. This can happen when an impermeable layer below the land surface retards the downward movement of water, to form an isolated body of perched or semiperched ground water above the regional ground-water body. The geologic unit that most commonly acts as a perching bed in central Pierce County is till of Vashon age. Locally, however, clay beds in the Colvos Sand, the Kitsap Formation, or impermeable beds in the Salmon Springs Drift may cause perching. Mudflows in the Lily Creek Formation cause perched ground-water bodies in the eastern part of T. 17 N., R. 5 E., and the Osceola and Electron Mudflows may cause some perching of ground water in the Buckley area and in the Puyallup River valley. The larger areas of perched ground water in central Pierce County, all of which are probably perched on till, are near Graham and Thrift in T. 18 N., Rs. 4 and 5 E., south of Puyallup, a large area in the vicinity of Summit and Midland, and part of the Fircrest-North Tacoma region. In the southern part of the project area, in Tps. 16 and 17 N., clay beds in the upper part of the Mashel Formation cause extensive bodies of perched ground water.

CHEMICAL CHARACTER OF THE GROUND WATER

Chemical analyses were made by the Geological Survey or were collected from local water agencies from 62 wells and springs. In all, 193 analyses of samples are listed in table 8. To supplement these analyses, field tests were made of water from 123 additional wells. These tests, which include determinations of bicarbonate, chloride, hardness, and specific conductance, are listed in table 9. These field tests were not performed under laboratory conditions and are probably not as accurate as standard laboratory analyses. However, in the aggregate, the field tests are useful in determining the general character of water from a particular area.

Expression of Analytical Results

All constituents in tables 8 and 9 are reported in parts per million (ppm). One part per million is one unit weight of a constituent in a million unit weights of water. The results can be expressed in grains per U. S. gallon by dividing the parts per million by 17.12. For ease in studying chemical analyses in detail, the composition can be expressed in equivalents per million. Parts per million values may be converted to equivalents per million by dividing them by the combining weights of each ion.

Hardness is expressed in this report as calcium carbonate. The reason for expressing hardness in this way is that the characteristics commonly referred to collectively as hardness by the user cannot be attributed to one specific constituent. In most water, calcium and magnesium are the chief constituents that cause hardness. In table 8, hardness is computed by converting the concentrations of these two constituents to an equivalent amount of calcium carbonate. At one time, hardness was a measure of the extent to which the water used with soap would form insoluble products; however, the introduction of the household use of detergents has reduced its importance somewhat in recent years.

The hardness of water to be used for ordinary domestic purposes does not become objectionable until it exceeds about 100 ppm. Whether a user would consider this water as "soft" or "hard" depends on the type of water to which he has become accustomed. To standardize such adjective ratings, the following arbitrary breakdown has been adopted by the U. S. Geological Survey.

Hardness as $CaCO_3$ (ppm)	Classification and suitability
0-60	Soft (suitable for most uses without softening)
61-120	Moderately hard (usable except in some industrial applications)
121-180	Hard (softening required by laundries and some other industries)
More than 180	Very hard (softening desirable for most purposes)

In table 8, total dissolved solids have been calculated for complete analyses by adding together the concentrations of all the separately determined constituents except bicarbonate. The concentration of bicarbonate is converted to an equivalent amount of carbonate, and then added to the summation. The computed value may be a more accurate indication of true concentration than the weight of the residue for some types of waters where the residue on evaporation may include soluble organic constituents or water of crystallization.

Specific conductance is shown in many of the analyses in tables 8 and 9. Specific conductance is a measure of the ability of water to conduct electrical current, and is expressed in micromhos per centimeter at 25°C. (Throughout this report the units of measurement are abbreviated to "micromhos at 25°C.") The specific conductance of a water sample is related to the amount of dissolved solids present. Numerically, the dissolved-solids content of water (in parts per million) generally is 55 to 75 percent of the specific conductance value. The dissolved-solids content of water in Pierce County, based on the data in table 8, ranges from 69 to 110 percent of the specific conductance, and averages 76 percent.

Some substances included in the gravimetric determination of dissolved solids are not in disassociated form and hence tend to destroy the theoretical relationship explained above. Silica (SiO_2) is such a substance (Hem, 1959, p. 54). Certain ground water in western Washington contains relatively high concentrations of silica. Laird has reported (1961, written communication) that a much closer correlation between dissolved solids and electrical conductance can be made by excluding the silica from the calculated dissolved solids. The dissolved-solids content of Pierce County ground water, excluding silica, ranges from 50 to 57 percent of the conductance and averages 53 percent. Of the 35 water samples for which both computed dissolved solids and specific conductance are available, the ratio of dissolved solids to conductance deviates from the average by less than 4 percent for 26 wells and by more than about 8 percent for only 2 wells.

According to the drinking water standards of the U. S. Public Health Service (1962, p. 7), a dissolved-solids content of less than 500 ppm is considered desirable. Except for water from wells in one very small area, the dissolved-solids content of water from all wells and springs in central Pierce County is well below that limit.

Hydrogen-ion concentration is expressed in terms of pH units. The significance of pH values is somewhat complex and is explained in detail by Hem (1959, p. 43). By definition, the pH value of a solution is the negative logarithm of the concentration of hydrogen ions in moles per liter. The pH is less than 7 in acid solutions and greater than 7 in basic solutions.

Range in Concentration of Constituents

Although, in general, the sampled ground water from all areas and from all depths penetrated by wells is of good quality and satisfactory for most uses, a considerable range in concentration and in proportion of the several constituents exists. This range is a result of the following features:

1. More than one discrete water type exists within the area. The several types contain dissolved constituents in different proportions as a result of different geologic environments.

2. Relatively small ranges in the amounts and proportions of constituents exist in water of a particular environment because of minor differences in the mineralogy of the materials through which the water percolates.

3. Locally, some water has become contaminated by saline water, and reflects, to a small degree, the nature of the contaminant.

Table 4 shows the range in concentration of all the constituents commonly determined. It does not include analyses of water that is thought to be contaminated as a result of saline intrusion.

Table 4.--Observed range in concentration of constituents in uncontaminated ground water.

Constituent	Greatest (ppm)	Least (ppm)
Silica (SiO_2)	54	7
Calcium (Ca)	25	5
Magnesium (Mg)	12	1
Sodium (Na)	58	4
Potassium (K)	3	<1
Bicarbonate (HCO_3)	280	22
Sulfate (SO_4)	18	<1
Chloride (Cl)	24	1
Nitrate (NO_3)	10	<1
Dissolved-solids content	248	61

Water Types

Water can be classified by chemical type on the basis of the predominant cation and anion, as computed in equivalents per million. For example, water in which calcium, magnesium, and bicarbonate make up at least half the cations and anions is referred to as a calcium bicarbonate water. This method of classification, although not expected to be precise, has proved very useful in showing the similarity or lack of similarity of some waters (Piper and others, 1953).

On plate 3, the ground water for which complete analyses are available has been classified by means of a binomial symbol. The first part of the symbol is the percentage of calcium and magnesium among the cations, and the second part is the percentage of bicarbonate and carbonate among the anions. This method of describing water type is discussed in detail by Piper and others (1953, p. 19). All water for which both parts of the symbol are 50 or greater, are of the calcium bicarbonate type. Reference to plate 3 shows that three types of ground water are in the project area. Ground water on the uplands is of the calcium bicarbonate type; all in the

Puyallup River valley is the sodium bicarbonate type; and water from a well in the northeast Tacoma upland region is predominant in sodium, chloride, and sulfate. These three types will be discussed separately.

Calcium Bicarbonate Water

By far the most common type of water in central Pierce County is that in which calcium and magnesium make up more than half the cations and bicarbonate makes up more than half the anions. The complete analyses of water samples taken from wells on the uplands show that all water in the upland area is of this type. However, a considerable range in proportion of constituents exists from well to well. For example, in water from well 19/2-2M2 calcium and magnesium constitute only 55 percent of the cations, whereas in that from well 19/6-2R1 the calcium and magnesium content is 87 percent of the cations. The proportion of bicarbonate among the anions ranges from 58 percent in water from well 19/1-34G1 to 96 percent in water from wells 16/4-5D1 and 20/2-9C1. Although the coverage of complete analyses is not uniform for the project area, the data on plate 3 show no significant relation between location of the well and the proportions of constituents present in the water. However, within the general water type, two minor subtypes are of general interest.

If the total amount of bicarbonate in water from wells is considered, rather than its relative amount, a geographic correlation can be made as in plate 3. Wells in the southeastern part of the project area, along the shore of Puget Sound adjacent to the west flank of the upland, and locally near Buckley, yield water whose bicarbonate content is greater than 100 ppm and whose dissolved-solids content is about 140 ppm or more. The remainder of the upland area yields calcium bicarbonate water in which the bicarbonate content generally is less than 100 ppm and locally is below 40 ppm. These two subtypes will be discussed separately.

High-bicarbonate water

In this report, the bicarbonate content of ground water is arbitrarily rated as high if it is greater than about 100 ppm. The two analyses that are considered typical of a high-bicarbonate water are of samples from wells 16/3-22A2 and 16/4-5D1. Well 16/3-22A2, 426 feet deep, taps water-bearing zones in the Mashel Formation; well 16/4-5D1, 116 feet deep, taps the Mashel about 40 feet below the land surface. In both, bicarbonate makes up about 95 percent of the anions. The proportion of calcium among the cations is much greater in water from the shallower well than from the deeper (pl. 3).

Although the two wells discussed above yield water from the Mashel Formation, there is no evidence to show that water of high bicarbonate content everywhere is restricted to the Mashel. For example, wells 18/4-7M1 and 33N1, which yield water containing 99 and 180 ppm of bicarbonate, tap zones that may be as much as a few hundred feet above the top of the Mashel. Well 20/2-29Q3 yields water in which the bicarbonate content is 110 ppm, although it taps zones less than 270 feet below the land surface--well above the top of the uppermost Tertiary deposits. Some of the wells along the coast, in the W½ of T. 20 N., R. 2 E., that yield water whose bicarbonate content is in excess of about 100 ppm, may penetrate deposits of Tertiary age. Here, as in the southeastern part of the upland, however, the source of the high-bicarbonate water cannot be restricted to Tertiary materials.

The area of high-bicarbonate water in the southeastern part of the upland is bisected by a northeast-southwest band in which water of low bicarbonate is predominant. No explanation is offered for the presence of this band, but it should be pointed out that the band is parallel to drainage lines and also that the margins of the band are roughly alined with what might be expected for the strike of older sedimentary beds in that area.

In summary, the high-bicarbonate water has a fairly well-defined geographic range although it seems not to have a well-defined stratigraphic range.

Low-bicarbonate water

Water from wells.--All the water samples collected from wells in the northeastern part of the upland contain less than 100 ppm of bicarbonate. The range in concentration is from about 40 to 90 ppm, and most concentrations are between 55 and 75 ppm. Because all the deeper sampled wells tap several water-bearing zones through a considerable depth interval, it was not possible to determine whether a correlation exists between bicarbonate or dissolved-solids content and depth of water-bearing zone. It is interesting to note, however, that water from the deepest sampled well, 19/2-32H2, contained 96 ppm of bicarbonate, the highest observed for this area. The diagnostic value of this sample is limited by the fact that the well taps water-yielding zones from 186 feet above to 979 feet below sea level; the water cannot be considered representative of any specific depth interval.

Water from springs.--Water of the calcium bicarbonate type is obtained from the several large springs in the project area, and is among those with the least dissolved solids. Of the six springs for which analyses appear in table 8, the total dissolved-solids content ranges from 86 ppm in water from Salmon Springs to 55 ppm in water from South Prairie Spring, which is the least reported for a ground-water source in central Pierce County. In water from all six springs, calcium plus magnesium constitutes 64 to 81 percent of the cations and bicarbonate 72 to 90 percent of the anions. The concentration of hardness in each is less than 55 ppm, and the water is classified as soft.

Sodium Bicarbonate Water

Water in which sodium accounts for more than half the cations and bicarbonate for more than half the anions is found only in the Puyallup River valley. The distinctiveness of the chemical character of this water is shown on plate 3, in which data are plotted for two wells at Sumner and two wells in the northeastern part of the tidal flat at Tacoma. In addition to being distinct as to chemical type, the water differs from other water in the area in the following respects:

1. The water contains more than 200 ppm of total dissolved solids and, except for water that has become contaminated as a result of saline intrusion, is the most mineralized in central Pierce County.

2. Bicarbonate content is over 180 ppm in water from many wells in the Puyallup River valley and over 220 ppm in water from a few. Water from most wells in central Pierce County contains less than 100 ppm of bicarbonate and rarely more than 150 ppm.

3. Chloride content is more than about 12 ppm; water from most of the wells in central Pierce County contains less than about 5 ppm of chloride.

The two wells at Sumner, for which complete analyses are available, tap zones from about 450 to 500 feet below the land surface; the two in the tidal flat tap zones at 465 to 595 feet and 750 to 850 feet below the land surface. At both places the wells tap sand and gravel beneath the generally fine-grained marine deposits of Recent age. The sand and gravel is continuous from Sumner to the tidal flat except in its southwestern part, and it is assumed that the water throughout this reach is of the same general type. For example, water from well 20/4-17F1, 500 feet deep, probably is of the sodium bicarbonate type.

In the southwestern part of the tidal flat, in secs. 3 and 4, T. 20 N., R. 3 E., water from wells is of a different quality from that from the two deep wells cited above. The dissolved-solids content is about half that of the two deep wells, the chloride content is less than 5 ppm, and the bicarbonate content is less than 100 ppm. In general, this water is very much like that from many wells on the uplands to the southwest. The materials tapped by these wells, although probably of the same age as those tapped by wells elsewhere in the tidal flat, doubtless contain water whose source is the deeper zones beneath the uplands.

Sodium bicarbonate water, where it occurs in the valley, may not everywhere be restricted to the greater depth ranges. For example, the water from well 20/4-7J2 may be of this type, although the relatively great hardness suggests that sodium may not be the preponderant cation. This well is 46 feet deep and taps Recent alluvium. The water from well 20/4-16P1, 175 feet deep, is similar to that from well 7J2.

Sodium Chloride Water

Water in which sodium accounts for more than half the cations and chloride accounts for more than half the anions is found only at Browns Point, in sec. 16, T. 21 N., R. 3 E. Water of this type represents a blend of native ground water with sea water. Although the water of Puget Sound is somewhat less saline than water from the ocean because of dilution by streams, its chemical character is similar to that of ocean water, and the usual criteria for determining sea-water intrusion will apply. Analyses of water samples from well 21/3-16N1 (table 8) show the usual characteristics of water that has become contaminated as a result of sea-water intrusion. For example, the magnesium calcium ratio is greater than 1 and the sulfate content is high--more than 100 ppm in each sample.

Of six wells in sec. 16 (table 9), four yield water that is either markedly or incipiently contaminated; only wells 21/3-16P1 and -16P3 yielded uncontaminated water in 1961. The wells whose waters have become blended with saline water in varying degrees range in depth from 184 to 419 feet below the land surface and from 84 to 329 feet below sea level. Of the wells sampled, well 21/3-16N1 yielded the most saline water, nearly 1,000 ppm of chloride after being pumped a few hours (table 9). An attempt to obtain a supply of fresh water near the site of well 16N1 by drilling a deeper well, 16N2, was not successful. The driller reported that the water brought up by the bailer from 419 feet below the land surface was extremely salty, drilling was then discontinued and the casing pulled. Well 16N2 bottoms in coarse materials, and although it penetrated strata of impermeable materials below the bottom of well 16N1, pumping 16N1 affected the water level in 16N2. This occurred when 16N2 was being drilled and its casing was 352 feet below the land surface, 157 feet below the bottom of the perforated interval in well 16N1.

Sea-water contamination at Browns Point is most marked during late summer when the wells are heavily pumped. During the winter, or even late in the spring, a well that has remained idle for several weeks will yield fresh water (table 9, analysis June 4, 1960, of sample from well 21/3-16P2). This situation strongly suggests that further saline encroachment can be prevented if the current (1962) annual pumpage from the Browns Point area is not exceeded.

Fragmentary information suggests that very localized contamination exists in the tidal flat. When well 21/3-27G1 was drilled in 1938 it reportedly penetrated a zone containing brackish water at about 550 feet below the land surface. Although this zone was cased off and the drilling was continued to 1,216 feet, the water pumped from the well still was too brackish for use and the well was never placed in service. Well 21/3-26Q1 (table 8) yielded water containing nearly 100 ppm of chloride in 1939. These are the only reported instances of markedly inferior water in the tidal flat.

The concentration of chloride in water from well 21/3-26N1 increased about 5 ppm from January 1938 to December 1944. It apparently decreased 9.5 ppm from 1944 to 1955, from 17 ppm to 7.5 ppm (table 8). However, a sample taken from the well in 1960 contained 13 ppm. Because water containing as much as 15 ppm of chloride is common in the Puyallup River valley, it must be assumed that this well yields water native to the area.

SUMMARY

The central part of Pierce County is mantled, almost everywhere, by unconsolidated deposits of Quaternary age. These materials were deposited during four major glaciations of the area and the intervening nonglacial intervals. The total thickness of unconsolidated deposits in central Pierce County, unknown at most places, is in excess of 2,000 feet locally. These deposits contain all the important aquifers in central Pierce County, the most productive of which are of Salmon Springs age or younger.

Unconsolidated deposits of Tertiary age and consolidated Tertiary rocks exposed in the eastern and southern parts of the project area are unimportant as aquifers.

Isolated moderate to large ground-water yields may be obtained from almost any part of the project area. Wells of large yield are most common in the region immediately southwest of Tacoma, and ground-water development is greatest here.

In central Pierce County, about 75,600 acre-feet of ground water is used annually. Of this, about 43,600 acre-feet is used for public supply, about

23,600 acre-feet by industries, and on the basis of water rights issued, about 6,000 acre-feet for irrigation. About 3,000 acre-feet is used for all other types of demand, including rural-domestic and stock.

Water levels in wells fluctuate appreciably in response to seasonal differences in the amount of precipitation, to long-term variations in precipitation, and to variations in pumping. Overdraft of ground water as of 1961 is limited to small areas, and withdrawal in the project area could be increased severalfold without causing serious overdraft of the area as a whole.

Ground water in central Pierce County, in general, is of good chemical quality and satisfactory for most uses. Locally, some contamination by sea water has occurred, but it likely will not become serious unless continuous heavy withdrawal occurs near Puget Sound or Commencement Bay.

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TABLE 5

Records of Representative Wells

in Pierce County, Washington

Table 5.--Records of wells.

Altitude: Interpolated from topographic maps where shown to nearest whole foot; measured where shown to nearest tenth or hundredth.
Type of well: Dg, dug; Dn, driven; Dr, drilled.
Depth and water level: Depth to well below land surface, recorded to nearest foot. Water-level measurement expressed in nearest tenth or hundredth of a foot made by the Geological Survey; measurement to nearest whole foot reported by owner, tenant, or driller. Measurement preceded by "+" is above land surface; where the head above land surface is not known, the entry is "flowing."

Type of pump: C, centrifugal; J, jet-centrifugal; N, none; P, plunger; Sb, submersible; T, deep-well turbine.
Use of water: D, domestic; Ind, industrial; Inst, institutional; Irr, irrigation; N, none; Obs, observation; PS, public supply; S, stock.
Remarks: C, chemical analysis in table 8; Cp, partial chemical analysis in table 9; dd, drawdown; gpm, gallons per minute; L, log in table 7. Entries concerning water quality, well yields, and material penetrated are reported chiefly by owners, tenants, and well drillers.

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 16 N., R. 3 E.						
1H1	T. D. Fuller	661	Dg	-	17	0	-	8.70	9-19-60	C	½	D	Till at surface.
4N1	Ed Toble	610	Dr	6	90	90	Sand	20	1953	P	1	D	Water level at surface in winter.
6E1	G. R. Brooks	475	Dr	6-4	135	135	-	81	12-29-53	J	1	D	Slight dd after several hrs bailing. 36 gpm; Cp, L.
6E2	J. Maskic	480	Dr	6	36	36	-	20	12-29-53	J	1	D	
6F1	W. J. Hennessy	560	Dg	30	28	-	-	20 21.68	12-29-53 7-18-60	J	1	D	Reported to have gone dry once.
6L1	Paul Burton	530	Dr	6-4	190	190	-	150	12-29-53	Sb	3/4	D,S	Supplies 2 families; Cp.
6P1	E. C. Garvin	430	Dr	6	73	-	-	-	-	J	1	D	
7F1	Truman Wilcox	355	Dr	8	37	-	Gravel	5	-	T C	5 1½	D,S	Yields 50 gpm. Supplies 3 houses and poultry; Cp, L.

8B1	A. J. Wareing	575	Dg	48	24	3	Hardpan	5 3.11	3-4-54 7-18-60	P	¼	D,S	Well goes dry in fall; L.
8B2	do.	560	Dg	48	21	3	do.	.53 3.67	3-4-54 7-18-60	P	¼	D	Yield inadequate in Sept.; can be pumped dry.
8G1	do.	540	Dg	36	12	-	-	-	-	N	-	N	Water has sulfur odor and taste. Well destroyed.
8J1	--Graham	643	Dg	60	24	8	-	7.30	3-4-54	N	-	-	Well deepened, now 8J2.
8J2	do.	645	-	12	41	-	-	13.31	8-16-60	C	-	D	
11H1	do.	764	Dg	42	40	4	-	17.50 18.79	10-20-54 8-30-60	P	¼	N	
12E1	Jonas Asplund	778	Dg	42	42	-	Boulders	37 26.67	Winter 8-30-60	P	¼	D	Yields about 4 gpm; L.
12M1	L. H. Click	625	Dg	60	46	-	-	19.60	8-30-60	J	½	D,S	
12Q1	J. G. Van Eaton	635	Dg	48	14	-	-	8.44	8-30-60	P	1/3	D	
13D1	Elliot Beaumont	610	Dr	10	263	-	-	30 30	10-20-54 7-10-60	J Sub.	2 3/4	D,S	Dd 30 ft, pumping 20 gpm; Cp.
13F1	-	650	Dg	60	17	-	-	7.98	8-30-60	P	-	D	
14C1	O. Enwall (Swan Lake Dairy)	625	Dr	8	295	-	Sand	-	-	T	5	D,S	Supplies 2 houses and 130 head of stock; Cp, L.
14F1	W. H. Bray	600	Dr	6	47	47	-	.50	8-30-60	J	-	D	Cp.
14H1	George Boettner	565	Dr	6	55	50±	Clay, blue	17.04	8-30-60	J	1/3	D,S	Iron content is objectionable.
18C1	Joe Raab	356	Dg	6	12	-	Gravel	7.23	7-18-60	P	1/3	D,S	
22A1	Charles McPhail	575	Dg	96-72	33	10	-	10	Winter	P	-	N	
22A2	do.	580	Dr	8	426	421	Sand and gravel	-	-	Sub.	-	D,S	Supplies several houses; C, L.
25D1	I. Von Clasen	700	Dg	48	27	-	-	2.09	10-27-54	N	-	N	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 16 N., R. 4 E.						
3M1	David Beckett	760	Dg	-	14	-	-	11.92	9-2-60	J	1/3	D	Well dug in hardpan; Cp.
4E1	I. D. Snyder	675	Dg	-	20	-	Sand	18.20	9-19-60	J	½	D	Water level very low in Sept. and Oct.
4R1	Lynn Dick	760	Dr	8	132	118	-	85	7- -52	J	1	D	Iron content objectionable; Cp, L.
5D1	S. R. White	640	Dr	6	116	-	-	Flowing	9-19-60	C	1	D	Flows 5 gpm; C, L.
5P1	Charles Meyer	780	Dg	108-78	48	5	-	27.15 36.38	10-22-54 9-19-60	P	1/3	D	
5P2	P. V. Akers	775	Dr	6	109	109	-	-	-	J	1	D	Iron content is objectionable.
6Q1	Clarence Bement	648	Dr	6	109	109	-	5.66	9-19-60	J	½	D,S	Cp.
7L1	R. A. Rave	670	Dg	42	15	14	-	12.77	8-31-60	-	-	D	
7Q1	Leif Thorvaldson	660	Dg	72	45	-	-	20 19.38	Summer 8-30-60	J	½	D	
7R1	do.	675	Dr	6	125	125	-	60	7- -49	J	3/4	D	Cp.
7R2	D. C. Anderson	690	Dg	60	34	34	Gravel	27.95 27.79	10-20-54 9-19-60	J	½	D	Iron content is objectionable; L.
9E1	Carl Langberg	750	Dg	60	45	8	Sand and gravel	19.95	9-19-60	J	1	D,S	Well penetrates 10 ft of "hard-pan."

9H1	F. Otremba	740	Dr	6	76	76	-	-	-	J	½	D	Supplies restaurant and tavern; iron content is objectionable.
9J1	Don and George Divelbiss	720	Dr	8	158	158	-	-	-	J	2	D,S	Iron content is objectionable; Cp.
10M1	John Nelson	720	Dr	6	99	-	-	-	-	J	3/4	D,S	
10R1	J. A. Ford	525	Dg	36	22	-	-	11.48	9-1-60	P	½	D	
11J1	Jerald Coburn	850	Dn	24	17	-	-	6.26	9-1-60	J	½	D,S	Iron content is objectionable.
11L1	A. Novlli	800	Dg	24	60±	60	-	54.83	9-1-60	J	1½	D	Well has gone dry.
11P1	E. M. Shook	800	Dg	24	65	65	-	56.43	9-1-60	J	½	D	Well goes dry in late summer and fall; iron content is objectionable.
11Q3	Lloyd Stuart	800	Dr	6	45	-	-	31.36	8-31-60	J	½	D	Iron content is objectionable; Cp.
11R1	Max Tappero	825	Dg	36	25	-	-	19.65	9-1-60	J	½	D,S	
14F1	O. E. Haynes	840	Dr	8	190	190	Sand and gravel	80	12-14-51	J	7½	D, Ind	Dd 10 ft after 4+ hrs pumping 60 gpm; Cp, L.
14P1	City of Eatonville	800	Dr	6	750	177	Rock	30	-	N	-	N	Supply inadequate; L.
15N1	S. H. Gillian and F. Larkin	870	Dr	8	175±	-	-	-	-	J(?)	2	D	Supplies 2 families.
16D1	T. W. Nelson	525	Dg	-	12	-	-	-	-	C	1½	D,S	
16H1	W. J. Burch	473	Dr	6	47	47	-	-	-	J	3/4	D,S	Iron content is objectionable.
16N1	Andy Ludwig	785	Dg	48	29	9	-	20	10-20-54	P	½	D	Supply very poor; L.
16N2	do.	790	Dg	96-60	37	35	Sand	31.85	7-19-60	J	3/4	D	Yields 2 gpm.
17F1	Henry Meyer	520	Dr	6	100	-	-	47.65	8-31-60	N	-	N	Iron content objectionable.
21C1	Ivan Swanson	775	Dg	75	17	-	Gravel	12.55	7-19-60	C	½	D	Supplies 3 cabins.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 16 N., R. 4 E.--Continued						
22B1	Ray Hiatt	850	Dr	6	232	-	-	200	1943	P	1½	D,S	Reported "hardpan" at 14 ft.
22M1	G. W. Emery	777	Dg	20	12	12	Sand, coarse	8.24	8-31-60	C	½	D	
22M2	do.	777	Dr	6	-	129	-	8	-	P	½	D,S	Iron content is objectionable.
26B1	J. J. Savlick	1,165	Dg	48	20	16	-	13.35	8-31-60	P	¼	D	Well is dry in summer.
30B1	F. Hasenbalg	675±	Dg	60	17	12	-	11.04 11.16	10-20-54 7-19-60	P	¼	D,S	"Hardpan" reported below 12 ft.
							T. 17 N., R. 2 E.						
1A1	H. Payne	397	Dg	48	35	-	Hardpan	8.01 10.84	2-11-54 5-24-60	J	1/3	D	Well can be pumped dry; water level recovers slowly.
1D1	M. W. Jones	380	Dr	6	88	88	-	56.57	5-24-60	J	1½	D, Irr	Supply adequate for 24-hour irrigation in summer.
1E2	Harvey Hoyt	395	Dg	48	16	16	Gravel	-	-	C	1/3	D	
1F1	Albert Betschart	400	Dg	24	16	15	do.	4.88	7-22-60	J	½	D,S	
1K1	Emil Betschart	425	Dg, Dr	6	105	-	-	-	-	J	1	-	Iron content is objectionable.
1K2	do.	400	Dr	10	183	183	Sand, gravel, and clay	60	-	T	25	D,S, Irr	Dd 39 ft after 4 hrs pumping 348 gpm. Iron content is objectionable; temp. 50° F; L.

1M2	H. J. Garrison	400	Dg	48	60	-	-	22.45	7-26-60	N	-	N	Supply inadequate.
1M3	do.	400	-	6	160±	-	-	68.99	7-26-60	J	1½	D,S	Well drilled inside casing of well 1M2; Cp.
1N1	A. M. Caspersen	390	Dg	96	8	-	Gravel	3.02	7-26-60	N	-	N	
1N2	do.	425	Dr	6	113	113	do.	93	5- -54	J	2	D,S	Dd 4 ft, pumping 8 gpm; L.
2B1	--Sexton	400	Dr	6	110	-	-	75.22	5-24-60	J	2	D,S	
2D1	R. J. Bromell	390	Dg	36	14	-	-	-	-	C	½	D,S	
2N1	--Lauranz	360	Dg	72	7	-	Gravel (?)	4.86 4.90	5-27-60	C	½	D	
2Q1	S. Goltao	405	Dg	48	45	-	Gravel	30.87	6-29-50	J	½	D,S	Temp. 48° F.
3C1	R. Wheeler	350	Dg	36	30	-	do.	23	-	J	1	D,S	
3D1	B. F. Whitehead	335	Dr	6	38	-	Gravel and sand	25.5 12.96	5-24-60	J	½	D, Irr	L.
3D2	M. H. Booth	330	Dr	6	40	40	Gravel	20	6- -50	J	1	D,S	Slight dd after 1/3 hr pumping 45 gpm; L.
6H1	U. S. Government	307	Dg	36	62	-	-	56.96	-	-	-	N	
10K1	V. Goldman	365	Dr	6	74	74	-	55.29	5-27-60	J	1	D,S	
10M1	O. Sokolik	340	Dg	6	39	-	-	-	-	P	½	D,S	
11F1	H. Anderson and M. Kleiven	380	Dg	36	15	-	Sand (?)	2.48 4.44	6-28-50 7-18-60	P	1/3	D	
11R1	Walter Gay	390	Dr	6	103	-	Sand and gravel	-	-	J	1½	D	Dd 20 ft, pumping 20 gpm; Cp, L.
12C1	L. E. Collins	400	-	6	92	-	Gravel	71.48	7-22-60	J	1	D	Well pumps dry at 5 gpm.
12F1	Oscar Berggren	410	Dg	-	12	4	Hardpan	9.62	7-22-60	J	½	D	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 17 N., R. 2 E.--Continued						
12K1	John I. Haas, Inc.	400	Dr	8	149	149	-	40.35	7-22-60	J	2	D	Iron content is objectionable; Cp.
12P1	P. F. Farmer	420	Dr	6	85	-	-	25.48 36.78	10-15-54 7-26-60	Sb	1	D,S	
13Q1	I. C. Beckwith	429	Dg,Dr	-	40	-	Gravel	15	-	J	½	D	L.
14D1	George Barkley	390	Dr	6	87	-	-	53.88	5-27-60	J	3/4	D	Iron content is objectionable.
14G1	E. J. Locke	395	Dg	48	15	-	Gravel	5.46 4.35	6-28-50 5-27-60	-	¼	D,S	Supplies 3 houses.
14R1	T. Hughes	420	Dg	48	38	-	Gravel, cemented	32	-	J	½	D	
15A1	H. O. Miller	395	Dg	-	35	-	-	15	-	J	1	D	
15D1	Golding Bros.	350	Dr	6	97	-	-	-	-	J	3/4	D,S	
15D2	do.	380	Dr	8	300	300	-	-	-	-	-	N	Supply inadequate; L.
15G1	Crowser	390	Dg	30	13	-	Gravel	8.74	6-28-50	P	½	D,S	
15J1	Milo Jenson	390	Dg	-	24	-	-	-	-	-	¼	D,S	
15N1	--Morris	375	Dr	6	47	-	-	11.02	5-27-60	J	½	N	Iron content is objectionable; well is dry in summer.
16A1	Charles Throssell	328	Dr	6	75	75	Gravel, pea	38.42	5-27-60	J	1	D	

16H1	--Golding	330	Dr	6	105	-	-	-	-	J	1	D	
16Q1	James Gonia	315	Dg	48	22	-	-	17.48	-	N	-	N	Well destroyed.
16Q2	H. O. Martin	320	Dg	48	42	40	Gravel	31.07 33.33	- 7-13-60	J	½	D	
16Q3	Roy Gonia	320	Dg	48	39	-	do.	37.15	10-4-43	J	½	N	
16Q4	James Gonia	320	Dr	6	115	-	-	7.05 9.07	10-4-43 7-13-60	J	3/4	D, Obs	Dd 40 ft after 6 hrs pumping 20 gpm; hydrograph on figure 10; L.
16Q5	Roy Gonia	320	Dr	6	96	96	-	29.83 35.75	8-20-45 7-13-60	J	1	D,S, Obs	Dd 6-7 ft, pumping 15 gpm; hydrograph on figure 10; Cp.
16Q6	J. T. Harrison	320	Dr	6	100	-	Sand, fine, black	13.54	7-13-60	J	4	Irr	
16Q7	do.	320	Dg	36	47	-	Gravel	27 20.53	6-29-50 7-13-60	J	½	D	Well 16Q6 drilled inside of 16Q7; both are still used.
16R1	F. Poletowski	348	Dg	48	20	-	do.	16 15.52	6-28-50 5-27-60	C	¼	D	Well is dry in fall if used much.
21A1	Gus Rody	348	Dr	6	41	-	-	12.32	5-27-60	P	½	D	Color of water is yellowish.
21K1	L. Longmire	325	Dr	6	50	-	Sand, coarse	40.07	-	J	½	D	
22A1	F. Rea	400	Dr	6	103	-	-	-	-	J	3/4	D,S	
22B1	H. E. Wood	400	Dg,Dr	6	86	86	-	50	-	J	½	D	Well dug to 40 ft.
22N1	R. W. Flournoy	364	Dr	8	110	-	-	-	-	J	-	D	
22N2	do.	360	Dg	42x48	31	-	-	23.00	7-13-60	J	-	S	
22Q1	Charles Ockfen	400	Dg	72	47	-	Sand and gravel	16.72	6-27-60	J	½	D,S	
22R1	A. Kirston	395	Dr	6	38	-	Sand	10	6- -51	J	3/4	D	Well penetrates "hardpan" to 31 ft and sand from 31 to 33 ft.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 17 N., R. 2 E.--Continued						
22R2	A. Kirston	395	Dg	60	23	-	Hardpan	9.55 10.91	6-27-50 7-13-60	-	½	D,S	Well supplies 7,000 chickens.
23J1	J. Goldman	440	Dr	6	87	-	-	-	-	-	½	D,S	
23L1	J. Kuffel	435	Dg	36	21	-	-	7.08 7.08	6-27-50 7-15-60	P	½	D,S	
23N1	E. Kirsten	425	Dg	36	29	-	-	17.81	6-27-60	-	¼	D	
23Q1	--Parker	430	Dr	-	181	-	-	-	-	T	25	Irr	
23R1	do.	455	Dr	6	92	-	-	-	-	J	2	D,S	
23R2	R. L. Parker	455	Dr	8	67	-	-	-	-	J	2	D,S	Yields 27 gpm.
24H1	F. Lipenski	420	Dg	60	24	7	Gravel	12	-	C	¼	D	L.
24J1	R. H. Rogers	445	Dg	60	21	-	-	5.96	8-16-60	N	-	N	
24J2	do.	445	Dg	48	17	-	-	9.34	8-16-60	P	1	D	Well has gone dry.
25D1	D. Reichlein	420	Dr	6	82	-	Sand (?)	-	-	J	½	D,S	
25D2	do.	420	Dg	36	8	-	-	5.54	7-15-60	C	½	N	Well can be pumped dry.
26C1	H. C. Hardisty	450	Dr	6	90	-	Sand	30	-	J	½	D	Well penetrates blue and brown clay; bottoms in sand.

26D2	do	450	Dr	6	96	-	do.	30 37.40	- 7-15-60	J	2	S	Well penetrates blue and brown clay with water-bearing sand below.
26D3	H. C. Hardisty	450	Dr	6	100	-	Sand	-	-	J	1½	D,S	Cp.
26F1	do.	445	Dr	10	159	159	-	20	-	Sb, T		Irr	Dd 128 ft, pumping 120 gpm; L.
26H1	Robert Hansen	440	Dr	6	42	-	Sand, black	14	-	-	½	D	
26K1	J. Grinde	477	Dg	36	37	37	Hardpan (?)	33.94 30.83	6-26-56 7-15-60	J	3/4	D	Water level low in Oct. and Nov.
27C1	--Thomas	390	Dr	10	69	69	-	11.90 13.36	10-13-54 7-15-60	C	¼	D,S	
28B1	McKenna Lumber Co.	305	Dg	40	20	-	Gravel (?)	12.84	7-13-60	C	5	PS	
28C1	McKenna Home for Aged (Morehaven Inc.)	295	Dr	8	80-85	-	Sand and gravel	-	-	J	3	Inst	Iron content is objectionable.
							T. 17 N., R. 3 E.						
1E1	Charles Harkins	525	Dg	48	24	10	Sand, gray	10 15.64	1-8-53 8-29-60	J	½	D	L.
1E2	F. Francisco	540	Dg	36	27	-	-	14.04	1-8-54	P	-	D	
1N1	J. E. Bell	525	Dg	48x60	20	-	Hardpan	8.80	5-23-60	-	-	D	Dd 11 ft after 16 hrs pumping 6 gpm.
1Q1	Allen Cotten	525	Dg	44	37	6	-	4.63 21.32	1-8-54 8-29-60	C	1/3	D	
2E1	P. Knudson	590	Dg	72	23	6	Sand and gravel	12.26	5-23-60	J	½	D,S	Drilled chiefly through "hardpan."

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 17 N., R. 3 E.--Continued						
2N1	R. L. Harland	600	Dg	42	32	8	Sand,yellow	24.90 27.20	1-8-54 5-23-60	J	1/3	S	
2N2	do.	605	Dr	6	115	-	-	99.38	5-23-60	Sb	3/4	D	
2Q1	Harkins, Co.	549	Dr	6	65	-	-	42.46	5-23-60	J	3/4	D	
2R1	Bernice Acton	505	Dr	8-6	578	-	-	-	-	-	-	D	Cp, L.
3E1	Mrs. Peterson	520	-	6	-	97	Sand	62	3- -52	J	1	D,S	Water level recovers slowly after pumping.
3H1	G. H. Erickson	595	Dg	48	22	-	-	12.27 11.80	1-8-54 5-23-60	J	¼	D,S	
4A1	J. Brand	480	Dr	6	65	-	-	35	3-18-54	J	1	D,S	
4A2	do.	460	Dr	6	24	-	-	19.32	5-10-60	N	-	N	
4F1	D. L. Flowers	510	Dg	48	32	4	-	15	2-9-54	P	¼	D	Well penetrates till through entire depth.
4G1	do.	475	Dr	6	148	148	-	70	6- -47	J	5	D,Ind	Dd slight after 2 hrs bailing 35 gpm.
4N1	Arvid Backstrom	475	Dr	6	258	258	Gravel	38 52.25	1951 5-22-60	J	1	D	Cp.

4R1	Jack Burnside	490	Dg	36	27	3	-	3.70 1.79	2-9-54 5-23-60	P	1/4	D	
5A1	--Sifford	425	Dg	12	11	-	Gravel	4.94 6.68	2-10-54 5-24-60	C	1/2	D	
5C1	E. Jescke	425	Dr	8	58	-	Sand and gravel	31.15	5-24-60	J	1	D,S	
5E1	--Pease	430	Dr	6	70	70	Gravel	48	5-20-48	T(?)	2	-	Dd 10 ft after 4 hrs pumping 29 gpm; L.
5J1	H. Hulscher and D. Benjamin	440	Dr	6	100	40	-	27.99	2-9-54	J	1	D,S	
5P1	H. L. Segar	430	Dg	48	18	-	-	9	Summer 1953	J	1/4	D,S, Irr	
5Q1	J. T. Jackson	431	Dg	3	15	-	Sand	8.20	8-16-60	C	0.6	Ind	Casing set in dug well; supply occasionally inadequate.
5Q2	do.	431	Dr	4	100	100	do.	37.39	8-16-60	J	1/3	D,S	Well penetrates several layers of "hardpan" interbedded in quicksand.
6D1	G. Anderson	395	Dg	24	30	-	-	5	2-11-54	P	1/4	D	
6G1	Raymond Wogomon	425	Dg	24	15	-	-	2.28	5-26-60	C	-	D	
6H1	W. Lenz	440	Dg	36	16	16	Sand	8.43 9.34	2-10-54 5-26-60	P	1/4	D,S	
6P1	Ray Richmond	425	Dg	10	28	-	Gravel	3.19	5-27-60	J	1/2	D	Casing set in dug well.
6Q1	Jack Feak	390	Dr	8	260	252	-	35	1952	N	-	N	Well destroyed; L.
6Q2	do.	415	Dg	36	23	-	-	13.94 8.70	10-22-54 5-26-60	J	1/4	D	
8B1	C. C. Guthrie	440	Dg	28	18	18	-	12.33 12.75	2-10-54 5-26-60	P	1/4	D	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 17 N., R. 3 E.--Continued						
8D1	Emil Lenz	422	Dn	2½	17	-	Sand	-	-	P	½	D	Well penetrates sand through entire depth.
8D2	--McIntyre	450	Dr	6	102	100	-	26.23	2-10-54	J	1	D	Yields 200 gpm.
8D3	Harry Nordyke	425	Dr	6	143	-	-	8.30	5-26-60	C	3/4	D	
8E1	A. Wymer	410	Dr	6	71	-	Gravel and sand	Flowing	5-26-60	J	1/4	D	Well penetrates blue clay to 22 ft, sand and gravel to 50 ft, "hardpan" to 71 ft.
8R1	H. G. Amundsen	445	Dr	8	99	99	Sand, coarse	.33	7-21-60	J	1½	D,S	Dd 45 ft after 1 hr pumping 100 gpm; temp. 54° F; L.
9B1	J. A. Frank	480	Dg	48-24	5	-	-	1.26	5-23-60	C	½	D,Irr	
9D1	R. W. Bainter	490	Dg	48	42	12	-	36.09	7-21-60	J	1/3	D,S	Supply inadequate.
9M1	L. O. Dickens	476	Dg	49	30	3.5	-	9.97	7-21-60	C	½	D	Supply inadequate.
10A1	H. Kuhlmann	605	Dr	6	87	-	Gravel	84.85	2-9-54	J	1	D	L.
10D1	N. E. Egland	510	Dg	48	90	-	-	60	2-9-54	P	1	D,S	
10G1	C. L. Groce	620	Dg	36	18	-	-	7.16	5-23-60	C	½	D	
10M1	C. L. Rawlinson	550	Dg	24	30	6	Till	12.77	8-11-60	-	-	D	Supply very poor.
11G1	J. A. Holroyd	555	Dr	8-6	264	-	Gravel	37	-	J	3	D,Irr	Pumped fine sand at 150 ft, deepened to 264 ft.

11R1	H. O'Brien	580	Dg	48	25	12	-	2.14 17.52	2-8-54 8-29-60	J	½	D,S	Supplies 70 head of stock.
12P1	F. V. Bartholomew	565	Dg	36	13	-	-	3.45 5.40	2-4-54 8-29-60	N	-	D	Well discharges by gravity.
13A1	Henry Taylor	566	Dg	48	-	6	Gravel and sand	14.38	8-18-60	C	½	D	Well penetrates about 15 ft of till near surface.
13C1	Mrs. Ella Allen	565	Dr	6	91	-	-	63.07	8-29-60	J	½	D,S	
13D1	Bill Brashears	574	Dr	6	117	-	-	80.15	8-29-60	J	-	D	
13E1	H. H. Henrickson	553	Dg	48	18	3	Hardpan	2.59 6.98	2-8-54 8-29-60	P	¼	D,S	
13G1	Fred Kronquist	525	Dr	6	75	75	Sand, fine, blue	40 26.56	10- -52 8-29-60	Sb	½	S	Iron content is objectionable.
13G2	do.	525	Dr	6	30	30	-	8 8.42	- 8-29-60	J	3/4	S	Iron content is objectionable.
13G3	do.	530	Dg	48	18	-	Sand	12	-	J	½	N	Supply inadequate.
13J1	Augusta Raysbrook	540	Dg	24	12	-	-	9.65	8-29-60	P	¼	D	
13J2	H. E. Alloway	540	Dr	6	24	-	-	11.15	8-29-60	J	½±	D	Iron precipitate reported in water.
13P1	A. Swanson	530	Dr	6	75	75	-	33	-	C	1	D	Iron reported in water.
15E1	George Logan	512	Dr	6	68	-	-	-	-	J	3/4	D,S	
16A1	N. W. Rhoades	520	Dr	6	105	-	-	35	1953	C	½	D,S	
16E1	Floyd Corbin	485	Dg	60	39	6	-	26.25	10-14-54	-	-	N	Well destroyed.
16E2	do.	485	Dr	6	86	86	-	42	R	J	½	D	Slight dd, pumping 20 gpm; L.
16Q1	Melvin Berglund	528	Dg	48	26	-	-	19.52	7-21-60	J	¼	D	
16Q2	do.	528	Dr	10	190+	-	-	26.51	7-21-60	J	1	S, Irr	Cp.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 17 N., R. 3 E.--Continued						
17C1	G. W. Colyar	440	Dg	30	24	10	Sand	4.50 2.00	2-10-54 5-26-60	J	1	D,S	
17F1	G. C. Peterson	440	Dg	36	14	-	do.	5.71 2.08	10-14-54 5-26-60	-	-	D	L.
17G1	A. W. Peterson	460	Dg	42	75	-	Gravel	39	1930	P	-	D,S	L.
17R1	E. L. MacAllister	493	Dg	36	26	-	-	18.20	7-21-60	J	½	D,S	Supply inadequate.
18H1	W. Brandt	416	Dr	6	96	-	-	14.04	2-11-54	J	1	D	
18N1	A. R. Redburg	425	Dr	6	83	83	Gravel	Flows	-	J	1	D,S	
18N2	do.	425	Dg	48	22	4	do.	12.34	7-21-60	-	-	N	
19B1	Fred Schafer	460	Dg	40	40	3	Gravel and sand	17.76	3-4-54	C	½	D,S	Well pumps dry in 2 hrs; L.
19J1	R. L. Murphy	478	Dg	108	40	-	do.	30	-	C	1	D	"Hardpan" at surface.
19N1	T. W. Croom	460	Dg,Dr	48-6	79	12	-	8.58	3-4-54	J	½	D	Dug well inadequate at 29 ft, drilled to 79. Water level in dug portion.
19N2	L. A. Meade	460	Dr	6	106	106	Gravel	21.51	8-16-60	J	1	D	
20A1	C. O. Robinson	495	Dr	6	67	67	-	Flows	-	J	½	D	Flows 20 gpm; L.
20C1	N. Rogich	445	Dr	8	70	-	-	Flowing	5-26-60	T	1½	D,S, Irr	Flows 8 gpm.

20H1	I. M. Larson	500	Dr	8	92	92	Gravel	20	-	T	5	D,S, Irr	Dd 60 ft after 1/3 hr pumping 60 gpm. Iron stains reported on plumbing equipment; L.
20H2	do.	500	Dg	42	29	6	-	7.57	12-30-53	J	¼	D	
20J1	E. G. Stovern	490	Dg	36	22	20	-	3.17	12-30-53	-	-	D,S	Withdrawal by bucket and windlass.
20N1	Walt Schorno (Schorno Farms)	460	-	48x60	100	-	-	6.03	8-16-60	J	½	D	
21D1	John Kizer	485	Dg	36	12	-	-	-	-	-	-	N	Well destroyed.
21D2	do.	492	Dr	10	66	66	-	-	-	J	1	D,S	Dd 10 ft, pumping 110 gpm; temp. 48° F; L.
21M1	Alvin Green	495	Dr	6	80	-	-	1.51	8-11-60	J	3/4	D	Dd 56 ft, pumping 30 gpm. Flows in winter; L.
22E1	R. S. Boyd	510	Dg	72	26	12	-	15.00	7-21-60	P	¼	D	Supply inadequate.
22K2	James Gasaway	530	Dr	6	52	-	-	43± 28.74	11-5-52 8-11-60	J	½	D	Dd 2 ft after pumping 5 gpm; L.
22P1	Mary Prescott	525	Dg	60	35	6	-	11.72	8-11-60	C	1	D	Till observed at surface.
22Q1	G. W. Gloyes	527	Dg	60	29	-	-	11.59	Spring	-	-	D	Slight dd, pumping 1,000 gpm; well penetrates clay and gravel; Cp.
22Q2	Don Green	530	Dg	48	29	6	-	10.96 25.81	2-9-54 8-11-60	J	-	D	
24A1	Bob Gallup	555	Dg	48-18	34	32	Gravel	7.36	2-4-54	J	1/3	D	L.
24J1	L. Nitzel	610	Dr	6	89	-	-	45.75	2-24-54	J	½	D	
24J2	do.	595	Dg	36	18	2	-	1.80	2-4-54	-	-	Irr	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 17 N., R. 3 E.--Continued						
24M1	Harold Wagner	540	Dg	24	23	-	-	9.13 14.18	2-4-54 8-11-60	N	-	N	
24M2	do.	540	Dr	6	23	-	-	10 9.40	2-4-54 -	J	$\frac{1}{2}$	D	Slight dd, pumping 8 gpm. "Hardpan" and boulders throughout entire depth.
24R1	E. R. Meyer	635	Dr	6	74	-	-	-	-	C	1	D,S	Iron content is objectionable.
24R2	do.	630	Dg	48	36	2	-	7.71	2-4-54	J	$\frac{1}{2}$	Irr	Till at surface.
25C1	Fred Fisher	585	Dg	54	19	-	-	16.77	8-18-60	P	$\frac{1}{4}$	D	Well is dry occasionally.
25D1	Walter Crosetto	575	Dr	6	98	-	-	58	8- -51	J	1	D,S	Well penetrates till.
26D1	Guy Taylor	520	Dg	72	34	0	Gravel	12.31 18.50	2-9-54 8-11-60	C	3/4	D	
26E1	I. W. Brown	530	Dg	48	20	3	-	4.43	12-30-53	-	-	D	Withdrawal by bucket and windlass.
26K1	Walter Roberts	580	Dg	48	47	0	-	39.00	8-11-60	J	1/3	D	Till exposed in well from land surface to 20 ft.
28A1	Humble Oil and Refining Co.	518	Dr	-	5721	-	-	-	-	N	-	N	Oil test well,destroyed; L.
28D2	A. E. Palmer	500	Dr	6	41	-	-	15.98	8-11-60	J	1	D,S	

28K1	L. E. Steltz	485	Dg	48	16	-	-	12 11.92	12-30-53 8-18-60	P	½	D	Pumps 3½ gpm. Water leaves white film on cookware.
28M1	Albert Steele	490	Dg	32	9	9	-	8.29	7-18-60	J	-	D	Very little fluctuation in water level.
30A1	Walt Schorno (Schorno Farms)	484	-	6	90	-	-	-	-	J	½ 1	S	Supplies dairy.
30D1	--Lapenski	465	Dg	48	41	-	-	7.10	7-18-60	C	½	N	
30F1	Gerald Loney	475	Dg	48	28	6	-	12.31	12-29-53	J	½	D	
30J1	Orville Templeman	465	D	-	-	-	-	-	-	J	1	D	Water reported to have bad taste.
31K1	John Russell	450	Dg	42	15	-	-	Flows	-	-	-	-	
33N1	Tom Crossman	660	Dr	6	104	100	Sand	85 88.47	3-3-54 8-18-60	T	2	D,S	Yields 500 gpm; Cp.
33N2	do.	660	Dg	33	15	3	-	7.05	8-18-60	-	-	N	Well penetrates till from land surface to 13 ft.
34R1	Wilfred Stephenson	553	Dg	30	-	8	-	7.57	8-18-60	P	½	D	Supply inadequate.
							T. 17 N., R. 4 E.						
1A1	J. S. York	725	Dg	48	35	7	"Hardpan"	28.01	9-23-60	J	1/3	D	
1B1	Harry Zeller	705	Dg	72	20	-	Gravel and sand	10.93	9-29-60	C	-	D	
1H1	Jens Mickelson	760	Dr	6	84	-	-	42.08	9-23-60	J	½	D	
1N1	R. R. Kelley	678	Dr	6	52	-	-	9.22	9-12-60	J	1	D	Dd 15 ft, bailing 20 gpm. Iron content is objectionable; L.
1Q1	L. G. Fairbanks	730	Dr	6	97	-	-	-	-	J	1	D	Iron content is objectionable.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
T.17 N., R. 4 E.--Continued													
1R1	J. W. Carlson	720	Dg	48	18	6	Hardpan (?)	10	10-27-54	C	1/3	D	
1R2	Ben Bennest	740	Dr	6	120	-	-	55.27	9-22-60	J	1	D	Cp.
1R3	W. J. Dillon	740	Dr	6	105	-	-	60.94	9-29-60	J	1	D	Supplies 3 houses; iron content is objectionable.
2C1	Mrs. Mabel Hansch	670	Dg	42	13	-	-	8.74	9-12-60	J	1/3	D	
2E1	Walt Strickland	655	Dg	48	9	9	-	7.75	9-12-60	J	½	D	
2E2	Andy Nickolaus	645	Dg	36	8	-	-	4.91	9-12-60	C	1	D, Ind	Supplies meat packing firm.
2J1	Laurence Wehrly	675	Dr	6	140	-	-	8 20.75	10-27-54 9-12-60	P	3/4	D	Cp.
2J2	do.	675	Dg	48	25	6±	-	10 10.14	10-27-54 9-12-60	P	-	N	
3B1	J. W. Richardson	660	Dg	60±	30	-	-	28.27	9-29-60	J	½	D	Supply inadequate; "hardpan" visible for about 12 ft.
3D1	Ted Thirion	640	Dg	72	18	-	-	5.55 11.71	10-27-54 9-12-60	P	1/3	D	Supplies 1 house and 1 store. Till at surface.
3R1	A. Nickolaus	650	Dr	6	64	64	-	60 5.85	- 9-12-60	J	½	D	

4E1	David Fields	634	Dr	6	200+	-	-	-	-	J	6	D,S	Supplies dairy.
4Q1	H. Anderson	660	Dr	6	97	97	Gravel	31 51.85	6- -53 9-12-60	Sb	½	D,S	Dd 10 ft, bailing 10 gpm. Supplies 20 head of stock; L.
5A1	J. A. Bjerge	625	Dr	6	140	135	-	10	7-2-51	T	5	D,S, Irr	Dd 25 ft after 4 hrs pumping 100 gpm; L.
5Q1	H. E. Johnson	618	Dg	48	20	10	-	9.23 12.55	10-25-54 9-12-60	C	½	D	Well goes dry short periods each summer.
6F1	Don Goddard	675	Dr	6	100	75(?)	-	12.25	9-15-60	-	-	D	Dd 25 ft, bailing 20 gpm; Cp, L.
6H1	C. Kronquist	700	Dg	60	26	8	Gravel	13.78	9-15-60	C	¼	D	Supply inadequate.
6J1	H. O. Carlson	710	Dr	6	120	-	-	60	9-15-60	J	1½	D,S	Yields 400 gpm.
7D1	V. W. Sherrill	590	Dr	6	105	105	-	50	Summer 1951	J	3/4	D	
7D2	Ashley Brockway	590	Dg	48	21	4	-	4.03 6.75	10-25-54 8-18-60	J	½	D	Supply inadequate.
7N1	E. Larson	575	Dg	42	49	10	-	24.39 33.30	10-27-54 9-15-60	J	¼	D,S	
8D1	C. M. Shelton	643	Dr	6	68	68	-	30	9-12-60	Sb	1	D,S	Well can be pumped dry in 1 hr; Cp.
8H1	J. W. Wood	629	Dr	6	121	-	-	44	11- -58	J	2	D,S	
9A1	Unknown	640	Dg	-	-	-	-	8.79	9-1-60	J	1	D	Supplies restaurant.
9D1	Bradley Brazel	639	Dr	6	90	-	-	40.37	9-12-60	J	3/4	D	Supplies 3 houses.
9P1	Norton Wells	639	Dr	6	103	-	-	53.37	9-15-60	J	1	D	
10B1	Olaf Gund	650	Dr	6	41	41	Gravel and sand	12.60	9-29-60	J	1	D,S	Supplies 70 head of stock.
12G1	Tony D'Andrea	660	Dg	72	21	4	Gravel	10.07	9-22-60	C	½	D,S	Iron content is objectionable.
12G2	C. R. Bullion	720	Dg	-	32	-	Sand and gravel	28	9-22-60	J	½	D,S	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 17 N., R. 4 E.--Continued						
12P1	T. H. Zimmerman	635	Dg	48	17	-	-	9.77	9-29-60	P	¼	D	
14H1	D. D. Borden	605	Dr	6	125	-	-	Flowing	9-29-60	J	1	D	Flows ½ gpm. Iron content is objectionable.
14H2	Lee Dilley	605	Dr	6	90	-	-	-	-	J	1	D	Iron content is objectionable, has sulfur odor.
14P1	R. C. Stidham	660	Dr	6	87	87	-	25	10-25-54	J	1	D,S	Dd 75 ft after 4 hrs pumping 15 gpm.
16D1	I. Furro	625	Dg	36	-	-	-	2.70	9-15-60	-	-	D	Supply inadequate.
16Q1	R. S. Finch	685	Dg	48	14	-	Gravel	2	9- -54	N	-	N	Well destroyed.
17B1	D. J. Connely	617	Dg	42	46	6	-	37.90 36.68	10-27-54 9-15-60	J	½	D,S	
18N1	Eunice Potrafke	540	Dg	24	26	14	Gravel	12.58	8-18-60	-	-	N	Iron content is objectionable.
18N2	do.	540	Dr	6	98	98	Sand	-	-	J	2	D,S	Do.
19D1	Selle's Farm Supply	550	Dr	6	65	-	-	-	-	J	1	D	Casing perforated at 63 ft; iron content is objectionable.
19E1	Weyerhaeuser School	575	Dg,Dr	6	52	-	Gravel	31 33.28	7-1-52 8-18-60	J	3	Inst	Dd 2 ft, bailing 30 gpm; iron content is objectionable; L.
19G1	W. R. Dalin	600	Dr	6	65	-	-	22.42	9-16-60	J	1	D,S	Supplies poultry farm.

20C1	D. W. Thorson	678	Dg	48	26	-	-	12.57 18.61	10-26-54 9-16-60	P	1/3	D	
22F1	R. C. Stidham	660	Dr	6(?)	100	-	-	20	-	J	1	D,S	Dd 80 ft after 1 hr pumping 17 gpm.
22K1	--Simi	625	Dr	6	125	125	-	-	-	J	½	D	Cp, L.
22K2	A. H. Wannbery	625	Dr	6	70	-	-	11.39	9-2-60	J	1/3	-	Water contains a small amount of iron.
23D1	R. M. King	625	Dr	6	52	52	-	Flowing	10-26-54	J	1	D	
23E3	T. W. Thirion	613	Dr	6	40	-	-	Flowing	9-16-60	-	-	D	Supplies resort.
23F1	H. Rietzel	615	Dr	6	32	32	Gravel	4	4-21-50	J	½	D	Dd 18 ft, pumping 10 gpm; L.
23F2	E. V. Wold	635	Dr	6	55	55	-	25	-	J	½	D	Dd 10 ft, pumping 12 gpm; iron content is objectionable; L.
27D1	Alvin Peter	600	Dg	31	24	13	-	13.50	9-15-60	P	¼	-	Iron content is objectionable.
27G1	Ray Dally	775	Dr	6	203	-	-	-	-	-	-	D	Supplies resort; iron content is objectionable; Cp.
27Q1	--McCurdy	800	Dg	48	23	-	-	9.71	9-2-60	P	1	D	
28B2	Ann and Frank Hoffman	685	Dg	48	21	6	-	18.80	9-15-60	P	-	D	Supply inadequate for 2 houses.
28P1	Arthur Balch	675	Dr	6	140	140	-	32.39 35.37	10-26-54 9-2-60	J	3/4	D,S	
29B1	L. Flansburg	675	Dg	96	11	3	-	1.90 4.19	10-26-54 9-16-60	P	-	D,S	
29C1	E. Peck	700	Dg	60	34	16+	-	23.94 26.30	10-26-54 9-15-60	J	1	D,S	
29E1	George Hackman	650	Dr	6	92	92	Gravel and sand	50	9-16-60	J	1	D,S	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
						T. 17 N., R. 4 E.--Continued							
30B1	E. L. Kropf	622	Dg	60	25	8	-	8 14.74	10-25-54 9-16-60	C	½	D,S	Cp.
30D1	Ed Hoffman	650	Dr	6	62	-	Gravel	49.30	9-16-60	J	3	D	Iron content is objectionable; Cp.
30M1	Charles Bunch	636	Dg	36	26	4	-	11.93 11.45	10-22-54 9-19-60	N	-	N	
30M2	Clifford Bayliss	636	D	6	103	-	-	-	-	J	1	D,S	Cp.
30M3	Dillard, Stevens	656	Dr	6	96	-	-	49.30	9-22-60	J	1	D	Iron content is objectionable.
30R1	Dennis Deean	596	D	-	102	-	-	-	-	J	1½	D	
31M1	Jack Graber	555	Dg	44	30	-	-	7.71	9-22-60	-	-	D	
31N1	S. R. Pritts	612	Dr	-	100	-	-	-	-	J	1	D	Cp.
31N2	D. D. Neilson	670	Dr	6	125	-	-	-	-	J	1	D,S, Irr	Cp.
31Q1	Harvey Crate	698	Dr	6	42	-	-	18.97	9-22-60	J	½	D	
32D1	John Haratyke	602	Dr	6	130	130	-	60	Summer	J	½	D	Iron content is objectionable.
32H1	Harold Stuard	650	Dr	6	112	-	-	20.73	9-2-60	J	1½	D	Do.
32H2	do.	644	Dg	72	18	6	-	8.99	9-2-60	-	-	N	
33M1	R. Beisel	640	Dg	28	30	6	Sand	9.15	9-2-60	C	1	D,S	

34A1	David Hellyer	810	Dr	6	176	-	-	143	8- -54	J	1	D	Iron content is objectionable.
34N1	A. V. Baardson	730	Dg	36	28	6	Till	17.45	9-2-60	J	1/3	D	Supply inadequate.
							T. 17 N., R. 5 E.						
5A1	Unknown	583	Dr	6	73	-	-	39.18	9-23-60	J	½	D	
6E1	Ronald Hiett	740	Dr	6	170	170	Andesite	23.71	9-23-60	Sb	3/4	D	Dd 25 ft, pumping 28 gpm.
6M1	Dennis Butler	730	Dr	6-4	301	301	-	-	-	Sb	3/4	D	Supplies store and 2 houses; Cp.
7J1	St. Paul and Tacoma Lumber Co.	635	Dr	8	72	72	Sand and gravel	45 37.94	6-11-48 9-23-60	N	-	N	Supply inadequate; L.
7K1	do.	630	Dr	-	182	-	Gravel	36	-	T	10	D	Supplies shop and offices; Cp, L.
7M1	C. W. Voss	640	Dg	-	35	-	-	25.80	9-1-60	P	-	D	
							T. 18 N., R. 2 E.						
34E1	Northern Pacific Ry.	315	Dg	144-60	21	11	-	7.47	2-23-60	T	3	Ind	Dd 13 ft after 2 hrs pumping 120 gpm; C.
34G1	C. A. North	320	Dr	8	26	26	-	12.07 11.53	5-8-51 2-23-60	C	5	Irr	Dd 2½ ft after 4 hrs pumping 150 gpm; L.
34N1	Willhoite-Sprokuffe	310	Dg	36	15	15	Gravel	9.85 3.79	10-2-45 2-23-60	P	-	D,Obs	Supplies 3 houses; hydrograph on figure 10.
35E1	Andy Ketter	340	Dg	-	36	-	Gravel (?)	9.2	2-23-60	J	½	D	
35J1	George Lenz	395	Dg	21	40-50	40-50	-	25.4	2-23-60	P	½	D	
35Q1	do.	390	Dr	6	149	-	-	66	9-30-52	J	3/4	D	Bailed 10 gpm; C, L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 18 N., R. 3 E.						
1D1	--Kuper	375	Dr	6	21	-	-	1.56	4-21-60	C	½	D	
1L1	Jack Brown	432	Dg	16-8	52	-	Gravel	42.79 33.09	1-9-40 5-9-60	J	½	D,S	
2R1	Ed Flood	456	Dg,Dr	32-6	120	-	do.	83.87	1-9-40	J	1	S	Well deepened from 87 ft.
3B1	R. Burnworth	460	Dr	6	135	-	-	80.62	4-27-60	J	2(?)	D,S	
3C1	C. A. Sherman	395	Dr	8	107	107	-	27 20.30	- 4-21-60	T	20	Irr	Dd 11 ft, pumping 230 gpm; L.
3N1	Mrs. Healy	400	Dr	6	66	66	Gravel	-	-	J	½	D	L.
3P1	Jerry Shannon	410	Dr	6	76	76	-	40	10-22-54	J	1	D	L.
3P2	H. Goebel	415	Dr	6	41	38	-	21.14	4-25-60	P	½	D	
3R1	G. C. DeMoss	417	Dg	-	43	-	-	38.50	1-5-40	N	-	N	Well destroyed.
3R2	H. Melton	425	Dr	6	93	-	-	29.58	4-25-60	J	-	D,Irr	Bailed 10 gpm; L.
4A1	G. W. Cluney	395	Dg	6	26	-	Gravel	20.05	1-12-40	J	-	N	
4H1	J. R. Lloyd	388	Dg	48	23	-	do.	13.88	6-5-40	P	½	D	
4K1	Thomas LeBlanc	400	Dr	6	113	113	-	9.20	4-26-60	C	3	D	Dd 2½ ft, pumping 40 gpm; L.
4R1	David Parker	395	Dr	8	80	-	-	6 1.54	8-4-54 4-26-60	T	7½	Irr	Dd 9 ft after 5 hrs pumping 100 gpm; L.

4R2	do.	395	Dr	6	34	-	-	11.41	4-26-60	J	1	D	
7N1	U. S. Government	350	Dg	36	15	-	-	10.83	-	N	-	N	Well destroyed.
10G1	R. M. Daines	412	Dr	8-6	91	91	Gravel	19.5 24.0	4-25-60	J	3	D,S	Dd 49 ft, pumping 140 gpm; 8 ft of 6 in screen; L.
11A1	Frank Fox	456	Dg	24	86	86	do.	83	12-15-39	P	1	D,S	
11A2	Ed Flood	455	Dg,Dr	6	102	-	-	-	-	J	2	D,S	
11D1	Edgar Stevens	430	Dg,Dr	5	95	-	Gravel	56	12- -39	J	3/4	D	
11N1	J. Tibbitts	424	Dr	6	50	50	"Hardpan"	12 24.68	1949 4-25-60	J	½	D	L.
11N2	Elk Plain School	430	Dr	8	61	61	Gravel and coarse sand	42.03	8-4-53	T	10	Inst	Bailed 50 to 60 gpm; L.
11N3	do.	430	Dr	6	102	-	-	36.14	4-26-60	J(?)	2	N	
11P1	Ed Flannery	425	Dg	6	52	-	Gravel	42.00 35.22	- 4-26-60	P	3/4	D,Irr, Obs	Hydrograph on figure 11.
11Q1	John Ockfen	435	Dg	20	52	-	Gravel, tight	32.54 30.97	6-1-40 4-26-60	P	1	D,S	
12M1	Bethel Junior High School	430	Dr	12-8	432	425	Sand and gravel	100	5- -58	T	30	Inst	Dd 191 ft after 7 hrs pumping 252 gpm; L.
12N1	Bethel School	430	Dr	10-5	410	410	-	63	5-10-52	T	20	Inst	Dd 49 ft after 6 hrs pumping 200 gpm; Cp, L.
12Q1	L. E. Balmer	475	Dg	24	38	-	Gravel	31.92	1-5-40	N	-	N	Well destroyed.
12Q2	do.	475	Dr	10	145	145	Sand and gravel	36	-	T	15	Irr	Dd 4 ft after 4 hrs pumping 240 gpm; L.
12Q3	do.	475	Dr	10-8	225	225	"Hardpan" (?)	37.38	5-9-60	J	1½	D,S	Dd 20 ft, bailing 50 gpm. "Hardpan" 17-225 ft.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 18 N., R. 3 E.--Continued						
13A1	M. Kreidler	470	Dg	42	41	-	-	-	-	-	-	N	
13D1	H. T. Bonnel and others	445	Dr	6	45	45	-	20	-	J	½	-	Dd 12 ft, pumping 17 gpm; L.
13E1	S. Bennett	420	Dg	18	30	30	-	14.32	5-18-60	C	½	D,S	
14A1	H. E. Stargel	425	Dr	6	57	-	Gravel	27	4-1-53	J	3/4	D	Dd 5 ft, pumping 8 gpm; L.
14K1	Mrs. L. Fairley	420	Dr	6	65	-	-	15.39	5-18-60	J	½	D	
14Q1	--Butts	460	Dr	6	72	72	-	41.45	5-28-40	-	3/4	D,Obs	Penetrates "hardpan" about 30 ft below land surface, hydrograph on figure 10.
14R1	M. Stone	460	Dr	6	68	-	-	38.27	5-10-60	J	½	D	
19R1	U. S. Government	385	Dg	60	31	-	Gravel	15.08	6-1-40	N	-	N	Well destroyed.
24A1	A. A. Reuther	480	Dr	6	61	61	-	3.96	2-28-61	J	1½	D	
24E1	J. E. Burks	455	Dg	36	9	-	Gravel, coarse	10 5.80	- 4-27-60	J	¼	D	
25F1	C. L. Liles	470	Dg	36	20	-	Gravel	16.41	6-1-40	P	¼	D	
25F2	W. K. Rogers	467	Dr	6	53	-	-	23.84	4-27-60	J	½	D	Dd 6 ft, pumping 20 gpm; L.
25H1	Art Crate	474	Dg	-	24	-	-	22.78	9-22-60	C	½	D	

25M1	R. Helverson	460	Dg	6	38	38	-	16.67	5-10-60	J	-	D	
25P1	Barney McFadden	443	Dg	-	69	-	-	27	7-30-56	-	-	Irr	Dd 15 ft, pumping 10 gpm.
26F1	C. Riley	440	Dg	48	19	-	-	13.37	5-10-60	C	¼	D,S	
26G1	J. Beckman	440	Dg	24	-	27	-	10.10	4-27-60	J	-	D	
27E1	M. E. Murray	412	Dg	48	19	-	Gravel	14.78	6-1-40	N	-	N	Well destroyed.
27G1	G. H. Harlow	430	Dg	44	41	-	-	20.57	5-10-60	J	1	D	
34H1	Unknown	425	Dg	53	23	-	-	4.62	5-10-60	C	1	D	
							T. 18 N., R. 4 E.						
1A1	Town of Orting	510	Dr	6	260	260	-	121.5	7-13-60	T	15	Irr	Cp.
1B1	V. C. McMahon II	544	Dg	24	13	-	Gravel	7.66 7.01	12-21-39 6-16-60	N	-	N	
3E1	John Howard	561.4	Dg	54	79	-	do.	78.61 Dry	1-5-40 6-6-60	-	-	D	L.
3M1	C. E. Southard	554	Dg	48	7	-	do.	1.32	1-5-40	-	-	N	Well destroyed.
3M2	E. M. Arthur	560	Dr	6	87	87	-	-	-	J	1	D	Yields 22 gpm.
3N1	Mrs. Storrar	563	Dg	42	103	-	Gravel	85 67.99	12- -39 6-6-60	J	1	D	Deepened from 86 ft in 1945.
4H1	Mrs. Ellis Jones	564.7	Dg	48	16	-	do.	11.48	1-5-40	N	-	D	
4H2	N. Ianello	565	Dr	6	126	-	-	80 93.42	1- -51 6-16-60	T(?)	2	D	Dd 4 ft, bailing 5 gpm; L.
4Q1	Anton Dworsky	545	Dg	30	10	-	Gravel	1.89 2.03	12-22-39 5-31-60	P	-	D,S	Supply inadequate.
4Q2	do.	541	Dg	36	103	-	do.	Dry	12-22-39	P	2	D,S	Do.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
T. 18 N., R. 4 E.--Continued													
5B1	Ross Plumb	476	Dg	36	108	108	Gravel	105.95 89.38	1-9-40 5-27-60	J	1	D,S	Supplies 2 houses.
5G1	Unknown	475	Dr	6	102	102	do.	-	-	-	-	D	L.
5L1	J. Cieplik	435	Dr	7	58	50	-	41.9	8-3-54	J	3/4	D	Well deepened from 58 ft; dd about 42 ft, bailing 8 gpm; L.
5P1	A. M. Glew	450	Dg	12	53	-	Gravel	53	1-9-40	N	-	N	Well destroyed.
6R1	Ray Richmond	425	Dg	10	27	-	do.	2.19	5-27-60	J	½	D	
7F1	Ed Parham	480	Dg, Dr	6	90	90	do.	-	-	J	1	D,S, Irr	Dd about 80 ft, bailing 5 gpm; L.
7M1	Roy Carlson	490	Dr	6	214	214	-	200	5-31-60	J	3/4	D	Cp.
7P1	Joe Jupiter	515	Dg	-	81	-	-	78.60 78.61	6-10-40 5-30-60	P	1/3	D,S, Obs	Hydrograph on figure 10.
8D1	J. Corbitt	425	Dr	6	85	-	-	9.72	6-2-60	J	½	D	
8F1	E. K. Waldron	426	Dr	12	152	-	Gravel	31.59 4.92	1-5-40 6-3-60	P	0	D,S	
8G1	McGee's Guest Home	498	Dg,Dr	30	200	-	do.	96.95	1-5-40	P	1	N	Deepened from 97 ft in 1945.
8G2	do.	495	Dr	6	145	145	-	-	-	J	2	Inst	L.

8J1	Albert Nelson	494	Dg,Dr	6	69	-	Gravel	35.77 17.39	1-5-40 6-2-60	J	1	D,S	Deepened from 59 ft.
8N1	K. E. Aultman	515	Dr	6	120	85	-	50.49	6-3-60	J	-	D,S	
8R1	R. Abroe	503	Dg	34	54		Gravel	42.17 37.9	12-29-39 5-31-60	J	½	D,S	
9A1	A. A. Ellis	576	Dg	42	90	-	do.	88.23 67.3	12-21-39 6-6-60	J	3/4	D	L.
9A2	H. E. Johnson	580	Dg,Dr	6	99	-	-	83	10- -40	J	-	N	Penetrates till to 55 ft; well destroyed.
9A3	E. E. Marriott	575	Dr	6	111	-	-	74.39	6-6-60	J	1	D	
9J1	C. G. Struve	560	Dr	6	125	125	-	86.62	6-6-60	Sb	-	D,S	Yields 10 gpm. Can be pumped dry in 5 min.
9Q1	E. G. Tinius	575	Dr	6	130	-	-	77.87	6-3-60	Sb	1	D,S	Yields 20 gpm; L.
9R1	George Ulvang	595	Dg	42	73	-	-	66.77	-	P	½	D,S	L.
9R2	Graham Grange	600	Dr	6	113	-	-	100±	1941	J	1½	PS	
9R3	Graham Garage	603	Dg	60	10	-	-	5.72	6-3-60	Sb	½	D,Obs	Hydrograph on figure 11.
10L1	R. Henderson	599	Dg	48	29	-	Till	4.7	3-8-40	-	-	D,S	Well penetrates "hardpan."
10L3	Robert Polly	605	Dg,Dr	48-6	138	-	Gravel	60	-	J	½	D,S	Occasionally went dry at 71 ft so was deepened to present depth.
10L4	E. B. Rathbun	605	Dr	6	112	108	-	60.51	6-3-60	C	40	D	Yields 600 gpm.
10N1	Fred Erickson	603	Dg	30	10	-	Sand	3.08	-	P	1/3	D	Sand and gravel to bottom of well.
10N2	do.	603	Dr	6	40	40	-	5.55	6-3-60	C	½	N	
10Q1	A. S. Andrews, Sr.	639	Dr	8	98	98	-	50	-	T	5	D,S	Yields 300 gpm; C, L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 18 N., R. 4 E.--Continued						
10Q3	A. S. Andrews, Jr.	625	Dr	6	86	86	-	37.11	6-6-60	J	-	D	
11R1	--O'Neil	752	Dg,Dr	6	94	-	-	80 76.33	10- -40 6-6-60	J	1	N	
11R2	Mrs. R. Knowles	747	Dr	6	78	78	-	54.71	6-7-60	J	½	D	Supplies 2 houses.
11R3	I. S. Pratt	745	Dr	6	76	76	-	56	1952-3	J	3/4	D	Supplies store and 2 houses; L.
12G1	William Stewart	800	Dg	48	9	9	-	1.17	6-16-60	C	1/6	D	
12M1	C. Wade	730	Dg	36	26	20	Sand and gravel	15.19 19.85	3-5-40 6-6-60	C	1/3	D,S	
12P1	G. F. Peterson	765	Dg	36	54	49	Gravel, sandy	48.68	3-6-40	J	½	D,S	
13D1	Ken Pavey	775	Dr	6	66	-	-	54	1954	J	3/4	D	Yields 750 gpm.
13M1	Lillian Meier	757	Dr	6	89	-	-	54 30.24	1936 6-16-60	J	1	D,S	
14B1	Henry and Otto Moebins	768	Dr	8	115	115	-	75 79.91	- 6-6-60	T	7½	Irr	Dd 20 ft, pumping 100 gpm; L.
14C1	O. R. Moebius	775	Dr	4	65	-	Gravel, sandy	56.58 52.77	3-5-40 6-3-60	-	1/3	D,S, Obs	Dd negligible after 4 hrs pumping 450 gpm; temp. 47° F; hydrograph on figure 12.
14F1	V. W. Wright	800	Dr	6	160	-	-	100+ 118.64	2-27-51 6-7-60	P	1½	D,S	Supplies 2 houses; Cp.

14L1	L. E. Nichols	810	Dg	48	25	-	-	16.42	6-7-60	J	¼	D	
14R1	Fred Lydick	775	Dr	6	120	120	Gravel	74.54	6-22-60	J	1	D	
15B1	Allan Chestnut	639	Dr	6	80	-	-	10	-	J	1	D,S	
15E1	Graham Post Office	630	Dg	36	63	-	Gravel	1.52 1.61	2-27-51 6-2-60	J	½	D	
15E2	--Adams	635	Dr	6	106	106	do.	50 33.38	12- -50 6-3-60	N	-	N	Dd 20 ft, bailing 6 gpm; L.
15G1	F. G. Dworsky	700	Dg	36	15	-	-	3.91 6.09	2-27-51 6-2-60	P	¼	D	
15N1	F. H. Goebel	820	Dg	-	28	-	-	20.14	2-27-51	P	¼	N	
15N2	Don Klingler	766	Dr	6	101	101	-	10 88.02	10-15-54 6-13-60	Sb	½	D,S	L.
15P1	R. F. Hampton	790	Dr	6	216	-	Sand and gravel	155	8-6-52	Sb	-	D	Slight dd, pumping 12 gpm; L.
15P2	V. Ackerson	780	Dg	60	24	4	Sand	18.39	6-13-60	J	1/3	D	
16E1	W. L. Funk	515	Dr	6	98	-	-	13 32.65	8- -52 6-2-60	C	2½	D	Supplies 2 houses; L.
16E2	D. C. Ferguson	512	Dr	6	120	-	-	32.35	6-2-60	J	½	D	
16E3	Walt McGee	517	Dr	6	116	116	-	25.44	6-2-60	Sb	1(?)	D	
16L1	L. F. Kennard	555	Dr	6	119	119	Gravel	68.19 70.27	2-28-51 6-2-60	J	3/4	D,S, Irr	
17B1	--Jolliff	490	Dg,Dr	6	110		Sand	51.90 28.83	11-3-41 5-31-60	J	½	D	Penetrated "hardpan" at 90 ft.
17D1	Robert Clupf	512	Dr	6	104	104	-	48.65	5-31-60	Sb	1½	D	
17J1	W. Myers	500	Dg	36	28	-	-	17.44	2-28-51	J	½	D	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 18 N., R. 4 E.--Continued						
17R1	C. M. Gardner	500+	Dr	6	90	-	Gravel	20	6-2-60	J	½	D	Supplies 2 houses.
18A1	W. B. Miller	517	Dg	60	59	-	do.	44.28	12-29-39	-	-	N	Well destroyed.
18J1	Walt Stanger	508	Dg	48	31	-	Gravel	21.97	6-3-60	J	½	D	
18M1	Dave Buckner	482	Dg	36	32	-	-	17.54	6-3-60	J	½	D	
20N1	Lloyd Morris	525	Dr	6	25	25	-	17.03	6-28-60	C	1/3	D	
21A1	D. T. Lindberg	842	Dg,Dr	6	151	-	-	142.43	9-6-41	J	2	D	
22B1	G. E. Toole	860	Dg	36	30	-	Sand	20.74	6-13-60	J	½	D,S	
22E1	Mrs. Elmer George	875	Dg	36	15	-	-	7.16	6-28-60	C	½	D	
22E2	Graham Hill Mutual Water Co.	885	Dr	8	359	359	Sand and gravel	260.12	11-23-60	-	-	PS	Yields at least 50 gpm; L.
22M1	L. M. Curtiss	895	Dr	8	320	-	-	248.06	6-13-60	Sb	5	D,S	
22N1	G. P. Fager	860	Dg	36	32	-	-	19.65 21.36	2-28-51 6-13-60	J	1	D,S	
23A1	--Stankey	762	Dr	6(?)	80	80	Gravel	60 56.76	- 6-22-60	J	1	D	
23C1	H. Reed	745	Dr	6	81	81	do.	56 45.38	5- -53 6-7-60	J	1	D,S	Little dd, pumping 15 gpm; L.

23M1	William Motycka	720	Dg	48	18	-	-	8.17 8.40	2-27-51 6-7-60	P	¼	D,S	
24M1	Lee Edwards	720	Dr	6	47	47	Clay	-	-	J	1/3	D,S	
25E1	E. A. Robinson	715	Dg	48	25	4-5	Gravel	Surface 10.88	2-20-54 6-15-60	P	¼	D,S	Supply inadequate; L.
25F1	M. Miller	710	Dr	6	62	60	-	14.81	8-11-60	J	3/4	D	
25L1	W. Metzener	710	Dg	60	21	-	Till	8.84	5-12-60	J	¼	D,S	
26D1	John Schiemer	719	Dr	6	89	89	-	28.3	2-27-51	J	½	D,S	
26D2	Helen Boskovich	719	Dr	-	39	-	-	9.85	6-7-60	J	1	D,S	
26G1	L. O. Gray	705	Dg	36	30	-	-	1.87	2-27-51	P	¼	D	
27B1	N. A. Nelson	748	Dr	6	87	-	-	38.66	2-27-51	J	1	D	
27C1	do.	748	Dg	36	20	-	-	4.85	6-13-60	J	½	S	
27E1	D. M. Jorgensen	334	Dg	48	20	-	-	4.89	6-22-60	C	1	D	
27E2	E. Cope	740	Dr	6	92	92	-	46.23	6-28-60	J	1	D	
27F1	S. M. Jorgensen	728	Dr	4	89	87	-	30	6-22-60	J	½	D	
27K1	W. C. Lavenborg	700	Dg	48	24	-	-	6.52	6-15-60	C	¼	D	
27K2	Fred Wiese	710	Dr	6	162	162	-	55.49	6-15-60	J	¼	D,S, Irr	Yields 125 gpm.
27M1	Kapowsin Grade School	730	Dr	6	160	85	-	35.40	2-28-51	T	7½	Inst	
27N1	S. H. Abrahamson	715	Dg	48	26	26	-	16.06	6-28-60	P	-	S	
27Q1	H. E. Bilderback	675	Dr	6	105	105	-	40	-	J	1	D	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 18 N., R. 4 E.--Continued						
28J1	E. L. Graeber	725	Dg,Dr	6	80	80	-	34 2.88	1- -53 6-15-60	J	½	D	L.
30A1	Fred Jones	475	Dg	36	20	-	Gravel	17.40 16.89	9-6-41 6-28-60	C,P	1/3	D,S	Supplies 2 houses; iron content is objectionable.
30A2	E. M. Chase	475	Dr	8	77	-	-	42	9-30-52	-	-	N	Dd 15 ft, pumping 25 gpm; L.
30G1	Mrs. Bert Kepka	470	Dr	6	18	-	-	-	-	C	¼	D,S	
31P1	J. E. Hershner	660	Dr	6	96	-	-	-	-	J	1	D	
32A1	Guy Norman	750	Dr	8	167	167	-	82	-	T	10	-	Dd 58 ft, pumping 100 gpm; Cp, L.
32J1	F. W. Hardman	625	Dr	8	170	170	-	35±	5- -52	T	5	Irr	L.
32N1	F. G. Sarver	740	Dg	42	54	54	-	38.13 30.91	10-28-54 6-28-60	J	3/4	D,S	L.
33E1	R. Rasmussen	640	Dr	8	251	251	-	46.27	6-22-60	J	1	D	Cp, L.
33H1	Jack Jackson	640	Dr	6	45	45	-	4 9.97	7-28-47 6-13-60	J	3/4	D,S	Casing perforated 35-43 ft.
33N1	John Fronia	650	Dr	6	162	162	-	53.44	6-22-60	J	1½	D,S	Yields 20 gpm; Cp, L.
33P1	A. W. Hatt	640	Dr	6	96	96	-	-	-	J	1½	D,S	
33P2	F. J. Spencer	650	Dr	6	135	135	-	46.06	6-28-60	Sb,J	1	D,Irr	

33Q1	G. Imeson	630	Dr	6	93	93	-	-	-	J	1	D	
33Q2	F. C. Pederson	635	Dg	48	31	10	-	10.21	6-22-60	P	1/3	D,S	
33R1	H. A. Galbraith	640	Dr	6	114	114	-	79	6-28-60	J	1	D	
34B1	Bill Turner	675	Dr	6	142	138	-	30.45 53.54	8-4-54 6-14-60	J	1	D,S	L.
34D1	E. A. Lauenborg	675	Dr	6	125	125	Gravel	50	7-15-52	J	3	D,S	Supplies mink farm and 2 houses; L.
34G1	Donald Hand	725	Dr	6	38	38	-	17.53	6-15-60	J	1/3	S	L.
34J1	W. Schenck	705	Dr	6	90	90	Gravel	32.25	2-27-51	J	3/4	D,S	Dd 44 ft, pumping 10 gpm; L.
34J2	do.	705	Dg	36	11	-	-	2.81	2-27-51	N	-	N	Well destroyed.
34M1	D. A. Long	640	Dg	48-36	-	-	Clay, blue	2.88 9.35	- 6-14-60	C	½	D,S	
34N1	H. R. Smith	640	Dg	48	19	-	-	8.46	6-28-60	J	½	D	
35N1	Lewis Weiner	695	Dr	6	103	103	-	28	11- -51	J	1	D,S	
						T. 18 N., R. 5 E.							
5G2	D. R. Deolittle	240	Dr	6	79	79	-	2.5	4-3-53	C	5	Irr	Dd 17 ft after 4 hrs pumping 120 gpm; L.
5H1	Irving Cope	245	Dr	8	84	84	-	7	7-21-52	C	10	Irr	Dd 20 ft after 4 hrs pumping 150 gpm. Water level is low in Aug. and Sept.; L.
5J1	Thomas Mathews	260	Dr	8	64	64	-	8.55	8-8-60	N	-	N	L.
5J2	Joe Kitchen	260	Dr	5	79	79	Gravel	8.19	8-8-60	C	7½	Irr	Dd 17 ft after 4+ hrs pumping 125 gpm. Casing perforated 74-79 ft.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
						T. 18 N., R. 5 E.--Continued							
5R1	H. Rice	260	Dr	6	60	-	-	10.73	8-10-60	C	7½	N	
6A1	State Soldiers Home	210	Dr	4	104	-	-	3 10	- 8-8-60	T	30	Irr	L.
6F1	William Davidson	340	Dr	6	93	-	-	Dry	9-24-54	N	-	N	Supply inadequate; L.
8A1	T. Ford	280	Dr	6	36	36	-	17.63	8-10-60	C	5	Irr	
9D1	R. Bartel	275	Dr	6	70	70	-	10	3-25-50	C	5	Irr	Dd 20 ft after 4 hrs pumping 150 gpm; L.
17L1	H. Knack	340	Dr	6	62	62	-	20.15	8-12-60	J	1	D	Water contains objectionable amount of iron.
18N1	V. H. Reed	740	Dg	30±	17	15	-	5.90	8-11-60	C	¼	D	Well pumps dry in summer; recovers in 1 day.
18P1	K. H. Thompson	740	Dr	6	106	-	-	75.63	8-11-60	J	1	D,S	Water contains objectionable amount of iron.
18P2	O. Jangbluth	730	Dg	48	14	-	-	8.22	8-11-60	P	¼	D,S	Supply inadequate.
19C1	Rod Miller	740	Dr	6	57	-	-	45	-	C	½	D	Dd 2 ft, bailing 13 gpm; L.
19N1	W. I. Beckstead	720	Dg	48	30	-	-	15.03	8-11-60	C	1/5	D,S	Water unfit for drinking.
21P1	St. Paul and Tacoma Lumber Co.	700	Dr	8	73	73	-	54.04	8-12-60	J	2	D	Supplies house, office, and maintenance shop; L.

30E1	K. J. Milton	726	Dr	6	36	-	-	-	-	J	½	D	
30F1	E. H. Fairbanks	680	Dr	6	80±	-	-	-	-	J	½	D	Pumps dry in 1 hr; recovers in few minutes.
30F2	A. P. Beffa	715	Dr	6	155	121	Gravel	25 38.65	1944(?) 8-10-60	J	1	D,S	Water leaves iron stains on plumbing fixtures; Cp.
30M1	C. B. Lingerman	705	Dr	-	165	-	-	11.21	8-10-60	J	3/4	D,S	
30M2	do.	690	Dr	6	263	243±	Sandstone, gray	63	-	J	3/4	D,S	
31Q1	G. Zaffeno	720	Dg	30	17	17	-	6.85	8-11-60	C	¼	D	
32D1	H. N. Rickert	495	Dr	6	52	52	-	4.27	8-10-60	J	½	D	Odor of water gets bad after well has been pumped for short time.
32D2	H. O. Rickert	485	Dr	6	55	55	-	5.73	8-12-60	J	½	D,S	
32R1	W. A. Anderson	580	Dr	6	56	-	Gravel	44 44.52	3-10-53 8-10-60	J	½	D	Dd 1 ft, pumping 10 gpm; reported to contain iron; L.
32R2	W. H. Franks	580	Dr	6	55	55	-	43 44.15	3-20-53 8-10-60	J	½	D	Dd 1 ft, pumping 10 gpm; water becomes dark on standing and has sulfurous smell; L.

T. 19 N., R. 1 E.

2R1	J. C. Morris	163	Dr	12-10	762	731	Sand and gravel streaks	144.25	2-14-61	T	20	PS	Dd 97 ft, pumping 155 gpm; L.
13J1	U. S. Government (Fort Lewis)	220	Dr	8	350	-	Gravel and sand	102±	10-22-40	-	-	N	Abandoned; L.
22K1	do.	168	Dr	8	188	185	Sand and gravel	164	7-16-43	N	-	N	Abandoned; L.
22K2	do.	197.5	Dr	8	220	210(?)	do.	193.2	7-15-43	N	-	N	Drilled to 220 ft in June 1943, later deepened to 242 ft, abandoned; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 1 E.--Continued						
22P1	E. I. duPont deNemours & Co., Well 1	208	Dr	10-8	252	252	Sand and gravel	208	12- -41	T	40	N	Yields 450 gpm; Cp, L.
22P2	E. I. duPont deNemours & Co., Well 2	208	Dr	12	266	266	do.	-	-	T	-	Ind	Yields 380 gpm; Cp, L.
26A1	E. I. duPont deNemours & Co.	220	Dr	6	80	-	-	25-30	-	C	1	Ind	
27C1	E. I. duPont deNemours & Co., Well 3	216	Dr	24-10	331	331	Sand and gravel	206	9-10-45	T	200	Ind	Well deepened from 297 ft; dd 44 ft after 4 hrs pumping 1,450 gpm; Cp, L.
33L1	Walter Braget	185	Dr	-	180	-	-	-	-	J	2	D,S	
34G1	U. S. Government (Fort Lewis, Well 9)	215	Dr	18	36	36	Sand and gravel	13.5 25	7-12-54 3-1-60	P,T, C	25, 7½,3	D,Irr	C, L.
34P1	U. S. Government (Fort Lewis)	225	Dr	12	141	-	-	65	12-18-59	-	-	Irr	Dd 62 ft after 4 hrs pumping 385 gpm; Cp, L.
35A1	City of DuPont, Well 1	240	Dr	12	128	128	Sand	29.33	3-24-60	T	15	PS	Slight dd after 72 hrs pumping 110 gpm; backfilled from 349 ft; L.
35A2	City of DuPont, Well 2	245	Dr	12-10	130	-	-	30	10-29-25	T	7½	PS	Yields 382 gpm; L.

T. 19 N., R. 2 E.

1A1	J. H. Hanson	300	Dr	8	65	65	-	35.05	2-25-60	N	-	N	L.
1A2	William Grab	300	Dr	6	60	-	-	-	-	J	1	-	Level dd to 50 ft, pumping 1,000 gpm; L.
1A4	99 Cleaners and Laundromat	315	Dr	-	-	-	-	42.67	-	T	3	Ind	
1C1	R. J. Dunn	277	Dg	40	25	25	Gravel	14.11	4-17-40	N	-	N	Well destroyed.
1C2	E. D. Strehlau	277	Dr	6	65	-	-	21.77	2-12-60	J	1	D	
1D1	William Wellan	273	Dg	30	29	24	Gravel	23.77	4-17-40	N	-	D	
1J1	Ken Walowsky	305	Dr	8	87	87	-	36 28.69	6-16-51 2-12-60	N	-	N	Dd 21 ft, bailing 30 gpm; L.
1K1	Lakewood Water District, Test Well 2	280	Dr	10	177	-	-	25	8- -49	-	-	N	Dd 25 ft after 1¼ hrs pumping 370 gpm; well destroyed; L.
1K2	Lakewood Water District, Well G	280	Dr	30-24	175	-	Gravel and coarse sand	23.3	1950	T	150	PS	Dd 52.5 ft after 4 2/3 hrs pumping 3,070 gpm; C.
1Q1	--Graydon	275	Dr	6	51	-	Sand and gravel	23.43	8-26-60	J	3/4	D	Yields 20 gpm; L.
2E1	Park Lodge School	251	Dr	6	90±	-	-	9.66	4-16-40	-	-	N	Dd 13 ft after 10 min pumping 15 gpm; well destroyed.
2J1	Lakewood Water District, Test Well 1	270	Dr	-	334	-	-	23	6-27-49	-	-	N	Well destroyed; L.
2J2	Lakewood Water District, Well F	270	Dr	12-8	100	96	-	24	6- -49	-	-	N	Dd 32 ft after 4 hrs pumping 500 gpm; well destroyed.
2M1	Lakewood Water District, Well K1	260	Dr	12-8	571	505	Sand	59.52 52.05	9-5-58 2-10-60	Sb,T	100	PS, Obs	Dd 90 ft after 4 hrs pumping 1,060 gpm; hydrograph on figure 11; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 2 E.--Continued						
2M2	Lakewood Water District, Well K2	260	Dr	16-10	572	497	Gravel and sand	52.15	2-10-60	Sb,T	150	PS	Dd 82 ft after 1 hr pumping 2,230 gpm; C, L.
2M3	Lakewood Water District, Well B	260	Dr	18-12	257	257	Sand and gravel	28	3- -42	-	-	N	Dd 100 ft, pumping 400 gpm; well destroyed; L.
2P1	Clover Park School	260	Dr	6	93	-	do.	21.19	4-12-40	-	-	N	Well destroyed (?); L.
2P2	do.	260	Dr	8	107	-	-	-	-	T	5	Inst	
2Q1	A. Olen	265	Dg,Dr	1½	28±	-	Gravel	17.37 22	2-11-60 10- -39	P	¼	D,Irr	
3N1	Lutheran Church	250	Dr	6	39	39	-	18.19	3-17-60	J	3½	D	
4A1	E. Buckley	250	Dr	6	54	54	Gravel	17 9.79	5-2-53 2-17-60	J	3/4	N	L.
4A2	E. W. Miles	250	Dr	6	29	29	do.	17	7-11-53	J	½	D	Slight dd, pumping 8 gpm; L.
4B1	Western State Hospital, Well 2	245	Dr	16-12	500	-	Gravel, sand, and boulders	20	-	T	60	Inst	Yields 1,000 gpm; L.
4B2	Western State Hospital, Well 1	245	Dr	16-12	935	-	Sand and boulders	27	-	T	60	Inst	Yields 750 gpm; L.
4G1	Lakewood Water District	410	Dr	12	241	191	Sand and gravel	163.4 164.4	1-4-58 2-10-60	Sb,T	100	PS	Dd 7 ft after several hrs pumping 1,400 gpm; L.

4K1	--Pruitt	305	Dr	6	86	-	Sand	82.80 79.51	4-16-40 2-23-60	J	1	D,S, Irr	"Hardpan" at land surface.
4M1	Jack Mills	280	Dg	36	36	-	-	29.93	8-19-54	-	-	N	
5C1	--Southerland	300	Dr	8	124- 126	-	-	80.1	2-24-60	J	1	D	
5D1	City of Steilacoom, Well 1	265	Dr	10	207	207	Gravel	48	1939	T	30	PS	Dd 38 ft, pumping 600 gpm. Cp, L.
5D2	City of Steilacoom, Well 3	285	Dr	12	190	144	do.	-	-	-	-	PS	Dd 126 ft, pumping 900 gpm; L.
5G1	H. Sorensen	335	Dg	48	57	-	-	52	5-30-41	P	½	D	Goes dry in Nov. Tight gravel to 40 ft, then 3 to 4 ft of "hardpan."
5H1	Lakewood Water District	340	Dr	12-8	898	898	Gravel and clay	100	1-12-61	-	-	N	Test well, insufficient yield; well destroyed; L.
5K1	J. W. Tucker	330	Dr	6	-	-	-	98.58	8-19-54	J	2	D	
5K2	G. T. Moffit	345	Dr	4	135	-	-	113 114.85	1941 2-16-60	J	1	D,S	
6P1	City of Steilacoom, Well 2	260	Dr	12-7	247	247	Gravel and sand	145.7 151.5	10-21-53 2-23-60	T	20	PS	Dd about 24 ft after 3 hrs pumping 250 gpm; Cp, L.
8A1	Lakewood Water District, Well T9	290	Dr	12-10	915	-	-	-	-	-	-	N	Test well 9, insufficient yield; well destroyed; L.
8B1	H. E. Bare	315	Dr	-	114	-	-	97 91.4	1949 2-16-60	J	1	D	
8G1	E. M. Pease	255	Dr	6	45	44	Gravel	38.35	8-19-54	J	½	D,S	L.
8H1	P. S. Herbert	260	Dg,Dr	29	50	42	do.	-	-	-	½	Irr, D,S	"Hardpan" at 42 ft. Water through "hardpan".

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 2 E.--Continued						
8H2	Forest Grove Play Area	265	Dg	26	43	-	-	36.28	2-16-60	N	-	N	
9A1	H. R. Battell	235	Dr	6-3	37	37	Gravel and sand	11.33	3-17-60	-	-	Irr	Dd 1.2 ft, pumping 50 gpm.
9D1	Lakewood Water District, Well T10	265	Dr	-	320	-	Gravel, coarse, and sand	27	-	-	-	N	Test well 10, insufficient yield; well destroyed; L.
9F1	Nell Wakely	235	Dr	6	165	-	-	10.05	8-19-54	J	1	-	L.
9G1	James Reid	245	Dg,Dr	6	58	58	Gravel	8.67 19.09	2-16-60 2-16-60	J	1	D	Well deepened from 26 ft. Gravel from 2 to 26 ft.
9N1	Frank Fihn	262	Dg	48	44	43	-	36.8	5-20-40	-	-	N	Well destroyed.
9N2	O. K. Musselwhite	260	Dn	6	-	-	-	17.09	2-23-60	C(?)	3/4	N	
10D1	E. R. Case	265	Dg	42	72	72	-	29.49	3-17-60	J	¼	D	
10E1	Lakewood Water District, Well E	275	Dr	18-12	460	460	Gravel and sand	-	-	-	-	N	Abandoned; L.
10F1	Lakewood Water District	270	Dr	12	174	-	-	44.57	4-10-40	N	-	N	Well destroyed.
10F2	Lakewood Water District, Well D	270	Dr	10	288	185	-	-	-	N	-	N	Yielded 200 gpm, well destroyed; L.
10F3	Lakewood Water District, Well C	270	Dr	10	219	196	Gravel (?)	38	2- -45	T	10	PS	Dd 11 ft after 12 hrs pumping about 150 gpm.

10F4	Lakewood Water District, Test Well 6	270	Dr	-	610	-	-	-	-	-	-	N	Well destroyed; L.
10F5	Lakewood Water District, Well D-2	270	Dr	16-12	503	469	Hardpan, gravel, and sand	39.3	2-9-60	Sb,T	150	PS	Dd 75 ft after 12 hrs pumping 1,500 gpm; C, L.
10F6	Lakewood Water District, Well D-3	270	Dr(?)	16	228	200	Gravel and sand	-	-	-	-	PS	L.
10L1	Lakewood Water District, Well D-1	270	Dr	24-12	638	-	-	50	12- -47	T	5	N	C, L.
11E1	--Paige	273	Dr	5	68	-	-	32±	4-17-40	-	1	D	Adequate for 6 families.
11J1	D. T. Jones	265	Dr	6	74±	-	Gravel	14.28 12.05	4-10-40 2-15-60	C	½	D	Loose gravel to 10 ft; cemented gravel and sand to bottom of well.
11J2	E. Hurd	265	Dr	6	65	-	-	9.48	2-15-60	J	1	Irr	Used only for sprinkling lawn.
11L1	Lakewood Water District, Test Well 4	275	Dr	10	200	200	-	-	-	N	-	N	Test well 4 destroyed; L.
11Q1	Lakewood Water District, Well H-2	275	Dr	16	510	86	Sand and gravel	21.25	2-10-60	T	150	PS	L.
12A1	U. S. Government (McChord A.F.B.)	285	Dr	-	141	-	Gravel and sand	-	-	N	-	N	C, L.
12C1	W. T. Jones	275	Dg	36-24	18	18	Gravel	14.11	4-10-40	C	1	D	Supplies 7 or 8 families. Gravel from land surface to 18 ft.
12C2	Washington State Highway	270	Dr	8	51	-	-	-	-	T	7½	PS, Irr	
12M1	R. L. Sawyer	275	Dr	8	65	65	Gravel	12	3-6-50	J	2	D	Dd 30 ft, pumping 9 gpm. Supplies 35 house trailers; L.
12M2	do.	275	Dr	6	40	-	-	10 6.76	8-25-54 2-15-60	C	¼	N	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
T. 19 N., R. 2 E.--Continued													
12Q1	Lakeview Riding Stables	280	Dg	36	24(?)	-	-	12.81	5-20-40	P	1	D,S	
13C1	W. A. Millard	285	Dr	6	63	-	-	25	6-3-53	J	1½	D	L.
13G1	U. S. Government (McChord A.F.B.)	294	Dr	12	200	195	Gravel, loose	27 31	3-2-39 2-15-60	T	40	PS	Dd 56 ft after 5 hrs pumping 800 gpm; C, L.
13G2	do.	300	Dr	12	298	-	Gravel	32 48	1-26-39 2-15-60	T	40	PS	Dd 62 ft after 4½ hrs pumping 600 gpm; C, L.
14B1	Lakewood Water District, Test Well 3	275	Dr	10-8	349	-	-	-	-	N	-	N	Well destroyed; L.
14B2	Lakewood Water District, Well H	275	Dr	30-24	110	93	Gravel, loose, coarse	22.8	2-10-60	Sb,T	100	PS, Obs	Dd 65 ft after 2 1/6 hrs pumping 2,300 gpm; hydrograph on figure 11; C, L.
14C2	--Keeting	275	Dr	6	-	-	-	29.0	2-15-60	J	1	D	Supplies trailer court and service station.
14D1	Lyle Donald	290	Dg,Dr	6	192	-	Gravel and sand	35	2-16-60	J	3	D	L.
14L1	U. S. Government (McChord A.F.B., Well 2)	310	Dr	12	220	205	Sand and gravel	-	-	T	50	PS	Dd 22 ft, bailing 80 gpm; C, L.
14L2	U. S. Government (McChord A.F.B., Well 9)	310	Dr	18-12	435	325	do.	45	2-15-60	T	50	D	Yields 465 gpm; C, L.

15G1	Tacoma Country Club	278	Dr	12	150	-	-	38.6	4-18-40	N	-	N	Well destroyed.
16R1	Lakewood Water District, Well A	275	Dr	16-12	224	224	Sand and gravel	70	8-24-43	T	40	PS	Dd 60 ft after 8 hrs pumping 400 gpm; C, L.
16R2	Lakewood Water District, Well A-2	275	Dr	16	295	-	do.	88.54	2-10-60	Sb,T	100	PS	Dd 70 ft after 4 hrs pumping 660 gpm; backfilled from 425 ft; L.
18H1	U. S. Government (Fort Lewis, Well 4)	235	Dr	-	1,450	-	-	114.3	6-4-53	N	-	N	L (incomplete).
18H2	U. S. Government (Fort Lewis, Well 4-A)	233.4	Dr	20-16	1,112	1,112	-	138	1945	T	-	PS	Dd 31 ft after 24 hrs pumping 500 gpm; L.
18Q1	U. S. Government (Fort Lewis, Well 2)	234	Dr	18	239	-	Sand and gravel	123 139	12- -40 3-1-60	T	-	PS	Dd 48 ft, pumping 1,100 gpm; C, L.
19B1	U. S. Government (Fort Lewis, Well 1)	234	Dr	18	224	220	Sand	125 140	11-22-40 3-1-60	-	-	PS	Dd 78 ft, pumping 900 gpm; C, L.
19F1	U. S. Government (Fort Lewis, Well 3)	235	Dr	18	229	229	Sand and gravel	139 138	1- -41 3-1-60	-	-	PS	Dd 60 ft, pumping 500 gpm; C, L.
21A1	E. J. Webber	280	Dg	36	34	-	Gravel	25.15	4-10-40	N	-	N	Well destroyed (?).
21A2	do.	279	Dr	8	59	-	-	33.70	9-3-41	-	1	D,PS	
21F1	W. Korte	265	Dr	6	53	53	Gravel	20.14 21.38	4-10-40 2-23-60	J	½	D	
21F2	H. T. McGill	263.6	Dg	36	28	28	do.	13.94	4-10-40	C	3/4	D	
21M1	Washington National Guard	265	Dg	27	-	-	-	17.70	3-24-60	N	-	N	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 2 E.--Continued						
22A1	E. A. Deeter	270	Dr	6	45	45	Sand and gravel	19	10-28-55	J	½	D	Dd 6 ft, bailing 16 gpm; L.
22C1	D. E. Bond	270	Dr	8	60	60	do.	20.20	11-3-60	J	3	D	Dd 10 ft, bailing 50 gpm; L.
22G1	Frank Kelley	279	Dg	30	25	-	Gravel	14.95	4-11-40	N	-	N	Well destroyed.
22H1	George Crilly	280	Dr	6	58	-	-	17.29	2-23-60	J	½	D	
22N1	U. S. Government, (Fort Lewis, Well 7)	279.6	Dr	38-26	2,261	1,400	-	90.7 45	6-4-42 3-1-60	T	-	N	Dd 128 ft after 72 hrs pumping 1,750 gpm; L.
23E1	--Latournay	280	Dr	8	49	-	-	16.86	2-23-60	J	1	D	
23H1	U. S. Government (McChord A.F.B., Well 7)	295	Dr	12	158	138	-	25	2-15-60	T	40	PS	Yields 435 gpm; C, L.
23H2	U. S. Government (McChord A.F.B., Well 8)	277.15	Dr	8	250	207	-	-	-	-	-	N	Yields 124.8 gpm; L
24A1	U. S. Government (McChord A.F.B., Well 4)	315	Dr	6	91	-	-	-	-	J	2	D	Yields 80 gpm; C.
27G1	U. S. Government (Fort Lewis, Well 8)	287	Dr	26-20	1,008	-	Sand and gravel	88 120	10- -43 3-1-60	T	150	PS	Dd 62 ft after 120 hrs pumping 2,125 gpm; C, L.

28F1	Washington National Guard	280	Dr	24	43	43	Gravel	8.4	4-12-40	C	30	PS	Casing perforated 33-43 ft. Dd 8 ft, pumping about 350 gpm.
28F2	do.	278	Dr	12	154	154	Gravel, fine, and sand	34.86	11-5-40	N	-	N	Dd 50 ft, pumping 100 gpm; well destroyed; L.
30B2	U. S. Government (Fort Lewis, "Sullivan" Well)	210	Dg	14	12	-	do.	-	-	T	200	PS	Dd 2 ft, pumping 1,500 gpm; C.
31J1	U. S. Government (Fort Lewis, Well 5)	282	Dr	38-20	1,000	990	-	145 187	3- -42 3-1-60	-	-	PS	Dd 63 ft, pumping 1,300 gpm; C, L.
32H1	U. S. Government	293	Dr	-	1,570	-	-	98	3-1-60	N	-	N	Well collapsed during pumping test; L.
32H2	U. S. Government (Fort Lewis, Well 6)	291	Dr	20-18	1,340	1,340	-	129	4-19-43	T	250	PS	Dd 83 ft, pumping 1,800 gpm; C, L.
36D1	U. S. Government (Fort Lewis, Well 10)	336	Dr	8	116	116	-	46 46	8- -57 3-1-60	T	-	-	Dd 61 ft after 8 hrs pumping 50 gpm; temp. 49° F; L.
							T. 19 N., R. 3 E.						
1A1	Summit Water & Supply Co.	450	Dr	12	303	251	Gravel	182.29	3-23-60	T	15	PS	Dd 30 ft after 2½ hrs pumping 130 gpm; L.
1C1	John Piekarski	430	Dr	8	190	189	-	173 165.46	2-5-54 5-18-60	T	7½	D, Irr	Dd 8 ft after 4 hrs pumping 147 gpm; L.
1C2	Stanley Slezak	440	Dr	8	195	195	Gravel	175.5 172.35	2-2-59 5-18-60	S	5	D, Irr	L.
1D2	Summit Water & Supply Co., Well 3	480	Dr	12	285	283	-	210.5 215.59	2-28-51 3-23-60	T	-	PS	Dd 39.5 ft after 3 hrs pumping 105 gpm; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
T. 19 N., R. 3 E.--Continued													
1E1	I. McGee	476	Dg	36	19	10	Hardpan	6.25 4.70	4-23-40 5-17-60	N	-	N	Well goes dry in Sept.
1J1	Summit Water & Supply Co., Well 1	475	Dr	12	407	407	Gravel	199.94	2-28-51	-	-	N	Dd 6.9 ft after 7½ hrs pumping 90 gpm; abandoned; L.
2A1	--White	460	Dg	-	185	185	-	180	4-23-40	N	-	N	Well destroyed.
2Q1	I. G. Young	415	Dg	72	12	3	-	.69 1.48	2-27-40 5-17-60	N	-	Obs	Hydrograph on figure 12.
3G1	Southeast Tacoma Mutual Water Co., Well 1	427	Dr	12-8	415	415	Gravel	173 187.13	2-28-51 3-23-60	T	50	PS	Dd 11 ft after 4 hrs pumping 350 gpm; L.
3G2	Southeast Tacoma Mutual Water Co., Well 4	427	Dr	10	422	422	Gravel and sand	183 198.47	1- -58 3-23-60	T	15	PS	Dd 62 ft, pumping 264 gpm; Cp, L.
3Q1	Franklin-Pierce School District 402	408	Dg	48	158	157.5	Gravel	153 146.17	4-27-40 5-17-60	P	10	Obs	Dd 1 ft after 1 hr pumping 20 gpm; hydrograph on figure 12.
4A1	Andrew Ellison	398	Dg	-	19	19	-	4.6	4-6-40	P	-	N	Supply inadequate.
4P1	--Stern	360	Dr	5	120	120	Gravel	114	9- -40	-	-	N	L.
5A1	George Packard	324	Dr	2	22	-	-	9.53	2-26-60	N	-	N	
5C1	Unknown	321	Dg	48	69	20	Gravel	56.00 55.6	4-8-40 2-29-60	J	1	D,S	Water contains objectionable amount of iron; L.

5K1	John Brunton	323	Dr	5	64	63.8	do.	52	4-20-40	P	1/3	D	L.
5L1	A. W. Shields	310	Dr	5	60	60	-	52.09	4-28-40	J	1	D	
5L2	Southeast Tacoma Mutual Water Co., Well 3	310	Dr	12-8	315	405	Sand and gravel; sand and clay	64 61.64	7-7-51 3-23-60	T	40	PS	Well drilled and cased to 405 ft, plug at 315 ft. Dd 210 ft after 10 hrs pumping 330 gpm. Used only in the summer; L.
5L3	Southeast Tacoma Mutual Water Co., Well 5	310	Dr	10	208	206	Gravel	65 63.09	11-16-59 3-23-60	T	15	PS	Dd 117 ft at 225 gpm; L.
5M1	R. A. Macera	305	Dr	8-6	100	100	-	30.08	2-25-60	J	½	D	
5N1	R. Homola	305	Dr	5	80	80	Gravel, dark, fine	31.8	4-24-40	P	1/3	N	Well destroyed; L.
5Q1	Clifford Schrammeck	315	Dr	6	69	-	Gravel	50	7-7-52	J	1	D	Supplies 3 families; L.
5Q2	do.	315	Dr	6	-	-	-	44.64	2-25-60	N	-	N	
6B1	H. H. Lilienthal	305	Dg	36	42	-	Till, sandy	29.05	4-8-40	N	-	N	Well destroyed; L.
6C1	Jack Caddigan	305	Dr	6	94	-	-	40.20	2-25-60	J	½	D, Irr	
6D1	Sunnycroft Sanitarium	307	Dr	6	82	82	Sand and gravel	-	10-11-39	-	-	N	Well destroyed; L.
6D2	--Lockner	305	Dr	-	86	-	-	-	2-25-60	J	3	PS	
6E1	--Megory	310	Dr	6	79	-	-	40 41.38	8- -39 2-29-60	J	1½	D	
7A1	Abert Kastner	290	Dr	6	56	56	-	17	10-7-57	-	-	-	Dd 33 ft after bailing 2 gpm; L.
7A2	Voss Bros.	293	Dg	48	18	18	Gravel	12.14	11-16-37	C	½	D	
8E1	A. Molinari	299	Dg	24	21	21	Sand and gravel	15.01	4-5-60	-	-	D,S	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 3 E.--Continued						
8H1	Parkland Light and Water Co., Well 1	325	Dr	-	216	-	-	77	1958	T	40	PS	Yields 325 gpm.
8M1	Frank Schibic	295	Dg	10	22	-	-	16.05	2-26-60	N	-	N	
8Q1	C. C. Marsh	305	Dg	16	26	19	Gravel	16.21	4-5-40	P	1/3	Irr, D,S	
8R1	Pacific Lutheran College	305	Dr	-	-	-	-	11.57	2-26-60	T	15	Irr	
8R2	do.	305	Dr	12	145	-	-	11	2-26-60	T	15	Irr	Dd 38 ft, pumping 150 gpm; well backfilled from 230 ft; L.
9C1	National Bank of Washington	383	Dg	48	26	-	-	10.66	2-27-40	N	-	N	Well destroyed.
9F1	Burt Raymond	330	Dr	6	90	90	Gravel, clean	69	3-4-40	J	2	D	Dd 0.1 ft after 10 hrs pumping 20 gpm.
9G2	Parkland Light and Water Co., Well 2	380	Dr	12	367	-	Gravel	110	2-23-51	T	60	PS	Dd 40 ft, pumping 525 gpm.
9G3	Parkland Light and Water Co., Well 3	380	Dr	24	174	153	do.	110 101.62	2-23-51 2-28-51	T	125	PS	Dd 40 ft after 8 hrs pumping 1,500 gpm; backfilled from 230 ft; L.
9G4	Parkland Light and Water Co., Well 5	380	Dr	24-18	177	177	Sand and gravel	110	2-26-60	T	125	PS	Dd 43 ft, pumping 1,500 gpm; L.

9H1	M. L. Dammann	390	Dg	36	15	-	-	2.75	3-4-40	N	-	N	
10D1	John Curtis	384	Dg	48	14	3	Clay and boulders	.53 .53	2-28-40 2-17-60	P	½	D,S	
10J1	Charles Hammond	420	Dg	60	21	-	-	2.9	5-13-60	P	½	D	
10P1	E. D. Erickson	390	Dg	48	18	-	-	2.71	2-27-40	N	-	N	
10P2	--Ellefson	380	Dg	60	13	-	-	1.79	5-13-60	C	1	S	
11K1	W. D. Heyer	420	Dg	36	19	19	-	1.57	2-27-40	N	-	N	Well destroyed.
12A2	Tom Bailey	460	Dg	36	17	-	-	7.35	5-18-60	J	½	D	Supply inadequate.
13E1	Louella Parker	447	Dg	48	16	16	Sand	1.17	5-18-60	N	-	N	Well destroyed.
13E2	L. J. Brewer	447	Dg	48	18	18	-	2.06	5-18-60	-	-	N	
13H1	Joe Guizzetti	465	Dg	48	10	-	-	1.81	5-9-60	J	1	S	
14E1	Dave Edmonds	400	Dr	-	131	131	-	99.82	5-13-60	T	1	D	
14K1	John Aberer	410	Dg	60	19	-	Hardpan	2.52	5-18-60	-	-	D	
14L1	L. J. Carson	405	Dr	6	200	200	-	90	5-17-60	J	1½	D	Dd 10 ft, pumping 20 gpm; L.
14M1	R. L. Whidden	400	Dg	54-60	30	4	Hardpan	1.61	5-13-60	-	-	-	Reported to go dry in Aug. and Sept.
14Q1	--Blythe	339	Dg	48	15	-	-	2.91	3-6-40	C	¼	Irr, D,S	
15K1	Rose Lawn Rec. Co.	336	Dg	-	22	15	-	14.29	3-6-40	N	-	N	Well destroyed.
15K2	Brookdale Golf Club	325	Dr	6	80	-	-	18.15	5-10-60	C,J	-	D,Irr	
15M1	George Koch	319	Dg	48	11	11	-	8.32	3-31-60	C	3/4	Irr	
15R1	John Irwin	325	Dr	6	38	-	Gravel	19	5- -54	J	1	D	Dd 2 ft, pumping 30 gpm; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
T. 19 N., R. 3 E.--Continued													
16B1	W. L. Gray	315	Dg	40	30	-	-	12.85	3-4-40	N	-	N	Well destroyed.
16B2	Walter Haynes	310	Dr	6	33	33	-	9.23	5-13-60	P	-	N	
16D1	Parkland Light and Water Co.	305	Dr	12	715	715	-	40 46.5	7- -55 8- -55	N	-	N	Formerly yielded 500 gpm; well destroyed; L.
16E1	S. A. Hill	305	Dr	-	44	-	-	-	-	-	-	N	Bailed 5 gpm; L.
16G1	D. S. Heath	305	Dr	6	37	-	-	14	-	J	-	-	Dd 1 ft, bailing 8 gpm; L.
16H1	O. Leap	310	Dg	8 or 10	30	-	-	17.39	5-13-60	C	-	N	
16H2	G. H. Rowe	320	Dg	30	42	-	-	18.5	5-13-60	C,J	-	D	
16L1	Clyde Sacco	310	Dr	6	105	105	-	9.31	3-31-60	J	¼	D	L.
17E1	William Goodwin	305	Dr	6	35	35	Sand and gravel	18 14.38	3-25-50 2-29-60	J	½	D	Dd 5 ft, pumping 15 gpm; L.
17L1	J. A. Purvis	295	Dg	8	23	23	-	15.82	4-5-40	P	1/3	N	
17L2	do.	295	Dr	5	95	-	-	-	-	J	¼	D	Trace of iron reported in water.
17L3	J. H. Gonyea	290	Dr	-	113	-	-	-	-	J	1½	D	
17L4	do.	290	Dr	8	220	-	-	-	-	J	5	D	
17P1	W. W. Tompkins	295	Dr	6	40	-	-	18	-	J	-	D	

17R1	Parkland Light and Water Co.	325	Dr	8	270	270	Sand	20.2	12-9-58	T	-	PS	Test well; dd 50 ft, pumping 205 gpm; L.
17R2	Parkland Light and Water Co., Well 4	320	Dr	18	77	77	Sand and clay	13.8	5-25-59	T	50	PS	Dd 67 ft, pumping 315 gpm; L.
18M1	U. S. Government (McChord A.F.B., Well 3)	315	Dr	16	550	500	Sand and gravel	60	2-15-60	T	75	PS	Dd 100 ft, pumping 1,450 gpm; C, L.
18R1	Dennis Durham	330	Dr	4	86	-	-	-	-	J	½	D	
20C1	C. A. Martens	335	Dr	8	167	162	Sand and gravel	38.5	2-2-59	-	-	PS	Dd 82 ft, pumping 110 gpm, 80-slot screen from 162 to 167 ft; L.
20C2	Jack Gilliland	330	Dr	10	117	-	Gravel, cemented	47	6-1-55	S	1	D	Dd 18 ft, pumping 16 gpm, iron 0.3 ppm; Cp, L.
20D1	Eva Swinney	335	Dg	36	35	-	-	-	-	J	½	D	
20E1	Pilots' Housing Assoc.	330	Dr	-	125(?)	-	-	-	-	T	5	PS	Sulfurous odor, brown precipitate.
20G1	Dan Phillips	330	Dr	8	39	39	-	-	-	J	¼	D	Cp.
20G2	O. A. Haugen	326	Dg	36	44	35	-	-	-	J	½	D	Cp.
20G3	Fred Seaman	330	Dr	8	78	-	-	-	-	J	½	D	
20K1	Milton and Willis Crooks	325	Dr	8	72	72	Gravel	20	10-9-46	J	3	PS	Dd 0 ft after 4 hrs pumping 50 gpm. Sulfurous odor, iron 3.6 ppm; L.
20K2	C. A. Leach	326	Dr	4	35	-	-	-	-	J	½	D	Supplies 5 houses, water has sulfurous odor; Cp.
20L1	--Roarbaugh	330	Dr	6	97	-	Gravel	-	-	J	1	D	Supplies 3 families; Cp, L.
20M1	Marie Huth	322	Dr	5	68	68	Gravel and sand	23.8	4-5-40	C	1	N	
20P1	C. P. Creso	324	Dr	6	68	68	Gravel	2.72	2-29-60	N	-	N	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 19 N., R. 3 E.--Continued						
20P2	Robert Creso	330	Dr	6	116	116	Sand and gravel	55	7- -55	J	1	D	Dd 32 ft, pumping 28 gpm; L.
20R1	G. Bresemann	325	Dg	36	32.2	-	Gravel, pea	27.88	3-12-40	-	3	D	
21F1	Phillip Zurfluh	350	Dr	6	-	-	-	-	-	J	½	D	Cp.
21K1	William Sargent	356	Dg	30	24	24	-	17.05 16.58	3-11-40 3-25-60	J	1	D	
21K2	F. Frank	355	Dg,Dr	6	67	67	Gravel, cemented	-	-	J	1/3	D	L.
21P1	Clara Welton	354	Dg	12	44	44	Sand	22.80	3-11-40	P	1/3	D	
21P2	E. W. Senff	355	Dr	6	115	115	-	-	-	J	1	D	
22F1	E. E. Larson	335	Dr	6	57	-	Gravel	27 26.10	1953 4-25-60	J	1½	D	Dd 15 ft, pumping 16 gpm; L.
22M1	M. Ackley	355	Dr	6	69	69	-	22.15	3-25-60	J	½	D,S	L.
23C1	Tacoma Meats Co.	330	Dr	12-10	550	550	Sand and gravel	104-7 93.46	10- -53 4-22-60	T	20	Irr	Dd 152 ft, pumping 430 gpm; Cp, L.
23H1	A. Nord	325	Dg	24	34	-	-	16	4-22-60	C	½	D	
23M1	C. A. Thompson	343	Dg	48-24	24	12-24	Gravel	10	1-24-40	N	-	N	Well destroyed.
23M2	do.	340	Dr	6	65-70	-	-	17.33	4-22-60	C	1	D	

23N1	Unknown	380	Dg	36	24	-	-	16.97 16.79	1-12-40	P	N	-	
24B1	N. Peters	480	Dg	48	39	6	Hardpan	1.92 18.66	2-26-40 11-3-60	P	-	Irr	Supply inadequate.
24R1	Charles Vrazeau	383	Dr	8	-	-	-	57.33	-	J	1	D	
25A1	John Kuper	380	Dr	6	93	-	-	53	3-31-53	J P	-	Irr	
25F1	Sutter Brothers	345	Dg	30	30	30	-	18 14.44	7-7-47 5-9-60	C	3½	N	Dd 8 ft after 4 hrs pumping 65 gpm.
25F2	do.	326	Dr	6	32	-	Gravel	2	8-9-47	P	-	D, Irr	Dd 20 ft after 4 hrs pumping 500 gpm.
25F3	F. X. Sutter	345	Dr	8	65	65	-	11.73	5-9-60	J	-	D	Dd 30 ft, pumping 500 gpm.
25H1	L. Gammon	325	Dg	48	12	12	Gravel and sand	5.40	2- -40	T	3	Irr, D,S	
25H2	do.	325	Dg,Dr	12	13	13	-	5.14	4-22-60	-	-	D,S	
25L1	Sutter Brothers	320	Dg	48	8	6	Gravel	5 at LSD	11-15-50 5-9-60	T	30	Irr	Dd 3 ft after 4 hrs pumping 400 gpm; L.
25M1	--Myers	390	Dr	6	45	-	do.	28	1- -51	J	½	D	Slight dd, bailing 10 gpm; L.
25N1	Margaret Crowell	390	Dr	6	69	-	do.	47.5 37.19	1-12-40 4-21-60	P	-	-	
25P1	Unknown	455	Dr	6	119	119	Sand	106.15	5-9-60	J	15	D	
26C1	Paul Smithlin	370	Dr	6	88	88	Gravel	35 24.44	6-11-53 3-31-60	P	½	D,S	L.
26F1	Ray Grow	373	Dg	30	50	-	do.	38.98	1-10-40	N	-	N	Well destroyed.
26F3	C. K. Reynolds	370	Dr	6	66	-	Gravel and sand	36	7- -52	J	1/3	D	Dd 18 ft, pumping 8 gpm; L.
26G1	--Orsborn	370	Dg	36	30	-	-	11.5	4-22-60	J	1 3/4	D	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 19 N., R. 3 E.--Continued						
26J1	H. J. McGee	390	Dr	8	91	91	Sand and gravel	49	8-25-54	J	3	D	L.
27E1	John Maruna	370	Dg	28	27	27	do.	18.39	3-12-40	C	½	D	
27E2	L. T. Powell	370	Dr	6	27	27	-	12.33	3-31-60	C	-	D	
27J1	B. A. Gustin	380	Dr	6	42	42	Sand and gravel	32	11-14-47	N	N	Irr	Dd 0.5 ft, pumping 60 gpm; L.
27Q1	Perry Sanders	380	Dg	6	24	-	-	18.03	3-31-60	J	¼	D	
27R1	J. B. Iams	375	Dg	36	29	-	-	23.18	1-12-40	J	1/6	D,S	
28B1	L. L. Sanders	365	Dr	8	390	125	Sand	40 19	3-11-40 3-31-60	T	10	D,Irr	Water reported to contain objectionable amount of iron; L.
28B2	do.	365	Dr	-	125	-	-	-	-	-	-	D	Water reported to contain iron; Cp.
28D1	Spanaway Water Co.	360	Dr	-	172	172	-	55.98	7-6-62	T	7½	PS	
28D2	do.	360	Dr	-	133	133	-	50.92	7-6-62	T	3	PS	
28E1	H. Arends	355	Dg,Dr	6	75	-	Gravel	27.30 27	8-5-54 3-25-60	J	½	D	Supplies 3 houses; L.
28F1	C. C. Modahl	360	Dg	40	35	-	Sand	30.94	11-8-37	N	-	N	Supply inadequate.
28F2	do.	360	Dr	5	55	-	Sand and gravel	30	12-28-44	J	-	D	

28F3	Bethel School District 403	360	Dr	8	134	130	Gravel	44	9-23-53	T	15	Inst	Dd 57 ft after 6 hrs pumping 100 gpm; L.
28F4	do.	360	Dr	6	97	-	-	-	-	T	3	Inst	
28J1	F. W. Schrades	375	Dr	6	55	47	Gravel	24.20	3-2-60	J	3/4	D	Dd 38 ft, bailing 6 gpm; L.
28K1	G. L. Dahl	370	Dr	6	93	-	Sand and gravel	-	-	C	½	D	L.
28L1	L. A. Berray	365	Dg	6	46	46	Sand	39.25 26.5	3-12-40 3-2-60	J	½	D	
28N1	Clark Boyes	345	Dr	-	68	-	-	-	-	J	¼	D	
29C1	C. P. Creso	330	Dr	6	140	140	Sand and gravel	24.59	2-29-60	J	1	D	Dd 60 ft, pumping 20 gpm; L.
29C2	do.	335	Dr	6	115	115	do.	31.16	2-29-60	J	1	D	Dd 30 ft, pumping 40 gpm; L.
29F1	Francis Spencer	330	Dr	5	75	60	-	-	-	J	¼	D	
29F2	J. H. Frame	330	Dg	36	30	-	-	-	-	J	1	D	
29F3	Ida Franz	330	Dr	-	30±	-	-	-	-	J	½	D	Sulfurous odor.
29G1	L. J. Carter	325	Dr	6	25	25	-	20	-	-	-	D	
29G2	R. G. Wells	330	Dr	6	111	-	-	28.25	10-14-60	J	1	D	
29J1	Stansbie's Lake Shore Apts.	325	Dr	6	39	-	Gravel	22.69	3-2-60	J	½	D	Dd 1 ft, pumping 20 gpm; L.
29K1	Art Roose	330	Dr	8	298	280	Clay and gravel	72	3-2-60	S	-	D	Supplies trailer court; dd 226 ft after pumping 8 hrs; L.
29N1	William Schmeckel	362	Dg	36	38	38	Gravel	32.87	4-4-40	N	-	N	Well destroyed.
29Q1	E. D. Frash	320	Dg	36	19	19	-	15.83	10-14-60	C	½	D	Trace of iron reported in water.
29R1	Louis Stanke	335	Dr	6	50	-	-	-	-	J	½	D	
29R2	Spanaway Water Co.	340	Dr	12	106	106	-	22.00	7-6-62	N	-	N	To be Public Supply; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 3 E.--Continued						
33C1	Pete Sylte	360	Dr	6	66	66	-	20	1-29-54	J	1½	D	Dd 22ft, pumping 20 gpm; L.
33C2	do.	360	Dr	8	77	77	-	20	1-29-54	-	-	N	Slight dd when bailed at 50 gpm; L.
33K1	J. C. Funkhause	385	Dr	5	29	-	-	13.77	4-21-60	J	½	D	
33L1	E. L. Tarpenning	385	Dg	48	21	21	Sand and gravel	14.32	3-14-40	-	¼	D, Irr	
33P1	Bill Fueston	385	Dr	6	50	50	-	16.41	11-3-60	J	1	D	Supplies 3 buildings. Dd 30 ft; L.
33P2	Owen Goff	380	Dr	6	55	-	-	12.05	3-2-60	J	½	D	Supplies motel.
33Q1	R. O. Jones	380	Dr	4	32	-	Gravel	12.37	5-18-60	J	1/3	D	
34D1	Unknown	385	Dg	30	50	-	-	31.13	1-12-40	J	1/3	D, S	
34L1	Clarence Johnson	395	Dg	36	18	-	-	7.4	4-27-60	J	1	D, S	
35C1	Loren Brandfas	370	Dr	6	47	47	Gravel	34	11-22-52	N	-	N	Dd 1.5 ft, pumping 6 gpm; well destroyed; L.
35D1	R. B. Turner	380	Dr	8	107	92	do.	24.92 18.42	6-24-52 4-21-60	-	-	Irr	Dd 33.21 ft after ½ hr pumping 125 gpm; L.
35F1	E. Fromm	375	Dr	8	46	46	-	21 29.12	4-2-51 4-21-60	J	5	Irr	Dd 5 ft, pumping 75 gpm; L.
35G1	G. Nelson	375	Dg	24	21	-	Gravel and sand	10.04	5-29-40	P	½	D	

35J1	R. S. Middleton	388	Dg	-	21	-	-	13.61	1-9-40	N	-	N	
35M1	Marten Inderbitzin	392	Dg	30	30	-	Gravel	21.56 19.57	1-10-40 4-21-60	J	1	D	
35M2	do.	392	Dr	8	84	84	-	19	3-5-53	T	5	Irr	Dd 51 ft after 4 hrs pumping 80 gpm; L.
35N1	R. S. Boyce	429	Dg	36	59	-	-	56.98	1-10-40	N	-	N	
35N2	H. J. Butz	415	Dg	30	64	-	Gravel	56.73	1-10-40	P	1	-	
35N3	H. Rutt, Jr.	425	Dr	6	83	-	-	48.25	4-21-60	J	1	D,S	
36E1	--Gisin	395	Dr	10	110	110	-	42 31.77	4-18-53 4-27-60	J	½	Irr D,S	L.
36N1	G. A. Jasmer	385	Dr	6	32	32	Gravel	9	8-25-54	C	½	D	Bailed 25 gpm; L.

T. 19 N., R. 4 E.

1J1	W. J. Moats	105	Dr	7	100	100	-	11 5	6-10-51 5-16-60	C	5	Irr	Dd 17 ft after 4 hrs pumping 120 gpm; L.
1Q1	J. S. Christensen	105	Dr	8	104	104	Gravel, coarse	24.75	11-3-60	T	15	Irr	Yields 300 gpm.
2D1	Roy Myers, Well 1	420	Dr	8-6	280	280	-	-	-	N	-	N	Well destroyed; L.
2D2	Roy Myers, Well 2	420	Dr	8-6	351	350	Gravel	325-330	4-25-60	T	7½	D	Yields 15 gpm; L.
2J1	R. W. Gogan	500	Dr	12	425	425	Sand, gravel	387	-	S	15	PS	Dd 32 ft when pumped 85 gpm; L.
4J1	D. S. Peterson	465	Dg	48	29	-	-	9.29 12.09	5-10-60	N	-	Obs	Hydrograph on figure 12.
4J2	Mrs. M. R. Ollinger	470	Dg	43	29	-	-	21.89	-	-	-	D	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
T. 19 N., R. 4 E.--Continued													
4L1	Lester Goelzer	355	Dr	6	240	240	-	200 200	10-3-51 5-10-60	T	31	Irr	Dd 30 ft after 4 hrs pumping 160 gpm; L.
4R1	Bob Chandler	439	Dg	84	12	5	Gravel, hard	2.04 1.65	2-28-40 5-10-60	P	1/3	N	
5F1	Fruitland Mutual Water Co.	330	Dr	12	417	403	-	191.45	5-11-54	N	-	N	Well destroyed; L.
6L1	--Ottman	455	Dr	10	212	212	-	177 165.48	3-9-50 5-18-60	C	7½	N	L.
6M1	A. Vincent	420	Dg	36	23	23	-	.48 3.23	2-28-40 5-13-60	P	½	N	
7A1	S. Lilja	423	Dg	48	37	3½	Gravel, cemented	18.52 19.73	2-28-40 5-10-60	-	-	D,S, Obs	Hydrograph on figure 13.
7D1	Summit Water & Supply Co.	440	Dr	12	326	326	Gravel	195 216.62	4-29-55 2-23-60	T	60	PS	Dd 1 ft after 8 hrs pumping 975 gpm; Cp, L.
7N1	Otis Sawyer	491	Dg	48	13	-	-	2.69 4.21	2-29-40 5-9-60	N	-	-	Well penetrates "hardpan."
8A1	R. Swalander	350	Dg	48	40	8	do.	29.05	3-7-40	N	-	N	Well destroyed.
8P1	W. Delaney	450	Dg	-	18	-	-	.71 1.80	2-29-40 5-9-60	J	½	D	

9A1	Willows Trailer Court	438	Dr	8	412	412	Sand	-	-	N	-	N	Yield inadequate, well destroyed; L.
9B1	Fruitland Mutual Water Co.	410	Dr	8	324	304	Gravel, coarse	250± 257.45	8-10-54 5-18-60	T	-	PS	Dd 1ft, pumping 500 gpm; L.m
9B2	do.	410	Dr	12	316	296	Gravel	236 259.45	- 5-10-60	T	34	PS	Dd 1 ft after 4 hrs pumping 500 gpm; L.
11G1	F. W. Phelps	520	Dg	36	46	46	-	20.42	5-10-60	J	1/3	D	Supplies 2 houses.
11K1	H. P. Hartman	526	Dr	8-6	418	410	-	234±	11-22-39	N	-	N	L.
12A1	J. Hardtke	110	Dr	6	127	85	Gravel	19	5-21-50	J	½	D, S, Irr	Dd 4 ft after 5 hrs pumping 75 gpm; L.
12G1	Otto Reise	115	Dr	15-6	285	285	do.	1.46 2.54	3-27-51 5-16-60	T	7½	Irr	Dd 6 ft, pumping 300 gpm; L.
12H1	W. C. Harm	110	Dr	6	124	124	do.	14.88	7-11-60	C	7½	Irr	Dd 17 ft after 4 hrs pumping 185 gpm; casing perforated.
12J1	W. Hardtke	110	Dr	6	85	85	do.	8.97 16.54	3-27-51 5-16-60	T	5	Irr	Dd 2 ft, pumping 50 gpm; L.
12J2	John Talik	110	Dr	6	125	125	-	18 12.39	- 5-16-60	C	6	Irr	Yields 125 gpm; L.
13A1	R. L. Bacon	120	Dr	8	100	-	Gravel	20.50 18.98	10-5-54 5-16-60	C	7½	N	Dd 2ft, pumping 45 gpm; L.
13B1	K. J. Schulz	125	Dr	6	117	117	-	19	12-5-51	-	-	Irr	Dd 21 ft after about 4 hrs pumping 120 gpm; water contains objectionable amount of iron; L.
13K1	Charles Raguse	125	Dr	6	86	86	Gravel	7	3-27-51	J	½	Irr	Slight dd after 12½ hrs pumping about 10½ gpm; water contains objectionable amount of iron.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 4 E.--Continued						
13K2	Charles Raguse	125	Dg	30	14	14	Gravel	10.62 8.08	3-27-51 5-16-60	J	¼	D	
14E1	W. E. Pork	520	Dg	36	10	9	Sand	1.44	2-24-40	N	-	N	Well destroyed.
14M1	W. V. Young	535	Dg	12	11	11	-	2.80	5-9-60	N	-	N	
14P1	Leroy Harvey	550	Dg	36	22	-	-	4.23	5-3-60	J	½	D,S	L.
15E1	Charles Taylor	485	Dg	84	21	21	-	5.66	2-24-40	N	-	N	Well destroyed.
15J1	W. V. Young	538	Dr	8-6	355	355	Gravel	265	5- -38	T	-	D	L.
15Q1	D. J. Glaser	550+	Dg	36	24	12	-	5.0	5-3-60	N	-	N	Original diameter of well was 48 inches; well destroyed.
15R1	Gerald Griffith	555	Dr	6	315	-	-	185	-	P	1	D	
16D1	--Thorson	430	Dg	-	27	-	-	7.03	3-7-40	N	-	N	Well destroyed.
16E1	Richard Starkel	443	Dr	8	296	296	-	278.21	5-3-60	J,Sb	7½	D,Irr	Dd 5 ft after 30 hrs pumping 70 gpm; temp. 46° F; L.
19A1	E. A. Resser	475	Dg	60	62	6	-	2 3.0	2-26-40 5-3-60	-	¼	D,S	Penetrates "hardpan" entire depth. Supply inadequate.
19A2	K. M. Bergman	480	Dr	4	220	209	-	200 197.8	- 5-9-60	-	1	D,S	

19D1	R. E. Ellis	465	Dg	48	10	10	-	1.05 3	2-26-40 5-3-60	J	½	N	
19J1	V. Rodius	442	Dg	60	12	4	-	1.90	5-9-60	J	1/3	Irr	Yields about 2 gpm.
19J2	do.	443	Dr	7-4	198	-	Gravel	141.59	5-9-60	J	1½	D	Yields about 11 gpm.
19N1	Orville Wright	390	Dr	6	90	90	-	72.13	5-3-60	J	½	D	Dd 3 ft, bailing 20 gpm; L.
19P1	Unknown	415	Dg	60	21	-	-	12.03	2-26-40	N	-	-	Cp.
19P2	W. W. Waite	430	Dg	26	21	21	-	4.45	5-3-60	P	-	D	Supply inadequate.
20A1	K. M. Bergman	453	Dr	6-4	235	235	Gravel	215 201.96	1944 5-3-60	N	-	N	Bailed about 8 gpm; L.
20A2	C. G. Aamodt	453	Dr	10	256	255	Sand and gravel	204.5 206.65	12-6-50 5-2-60	J	3	D,S	Very little dd, bailing 38 gpm; L.
20E1	Harold Cox	350	Dg,Dr	48-5	98	-	do.	70± 74.18	3-18-40 5-3-60	P	½	D,S	
20K1	F. R. Blyton	460	Dg	50	18	-	Till	12.06	10-3-40	N	-	N	Well destroyed.
20K2	do.	460	Dr	8	191	-	Gravel, clean	-	-	-	-	N	Well destroyed.
20K3	do.	458	Dr	8	193	193	Gravel and sand	183 185.77	3-16-40 5-3-60	P	2	D,S, Obs	Till from surface to 85 ft, unknown thickness of cemented gravel, then aquifer of clean gravel and coarse sand; temp. 46° F; hydrograph on figure 13.
21G1	Leroy Powell	483	Dg	36	8	4	Quicksand	2.28	2-29-40	N	-	N	Well destroyed.
21H1	J. W. Hess	487	Dg	40	9	-	-	8.03	5-2-60	J	½	D	
21K1	Glenn Shawgo	475	Dg	12	11	-	-	5.32	5-3-60	-	-	N	
21R1	Frank Hall	516	Dg	48	21	-	-	18.33 2.28	6-2-46 5-2-60	C	¼	D	Dd 1 ft after 4 hrs pumping 5 3/4 gpm. Supplies 2 houses; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 4 E.--Continued						
22D1	Firgrove Mutual Water District	461	Dr	10	236	236	-	143 178.39	3- -53 5-3-60	J,Sb	7½ 7½	PS	Dd 230 ft, pumping 115 gpm; L.
22G1	C. A. Massie	559	Dg	36	42	32	Gravel, fine, sandy	2.21 3.17	2-24-40 5-2-60	C	¼	N	Dd 15 ft after 6 hrs pumping about 4 gpm.
22M1	Firgrove Mutual Water District	502	Dr	6	240	-	-	176.59	5-4-60	Sb	1½	PS	
22M2	do.	500	Dr	12	399	399	Sand and gravel	248	3-31-61	N	-	N	To be Public Supply; L.
23C1	Joseph MacGhee	561	Dr	8	388	388	-	319.90	5-9-60	J,Sb	2	PS	Cp.
24A1	Birchal Baker	148	Dn	4	30	30	-	16.80	9-4-41	N	-	N	Well destroyed.
24A2	do.	148	Dn	4	57	-	-	17.77	9-4-41	N	-	N	Do.
24A3	V. Baker	145	Dr	5	145	145	Gravel	14.26 14.05	8-1-41 5-16-60	J	1	D,Irr, Obs	Yields 100 gpm; Cp, L.
24A4	H. T. Anderson	140	Dr	5	138	138	-	12	7-13-60	J	3/4	D,S	Yields 75-100 gpm, water contains objectionable amount of iron.
24A5	J. O. Larkin	140	Dr	4	131	-	-	20.25	7-13-60	J	½	D	
24A6	C. J. Vantook	140	Dr	6	80	-	-	13.17	7-13-60	J	3/4	D,S, Irr	Water reportedly contains iron; has sulfurous odor.
25G1	Carl Silvernail	155	Dr	6	59	59	Gravel	Flowing	7-15-60	J	1½	S	

27B1	--Otto	562	Dg	40	9	-	Sand	2.41	5-2-60	J	¼	D	Supplies 2 houses.
27M1	Thun Field	530	Dr	6	200	200	-	138.07	6-14-60	Sb	1	Ind	Yields 5 gpm.
30D1	A. Bailey	380	Dr	8	90	-	-	55.16	5-18-60	J	3	D,Irr	
30D2	do.	375	Dr	6	73	-	-	56.79	5-18-60	J	2	D,Irr	Supplies 2 houses.
30F1	Sportsmen's Club	350	Dr	6	113	113	-	10.44	5-25-60	J	3	D	
30F2	do.	350	Dr	10	12	-	-	4.71	5-25-60	C	2	N	
30P1	George Wollgramm	452	Dg	36	12	-	-	3.94	5-25-60	-	-	S	
30P2	Dick Miller	450	Dr	6	80(?)	-	-	98.76	5-25-60	J	¼	D	
31A1	Ed Kindell	450+	Dr	6	111	111	-	96.35	5-25-60	Sb	-	S	
31C1	Olin Mathieson Chemical Corp.	455	Dr	6	150	150	-	126 113.63	8-15-47 5-18-60	J	1	D,Ind	Dd 2 ft after 4 hrs pumping 20 gpm; Cp, L.
31C2	Richard Russell	455	Dg,Dr	6	148	148	-	135	5-25-60	J	1	D	L.
31D1	Norman Hudson	395	Dr	6	84	-	-	50.24	5-29-40	J	1	D,S	
31E1	Olin Mathieson Chemical Corp.	402	Dr	6	76	-	Sand and gravel	47.40	11-11-39	N	-	N	Well destroyed.
31Q1	do.	422	Dr	10	80	80	do.	32	10- -35	T	15	Ind	Yields 575 gpm.
32C1	George Barna	482	Dr	6	165	-	-	-	-	J	2	D,S	
33R1	L. T. Murphy	530	Dr	6	120	120	-	77.88	6-16-60	J	1	D	Yields 80 gpm.
34E1	Pierce County	500	Dg	48	52	-	-	47.51	2-29-40	N	-	N	
							T. 19 N., R. 5 E.						
1E1	L. Orne	630	-	4	202	-	Sand,coarse	147.75 147.01	4-14-52 7-29-60	P	1	D	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 19 N., R. 5 E.--Continued						
1H1	G. Straub	670	Dr	4	270	-	-	194.08	7-29-60	P	1	D,S	Constant pumping does not lower water level appreciably.
2B2	--Bench	605	Dg	50	7	-	Gravel	3.33	7-20-60	P	½	N	
2B3	do.	605	Dg	50	13	-	do.	0 8.03	11-22-53 7-29-60	P	½	D,S	
2B4	V. B. Story	615	Dg	48	17	-	-	9.44	7-29-60	C	¼	D	
2C1	Alfred Bench	615	Dg	50	17	-	Gravel	6.17	7-29-60	P	½	D	L.
2C2	G. Juhl	615	Dg	60x 48-36	25	25	-	17.28	7-5-60	J	½	D,S	
2J1	D. H. Hanson	625	Dg	48	18	8	Gravel and hardpan	7.8 7.55	9-24-53 7-29-60	J	½	D,S	L.
2M1	L. Martin	670	Dr	6	154	154	-	137.78	8-1-60	J	1	D	Supplies 3 houses.
2P1	A. Hammerberg	675	Dr	6	54	54	-	31.56	8-1-60	J	½	D	Yields about 9 gpm.
3A1	N. Varoi	630	Dr	6	137	-	Gravel	120± 119.24	8- -52 8-1-60	T	1½	D,S	
3D1	W. G. Ryan	605	Dg	36	25	25	-	14.55	7-6-60	J	½	D	
4N1	V. Angline	440	Dg	12	15	15	-	4.91	7-12-60	C	1/3	D,S	

6D1	L. M. Hatch	90	Dr	7	110	110	Gravel	7	5-30-51	-	7½	Irr	Dd 17 ft after 4 hrs pumping 160 gpm; L.
6E1	J. E. Stril	92	Dr	6	143	143	-	11 13.16	2-17-46 7-11-60	C	5	Irr	L.
6E2	John Ostafichuk	98	Dr	6	151	151	-	15 15.92	10-10-47 7-11-60	C	5	Irr	Dd 6 ft after 4+ hrs pumping 130 gpm; L.
6L1	H. Brammer	98	Dr	6	88	88	Sand and gravel	18 17.84	6- -52 7-11-60	T	5	Irr	Dd 3 ft, pumping 32 gpm; L.
6M1	Otto Davis	90	Dr	4	173	173	Gravel	13	1932	P	3	D,S, Irr	Yields 50 gpm; L.
6M2	W. E. Crabtree	101	Dr	6	111	111	-	6	7-29-52	C	3	Irr	Dd 11 ft after 4 hrs pumping 120 gpm; L.
6M4	C. E. Hyde	100	Dr	6	111	111	Gravel	18.99	7-11-60	C	2	Irr	Dd 14 ft after 4 hrs pumping 120 gpm; Cp, L.
6M5	Norbert and Lucille Alexandra	103	Dr	5	100	-	-	18 17.21	- 7-11-60	C	5	Irr	Water level is low in summer.
6N1	Marvin Ward	100	Dr	6	100	97	-	17 18.25	6-15-50 7-11-60	T	5	Irr	Dd 21 ft after 4 hrs pumping 96 gpm; L.
7D1	Nick Polly	110	Dr	6	120	120	-	17 17.46	6-19-50 7-11-60	C	7½	Irr	Supplies 20 acres; casing perforated 87-120 ft.
7D2	G. L. Matlock	110	Dr	6	101	101	Gravel	15 16.16	6- -51 7-11-60	C	7½	Irr	Dd 3 ft after 4 hrs pumping 120 gpm; water hard; L.
8B1	Elvo Silva	450	Dr	6	73	-	do.	71 47.59	3- -53 7-12-60	J	1	N	L.
9B1	Ben Volk	655	Dr	6	250	250	-	207.87	7-12-60	N	-	N	
10J1	Norman Looney	645	Dr	6	212	-	Gravel	204 201.62	1947 7-12-60	P	1½	D	Supplies 2 houses.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
T. 19 N., R. 5 E.--Continued													
11F1	R. C. Duncan	650	Dg	60	16	-	-	7.56	8-1-60	C	½	D	
11G1	A. C. Morse	650	Dr	6	214	214	Gravel and sand	205	1948	J	2	D,S	Slight dd after 20 min pumping 10 gpm.
13E1	B. Inglin	385	Dr	6	-	-	-	-	-	C	1	D,S	
13F1	E. Paulsen	400	Dg	36	10	7	Sand and gravel	1.6 2.76	9-23-53 7-15-60	J	1/3	D	Water contains objectionable amount of iron.
13F2	M. Crab	400	Dr	6	38	-	Gravel and coarse sand	7.85 8.59	4-2-51 7-15-60	C	1	D,S	L.
14K1	Jerome Soler	355	Dr	6	42	35	-	6-7 7	3- -53 7-15-60	J	1	D,S	
18D1	J. Kraus	110	Dg	24	14	12	-	8.89	7-12-60	C	1/3	D	
18L1	Alfred Scholz	120	Dg	72	11	11	-	4 1.68	- 7-12-60	C	15	Irr	Dd 4 ft, pumping 250 gpm.
19D1	C. T. VanHook	130	Dg	48	9	9	Gravel	6.04	7-13-60	N	-	N	Water contains too much algae for domestic use.
19M1	Clover Leaf Dairy	145	Dr	6	81	-	-	3.04 1.56	6-11-40 7-28-60	C	5-7	D, Irr, Obs	Dd 5 ft after 4 hrs pumping 275 gpm; temp. 50° F; hydrograph on figure 16.
29L1	B. Brewer	180	Dg	36	9	9	Sand and gravel	3 3.37	10-1-52 7-14-60	C	4	Irr, Obs	Dd 3 ft after 6 hrs pumping 40 gpm.

30G1	J. Gratzer	175	Dr	6	100	100	-	9.15	7-14-60	N	-	N	
30M1	E. R. Campbell	165	Dr	6	96	96	Gravel	8.69	7-14-60	J	½	D	Dd 8 ft after 7 hrs pumping 100± gpm. Water leaves iron stain on plumbing fixtures.
30N1	Elsie Koehler	170	Dr	6	93	93	Sand and gravel	8.51	7-14-60	C	5	Irr	Dd2 ft, pumping 50 gpm; water contains objectionable amount of iron; L.
30P1	H. C. Flanagan	170	Dr	10	78	78	Gravel	4 3.41	1953 7-14-60	N	-	N	L.
31D1	J. R. McLean	175	Dr	6	100	100	Sand and gravel	4.11	7-15-60	N	-	N	Water reported to contain iron; L.
31Q1	H. J. Copeland	201	Dg	6	42	-	-	1.28	-	N	-	N	Well destroyed.
31Q2	Tad Sasaki	205	Dr	6	99	99	Gravel, cemented, blue	4.09	7-15-60	C	7½	Irr	Dd 11 ft, pumping 100 gpm; water contains objectionable amount of iron and sulfur; L.
31R1	Takashi Sasaki	205	Dr	8	90	90	Gravel	6.29	7-15-60	C	7½	Irr	Dd 11 ft, pumping 125 gpm; water contains objectionable amount of iron; L.
32E1	H. P. Ford	195	Dr	6	83	83	-	8	Winter 1948	C	7½	Irr	Dd 18 ft after 4+ hrs pumping 100 gpm. Well penetrates sand and clay through entire depth.
32G1	J. Scheonbachler	210	Dr	6	83	-	-	11.45 10.66	6-11-40 7-13-60	C	3/4	S	Dd 5.4 ft after 28 hrs pumping 250 gpm.
32J2	City of Orting	220	Dr	12-7	250	225	-	6.1 6.46	3-27-53 7-13-60	T	30	PS	Dd 30.2 ft after 3.2 hrs pumping 485 gpm; L.
32M1	Solomon Olsen	205	Dr	8	93	93	Gravel	8	4-18-52	C	10	Irr	Dd 10 ft after 4 hrs pumping 150 gpm. Well penetrates sand and clay to 71 ft, gravel to 93 ft.
33N1	R. E. Fitch	232	Dr	3	222	207	Gravel, cemented	13.5	1935	P	3/4	N	Yields 125 gpm; water contains objectionable amount of iron; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 19 N., R. 5 E.--Continued						
35R1	F. Lewis	755	Dr	8	143	-	-	123 117.43	4- -55 8-24-60	J	-	D,S	Slight dd, bailing 10 gpm; L.
							T. 19 N., R. 6 E.						
4M1	Marion Water District	690	Dr	10	305	305	Gravel and sand, cemented	49.47 30	7-30-53 8-25-60	T	20	PS	Dd 7 ft, pumping 200 gpm; C, L.
7B1	E. H. Krolick	675	Dr	6	201	201	-	Dry	-	N	-	N	Well not completed.
8J1	Floyd Jones	695	Dr	6	65	65	-	54 54.99	1950 8-23-60	T	3/4	D,S	
8J2	M. J. Sippola	700	Dg	48-36	23	5	Gravel	22.49 19.29	9-24-53 8-23-60	C	½	D,S	Water rusts pipes; L.
8R1	Fred Schoonover	690	Dr	6	81	81	-	59.97	8-23-60	J	½	D	
9L1	Fitzer Sawmill	710	Dr	12	191	190	-	70	8-23-60	J	5	Ind	Yields 40 gpm; L.
9N1	Harold Eatherton	700	Dr	6	87	87	-	-	-	J	1	D,S	Well penetrates "hardpan" to 20 ft. Supplies 22 head of stock.
9P1	George Faust	690	Dg	36	24	24	-	23.05 18.7	9-22-53 8-23-60	P	¼	D	
9P2	J. Gregg	700	Dg	36	33	20(?)	Sand	16.5 16.12	9-22-53 8-23-60	P	¼	D	L.

9P3	Unknown	700	Dg	40	13	12	-	9.25 6.66	9-22-53 8-23-60	N	-	N	Water is discolored.
10G1	G. E. Eccles	810	Dg	42	26	26	Sand, red	13	8- -52	J	1/3	D	Well flows in winter; L.
10J1	Mich Franich	820	Dg	48	21	-	-	19.46 17.79	9-22-53 8-25-60	J	½	D	Well inadequate in summer.
10P1	Matt Peltola	865	Dg	42	50	3	Sand lenses	31.81 22.62	9-22-53 8-25-60	J	½	D	L.
10Q1	C. J. MacAllister	870	Dr	6	156	-	-	74.94	8-25-60	P	½	D, S	Supplies 1 house, 4 head of stock, and 1,300 chickens.
10Q2	Mary Parlari	840	Dg	96	23	23	-	13.78 14.99	9-22-53 8-25-60	C	½	D,S	
10R1	J. P. Anderson	820	Dg	48	20	-	-	14.48 19.46	9-22-53 8-25-60	J	1	D	Supply inadequate in Sept.
17A1	W. R. Carson	485	Dg	48	4	4	Gravel	2.79	8-24-60	C	½	D	Supply inadequate in summer.
17B1	V. Mikulich	480	Dg	10	6	6	Sand and gravel	3.82	8-23-60	P	½	D	Water reported to contain iron.
18A1	J. Joseph	505	Dr	6	72	72	-	44	8-24-60	J	1	D,S	
18E1	J. Wald	425	Dr	6	37	37	Gravel	9	6-1-51	J	2	PS	Dd to 16 ft after 4 hrs pumping 100 gpm; L.
18F1	Don King	490	Dg	36	11	-	do.	3.55 2.99	4- -51 8-24-60	C	½	N	Supply inadequate.
18K1	S. W. Barton	695	Dg	72-48	25	4	-	2.08 11.22	4-2-51 8-23-60	P	1/6	S	Water reported high in iron.
	T. 20 N., R. 2 E.												
3M2	E. A. Randrup	160	Dr	6	45	-	Sand	Flowing	5-20-40	-	½	D	L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 2 E.--Continued						
3N1	Arnold Johnson	160	Dr	6	50	-	-	Flowing	3-1-60	J	1/3	D	
4R1	J. M. Glass	115	Dr	6	24	-	Sand and gravel	-	-	C	-	D	L.
9C1	Day Island Water District, Well 1	10	Dr	8	481	480	-	Flowing	11-4-38	P	20	PS	Pumps about 200 gpm; C, Cp, L.
9C2	Day Island Water District, Well 2	20	Dr	10-8	606	284-606	-	30.67	3-1-60	-	-	PS	Pumped 125 gpm for 8 hrs; Cp, L.
9H1	Albertson's Food Center	205	Dr	8	174	174	-	56	4-10-58	J	2,5	Ind	Dd 75ft, pumping 85 gpm; L.
9K1	University Place Water Co.	190	Dr	16	381	360	Sand and gravel	106.8	6-26-61	T	300	PS	L.
9P1	W. R. Waer	260	Dr	4	40	40	-	23	2-25-60	J	½	D	
10C1	Paul Pender	330	Dr	6-4	175	-	-	87	12-3-40	P	1½	D	
10D1	W. H. Craft	250	Dg	48-24	28	6	Gravel	16.76 27.9	5-25-39 3-1-60	-	½	D	
10K1	C. W. Holman	313	Dg	48	62	-	Sand	54.26 Dry	5-23-40 2-26-60	P	1	N	L.
11J1	City of Fircrest	234	Dr	10	280	280	-	Flowing	1-12-38	P	-	N	
11J5	City of Fircrest, Well 1	280	Dr	8	125	-	Gravel, clean	49.32	4-11-40	N	-	N	Well destroyed; L.

11J6	City of Fircrest, Well 2	290	Dr	10	169	169	Sand and gravel	65	7- -41	T	50	PS	Dd 2 ft after 16 hrs pumping 525 gpm; L.
11J7	City of Fircrest, Well 3	285	Dr	12-6	312	-	-	51 55.8	7- -50 2-29-60	T	25	N	L.
11K1	City of Fircrest	227	Dr	10	200	200	-	Flowing	1-12-37	N	-	N	Well destroyed.
11K2	do.	228	Dr	8	397	397	Sand	Flowing	1938	N	-	N	Well destroyed; L.
11L1	Fircrest Golf Club	280	Dr	10	120	120	Sand and gravel	50	3-25-51	-	-	Irr	Dd 60ft, pumping 185 gpm; L.
11M1	do.	315	Dr	10	257	257	-	97 96.6	10-10-52 2-26-60	T	60	Irr,D	Dd 80 ft after 4 hrs pumping 600 gpm; L.
11N1	do.	315	Dr	10-8	270	-	-	90	8-5-37	T	-	N	L.
11R1	City of Fircrest, Well 4	295	Dr	12	152	152	Sand and gravel	49 66.5	9-1-50 2-29-60	T	40	PS	Dd 8 ft after 9 hrs pumping 525 gpm; L.
11R2	City of Fircrest, Well 5	285	Dr	12-10	136	136	Gravel and sand	55	5-7-58	T	150	PS	Dd 8.9 ft, pumping 1,250 gpm; L.
11R3	F. C. Holly	275	Dr	6	88	87	Gravel	57 48.28	9-14-56 5-16-60	N	-	-	Dd 5 ft, pumping 25 gpm; L.
12H1	Bellarmine High School	405	Dr	8	218	218	Sand and gravel	172	10-7-41	T	7½	Irr, Inst	L.
13A1	City of Tacoma, Light Division	246	Dr	24-18	211	185	do.	38.6	6-18-53	-	-	-	Supplies heat pump; water is recharged through well 13A2, backfilled from 260 ft; L.
13A2	do.	244	Dr	30-24	85	63	-	-	-	-	-	-	Recharge well for 13A1, see above. Finished with 21.7 ft of 100 slot screen, dd 2.2 ft after 4 hrs pumping 2,500 gpm.
13H1	City of Tacoma, Well 4A	245	Dr	38-26	187	204	Sand and gravel	32.90	11-10-60	T	100	PS, Obs	Yields 1,450 gpm, dd 92 ft, backfilled from 294 ft; hydrograph on figure 14; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
T. 20 N., R. 2 E.--Continued													
13J1	City of Tacoma, Well 6A	267.23	Dr	38-26	179	183	Sand and gravel	27.22	11-10-60	T	150	PS	Yields 3,770 gpm, dd 74 ft, plugged back from 355 ft; L.
13J2	City of Tacoma, Well 11A	269	Dr	36-26	113	92.5	do.	57.50	11-10-60	T	250	PS	Yields 9,350 gpm, dd 25 ft. Backfilled from 151 ft; C, L.
13R1	South Tacoma Ice Co.	275	Dr	6	140	-	Gravel, coarse	30	1929	P	-	N	L.
14A1	University Place Water Co.	220	Dr	10	70	50	Sand and gravel	9	6- -45	T	50	PS	L.
14A2	do.	220	Dr	10	75	75	do.	14 17.1	6- -45 2-25-60	T	30	PS	L.
14A3	do.	220	Dg,Dr	10	30	-	-	Flowing	2-26-60	T	15	PS	L.
14D1	City of Fircrest	370	Dr	10-8	264	264	Sand and gravel	154	7- -62	N	-	N	To be Public Supply; L.
14G1	R. H. Christenson	280	Dr	6	80	-	-	54.38	3-1-60	J	½	D	
15A1	R. Fichtner	365	Dg	48	78	40	Sand	72.47	5-22-40	J	1½	D,S	
15C1	University Place Water Co.	400	Dr	10	288	-	Sand and gravel	188	11-19-56	T	15	PS	Dd 38 ft, pumping 900 gpm; C, L.
15C2	H. L. Larson	400	Dr	6	252	252	-	200 190.59	10-18-55 4-12-60	S	-	D	L.
15G1	L. F. Drexler	405	Dg	44	135	-	Sand	121.78	5-22-40	N	1	N	Well destroyed.

15L1	J. Nelson	410	Dr	8-6	251	251	-	200±	1938	N	-	N	L.
15L2	C. H. Erickson	405	-	36	129	-	-	-	-	P	3/4	D	
15L3	--Lundell	405	Dr	8	245	-	-	204	2-25-60	Sb	1	D,S	
15M1	J. W. Forsythe	410	Dg,Dr	36-8	440	191±	Gravel, cemented	299.50 295.90	5-29-40 5-1-41	P	2	N	Dd 7 ft after 15 min pumping 10 gpm; well destroyed; L.
15N1	H. J. Boedecker	415	Dg	48	145	110	-	Dry	1960	-	-	N	"Hardpan" to 50 ft, then alternate layers of compact sand and gravel; well destroyed.
16A1	University Place Water Co., Well 6	310	Dr	8	171	162	Sand and gravel	86.0 96.5	4-28-51 2-26-60	T	60	PS	Dd of 25 ft after 3 hrs pumping 440 gpm; L.
16A2	University Place Water Co., Well 7	310	Dr	8	176	175	Sand	94	-	T	30	PS	Dd 27.5 ft, pumping 385 gpm; L.
16G1	University Place School District 83	250	Dr	16-10	150	138	Sand and gravel	45 43.2	 2-26-60	T	15	Inst	Dd 75 ft, pumping 200 gpm; L.
16L1	C. C. Curran	230	Dr	8	62	62	do.	32	-	J	1	D	Dd 14 ft, pumping 12 gpm; L.
16M1	Sunset Beach Improvement Club	120	Dr	8	118	-	-	75	6-7-52	T	3	PS	Slight dd, bailing 40 gpm; Cp, L.
17R2	C. G. Hockenberger	215	Dr	8	161	-	-	139.08	2-29-60	C	1	-	Used in summer only.
20P1	Pioneer Sand and Gravel Co.	25	Dr	22-12	1,020	1,020	Gravel	Flowing Flowing	6- -41 2-23-60	T	200	Ind	Dd 55 ft, pumping 1,500 gpm; Cp, L.
21P1	New Tacoma Cemetery	224	Dr	10	243	-	do.	133	1931	T	50	D,Irr	Dd about 10 ft, pumping 200-300 gpm. Casing is perforated.
21P2	do.	224	Dr	6	243	243	do.	133	1931	P	3	D	
21P3	do.	240	Dr	12	218	202	-	98	7-2-59	N	-	N	Dd 45.2 ft, test pumping 450 gpm; L.
22C1	Truman Drum	395	Dr	6	260	260	Sand, fine, dirty	193	6-10-47	N	-	N	L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
	T. 20 N., R. 2 E.--Continued												
22G1	C. F. Miller	356	Dr	6	177	-	-	165	-	P	3/4	N	
22K1	T. A. Thompson	385	Dr	6	177	-	-	163.4	2-24-60	J	1½	D,S	
22N1	Charles Wright Academy	230	Dr	6	172	-	Sand and gravel	132.4	2-29-60	J	-	Inst	Yields 15 gpm; L.
22N2	do.	230	Dr	10-8	330	330	do.	155.5	1960	-	-	Inst	
23H1	Nelson Cutt	275	Dg	6	51	45	-	45.40 49.37	5-18-40 3-3-60	J	½	N	Formerly 48-inch casing.
23J1	R. A. Corey	310	Dr	-	138	-	-	103.6	3-10-60	J	5	-	Dd 1 ft after ½-1 hr pumping 30 gpm.
23K1	Hartts Bros.	195	Dr	8	54	-	Gravel	5	10-13-54	C	3	D	Supplies 10 houses; L.
23Q1	Ralph Walder	255	Dg	48	70	-	-	67.44	5-17-40	P	½	Irr	Mostly sand near top of well, cemented gravel at bottom.
23Q2	--Konschuh	290	Dr	6	101	-	-	86.73	3-1-60	J	1	-	
24A1	Northern Pacific Ry.	252	Dg	360	41	-	Gravel	20.7	-	N	-	N	Well destroyed.
24A2	do.	252	Dr	18-15	196	196	do.	-	-	T	50	PS, Ind	Dd 47 ft, pumping 1,200 gpm; C, L.
24F1	Andrew Sims	295	Dg	48	67	-	Sand	62.59	5-17-40	P	3/4	D	L.
24F2	do.	295	Dr	6	124	-	-	7.2	3-2-60	J	½	D	

25E1	Calvary Cemetery	250	Dr	12-10	330	330	Gravel and sand	25	4- -36	T	40	Irr	Dd 40 ft after 1 hr pumping 400 gpm; Cp.
25F1	J. Portman	260	Dr	8	52	52	-	26	1943	J	½	D	
25G1	do.	239.25	Dg	18	30	-	-	11.96	5-6-59	C	-	Irr	
25H1	J. Andre	230	-	18	3	-	-	1.71	5-6-59	-	2	Irr	
25K1	Melvin Chase	231.02	-	10	31	-	-	2.80	6-12-59	J	-	Irr	L.
25L1	Burkehart and Chase	251.48	Dg	30	35	-	-	25.00	5-6-59	J	1	D	Cp.
25N1	Flett Dairy	245.99	Dr	16	72	-	-	24.50	11-9-59	T	20	N	Formerly irrigation well. Dd 20 ft, pumping 400 gpm.
25P1	Leo Chase, Well 1	246.05	Dr	10	62	62	-	19.08	5-6-59	J	1	D	Dd 25 ft after 4 hrs pumping 450 gpm; Cp, L.
25P2	Flett Dairy	247.70	Dr	12	60	-	-	43.47	8-17-59	J	-	Ind	
25P3	do.	248	Dr	12	121	-	Gravel and sand	20.90	9-15-59	S	25	Ind	Dd 57 ft after 30 min pumping 480 gpm; L.
25Q1	Leo Chase, Well 2	236.11	Dr	10	62	-	-	7.05	5-27-59	-	-	Irr	
26H1	Calvary Cemetery	247	Dr	8-6	165	-	-	25	-	N	-	N	Well destroyed.
26J1	James Holroyd	249.69	Dg	48	38	-	Sand, fine	29.98	5-6-59	J	-	D, Irr	Hydrograph on figure 13; Cp.
26J2	T. E. Hay	249.35	Dg	56	34	-	-	31.60	11-17-59	J	1	D	Cp.
26J3	Richard Hay	245.42	Dr	6	63	-	Gravel	26.25	11-19-59	J	½	D	Dd 4 ft, pumping 20 gpm; L.
26J4	--Croft	245	Dr	6	35	-	Sand and gravel	20	-	-	-	D	Dd 2 ft, pumping 20 gpm; L.
26L2	Hjalmar Hanson	220	Dr	6	53	-	Sand	20	6-2-59	J	-	D	Dd 10 ft, bailing 35 gpm; L.
26M1	Lakewood Water District	215	Dr	10	516	516	Hardpan	108	6-28-60	-	-	PS	Test well. Well backfilled from 625 ft; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
	T. 20 N., R. 2 E.--Continued												
26M2	Lakewood Water District	215	Dr	16-10	515	515	Gravel, hardpan	91	6-28-60	-	-	PS	
26N1	E. V. Grubert	239.13	Dr	8	79	-	-	27.62	11-18-59	J	-	D	Cp, L.
26P1	E. Raff	230.25	Dr	6	45	-	-	8.62	5-11-59	P	1/4	D	Cp.
26P2	J. Flett	225.83	Dr	6	120	-	-	4.93	5-14-59	J	1/2	D	Cp.
26P3	Bertha Ponton	225.85	Dr	6	37	-	-	8.2	11-12-59	-	-	D	Cp.
26P4	Richfield Oil Co. Lorne Bently, lessee	227.28	Dr	6	58	-	-	6.8	11-12-59	J	1	D	
26P5	P. J. Hussey	231.49	Dr	6	42	-	-	13.7	11-12-59	P	1/4	D	
26P6	Weldon Barrett, Jr.	231.98	Dr	6	34	-	-	17.7	11-17-59	C	1/4	D	Cp.
26P7	Max Hopp	250	Dr	6	66	66	-	26	5-12-56	C	-	D	L.
26P8	--Sherrod	240	Dr	6	40	-	-	11.8	3-17-60	J	1	D	
26Q1	G. L. Larson	228.78	Dr	8	22	-	-	7.6	11-13-59	-	1/4	Irr	Owner reports water is contaminated.
26Q2	A. C. Gratzer	232.06	Dr	6	42	-	-	13.6	11-13-59	J	-	D	Cp.
26Q3	Richard Maxwell	235.09	Dr	8	68	-	-	14.2	11-13-59	J	-	D	
26Q4	Joe Bricker	230.55	Dr	6	94	-	Sand and gravel	16.2	11-18-59	-	-	-	Dd 1 ft, pumping 30 gpm; L.

26Q5	C. Kiphart	230	Dr	6	53	-	-	9	3-30-59	J	1	D	Dd 15 ft, pumping 40 gpm; L.
26Q6	Fitzpatrick and McIntyre	240	Dr	6	40	-	Sand	15	11-12-58	-	-	D	Dd 10 ft after bailing 40 gpm; L.
26Q7	S. L. Rowland	235	Dr	6	116	-	Sand, packed	14	10-25-55	-	-	D	Dd 8 ft, pumping 50 gpm; L.
26R1	William Steinhoff	230	Dr	6	91	91	Gravel, hard	20	8-20-54	J	1	D	Dd 15 ft, pumping 16 gpm; L.
26R2	Paul Stump	242.57	Dr	6	44	-	-	23.5	11-16-59	P	½	D	Cp, L.
26R3	Dick Inderbitzin	243	Dr	6	55	-	Gravel	20	3-26-59	-	-	D	Dd 7 ft, pumping 30 gpm; L.
26R4	Arthur Stroud	243.77	Dr	6	74	-	-	18.0	11-17-59	J	1	D	Cp.
27J1	Dr. D. G. Willard	230	Dr	6	175	-	-	103.5	8-19-58	J	1	D	
27K1	J. T. Garoutte	215	Dr	6	225	225	-	163	10- -54	-	-	D	Dd 15 ft, pumping 10 gpm; L.
28B1	Ann Goodwin	240	Dr	6	283	-	-	155.8	2-29-60	J	1½	D	
29Q1	West Tacoma Newsprint Co., Well 1	19	Dr	34-8	548	542	Gravel	Flowing	10- -38	-	-	-	Flows 215 gpm. Well rehabilitated; see 20/2-29Q3; C, L.
29Q2	West Tacoma Newsprint Co., Well 2	14	Dr	36-12	854	800	Gravel and sand	Flows	-	N	-	N	Flows 580 gpm. Driller reported level 28 ft above land surface; C, L.
29Q3	West Tacoma Newsprint Co.	19	Dr	12-8	275	275	Gravel	Flows	-	T	10	Ind	Flows 300 gpm, dd 65 ft after 24 hrs pumping 675 gpm. Rehabilitated well 20/2-29Q1; Cp.
32B1	West Tacoma Newsprint Co., Well 3	22	Dr	18-12	1,172	1,109	do.	Flows	-	T	125	Ind	Flows 1,500 gpm. Dd 50 ft after 4 hrs pumping 4,200 gpm; C, Cp, L.
32B2	West Tacoma Newsprint Co., Well 4	35	Dr	20-8	796	-	Sand and gravel	Flows	-	T	100	Ind	Dd 78 ft, pumping 1,400 gpm; L.
32Q1	H. B. Foster	305	Dr	-	93	-	-	-	-	P	3/4	D, Irr	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
T. 20 N., R. 2 E.--Continued													
32Q2	G. Taylor	305	Dr	6	115	115	-	95	4-5-53	J	1	D	Supply adequate for small farm. Dd 3 ft, bailing 16 gpm; L.
32Q3	Robert Lester	305	Dr	6	119	119	-	87.2	2-16-60	Sb,T	3/4	D	
34B1	Ray Noble	250	Dr	6	72	72	-	-	-	-	-	D	Dd 58 ft, bailing 15 gpm; L.
34E1	Lakewood Water District, Test Well 5	240	Dr	10	287	-	Sand and gravel	71	7- -50	T	40	PS	Dd 36 ft, pumping 290 gpm; C, L.
34E2	Lakewood Water District, Well 1	240	Dr	36-12	267	267	do.	72.0 66.6	2-14-52 2-10-60	T	150	PS, Obs	Hydrograph on figure 11; C, L.
34K1	A. G. Ellis	240	Dg	36	44	4-6	Gravel	36.77 41.00	5-3-39 2-9-60	-	-	N	
34L1	O. H. Weller	209.3	Dg	48	13	12	do.	8.85	4-18-40	P	½	D	
34R1	J. W. Mann	251	Dg,Dn	48	36	36	Gravel, pea	31.45 29.66	4-16-40 2-9-60	C	1/3	D	
35C3	Floyd Firebaugh	256.01	Dr	5	52	-	-	36.7	11-13-59	N	-	N	Well destroyed.
35C4	Dennis Livingston	255.82	Dr	5	58	-	-	36.2	11-19-59	J	1	D	Cp.
35D1	H. R. Hall	255.21	Dr	6	80	78	-	31.6	5-11-59	J	1½	D,Irr	Cp, L.
35F1	Charles Rugh	252.70	Dr	6	70	-	-	34.2	10-14-59	J	-	D	

35F2	Robert Nadolskey	258.81	Dr	6	53	-	-	37.8	11-12-59	J	½	D	
35G1	A. W. Freckleton	260.02	Dr	6	74	-	Sand and gravel	37.8	11-12-59	C	1½	D	Dd 3 ft, pumping 15 gpm; Cp, L.
35G2	do.	226.49	Dn	1¼	8	-	-	6.3	11-5-59	N	-	Obs	USGS test well; L.
35K1	J. B. Sparks	262.02	Dr	6	79	-	-	42.8	11-12-59	J	½	D	Cp.
35P1	Pasadena Co., Inc. (Lakewood Community Center)	258	Dr	10-4	768	768	Sand, black	37 57.5	7- -37 2-11-60	N	-	N	L.
36B1	Puget Sound Rendering Co.	230.89	Dr	8	33	-	Gravel	9.1	5-12-59	C	20	Ind	Uses 66,000 gallons per day; Cp.
36B2	Mountain View Memorial Park	230	Dr	12	183	183	Sand and gravel	7.5	4-12-60	T	60	Irr	Dd 69 ft, pumping 1,000 gpm; L.
36C1	Flett Dairy	248	Dr	6	90	-	-	-	-	-	7½	Ind	
36C2	do.	248	Dg	30	35	-	-	-	-	T	5	N	Owner reports water is contaminated.
36F2	Mountain View Memorial Park	230	Dr	12	155	155	Gravel	0	5-10-59	N	-	N	Dd 18± ft, pumping 500 gpm. Well caved; L.
36F3	do.	231.68	Dr	12	155	155	-	0.1	5-10-59	T	60	Irr	Dd 30 ft after pumping 24 hrs at 800 gpm; Cp, L.
36G1	do.	230	Dr	12	42	42	-	2.2	5-22-54	-	-	Irr	Yields 100± gpm; L.
36H2	C. A. King	268.9	Dr	6	57	-	-	31.76	12-10-59	J	-	D	
36J1	Troubador Inn	275	Dg	48	41	-	Gravel	31.05	5-29-40	-	-	N	Well destroyed.
36L1	Mountain View Memorial Park	269.55	Dr	8	202	-	do.	44.33	5-13-59	N	-	Obs	Hydrograph on figure 19; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 20 N., R. 3 E.						
1L1	Kazue Yotsuuye (Brookville Gardens)	15	Dr	10-6	185	185	-	+0.3 1	7-22-52 3-16-60	T	25	Irr	Dd 99 ft after 3 hrs pumping 200 gpm; Cp, L.
1R1	Century Amusement Co., Inc.	20	Dr	2	252	-	Sand, coarse, and pebbles	12	-	N	-	N	Well abandoned; L.
1R2	Andre's Hardware Store	14	Dn	2½	93	93	-	.13	6-14-60	J	3/4	Ind	
2N1	A. R. Bunge	20	Dn	2	62-67	62-67	-	5	6-10-53	C	10	D, Irr	Slight dd after 4 hrs pumping 120 gpm. Well number refers to 6 driven wells ranging in depth from 62 to 67 ft.
2Q1	George Kowascki	15	Dr	8	82	72	-	5	6- -50	N	-	N	Dd 25 ft after 6 hrs pumping 100 gpm, level recovers in about 3 min; well destroyed; L.
3L1	City of Tacoma, Sewer Division	10	Dr	12	534	534	Gravel and sand	+11	4- -60	-	-	Ind	Dd 40 ft after 48 hrs pumping 1,000 gpm; Cp, L.
3M1	Washington Gas and Electric Co.	12	Dr	-	400-500	-	-	Flows	-	N	-	N	Cp.
3R1	Walter Fietz (Federal Meat Co.)	25	Dr	3	-	-	-	Flows	-	J	5	S	Pumps 75 gpm 24 hrs a day; Cp.
4D1	Tacoma Savings & Loan Assoc., Well 1	120	Dr	-	202	202	Sand and gravel	95	1956	-	-	Ind	Discharge well for heat pump system; L.

4D2	Tacoma Savings & Loan Assn., Well 2	120	Dr	-	147	-	Gravel and sand	95	1956	T	-	Ind	Intake well for heat-pump system; L.
4G1	Northwest Door Co.	25	Dr	12-8	600	600	Sand, coarse, and gravel	+5 Flowing	1941 1960	N	-	N	Dd 45 ft, pumping 500+ gpm; backfilled from 640 ft; Cp, L.
4H1	Wheeler-Osgood Sales Corp.	12	Dr	10-8	392	-	-	Flowing	8-4-39	P	-	N	Pumped 300 gpm, flows 70 gpm.
4H2	St. Paul and Tacoma Lumber Co.	12	Dr	16-12	1,501	1,501	Gravel and sand	Flows	-	C(?)	15	Ind	Dd 11 ft after 24 hrs pumping 775 gpm. Flows 571 gpm; L.
4J1	Carstens Packing Co.	12	Dr	12-8	452	-	-	Flows	-	N	-	N	Yields 350 gpm. Flows 140 gpm.
4J2	do.	12	Dr	10-8	705	640	Gravel	-	-	T	15	Ind	Yields 680 gpm. Flows 40 gpm; L.
4J3	do.	10	Dr	12-10	547	547	Gravel and sand	Flows	-	T	10	Ind	Dd 21 ft after 4 hrs pumping 550 gpm; temp. 54° F; flows 550 gpm; Cp, L.
4P1	Washington Gas and Electric Co.	15	Dr	10	385	-	-	Flowing	6-9-60	N	-	N	Cp.
4P2	Harmon Mfg. Co.	10	Dr	12-10	250	250	Sand and gravel	+23	1940	T	15	N	Yields 250 gpm. Flows about 100 gpm; L.
4Q1	Wheeler-Osgood Sales Corp.	8	Dr	10-8	492	490	Gravel, coarse	+20 +4	8- -39 6-9-60	N	-	N	Yields 80 gpm. Flows 30 gpm; Cp, L.
5D1	Continental Baking Co.	367	Dr	10-6	396	-	-	80	-	N	-	N	Pumped 72,000 gallons per day. Well destroyed.
7F1	Allenmore Golf Course	320	Dr	12-10	160	-	Gravel and sand	60	-	T	30	Irr	Dd 11 ft after 48 hrs pumping 300 gpm; L.
7G1	do.	380	Dr	10	270	270	-	126 140.10	4-15-48 3-22-60	T	30	Irr	Dd 9 ft after 4+ hrs pumping 300 gpm; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 3 E.--Continued						
7N2	Pacific Match Co.	255	Dr	10-8	205	-	Gravel	17	1- -40	C	10	Ind	L.
7Q1	Tacoma Milk Producers Assoc.	255	Dr	8-6	141	141	Gravel and sand	100	-	T	-	Ind	Dd 12 ft, pumping 55 gpm; L.
7R1	City of Tacoma	249	Dr	-	90	-	-	-	-	N	-	N	Supply inadequate; well destroyed; L.
8K1	J. E. Berkheimer Mfg. Co.	230	Dr	12-8	107	107	Gravel	-	-	T	10	N	L.
8R1	City of Tacoma, Well T1	290	Dr	8-6	221	-	-	-	-	N	-	N	Supply inadequate; L.
9A1	Container Corp. of America	20	Dr	8	175	171	-	Flows	-	T	20	N	Dd to 75 ft after 4 hrs pumping 250 gpm; L.
9A2	do.	20	Dr	6	117	117	-	Flows	-	-	-	N	Dd 20 ft, pumping 20 gpm.
9A3	do.	20	Dr	12	320	320	Gravel	Flowing	3-16-60	T	50	Ind	Dd 53 ft after 48 hrs pumping 500 gpm; temp. 51½° F; L.
9C1	Medosweet Dairies	65	Dr	10	161	-	-	30 23.08	1939 3-16-60	T	25	Ind	Dd 10-11 ft after 24 hrs pumping 165 gpm. Well deepened from 120 ft.
9C2	Cammarano Bros.	30	Dr	8-6	301	-	Sand and gravel	0	4- -59	T	15	Ind	Well deepened from 146 ft. Dd 152 ft, pumping 101 gpm; Cp, L.

9D1	Carling Brewing Co.	80	Dr	12-8	150	-	-	40	-	N	-	N	Well replaced by 9D2.
9D2	Carling Brewing Co., Well 1	80	Dr	10	247	-	-	80	-	T	40	N	Dd 60 ft, pumping 375 gpm; abandoned; Cp, L.
9D3	Carling Brewing Co., Well 5	110.94	Dr	22-12	677	677	Sand and gravel	61 75	7- -49 3-15-60	T	100	Ind	Dd 54 ft after 4 hrs pumping 1,500 gpm; L.
9D4	Carling Brewing Co., Well 4	105.95	Dr	20-12	540	540	Gravel	65	3-15-60	T	100	Ind	Yields 1,200 gpm; Cp, L.
9E1	Sharpe Sign Co.	105	Dr	6	200	200	-	97.30 67.54	7-13-39 5-26-60	N	-	Obs	Yields 100 gpm.
9E2	National Soap Co., Well 2	105	Dr	12-8	435	-	Gravel and sand	-	-	T	25	Ind	Little dd when pumped 125 gpm.
9E3	Pacific Refrigerating Co.	145	Dr	12-8	259	259	Gravel	83	1935	T	-	N	Abandoned; L.
9E4	Tacoma Ice and Cold Storage Co.	125	Dr	14-10	710	360	-	73.1 112.37	5- -53 3-15-60	T	20	Ind	Dd 49 ft, pumping 360 gpm. Casing perforated 145-165 ft and 280-290 ft.
9F1	Silver Springs Brewing Co.	40	Dr	8-6	618	595	-	Flows	-	J	7½	Ind	Dd 25 ft after 4 hrs pumping 150 gpm; Cp, L.
10B1	Medosweet-Foremost Dairies	25	Dr	10	275	269	-	Flowing Flowing	6- -51 3-16-60	J	7½	Ind	Flows 100 gpm; Cp, L.
11C1	The Milwaukee Road	20	Dr	3	160	-	Silt and sand	Flowing	3-16-60	T	-	Ind	Flows 30 gpm; L.
11J1	W. C. Bluhm	20	Dn	1½	70	70	-	4.65	3-16-60	P	¼	D,S	
11J2	E. Finley	25	Dn	1½	100+	100+	-	-	-	C	¼	D,S	
11P1	J. J. McDonald	25	Dr	6	88	88	-	-	-	J	½	D	Yields 10 gpm; L.
11P2	Tony Banaszak	25	Dr	6	41	41	Gravel	10	-	J	½	D	Dd 15 ft, pumping 10 gpm; L.
11P4	E. Barker	25	Dr	6	90	85	do.	Flowing	1960	C	½	D	Dd 35 ft, pumping 20 gpm; L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
						T. 20 N., R. 3 E.--Continued							
12C1	Colonial Gardens	15	Dr	3	277	-	Sand, coarse	+4 .38	8-20-40 3-16-60	P	-	D,Irr	Yields 132 gpm; Cp, L.
13B1	Louise Suss	25	Dn	2	40	40	-	-	-	P	¼	D	
13G1	L. P. Zebroski	20	Dr	8	86	86	-	Flowing	3-21-60	N	-	N	Reported no dd after 5 hrs pumping 80 gpm; well destroyed; L.
13G2	do.	20	Dn	2	92	92	-	1	1957	J	1	D	
13H1	Eugene Mourey	20	Dn	2	84	-	-	-	-	C	¼	D	
13H2	Walter Stemp	20	Dr	4	38	38	-	8	2-10-51	-	-	Irr	Dd 12 ft, pumping 25 gpm. Well used only in summer; L.
13H3	do.	20	Dr	6	75	75	-	-	-	N	-	N	Well destroyed; L.
13H4	do.	20	Dr	6	253	-	-	-	-	N	-	N	Well destroyed; L.
14B1	L. L. Jacobsen	175	Dr	6	145	145	Gravel	124 103.28	1951 3-11-60	J	½	D	L.
14B2	Harold Olsen	60	Dr	6	80	-	-	33	8-26-60	J	1	D	Dd 14 ft, bailing 10 gpm; L.
14C1	Charles Rutheford	50	Dr	6	105	105	Sand and gravel	-	-	J	3/4	D	Dd to 50 ft, pumping 8 gpm; L.
14C2	N. M. Becker	40	Dr	6	38	-	Gravel	-	-	J	½	D	L.
14R1	Dwight Robinson	260	Dr	8	230	230	-	170 187.27	8-1-51 3-11-60	Sb	5	D,Irr	L.

15K1	L. G. Olsen	300	Dg	48	55	8	-	47.00	4-25-40	N	3/4	N	Well destroyed.
15K2	B. Kreider	270	Dg	48	74	74	-	61.9	5-16-40	-	-	N	Reported caved in below 65 ft.
17J1	--Fetkie	360	Dg	-	144	-	-	144	- -	N	-	N	Well destroyed.
18C1	City of Tacoma, Well T-10	310	Dr	12	185	185	Gravel, coarse	93.69	5-6-53	N	-	Obs	Hydrograph on figure 14 and 19; L.
18C2	City of Tacoma, Well 12-A	309	Dr	36-30	167	141	Sand and gravel	84.40	11-10-60	T	200	PS	Yields 5,000 gpm, dd 122 ft; L.
18D1	City of Tacoma, Well 2-A	243.0	Dr	38-26	172	146	Gravel and sand	36.50	11-10-60	T	75	PS, Obs	Yields 2,025 gpm, dd 60 ft; hydrograph on figure 14; L.
18D2	City of Tacoma, Well 2-B	245	Dr	36-30	83	57	Gravel, coarse	25.40	11-10-60	T	200	PS	Dd 4.5 after 64 hrs. Pumping 64 hrs at 3,600 gpm; L.
18D3	City of Tacoma, Well 9-A	280	Dr	52-42	127	93	Gravel and sand	58.59	11-10-60	T	800	PS	Yields 5,500 gpm; C, L.
18F1	B. A. Hogeberg	300	Dr	6	83	83	-	64.3 73.63	7- -52 4-29-60	J	3	D, Irr	Dd 5 ft after 4 hrs pumping 31 gpm.
18F2	38th Street Golf Range	300	Dr	8	117	117	-	77	1-5-60	J	3	D, Irr	L.
19F1	City of Tacoma, Well 5-A	266	Dr	38-26	378	352	Gravel and sand	41.91	11-10-60	T	300	PS	Yield 6,240 gpm, dd 68 ft; C, L.
19L1	City of Tacoma, Well 9-A (Old)	273	Dr	38-26	293	266	-	-	-	N	-	N	Well destroyed; L.
19P1	City of Tacoma, Well 1-A	261	Dr	38-24	310	305	-	38.78	11-10-60	T	150	PS, Obs	Dd 60 ft after 4 hrs pumping 3,075 gpm, water analysis; hydrograph on figure 15; C, L.
19P2	City of Tacoma, air-lift system, Well 15	266	Dr	12-10	205	-	-	34.37	9-2-37	N	-	N	Well destroyed.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 20 N., R. 3 E.--Continued						
19P3	City of Tacoma, air-lift system, Well 1	266.1	Dr	12	117	-	-	31.91	9-2-37	N	-	N	Well destroyed.
19P4	City of Tacoma, air-lift system, Well 1-A	264	Dr	14-12	240	-	-	42.02	11-10-60	N	-	Obs	
19P5	City of Tacoma, air-lift system, Well 2	270	Dr	12	123(?)	-	-	33.95	9-2-37	N	-	N	Well destroyed.
19P6	City of Tacoma, air-lift system, Well 3	268.3	Dr	12-10	186	-	-	34.78	9-2-37	N	-	N	
19P7	City of Tacoma, air-lift system, Well 17	-	-	-	135	-	-	39	3- -07	N	-	N	Well destroyed in 1909.
19P8	City of Tacoma, air-lift system, Well 16	270	-	-	153	-	-	42.9	3- -07	N	-	N	Do.
22B1	T. A. Ligman	344	Dg	40	94	-	Gravel	-	-	N	-	N	Well destroyed.
23H1	A. Kapphahn	355	Dr	6	254	254	-	216 214.71	1930 3-11-60	Sb	1	D,Irr	L.
25B1	S. M. Skoog	280	Dg	48	56	-	Sand	53	5- -40	J	3/4	D	

25C1	Summit Water & Supply Co., Well 4	305	Dr	12	227	227	Gravel	162.96	3-23-60	T	30	PS	Dd 31½ ft, pumping 340 gpm. Perforated 211-214 ft; L.
25N1	Roy Pierantozzi	420	Dr	6	248	-	Sand	196 200.6	1951 3-11-60	Sb	-	D	Bailed 9-10 gpm; Cp.
26C2	J. A. Nelson	385	Dg	48	81	30	-	72.30	5-16-40	N	-	N	Well destroyed.
26H1	Vog Bros.	425	Dg	48	188	188	-	185	-	-	-	N	
26K1	C. E. Samuelson	416	Dg	30	28	10	Gravel and till	15.17 14.22	4-22-40 3-8-60	N	-	N	
27E1	--Njystad	415	Dr	6	187	187	Gravel	178	2- -52	J	3	-	L.
27K1	F. Ido	420	Dg	8	190	190	-	175±	4-20-40	N	-	N	Well destroyed.
28F1	Albertson's Food Center	380	Dr	6	182	182	Gravel	158	-	T	5	Ind	Dd 2 ft, bailing 20 gpm; L.
28K1	P. A. Carson	390	Dr	8	180	180	-	150	6-20-50	T	10	Irr	Dd 10 ft after 4 hrs pumping 150 gpm; L.
30C1	City of Tacoma, air-lift system, Well 4	266.2	Dr	12-7	176(?)	-	-	33.78	9-2-37	N	-	N	
30C2	City of Tacoma, air-lift system, Well 5	266	Dr	12-10	244	-	-	35.40	9-2-37	N	-	Obs	Hydrograph on figure 15.
30C3	City of Tacoma, air-lift system, Well 6	268	Dr	12-10	205	-	-	35.56	9-2-37	N	-	N	
30C4	City of Tacoma, Well 8-A	267	Dr	38-26	297	297	Sand and gravel	41.08	11-10-60	T	200	PS	Dd 60 ft, pumping 4,250 gpm, backfilled from 307 ft; L.
30F1	City of Tacoma, air-lift system, Well 7	268	Dr	12	126	-	-	32.05	9-2-37	N	-	N	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
T. 20 N., R. 3 E.--Continued													
30F2	City of Tacoma, air-lift system, Well 13	270	Dr	10	229	-	-	35.41	9-2-37	N	-	N	
30F3	City of Tacoma, air-lift system, Well 8	268	Dr	12-10	151	-	-	32.68	9-2-37	N	-	N	
30F4	City of Tacoma, air-lift system, Well 12	270	Dr	12-2	290(?)	-	-	-	-	N	-	N	Well destroyed.
30L1	City of Tacoma, air-lift system, Well 14	267.9	Dr	12	155(?)	-	-	38.13	9-2-37	N	-	N	
30L2	City of Tacoma, air-lift system, Well 9	258.1	Dr	12	149	-	-	23.51	9-2-37	N	-	N	
30L3	City of Tacoma, air-lift system, Well 10	255.9	Dr	12-10	207	-	-	22.20	9-2-37	N	-	N	
30L4	City of Tacoma, air-lift system, Well 18	258	Dr	-	121	-	-	-	-	N	-	N	L.
30L5	City of Tacoma, Well 7-A	256	Dr	38-16	298	307	Gravel	27.90	11-10-60	T	50	PS	Dd 67 ft, pumping 3,941 gpm, backfilled from 350 ft; L.

30L6	City of Tacoma, Well 10-B	257	Dr	30-18	83	83	Gravel and sand	28.48	11-10-60	T	40	PS	Dd 31.5 ft, pumping 930 gpm; L.
30L7	City of Tacoma	257	Dr	26	-	-	-	-	-	N	-	N	
30N1	City of Tacoma, Well 3-A	270.9	Dr	38-26	325	325	Gravel and sand	41.46	11-10-60	T	200	PS, Obs	Dd 63 ft, pumping 3,920 gpm, backfilled from 358 ft; hydrograph on figure 15; C, L.
31E2	Ruth Evans	280	Dr	6	63	-	-	38.4	5-16-60	J	½	D	
31E3	--Wolff	280	Dr	6	75	-	-	34.1	5-16-60	J	1	D	
31E4	J. M. Bland	280	Dr	6	90	-	-	-	-	J	1	D	
31E5	Roy Knudson	280	Dr	6	66	66	Gravel	39.64	5-16-60	J	1	D	Penetrated "hardpan."
31F1	Lakewood Water District, Test Well 7	300	Dr	10	209	-	-	54.23	1-22-51	N	-	N	Yields 1,000 gpm; C, L.
31F2	Lakewood Water District, Well J	300	Dr	36-18	159	137	-	56.5	2-24-52	-	-	PS	Dd 47.1 ft after 4 hrs pumping 1,500 gpm; C, L.
31H1	Cooney Transfer Co.	290	Dr	8	198	-	-	43.1	3-8-60	J	3	Ind	
31M1	R. G. Nobes	280	Dr	6	75	75	-	53	-	J	½	N	L.
32D1	E. B. Gustafson	306	Dg	48	16	-	Gravel	9.79	4-22-40	P	¼	D,S	Till from 13 ft below land surface.
32D2	J. E. Erdahl	314	Dr	10	80	-	-	62.63	4-24-40	P	1	D,S, Obs	
32D3	E. Lambert	304	Dg	30	18	17	Sand	15.50 61.32	10-4-40 3-8-60	J	½	D	
32D4	A. T. Kluss	314	Dr	5	114	114	Gravel, loose	75	12- -40	-	-	D	L.
32G1	J. L. Ryan	330	Dg	48	101	-	Sand	98.54	7- -40	N	-	N	Well destroyed; L.
32G2	--Athow	325	Dg	48	117	-	Gravel	108	1930's	N	-	N	Well destroyed.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 3 E.--Continued						
32M1	B. J. Holman	290	Dg	72	7	-	-	5.7	3-22-60	P	½	D,S	Dd 4½ ft, pumping 25 gpm; L.
32P1	E. Wagner	320	Dr	6	70	70	-	57.29	3-7-60	J	½	D	
34A1	Fred Olsen	408	Dg	48	133	30	Gravel and sand	-	-	N	-	N	Well apparently caved in below 133 ft. Well destroyed.
34E1	Frank Reding	423	Dg	48	20	-	Hardpan	3.75 3.40	4-20-40 3-8-60	P	-	Obs	Hydrograph on figure 13.
34F1	Henry Berger	417	Dg	48	185	8	-	180±	-	N	-	N	Well destroyed.
34L1	Southeast Tacoma Mutual Water Co., Well 2	410	Dr	12-10	505	396	Gravel	165 180.27	2-28-51 3-23-60	T	75	PS	Dd 1.5 ft, pumping 350 gpm; dd 3 ft, pumping 552 gpm; temp. 50° F; L.
35F1	C. O. England	405	Dg	48	18	-	-	8.92 .97	4-22-40 3-8-60	J	¼	D	
35F2	Peter Krapf	425	Dr	6	288	288	-	208	-	T	5	Irr	
35G1	I. S. Broxson	425	Dg	36-24	185	185	Sand, fine, light	175 177.5	1935 3-8-60	P	1	D,Irr, Obs	Hydrograph on figure 13; L.
35H1	--Bjork	430	Dg	36-24	187	185	Sand and gravel	172-175	-	P	3/4	D	
35L1	--Smith	420	Dr	6	187	-	-	170	9- -53	Sb	2	D,Irr	Slight dd, bailing 10 gpm; L.
35L2	Louis Burkett	415	Dg	48	16	-	-	10.35	8-25-60	P	½	Irr	

35R1	A. E. Koval	445	Dr	6	315	315	Sand, gravel, "hardpan"	164	8-28-52	Sb,T	5	D	L.
36D1	H. J. Aungst	423	Dg	48	34	-	-	5.00 3.41	4-22-40 3-11-60	P	-	N	
36R1	L. L. Corey	429	Dg	48	13	-	Quicksand	3.55	4-23-40	C	½	D	Supplies 3 houses.
							T. 20 N., R. 4 E.						
1D1	R. B. Twaddle	75	Dg	36	18	18	-	12 2.85	8-30-47 4-18-60	-	-	Irr	Dd 2 ft after 4 hrs pumping 17 gpm; L.
1M1	Roy Ray	60	Dn	3	34	34	-	5.89	4-18-60	P	¼	D, Irr	Dd 2 ft, pumping 4 gpm; L.
2Q1	W. G. Knobbee	75	Dg	48	18	18	-	2.73	4-25-60	N	-	N	Dd 6 ft, pumping 35 gpm.
3R1	L. Reisinger	330	Dr	10-8	371	362	-	130 81.53	- 4-6-60	N	-	N	L.
3R2	do.	330	Dr	6	126	-	-	104.71	4-6-60	J	1½	N	
4L1	George Aldridge	325	Dg	36	81	-	-	77.8	5-13-60	N	-	N	
5E1	Fusfield and Oppheim (Richfield Service Station)	30	Dr	4	350	-	-	+2.5	6-12-40	-	-	N	Flows 2-2½ gpm; L.
5Q1	Town of Milton, Well 1	50	Dr	-	200	-	-	Flows	-	-	-	N	Dd 30 ft after 4 hrs pumping 30 gpm; abandoned.
5Q2	Town of Milton	50	Dr	12-8	540	540	-	7	8- -45	N	-	N	Dd 15 ft after 4 hrs pumping 400 gpm; abandoned; L.
5Q3	Town of Milton, Well 3	50	Dr	10	80	80	Sand and gravel	8 16	6- -48 4-5-60	T	60	PS	Dd 19 ft after 4 hrs pumping 500 gpm; L.
5Q4	Town of Milton	70	Dr	12	76	76	-	8 16.04	1- -51 4-5-60	T	50	PS	Do.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
T. 20 N., R. 4 E.--Continued													
5Q5	Town of Milton	50	Dr	10	98	-	-	23.56	4-5-60	T	50	PS	L.
5Q6	Town of Milton, Well 4	50	Dr	18	80	43	-	17.0 13	4-5-60 -	T	25	PS	Dd 27 ft, pumping 510 gpm; L.
6A1	T. Crawe	200	Dg	40	-	-	-	4.62	3-23-60	C	½	D	Well is dry in summer.
6F1	Town of Fife	23	-	-	-	-	-	-	-	T	10	PS	
7D1	Oakwood Dairy	14	Dn	2	75	-	-	3 1.37	- 4-3-60	P	½	D,S	
7H1	K. Kondo	20	Dn	2	62	62	-	-	-	J	1	Irr	Yields 110 gpm.
7J2	Ben Holdner	25	Dn	2	46	46	-	6	10-27-52	C	-	S,Irr	Slight dd after 5 hrs pumping 170 gpm; Cp.
7Q1	L. V. Ambuehl	24	Dr	8	190	190	Sand, blue	Flowing	6-1-60	C	2½	Ind	Dd 13 ft, pumping 280 gpm; Cp. Flows 20 gpm; L.
8C1	--Miethkes	25	Dr	4	87	87	-	Flowing	4-5-60	P	½	D,Irr	
8D1	Ben Yoshida	25	Dn	2	60	60	-	4	4-12-53	-	-	Irr	Slight dd after 8 hrs pumping 100 gpm.
8F1	do.	25	Dn	2	44	44	-	4	2-10-53	-	-	-	Reported "no" dd after 8 hrs pumping 100 gpm.
8F2	Yoshihiko Tanabe	25	Dn	2	65	65	-	Flowing	4-20-60	-	-	N	Yields 100 gpm.

8M1	Akinobu Yotsuuye	25	Dr	8	168	153	-	Flowing	4-3-60	C	-	Irr	Dd 16 ft, pumping 120 gpm; L.
8Q1	H. L. Forman	75	Dn	2	48	48	-	Flowing	4-28-60	-	1	D	
9A1	George Fillies	360	Dg	48	31	-	-	25.47 18.27	11-3-54 4-5-60	N	-	N	
9D1	E. Lutter	275	Dg	60	119	6	-	107.60	11-3-54	P	1	N	Reported till to 119 ft.
10B1	Unknown	375	Dg	72	18	-	-	3.80 Flowing	11-2-54 4-6-60	N	-	D	
10D1	Bert Shomaker	360	Dg	42	42	-	-	21.85	4-5-60	P	-	N	
10M1	Mountain View-Edgewood Water District	360	Dr	-	205	-	-	-	-	N	-	N	Well destroyed; L.
11A1	Mrs. P. Mina	75	Dg	30	21	-	Gravel	17.63	4-23-60	C	¼	D	
11C1	T. A. Hagen	400	Dg	68	22	22	-	6.32	4-25-60	N	-	N	
12A1	D. L. Cartwright	65	Dr	8	308	308	Sand	Flowing	4-22-60	C	½	D,Irr	Cp, L.
12C1	Viola Canfield	60	Dr	3	250	250	-	Flowing	4-22-60	C	20	N	Gas in water.
14F1	F. Pyfer	425	Dg	36	25	-	Gravel	10 18.31	- 4-6-60	N	-	N	
14M1	C. J. Thoren	455	Dg	42	42+	-	-	38 44.91	8- -26 4-6-60	P	-	N	
15F1	H. C. Jorgenson	395	Dg	42	34	-	-	33.28 24.14	11-3-54 4-6-60	J	3/4	D,S	
15F2	S. Zackula	380	Dg	48	18	6	-	13.08 4.42	11-3-54 4-6-60	C	½	D	Well penetrates "hardpan" to 8 ft, sand and gravel to 20 ft.
15H1	Marvin Larson	425	Dg	34	47	6	Gravel	28.49	4-20-60	P	-	N	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 4 E.--Continued						
15N1	Mountain View-Edgewood Water District	75	Dr	12	94	93	Sand and gravel	1.84	4-20-60	T	100	PS	Dd 2-3 ft after 1 hr pumping 500-550 gpm; L.
15N2	do.	75	Dr	16	22	22	Gravel	2.85	4-20-60	T	50	PS	Yields 250 gpm; casing reported to be perforated from top to bottom of well
15N3	do.	75	Dr	16	22	22	do.	2.85	4-20-60	T	40	PS	Casing reported to be perforated from top to bottom of well.
15Q1	H. Henon	400	Dg	36	29	-	-	6.47	11-2-54	C	1/3	N	
16M1	Sanitary Infant Dairy	30	Dr	6	250	250	Gravel	Flowing	3-2-51	C	7½	S	
16P1	F. Blaser	30	Dn	-	175	-	do.	Flows	-	J	½	D,S	Supplies 4 houses; Cp.
16P2	do.	30	Dn	2	15	15	-	.44	4-7-60	-	-	Irr	
16P3	David Heath	30	Dr	-	230	230	Gravel	-	-	C	1	D	L.
17A1	R. Apthorp	35	Dr	4	230	230	-	-	-	J	1/3	D,S	
17D1	Steven Jankanish	25	Dn	2	-	-	Gravel	-	-	J	1/3	D,S	
17F1	Western Washington Experiment Station	25	Dr	18-10	500	475	-	Flows	-	-	-	-	Dd 42 ft, pumping 600 gpm; Cp, L.
17K1	Arnold Kaelin	25	Dr	2	267	182	Silt	Flows	-	-	-	D	L.

17M1	Western Washington Experiment Station	25	Dr	18-10	390	390	-	Flows	-	C	20	Irr	Dd 39 ft, pumping 1,000 gpm. Flows 100 gpm; L.
18F1	G. H. Thomas	25	Dn	2	144	-	Sand and gravel	At Surface	-	C	¼	D	Reported slight dd, pumping 1,400 gph.
18F2	A. F. Flynn	25	Dn	2	104	-	Gravel	8	3-2-51	J	¼	D	
18G1	Valley Packing Co.	24	Dr	6	315	-	-	+46 21.25	12-31-47 4-3-60	C	5	Ind	Dd about 12 ft after 4 hrs pumping 240 gpm. Penetrated sand and clay to bottom. Casing perforated 260-315 ft.
18H1	Puyallup Dairy Farm	25	Dr	8	550	550	Sand	30	-	N	-	N	Well destroyed; L.
18J1	--Kriesman	25	Dr	6	200	200	-	Flows	-	-	5	Irr	Dd 14 ft after 4 hrs pumping 75 gpm; L.
18K1	F. W. Carlson	25	Dr	6	308	308	-	Flowing	4-3-60	C	5	D,S, Irr	Yields 135 gpm.
18K2	A. N. Olsen	25	Dn	2	296(?)	-	Sand and gravel	Flows	-	N	-	D,S	
18K3	do.	25	Dr	4	52	48	-	14.09	4-3-60	C	5	Irr	Yields 50 gpm.
18M1	B. W. Lyon	25	Dn	2	253	-	-	5	3-21-60	T	1	D,Irr	
18N1	J. S. Sasaki	20	Dr	8	173	173	Sand	At LSD	3- -60	C	10	Irr	Dd 20 ft at 200 gpm; L.
18P1	George Richen	25	Dr	6	366	366	-	Flowing	12-9-47	J,Sb	7½-1	D,S, Irr	Dd 22 ft after 4 hrs pumping 60 gpm. Well penetrates sand, casing perforated 340-350 ft; Cp.
19B1	Stanley Raczkowski	25	Dn	2	97	-	-	-	-	P	½	D	
19D1	--Baginski	25	Dn	2	150	150	-	20	4-21-60	J	1	D,S	Yields 1,000 gph.
19F1	L. Steiner	25	Dn	2	110	110	-	Flowing	4-21-60	P	3/4	D,S	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
T. 20 N., R. 4 E.--Continued													
19F2	George Wasisco	25	Dn	2	98	-	-	Flowing	7-27-53	J	1/3	D	Reported slight dd after 4 hrs pumping 15 gpm.
19M1	Anton Schuler	25	Dn	2	86	86	-	Flowing	4-5-60	J	3/4	Irr	
19M2	do.	25	Dn	2	87	87	-	Flowing	4-5-60	J	3/4	Irr	
19M3	do.	25	Dn	2	88	88	-	Flowing	4-5-60	J	3/4	Irr	
19M4	Anton Schuler	25	Dr	6	155	155	Gravel	-	-	J	3/4	D,S, Irr	
19R1	G. H. Deeds	25	Dn	2	115	115	-	6 Flowing	- 4-11-60	C	3	Irr	Wells 19R1, 19R2, and 19R3 are connected to one pump.
19R2	do.	25	Dn	2	140	140	-	6 Flowing	- 4-11-60	C	3	Irr	
19R3	do.	25	Dn	2	120	120	-	6 Flowing	- 4-11-60	C	3	Irr	
20C1	Stanley Sulkosky	25	Dr	6	801	-	-	Flowing	4-3-60	-	-	D,Irr	L.
20E1	--Hall	25	Dn	2	74	74	-	16	6- -46	P	-	N	Dd 2 ft after 48 hrs pumping 25 gpm.
20J1	W. G. Knott	30	Dr	4	265	-	-	11.29 4.05	8-18-54 4-11-60	N	-	N	L.

20K1	E. R. Partridge	25	Dr	6	267	267	Gravel	Surface	-	C	3	D, Irr	L.
20N1	Oswold Gaiel	30	Dn	2	90	90	Sand	2 2	4-27-51 4-11-60	C	3	Irr	Dd 10 ft after 6 hrs pumping 60 gpm.
21B1	Joe Meyer	30	Dn	2	190	-	Gravel and sand	Near Surface	3-2-51	P	1/3	D, S	
21H1	--Lacy	30	Dr	3	180	-	-	Flowing	1939	C	-	N	
21N1	J. C. Franzen	25	Dr	6	298	298	-	Flowing Flowing	4-30-46 4-12-60	C	5	Irr	Yields 400 gpm; L.
21P1	Eugene Gambriel	25	Dr	6	230	230	-	Flowing Flowing	4-9-46 4-12-60	C	3	Irr	Flows 40 gpm; L.
22M1	Lacy Dairy Farm	35	Dr	3	205	-	-	Flowing	4-28-60	C	1½	D, S	Yields 100 gpm.
22P2	H. P. Scheyer	25	Dr	6	175	170	-	4.32	4-21-60	C	3	Irr	Yields 12 gpm.
22Q1	H. J. Wiese	30	Dn	2	29	-	-	10	6- -49	-	-	Irr	
23L1	H. George	50	Dn	2	15	15	-	1.43	4-7-60	N	-	N	
23N1	A. G. Stone	35	Dr	6	222	222	-	Flowing Flowing	9-1-46 4-7-60	N	-	Irr	Flows 2-5 gpm; L.
24B1	Fibreboard Products, Inc.	60	Dr	16	462	462	Gravel	+4.95	2-16-38	N	-	N	Dd 4.68 ft after ½ hr pumping 694 gpm; well destroyed; L.
24B2	do.	60	Dr	18-12	456	456	-	Flows	-	T	60	Ind	Dd 1½ ft after 24 hrs pumping 300 gpm; C, L.
24F1	Standard Brands of California, Well 1	61	Dr	16-12	480	-	-	+.97	12-7-37	-	-	Ind	
24F2	Standard Brands of California, Well 2	61	Dr	8	168	-	-	+3.74	11-3-38	N	-	N	
24F3	Standard Brands of California, Well 3	61	Dr	18	572	562	-	+3.25 +.42	11-30-37 4-1-60	C	-	Ind, Obs	Dd 8 ft, pumping 2,400 gpm; hydrograph on figure 13; C, L.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 4 E.--Continued						
25C1	Thomas St. Clair	275	Dg	60	28	-	-	11 11.38	- 4-8-60	C	5	Irr	Dd 4 ft, pumping 96 gpm. Well penetrates soil to 12 ft, sand to 28 ft.
25G1	William McClane	65	Dr	6	164	164	-	1 1.2	8-21-50 4-8-60	C	5	Irr	Dd about 4 ft after 4 hrs pumping 100 gpm. Well penetrates sand to 153 ft, gravel to 164 ft; Cp.
25J1	L. O. Faunce	75	Dr	8	129	129	Sand and gravel	8.34 5.67	9-15-54 4-19-60	C	5	Irr	Yields 55 gpm; L.
25N1	Simon Von Lierop	70	Dr	6	113	113	Gravel	6.5 9.73	1-28-52 4-18-60	C	7½	Irr	Dd 7 ft after 4 hrs pumping 180 gpm. Well penetrates sand and clay to 80 ft, gravel to 113 ft.
25P1	Ed Noble	75	Dr	6	92	92	-	8	4-24-53	J	½	D	Dd 11 ft after 3 hrs pumping 60 gpm; L.
25Q1	B. L. Nutter	60	Dr	6	105	105	Gravel	5 Flowing	4-2-52 4-18-60	C	3	D,Irr	Dd 11 ft after 4 hrs pumping 60 gpm. Well penetrates sand and clay to 95 ft, gravel to 105 ft.
26D1	C. E. Shoe	40	Dr	6	218	218	-	Flowing Flowing	6-11-47 4-7-60	C	5	D,Irr	Dd 4 ft, pumping 120 gpm. Well penetrates sand for entire depth; Cp.
26G1	Mrs. R. Nix	50	Dr	8	169	169	Gravel	Flowing Flowing	10-25-51 4-12-60	C	5	D,Irr	Dd 21 in. after 4 hrs pumping 150 gpm. Well penetrates sand and clay to 150 ft, gravel to 169 ft.

26R1	F. E. Sandford	70	Dr	6	112	112	-	4.5 4.52	7-28-46 4-18-60	T	5	Irr	Dd 12 ft after 4 hrs pumping 120 gpm; L.
27J1	Puyallup Ice Co.	50	Dr	12	233	-	-	Flowing	4-8-60	T	25	Ind	Dd 39.2 ft after 3.4 hrs pumping 500 gpm; L.
27L1	Farmer's Union Berry Coop.	45	Dr	8	285	-	-	Flowing	9-16-48	C	2	Ind	Flows 35 gpm. Dd 35 ft, pumping 300 gpm. Well penetrates sand and silt to 248 ft, gravel to 285 ft.
28E1	F. J. Plottenberger	37	Dn	2	82	-	Gravel	9	10- -41	-	½	Irr	L.
28H1	Brew Mfg. Co.	43	Dr	12	200	-	-	Flowing	4-11-60	N	-	Ind	Flows approximately 10 gpm.
28H2	Hunt Bros. Packing Co.	46	Dr	8	140(?)	-	-	Flowing	6- -40	-	-	N	Well pumped sand; well destroyed.
28H3	do.	46	Dr	4	165	-	-	+8	6- -40	-	-	N	Flows 25 gpm. Pumps 52 gpm; temp. 52° F; well destroyed.
28H4	Puyallup Ice Co.	45	Dr	6	253	253		Flowing	4-8-60	C	5	Ind	Pumped 60 gpm; L.
28J1	do.	45	Dr	6	252	-	-	-	-	C	5	N	Flows 5 gpm, dd 11 ft after 8 hrs pumping 125 gpm; L.
29D1	F. T. Smith	25	Dn	2	108	108	-	Flows	-	N	-	N	Well destroyed.
29D2	H. B. Louderback	30	Dr	6-4	265	265	-	Flowing	4-20-60	C	3	S	
29F1	A. R. Hartman	30	Dr	6-4	265	265	-	Surface	3-28-46	N	-	N	Dd 15 ft after 4 hrs pumping 65 gpm, well destroyed; L.
29H1	do.	30	Dn	2	55	-	-	+12-15	4-21-60	T	3	Irr	Pumped 30-40 gpm.
30J1	Charles Waldherr	160	Dr	6	97	95	-	62.64	3-23-60	Sb,J	½	D	Dd 6 ft after 45 min bailing 10 gpm; L.
30K1	M. Deland	355	Dr	4	284	-	-	30 125	9-15-54 4-21-60	Sb	7½	D,Irr	Yields 100 gpm.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 4 E.--Continued						
30L1	V. Kershner	355	Dr	6	140	140	-	130.13	4-21-60	J	1	D	Pumped 400 gpm; Cp, L.
31B1	F. Bolte	375	Dr	6	56	-	-	32.69	4-8-60	J	¼	D	
31D1	Summit Water and Supply Co., Well 2	380	Dr	12	311	-	Gravel	119.83	2-28-51	N	-	N	Slight dd, pumping 100 gpm; well destroyed; L.
31F1	P. S. McDermott	421	Dg	36	57	-	-	55	1940	P	½	N	Well is apparently in gravelly, sandy till; well destroyed.
31G1	J. J. Lyon	350	Dr	6	126	-	-	69.29	4-7-60	Sb	½	D	Dd 16 ft, pumping 7 gpm; L.
31G2	James Brown	340	Dr	6	93	93	Gravel	-	-	J	1	D	Yields 8 gpm; L.
32E1	Henry Bassi	240	Dg	36	17	-	-	5.29	4-8-60	C	-	D	
32J1	City of Puyallup	210	Dr	16-12	164	-	-	-	-	-	-	N	Test well. Flows about 450 gpm; L.
34B1	A. L. Luhtala	50	Dr	6	42	42	-	2 1.57	6-29-52 -	C	5	D	Dd 17 ft after 4 hrs pumping 80 gpm. Well penetrates sand and clay to 35 ft, gravel to 42 ft.
34C1	Lutheran Welfare Society	50	Dr	6	264	264	Gravel and sand	Flowing	4-11-60	-	-	N	Flows 20-25 gpm; L.
34E1	John Mladinich	50	Dr	6	43	43	-	7 2.31	- 4-11-60	C	½	Irr	Dd 14 ft, pumping 25 gpm; L.

34G1	City of Puyallup	150	Dr	16-12	574	574	Sand and gravel	28	5-18-62	Sb	75	PS	Dd 122 ft after 3 hrs pumping 510 gpm; Cp, L.
34H1	Aves Blueberry Farm	75	Dr	8	105	-	-	Flowing	4-12-60	N	-	N	
35B1	F. R. Minckler	70	Dn	2	22	22	Sand	8 3.83	10-9-52 4-12-60	C	5	Irr	Irrigates only about 2 wks per yr. Well penetrates soil to 8 ft, sand to 22 ft.
35D1	Arthur Sandberg	65	Dr	8	161	161	Sand, and sand and clay	5.30 4.16	9-15-54 4-12-60	C	11	Irr	Yields 120 gpm; L.
35E1	Henry Leland	65	Dr	7	46	46	Gravel	6 2.73	10-11-52 4-12-60	C	5	Irr	Yields 120 gpm. Well penetrates sand and clay to 41 ft, gravel to 46 ft.
35J2	A. H. Peterson	205	Dr	6	195	195	do.	135 99.96	6- -53 4-12-60	Sb	-	D	Dd 20 ft, pumping 5 gpm; L.
35J3	Andrew Hogenson	250	Dr	6	85	-	-	24.09	5-16-60	J	3/4	D	
35L1	C. R. Johnson	340	Dr	8	38	38	Gravel	Flowing	4-21-60	-	-	PS	Dd 8 ft after 4 hrs pumping 35 gpm; L.
35R1	A. J. Kolowinski	315	Dr	6	288	288	-	217.97	4-18-60	J	5	D	L.
36A1	Don Swanson	70	Dr	6	100	100	-	12 8.98	3-4-46 4-18-60	C	12	D, Irr	Dd 27 ft after 4 hrs pumping 150 gpm; L.
36G1	Emil Johnson	80	Dr	6	95	95	Sand and gravel	7 7.05	5-20-46 4-18-60	T	3	Irr	Dd 10 ft after 4 hrs pumping 64 gpm; L.
36H1	Frank Chervenka	76	Dr	6	98	-	-	-	-	-	5	D, Irr	Dd 5-6 in., pumping 120 gpm. Sulfurous taste.
36H2	do.	78	Dr	6	98	-	-	4.72	4-28-60	C	15	Irr, Obs	Dd 6.4 ft after 50 min pumping 300 gpm; hydrograph on figure 16.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 4 E.--Continued						
36H3	L. L. Wade	76	Dr	8	86	86	-	4.5 5.03	1946 4-18-60	C	15	Irr	Dd 9 ft after 10 hrs pumping 300 gpm; Cp, L.
36R1	George Holm	81	Dr	6	96	96	Gravel	7	1-14-52	C	3	D	Dd 14 ft after 4 hrs pumping 120 gpm. Well penetrates sand and clay to 76 ft, gravel to 96 ft.
							T. 20 N., R. 5 E.						
3J1	C. A. Fiman	480	Dr	6	158	158	-	123.82	7-7-60	Sb	3/4	D,S	
3K1	C. E. Carter	500	Dr	6	101	101	-	87.89	7-7-60	Sb	3/4	D	Yields 60 gpm.
3N1	O. E. McAllister	505	Dg	42(?)	55	12	Gravel and sand	28	1-23-54	J	3/4	D,S	Well pumps dry in 8 hrs, recovers in ½ hr; L.
3P1	A. D. McAllister	500	Dr	-	175	-	-	-	-	J	½	D,S	
3R1	G. Thompson	510	Dg	48	35	9	-	24.86	7-7-60	J	1/3	D,S	
4C1	D. Tyner	525	Dg	48	48	-	-	43.33	7-7-60	J	1/3	D	Water contains objectionable amount of iron.
4F1	G. Hocking	495	Dg	48	22	-	-	8.15	7-8-60	J	½	D	
5J1	Lake Tapps Water Co.	570	Dr	10	97	97	Sand and gravel	67.5	10-4-55	T	10	PS	Dd 17 ft, pumping 104 gpm; L.

5P1	C. E. Thomas	555	Dg	36	12	12	-	1.51	7-7-60	C	½	D	Supplies 2 houses. Yields 6-8 gpm.
7D1	Dieringer School District 343	65	Dr	12-10	408	408	-	Flows	-	C	7½	Inst	Flows 180 gpm; dd 17 ft, pumping 500 gpm; L.
8N1	T. Urback	440	Dr	6	149	149	-	109	7-7-60	P	3/4	D	Supplies 3 houses.
10H1	J. A. Zedler	535	Dg	48	12	5	-	6.83	7-8-60	C	½	D	Water tastes of iron.
10R1	G. Nickelson	540	Dg	36	30	30	-	3.84	7-8-60	C,P	1/3	PS	Water in well fluctuates with the rising and lowering of the lake.
11E1	V. Grote	545	Dg	36	27	12	-	10.44	7-6-60	J	½	D,S	
11N1	Mrs. Fred Sorensen	555	Dg	42±	45±	8±	Gravel	40	-	J	½±	D,S	Water leaves white precipitate, reported to contain iron.
11N2	C. Hitt	555	Dr	6	56	56	-	29.69	7-8-60	C	½	D	
14E1	P. Fadola	550	Dg	48	50	5	-	34.79	7-6-60	J	1/3	D,S	Yields 5 gpm.
14L1	R. A. Marshall	560	Dr	6	58	58	Gravel	-	-	J	-	D,S	Iron content is objectionable.
14P1	Isdore Ochsner	545	Dr	6	110	110	-	30	1950	J	1½	D,S	Dd 15 ft after 24 hrs pumping 60 gpm.
14R1	Rudy Koch	517	Dg	72	37	4	Sand and gravel	3	1- -54	P	1/3	D,S	Supply fair, water contains objectionable amount of iron.
17M1	Lake Tapps Development Co.	655	Dr	10	382	382	-	352.68	3-29-51	T	7½	N	Reported "no" dd, pumping 150 gpm; L.
18H1	W. D. Goodrow	640	Dg	78-36	104	8	-	99.55 Dry	3-29-51 7-7-60	N	-	D	Well reported to penetrate sand and gravel to 8 ft, "hardpan" 8 ft to 104 ft.
19E1	R. J. Hill	64	Dr	3	230	230	-	Flows Flowing	- 6-29-60	C	5	N	Casing perforated 190-230 ft; water has sulfur smell.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 5 E.--Continued						
26N1	Robert Taylor	540	Dg	48	9	8	Sand	11 5.3	Summer 53 7-5-60	N	-	N	Water contains objectionable amount of iron.
26N2	do.	545	Dr	6	54	54	-	21.61	7-5-60	J	3/4	D	Yields 9 gpm; water contains objectionable amount of iron.
26P1	F. Wipfli	540	Dr	6	105	105	-	Flowing	7-5-60	C	½	D,S	Yields 20 gpm.
27M1	W. G. Johnson	575	Dg	60	12	5	Hardpan	2.35	6-31-60	J	½	D,S	Water leaves brown stain on plumbing fixtures.
27M2	Mrs. Lewis Wahl	560	Dg	48	34	4	-	20.36	7-6-60	J	½	D	
27Q1	Dan Peoples	610	Dr	6	96	96	Gravel	84	8- -43	J	1½	D,S	
27R1	Eugene McColley	555	Dg	36	37	4	-	29 23.18	Summer 53 7-5-60	P	1/3	D,S	
28F1	Bonney Lake Water Co.	643	Dr	10-8	337	335	-	188.08	8-29-60	T	20	N	Dd 26 ft, pumping 180 gpm; temp. 49° F; Cp, L.
28H1	Lewis Day	560	Dg	48	47	-	-	-	-	J	½	D	Well can be pumped dry, level recovers over night.
28N1	do.	675	Dr	8	417	417	-	278	-	T	7½	PS	Yields 40 gpm; L.
29A1	M. J. Hall	645	Dr	6	111	109	Hardpan	76.10	3-29-51	-	-	D,S	Well can be pumped dry in 40 min.

29A2	do.	645	Dg	48-36	20	-	do.	11.14 15.78	3-29-51 6-30-60	C	¼	D,S	Well goes dry in summer if used continuously. Blue "hardpan" from 5 to 20 ft.
29M1	Ray Curran	75	Dr	6	280	280	-	6.29	6-31-60	C	5	Irr	
30B1	J. G. Magee	65	Dr	6	150	150	Gravel	0	-	C	3	Irr	Dd 10 ft after 3-4 hrs pumping 100 gpm. Water contains objectionable amount of iron; L.
30C1	Frank Komoto	65	Dr	6	133	133	do.	1 .54	7-23-51 6-29-60	C	3	Irr	Dd 17 ft after 4 hrs pumping 120 gpm. Water contains objectionable amount of iron. Well penetrates sand and clay to 125 ft, gravel to 133 ft.
30E1	Lewis Ryan	75	Dr	6	131	131	do.	5 6.49	- 6-29-60	C	3	Irr	Dd 18 ft after 5 hrs pumping 80 gpm; L.
30N1	H. D. Foster	75	Dr	6	90	90	Sand and gravel	5 7.86	2-3-45 6-29-60	C	5	Irr	
31C1	Washington State Experiment Station	82	Dg	48	48	-	-	8.46 8.29	- 6-29-60	C	1	N	
31C2	L. E. Bagley	70	Dr	6	134	134	-	10 .24	- 6-29-60	C	3	Irr	Water reported to contain iron.
31H1	D. P. Rager	85	Dr	6	184	184	Sand and gravel	14 13.46	11-12-47 6-29-60	C	3	D,Irr	L.
31N1	G. L. Matlock	85	Dr	6	151	151	Gravel	8 11.74	2-25-46 7-8-60	C	5	Irr	Water reported to contain iron.
32E1	A. Leslie	85	Dn	3	119	-	-	9 9.69	4-20-46 6-29-60	C	1½	D,Irr	
32M1	Harry Lions	85	Dr	4	144	144	Sand and gravel	11 11.81	8-20-46 6-29-60	C	1	D,Irr	L.
33A1	C. W. Frost	600	Dg	48	21	4	-	11.44	6-30-60	J	½	D,Irr	

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well: Alt. (feet)	Well: Type	Well: Diam. (inches)	Well: Depth (feet)	Well: Casing depth (feet)	Character of water-bearing material	Water level: Below land surface (feet)	Water level: Date	Pump: Type	Pump: H.P.	Use of water	Remarks
							T. 20 N., R. 5 E.--Continued						
33E1	William Rehberg	580	Dr	6	207	207	Gravel	180	12-5-49	J	2	D	Dd 2 ft after 4 hrs pumping 4½ gpm; L.
33M1	Town of Bonney Lake	580	Dr	6	189	189	-	171.89	6-31-60	Sb	3½	PS	
34B1	Vick Jenson	565	Dg	48	26	-	-	18.35	7-6-60	C	¼	D	Water level is low in summer.
34C1	August Kacer	610	Dr	6	111±	111	Gravel	-	-	J	1½	D,S	
34R1	H. E. Crane	595	Dg	60	17	5	"Hardpan"	10.24	7-5-60	P	¼	D	
34R2	L. C. Morton	630	Dr	6	134	-	Gravel	116	-	J	1½	D	L.
34R3	H. O. Wetrich	600	Dr	6	192	-	do.	120±	4-11-53	J	3	D	Supplies 3 houses; L.
35G1	Oscar Bartholomew	580	Dr	6	120	-	-	7.96	8-29-60	J	1/3	D,S	Water reported to contain some iron.
35J1	Ed Hulett	615	Dg,Dr	5	107	107	Sand and gravel	32.24 28.48	4-14-52 7-8-60	J	1/3	D	
35R1	Ruth Torgerson	615	Dr	6	113	113	-	32.89	7-8-60	J	½	D	L.
							T. 20 N., R. 6 E.						
31H1	Unknown	660	Dg	48	10	-	-	-	-	P	-	-	

							T. 21 N., R. 2 E						
23G1	L. J. Wingard	140	Dr	6	423	-	-	-	-	N	-	N	Supply inadequate; L.
23H1	Tacoma Smelting Co.	20	Dr	6	212	-	-	22.8	3-3-60	T	40	Ind	Yields about 350 gpm.
25B1	City of Tacoma, Water Division	138	Dr	15	480±	-	-	40.04	11-20-38	N	-	N	
							T. 21 N., R. 3 E.						
15K1	Dash Point Coop. Water Assoc., Well 1	395	Dr	8	80	80	Silt, sand, gravel	Flows	-	N	-	PS	Flows 25 gpm. Well penetrates sand and gravel to 50 ft, blue clay and fine sand to 80 ft.
15K2	Dash Point Coop. Water Assoc., Well 2	400	Dr	12	66	66	do.	Flows	-	N	-	PS	Flows 70 gpm. Well penetrates sand and gravel to 8 ft, silt and sand to 66 ft.
15K3	Dash Point Coop. Water Assoc., Well 3	415	Dr	6	58	58	do.	Flows	-	N	-	PS	Flows 5 gpm. Well penetrates sand and gravel to 40 ft, blue clay and fine sand to 58 ft.
15K4	Dash Point Coop. Water Assoc., Well 4	415	Dr	8	62	62	do.	Flows	-	N	-	PS	Flows 60 gpm. Casing perforated 10-62 ft.
15K5	Dash Point Coop. Water Assoc., Well 5	430	Dr	8	64	64	do.	Flows	-	N	-	PS	Flows 25 gpm.
15K6	Dash Point Coop. Water Assoc., Well 6	430	Dr	8	67	67	do.	Flows	-	N	-	PS	Do.
16G1	Beverly Heights Water Co.	400	Dr	6	40	32	Sand, fine (silt)	0	3-7-60	N	-	N	Supply inadequate in summer. Well penetrates sandy clay to 30 ft, sand to 40 ft.
16L1	Caledonia Water Co., Well 1	15	Dr	8	184	-	-	3.98 4.32	6-25-59 3-7-60	C	25	PS	Cp.

Table 5.--Records of representative wells--Continued

Well No.	Owner or tenant	Well					Character of water-bearing material	Water level		Pump		Use of water	Remarks
		Alt. (feet)	Type	Diam. (inches)	Depth (feet)	Casing depth (feet)		Below land surface (feet)	Date	Type	H.P.		
							T. 21 N., R. 3 E.--Continued						
16L2	Caledonia Water Co., Well 2	50	-	-	-	-	-	-	-	T	10	PS	Cp.
16N1	Hyada Mutual Water Co., Well 3	90	Dr	8	207	207	Sand and gravel	81±	6-25-59	Sb	25	N	Yields 350 gpm; C, Cp, L.
16N2	Hyada Mutual Water Co.,	90	Dr	8	419	419	do.	117.45	3-15-60	N	-	N	Well destroyed; L.
16P1	Hyada Mutual Water Co., Well 1	210	Dr	8-6	272	-	-	-	-	T	7½	PS	Dd 6.5 ft after ½ hr pumping 42 gpm; Cp.
16P2	Hyada Mutual Water Co., Well 2	210	Dr	8	294	294	Gravel	217.2	1-17-61	T	15	PS	Dd 2.5 ft after 1 hr pumping 80 gpm; Cp, L.
16P3	Hyada Mutual Water Co.,	210	Dr	10-8	269	269	Sand and gravel	203.25	10-12-61	Sb	-	PS	Dd 27 ft after 8 hrs pumping 215 gpm.
22E1	Foss Launch and Tug Co.	10	Dr	6	207	-	-	3.3	3-8-60	C	½	D, Ind	
22Q1	National Oyster Co.	15	Dr	6	75	75	Gravel	15	11- -50	T	5	Ind	Dd 35 ft, pumping 20 gpm; L.
23G1	G. T. Pilant	360	Dg	30	10	10	-	2.27	3-23-60	P	-	D	
23H1	Ivan Cole	385	Dg	48	16	-	-	3.64	3-8-60	P	½	D	Supply not adequate in Oct.
25L1	Woodworth Co.	125	Dr	8	196	193	Gravel and sand	97.79	3-23-33	T	40	Ind	Dd 11.99 ft after 3 hrs pumping 111 gpm. Well inadequate; Cp, L.

25R1	V. Abuan	395	Dg	12	57	-	-	40.40	3-23-60	N	-	D	Till at surface.
26N1	City of Tacoma, tide flats, Well 1	10.9	Dr	24	785	779	Gravel	Flows	-	T	60	N	Dd 95 ft after 4 hrs pumping 1,050 gpm. Black, fine sediment present; C, L.
26Q1	Buffelen Woodworking Co.	7	Dr	12-10	450	450	-	Flowing	3-8-60	C	25	Ind	Dd 25± ft, pumping 200 gpm; temp. 58° F; C, Cp.
27G1	Hooker Chemical Corp.	10	Dr	18-10	1,216	-	-	Flows	-	-	-	N	Dd 56 ft, pumping 1,200 gpm; L.
27H1	Karl Seigel	15	Dr	6	47	47	-	5.93	8-18-54	J	¼	D	
29N1	General Mills, Inc.	15	Dr	-	150	-	Sand and gravel (?)	4-7	-	N	-	N	Water level fluctuates with tide. Well destroyed.
29P1	General Mills, Inc., Well 2	15	Dr	12-8	350	-	-	12	-	P	-	Ind	No noticeable decline in water level in 35 yrs. Combined yield of 29P1 and 29P2 is 250 gpm.
29P2	General Mills, Inc., Well 3	15	Dr	12-8	540	-	-	Flowing	1939	P	-	Ind	Temp. 54° F in 1939.
35B1	Buffelen Woodworking Co.	7	Dr	18-12	856	856	Gravel, clean	Flows	-	T	60	Ind	Dd 115± ft, pumping 2,200 gpm; C, L.
36L1	Kaiser Aluminum Corp.	19	Dr	8	950	-	-	14	1952	T	50	Ind	Temp. 51.5° F; L.
36L2	do.	15	Dr	24-18	836	-	-	-	-	-	-	N	L.
36P1	do.	19	Dr	18	824	824	Gravel	Flows	-	T	60	Ind	Yields 1,000 gpm; Cp, L.
36Q1	do.	19	Dr	18-7	901	901	Gravel and sand	Flows	-	T	30	N	Flows 300 gpm.

Table 6.--Records of springs.

Altitude: Interpolated from topographic maps.
Use: D, domestic; Ind, industrial; Inst, institutional; Irr, irrigation; N, not in use; PS, public supply; S, stock.
Remarks: C, chemical analysis in table 8.

Spring number	Owner	Altitude (feet)	Estimated yield (gpm)	Use	Remarks
T. 16 N., R. 3 E.					
5M1s	Weyerhaeuser Timber Company	510	--	D, S	Supplies Harts Lake Resort and a farm.
12E1s	Edward Poorman, Jr.	700	--	D, S	
T. 16 N., R. 4 E.					
2N1s	Sam Geskow	680	--	D	Supplies 4 summer homes.
3J1s	Unknown	718	50	D	Issues from gravel overlying Mashel Formation.
6G1s	Glen Dunn and Lynn Weiss	653	--	D	Temp. 51° F.
8M1s	C. C. Josselyn	758	--	D, S	Goes dry in summer. Temp. 51° F.
14B1s	Ed Raysbrook	725	--	D	
16D1s	T. W. Nelson	630	--	S	
17E1s	L. Mettler	486	5	D, S	Temp. 49° F.
17G1s	--Odel	608	--	D	
19A1s	F. Hendricksen	570	10	D, S	
19C1s	J. H. Larson	525	--	D, S	Pumping 1,000 gpm will pump dry in 4 hrs.
20P1s	Weyerhaeuser Timber Company	550	--	N	Temp. 47° F.
22H1s	J. Robbie	715	--	D	Considerable seasonal fluctuation of yield.
22L1s	J. E. DeFigh	700	--	D	
23M1s	W. P. Robbie	--	20	D	Iron content of water is objectionable.
29J1s	City of Tacoma Light Department	750	--	PS	Supplies housing unit at LaGrande Dam.
30M1s	Hasenbalg (Mashel Prairie Spring)	680	3	N	
32A1s	City of Tacoma Light Department	836	4	PS	Supplies housing unit at LaGrande Dam.
33D1s	---do------------------------	976	4	PS	---Do------------------------------
T. 17 N., R. 2 E.					
13E1s	G. Lambertsen	400	20	D, S	
24A1s	J. J. Kominski	425	40	D, S	
24C1s	---do--------	425	60	S	
26N1s	J. H. Taylor	380	--	D	Spring issues from coarse gravel.

T. 17 N., R. 3 E.					
7N1s	A. Chopic	400	--	D, S	Inadequate from September to December.
T. 17 N., R. 4 E.					
12N1s	T. H. Zimmerman	650	--	D	
20R1s	R. W. Hansen	666	--	D, S	Temp. 52° F.
26J1s	Builders Brick Company	660	--	D	
26K1s	T. Simonsen	645	--	D, S	Spring probably issues at top of Mashel Formation. Temp. 49° F.
26R1s	Builders Brick Company	630	--	D	Supplies two houses.
28D1s	E. Lowell	598	--	D, S	
33K1s	F. Guske, Sr.	650	--	S	Owner reports water unsuitable for drinking. Temp. 50° F.
33R1s	---do-------	699	--	D	Yield low in October.
T. 17 N., R. 5 E.					
5J1s	St. Regis Paper Company	593	100	D	Temp. 46° F.
6G1s	E. Hansen	705	--	D	Yield low in August.
30N1s	D. Elmore	830	--	D	Owner reports no seasonal fluctuation.
T. 18 N., R. 1 E.					
22D1s	U. S. Government	170	3,000	S	
T. 18 N., R. 3 E.					
7N1s	C. G. Schwentz	370	100	S	Temp. 46° F.
35G1s	--McFadden	450	--	N	
36 E1s	--Ackelson	465	20	D, S	Supplies several houses.
T. 18 N., R. 4 E.					
1Q1s	J. C. McMahon	600	--	D	
3D1s	N. A. Stewart	550	2	D, S	
4M1s	City of Tacoma (Thomas Spring)	435	3,500	N	Reported large seasonal fluctuation.
12B1s	V. C. McMahon	645	5	D, S	Temp. 49° F.
15A1s	H. McGee	681	--	D	Temp. 48° F.
15K1s	O. A. Westlund	700	--	D	Iron content of water is objectionable.
20H1s	City of Tacoma (Patterson Spring)	500	500	N	Temp. 44-48° F.
21E1s	A. Harpel	550	--	D, S	
T. 18 N., R. 5 E.					
6G1s	State Solders Home	248	50	Inst	Temp. 46° F.
8R1s	City of Orting (Harmon Spring)	480	--	PS	
8R2s	---do---------------------	440	--	PS	
8R3s	City of Orting	600	--	N	

Table 6.--Records of springs--Continued

Spring number	Owner	Altitude (feet)	Estimated yield (gpm)	Use	Remarks
T. 18 N., R. 5 E.--Continued					
9L1s	E. Yanasak	640	--	D, S	
19B1s	A. E. Glenn	700	--	D, S	Considerable seasonal fluctuation of yield.
20D1s	I. J. Howe	710	--	D, S	Supplies two houses.
20E1s	---do-----	500	8	D	Supplies three houses.
30G1s	R. Cox	650	10	D, S	
31P1s	Unknown	640	5	N	
T. 19 N., R. 1 E.					
1R1s	City of Steilacoom	133	100	N	
12A1s	City of Steilacoom (Steilacoom Springs)	170	300	N	
12A2s	Unknown	150	400	N	
12G1s	U. S. Government	160	150	N	
12K1s	Northern Pacific Ry. (Ketron Springs)	150	350	N	
12P1s	U. S. Government	150	50	N	
12Q1s	---do-----------	145	100	N	
13E1s	Pioneer Sand & Gravel Company	185	1,000	N	
22G1s	U. S. Government (Dupont Spring)	5	6,000	N	Yield reported to fluctuate with tide.
33G1s	C. Kodis	280	50	D	Supplies two houses.
33K1s	M. Ripka	200	50	D	
33L1s	D. M. Linfhieum	190	--	D	
T. 19 N., R. 2 E.					
2L1s	Villa Plaza Development (Ponce de Leon Springs)	240	250	N	Considerable seasonal fluctuation of yield. Temp. 52° F.
19Q1s	U. S. Government (Sequallitchew Springs)	210	2,500	PS	Partial supply for Fort Lewis. C.
T. 19 N., R. 3 E.					
6P1s	Unknown (Crystal Springs)	275	750	N	Considerable seasonal fluctuation of yield. Temp. 46° F.
17N1s	Unknown	300	2,000?		
17R1s	Parkland Light & Water (Melville Springs)	325	250	PS	
21B1s	Marymount Military Academy	345	10	Inst	Iron content of water is objectionable.
21H1s	---do-------------------	335	200-500	Inst	Temp. 50°F.

25G1s	F. Deuber (Big Hole Spring)	350	200	Irr	
26H1s	Clover Creek School (Montgomery Spring)	325	20-30	Inst	
T. 19 N., R. 4 E.					
12N1s	O. Reise	300	200-300	PS	Principal source for Alderton-McMillin System. Temp. 47° F.
13D1s	Geiger Ranch	295	200	D, S	Temp. 47° F.
30H1s	Unknown (Marcum Spring)	345	--		
T. 19 N., R. 5 E.					
2B1s	J. B. Story	605	--	Irr	
27B1s	City of Orting (Boatman Spring)	360	--	PS	
T. 19 N., R. 6 E.					
16C1s	Kenyon, Smith, Mayfield	725	--	D	Supplies three homes.
18L1s	Town of South Prairie	575	15	N	C.
T. 20 N., R. 2 E.					
3M1s	T. Mathie	145	125	Irr	Temp. 51° F.
11J4s	City of Fircrest	285	--	N	
11K1s	---do---------	226	450	N	
11K2s	---do---------(Regents Park Spring)	222	900	N	
14A1s	University Place Utilities Company	197	2,000	N	Temp. 46° F.
17R1s	--Todd	80	--	D	
20Q1s	Pioneer Sand & Gravel Company	15	2,400	Ind	
22P1s	Unknown	155	400	D	
23P1s	Unknown (Keystone Spring)	165	3,500	Irr	
26D1s	Unknown	125	25	N	
27Q1s	Washington State Department of Game (Game Farm Spring)	185	3,150	D, Ind	Temp. 46° F. C.
32H1s	Western State Hospital	160	--	N	
33D1s	---do---------------	150	--	N	
33E1s	---do---------------(Asylum Spring)	150	1,000	Irr	Temp. 53° F. C.
36E1s	Flett Dairy (Flett Springs)	230	50	S	
T. 20 N., R. 3 E.					
8J1s	Northern Pacific Railway	180	100	N	Temp. 49° F.
9N1s	---do----------------(Delin Street Spring)	175	1,500	N	Temp. 50° F.
9P1s	Northern Pacific Railway (Pacific Avenue Spring)	200	150	N	Temp. 49° F.
16B1s	Northern Pacific Railway (Tacoma and Eastern Spring)	225-250	2,100	N	
23D1s	Northern Pacific Railway (Swan Creek Spring)	225	1,200	N	Temp. 48° F.

Table 6.--Records of springs--Continued

Spring number	Owner	Altitude (feet)	Estimated yield (gpm)	Use	Remarks
T. 20 N., R. 3 E.	Continued				
24B1s	Unknown	130	250	D	Temp. 46° F.
25A1s	Unknown (Canyon Road Springs)	200	550	N	Temp. 50° F.
T. 20 N., R. 4 E.					
30L1s	Unknown	231	75	D	
32J1s	City of Puyallup (Maplewood Spring)	78	12,500	PS	Temp. 46° F.
34Q1s	City of Puyallup	385	--	PS	
35J1s	Unknown	123	50	N	
36M1s	---do---		50	N	
T. 20 N., R. 5 E.					
18L1s	City of Puyallup (Salmon Springs)	228	3,600	PS	Salmon Springs group also supplies Crystal Springs Water Company. Temp. 46° F.
18P1s	City of Sumner (Salmon Springs)	230	1,800	PS	Temp. 46° F. C.
25G1s	H. Whitehouse	500	700	N	
29L1s	Webber and Ritter	250	--	PS	Supplies Elhi Water Company.
34N1s	Unknown	590	--	D	
T. 21 N., R. 2 E.					
23H1s	Tacoma Smelting Company (Bokien Spring)	145	35	Ind	
25B1s	City of Tacoma (Mason Gulch Spring)	122	1,400	N	Formerly public supply. Temp. 49° F.
27J1s	Unknown		40	N	
27J2s	---do---		125	N	
27R1s	---do---		50	N	
34B1s	---do---	175	75	N	
34B2s	---do---	175	75	N	
34F1s	---do---	175	560	N	Temp. 48° F.
T. 21 N., R. 3 E.					
30M1s	Unknown	60	--	N	Temp. 50° F.
T. 21 N., R. 4 E.					
31G1s	C. H. Sandford	260	5	D, S	Considerable seasonal fluctuation of yield.

Table 7.--Drillers' logs of representative wells.

Materials	Thickness (feet)	Depth (feet)
Well 16/3-6E1		
G. R. Brooks. Altitude about 475 feet. Drilled by Pete Sylte.		
Old well; no record	20	20
Sand, coarse, volcanic	40	60
Clay and boulders	70	130
Sand	5	135

Casing, 6- and 4-inch to 135 ft.

Materials	Thickness (feet)	Depth (feet)
Well 16/3-7F1		
Truman Wilcox. Altitude about 355 feet. Drilled by Peterson. Memory log by owner.		
Sand	10	10
Clay	15	25
Gravel	12	37

Casing, 8-inch.

Materials	Thickness (feet)	Depth (feet)
Well 16/3-8B1		
A. J. Wareing. Altitude about 575 feet.		
Topsoil	3	3
Till	4	7
Gravel	13	20
No record	4	24

Casing, 48-inch to 3 ft.

Materials	Thickness (feet)	Depth (feet)
Well 16/3-12E1		
Jonas Asplund. Altitude about 778 feet. Dug by owner. Memory log.		
Topsoil and gravel	15	15
Sand	6	21
Boulders, cemented, red	21	42

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 16/3-14C1		
O. Enwall (Swan Lake Dairy). Altitude about 625 feet. Drilled by Bell and Son, 1940.		
Till	10	10
Sand and gravel	50	60
Sand	235	295

Casing, 8-inch.

Well 16/3-22A2

Charles McPhail. Altitude about 580 feet. Drilled by Pete Sylte, 1957.

Materials	Thickness (feet)	Depth (feet)
Topsoil and "rocks"	6	6
Clay, brown, and boulders	11	17
Clay, blue, and boulders	68	85
Clay, blue	50	135
Peat	1	136
Clay, blue	9	145
Peat	2	147
Clay, blue	38	185
Clay, blue, and peat, some sand	21	206
Sand, fine; water-bearing	1	207
"Hardpan"	10	217
Clay, gravelly	5	222
Sand, muddy, and gravel; water-bearing	5	227
Clay, blue, some peat	38	265
Clay, sandy, and peat	20	285
Peat	7	292
Clay, blue	13	305
Clay, hard, and peat, boulder at 311-312 ft	23	328
Clay, sandy	8	336
Clay, blue	17	353
Sandstone	4	357
Clay, blue	9	366
Sandstone	3	369
Clay, sandy	11	380
Sand, muddy	8	388
Clay, blue	17	405
Sand, dry	5	410
Sand, fine; water-bearing	11	421
Sand and gravel; water-bearing	5	426

Casing, 8-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 16/4-4R1		
Lynn Dick. Altitude about 760 feet. Drilled by Tacoma Pump and Well Drilling Co., 1952.		
Old well; no record	25	25
Boulders	5	30
Clay, blue, and rock	9	39
"Hardpan"	4	43
Gravel; water-bearing	1	44
Clay and gravel	7	51
Clay, blue	9	60
Clay, sandy, green	8	68
Sand, gravel, and clay; water-bearing	7	75
Clay, blue	10	85
Sand; water-bearing	5	90
Sand, gravel, silt, and wood; water-bearing	30	120
Clay, sandy, blue; water-bearing	12	132
Casing, 8-inch to 118 ft.		
Well 16/4-5D1		
S. R. White. Altitude about 640 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Topsoil	3	3
Clay, blue, and gravel	28	31
Clay and sand; water-bearing	3	34
Clay, blue	6	40
Sand and clay; water-bearing	10	50
Sand; water-bearing	10	60
Clay, blue	22	82
Open hole	34	116
Casing, 6-inch.		
Well 16/4-7R2		
D. C. Anderson. Altitude about 690 feet. Memory log.		
Gravel, clay, and "hardpan"	14	14
Ash	15	29
Gravel and pumice stone	4	33
Gravel, clean	1	34
"Shale"		34+
Casing, 60-inch to 34 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 16/4-14F1		
O. E. Haynes. Altitude about 840 feet. Drilled by Richardson Well Drilling Co., 1942?.		
Gravel and boulders	77	77
Gravel; water-bearing, yield 10 gpm	23	100
"Hardpan"	8	108
No record; water-bearing, yield 24 gpm	12	120
Clay	17	137
Gravel; water-bearing	7	144
Lost all water in crevice at 144 ft		
No record	1	145
Sand; water-bearing	3	148
Gravel	7	155
Clay	35	190

Casing, 8-inch to 190 ft; originally perforated 80-120; reperforated 77-100, 108-120, and 135-190 ft.

Materials	Thickness (feet)	Depth (feet)
Well 16/4-14P1		
City of Eatonville. Altitude about 800 feet. Drilled by L. B. Richardson, 1942.		
Clay	177	177
"Rock," hard, brown	16	193
(Water-level at about 30 ft)		
"Rock," hard, brown	9	202
"Rock," hard, blue	2	204
"Rock," hard, brown	19	223
Clay	3	226
"Rock," hard, black	69	295
Shale, brown	5	300
"Rock," black	16	316
Clay, white	2	318
"Rock"	37	355
"Rock," red	5	360
"Rock," black	20	380
"Rock," red	14	394
"Rock"	46	440
"Rock," hard	28	468
"Rock," red	9	477
"Rock," black	16	493
Clay, blue	7	500
"Rock," green	5	505
"Rock," black	10	515
Shale, green	5	520
"Rock," hard	13	533
Shale, green and clay	2	535
Clay, white	3	538

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 16/4-14P1--Continued		
"Rock," black	10	548
Clay, pink	7	555
"Rock," black	3	558
Clay, blue	6	564
"Rock," black	26	590
Clay, white, and "rock"	35	625
"Rock," broken	25	650
"Rock," hard, and clay	22	672
"Rock," red	17	689
"Rock," broken	46	735
"Rock," hard	5	740
Crevice	3	743
"Rock," black	7	750

Casing, 6-inch to 177 ft.

Well 16/4-16N1

Andy Ludwig. Altitude about 785 feet.

Sand; water-bearing	28	28
"Hardpan"	1	29

Casing, 48-inch to 9 ft.

Well 17/2-1K2

Emil Betschart. Altitude about 400 feet. Drilled by Pete Sylte, 1959.

Topsoil and clay	7	7
Clay and gravel	4	11
Clay and boulders	7	18
Clay and gravel	2	20
"Hardpan" and boulders	9	29
Gravel, cemented	53	82
Clay and sand; water-bearing	7	89
"Hardpan" and boulders	43	132
Sand, gravel, and clay	9	141
Gravel, sand, and clay; water-bearing	8	149
"Hardpan"	5	154
Gravel, cemented	29	183

Casing, 10-inch to 183 ft; perforations 116 to 176 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/2-1N2		
A. M. Caspersen. Altitude about 425 feet. Drilled in 1954.		
"Hardpan" and boulders	31	31
Gravel, cemented	4	35
"Hardpan"	19	54
Gravel, cemented	8	62
"Hardpan"	34	96
Gravel, cemented	9	105
Gravel and boulders	8	113
Casing, 6-inch to 113 ft.		
Well 17/2-3D1		
B. F. Whitehead. Altitude about 335 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Soil	2	2
Sand, fine	3	5
Gravel, very sandy, and coarse sand	33	38
Casing, 6-inch.		
Well 17/2-3D2		
M. H. Booth. Altitude about 330 feet. Drilled by Tacoma Pump and Well Drilling Co., 1950. Memory log.		
Sand, coarsens toward bottom	12	12
Gravel, fine	2	14
Sand, brown	5	19
Gravel; water-bearing at 20 ft	5	24
Gravel and sand	16	40
Casing, 6-inch to 40 ft.		
Well 17/2-11R1		
Walter Gay. Altitude about 390 feet. Drilled by Tacoma Pump and Well Drilling Co., 1954.		
Topsoil	3	3
"Hardpan" and "rocks"	17	20
"Hardpan"	4	24
Clay, brown, sand, and gravel	8	32

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/2-11R1--Continued		
"Hardpan"	4	36
Clay, brown, sand, and gravel	4	40
"Hardpan"	28	68
Sand and gravel, hard packed	35	103

Casing, 6-inch. Screened.

Well 17/2-13Q1

I. C. Beckwith. Altitude about 429 feet. Memory log.

Sand and silt	15	15
Quicksand	15	30
"Hardpan"	8	38
Gravel	2	40

Well 17/2-15D2

Golding Bros. Altitude about 380 feet. Drilled by Richardson Well Drilling Co. in 1952.

Topsoil	4	4
"Hardpan"	17	21
Gravel and clay	37	58
Gravel and clay with streaks of sand, test bail at 40 gpm, went dry	4	62
Gravel and clay with streaks of sand, bail 20 gpm with 20 ft dd	30	92
Gravel and clay	60	152
Clay, sandy, blue	3	155
Clay, blue, and gravel	15	170
Sand and blue clay	4	174
Gravel and blue clay	7	181
Clay, blue	3	184
Clay, gritty, brown	7	191
Sand and clay, brown	22	213
Clay, sticky, blue	6	219
Clay, blue, and sand	25	244
Clay, blue, sandy	8	252
Sand and clay	48	300

Casing, 8-inch, capped, nonproducing.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/2-16Q4		
James Gonia. Altitude about 320 feet. Drilled by Horseman Pump Co., 1941.		
Boulders	20	20
"Hardpan"	58	78
No record	37	115
Casing, 6-inch.		
Well 17/2-24H1		
F. Lipenski. Altitude about 420 feet. Dug by owner.		
Soil	2	2
Till	20	22
Gravel	2	24
Casing, 60-inch to 7 ft.		
Well 17/2-26F1		
H. C. Hardisty. Altitude about 445 feet. Drilled by R. R. Charlton, 1955.		
Topsoil	25	25
Gravel	6	31
"Hardpan" and boulders	9	40
Gravel	7	47
"Hardpan" and boulders	33	80
"Hardpan"	67	147
Gravel; water-bearing	12	159
Casing, 10-inch to 159 ft; perforated 40 to 47 ft and 147 to 155 ft.		
Well 17/3-1E1		
Charles Harkins. Altitude about 525 feet. Dug by owner.		
Gravel	10	10
"Hardpan"	12	22
Sand, gray	2	24
Casing, 48-inch to 10 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/3-2R1		
Bernice Acton. Altitude about 505 feet. Drilled by Pete Sylte, 1960.		
Topsoil	5	5
"Hardpan" and boulders	55	60
Gravel, cemented	7	67
Sand and clay, hard	137	204
Sand, fine; small artesian flow (4 gpm)	1	205
Clay, brown	12	217
Peat and clay	13	230
Silt, dark brown	20	250
Silt, green	9	259
"Hardpan"	27	286
Clay, blue	2	288
"Hardpan"	16	304
Clay, gravelly	15	319
"Hardpan"	30	349
Sand, muddy	10	359
Clay, blue	8	367
Clay, sandy, blue	58	425
Silt, dry	13	438
Sand and clay, hard	9	447
Silt and clay	8	455
Clay, blue	6	461
Clay, sandy	9	470
Sand, hardpacked, and clay; water-bearing	5	475
Sand, hardpacked	11	486
No record, some gravel near bottom	92	578

Casing, 8- and 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 17/3-5E1		
--Pease. Altitude about 430 feet. Drilled by Peterson Brothers Drilling Co., 1947.		
Soil, sandy	12	12
Gravel, clayey	11	23
Gravel; water-bearing	2	25
Clay and "rock"	40	65
Gravel; water-bearing	5	70

Casing, 6-inch to 70 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 17/3-6Q1

Jack Feak. Altitude about 390 feet. Drilled by Service Hardware, 1952.

Materials	Thickness (feet)	Depth (feet)
Clay and rocky "hardpan"	45	45
Sand, brown, with "rocks" and clay	5	50
Boulders, sand, and gravel	30	80
Clay, hard, and some large "rocks"	16	96
Sand, brown	74	170
Clay, soft, black	5	175
Sand and clay	25	200
Clay, soft, green	5	205
Sand; water-bearing	10	215
Sand, muddy, some small gravel	30	245
Sand, fine, hard packed, some clay and gravel	15	260

Casing, 8-inch to 252 ft; perforated 60 to 65 ft, and 96 to 108 ft.

Well 17/3-8R1

H. G. Amundsen. Altitude about 445 feet. Drilled by Tacoma Pump and Well Drilling Co., 1959.

Materials	Thickness (feet)	Depth (feet)
Topsoil	4	4
Clay and gravel	43	47
Gravel, cemented	3	50
Boulder at 50 ft.		
Gravel and clay; water-bearing	30	80
Gravel and some sand; water-bearing	19	99

Casing, 8-inch to 91 ft; screened 91 to 99 ft.

Well 17/3-10A1

H. Kuhlmann. Altitude about 605 feet. Drilled by Tacoma Pump and Well Drilling Co., 1951. Memory log.

Materials	Thickness (feet)	Depth (feet)
Soil	4	4
Till	81	85
Gravel	2	87

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/3-16E2		
Floyd Corbin. Altitude about 485 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Old well; no record	40	40
"Hardpan"	35	75
Gravel, hardpacked	10	85
Gravel; water-bearing	1	86
Casing, 6-inch to 86 ft.		
Well 17/3-17F1		
G. C. Peterson. Altitude about 440 feet.		
Clay	13	13
Sand, black	1	14
Well 17/3-17G1		
A. W. Peterson. Altitude about 460 feet. Memory log.		
Soil, clay, and "rocks"	10	10
Till	10	20
Gravel and clay	10	30
Clay	10	40
Clay, red	10	50
Till	10	60
Gravel	15	75
Casing, 42-inch.		
Well 17/3-19B1		
Fred Schafer. Altitude about 460 feet. Dug by owner.		
Topsoil	4	4
Till	27	31
Boulders	6	37
Gravel and sand	3	40
Casing, 40-inch to 3 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/3-20A1		
C. O. Robinson. Altitude about 495 feet. Drilled by Pete Sylte, 1951.		
Topsoil	4	4
Clay, blue, and boulders	38	42
Gravel, cemented, and "hardpan"	24	66
Gravel, pea, some sand	1	67
Casing, 6-inch to 67 ft.		
Well 17/3-20H1		
I. M. Larson. Altitude about 500 feet. Drilled by Tacoma Pump and Well Drilling Co., 1952.		
Subsoil	4	4
Till, soft	16	20
Gravel and till	5	25
Clay, blue	5	30
Gravel, hard, and till	32	62
Gravel, loose; water-bearing	5	67
Gravel, compacted; water-bearing	13	80
Till, hard	10	90
Gravel, compacted; water-bearing	2	92
Casing, 8-inch to 92 ft; perforated from 75 to 80 ft.		
Well 17/3-21D2		
John Kizer. Altitude about 492 feet. Drilled by Tacoma Pump and Well Drilling Co., 1956.		
Topsoil	5	5
"Hardpan"	43	48
Gravel, cemented	8	56
Gravel; water-bearing	10	66
Casing, 10-inch to 66 ft.		
Well 17/3-21M1		
Alvin Green. Altitude about 495 feet. Drilled by Richardson Well Drilling Co., 1957.		
Clay and gravel	3	3
Clay and gravel, with large "rocks"	24	27
Clay, blue	9	36

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/3-21M1--Continued		
Clay and gravel	11	47
"Hardpan"	8	55
Clay and gravel	19	74
Sand, coarse, and gravel	1	75
No record	5	80

Casing, 6-inch.

Well 17/3-22K2

James Gasaway. Altitude about 530 feet. Drilled by Service Hardware, 1952.

"Hardpan" and boulders	35	35
Gravel, hardpacked, and boulders	15	50
Gravel	2	52

Casing, 6-inch.

Well 17/3-24A1

Bob Gallup. Altitude about 555 feet.

Till	28	28
Gravel	6	34

Casing, 48- to 18-inch to 32 ft.

Well 17/3-28A1

Humble Oil and Refining Co. Altitude about 518 feet. Drilled 1961.

Modified partial drillers' log		
No record	10	10
Sand and gravel, coarse; predominantly basalt and andesite, some granite	267	277
Sand and gravel, coarse; contains tan and dark-blue clay	59	336
Clay, silty and sandy, blue-gray	31	367
Sand and gravel, coarse; some silty clay and fine-grained sandstone	63	430
Clay, greenish-gray; some basalt gravel	89	519
Clay and claystone, green-gray	518	1,037
Basalt	152	1,189
Total depth of well		5,721

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/4-1N1		
R. R. Kelley. Altitude 678 feet. Drilled by Tacoma Pump and Well Drilling Co., 1960.		
Clay	9	9
"Hardpan"	37	46
"Rock"	1	47
Sand and gravel	5	52

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 17/4-4Q1		
H. Anderson. Altitude about 660 feet. Drilled by Service Hardware, 1953.		
Silt and brown gravel	9	9
Boulders, blue clay, and gravel	11	20
Boulders and gravel	5	25
Gravel, cemented	10	35
"Hardpan" and boulders	27	62
Clay, gray, and gravel	17	79
Gravel; water-bearing	2	81
Clay, brown and yellow, and cemented gravel	10	91
Clay, yellow	2	93
Gravel; water-bearing	3	96
Gravel and boulders; water-bearing	1	97

Casing, 6-inch to 97 ft.

Materials	Thickness (feet)	Depth (feet)
Well 17/4-5A1		
J. A. Bjerge. Altitude about 625 feet. Drilled by Ralph R. Charlton, 1951.		
Peat	6	6
"Hardpan"	113	119
Gravel	21	140

Casing, 6-inch to 135 ft.

Materials	Thickness (feet)	Depth (feet)
Well 17/4-6F1		
Don Goddard. Altitude about 675 feet. Drilled by Rainier Well Drilling Co., 1960.		
Topsoil and large boulders	3	3
Gravel, hard, cemented	18	21
Clay, soft, cemented; water-bearing	27	48

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/4-6F1--Continued		
Sand, fine, and powdered "rock"	48	96
Sand, coarse, and scattered "rock"	4	100
Clay, dense	-	-

Casing, 6-inch to 75 ft.

Well 17/4-19E1

Weyerhaeuser School. Altitude about 575 feet. Drilled by Tacoma Pump and Well Drilling Co., 1952.

Materials	Thickness (feet)	Depth (feet)
Old dug well; no record	45	45
"Hardpan"	2	47
Gravel and clay, hardpacked; water-bearing	3	50
Gravel, loose	2	52

Casing, 6-inch.

Well 17/4-22K1

--Simi. Altitude about 625 feet. Drilled by Service Hardware.

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Clay and sand	123	125

Casing, 6-inch to 125 ft.

Well 17/4-23F1

H. Rietzel. Altitude about 615 feet. Drilled by Tacoma Pump and Well Drilling Co.

Materials	Thickness (feet)	Depth (feet)
Sand	2	2
Till	28	30
Gravel	2	32

Casing, 6-inch to 32 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 17/4-23F2		
E. V. Wold. Altitude about 635 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Soil	3	3
"Hardpan"	24	27
Gravel, hard packed	4	31
"Hardpan"	19	50
Gravel, hard packed	5	55
Casing, 6-inch to 55 ft.		
Well 17/5-7J1		
St. Paul and Tacoma Lumber Co. Altitude about 635 feet. Drilled by L. R. Gaudio, 1948.		
Sand and gravel	20	20
Gravel, cemented	42	62
Sand and gravel	10	72
Casing, 8-inch to 72 ft.		
Well 17/5-7K1		
St. Paul and Tacoma Lumber Co. Altitude about 630 feet. Drilled by A. P. Graf, 1952.		
Gravel, coarse	19	19
Clay, sandy, brown	7	26
Gravel, hard packed	23	49
Gravel, water-bearing	11	60
Clay, brown	47	107
Gravel, cemented	17	124
Sand, hard packed	2	126
Clay, yellow	35	161
Clay and broken "rock"	9	170
"Rock," gray	12	182
Well 18/2-34G1		
C. A. North. Altitude about 320 feet. Drilled by Wilson W. Sides.		
Topsoil	2	2
Cobbles	24	26
Casing, 8-inch to 26 ft; perforated from 14 to 26 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/2-35Q1		
George Lenz. Altitude about 390 feet. Drilled by D. J. Robinson, 1952.		
Old well; no record	42	42
"Hardpan"	17	59
Gravel, hard packed; water-bearing	4	63
"Hardpan"	18	81
Sand, fine, and clay; water-bearing	52	133
"Hardpan"	3	136
Gravel, hard packed; water-bearing	11	147
Gravel, clean; water-bearing	2	149
Casing, 6-inch.		
Well 18/3-3C1		
C. A. Sherman. Altitude about 395 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Topsoil	2	2
Gravel, dry	3	5
"Hardpan"	16	21
Gravel, hard packed, dry	19	40
"Hardpan"	11	51
Quicksand	4	55
Sand, gravel, and clay	1	56
Sand and gravel, loose; water-bearing	3	59
Sand, muddy	6	65
Sand and gravel; water-bearing	2	67
Gravel, hard packed	3	70
"Hardpan"	7	77
Gravel, and sand, loose; water-bearing	9	86
"Hardpan"	8	94
Gravel; water-bearing	2	96
"Hardpan"	3	99
Gravel, some clay; water-bearing	2	101
Sand, muddy, some gravel	4	105
Gravel; water-bearing	2	107
Casing, 8-inch to 107 ft; perforated from 77 to 86 ft.		
Well 18/3-3N1		
Mrs. Healy. Altitude about 400 feet. Drilled by Service Hardware, 1949.		
No record	10	10
"Hardpan," mild; water-bearing at 38 ft	28	38

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/3-3N1--Continued		
Gravel, hard, cemented	26	64
Sand and gravel; water-bearing	2	66

Casing, 6-inch to 66 ft.

Well 18/3-3P1

Jerry Shannon. Altitude about 410 feet. Drilled by Richardson Well Drilling Co., 1953.

Materials	Thickness (feet)	Depth (feet)
Topsoil	3	3
Clay and boulders	9	12
"Hardpan"	54	66
Sand, fine	4	70
"Hardpan"	5	75
Sand and gravel, fine to coarse	1	76

Casing, 6-inch to 76 ft.

Well 18/3-3R2

H. Melton. Altitude about 425 feet. Drilled by Richardson Well Drilling Co., 1953.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel	3	3
"Hardpan"	34	37
"Hardpan;" water-bearing	36	73
Sand	2	75
"Hardpan"	18	93
Sand and gravel	-	-

Casing, 6-inch.

Well 18/3-4K1

Thomas Le Blanc. Altitude about 400 feet. Drilled by Tacoma Pump and Well Drilling Co.

Materials	Thickness (feet)	Depth (feet)
Topsoil	1	1
Gravel	19	20
"Hardpan"	3	23
Sand and gravel; water-bearing	9	32
Gravel, packed; water-bearing	18	50
Sand, fine; water-bearing	1	51
"Hardpan"	11	62
Sand, fine to coarse; water-bearing	13	75
Clay, dry	15	90

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/3-4K1--Continued		
Clay and gravel; water-bearing	16	106
Clay and gravel	2	108
Gravel, packed; water-bearing	5	113

Casing, 6-inch to 113 ft.

Well 18/3-4R1

David Parker. Altitude about 395 feet. Drilled by Tacoma Pump and Well Drilling Co., 1952.

Dug well; no record	12	12
"Hardpan"	6	18
Gravel, loose, coarse; water-bearing	7	25
"Hardpan"	12	37
Gravel, hard packed; water-bearing	14	51
Gravel, coarse, some clay; water-bearing	6	57
Sand, fine to coarse, and gravel; water-bearing	5	62
Gravel, hard packed; water-bearing	14	76
Gravel, loose, coarse; water-bearing	4	80

Casing, 8-inch; perforated from 18 to 25 ft.

Well 18/3-10G1

R. M. Daines. Altitude about 412 feet. Drilled by M. A. Hansen, 1959.

Topsoil	3	3
Gravel and "rock"	9	12
"Hardpan"	22	34
Clay and gravel	41	75
Gravel, hard packed; water-bearing	8	83
Gravel, loose; water-bearing	8	91

Casing, 8-inch to 83 ft, 6-inch from 83 to 91 ft.

Well 18/3-11N1

J. Tibbitts. Altitude about 424 feet. Drilled by Richardson Well Drilling Co., 1949.

Old well; no record	36	36
"Hardpan"	14	50

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 18/3-11N2

Elk Plain School. Altitude about 430 feet. Drilled by Tacoma Pump and Well Drilling Co., 1953.

Materials	Thickness (feet)	Depth (feet)
Gravel	24	24
"Hardpan" with large gravel and some boulders	18	42
Sand, hard packed, with large gravel	10	52
Gravel and clay	4	56
Gravel, large, small amount of sand	4	60
Clay and gravel, hard packed	1	61

Casing, 8-inch to 61 ft.

Well 18/3-12M1

Bethel Junior High School. Altitude about 430 feet. Drilled by Western Drilling and Equipment Co., 1958.

Materials	Thickness (feet)	Depth (feet)
"Rock," loose, and glacial till	8	8
Till, glacial, tight packed	47	55
"Hardpan"	7	62
Sand and gravel; water-bearing	121	183
Gravel, cemented, hard packed	22	205
Clay mixed with "rocks"	21	226
"Hardpan"	35	261
Silt and sand	9	270
Sand and "rocks"	51	321
Sand, black, and gravel	9	330
Clay and silt, mixed with small gravel	62	392
Sand and gravel; water-bearing	5	397
"Hardpan"	13	410
Sand and gravel, coarse; water-bearing	22	432

Casing, 12-inch to 226 ft, 10-inch from 214 to 394 ft, 8-inch from 381 to 391 ft, 8-inch from 402 to 425 ft; screened from 392 to 402 ft.

Well 18/3-12N1

Bethel School. Altitude about 430 feet. Drilled by Service Hardware Co., 1952.

Materials	Thickness (feet)	Depth (feet)
Gravel and topsoil	30	30
Clay, brown	2	32
Gravel, hard packed	13	45
Gravel, firm; water-bearing	5	50
Gravel, loose; water-bearing	8	58
Clay and gravel	3	61

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/3-12N1--Continued		
Gravel, loose; water-bearing	3	64
"Hardpan"	7	71
Gravel and large "rocks"; water-bearing	2	73
Sand, hard packed	7	80
Gravel and clay	50	130
Gravel and clay, hard packed; water-bearing	4	134
Gravel and clay	16	150
Gravel, firm, streaks of clay; water-bearing	20	170
Gravel and sand, fine, loose; water-bearing (fine streaks of clay)	20	190
Gravel, hard packed, varying amounts of clay	57	247
"Rock"	8	255
Clay with gravel	19	274
Clay with gravel; occasional layers of water-bearing sand	126	400
Gravel, loose; water-bearing	4	404
Gravel, hard, and clay	6	410

Casing, 10-inch to 247 ft, 6-inch from 0 to 397 ft, 5-inch from 392 to 410 ft; perforated from 400 to 403 ft.

Well 18/3-12Q2

L. E. Balmer. Altitude about 475 feet. Drilled by Ralph Charlton, 1953.

Materials	Thickness (feet)	Depth (feet)
Gravel	40	40
Gravel; water-bearing	30	70
Clay and sand	18	88
"Hardpan"	4	92
Clay and "rock"	8	100
Clay; water-bearing	13	113
Sand and gravel; water-bearing	22	135
Gravel, soft, and clay; water-bearing	10	145

Casing, 10-inch to 145 ft; perforated 40 to 145 ft.

Well 18/3-13D1

H. T. Bonnel and others. Altitude about 445 feet. Drilled by Tacoma Pump and Well Drilling Co., 1953.

Materials	Thickness (feet)	Depth (feet)
Gravel	15	15
"Hardpan"	17	32
Gravel, hard packed; water-bearing	8	40
Gravel, clean; water-bearing	5	45

Casing, 6-inch to 45 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/3-14A1		
H. E. Stargel. Altitude about 425 feet. Drilled by Service Hardware Co., 1953.		
Soil	2	2
"Hardpan"	4	6
"Hardpan" and boulders	18	24
Gravel, cemented	7	31
Gravel, cemented; water-bearing	17	48
Gravel, cemented	6	54
Gravel; water-bearing	3	57
Casing, 6-inch.		
Well 18/3-25F2		
W. K. Rogers. Altitude about 467 feet. Drilled by Tacoma Pump and Well Drilling Co., 1954.		
Gravel	20	20
No record; water-bearing	4	24
"Hardpan"	6	30
"Hardpan"; water-bearing	22	52
Gravel, loose	1	53
Casing, 6-inch.		
Well 18/4-3E1		
John Howard. Altitude 561.4 feet. Dug in 1939.		
Gravel	4	4
"Hardpan"	20	24
Gravel, some layers of sand	55	79
Well 18/4-4H2		
N. Ianello. Altitude about 565 feet. Drilled by Service Hardware Co., 1951.		
Soil and gravel	18	18
"Hardpan" and boulders	70	88
Gravel	4	92
"Hardpan"	3	95
Clay	16	111
Gravel, cemented, streaks of sand and gravel; water-bearing	15	126
Casing, 6-inch.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-5G1		
--. Altitude about 475 feet. Drilled by Service Hardware Co., 1952.		
Old well; no record	79	79
Gravel, large	11	90
"Hardpan"	10	100
Gravel, water-bearing	2	102
Casing, 6-inch to 102 ft.		
Well 18/4-5L1		
J. Cieplik. Altitude about 435 feet. Drilled by Service Hardware Co.		
Soil and large "rock"	25	25
"Rock," large, and boulders	15	40
"Hardpan"	5	45
Gravel, water-bearing	5	50
Gravel, loose; water-bearing	8	58
Casing, 7-inch to 50 ft.		
Well 18/4-7F1		
Ed Parham. Altitude about 480 feet.		
Old well; no record	32	32
"Rocky"	58	90
Casing, 6-inch to 90 ft.		
Well 18/4-8G2		
McGee's Guest Home. Altitude about 495 feet. Drilled by Tacoma Pump and Well Drilling Co., 1956.		
Gravel	22	22
"Hardpan"	53	75
Gravel and clay; water-bearing	10	85
Gravel, hard packed	15	100
Gravel; water-bearing	4	104
No record	41	145
Casing, 6-inch to 145 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-9A1		
A. A. Ellis. Altitude about 576 feet. Dug in 1939.		
Gravel	5	5
"Hardpan"	38	43
Gravel, clean, and boulders	8	51
Gravel, consolidated	14	65
Sand and gravel	25	90
Casing, 42-inch.		
Well 18/4-9Q1		
E. G. Tinius. Altitude about 575 feet. Drilled by Tacoma Pump and Well Drilling Co., 1959.		
Topsoil	3	3
"Hardpan"	94	97
Gravel, hard packed; water-bearing	33	130
Casing, 6-inch; perforated from 97 to 118 ft.		
Well 18/4-9R1		
George Ulvang. Altitude about 595 feet. Dug by owner, 1922.		
Topsoil and gravel	4	4
"Hardpan"	45	49
Gravel and sand pockets	24	73
Casing, 42-inch, from 49 to 73 ft.		
Well 18/4-10Q1		
A. S. Andrews, Sr. Altitude about 639 feet. Drilled by Luecks.		
Topsoil	2	2
"Hardpan"	48	50
Sand and gravel, with clay; water-bearing	4	54
"Hardpan"	10	64
Boulders	3	67
Gravel, cemented	13	80
Sand and gravel, with clay; water-bearing	14	94
Sand and gravel; water-bearing	4	98
Casing, 8-inch to 98 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-11R3		
I. S. Pratt. Altitude about 745 feet. Drilled by Richardson Well Drilling Co., 1953.		
No record	40	40
Sand and gravel, coarse	36	76
Casing, 6-inch to 76 ft.		
Well 18/4-14B1		
Henry and Otto Moebins. Altitude about 768 feet. Drilled by R. W. Charlton, 1952.		
"Hardpan"	100	100
Gravel	15	115
Casing, 8-inch to 115 ft; perforated from 100 to 115 ft.		
Well 18/4-15E2		
--Adams. Altitude about 635 feet. Drilled by Service Hardware Co., 1950.		
Soil and fill	10	10
"Hardpan," mild to hard	30	40
Gravel, cemented	7	47
Boulders and loose gravel	23	70
Gravel, coarse; water-bearing	36	106
Casing, 6-inch to 106 ft.		
Well 18/4-15N2		
Don Klingler. Altitude about 766 feet. Drilled by Service Hardware Co., 1952.		
Till and "rocks"	18	18
Till, very hard	25	43
Clay, brown	4	47
Gravel, hard; water-bearing	8	55
Gravel, cemented; water-bearing	40	95
Sand and gravel	6	101
Casing, 6-inch to 101 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-15P1		
R. F. Hampton. Altitude about 790 feet. Drilled by Service Hardware Co.		
No record	43	43
Sand	12	55
Sand and large "rocks"	7	62
Gravel, cemented	2	64
Clay and gravel, hard	20	84
Gravel, hard packed	6	90
Clay, sandy, brown, and hard packed gravel	16	106
Sand, brown	18	124
Gravel, hard packed	54	178
Sand, dirty, some gravel	11	189
Sand, heaving, coarse	7	196
Clay, sandy, brown; water-bearing	16	212
"Rock," hard packed	4	216
Sand and gravel; water-bearing	-	-

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 18/4-16E1		
W. L. Funk. Altitude about 515 feet. Drilled by Service Hardware Co., 1952.		
Soil	2	2
"Hardpan," with some large "rocks"	36	38
Clay and rocky "hardpan"	22	60
Sand, hard packed, with clay and large "rocks"	16	76
Boulders	3	79
Gravel, hard; water-bearing	7	86
Gravel, hard	4	90
Gravel and large "rocks"	8	98

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 18/4-22E2		
Graham Hill Mutual Water Co. Altitude about 885 feet. Drilled by Tacoma Pump and Well Co. in 1960.		
Topsoil	4	4
Clay, sticky, blue	31	35
"Hardpan"	16	51
Clay and sand	14	65
"Hardpan"	60	125
Sand, dry	5	130

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-22E2--Continued		
Sand; water-bearing	44	174
Gravel, big, hard, some clay, dry	19	193
Sand, dry	61	254
Clay, blue	17	271
Gravel, big; water-bearing	4	275
Clay, gray	70	345
Gravel and clay	3	348
Sand; water-bearing	2	350
Gravel, hard-packed, and clay	4	354
Gravel, hard-packed, and sand	5	359

Casing, 8-inch

Well 18/4-23C1

H. Reed. Altitude about 745 feet. Drilled by Service Hardware Co., 1953.

Open hole	22	22
Gravel and clay, hard	35	57
Sand, hard, brown	1	58
Gravel, cemented	22	80
Gravel	1	81

Casing, 6-inch to 81 ft.

Well 18/4-25E1

E. A. Robinson. Altitude about 715 feet.

"Dirt"	6	6
"Hardpan"	14	20
Gravel	5	25

Casing, 48-inch to 4-5 ft.

Well 18/4-28J1

E. L. Graeber. Altitude about 725 feet. Drilled by Service Hardware Co., 1953.

Open hole	27	27
"Hardpan"	53	80

Casing, 6-inch to 80 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-30A2		
E. M. Chase. Altitude about 475 feet. Drilled by Service Hardware Co.		
Gravel, cemented, hard	45	45
Sand and gravel, hard packed; water-bearing	2	47
Sand and gravel	11	58
Gravel, very hard packed	9	67
Clay, hard, brown, with large "rocks"	3	70
Gravel, coarse; water-bearing	7	77
Casing, 8-inch.		
Well 18/4-32A1		
Guy Norman. Altitude about 750 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1958.		
Topsoil	2	2
"Hardpan"	21	23
Clay, sandy, and gravel	32	55
Sand, dry	10	65
Sand; water-bearing	59	124
Clay, blue	33	157
Sand, coarse	2	159
Sand, coarse, and gravel	8	167
Casing, 8-inch to 167 ft; perforated 162 to 167 ft.		
Well 18/4-32J1		
F. W. Hardman. Altitude about 625 feet. Drilled by Service Hardware Co., 1951.		
Clay and clay loam	25	25
Sand, water-bearing	1	26
Clay with "rocks"	64	90
Sand, water-bearing	5	95
Clay and "rocks," packed	30	125
Clay, rocky; water-bearing	27	152
Clay, rocky	18	170
Casing, 8-inch to 170 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-32N1		
F. G. Sarver. Altitude about 740 feet. Dug by owner.		
Sand and loam	12	12
Till	20	32
Gravel	5	37
Sand	5	42
Till	10	52
Gravel	2	54

Casing, 42-inch to 54 ft.

Well 18/4-33E1

R. Rasmussen. Altitude about 640 feet. Drilled by Service Hardware Co., 1954.

Materials	Thickness (feet)	Depth (feet)
Clay and large "rock"	20	20
Clay and "rock," hard packed	12	32
Clay and "rock," softer	14	46
Clay and "rock;" water-bearing	13	59
Clay and "rock," very hard packed	16	75
Clay	5	80
Sand, blue, and clay	10	90
Clay, blue, and gravel; water-bearing	70	160
"Hardpan," brown; water-bearing	35	195
Gravel, coarse	11	206
"Rock" and lava	5	211
Gravel, brown, boulders, and clay; water-bearing	40	251

Casing, 8-inch to 251 ft; perforated from 165 to 251 ft.

Well 18/4-33N1

John Fronia. Altitude about 650 feet. Drilled by Service Hardware and Implement Co. in 1952.

Materials	Thickness (feet)	Depth (feet)
"Rocks"	10	10
Clay, blue, and "rock"	20	30
"Hardpan"	5	35
"Hardpan" and boulders	43	78
Clay, blue, with sand	22	100
Sand	10	110
Clay	5	115
Sand, clay, some gravel	16	131
Gravel, cemented	16	147
Clay, yellow, large boulders	10	157
Clay, boulders	5	162

Casing, 6-inch to 162 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-34B1		
Bill Turner. Altitude about 675 feet. Drilled by Service Hardware Co.		
Soil and "hardpan"	60	60
Gravel and large "rock"	72	132
Clay, brown	4	136
Boulders	6	142
Casing, 6-inch to 138 ft.		
Well 18/4-34D1		
E. A. Lauenborg. Altitude about 675 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1952.		
Clay	8	8
Clay, brown, and gravel	6	14
Clay, blue; sand and gravel; water 22 to 28 ft	14	28
"Hardpan," blue, rocks	28	56
Sand and clay, gravel; water-bearing	14	70
"Hardpan," blue, rocks	6	76
Clay and sand	9	85
"Hardpan," rocky	20	105
Sand, gravel, and clay; water-bearing	12	117
Gravel, hard packed; water-bearing	6	123
Gravel, loose; water-bearing	2	125
Casing, 6-inch to 125 ft.		
Well 18/4-34G1		
Donald Hand. Altitude about 725 feet. Drilled by Richardson Well Drilling Co., 1958.		
Clay and gravel	3	3
Clay, sand, and gravel	6	9
Clay, blue	20	29
"Hardpan," blue	6	35
Sand and gravel	3	38
Casing, 6-inch to 38 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/4-34J1		
W. Schenck. Altitude about 705 feet. Drilled by Tacoma Pump and Well Drilling Co., 1947.		
Topsoil and "hardpan;" water-bearing at 18 ft in gravel	18	18
"Hardpan;" water-bearing at 29 ft	11	29
"Hardpan," blue	7	36
Gravel; water-bearing	4	40
Gravel, hard packed; water-bearing	8	48
"Hardpan"	9	57
Gravel; water-bearing	3	60
"Hardpan"	10	70
Gravel, hard packed, and sand; water-bearing	20	90
Casing, 6-inch to 90 ft.		
Well 18/5-5G2		
D. R. Deolittle. Altitude about 240 feet. Drilled by Ralph R. Charlton, 1953.		
Sand and clay	70	70
Gravel; water-bearing	9	79
Casing, 6-inch to 79 ft; perforated from 72 to 79 ft.		
Well 18/5-5H1		
Irving Cope. Altitude about 245 feet. Drilled by Ralph Charlton.		
Sand and clay	60	60
Gravel	24	84
Casing, 8-inch to 84 ft; perforated from 60 to 80 ft.		
Well 18/5-5J1		
Thomas Mathews. Altitude about 260 feet. Drilled by Ralph R. Charlton, 1950.		
Sand	40	40
Gravel	24	64
Casing, 8-inch to 64 ft; perforated from 40 to 60 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/5-6A1		
State Soldiers Home. Altitude about 210 feet. Drilled in 1930.		
Old hole; no record	83	83
Gravel and sand	15	98
Gravel	4	102
"Hardpan"	2	104
Casing, 4-inch.		
Well 18/5-6F1		
William Davidson. Altitude about 340 feet. Drilled by Service Hardware Co., 1952.		
Soil and sand	38	38
Clay, brown sand, and "rocks"	11	49
Clay, hard, blue, with large "rocks" at 49 ft	3	52
Clay, light brown, and "rocks"	15	67
Sand, brown	3	70
Clay, brown, sand and "rocks"	11	81
"Rock"	5	86
"Hardpan" and boulders	7	93
Casing, 6-inch.		
Well 18/5-9D1		
R. Bartel. Altitude about 275 feet. Drilled by Ralph R. Charlton, 1950.		
Sand	65	65
Gravel	5	70
Casing, 6-inch to 70 ft.		
Well 18/5-19C1		
Rod Miller. Altitude about 740 feet. Drilled by Tacoma Pump and Well Drilling Co., 1952.		
Topsoil	5	5
Clay, sand, gravel, and "rock"	10	15
"Hardpan"	31	46
Gravel and clay; water-bearing	9	55
Gravel, loose; water-bearing	2	57
Casing, 6-inch.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 18/5-21P1		
St. Paul and Tacoma Lumber Co. Altitude about 700 feet. Drilled by L. R. Gaudio, 1956.		
Sand and gravel	18	18
"Hardpan"	15	33
Gravel	9	42
"Hardpan"	8	50
Clay, sandy, brown	5	55
Sand, brown; water-bearing	1	56
Sand	12	68
Clay, brown	5	73
Casing, 8-inch to 73 ft; perforated from 58 to 68 ft.		
Well 18/5-32R1		
W. A. Anderson. Altitude about 580 feet. Drilled by Service Hardware Co., 1953.		
Topsoil	2	2
"Hardpan"	32	34
Boulders and clay; water-bearing at 40 ft	9	43
Boulders and hard packed gravel; water-bearing	6	49
"Hardpan"	2	51
Gravel, packed	5	56
Casing, 6-inch.		
Well 18/5-32R2		
W. H. Franks. Altitude about 580 feet. Drilled by Service Hardware Co., 1953.		
Soil	2	2
Clay and gravel	19	21
Clay, gravel, and boulders	14	35
Clay and boulders	7	42
"Hardpan" and boulders	6	48
"Hardpan" and boulders; water-bearing at 55 ft	7	55
Casing, 6-inch to 56 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/1-2R1		
J. C. Morris. Altitude about 163 feet. Drilled by L. R. Gaudio in 1956.		
"Hardpan"	18	18
Sand, coarse, and gravel; water-bearing	28	46
Clay, sandy	24	70
Sand and gravel, dry	50	120
Gravel, dry, hard packed	19	139
Clay, sandy, brown	9	148
Gravel, cemented	26	174
Sand, loose, and gravel	2	176
Gravel, cemented	8	184
Sand, loose, and gravel	7	191
Sand, loose, some gravel	17	208
Sand, brown	10	218
Sand, hard, muddy	12	230
Clay, sandy	15	245
Sand, hard packed, brown	35	280
Sand, coarse	10	290
Sand and gravel	20	310
Gravel, coarse	35	345
Sand, muddy	30	375
Sand, muddy, fine	42	417
Clay, sticky	8	425
Clay and gravel	8	433
Clay	20	453
Gravel, and sand, coarse, dirty	8	461
Sand and gravel	12	473
Clay	2	475
"Hardpan"	10	485
Clay, sandy	4	489
Sand, some gravel	28	517
Sand, gravel, coarse	11	528
"Hardpan"	2	530
Sand and gravel	25	555
Sand	47	602
Sand and gravel	9	611
Clay	20	631
Sand and gravel	6	637
Clay	5	641
"Hardpan"	4	645
Clay, gray	15	660
Clay, varicolored	30	690
Sand	19	709
Clay	10	719
"Hardpan"	9	728
Sand, streaks of gravel	34	762

Casing, 12-inch 0 to 648, 10-inch 0 to 731 ft, screened from 731 to 761 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/1-13J1		
U. S. Government (Fort Lewis). Altitude about 220 feet. Drilled by R. J. Strasser Drilling Co., 1940.		
Gravel, clayey matrix, gray	68	68
Gravel, loose; water-bearing	2	70
Gravel, cemented, clayey matrix	11	81
Silt, chocolate brown (lignitic)	15	96
Sand, fine; water-bearing	2	98
Silt, slightly sandy, brownish-gray	47	145
Gravel and sand	3	148
Clay, slightly sandy, brownish-gray	22	170
Clay, sandy, lead blue	38	208
Silt, blue, some gravel	6	214
Gravel, cemented, blue binder	18	232
Sand, cemented	17	249
Gravel, pea, clay binder	51	300
Sand, hard	4	304
Sand, soft, with gray muck	10	314
Sand, soft, some gravel	16	330
Sand, hard	20	350

Casing, 8-inch.

Materials	Thickness (feet)	Depth (feet)
Well 19/1-22K1		
U. S. Government (Fort Lewis). Altitude about 168 feet. Drilled in 1943.		
Sand, fine, and gravel	13	13
Sand, coarse, and gravel	2	15
Gravel, coarse, and sand	13	28
Clay, "muddy," and gravel	2	30
Gravel, coarse	11	41
Sand and gravel, tight	5	46
Gravel, fine	3	49
Gravel, coarse, and sand	10	59
Gravel, sand, and mud	2	61
Gravel and sand	6	67
Gravel, sand, and mud, tight at 70 ft	4	71
Gravel and sand	23	94
Gravel, sand, and mud	2	96
Gravel	18	114
Sand, fine; water-bearing	2	116
Gravel and sand	1	117
Gravel and coarse sand	9	126
Sand, fine	2	128
Boulders	2	130
Gravel, coarse, and sand	5	135

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/1-22K1--Continued		
"Hardpan"	1	136
Gravel and coarse sand	5	141
Clay, lead colored, and fine gravel	11	152
Clay	3	155
Clay and coarse gravel	5	160
Clay and fine gravel	5	165
Sand and gravel	4	169
Sand and fine gravel	16	185
No record	3	188

Casing, 8-inch to 185 ft; perforated from 169 to 170 ft and from 172 to 185 ft.

Well 19/1-22K2

U. S. Government (Fort Lewis). Altitude 197.5 feet. Drilled in 1943.

Materials	Thickness (feet)	Depth (feet)
Gravel, fine, and sand	20	20
Gravel, fine, and yellow clay	8	28
Gravel, coarse, yellow	17	45
Gravel, loose	9	54
Gravel, tight, and yellow clay	4	58
Sand, fine, and gravel	5	63
Gravel, coarse	5	68
Clay, yellow	6	74
Pebbles, sand, and clay	5	79
Clay, lead color	31	110
Gravel, coarse	10	120
Clay, fine, and gravel	11	131
Gravel, loose	11	142
"Hardpan"	13	155
Gravel, sand, and mud	15	170
Gravel, coarse, tight	8	178
Gravel, fine, loose	3	181
Gravel, fine, and clay	27	208
Sand, gravel, and clay	10	218
Gravel, loose; water-bearing	2	220

Casing, 8-inch to 210 ft; perforated from 200 to 210 ft.

Well 19/1-22P1

E. I. duPont de Nemours and Co., well No. 1. Altitude about 208 feet. Drilled by L. V. Denny, 1941.

Materials	Thickness (feet)	Depth (feet)
No record	217	217

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/1-22P1--Continued		
Gravel, some sand and clay; water-bearing	16	233
Gravel, coarse, very little sand	19	252

Casing, 10-inch; perforated 220 to 252 ft; 8-inch liner: perforated 192 to 252 ft.

Well 19/1-22P2

E. I. duPont de Nemours and Co., well No. 2. Altitude about 208 feet. Drilled by L. V. Denny, 1941.

Materials	Thickness (feet)	Depth (feet)
Gravel, dry, coarse, and packed sand	33	33
Gravel, some clay and sand; water-bearing	25	58
Gravel, coarse	208	266

Casing, 12-inch to 266 ft; perforated from 220 to 264 ft.

Well 19/1-27C1

E. I. duPont de Nemours and Co., well No. 3. Altitude about 216 feet. Drilled by N. C. Jannsen Drilling Co., 1945.

Materials	Thickness (feet)	Depth (feet)
Gravel, loose	112	112
Peat	14	126
Clay, sandy, yellow	19	145
Clay and gravel	31	176
Gravel	6	182
Gravel, cemented	50	232
Sand and gravel	5	237
Sand and gravel, cemented	8	245
Sand and gravel	25	270
Sand	12	282
Sand and gravel	13	295
Sand	2	297
Sand and gravel	34	331

Casing, 24-inch to 331 ft; perforated from 220 to 280 ft.

Well 19/1-34G1

U. S. Government (Fort Lewis, Well 9). Altitude about 215 feet. Drilled by Richardson Well Drilling Co., 1950.

Materials	Thickness (feet)	Depth (feet)
Dirt, black, and sand	9	9

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/1-34G1--Continued		
Clay, yellow, sand, and gravel	3	12
"Hardpan;" water-bearing	6	18
Sand and gravel, little clay toward bottom; water-bearing	18	36

Casing, 18-inch to 36 ft; perforated from 18 to 32 ft.

Well 19/1-34P1

U. S. Government. Altitude about 225 feet. Drilled by Richardson Well Drilling Co., 1959.

Materials	Thickness (feet)	Depth (feet)
Sand	3	3
Clay and gravel	15	18
"Hardpan"	4	22
Sand, gravel, and clay	8	30
Sand, brown, and clay	4	34
Sand, fine to coarse	41	75
Clay, yellow, and sand	9	84
Clay, blue, with streaks of sand	31	115
Sand and gravel	2	117
Sand, gravel, and clay streaks	10	127
"Hardpan"	4	131
Sand and gravel, loose, with clay streaks	10	141

Casing, 12-inch.

Well 19/1-35A1

City of Dupont, well 1. Altitude about 240 feet. Drilled in 1925.

Materials	Thickness (feet)	Depth (feet)
Gravel, dry	45	45
Gravel, cemented	35	80
Sand, coarse, packed	30	110
Sand and gravel; water-bearing	18	128
"Hardpan," sandy	45	173
Sand and gravel, loose, dry	55	228
Clay and gravel	10	238
Sand, hard packed	75	313
Sand and clay	16	329
Sand, blue	20	349

Casing, 12-inch to 128 ft; backfilled to 128 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/1-35A2		
City of Dupont, well 2. Altitude about 245 feet. Drilled in 1925.		
Gravel, dry	45	45
Gravel, cemented	35	80
Sand, red	30	110
Clay, red	6	116
Clay, blue	8	124
Sand, dry	4	128
No record	2	130
Casing, 12- to 10-inch.		
Well 19/2-1A1		
J. H. Hanson. Altitude about 300 feet. Drilled by Richardson Well Drilling Co., 1950.		
Sand and gravel	21	21
Gravel and clay	4	25
"Hardpan"	26	51
Sand, gravel with streaks of clay; water-bearing	13	64
Sand and gravel	1	65
Casing, 8-inch to 65 ft.		
Well 19/2-1A2		
William Grab. Altitude about 300 feet. Drilled by Richardson Well Drilling Co., 1951		
Sand and gravel	25	25
Gravel and clay	19	44
Sand with streaks of clay	15	59
Sand, coarse, and gravel	1	60
Casing, 6-inch.		
Well 19/2-1J1		
Ken Walowsky. Altitude about 305 feet. Drilled by Richardson Well Drilling Co., 1951.		
Gravel, large, and clay	7	7
"Hardpan"	24	31
Clay and gravel	3	34
Sand and gravel, coarse; water-bearing	3	37
Clay, yellow, and gravel	9	46

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-1J1--Continued		
Sand, coarse and gravel, loose; water-bearing	7	53
Clay, yellow, and gravel; water shut off at 55 ft	14	67
"Hardpan"	10	77
Sand, coarse, and gravel, showing clay	4	81
Sand, fine	2	83
Sand, coarse, and gravel	4	87

Casing, 8-inch to 87 ft; perforated from 53 to 69 ft.

Well 19/2-1K1

Lakewood Water District, test well 2. Altitude about 280 feet. Drilled by Richardson Well Drilling Co., 1949.

Topsoil	2	2
Gravel, cemented	15	17
"Hardpan"	24	41
Gravel and sand, coarse; water-bearing at 50 ft	15	56
Gravel, coarse, loose, some clay; water-bearing	6	62
Gravel, loose, some coarse sand	5	67
Sand and gravel	5	72
"Hardpan"	3	75
Gravel, loose, some coarse sand	5	80
Sand	8	88
Sand, fine, and clay	3	91
Sand and gravel	2	93
Sand, fine	28	121
Clay, blue, sandy, and chunks of wood	16	137
Clay, blue	11	148
Sand, coarse	2	150
Sand and gravel	3	153
Gravel and sand, coarse; water-bearing	20	173
Sand and gravel, small streaks of clay	4	177

Casing, 10-inch.

Well 19/2-1Q1

--Graydon. Altitude about 275 feet. Drilled by Richardson Well Drilling Co., 1950.

Sand and gravel	6	6
"Hardpan"	14	20
Gravel and clay	10	30
"Hardpan," blue	5	35

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-1Q1--Continued		
Gravel and clay	15	50
Sand, coarse, and gravel	1	51

Casing, 6-inch.

Well 19/2-2J1

Lakewood Water District, test well 1. Altitude about 270 feet. Drilled by Richardson Well Drilling Co., 1949.

Materials	Thickness (feet)	Depth (feet)
Gravel, coarse	5	5
"Hardpan"	18	23
Gravel, loose; water-bearing	8	31
"Hardpan"	16	47
Gravel, loose; water-bearing	9	56
Sand, gray, and gravel	7	63
Gravel, coarse	5	68
Gravel, cemented	2	70
Gravel, large, small streak of coarse sand	10	80
Gravel, medium, and sand	5	85
Gravel, coarse	3	88
Gravel, coarse, streaks of sand and clay	5	93
Gravel, coarse	3	96
"Hardpan," blue	2	98
Gravel, coarse, loose; water-bearing	17	115
Gravel and clay	2	117
Clay	4	121
Gravel and clay streaks	5	126
Clay, sandy, blue	39	165
Clay and gravel	15	180
Sand and pebbles; water-bearing	5	185
Gravel and clay, "Hardpan"	16	201
Sand, fine	2	203
"Hardpan"	29	232
Sand, fine	1	233
"Hardpan"	9	242
Clay, blue, with streaks of sand and gravel	11	253
Clay, gray, pebbles, and sand	12	265
Clay and gravel	4	269
Sand and gravel	4	273
Clay, blue	5	278
"Hardpan"	20	298
Sand, fine	5	303
Sand, coarse, and pea gravel	5	308
Sand, coarse	7	315
Sand and pea gravel	5	320
Sand and gravel	4	324
Clay, green	10	334

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-2M1		
Lakewood Water District, well K1. Altitude about 260 feet. Drilled by L. R. Gaudio, 1958.		
Gravel and boulders	10	10
"Hardpan"	37	47
Sand and gravel	6	53
Sand, fine	22	75
Sand and some gravel; water-bearing	11	86
Gravel, cemented	11	97
Sand and some gravel	17	114
Gravel, coarse; water-bearing	21	135
Gravel, cemented	15	150
Clay, blue	55	205
"Hardpan"	11	216
Gravel	6	222
"Hardpan"	8	230
Gravel, cemented	17	247
Sand and gravel	6	253
Clay, blue	70	323
"Hardpan"	4	327
Clay	8	335
Clay, sandy, hard packed, layered	65	400
"Hardpan," and layers of sand	8	408
Clay	10	418
Sand, black, muddy	6	424
Clay	27	451
"Hardpan"	4	455
Gravel, cemented; water-bearing	21	476
Sand, coarse; water-bearing	3	479
Gravel, cemented; water-bearing	16	495
Sand, coarse, and thin streaks of clay	25	520
Sand	51	571
Casing, 12-inch to 400 ft, 8-inch to 505 ft; screened from 505 to 571 ft.		
Well 19/2-2M2		
Lakewood Water District, well K2. Altitude about 260 feet. Drilled by L. R. Gaudio.		
Gravel, coarse	10	10
"Hardpan"	37	47
Sand	13	60
Clay, sandy, and fine gravel	30	90
Gravel, cemented	3	93
Sand and a little gravel	17	110
Gravel, coarse	24	134
Clay, blue	10	144
Sand	6	150

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-2M2--Continued		
Sand, muddy, and gravel	10	160
Clay, blue	45	205
"Hardpan"	27	232
Gravel, cemented	8	240
Sand and little gravel	14	254
Clay, blue	59	313
"Hardpan," sandy	19	332
Sand, cemented	18	350
Clay, hard, sticky	5	355
Clay, sandy, hard packed	42	397
Sand, cemented	15	412
Clay, sandy	34	446
"Hardpan"	16	462
Gravel, cemented	11	473
Gravel, coarse, cemented	22	495
Gravel, coarse, and sand	10	505
Sand, coarse	15	520
Sand, fine	30	550
Sand, coarse	22	572
"Hardpan"	-	-

Casing, 16-inch to 497 ft, 10-inch from 454 to 497 ft; screened from 497 to 572 ft; gravel packed from 454 to 497 ft.

Well 19/2-2M3

Lakewood Water District, well B. Altitude about 260 feet. Drilled by R. J. Strasser, 1942.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel	16	16
Gravel, cemented	9	25
Gravel; water-bearing	1	26
Gravel, cemented	21	47
Clay, sandy	5	52
Clay, sandy	1	53
Clay, hard, and bound gravel	8	61
Clay, sandy	10	71
Sand, fine; water-bearing	18	89
Sand and gravel, cemented	9	98
Sand, tight	31	129
Sand, loose; water-bearing	3	132
Gravel, cemented	17	149
Gravel and clay	8	157
Clay, blue	46	203
Gravel, cemented	21	224
Sand, coarse, and gravel; water-bearing	12	236

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-2M3--Continued		
Gravel, cemented	21	257

Casing, 18-inch from 0 to 60 ft, 12-inch from 0 to 257 ft; perforated from 75 to 90 ft, 125 to 135 ft, 142 to 154 ft, and 219 to 235 ft.

Well 19/2-2P1

Clover Park School. Altitude about 260 feet. Drilled by Gilstron, 1928.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel; water-bearing below 18 ft	28	28
"Hardpan"	5	33
Sand and gravel, loose	7	40
Sand and gravel, tight	25	65
Sand, loose; water-bearing	15	80
"Hardpan"	10	90
Sand and gravel; water-bearing	3	93

Casing, 6-inch.

Well 19/2-4A1

E. Buckley. Altitude about 250 feet. Drilled by Service Hardware Co., 1953.

Materials	Thickness (feet)	Depth (feet)
Soil and boulders	2	2
"Hardpan" and boulders	18	20
Gravel, cemented	15	35
Gravel, cemented; water-bearing	11	46
Gravel	8	54

Casing, 6-inch to 54 ft.

Well 19/2-4A2

E. W. Miles. Altitude about 250 feet. Drilled by Service Hardware Co., 1953.

Materials	Thickness (feet)	Depth (feet)
Soil and boulders	8	8
Gravel, cemented	15	23
Gravel, hard packed	6	29

Casing, 6-inch to 29 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-4B1		
Western State Hospital, well 2. Altitude about 245 feet. Drilled by N. C. Jannsen Drilling Co., 1938.		
Sand and gravel	30	30
Gravel	5	35
No record	15	50
Gravel	40	90
Clay, blue	72	162
Gravel	33	195
"Shale"	70	265
Gravel and sand	30	295
Boulders and gravel	60	355
Clay, hard, sandy	40	395
Gravel and boulders	31	426
Gravel	34	460
Clay, sticky	6	466
Boulders	5	471
Clay and gravel	17	488
Boulders	4	492
No record	8	500
Casing, 16- to 12-inch; perforated 30 to 35 ft, 50 to 90 ft, 162 to 195 ft, 275 to 355 ft, 395 to 420 ft, 430 to 455 ft, and 475 to 500 ft.		
Well 19/2-4B2		
Western State Hospital, well 1. Altitude about 245 feet. Drilled by N. C. Jannsen Drilling Co., 1938.		
Sand and gravel	35	35
Sand	15	50
Gravel	40	90
Clay, blue	74	164
Gravel	31	195
"Shale"	70	265
Gravel and sand	30	295
Boulders and gravel	60	355
Clay, hard, sandy	40	395
Gravel and boulders	31	426
Gravel	34	460
Clay	6	466
Boulders	5	471
Clay and gravel	29	500
Gravel, cemented, and boulder	78	578
Sand	12	590
Gravel, cemented	60	650

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-4B2--Continued		
Sand and boulders	50	700
Clay, sandy	30	730
Gravel, cemented and hard	53	783
Sand and boulders	67	850
Clay, sandy, with wood	15	865
Sand and boulders	20	885
Clay, sandy	10	895
Boulders and clay	25	920
Sand, with wood	13	933
Clay and gravel	2	935

Casing, 16- to 12-inch; perforated below 500 ft.

Well 19/2-4G1

Lakewood Water District. Altitude about 410 feet. Drilled by L. R. Gaudio, 1958.

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	150	150
Clay, sandy, with some gravel	15	165
"Hardpan"	15	180
Sand and gravel, tight; water-bearing	10	190
Gravel, to 4 inches, loose; water-bearing	25	215
Sand, medium	11	226
Sand and gravel	4	230
Sand, fine	10	240
Clay	1	241

Casing, 12-inch to 191 ft; screened from 191 to 229 ft.

Well 19/2-5D1

City of Steilacoom, well 1. Altitude about 265 feet. Drilled by L. V. Denny, 1939.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel	35	35
Clay, blue, and "hardpan"	10	45
Sand and gravel; water-bearing	1	46
Clay, sandy, blue	18	64
Gravel; water-bearing	1	65
Clay, blue, and "hardpan"	11	76
Sand and gravel	9	85
Gravel, cemented	27	112
Sand and gravel, "muddy"	13	125
Gravel, cemented, blue	32	157
Gravel, coarse; water-bearing	30	187

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-5D1--Continued		
Gravel, cemented	4	191
Gravel and sand, pieces of wood at 205 ft; water-bearing	16	207

Casing, 10-inch to 207 ft; perforated from 157 to 207 ft.

Well 19/2-5D2

City of Steilacoom, well 3. Altitude about 285 ft. Drilled by L. R. Gaudio in 1960.

Materials	Thickness (feet)	Depth (feet)
"Hardpan," sandy	35	35
"Hardpan," gravel	5	40
Gravel, cement; trace of water	3	43
"Hardpan," yellow	5	48
"Hardpan," gray	13	61
Gravel, cemented	4	65
"Hardpan"	60	125
Gravel, coarse, tight, some water coming in at 115 ft	20	145
Gravel, tight, cemented, test 90 gpm at 153 ft	8	153
Gravel, coarse, sand	19	172
Sand, heaving	3	175
Gravel, coarse	8	183
Clay, sandy	1	184
Clay, blue	6	190

Casing, 12-inch to 144 ft; 40 ft of screen.

Well 19/2-5H1

Lakewood Water District. Altitude about 340 feet. Drilled by L. R. Gaudio, 1961.

Materials	Thickness (feet)	Depth (feet)
Topsoil	3	3
"Hardpan," sandy below 11 feet	84	87
"Hardpan," sand, gravel; in layers	31	118
Sand and gravel	20	138
Sand, fine to coarse, blue	2	140
Clay, blue	15	155
Sand and gravel; peat at 163 feet	9	164
Gravel and sand	3	167
Sand and gravel, partly cemented	7	174
Gravel and sand	16	190
Gravel, cemented	10	200
Clay and gravel, layered, compact	6	206
Gravel and clay	5	211

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-5H1--Continued		
Sand and gravel	16	227
Clay	2	229
Sand	2	231
Clay and sand, layered	4	235
Sand, medium	10	245
Clay	2	247
Sand	6	253
Clay, sticky, gray	231	484
Clay, sandy	68	552
Clay, tough, sticky	53	605
"Hardpan"	30	635
Clay and gravel	15	650
Clay, sticky, blue	10	660
Clay, sandy, hard	30	690
Clay, sticky, blue; sandy layers	50	740
Clay, blue	13	753
Sand, fine, blue	5	758
Clay, sticky, blue	42	800
Clay, blue	10	810
Clay, silty, laminated, blue	17	827
Clay and gravel	4	831
Clay, sticky, blue	12	843
Clay, sandy, hard	12	855
Clay and gravel	1	856
Sand and gravel, tight	24	880
Sand, some gravel	5	885
"Hardpan"	3	888
Gravel, coarse; and sand	4	892
Gravel, cemented	6	898

Casing, 12-inch to 8-inch.

Well 19/2-6P1

City of Steilacoom, well 2. Altitude about 260 feet. Drilled by L. R. Gaudio, 1953.

Gravel and soil	3	3
Gravel, hard	6	9
"Hardpan," light gray	42	51
Gravel with sand, trace of clay	12	63
"Hardpan," brown	8	71
Gravel with brown clay	2	73
Gravel, with blue, brown, and gray clay	4	77
Gravel, some red stained, and dirty sand	6	83
Gravel, some red stained, little sand	3	86
Gravel and sand, blue, gray, dirty	3	89
Sand, blue, and little gravel	3	92

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-6P1--Continued		
Sand and gravel, dirty	9	101
Sand, fine to medium, blue, gray	5	106
Clay, brown and blue	11	117
Sand, fine, very little small gravel	7	124
Sand, fine to coarse, dirty	8	132
Sand, fine, with small chunks of clay, pieces of wood	11	143
Clay, dark gray	8	151
Sand, dirty, gray	3	154
Sand and gravel	3	157
Clay, little pea gravel	7	164
Sand, fine, dirty	3	167
Sand and pea gravel	6	173
Sand, fine, and some clay	8	181
Sand and gravel, some clay	4	185
Gravel, with sand and clay	11	196
Sand and gravel up to 3 inches	8	204
"Hardpan"	5	209
Sand, fine	4	213
Sand, and a little gravel	21	234
"Hardpan"	5	239
Gravel, coarse	8	247

Casing, 12- and 7-inch to 247 ft.

Well 19/2-8A1

Lakewood Water District, well T9. Altitude about 290 feet. Drilled by L. R. Gaudio, 1958.

Materials	Thickness (feet)	Depth (feet)
"Hardpan" and boulders	10	10
Sand, brown	15	25
Gravel, dry	10	35
Gravel, cemented, hard	23	58
Gravel and sand	17	75
Sand, coarse	15	90
Sand and coarse gravel	11	101
Clay	8	109
Clay and "hardpan"	36	145
Sand, fine, and layers of clay	25	170
Clay, hard, sandy	5	175
Clay, blue	30	205
Clay, hard, sandy	12	217
Sand, hard packed, layers of black and brown clay	39	256
Gravel, cemented	9	265
Gravel, coarse	15	280
Clay	5	285
Sand and gravel	5	290
Gravel, cemented	15	305

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-8A1--Continued		
Sand and gravel, chunks of "hardpan"	6	311
Sand and gravel, tight	19	330
Gravel, coarse	10	340
Clay, sandy	10	350
Clay, blue	164	514
Clay, blue, with sandy streaks	21	535
Sand, hard packed	10	545
Clay, blue, and sand streaks	25	570
Clay, blue	120	690
Sand, hard packed	4	694
Clay, blue	67	761
"Hardpan," sandy	19	780
Clay, sandy	5	785
Clay, sticky, with gravel	20	805
Clay, sandy	45	850
"Hardpan"	4	854
Sand and gravel, light to medium bluish-gray; water-bearing	4	858
Gravel, cemented, and "hardpan"	9	867
Clay, sandy	13	880
Sand, medium grained, light bluish gray, and clay	35	915

Casing, 12- to 10-inch.

Well 19/2-8G1

E. M. Pease. Altitude about 255 feet. Drilled by Gilstrap. Memory log.

Soil	2	2
Gravel, pea	15	17
Clay	10	27
Till	15	42
Gravel	3	45

Casing, 6-inch to 44 ft.

Well 19/2-9D1

Lakewood Water District, well T10. Altitude about 265 feet. Drilled by L. R. Gaudio.

Sand	6	6
"Hardpan" and boulders	49	55
Sand and gravel	3	58
Gravel, cemented	12	70
Gravel and sand; water-bearing	17	87
Clay and gravel	15	102
Gravel, loose, and layers of clay	12	114

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-9D1--Continued		
Clay and sand	14	128
Sand, with some gravel and clay layers; water-bearing	42	170
Sand, with layers of clay	15	185
Clay, sandy, blue	13	198
Clay, blue	44	242
Sand, hard packed, cemented	21	263
Clay and gravel, hard, sticky	7	270
"Hardpan" and cemented gravel	6	276
Gravel and sand, coarse; water-bearing	12	288
"Rocks," large, and layers of "hardpan"	9	297
Clay, sandy, blue	23	320

Well 19/2-9F1

Nell Wakely. Altitude about 235 feet. Drilled by Richardson Well Drilling Co., 1954.

Clay and gravel	17	17
"Hardpan;" water-bearing	22	39
Clay and gravel	7	46
Sand and gravel, coarse, loose	4	50
Clay, sand, and gravel	4	54
Sand, fine, heaving	26	80
Sand, fine, and blue clay	7	87
Sand, fine, and shallow streaks of clay	62	149
Clay, blue	3	152
Clay, blue, and sand	8	160
Sand, fine and coarse, gravel, and clay	3	163
No record	2	165

Casing, 6-inch.

Well 19/2-10E1

Lakewood Water District, well E. Altitude about 275 feet. Drilled by R. and W. Well Drilling Co., 1946.

No record	50	50
Gravel, loose	25	75
Sand, fine, brown	23	98
Sand and gravel	3	101
Gravel, fine	5	106
Sand	11	117
Clay, blue, and coarse gravel	12	129
Clay, blue	7	136

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-10E1--Continued		
Clay, yellow, and sand	21	157
Clay, hard, and coarse sand	40	197
Gravel, coarse, and sand	12	209
Gravel, coarse	3	212
Sand, coarse, and gravel	15	227
Sand, brown	2	229
Sand and gravel	4	233
Sand and clay	8	241
Gravel, large	8	249
Sand, coarse, gray	11	260
Sand, coarse, gray (hard)	8	268
Sand, gray, and gravel, (hard)	3	271
Clay, yellow	2	273
Clay, blue	42	315
Sand, fine, blue	6	321
Clay, blue, and gravel	4	325
Sand, blue, fine	19	344
Gravel, small	9	353
Clay, gray	56	409
Clay and gravel	12	421
Clay, gray-green	9	430
Clay and gravel	14	444
Clay, yellow	16	460

Casing, 18- and 12-inch to 460 ft; perforated.

Well 19/2-10F2

Lakewood Water District, well D. Altitude about 270 feet. Drilled by L. V. Denny, 1920.

Old well; no record	184	184
Sand, packed	4	188
"Hardpan"	6	194
Gravel, coarse	11	205
Sand, some gravel	13	218
Sand, medium	6	224
Sand, finer, brown	18	242
Gravel, medium	6	248
Gravel, coarse, and sand	8	256
Sand, coarse	10	266
"Hardpan"	16	282
Gravel and sand, coarse	6	288

Casing, 10-inch to 185 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-10F4		
Lakewood Water District, test well 6. Altitude about 270 feet. Drilled by L. R. Gaudio, 1950.		
"Hardpan"	76	76
Clay, blue	11	87
Gravel and sand; water-bearing	2	89
Sand; water-bearing	10	99
Gravel and sand; water-bearing	11	110
Sand, brown, and clay	9	119
Sand, brown, and clay, some gravel	52	171
"Hardpan"	35	206
Sand and gravel, hard packed	11	217
Sand, fine	17	234
Sand, some gravel	8	242
Gravel, coarse; water-bearing	9	251
Sand	6	257
"Hardpan"	5	262
Sand and gravel; water-bearing	8	270
"Hardpan"	2	272
Sand and gravel; water-bearing	13	285
Clay	2	287
Sand; water-bearing	29	316
Gravel and clay	3	319
Clay, sandy, and peat at 333 ft	73	392
Clay, sandy, red	29	421
Sand, gray, fine	5	426
"Hardpan," gray	10	436
Clay and brown sand	13	449
Clay, yellow	8	457
Sand and gravel, hard, cemented streaks; water-bearing	58	515
Clay, sandy	19	534
"Hardpan"	22	556
Clay, brown	9	565
Clay, sandy	18	583
Gravel, cemented	8	591
Sand; water-bearing	19	610
Well 19/2-10F5		
Lakewood Water District, well D2. Altitude about 270 feet. Drilled by L. R. Gaudio, 1959.		
Gravel and sand, coarse	145	145
Clay, sandy	6	151
Boulders and clay	9	160
Sand and gravel	35	195
Gravel, coarse	37	232

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-10F5--Continued		
Clay and silt, dark blue-gray	36	268
Clay, blue-gray, with layers of "hardpan"	12	280
Sand, fine, blue-gray	18	298
Clay, blue-gray	17	315
Sand, silty, blue-gray	20	335
Clay, brown, with carbonized wood	35	370
Sand, tight	31	401
Sand, tight, with layers of brown clay	22	423
Gravel, cemented	18	441
Clay, tight, brown	9	450
"Hardpan"	24	474
Gravel and sand, with streaks of "hardpan"	23	497
"Hardpan"	6	503

Casing, 16- to 12-inch to 469 ft; screened 469 to 497 ft.

Well 19/2-10F6

Lakewood Water District, well D3. Altitude about 270 feet. Drilled by L. R. Gaudio, 1959.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel	78	78
Clay, blue	11	89
Sand, blue	8	97
Clay, blue	3	100
Sand and gravel	17	117
Sand and a little gravel	3	120
Sand	17	137
Clay and "rocks," and granodioritic boulders from 139 to 144 ft	22	159
Sand, gravel, and streaks of "hardpan"	11	170
Gravel, cemented	19	189
Sand, brown	7	196
Sand and gravel, blue	4	200
Gravel, coarse, and sand	25	225
Sand and gravel, tight	3	228

Casing, 16-inch to 200 ft; screened from 200 to 224 ft.

Well 19/2-10L1

Lakewood Water District, well D1. Altitude is about 270 feet. Drilled by N. C. Jannsen, 1947.

Materials	Thickness (feet)	Depth (feet)
Gravel and loose "rock"	84	84
Gravel, tight packed	8	92
Clay	8	100
Gravel and "rock"	10	110

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-10L1--Continued		
Gravel, loose	5	115
Gravel and "rock"	65	180
Gravel, fine, with "rock"	37	217
Sand, coarse, with gravel	23	240
Sand, gravel, and blue clay	10	250
Clay, blue, with gravel	10	260
Gravel	20	280
Sand and gravel	30	310
Gravel, sand, and clay	10	320
Clay	10	330
Sand, coarse, and gravel; water-bearing	288	618
Clay	20	638

Casing, 24- to 12-inch.

Well 19/2-11L1

Lakewood Water District, test well 4. Altitude is about 275 feet. Drilled by Richardson Well Drilling Co., 1950.

Materials	Thickness (feet)	Depth (feet)
Topsoil	3	3
Gravel and clay	21	24
Gravel; water-bearing	4	28
Sand and gravel, streaked with clay	16	44
Gravel and clay	23	67
"Hardpan"	6	73
Clay and yellow gravel	9	82
"Hardpan"	20	102
Clay, sandy, and gravel	4	106
Clay, sandy	7	113
Clay, sandy, and gravel	3	116
"Hardpan"	10	126
Sand and gravel	4	130
Clay, brown	2	132
Clay, blue	8	140
"Hardpan"	43	183
Sand, dirty, some gravel	5	188
"Hardpan"	12	200

Casing, 10-inch to 200 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-11Q1		
Lakewood Water District, well H2. Altitude is about 275 feet. Drilled by L. R. Gaudio, 1959.		
Gravel and sand, loose	11	11
"Hardpan"	14	25
Gravel and sand, tight; water-bearing	58	83
Gravel and sand; water-bearing	22	105
Sand and some gravel	18	123
Clay, blue, sandy	5	128
Sand, fine, blue	52	180
"Hardpan"	7	187
Gravel, cemented	18	205
Sand and coarse gravel, tight at base	8	213
Sand and coarse gravel	29	242
Clay, blue	18	260
"Hardpan"	5	265
Gravel, cemented	22	287
Sand, fine, muddy	17	304
Sand, coarse, and some gravel	9	313
Clay, sandy	27	340
Sand, fine, hard packed	30	370
Clay, sandy	3	373
Sand and gravel	13	386
Clay, sandy, blue	8	394
Clay, gray	14	408
"Hardpan," yellow	52	460
Gravel, cemented	5	465
Sand and gravel	4	469
Gravel, cemented, and "hardpan"	41	510
Casing, 16-inch to 86 ft; screened 85 to 106 ft.		
Well 19/2-12A1		
U. S. Government (McChord A.F.B.). Altitude about 285 feet. Drilled by N. C. Jannsen Drilling Co., 1929.		
Pit	7	7
Gravel, loose	15	22
Gravel, cemented	3	25
"Hardpan"	3	28
Gravel	11	39
Boulders	5	44
Gravel and sand, some cobbles	64	108
Sand and clay	4	112
Clay, sandy	5	117
Sand	24	141

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-12M1		
R. L. Sawyer. Altitude about 275 feet. Drilled by Tacoma Pump and Well Drilling Co., 1950.		
Soil	2	2
Clay, sandy, and gravel	14	16
Gravel, water-bearing	7	23
"Hardpan"	11	34
Sand and gravel	7	41
"Hardpan"	9	50
Gravel; water-bearing	15	65

Casing, 8-inch to 65 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/2-13C1		
W. A. Millard. Altitude about 285 feet. Drilled by Tacoma Pump and Well Drilling Co., 1953.		
Topsoil	2	2
Gravel, dry	9	11
"Hardpan"	17	28
Clay, sandy	4	32
"Hardpan"	12	44
Gravel, hard packed; water-bearing	16	60
Sand, and gravel; water-bearing	3	63

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 19/2-13G1		
U. S. Government (McChord A.F.B.). Altitude about 294 feet. Drilled by R. J. Strasser, 1939.		
Gravel, loose to tight	109	109
Silt	31	140
Gravel, loose	10	150
Gravel, tight	6	156
Gravel, loose	5	161
Gravel, tight	20	181
Sand and gravel, loose	9	190
Clay, blue	10	200

Casing, 12-inch to 195 ft; perforated from 145 to 150 ft, 152 to 165 ft, and 170 to 181 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-13G2		
U. S. Government (McChord A.F.B.). Altitude about 300 feet. Drilled by R. J. Strasser, 1939.		
Gravel, cemented at top, but clean toward bottom	93	93
Sand, with clay binder	10	103
Gravel	7	110
Sand, very muddy	7	117
Gravel, cemented	25	142
Gravel, loose	9	151
Sand, clean	7	158
Gravel	24	182
Sand	1	183
Gravel, cemented	27	210
Sand, muddy	50	260
Sand and gravel, muddy	38	298
Casing, 12-inch; perforated from 140 to 153 ft, 165 to 182 ft, and 264 to 278 ft.		
Well 19/2-14B1		
Lakewood Water District, test well 3. Altitude about 275 feet. Drilled by Richardson Well Drilling Co., 1949.		
"Hardpan"	21	21
Gravel, dry, and "hardpan"	2	23
Clay, gray, and gravel	4	27
"Hardpan"	18	45
Clay, brown, and gravel	4	49
Clay, sand, and gravel	6	55
"Hardpan"	5	60
Gravel, coarse, loose; water-bearing	2	62
Sand and gravel	4	66
Gravel, loose, showing clay	14	80
Sand, brown, and some gravel	4	84
Sand, coarse	2	86
Sand and gravel	2	88
Gravel with streaks of clay	8	96
Sand, gravel, and some clay	4	100
Gravel, loose, some coarse sand	6	106
Sand, coarse, streaked with gravel	9	115
Gravel and fine sand	3	118
Sand, fine, heaving	5	123
Clay, sandy, blue	6	129
Sand, fine, gray	51	180
Clay, brown, sand, and some gravel	13	193
"Hardpan"	9	202
Clay, green, coarse sand, and gravel	4	206

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-14B1--Continued		
"Hardpan"	20	226
Sand, coarse	3	229
Gravel, pea, loose, and coarser gravel	2	231
Gravel and coarse sand, showing some clay	10	241
Gravel and coarse sand	2	243
Clay, blue	20	263
Clay, streaked with gravel	5	268
Sand, coarse, and gravel; water-bearing	1	269
Clay, gray, and gravel	6	275
"Hardpan"	23	298
Clay and coarse sand	3	301
Gravel and coarse sand	2	303
Clay, sand, and gravel	4	307
Gravel and coarse sand	12	319
Clay, brown, sand, and gravel	6	325
Sand, fine, red, and clay	24	349

Casing, 10-inch to 221 ft, 8-inch from 0 to 349 ft. Casing pulled.

Well 19/2-14B2

Lakewood Water District, Well H. Altitude about 275 feet. Drilled by L. R. Gaudio, 1951.

Gravel, dirty	18	18
"Hardpan," with large boulders	18	36
Sand and gravel, dirty	12	48
"Hardpan"	5	53
Sand and gravel, streaks of clay in last 14 ft	33	86
Gravel, loose, coarse, some clay below 96 ft	18	104
Sand, fine	6	110

Casing, 30-inch to 93 ft; 24-inch to 85 ft; screened from 86 to 106 ft.

Well 19/2-14D1

Lyle Donald. Altitude about 290 feet. Drilled by R. and W. Drilling Co., 1941.

No record	50	50
Gravel, cemented	70	120
Sand, heaving	55	175
Gravel and sand	6	181
No record	11	192

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-14L1		
U. S. Government (McChord A.F.B., well 2). Altitude about 310 feet. Drilled by Richardson Well Drilling Co.		
Topsoil	1	1
Sand and gravel, dirty	5	6
Clay, sand, and gravel	51	57
"Hardpan"	5	62
Sand and gravel, dirty	7	69
Clay, sand, and gravel	13	82
Sand and clay	44	126
Clay, blue	14	140
Sand, dirty	5	145
Clay, sand, and gravel	17	162
"Hardpan"	48	210
Sand and gravel; water-bearing	10	220

Casing, 12-inch to 205 ft; screened from 205 to 220 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/2-14L2		
U. S. Government (McChord A.F.B., well 9). Altitude about 310 feet. Drilled by Otis Kesti, 1956.		
Clay and gravel; water-bearing	61	61
Clay, gravel, and sand	10	71
Sand and gravel	35	106
Sand, gravel, and some clay	10	116
"Hardpan"	10	126
Clay	8	134
Gravel, cemented	12	146
Sand and gravel	6	152
"Hardpan"	14	166
Clay	10	176
"Hardpan"	10	186
Sand and clay	70	256
"Hardpan"	33	289
Clay	21	310
Clay and fine sand	10	320
Silt and clay	99	419
"Hardpan"	16	435

Casing, 18- to 12-inch to 325 ft; perforated from 94 to 96 ft, 138 to 140 ft, 150 to 154 ft, and 220 to 254 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-16R1		
Lakewood Water District, well A. Altitude about 275 feet. Drilled by R. J. Strasser, 1942.		
Gravel, loose	18	18
Gravel, coarse	10	28
Clay, sandy, and gravel	11	39
Sand and gravel; water-bearing	4	43
Gravel, cemented	4	47
Clay, sandy	9	56
Gravel and sand; water-bearing	45	101
Clay, sandy, hard	30	131
Gravel, cemented	23	154
Sand and gravel; water-bearing	6	160
Clay, sandy, hard	11	171
Gravel, cemented	13	184
Sand and gravel; water-bearing	19	203
Clay, sandy, and coarse gravel	16	219
Clay, sandy, and some gravel	5	224

Casing, 16-inch to 107 ft, 12-inch to 224 ft; perforated from 160 to 224 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/2-16R2		
Lakewood Water District, well A2. Altitude about 275 feet. Drilled by L. R. Gaudio, 1959.		
Gravel, coarse	50	50
Sand, and coarse gravel	5	55
Gravel, coarse	10	65
Sand and gravel	20	85
Sand, coarse, some gravel	3	88
Sand, tight, packed	6	94
Clay, sandy	29	123
"Hardpan" and cemented gravel	27	150
Sand and gravel	10	160
Clay, sandy	11	171
Gravel and sand, cemented "hardpan"	27	198
Gravel, coarse; and boulders	9	207
Gravel and boulders, tight	11	218
Gravel, cemented	8	226
Sand and gravel, tight	19	245
Sand and gravel	9	254
Sand, medium to coarse	6	260
Sand, some gravel	6	266
Sand and gravel, brown	16	282
Sand, coarse	10	292
Sand and gravel, blue	7	299
Gravel, cemented, hard, blue	15	314

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-16R2--Continued		
Sand, some gravel	6	320
Sand, dark	10	330
Clay, blue	12	342
Sand and clay	11	353
Sand, hard-packed	8	361
Sand, hard-packed, layers of clay	44	405
Clay, yellow	20	425

Casing, 16-inch to 236, 12-inch 236 to 294, slotted 238 to 294 ft.

Well 19/2-18H1

U. S. Government (Fort Lewis, well 4). Altitude about 235 feet. Drilled by N. C. Jannsen Drilling Co., 1941.

Materials	Thickness (feet)	Depth (feet)
Record from inspection of cuttings. Materials above 842 feet shown in log of replacement well 19/2-18H2.		
Clay, sandy	58	900
Sand and grit	60	960
Sand, grit, and clay	40	1,000
Sand and ½-inch pebbles	100	1,100
Sand, grit, and clay	30	1,130
Clay, lead-blue	90	1,220
Clay, gritty in part	70	1,290
Sand, fine to grit	60	1,350
Grit and clay	10	1,360
Sand to ½-inch pebbles	90	1,450
Clay	-	-

Well 19/2-18H2

U. S. Government (Fort Lewis, well 4A). Altitude 233.4 feet. Drilled by Roscoe Moss, 1943.

Materials	Thickness (feet)	Depth (feet)
Soil	1	1
Sand and gravel, to 10-inch	48	49
Clay, blue	3	52
Sand and gravel; water-bearing	8	60
Clay, sandy, and gravel	13	73
Sand and gravel; water-bearing	2	75
Clay, sandy, and gravel	29	104
Sand and pebble gravel; water-bearing	16	120
Sand, fine	4	124
Sand, gravel, and cobbles	2	126
Clay, gray, pieces of wood	26	152

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-18H2--Continued		
Sand, fine	6	158
Clay, silty, brown	17	175
Clay, blue, hard	4	179
Clay, hard, blue and brown	41	220
Clay, sandy, and gravel	55	275
Sand and cobble gravel; water-bearing	11	286
Clay, sandy	49	335
Clay, blue	335	670
Clay, sandy, blue	26	696
Clay, blue	34	730
Clay, sandy, blue	98	828
Clay, hard, blue	10	838
Clay, sandy, blue	64	902
Clay, blue, some pebble gravel	3	905
Sand, coarse, and clay	13	918
Clay, sandy, blue	9	927
Sand, fine, blue	16	943
Sand, gravel, and some clay	5	948
Clay, sandy, blue	12	960
Gravel and sand; water-bearing	10	970
Clay, sandy, blue	10	980
Gravel and sand; water-bearing	46	1,026
Clay, sandy, blue	10	1,036
Gravel and sand	14	1,050
Clay, sandy, blue	10	1,060
Clay, sandy, brown	30	1,090
Clay, brown	5	1,095
Clay, sandy, blue	5	1,100
Clay, blue, silty	12	1,112

Casing, 20-inch to 580 ft, 18-inch from 580 to 730 ft, and 16-inch from 730 to 1,112 ft; perforated from 276 to 290 ft, 943 to 947 ft, 960 to 970 ft, 985 to 1,026 ft, and from 1,036 to 1,050 ft.

Well 19/2-18Q1

U. S. Government (Fort Lewis, well 2). Altitude about 234 feet. Drilled by R. J. Strasser, 1940.

Gravel, cemented	36	36
Silt, blue	9	45
Gravel; water-bearing	5	50
Silt, blue	25	75
Sand, heaving	32	107
Silt, sandy, blue	33	140
Clay, hard, with some gravel	18	158
Gravel, cemented	57	215
Sand and gravel; water-bearing	13	228

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-18Q1--Continued		
Gravel, cemented	11	239

Casing, 18-inch.

Well 19/2-19B1

U. S. Government (Fort Lewis, well 1). Altitude about 234 feet. Drilled by R. J. Strasser, 1940.

Materials	Thickness (feet)	Depth (feet)
Gravel, cemented	45	45
Sand, coarse; water-bearing	2	47
Sand, some gravel, and pieces of wood	6	53
Gravel, cemented	36	89
Sand, fine, yellow, running; water-bearing	10	99
Silt, blue	20	119
Gravel, loose; water-bearing	3	122
Silt, gray	27	149
Clay, hard, brown	3	152
"Hardpan"	18	170
Gravel, cemented	26	196
Sand, loose	6	202
Sand and gravel, loose; water-bearing	12	214
"Conglomerate" and "sandstone"	10	224

Casing, 18-inch to 220 ft; perforated from 124 to 130 ft, 192 to 199 ft, and from 201 to 215 ft.

Well 19/2-19F1

U. S. Government (Fort Lewis, well 3). Altitude about 235 feet. Drilled by R. J. Strasser, 1941.

Materials	Thickness (feet)	Depth (feet)
Gravel, cemented	40	40
Gravel, loose, and sand; water-bearing	5	45
Sand, "heavy," gray	20	65
Clay, hard, blue	4	69
Sand, gray, heaving	11	80
Silt, blue	24	104
Gravel, cemented, and large boulders	34	138
Clay, blue	10	148
Gravel, cemented	2	150
Peat and rotted wood	5	155
Clay, blue	3	158
Gravel, hard, cemented	31	189
Sand and gravel; water-bearing	31	220

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-19F1--Continued		
Gravel, cemented	9	239

Casing, 18-inch to 229 ft.

Well 19/2-22A1

E. A. Deeter. Altitude about 270 feet. Drilled by Tacoma Pump and Well Drilling Co., 1955.

"Rocky"	7	7
Gravel, dry	6	13
"Hardpan"	3	16
Gravel, dry	2	18
"Hardpan"	21	39
Sand; water-bearing	5	44
Sand and gravel	1	45

Casing, 6-inch to 45 ft.

Well 19/2-22C1

D. E. Bond. Altitude about 270 feet. Drilled by Pete Sylte in 1960.

Gravel, dry	21	21
Clay and gravel	9	30
Gravel, cemented	3	33
Gravel and sand, fair flow of water	2	35
Gravel, cemented	21	56
Gravel and sand, good flow of water	4	60

Casing, 8-inch to 60 ft; perforated 55-57 ft.

Well 19/2-22N1

U. S. Government (Fort Lewis, well 7). Altitude 279.6 feet. Drilled by Roscoe Moss Co., 1941.

Gravel and boulders	114	114
Sand and gravel	19	133
Clay and gravel	27	160
Gravel and boulders	16	176
Boulder, granite	3	179
Clay, hard, and gravel	16	195
Sand	5	200
Clay, hard, and gravel	31	231

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-22N1--Continued		
Clay, sticky	8	239
Clay	5	244
Sand, gravel, and clay	50	294
Sand, gravel, and boulders	5	299
Clay and gravel	16	315
Gravel, boulders, and some clay	70	385
Sand and gravel, with streaks of clay	85	470
"Rock," black	28	498
Clay, sandy	29	527
Clay, hard, and sand	8	535
Clay and streaks of sand	70	605
Clay and a few boulders	15	620
Clay, sandy, hard	10	630
Clay, sandy, with streaks of sand	41	671
Clay, with streaks of sand and gravel	105	776
Boulders, in hard clay and sand	28	804
Sand	15	819
Clay, hard	6	825
Boulders, hard	8	833
Clay, hard, and sand	7	840
Boulders, hard	20	860
Clay, sandy, hard, and some gravel	24	884
"Shale," black	6	890
Clay, sandy, with streaks of sand	16	906
Clay, blue	16	922
Clay, gray	8	930
Clay, blue	15	945
Clay, sandy, gray	35	980
Clay, with streaks of sand	28	1,008
Sand, gray, medium to fine	12	1,020
Clay, blue	100	1,120
Clay and sand, hard	42	1,162
Clay, hard, sticky	33	1,195
Sand, fine, with streaks of clay	141	1,336
Clay, sticky	14	1,350
Clay, blue and gray	63	1,413
Clay, hard, sticky	32	1,445
Clay, blue and gray	60	1,505
Clay, gray	10	1,515
Clay and sand	21	1,536
Clay	69	1,605
Clay, sandy, hard and sticky	180	1,785
Sand, hard, and cemented clay	476	2,261

Casing, 38- to 26-inch to 1,400 ft; perforated.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-23H1		
U. S. Government (McChord A.F.B., well 7). Altitude about 295 feet. Drilled by L. R. Gaudio, 1956.		
Gravel, coarse, sand, clay, and few boulders	27	27
Gravel and sand	5	32
Gravel, fine to coarse, sand and clay	13	45
Gravel and sand	2	47
Gravel, coarse, and coarse sand	8	55
Gravel, coarse, large boulders, and some sand	10	65
"Hardpan"	15	80
Gravel, sand, and some clay	10	90
Gravel, small, and coarse sand	3	93
Sand, coarse and fine, and some clay	6	99
Sand	4	103
Gravel, coarse, and fine sand	3	106
Gravel, coarse and fine, and fine sand	4	110
Clay, blue, and little sand	6	116
"Hardpan" and sand mixture	13	129
Sand, fine, and some clay	5	134
Gravel with coarse and fine sand	10	144
Sand, coarse and fine, and some gravel	3	147
Gravel and sand, coarse	3	150
Gravel, coarse, and some sand	8	158

Casing, 12-inch to 138 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/2-23H2		
U. S. Government (McChord A.F.B., well 8). Altitude 277.15 feet. Drilled by Western Drilling Co.		
Boulders, gravel, and clay	7	7
Boulders, gravel, and clay; water-bearing	10	17
Boulders, gravel, and clay	6	23
Gravel, small, and sand and clay	6	29
Gravel, fine, and sand; water-bearing	3	32
Gravel, fine, and sand	11	43
Gravel, coarse, and sand	4	47
Gravel, fine, and sand	10	57
Gravel, coarse, and sand	11	68
Sand, coarse, and gravel and clay	12	80
Sand, coarse, and gravel, layer of fine sand and clay	10	90
Sand, fine, and clay	10	100
Sand, fine, and small gravel, and clay	12	112
Silt, fine, and sand and clay	10	122
"Hardpan," fine silt, and clay	4	126
Gravel, coarse, and sand and clay; water-bearing	6	132

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-23H2--Continued		
Gravel, coarse, fine sand, and clay	7	139
Gravel, coarse, sand, and some clay; compact	7	146
Sand, coarse, gravel, clay, and large "rocks"	19	165
Gravel, coarse, sand, and some clay	15	180
Silt and clay	70	250

Casing, 8-inch to 207 ft.

Well 19/2-27G1

U. S. Government (Fort Lewis, well 8). Altitude about 287 feet. Drilled by Roscoe Moss Co., 1943.

Materials	Thickness (feet)	Depth (feet)
Sand, gravel, and boulders	65	65
Sand and clay	2	67
Sand, gravel, and boulders	11	78
Sand and gravel	10	88
Clay, blue	2	90
Clay, sandy, blue	115	205
Clay, blue	30	235
Sand and gravel to 6-inch	35	270
Sand, coarse, some gravel to ½-inch	8	278
Sand and gravel to 6-inch	90	368
Sand, blue	10	378
Sand and gravel to 6-inch	12	390
Clay, blue, and hard gravel (till)	10	400
Sand, gravel and cobbles; tight	40	440
Clay, hard, gray	60	500
Clay and gravel, hard	93	593
Sand and pebble gravel	8	601
Clay, blue	8	609
Sand and pebble gravel; sharp	12	621
Clay, hard, gravelly	19	640
Sand and clay, hard	93	733
Sand and cobble gravel	35	768
Sand and pebble gravel	19	787
Sand, tight (contains carbonized wood and lignite)	11	798
Sand, silt, and clay	122	920
Clay (lignite)	4	924
Sand, cemented, and clay	72	996
Clay, gray, laminated	12	1,008

Casing, 26- to 20- inch to unknown depth; perforated from 593 to 601 ft, 609 to 621 ft, and from 733 to 787 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-28F2		
Washington National Guard. Altitude about 278 feet. Drilled by R. and W. Drilling Co., 1940.		
No record	90	90
Gravel, up to 1-inch, tight	16	106
Sand, fine, gray	48	154

Casing, 12-inch to 154 ft; perforated.

Well 19/2-31J1

U. S. Government (Fort Lewis, well 5). Altitude about 282 feet. Drilled by Roscoe Moss Co., 1941.

Materials	Thickness (feet)	Depth (feet)
Sand, gravel, and boulders; water-bearing at 42 ft	60	60
Clay and gravel	60	120
Sand and gravel, in clay	14	134
Sand and gravel, "sharp," in clay	26	160
Sand and gravel, "sharp;" water-bearing	20	180
Clay, blue	25	205
Clay, blue, with some gravel	5	210
Sand, "sharp," cobble gravel, and some clay; water-bearing	28	238
Sand, cobbles, and boulders	22	260
Sand and clay, packed	40	300
Sand and gravel, in clay	55	355
Sand, packed (contains carboniz ed wood)	15	370
Sand, packed, with streaks of clay	42	412
Clay, silty, gray	28	440
Clay, blue	40	480
Clay and gravel	20	500
Sand, packed, and clay	16	516
Clay, blue	9	525
Sand, packed, and clay (carbonaceous)	35	560
Clay, and some wood	10	570
Sand	30	600
Clay, blue	10	610
Gravel, cobble; water-bearing	16	626
Clay	24	650
Clay and sand	10	660
Sand and cobble gravel	32	692
Sand	20	712
Clay and gravel, some wood	20	732
Gravel, pebble and cobble	8	740
Clay, some gravel at top (till?)	70	810
Clay, sandy	85	895
Sand and clay, some gravel	10	905
Clay, sandy	20	925
Sand, fine	5	930
Clay, sandy	25	955

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-31J1--Continued		
Sand, clay, and gravel	7	962
Clay, blue	16	978
Clay, gray (carbonaceous)	22	1,000

Casing, 38- to 20-inch to 990 ft; perforated from 210 to 260 ft, 300 to 355 ft, 610 to 626 ft, 660 to 692 ft, 732 to 745 ft, 895 to 905 ft, and from 955 to 965 ft.

Well 19/2-32H1

U. S. Government. Altitude about 293 feet. Drilled by Roscoe Moss Co., 1941.

Materials	Thickness (feet)	Depth (feet)
Gravel	90	90
Gravel and clay	20	110
Gravel and boulders	35	145
Clay and grit	67	212
Gravel and grit	18	230
Clay and grit	103	333
Sand and gravel	29	362
Clay	18	380
Clay and some gravel	15	395
Gravel and some clay	30	425
Sand, packed	11	436
Gravel and some clay	14	450
Clay and sand	105	555
"Boulders"	52	607
Clay and gravel	5	612
"Conglomerate"	108	720
Clay, blue	87	807
Blue clay and gravel	44	851
Sand and gravel	22	873
Clay, blue, and gravel	87	960
Sand and gravel	80	1,040
Clay and gravel	20	1,060
Clay	23	1,083
Clay and gravel	37	1,120
Clay, sandy	170	1,290
Sand and gravel	36	1,326
Clay	48	1,374
Clay, and some gravel	9	1,383
Clay	101	1,484
Sand and gravel	35	1,519
Clay	51	1,570

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-32H2		
U. S. Government (Fort Lewis, well 6). Altitude about 291 feet. Drilled by Roscoe Moss Co., 1943.		
Sand, gravel, and cobbles	30	30
Sand, gravel, and boulders; cemented	8	38
Sand and cobble gravel	3	41
Sand, gravel, and boulders; tight	27	68
Sand, gravel, and boulders; loose	22	90
Sand, gravel, and boulders; tight	15	105
Sand and cobble gravel; loose	25	130
Sand, fine, yellow	64	194
Clay, blue, (carbonaceous)	6	200
Sand, fine, blue	4	204
Sand and cobble gravel	12	216
Sand, fine, brown	54	270
Sand, fine, blue	16	286
Clay, blue	38	324
Clay, blue, and gravel (till?)	16	340
Sand and gravel, tight	8	348
Clay, blue	208	556
Sand, fine, packed, blue	34	590
Sand, silty, blue	68	658
Sand and cobble gravel	2	660
Sand, blue, hard	140	800
Sand and cobble gravel	20	820
Sand and pebble gravel	5	825
Sand, fine, blue	115	940
Sand, fine, and cobble gravel	20	960
Sand and pebble gravel	10	970
Sand and cobble gravel	20	990
Clay with sandy streaks, greenish	49	1,039
Sand with clayey streaks	141	1,180
Clay, sandy, blue	54	1,234
Sand and fine gravel	36	1,270
Sand, fine, tight, blue	53	1,323
Clay, blue (carbonaceous)	17	1,340

Casing, 20- to 18-inch to 1340 ft; perforated from 105 to 130 ft, 204 to 216 ft, 340 to 348 ft, 800 to 825 ft, 950 to 990 ft, and 1,240 to 1,270 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/2-36D1		
U. S. Government (Fort Lewis, well 10). Altitude about 336 feet.		
Gravel, loose, with some clay	20	20
Gravel, silty, with cobbles; compact	35	55
Gravel, cobbles, and boulders	3	58

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/2-36D1--Continued		
Gravel, sandy	2	60
Gravel, silty, with cobbles; compact	10	70
Gravel, sandy, with some clay; compact	3	73
Gravel, silty, with cobbles; compact	7	80
Gravel, sandy, slightly compact	20	100
Gravel, silty, sandy, compact	10	110
Gravel, cobbles, and boulders, with minor amounts of sand	6	116

Casing, 8-inch to 116 ft.

Well 19/3-1A1

Summit Water and Supply Co. Altitude about 450 feet. Drilled by L. R. Gaudio, 1958.

Topsoil	3	3
"Hardpan," some boulders	28	31
Sand and gravel, tight	6	37
Sand, gravel, and boulders	129	166
Sand, fine, dry	6	172
Sand, gravel, and boulders	9	181
Gravel, cemented	34	215
Sand, gravel, and boulders; water-bearing	34	249
Gravel, loose, and clay stringers	4	253
Sand and gravel, tight	6	259
Gravel, loose, and fine sand	3	262
Sand and gravel, fine	3	265
Sand and gravel, tight	7	272
"Hardpan" and boulders	3	275
Gravel and interbedded tight sand, may contain some "hardpan"	28	303

Casing, 12-inch to 251 ft; screened from 249 to 291 ft.

Well 19/3-1C1

John Piekarski. Altitude about 430 feet. Drilled by Pete Sylte, 1953.

Topsoil	3	3
"Hardpan"	26	29
Gravel, dry, hard packed	131	160
Gravel, sand, and clay	15	175
Sand and some gravel; water-bearing	3	178
Gravel and sand; water-bearing	11	189
Gravel, cemented	1	190

Casing, 8-inch to 189 ft; perforated from 184 to 189 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-1C2		
Stanley Slezak. Altitude about 440 feet. Drilled by Pete Sylte, 1959.		
Open hole	50	50
Gravel, dry	2	52
"Hardpan"	9	61
Gravel, cemented	62	123
Sand, dry, packed	6	129
Gravel, cemented	11	140
Sand, dry, packed	19	159
Gravel, cemented	22	181
Gravel; water-bearing	2	183
Gravel, cemented	2	185
Gravel; water-bearing	10	195

Casing, 8-inch to 195 ft; perforated from 189 to 192 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-1D2		
Summit Water and Supply Co., well 3. Altitude about 480 feet. Drilled by L. R. Gaudio, 1951.		
Clay, brown	4	4
"Hardpan," blue	77	81
Gravel, cemented, greenish brown	82	163
Sand, fine, brown	14	177
Gravel, cemented, gray	23	200
Clay, sandy, brown	15	215
Sand, brown	1	216
Clay, sandy, brown	17	233
Sand and gravel	2	235
Clay and gravel	21	256
Sand and gravel, hard, clayey	3	259
Sand and gravel, loose; water-bearing	7	266
"Hardpan," gray	3	269
Gravel, cemented	16	285

Casing, 12-inch to 283 ft; perforated from 256 to 282 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-1J1		
Summit Water and Supply Co., well 1. Altitude about 475 feet. Drilled by L. R. Gaudio, 1950.		
Gravel, cemented, blue	56	56
Gravel, cemented, yellow	24	80
Gravel, cemented, yellow, and streaks of sand	84	164
Sand	3	167

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-1J1--Continued		
Gravel, cemented, yellow, and streaks of sand	34	201
Sand and gravel	1	202
Gravel, cemented	9	211
Sand and gravel	17	228
Gravel and clay	20	248
Clay, sandy, yellow	16	264
Clay, yellow, and coarse gravel	21	285
Clay, sandy, yellow	4	289
Gravel, cemented, changing from yellow to blue	17	306
Gravel, cemented, blue-gray	44	350
Sand and gravel, hard packed	12	362
Clay and gravel, cemented, yellow	13	375
Clay, sandy, yellow	12	387
Gravel, cemented	20	407

Casing, 12-inch to 407 ft; perforated from 200 to 230 ft.

Well 19/3-3G1

Southeast Tacoma Mutual Water Co., well 1. Altitude about 427 feet. Drilled by Pete Sylte, 1947.

Materials	Thickness (feet)	Depth (feet)
Gravel and clay	19	19
Sand and gravel	4	23
Gravel and clay	33	56
Sand and clay; water-bearing	2	58
Clay and gravel	77	135
Gravel, coarse, dry	40	175
Clay and gravel	20	195
Sand and gravel; water-bearing	25	220
Clay and gravel	66	286
Sand and gravel; water-bearing	4	290
Clay and gravel	22	312
Sand and gravel; water-bearing	18	330
Sand, (quicksand); water-bearing	45	375
Sand and gravel; water-bearing	40	415

Casing, 12-inch to 155 ft, 10-inch from 155 to 385 ft, 8-inch from 385 to 415 ft; perforated from 197 to 218 ft, 313 to 330 ft, and from 385 to 415 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-3G2		
Southeast Tacoma Mutual Water Co., well 4. Altitude about 427 feet. Drilled, 1958.		
Soil	2	2
Gravel, cemented	13	15
"Hardpan"	6	21
Boulders and "hardpan"	3	24
"Hardpan"	31	55
"Hardpan," sandy	13	68
"Hardpan"	12	80
"Hardpan," sandy	10	90
Gravel, cemented	65	155
Gravel and sand	3	158
Gravel, cemented	27	185
Gravel and sand	9	194
Gravel, cemented, and sand	9	203
Gravel, cemented	31	234
"Hardpan"	27	261
Sand	9	270
Gravel and sand	6	276
Boulders and "hardpan"	24	300
Gravel and clay	17	317
Gravel and sand	13	330
Sand	3	333
Gravel and sand	2	335
Sand	4	339
Boulders and "hardpan"	5	344
"Hardpan"	16	360
Sand	5	365
Clay, sandy	17	382
Sand, clayey	12	394
Sand	25	419
Sand, clayey	3	422

Casing, 10-inch to 422 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-4P1		
--Stern. Altitude about 360 feet. Drilled by D. H. Watts, 1940.		
Clay, shot	4	4
"Hardpan"	23	27
Sand, subangular, dark	86	113
"Hardpan"	1	114
Gravel, clean, well sorted	6	120

Casing, 5-inch to 120 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-5C1		
--. Altitude about 321 feet. Dug, 1924.		
Gravel	19	19
"Hardpan"	20	39
Gravel	30	69

Casing, 48-inch to 20 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-5K1		
John Brunton. Altitude about 323 feet. Drilled by L. V. Denny, 1940.		
Soil and gravel	21	21
Gravel, cemented	34	55
Gravel, clean	9	64

Casing, 5-inch to 64 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-5L2		
Southeast Tacoma Mutual Water Co., well 3. Altitude about 310 feet. Drilled by Pete Sylte, 1951.		
Topsoil	2	2
Gravel, dry	19	21
Gravel, cemented	7	28
"Hardpan"	16	44
Gravel, cemented	21	65
Gravel and clay; water bearing	33	98
Gravel, cemented	6	104
Sand, red, and gravel; water-bearing	27	131
Gravel, cemented	4	135
Sand, red, and gravel; water-bearing	4	139
Gravel, cemented	30	169
Clay, blue	15	184
Gravel, cemented	20	204
"Hardpan"	5	209
Sand and gravel; water-bearing	4	213
Gravel, cemented	22	235
Clay, blue	13	248
Clay, sandy	5	253
Gravel, cemented	17	270
Gravel and blue clay	5	275
Gravel, cemented	10	285

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-5L2--Continued		
Clay, sandy, blue	15	300
Gravel, sand, clay, and peat	30	330
Gravel, sand, and clay; water-bearing	4	334
Sand and gravel, cemented	27	361
Sand and gravel, muddy	8	369
Gravel, cemented	6	375
Sand, gravel, and clay	15	390
Sand, hard packed, green	15	405

Casing, 12-inch to 333 ft, 8-inch from 333 to 405 ft; perforated from 65 to 98 ft, and from 209 to 213 ft.

Well 19/3-5L3

Southeast Tacoma Mutual Water Co., well 5. Altitude about 310 feet. Drilled by Western Drilling and Equipment Co., 1959.

Gravel, medium sized	24	24
"Hardpan;" water-bearing	33	57
"Hardpan"	21	78
Sand	2	80
Gravel, loose; water-bearing	2	82
Gravel, loose	16	98
"Hardpan"	9	107
Gravel and sand, fine	12	119
Sand, brown; water-bearing	6	125
Sand, brown	13	138
Gravel, cemented, hard	42	180
Clay, blue	4	184
Sand, brown, and gravel	5	189
Gravel, pea; water-bearing	17	206
Gravel, cemented, and sand; very hard	2	208

Casing, 10-inch to 206 ft; perforated from 189 to 200 ft, and from 83 to 98 ft.

Well 19/3-5N1

R. Homola. Altitude about 305 feet. Drilled by L. V. Denny, 1940.

Gravel, coarse, and sand	50	50
"Quicksand"	26	76
Gravel, fine, clean	4	80

Casing, 5-inch to 80 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 19/3-5Q1

Clifford Schrammeck. Altitude about 315 feet. Drilled by Tacoma Pump and Well Drilling Co., 1952.

Gravel	16	16
"Hardpan"	32	48
Gravel, dry, hard packed	8	56
"Hardpan"	2	58
Gravel, hard packed; water-bearing	9	67
Gravel, loose; water-bearing	2	69

Casing, 6-inch.

Well 19/3-6B1

H. H. Lilienthal. Altitude about 305 feet. Dug, 1939.

Sand and gravel	20	20
Clay, sandy, and till	22	42

Casing, 36-inch.

Well 19/3-6D1

Sunnycroft Sanitarium. Altitude about 307 feet. Drilled by N. C. Jannsen Drilling Co., 1931.

Gravel, loose	33	33
Gravel, cemented; water-bearing	26	59
Gravel	11	70
Sand, fine	3	73
Sand and gravel, packed	5	78
Sand and gravel; water-bearing	4	82

Casing, 6-inch to 82 ft.

Well 19/3-7A1

Albert Kastner. Altitude about 290 feet. Drilled by Glacier Pump and Drilling Co., 1957.

Topsoil	1	1
Gravel, coarse	20	21
Clay, blue, and "rock" ("hardpan")	30	51

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-7A1--Continued		
Clay, blue, and boulders; water-bearing	4	55
Sand, coarse, and pea gravel	1	56

Casing, 6-inch to 56 ft.

Well 19/3-8R2

Pacific Lutheran College. Altitude about 305 feet. Drilled by Richardson Drilling Co., 1955.

Materials	Thickness (feet)	Depth (feet)
Topsoil	2	2
Gravel, clay, and boulders	11	13
Gravel and clay	4	17
Clay, sand, and gravel; water-bearing	7	24
Sand and gravel, cemented	40	64
"Hardpan"	2	66
Clay and gravel	10	76
"Hardpan"	15	91
Gravel and clay	4	95
"Hardpan"	20	115
Gravel and clay	4	119
Sand and clay, brown	2	121
Gravel and clay	28	149
Clay, sand, and gravel	13	162
"Hardpan"	5	167
Clay, sand, and gravel (brown)	36	203
Sand, green	2	205
"Hardpan" with boulders	25	230

Casing, 12-inch.

Well 19/3-9G3

Parkland Light and Water Co., well 3. Altitude about 380 feet. Drilled by Richardson Drilling Co., 1950.

Materials	Thickness (feet)	Depth (feet)
Topsoil and clay	9	9
"Hardpan" (clay, gravel, and boulders)	47	56
Gravel and clay	19	75
"Hardpan," gravel, and boulders	1	76
Gravel, loose, and clay	4	80
Gravel and sand, loose	10	90
Gravel, fine, and sand	10	100
"Hardpan," clay, and boulders	1	101
Gravel, coarse, and "hardpan"	10	111

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-9G3--Continued		
Gravel, loose	35	146
Gravel, fine, and coarse sand	5	151
Clay, sand, and gravel	3	154
Sand and gravel	19	173
Sand, gravel, and clay	2	175
"Hardpan"	15	190
Sand, coarse, and gravel	6	196
Gravel, fine, and fine sand	23	219
Clay, yellow, and coarse sand; water-bearing	2	221
"Hardpan"	9	230

Casing, 24-inch to 174 ft; screened from 152 to 174 ft.

Well 19/3-9G4

Parkland Light and Water Co., well 5. Altitude about 380 feet. Drilled, 1956.

Materials	Thickness (feet)	Depth (feet)
Clay, brown	9	9
"Hardpan"	6	15
Clay and gravel; water-bearing	5	20
"Hardpan," blue, and boulders	65	85
"Hardpan," gray, brown, sandy	10	95
Gravel, cemented, with layers of coarse gravel	7	102
Sand and gravel, tight; water-bearing	10	112
"Hardpan," brown	3	115
Sand, coarse, and large gravel	4	119
"Hardpan," brown	21	140
Sand, brown, and clay layers	6	146
Sand and gravel, tight	7	153
Sand and gravel	5	158
Gravel, cemented	19	177

Casing, 24-inch to 158 ft, 18-inch from 122 to 160 ft; perforated from 160 to 175 ft.

Well 19/3-14L1

L. J. Carson. Altitude about 405 feet. Drilled by Tacoma Pump and Well Drilling Co.

Materials	Thickness (feet)	Depth (feet)
Clay and topsoil	6	6
Clay, blue, and "hardpan"	59	65
Clay and gravel	55	120
Gravel; water-bearing	5	125
Sand and gravel, hardpacked	1	126
Clay, sandy	5	131

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-14L1--Continued		
Sand and gravel	9	140
Clay, blue	3	143
Sand and large gravel	2	145
Sand	5	150
Clay, blue, and "hardpan"	3	153
Sand and gravel, hard packed	4	157
"Hardpan"	9	166
Sand and gravel, hard packed	3	169
"Hardpan"	11	180
Sand and gravel, hard packed	10	190
"Hardpan"	10	200

Casing, 6-inch to 200 ft; perforated from 120 to 125 ft, 131 to 140 ft, 143 to 145 ft, 153 to 157 ft, 166 to 169 ft, and from 180 to 190 ft.

Well 19/3-15R1

John Irwin. Altitude about 325 feet. Drilled by Tacoma Pump and Well Drilling Co., 1954.

Materials	Thickness (feet)	Depth (feet)
Gravel, dry	19	19
Gravel; water-bearing	7	26
Gravel, hard packed	2	28
"Hardpan"	8	36
Gravel, water-bearing	2	38
"Hardpan"	-	-

Casing, 6-inch.

Well 19/3-16D1

Parkland Light and Water Co. Altitude about 305 feet. Drilled by M. A. Wutz, 1955.

Materials	Thickness (feet)	Depth (feet)
Gravel and "hardpan"	47	47
Gravel; water-bearing	4	51
Clay, gravel, and "hardpan"	90	141
Sand and gravel; water-bearing	10	151
Clay, gravel, and "hardpan"	141	292
Gravel and sand; water-bearing	7	299
Clay, gravel, and "hardpan"	416	715

Casing, 12-inch to 715 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-16E1		
S. A. Hill. Altitude about 305 feet. Drilled by Service Hardware Co.		
Soil and boulders	15	15
Gravel, cemented	27	42
Gravel	2	44
Well 19/3-16G1		
D. S. Heath. Altitude about 305 feet. Drilled by Service Hardware Co.		
Topsoil	2	2
Gravel, cemented	15	17
Gravel; water-bearing	5	22
Gravel, cemented; water-bearing	15	37
Casing, 6-inch.		
Well 19/3-16L1		
Clyde Sacco. Altitude about 310 feet. Drilled by Richardson Drilling Co., 1949.		
Topsoil	4	4
Gravel and boulders	5	9
Gravel and clay	11	20
"Hardpan"	27	47
Sand and gravel	5	52
Clay, sandy	3	55
"Hardpan"	4	59
Clay, sandy, and gravel	8	67
"Hardpan"	2	69
Clay, sandy, and gravel	8	77
"Hardpan"	14	91
Gravel and clay	2	93
"Hardpan"	12	105
Sand and gravel, coarse	-	-
Casing, 6-inch.		
Well 19/3-17E1		
William Goodwin. Altitude about 305 feet. Drilled by Tacoma Pump and Well Drilling Co., 1950.		
Soil	2	2
Gravel, dry	28	30

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-17E1--Continued		
"Hardpan"	4	34
Sand and gravel; water-bearing	1	35

Casing, 6-inch to 35 ft.

Well 19/3-17R1

Parkland Light and Water Co. Altitude about 325 feet. Drilled by Richardson Drilling Co., 1958.

Materials	Thickness (feet)	Depth (feet)
Topsoil	2	2
Gravel, sand, and clay	28	30
Gravel, sand, and clay; seepage	27	57
Sand and gravel; water-bearing	10	67
Sand and clay	12	79
"Hardpan"	50	129
Clay, sand, and gravel	31	160
"Hardpan"	13	173
Clay, sand, and gravel	46	219
Clay and sand	7	226
Clay, sand, and gravel	36	262
Sand, coarse, and wood; water-bearing	3	265
Sand and clay, some gravel	5	270

Casing, 8-inch.

Well 19/3-17R2

Parkland Light and Water Co., well 4. Altitude about 320 feet. Drilled, 1959.

Materials	Thickness (feet)	Depth (feet)
Surface dirt	4	4
Gravel, sand, clay, and boulders	53	57
Sand and gravel; water-bearing	5	62
Sand and clay	3	65
Sand and clay; water-bearing	8	73
Sand and clay	4	77

Casing, 18-inch to 77 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-18M1		
U. S. Government (McChord A. F. B., well 3). Altitude about 315 feet. Drilled by Roscoe Moss Drilling Co., 1943.		
Soil	2	2
Sand and gravel, coarse	38	40
Sand and cobble gravel	18	58
Gravel	48	106
Sand, gravel, and cobbles; tight	28	134
Sand and gravel	46	180
Gravel and clay	20	200
Sand and gravel	10	210
Clay, blue	5	215
Sand and gravel	5	220
Clay and gravel	25	245
Gravel and cobbles	7	252
Sand and gravel, tight, static water level 50 ft	42	294
Sand and gravel, coarse	56	350
Clay, sandy, blue	12	362
Sand	13	375
Clay, blue	25	400
Clay, yellow, and boulders	12	412
Sand, yellow, and gravel	58	470
Clay, brown	10	480
Sand and gravel	10	490
Clay, blue	2	492
Sand and gravel, 2-inch cobbles	8	500
Clay, greenish gray	50	550

Casing, 16-inch to 500 ft; perforated from 201 to 210 ft, 217 to 220 ft, 245 to 250 ft, 417 to 470 ft, 481 to 490 ft, and 491 to 498 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-20C1		
C. A. Martens. Altitude about 335 feet. Drilled by Tacoma Pump and Well Drilling Co., 1959.		
Topsoil	2	2
Gravel	8	10
Sand and gravel, packed	34	44
Sand and gravel; water-bearing	12	56
"Hardpan"	8	64
Sand and gravel; water-bearing	11	75
Sand and gravel, packed	27	102
"Hardpan"	21	123
Sand, fine; water-bearing	11	134

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-20C1--Continued		
Clay, blue	13	147
Sand, fine; water-bearing	6	153
Sand and gravel; water-bearing	14	167

Casing, 8-inch to 162 ft; screen to 167 ft.

Well 19/3-20C2

Jack Gilliland. Altitude about 330 feet. Drilled by Western Drilling and Equipment in 1955.

Gravel and boulders	23	23
Gravel, cemented	21	44
Sand, with clay	23	67
Sand	47	114
Gravel, cemented	3	117

Casing, 10-inch.

Well 19/3-20K1

Milton and Willis Crooks. Altitude about 325 feet. Drilled by Richardson Well Drilling Co.

"Hardpan"	50	50
Sand, some water	2	52
Clay and gravel	14	66
Gravel; water-bearing	6	72

Casing, 8-inch to 72 ft.

Well 19/3-20L1

--Roarbaugh. Altitude about 330 feet. Drilled by Service Hardware and Implement Co.

Soil, gravel and boulders	30	30
Clay, brown	14	44
? , water containing silt	5	49
"Hardpan"	21	70
? , water containing silt	8	78
Gravel, cemented, boulders	14	92
Gravel; water-bearing	5	97

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-20P2		
Robert Creso. Altitude about 330 feet. Drilled by Pete Sylte in 1955.		
Open hole	20	20
Sand, brown	8	28
Sand and gravel, cemented	6	34
Sand, fine	12	46
Clay, blue	9	55
Sand, cemented	7	62
Clay, blue, and gravel	10	72
Clay, sandy, blue, some water	23	95
Gravel, cemented	18	113
Sand and gravel, water	3	116
Casing, 6-inch to 116 ft.		
Well 19/3-21K2		
F. Frank. Altitude about 355 feet. Dug, drilled by Service Hardware and Implement Co.		
Open hole	17	17
Gravel, cemented	50	67
Casing, 6-inch to 67 ft.		
Well 19/3-22F1		
E. E. Larson. Altitude about 335 feet. Drilled by Tacoma Pump and Well Drilling Co., 1953.		
Topsoil	18	18
Gravel, dry	22	40
Gravel and some clay; water-bearing	15	55
Clay, sandy, blue, and clean gravel; water-bearing	2	57
Casing, 6-inch.		
Well 19/3-22M1		
M. Ackley. Altitude about 355 feet. Drilled by Richardson Drilling Co., 1950.		
No record	28	28
Sand and gravel, coarse	41	69
Casing, 6-inch to 69 ft; perforated.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-23C1		
Tacoma Meats Co. Altitude about 330 feet. Drilled by Richardson Drilling Co., 1953.		
Topsoil	6	6
Clay, gravel, and boulders	31	37
Clay, sand, and gravel	30	67
Sand and gravel; water-bearing	10	77
Clay, sand, and gravel	15	92
"Hardpan"	6	98
Gravel and clay	27	125
"Hardpan"	85	210
Clay, sand, and gravel	5	215
Gravel, clay, and boulders	90	305
Clay	26	331
Clay, sandy and gravel	10	341
Clay, sticky, blue	7	348
Sand and gravel, cemented	30	378
Clay, sand, and gravel	47	425
Clay, hard, sandy	12	437
Sand and gravel, cemented	55	492
Clay, sand, and gravel	5	497
Sand, dirty, heaving	14	511
Clay and gravel	2	513
Sand, fine to coarse, and clay	4	517
Sand and gravel, cemented	32	549
Sand and gravel; water-bearing	1	550
Casing, 12- to 10-inch to 550 ft.		
Well 19/3-25L1		
Sutter Bros. Altitude about 320 feet. Dug by owner.		
Soil	3	3
"Hardpan"	1	4
Gravel, loose	4	8
Casing, 48-inch to 6 ft.		
Well 19/3-25M1		
--Myers. Altitude about 390 feet. Drilled by Service Hardware and Implement Co., 1951.		
Dug, no record	30	30
Gravel and boulders	12	42

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-25M1--Continued		
Gravel; water-bearing	3	45
"Hardpan"	-	-

Casing, 6-inch.

Well 19/3-26C1

Paul Smithlin. Altitude about 370 feet. Drilled by Service Hardware and Implement Co.

Materials	Thickness (feet)	Depth (feet)
No record	14	14
Gravel, dry	14	28
Gravel, sand and clay	2	30
Gravel, cemented	9	39
Gravel, a little water	3	42
Clay, sandy, gray	18	60
Clay and gravel	10	70
Gravel, cemented	6	76
Sand; water-bearing	7	83
Clay, yellow, and sand	4	87
Gravel; water-bearing	1	88

Casing, 6-inch to 88 ft.

Well 19/3-26F3

C. K. Reynolds. Altitude about 370 feet. Drilled by Service Hardware and Implement Co., 1952.

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Gravel and rocks	21	23
Gravel, cemented	17	40
Gravel, hard	23	63
Gravel and sand	3	66

Casing, 6-inch.

Well 19/3-26J1

H. J. McGee. Altitude about 390 feet. Drilled in 1951.

Materials	Thickness (feet)	Depth (feet)
"Hardpan" and boulders	10	10
Gravel, hardpacked	27	37
"Hardpan" and boulders	9	46

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-26J1--Continued		
Gravel, cemented, and boulders	35	81
"Hardpan" and gravel	5	86
"Hardpan" and gravel, and sand	2	88
Sand and gravel	3	91

Casing, 8-inch to 91 ft.

Well 19/3-27J1

Byrl A. Gustin. Altitude about 380 feet. Drilled by Hanson (Puyallup) in 1947.

Soil	1	1
Gravel, dry, hardpacked	4	5
"Hardpan"	15	20
Gravel, coarse; water-bearing	22	42

Casing, 6-inch to 42 ft; perforated 36 to 41 ft.

Well 19/3-28B1

L. L. Sanders. Altitude about 365 feet. Drilled in 1933.

Gravel	65	65
"Hardpan"	13	78
Sand and gravel	22	100
Sand, fine; water-bearing	25	125
No record	265	390

Casing, 8-inch to 125 ft.

Well 19/3-28E1

H. Arends. Altitude about 355 feet. Drilled by Service Hardware and Implement Co.

Open hole	32	32
"Hardpan"	4	36
Clay and sand	9	45
Clay	3	48
Gravel, cemented	25	73
Gravel	2	75

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-28F3		
Bethel School District 403. Altitude about 360 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Gravel, dry	22	22
"Hardpan"	25	47
Sand and gravel, cemented	6	53
Clay, sandy	2	55
Sand	2	57
Gravel and rocks, cemented	21	78
Sand and gravel, water-bearing, tested 30 gpm	1	79
Sand and gravel, cemented	3	82
Sand and gravel, heavy with clay	4	86
Gravel, large, and sand	3	89
Sand, gravel, and clay	8	97
Sand and gravel, cemented	2	99
Sand, coarse, some large gravel	2	101
Gravel, large, some sand	13	114
Sand and gravel, cemented	1	115
Clay, blue	6	121
Sand and gravel, coarse	9	130
No record	4	134

Casing, 8-inch to 130 ft; screened 121 to 130 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-28J1		
F. W. Schrades. Altitude about 375 feet. Drilled by Service Hardware and Implement Co., 1951.		
Soil and gravel	6	6
Gravel, loose, dry	24	30
"Hardpan"	5	35
Gravel, water-bearing (low gpm)	3	38
"Hardpan"	7	45
Gravel, water-bearing with large rock	10	55

Casing, 6-inch to 47 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/3-28K1		
G. L. Dahl. Altitude about 370 feet. Drilled by Service Hardware and Implement Co., 1951.		
No record, dug well	28	28
"Hardpan"	17	45
Gravel, hard, cemented	20	65

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-28K1--Continued		
"Hardpan"	17	82
Sand and gravel, hardpacked	9	91
Sand and gravel, loose, water-bearing	2	93

Casing, 6-inch to 67 ft.

Well 19/3-29C1

C. P. Creso. Altitude about 330 feet. Drilled by Tacoma Pump and Well Drilling Co., 1959.

Materials	Thickness (feet)	Depth (feet)
Topsoil	2	2
Gravel	19	21
Gravel and clay	10	31
Sand and clay	11	42
Sand	6	48
"Hardpan"	10	58
Gravel, hardpacked; water-bearing	31	89
Sand and water	11	100
Sand, gravel; water-bearing	40	140

Casing, 6-inch to 140 ft.

Well 19/3-29C2

C. P. Creso. Altitude about 335 feet. Drilled by Tacoma Pump and Well Drilling Co., 1959.

Materials	Thickness (feet)	Depth (feet)
Topsoil	8	8
Sand and gravel	24	32
Sand; water-bearing	48	80
Sand, (some clay); water-bearing	13	93
Sand; water-bearing	10	103
Sand and gravel; water-bearing	12	115

Casing, 6-inch to 115 ft.

Well 19/3-29J1

Stansbie's Lake Shore Apartments. Altitude about 325 feet. Drilled by Tacoma Pump and Well Drilling Co., 1953.

Materials	Thickness (feet)	Depth (feet)
Topsoil	2	2
Gravel, loose, dry	33	35

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-29J1--Continued		
Gravel, hardpacked	3	38
Gravel, loose, clean; water-bearing	1	39

Casing, 6-inch.

Well 19/3-29K1

Art Roose. Altitude about 330 feet. Drilled by Pete Sylte in 1955.

Materials	Thickness (feet)	Depth (feet)
Gravel, dry	35	35
"Quicksand"	49	84
"Hardpan"	52	136
Silt, dry	64	200
"Hardpan"	60	260
Clay, brown, and gravel	32	292
"Hardpan"	6	298

Casing, 8-inch to 280 ft.

Well 19/3-29R2

Spanaway Water Co. Altitude about 340 feet. Drilled by Tacoma Pump and Well Drilling Co., 1962.

Materials	Thickness (feet)	Depth (feet)
Topsoil	3	3
Gravel, dry	17	20
"Hardpan"	18	38
Sand and gravel, hardpacked; water-bearing	5	43
Gravel, coarse, water-bearing	17	60
Gravel, and coarse sand, water-bearing	3	63
Sand, packed; water-bearing	9	72
Clay and rocks	2	74
Sand and gravel, water-bearing	10	84
Sand and gravel, hardpacked	7	91
Sand, packed, some gravel	15	106

Casing, 12-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 19/3-33C1

Pete Sylte. Altitude about 360 feet. Drilled by owner in 1954.

Topsoil	2	2
Gravel, dry	18	20
Gravel, sand; water-bearing	8	28
"Hardpan"	33	61
Gravel, sand; water-bearing	5	66

Casing, 6-inch to 66 ft.

Well 19/3-33C2

Pete Sylte. Altitude about 360 feet. Drilled by owner.

Gravel, dry	20	20
Gravel and sand; water-bearing	9	29
"Hardpan"	42	71
Gravel, sand; water-bearing	6	77

Casing, 8-inch to 77 ft; perforated 71 to 74 ft.

Well 19/3-33P1

Bill Fueston. Altitude about 385 feet. Drilled by Service Hardware and Implement Co.

Boulders and gravel	24	24
Clay, brown, and gravel	10	34
Gravel, hardpacked	16	50

Casing, 6-inch to 50 ft.

Well 19/3-35C1

Loren Brandfas. Altitude about 370 feet. Drilled by Service Hardware and Implement Co.

Old well, no record	33	33
"Hardpan"	12	45
Gravel	2	47

Casing, 6-inch to 47 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-35D1		
R. B. Turner. Altitude about 380 feet. Drilled by Service Hardware and Implement Co. in 1952.		
Gravel	10	10
Gravel and boulders	27	37
Gravel, water-bearing	2	39
"Hardpan"	8	47
Gravel, water-bearing	3	50
Gravel, hardpacked	9	59
Gravel, water-bearing	2	61
Gravel and sand, hardpacked	11	72
Gravel, water-bearing	3	75
Sand and gravel, hardpacked	20	95
Sand and gravel, coarse, 50 gpm with 12 ft dd	1	96
Gravel, hardpacked	4	100
Gravel, loose	2	102
Gravel, hardpacked	3	105
Sand and gravel, loose	2	107
Casing, 8-inch to 92 ft.		
Well 19/3-35F1		
E. Fromm. Altitude about 375 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1951.		
Soil	3	3
Sand and gravel, hard, dry	32	35
Gravel, clean; water-bearing	11	46
Casing, 8-inch to 46 ft; perforated 25 to 45 ft.		
Well 19/3-35M2		
Martin Inderbitzin. Altitude about 392 feet. Drilled in 1952.		
Soil	4	4
Gravel, hardpacked, dry	9	13
"Hardpan"	11	24
Gravel, hardpacked; water-bearing	9	33
Gravel, loose, clean; water-bearing	2	35
Sand, fine, muddy; water-bearing	4	39
Gravel, hardpacked	5	44
Gravel, coarse, some clay; water-bearing	2	46
Gravel, hardpacked with clay; water-bearing	25	71
Sand and gravel, clean; water-bearing	2	73

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/3-35M2--Continued		
Gravel, hardpacked; water-bearing	6	79
Sand and coarse gravel; some clay; water-bearing	2	81
Sand and gravel, hardpacked, water-bearing	2	83
Gravel, loose, coarse; water-bearing	1	84

Casing, 8-inch to 84 ft.

Well 19/3-36E1

--Gisin. Altitude about 395 feet. Drilled by R. R. Charlton in 1953.

"Hardpan"	95	95
Gravel	15	110

Casing, 110 ft.

Well 19/3-36N1

G. A. Jasmer. Altitude about 385 feet. Drilled by Service Hardware and Implement Co.

Soil and rock	9	9
Gravel, hardpacked	11	20
"Hardpan"	12	32
Sand and gravel, loose; water-bearing	-	-

Casing, 6-inch to 32 ft.

Well 19/4-1J1

W. J. Moats. Altitude about 105 feet. Drilled by Ralph Charlton in 1951.

Sand and clay	75	75
Gravel	25	100

Casing, 7-inch to 100 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Well 19/4-2D1

Roy Myers, well 1. Altitude about 420 feet. Drilled by L. B. Richardson in 1950.

Materials	Thickness (feet)	Depth (feet)
Topsoil	3	3
Sand, dry	1	4
Gravel and clay, hard	19	23
"Hardpan"	15	38
Clay, yellow, gravel; water, 42 gpm	3	41
"Hardpan"	13	54
Clay, yellow, and gravel	24	78
"Hardpan"	9	87
Clay, yellow, and gravel	10	97
Clay, blue	11	108
Clay, gritty, brown	43	151
"Hardpan"	37	188
Clay, gravel, and boulders	43	231
Clay, sandy, yellow	34	265
Sand, silty, brown	15	280

Casing, 8-inch to 192 ft, 6-inch 192 to 280 ft.

Well 19/4-2D2

Roy Myers, well 2. Altitude about 420 feet. Drilled by Richardson Well Drilling Co. in 1950.

Materials	Thickness (feet)	Depth (feet)
Topsoil	2	2
Clay, sandy	7	9
"Hardpan"	51	60
Clay, yellow	2	62
Clay, yellow, and gravel	21	83
Clay, blue	3	86
Clay, gritty, blue, gravel, hard	3	89
"Hardpan"	7	96
Gravel and yellow clay	13	109
Clay, gritty, blue	14	123
Clay, yellow, and gravel	35	158
Gravel, cemented and boulders	23	181
Clay, yellow, and gravel	34	215
"Hardpan"	25	240
Clay, brown, and gravel	10	250
Clay, yellow, and gravel	25	275
Clay, sandy, dirty, brown	42	317
Clay, sand and gravel, boulders	33	350
Sand, coarse	1	351

Casing, 8-inch to 263 ft, 6-inch to 350 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-2J1		
R. W. Gogan. Altitude about 500 feet. Drilled by Richardson Well Drilling Co. in 1959.		
Sand, clay, yellow	25	25
Clay, sand and gravel	41	66
"Hardpan"	82	148
"Hardpan," blue	12	160
"Hardpan"	14	174
"Hardpan," blue	47	221
Clay, sand and gravel	13	234
Clay, sand and gravel, yellow	39	273
Sand and clay, yellow	7	280
Clay, sand and gravel, yellow	93	373
"Hardpan"	15	388
Clay, sand and gravel	27	415
"Hardpan"	8	423
Clay, sand and gravel	2	425
Sand and gravel; water-bearing	-	-

Casing, 12-inch to 425 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/4-4L1		
Lester Goelzer. Altitude about 355 feet. Drilled by R. R. Charlton in 1951.		
"Hardpan"	180	180
Gravel	6	186
"Hardpan"	20	206
Gravel	34	240

Casing, 6-inch to 240 ft.

Materials	Thickness (feet)	Depth (feet)
Well 19/4-5F1		
Fruitland Mutual Water Co. Altitude about 330 feet. Drilled by R. R. Charlton in 1954.		
"Hardpan"	20	20
Gravel; water-bearing	3	23
"Hardpan"	245	268
Gravel, fairly clean, some sand, loose	7	275
Sand, fine	25	300
Clay	60	360
Sand, fine, heaving	41	401
Sandstone (?) (hard)	16	417

Casing, 12-inch to 403 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-6L1		
--Ottman. Altitude about 455 feet. Drilled by L. R. Gaudio in 1950.		
Soil and gravel	12	12
Gravel, cemented	12	24
Sand and gravel, loose	8	32
Gravel, cemented	61	93
Gravel cemented, with streaks of sand	19	112
Gravel, cemented	48	160
Clay, cemented gravel, streaks of sand	35	195
Sand, fine, streaks of clay, thin streaks of gravel	14	209
Sand and gravel	3	212
Casing, 10-inch to 212 ft.		
Well 19/4-7D1		
Summit Water and Supply Co. Altitude about 440 feet. Drilled by Service Hardware and Implement Co. in 1955.		
Gravel	15	15
Gravel, clay	12	27
Clay, hardpacked gravel	175	202
Gravel, loose; water-bearing	24	226
Clay, hardpacked gravel	18	244
Gravel, loose	5	249
Clay, hardpacked gravel	71	320
Clay and gravel	6	326
Casing, 12-inch to 326 ft; perforated 244 to 249 ft.		
Well 19/4-9A1		
Willows Trailer Court. Altitude about 438 feet. Drilled by Rainier Drilling Co. in 1962.		
Gravel and silt	18	18
Gravel and silt; water-bearing	5	23
Gravel, cemented, blue	46	69
Gravel; water-bearing	1	70
Clay, brown, some gravel	65	135
Clay, blue, and gravel	41	176
Clay, brown, and gravel	139	315
Clay and sand; water-bearing	60	375
Clay and gravel	8	383
Sand; water-bearing	1	384
Clay and gravel	2	386

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-9A1--Continued		
Clay, red, and sand	8	394
Sand; water-bearing	1	395
Clay and gravel	4	399
Sand; water-bearing	1	400
Clay and gravel	12	412

Casing, 8-inch; yield inadequate, casing pulled.

Well 19/4-9B1

Fruitland Mutual Water Co. Altiutude about 410 feet. Drilled by R. R. Charlton in 1954.

"Hardpan"	200	200
Sand, dry	50	250
"Hardpan"	38	288
Gravel; water-bearing	36	324

Casing, 8-inch to 304 ft.

Well 19/4-9B2

Fruitland Mutual Water Co. Altiutude about 410 feet. Drilled by R. R. Charlton in 1954.

"Hardpan"	200	200
Sand, dry	50	250
"Hardpan"	30	280
Gravel; water-bearing	36	316

Casing, 12-inch to 296 ft.

Well 19/4-11K1

H. P. Hartman. Altitude about 526 feet. Drilled by N. C. Jannsen Drilling Co. in 1936.

Gravel, cemented	15	15
Gravel	7	22
Gravel, cemented, and sand	11	33
Gravel	9	42
Gravel, cemented	6	48
Gravel and boulders	25	73
Sand	5	78
Gravel, coarse, and boulders	19	97
Sand	5	102

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-11K1--Continued		
Gravel	23	125
Sand, coarse, and gravel	53	178
Gravel, loose, some sand; a little water at bottom	26	204
Sand, "lava"	2	206
Gravel	2	208
"Hardpan"	1	209
Gravel, loose and "dry"	58	267
Gravel and sand	18	285
Sand	10	295
Sand and gravel	33	328
"Quicksand;" water-bearing	12	340
Sand and fine gravel	62	402
Gravel, fine; water-bearing	6	408
Gravel and coarse sand; water-bearing	10	418

Casing, 8-inch to 6-inch to 410 ft.

Well 19/4-12A1

G. J. Hardtke. Altitude about 110 feet. Drilled by Stanley Baker.

Silt and sand	80	80
Gravel	5	85
No record	42	127

Casing, 6-inch to 85 ft.

Well 19/4-12G1

Otto Reise. Altitude about 115 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1947.

Silt, sand, clay, gravel	40	40
Sand, hardpacked, and silt	30	70
Sand, hardpacked, and gravel	18	88
Gravel, loose, clean	5	93
Sand, hardpacked, clay, silt, gravel	172	265
Sand and gravel	20	285

Casing, 6-inch to 285 ft, 15-inch from 0 to 38 ft, 6-inch from 34 to 265 ft.

Well 19/4-12J1

W. Hardtke. Altitude about 110 feet. Drilled by Charles Weller in 1950.

Silt and sand	80	80

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-12J1--Continued		
Gravel	5	85

Casing, 6-inch to 85 ft.

Well 19/4-12J2

John Talik. Altitude about 110 feet. Drilled by LeRoy Gunnarsen in 1952.

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Sand, silty, and clay	121	123
Sand and gravel	2	125

Casing, 6-inch to 125 ft.

Well 19/4-13A1

R. L. Bacon. Altitude about 120 feet. Drilled by Service Hardware and Implement Co.

Materials	Thickness (feet)	Depth (feet)
Silt and sand	74	74
Gravel; water-bearing	26	100

Casing, 8-inch.

Well 19/4-13B1

K. J. Schultz. Altitude about 125 feet. Drilled by R. R. Charlton.

Materials	Thickness (feet)	Depth (feet)
Sand and clay	82	82
Gravel	35	117

Casing, 6-inch to 117 ft; perforated 82 to 117 ft.

Well 19/4-14P1

Leroy Harvey. Altitude about 550 feet. Dug in 1921.

Materials	Thickness (feet)	Depth (feet)
Topsoil	2	2
Sand	4	6
Gravel	14	20
"Hardpan"	2	22

Casing, 36-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-15J1		
W. V. Young. Altitude about 538 feet. Drilled by N. C. Jannsen in 1938.		
Gravel, cemented	40	40
Gravel, loose, and boulders	41	81
Gravel and sand	29	110
Gravel, loose	41	151
Gravel, fine	43	194
Boulders	59	253
"Hardpan"	27	280
Gravel, cemented	57	337
Gravel and clay	6	343
Gravel, pea; water-bearing	4	347
Clay	8	355
Casing, 8-inch to 267 ft, 6-inch to 355 ft; perforated.		
Well 19/4-16E1		
Richard Starkel. Altitude about 443 feet. Drilled by Pete Sylte in 1959.		
Topsoil	1	1
Clay, blue	3	4
Clay, sandy, blue	12	16
Gravel, cemented	7	23
"Hardpan"	6	29
Gravel, cemented	8	37
"Hardpan"	42	79
Gravel, cemented	35	114
Gravel, dry	23	137
Gravel, cemented	103	240
Sand, wet, muddy	4	244
Silt, dry, and sand	5	249
Silt and wet sand	23	272
Sand, little water	1	273
Gravel, cemented	8	281
Gravel, hardpacked; water-bearing	3	284
Gravel, some sand, good flow	12	296
Casing, 8-inch to 296 ft; perforated 281 to 293 ft.		
Well 19/4-19N1		
Orville Wright. Altitude about 390 feet. Drilled by Richardson Well Drilling Co. in 1959.		
Gravel, loose	7	7
"Hardpan"	41	48

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-19N1--Continued		
Clay and gravel, seepage 50 ft	7	55
"Hardpan"	7	62
Clay and gravel, seepage 78 ft	20	82
No record	8	90

Casing, 6-inch to 90 ft.

Well 19/4-20A1

K. M. Bergman. Altitude about 453 feet. Drilled by Richardson and Webber in 1943.

Clay, yellow	12	12
"Hardpan," blue	15	27
(?), with some water	3	30
Clay, blue and gravel	8	38
"Hardpan," with boulders	89	127
Rock (had to run 4-inch casing)	9	136
"Hardpan"	82	218
"Hardpan" (?) show of water at 219 ft	12	230
Gravel, water-bearing	5	235

Casing, 6-inch to 127 ft, 4-inch to 235 ft.

Well 19/4-20A2

C. G. Aamodt. Altitude about 453 feet. Drilled by L. R. Gaudio in 1950.

Clay and gravel	10	10
Gravel, cemented	16	26
"Hardpan"	30	56
Gravel, cemented	149	205
Clay and gravel	4	209
Gravel, cemented	7	216
Sand, gravel, some water	16	232
Sand, gravel, coarse, loose	20	252
"Hardpan"	4	256

Casing, 10-inch to 255 ft; perforated 232 to 252 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-21R1		
Frank Hall. Altitude about 516 feet. Dug by Chester Miller, former owner in 1946.		
Gravel	5	5
Sand and clay	2	7
Sand, gravel, and clay	3	10
"Hardpan"	2	12
Gravel and sand; water-bearing	6	18
"Hardpan"	1	19
Sand; water-bearing	2	21
"Hardpan"	?	?
Casing, 48-inch.		
Well 19/4-22D1		
Firgrove Mutual Water District. Altitude about 461 feet. Drilled by R. R. Charlton in 1953.		
Sand	5	35
Rock, loose	35	40
Gravel; water-bearing	20	60
Gravel, loose	100	160
Gravel; water-bearing	15	175
"Hardpan"	55	230
Gravel; water-bearing	6	236
Casing, 10-inch to 236 ft; perforated from 160 to 230 ft, 230 to 236 ft.		
Well 19/4-22M2		
Firgrove Mutual Water District. Altitude about 500 feet. Drilled by L. R. Gaudio, 1961.		
Boulders and "hardpan"	10	10
Gravel, cemented	55	65
Sand and gravel, tight, large rocks	5	70
Gravel, cemented, rocks	28	98
Sand and gravel, tight	2	100
"Hardpan"	10	110
Sand and gravel, tight	5	115
Gravel, cemented	33	148
Sand and gravel, tight, rocks	22	170
"Hardpan"	65	235
Sand and gravel, dirty	5	240
Sand, silty	10	250

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/4-22M2--Continued		
Sand and gravel, some water	2	252
Sand and gravel, dirty	2	254
Gravel, cemented	12	266
"Hardpan"	17	283
Clay, yellow, some gravel	8	291
"Hardpan"	20	311
Sand and gravel, tight	4	315
Sand and gravel	1	316
Sand and gravel, tight	11	327
"Hardpan"	13	340
Sand, silty	42	382
Sand, some gravel, water-bearing	10	392
Clay and gravel	1	393
Sand and gravel	2	395
"Hardpan"	4	399

Casing, 12-inch.

Well 19/4-24A3

V. Baker. Altitude about 145 feet. Drilled in 1941.

Silt	25	25
Gravel; water contains iron	5	30
Sand; water contains iron	20	50
Clay, blue and gravel (till?)	35	85
Gravel, cemented, brown	59	144
Gravel; water-bearing	1	145

Casing, 5-inch to 145 ft.

Well 19/4-31C1

Olin Mathieson Chemical Corp. Altitude about 455 feet. Drilled by Richardson Well Drilling Co. in 1947.

Soil	3	3
"Hardpan"	37	40
Clay and boulders	25	65
"Hardpan"	13	78
Clay and boulders	20	98
Clay, sandy	37	135
Clay with large boulders	13	148
Gravel; water	2	150

Casing, 6-inch to 150 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 19/4-31C2

Richard Russell. Altitude about 455 feet. Drilled by L. R. Gaudio.

No record	29	29
"Hardpan," blue	14	43
"Hardpan," 2 to 3 gpm at 53 ft	94	137
Gravel, small amount of water	2	139
"Hardpan"	5	144
Gravel	4	148

Casing, 6-inch to 148 ft.

Well 19/5-2C1

Alfred Bench. Altitude about 615 feet. Dug well.

Soil	8	8
"Hardpan"	8	16
Gravel	1	17

Casing, 50-inch to 17 ft.

Well 19/5-2J1

D. H. Hanson. Altitude about 625 feet. Dug well.

Topsoil	4	14
"Hardpan" and loose gravel	14	18

Casing, 48-inch to 8 ft.

Well 19/5-6D1

L. M. Hatch. Altitude about 90 feet. Drilled by R. R. Charlton in 1951.

Sand and clay	82	82
Gravel	28	110

Casing, 7-inch to 110 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/5-6E1		
J. E. Stril. Altitude about 92 feet. Drilled by Nels Nelson.		
Soil and clay	12	12
Sand, fine; water-bearing	19	31
Sand and gravel	5	36
Clay and gravel	32	68
Gravel; water-bearing	2	70
Sand and gravel	13	83
Sand, hard, and gravel	6	89
Sand, fine	19	108
Sand, hard, and gravel	27	135
Sand; water-bearing	5	140
Gravel	3	143
Casing, 6-inch to 143 ft.		
Well 19/5-6E2		
John Ostafichuk. Altitude about 98 feet. Drilled by Nels Nelson, 1947.		
Soil and clay	9	9
Sand, black; water-bearing	15	24
Clay, blue and gravel	31	55
Sand, hard, black, with gravel; water-bearing	17	72
Sand, black; water-bearing	70	142
Sand and gravel; water-bearing	9	151
Casing, 6-inch to 151 ft.		
Well 19/5-6L1		
H. Brammer. Altitude about 98 feet. Drilled by Service Hardware and Implement Co. in 1952.		
Clay and sand	51	51
Clay, sand, and rock	20	71
Clay, hard, and rock	10	81
Sand	5	86
Sand and gravel	2	88
Casing, 6-inch to 88 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/5-6M1		
Otto Davis. Altitude about 90 feet. Drilled in 1932.		
Sand and gravel, small, blue mud; water-bearing	33	33
Boulders	140	173
Casing, 4-inch to 173 ft.		
Well 19/5-6M2		
W. E. Crabtree. Altitude about 101 feet. Drilled by R. R. Charlton.		
Sand and clay	89	89
Gravel	22	111
Casing, 6-inch to 111 ft.		
Well 19/5-6M4		
C. E. Hyde. Altitude about 100 feet. Drilled by R. R. Charlton in 1952.		
Sand and clay	85	85
Gravel	26	111
Casing, 6-inch to 111 ft; perforated 85 to 111 ft.		
Well 19/5-6N1		
Marvin Ward. Altitude about 100 feet. Drilled by R. R. Charlton in 1950.		
Sand	82	82
Gravel	18	100
Casing, 6-inch to 97 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 19/5-7D2

G. L. Matlock. Altitude about 110 feet. Drilled by R. R. Charlton in 1950.

Sand and clay	80	80
Gravel	21	101

Casing, 6-inch to 101 ft.

Well 19/5-8B1

Elvo Silva. Altitude about 450 feet. Drilled in 1953.

"Hardpan"	31	31
Clay	30	61
Gravel	12	73

Casing, 6-inch, screened.

Well 19/5-13F2

M. Crab. Altitude about 400 feet. Drilled by N. C. Jannsen in 1933.

Loam, black	3	3
Gravel	7	10
Sand and gravel	12	22
Gravel and rock (boulders)	8	30
Gravel	6	36
Gravel and coarse sand; water-bearing	2	38

Casing, 6-inch.

Well 19/5-30N1

Elsie Koehler. Altitude about 170 feet. Drilled by J. L. Bell Water Well Drilling in 1957.

Topsoil	2	2
Clay	8	10
Clay, blue and sand, some water	12	22
Sand, gray, and clay	60	82
Sand, hard, and gravel; water-bearing	11	93

Casing, 6-inch to 93 ft; perforated from 87 to 91 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/5-30P1		
H. C. Flanagan. Altitude about 170 feet. Drilled by R. R. Charlton in 1953.		
Topsoil	2	2
Gravel	18	20
Sand	35	55
Sand and gravel; water-bearing	23	78
Casing, 10-inch to 78 ft; perforated from 70 to 78 ft.		
Well 19/5-31D1		
J. R. McLean. Altitude about 175 feet. Drilled by J. L. Bell Water Well Drilling in 1959.		
Topsoil	1	1
Sand	4	5
Clay, blue, and sand	13	18
Clay, brown	13	31
Sand, blue, and gravel; water-bearing	6	37
Sand, hard, blue, and gravel	35	72
Gravel, cemented	6	78
Sand and gravel, water-bearing	22	100
Casing, 6-inch to 100 ft; perforated from 82 to 90 ft.		
Well 19/5-31Q2		
Tad Sasaki. Altitude about 205 feet. Drilled by J. L. Bell Water Well Drilling in 1956.		
Topsoil	3	3
Sand, brown, and gravel	3	6
Sand, brown and blue, and gravel; water-bearing	11	17
Clay, sandy, brown	13	30
Sand, blue, and gravel, some water	6	36
Sand, hard, dry, blue, gravel and clay	36	72
Gravel, cemented, blue; water-bearing	16	88
"Hardpan" (?), blue	8	96
Gravel, cemented, blue; water-bearing	3	99
Casing, 6-inch to 99 ft; perforated from 81 to 89 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/5-31R1		
Takashi Sasaki. Altitude about 205 feet. Drilled by R. R. Charlton in 1954.		
Sand and clay	80	80
Gravel	10	90
Casing, 8-inch to 90 ft.		
Well 19/5-32J2		
City of Orting. Altitude about 220 feet. Drilled by L. R. Gaudio in 1953.		
Silt, mucky, sand and gravel	63	63
Sand, gravel and boulders	27	90
"Hardpan"	1	91
Sand and gravel; water-bearing	3	94
Sand, brown	41	135
Sand, hard, blue	50	185
Sand and gravel, brown; water-bearing	12	197
Clay, blue	16	213
Sand and gravel; water-bearing	12	225
Sand, fine, and clay	17	242
Sand, fine, and coarse gravel	8	250
Casing, 12-inch to 189 ft, 7-inch from 189 to 226 ft; screened from 189 to 199 and from 210 to 226 ft.		
Well 19/5-33N1		
R. E. Fitch. Altitude about 232 feet. Drilled by Fred Jensen in 1935.		
Soil	5	5
Gravel, boulder, loose	15	20
Sand and clay	3	23
"Hardpan"	7	30
Sand and gravel, fine	7	37
Clay, gray, with fine gravel	14	51
"Hardpan" and coarse gravel	3	54
Boulders, hard	8	62
"Hardpan"	2	64
Sand and clay, hard	3	67
"Hardpan"	25	92
Sand, gray; water-bearing	1	93
Sand, with mica and reddish clay	19	112

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/5-33N1--Continued		
Silt; a few rocks	97	209
"Hardpan;" water-bearing	11	220
Sand, fine, gray, and clay	2	222

Casing, 3-inch to 207 ft; screened from 207 to 217 ft.

Well 19/5-35R1

F. Lewis. Altitude about 755 feet. Drilled by Service Hardware and Implement Co. in 1955.

Materials	Thickness (feet)	Depth (feet)
Sand, gravel, black, and muddy	28	28
Clay, hard, brown	13	41
Sand and gravel, boulder at 45 ft	9	50
Sand and gravel	5	55
"Hardpan"	10	65
Clay, blue, and rocks	20	85
Clay, brown and rocks, boulders, hard	13	98
Rocks and gravel, boulders, hard	8	106
Gravel, softer, some boulders	7	113
Rocks	6	119
Rocks and clay, "hard drilling"	6	125
Rock and clay, brown, some water	6	131
Gravel, hardpacked	4	135
Sand and gravel, hard; water-bearing	8	143

Casing, 8-inch.

Well 19/6-4M1

Marion Water District. Altitude about 690 feet. Drilled by Northwest Drilling Co. in 1953.

Materials	Thickness (feet)	Depth (feet)
Topsoil	4	4
Sand and gravel, brown	16	20
Sand, gravel, and clay, brown	9	29
Sand and gravel, brown	7	36
Sand, brown	9	45
Gravel, dry, brown	9	54
Gravel and sand, brown; water-bearing	7	61
Clay, blue, sand and gravel	2	63
Gravel and sand, hardpacked, cemented; water-bearing	52	115
Clay, brown, and gravel	9	124
Sand, brown and gravel, dry (?)	62	186
Clay, blue and sand and gravel	10	196

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/6-4M1--Continued		
Clay, blue, thin layer of sand	54	250
Clay, blue, and gravel	55	305

Casing, 10-inch to 305 ft; perforated 63 to 115 ft.

Well 19/6-8J2

M. J. Sippola. Altitude about 700 feet.

Surface	4	4
Clay, blue	15	19
Gravel	4	23
"Hardpan," blue	at	23

Casing, 48 to 36-inch to 5 ft.

Well 19/6-9L1

Fitzer Sawmill. Altitude about 710 feet. Drilled by Richardson Well Drilling Co. in 1955.

Clay, sand, gravel, boulders	15	15
Clay, sand, gravel, blue	5	20
"Hardpan," seepage	10	30
Clay and gravel, dry, blue	49	79
Sand; water-bearing	28	107
Gravel and clay, hard	38	145
Clay, blue, and gravel, sticky	11	156
Sand and clay some small gravel	15	171
Clay and sand, sticky	20	191

Casing, 12-inch to 190 ft.

Well 19/6-9P2

J. Gregg. Altitude about 700 feet. Drilled in 1920.

Sand and rock	8	8
"Hardpan" (no wood)	22	30
Sand	3	33

Casing, 36-inch to 20 (?) ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 19/6-10G1		

G. E. Eccles. Altitude about 810 feet. Dug by owner.

Loam and sand	5	5
"Hardpan"	7	12
Sand, red	10	22
Sand, green	4	26

Casing, 42-inch.

Well 19/6-10P1

Matt Peltola. Altitude about 865 feet. Dug well.

Topsoil	3	3
"Hardpan"	20	23
Clay	27	50

Casing, 42-inch.

Well 19/6-18E1

J. Wald. Altitude about 425 feet. Drilled by R. R. Charlton 1950-51.

Sand and clay	20	20
Gravel	17	37

Casing, 6-inch to 37 ft.

Well 20/2-3M2

E. A. Randrup. Altitude about 160 feet. Drilled by R. Gilstrap in 1940.

"Hardpan"	35	35
Clay, brown	7	42
Sand	3	45

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-4R1		
J. M. Glass. Altitude about 115 feet. Drilled by Richardson Well Drilling Co.		
Sand and gravel	6	6
Clay, sandy	9	15
Clay, sandy, blue	9	24

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 20/2-9C1		
Day Island Water District, well 1. Altitude about 10 feet. Drilled by W. A. Garland in 1923.		
Clay, hard, sandy	3	3
Sand, cemented	29	32
Clay, blue	10	42
Sand, gravel, and boulders, hard	43	85
Boulder	4	89
"Hardpan"	22	111
Boulders and sand	5	116
Sand, fine, blue, and gravel	6	122
Sand and coarse gravel	7	129
Sand, fine, and gravel	45	174
Sand, gravel, and boulders	4	178
Sand, fine, cemented	15	193
Sand and gravel, cemented	39	232
Clay and sand	8	240
Clay, blue	35	275
Sand, fine, and boulders	6	281
Sand, brown	4	285
Sand and gravel	21	306
Clay, blue and brown, sandy streaks	75	381
Sand, fine and gravel	9	390
Clay, blue, and sand	47	437
Clay, brown	4	441
Wood fragments	2	443
Sand, fine, and silty	7	450
Gravel, coarse; water-bearing	3	453
Gravel and sand, cemented	3	456
Sand, fine, blue and gray	25	481
Gravel, thin layer	?	-

Casing, 8-inch to 480 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-9C2		
Day Island Water District, well 2. Altitude about 20 feet. Drilled by Richardson Well Drilling Co.		
Soil	3	3
Clay, yellow, and gravel	6	9
"Hardpan"	36	45
Sand, clay, and gravel	2	47
Clay, blue and gravel	8	55
Clay, blue	12	67
Sand, fine, and gravel	2	69
"Hardpan"	7	76
Gravel, loose, coarse	4	80
Clay, sand, and gravel	10	90
"Hardpan"	76	166
Sand, fine, and gravel, some clay	3	169
Sand, clay, and some gravel	17	186
"Hardpan"	7	193
Clay, sand, and gravel	1	194
"Hardpan"	87	281
Clay, blue	8	289
Clay and gravel	18	307
Sand, fine, clay, and gravel	7	314
"Hardpan"	20	334
Clay, blue, and fine sand	19	353
Sand, fine	19	372
Clay, brown, blue, and pink	18	390
Sand, fine, clay, and some gravel	6	396
"Hardpan"	19	415
Sand, fine, heaving, with streaks of clay	10	425
Clay, blue, green, and brown	23	448
Sand, clay, and a little fine gravel	4	452
Clay, black, and brown, and a few pieces of wood	15	467
"Hardpan"	13	480
Clay, sand, and some gravel	24	504
Sand, coarse, clay streaks, and a few pebbles	28	532
Clay, gray, and brown	14	546
Clay, brown, and fine sand	9	555
Clay, brown	10	565
"Hardpan," fine and sandy	13	578
Sand, pebbles, and some clay	8	586
Sand, coarse to fine, and pea gravel	7	593
Sand, coarse to fine, with clay	6	599
Sand and gravel, coarse, some clay	7	606

Casing, 10-inch to 284 ft, 8-inch from 0 to 606 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-9H1		
Albertson's Food Center. Altitude about 205 feet. Drilled by Richardson Well Drilling Co. in 1957.		
Fill	2	2
Clay and gravel	6	8
"Hardpan"	16	24
Clay and gravel	4	28
Sand, clay (seepage)	3	31
Sand, clay, and gravel	9	40
"Hardpan"	26	66
Clay and sand	2	68
"Hardpan"	3	71
Sand, fine and coarse, and gravel	1	72
"Hardpan"	2	74
Sand, coarse, and gravel	4	78
"Hardpan"	14	92
Clay and fine sand	15	107
Clay, blue, some gravel	2	109
Clay, sticky, blue	17	126
Clay, sand and gravel	21	147
Clay, blue	9	156
Clay, sand and gravel	6	162
Sand and gravel, fine and coarse	5	167
Clay, sand and gravel	2	169
Sand and gravel, coarse	5	174
Casing, 8-inch to 174 ft.		
Well 20/2-9K1		
University Place Water Co. Altitude about 190 feet. Drilled by Richardson Well Drilling Co., 1961.		
Topsoil	4	4
Clay, sand, gravel, yellow	26	30
Clay, sand, gravel, gray	3	33
Sand and gravel, water-bearing	10	43
Sand, dirty, some gravel	5	48
Clay, sticky, tough, blue	6	54
Sand, dirty; streaks of gravel	6	60
Sand and gravel, water-bearing	4	64
Sand and gravel; streaks of clay	8	72
Clay	9	81
Sand and gravel, streaks, wood at 93 ft	19	100
Clay, blue	69	169
Clay, sand, gravel, blue	10	179

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-9K1--Continued		
Clay, sandy, blue	61	240
Clay, blue	51	291
Clay, silty, blue	28	319
Clay, blue; some gravel	17	336
"Hardpan"	21	357
Sand, some gravel	24	381

Casing, 16-inch to 360 ft, screened 360 to 381 ft.

Well 20/2-10K1

C. W. Holman. Altitude about 313 feet. Dug in 1905.

Topsoil	6	6
"Hardpan"	10	16
Sand and gravel	20	36
"Hardpan"	20	56
Sand	6	62

Casing, 48-inch.

Well 20/2-11J5

City of Fircrest, well 1. Altitude about 280 feet. Drilled by L. V. Denny.

Soil	3	3
"Hardpan"	35	38
Sand and gravel, hard	14	52
Sand, coarse	42	94
Gravel; water-bearing	26	120
"Hardpan"	5	125

Casing, 8-inch.

Well 20/2-11J6

City of Fircrest, well 2. Altitude about 290 feet. Drilled by L. V. Denny in 1941.

Soil	5	5
"Hardpan"	30	35
Sand; water-bearing	2	37

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-11J6 --Continued		
Sand, hard, dry	33	70
Sand and clay	31	101
Gravel and sand	2	103
Gravel, coarse, and sand; water-bearing	11	114
Gravel, fine, and sand	2	116
Sand	3	119
Gravel, coarse, and sand; water-bearing	21	140
Gravel, fine, and sand; water-bearing	8	148
Gravel, coarse	18	166
Gravel, fine, and sand	3	169
"Quicksand"	-	-

Casing, 10-inch to 169 ft; perforated from 123 to 162 ft.

Well 20/2-11J7

City of Fircrest, well 3. Altitude about 285 feet. Drilled by Pete Sylte in 1950.

Materials	Thickness (feet)	Depth (feet)
Soil	4	4
Sand and gravel, cemented	41	45
Sand, hard, dry	8	53
Sand, some water	13	66
Sand, cemented	21	87
"Hardpan"	15	102
Sand and gravel; water-bearing	5	107
Sand, fine	9	116
Sand and gravel, cemented	6	122
Sand, very fine	2	124
Sand, cemented	11	135
"Hardpan"	58	193
Sand, muddy	2	195
"Hardpan"	13	208
Sand, muddy	13	221
"Hardpan"	44	265
Gravel, sand, and clay	10	275
Silt	13	288
"Hardpan"	5	293
Sand, hard, small flow of water	5	298
Gravel, cemented	14	312

Casing, 12- and 6-inch; perforated from 96 to 108 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-11K2		
City of Fircrest. Altitude about 228 feet. Drilled by L. V. Denny.		
Sand, coarse	100	100
Sand, fine	107	207
Clay, blue	3	210
"Hardpan"	80	290
Clay, gray	4	294
Silt	10	304
Gravel, cemented	50	354
Clay, pink	3	357
"Hardpan," sandy	20	377
Sand, "volcanic"	20	397
Casing, 8-inch.		
Well 20/2-11L1		
Fircrest Golf Club. Altitude about 280 feet. Drilled by Tacoma Pump and Drilling Co. in 1951.		
Soil	6	6
Sand and gravel, compact	4	10
"Hardpan"	23	33
Clay, sandy	6	39
Sand and gravel, some water	10	49
"Hardpan"	15	64
Sand and gravel, compact, some water	4	68
"Hardpan," sandy	9	77
Sand and gravel, water-bearing	2	79
Sand and gravel, hardpacked	2	81
Sand, hardpacked	2	83
Sand and gravel, hardpacked	2	85
"Hardpan"	2	87
Sand and gravel, coarse	24	111
Sand and gravel, hardpacked	4	115
Sand and gravel, coarse	5	120
Casing, 10-inch to 120 ft; perforated from 77 to 81, 83 to 85, and 87 to 120 ft.		
Well 20/2-11M1		
Fircrest Golf Club. Altitude about 315 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1952.		
Soil, rocky	3	3
Sand, gravel, and clay, dry	16	19

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-11M1--Continued		
Sand, loose, with gravel and clay	3	22
"Hardpan," sandy	4	26
Sand and gravel, dry	13	39
"Hardpan"	2	41
Sand and gravel, dry	34	75
Sand, coarse, muddy, some water	10	85
"Quicksand"	17	102
Sand and gravel, medium-size, muddy	12	114
"Quicksand"	30	144
Sand and gravel, clean	2	146
"Quicksand," fine	13	159
"Hardpan," sandy	19	178
Clay, blue	4	182
Sand and gravel, hardpacked	6	188
Sand, gravel, loose, muddy	3	191
Sand and gravel, hardpacked	7	198
Gravel, cemented, dry	12	210
Sand and coarse gravel	6	216
Clay, brown	1	217
Sand and gravel, muddy	4	221
Peat and blue clay	8	229
Sand, gravel, clay, hardpacked, small amount of water	7	236
Sand and gravel, clean; water-bearing	4	240
Sand, gravel, and clay	2	242
Sand and gravel, clean; water-bearing	15	257

Casing, 10-inch to 257 ft; perforated from 236 to 252 ft.

Well 20/2-11N1

Fircrest Golf Club. Altitude about 315 feet. Drilled by E. F. Lawson in 1923; deepened by N. C. Jannsen Drilling Co. in 1930.

Loam	2	2
"Hardpan"	48	50
Sand	5	55
"Hardpan"	3	58
Sand, red, dry	49	107
"Quicksand"	62	169
Sand, packed or cemented	9	178
Gravel and coarse sand	6	184
Gravel, coarse	3	187
Sand and gravel	8	195
No record	10	205
Clay and sand	20	225
Sand and gravel	2	227

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-11N1--Continued		
No record	3	230
Sand	2	232
Sand and gravel	13	245
Gravel, fine	6	251
Sand, hard	19	270

Casing, 10-inch and 8-inch.

Well 20/2-11R1

City of Fircrest, well 4. Altitude about 295 feet. Drilled by Pete Sylte in 1950.

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
"Hardpan"	17	19
Sand and gravel, dry	10	29
Sand, dry, some clay	33	62
Sand and gravel	5	67
Sand, coarse, little water	1	68
Clay and sand	5	73
Sand, coarse, little water	1	74
Clay and sand	9	83
Gravel, cemented	5	88
Gravel and sand; water-bearing	6	94
Sand, small flow of water	10	104
Sand and gravel, cemented	2	106
Gravel; water-bearing	1	107
Gravel, cemented	6	113
Clay, sand, and gravel	8	121
Gravel and sand; water-bearing	1	122
Gravel, cemented	6	128
Sand and gravel; water-bearing	2	130
Sand	4	134
Gravel, cemented	7	141
Gravel; water-bearing	8	149
Gravel, cemented	1	150
Sand and clay, dry	2	152

Casing, 12-inch to 152 ft; perforated from 88 to 94 and 141 to 149 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 20/2-11R2

City of Fircrest, well 5. Altitude about 285 feet. Drilled by Pete Sylte in 1958.

Topsoil, sandy	3	3
"Hardpan"	20	23
Sand and gravel, dry-packed	19	42
Dry sand	22	64
Sandy, hard, dry, and clay	3	67
Sand, small flow of water	17	84
Sand and gravel, cemented	6	90
Gravel and sand; water-bearing	3	93
Gravel, cemented	7	100
Gravel and sand; water-bearing	4	104
Sand	1	105
Gravel and sand; water-bearing	5	110
Gravel, cemented	2	112
Gravel and sand; water-bearing	24	136

Casing, 12-inch to 103 ft, 10-inch 95 to 136 ft; perforated from 103 to 136 ft.

Well 20/2-11R3

F. C. Holly. Altitude about 275 feet. Drilled by M. M. Johnson in 1956.

Topsoil	3	3
Gravel and rocks	5	8
"Hardpan" and gravel	34	42
Sand, fine	16	58
Sand; water-bearing	17	75
"Hardpan"	2	77
Gravel; water-bearing	10	87
Sand	1	88

Casing, 6-inch to 87 ft; perforated 76 to 86 ft.

Well 20/2-12H1

Bellarmine High School. Altitude about 405 feet. Drilled by J. J. Bell and Son in 1940.

"Hardpan"	22	22
Sand, silt, and clay	151	173
Sand, coarse, and gravel; water-bearing	10	183
Sand, silty, hard	27	210
Sand, coarse, and gravel, water-bearing	8	218

Casing, 8-inch to 218 ft; perforated from 173 to 183 ft, and 210 to 215 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-13A1		
City of Tacoma, Light Division. Altitude about 246 feet. Drilled by L. R. Gaudio in 1953.		
Gravel and sand, dirty	5	5
Sand, dirty, coarse, some gravel	45	50
Sand and gravel	15	65
Gravel, coarse, less sand than 50-65 ft	24	89
Sand, gravel and clay	3	92
Sand and gravel cemented with blue clay	28	120
Sand and gravel cemented with brown clay	5	125
Sand and gravel cemented with blue clay	7	132
Sand and gravel cemented with green clay	4	136
Sand and gravel, coarse, little blue clay	4	140
Sand, gravel, and clay	18	158
Sand and gravel cemented with brown clay	4	162
Clay, brown sand	5	167
Sand, brown, with little clay	8	175
Clay and sand	3	178
Sand, gravel, and clay	9	187
Sand and gravel	15	202
Sand, gravel, and clay	6	208
Sand and gravel	5	213
Sand, gravel, and clay	9	222
Gravel and sand, some clay	4	226
Sand, gravel and clay	29	255
Clay	5	260
Casing, 24-inch to 187 ft, 18-inch to 185 ft; screened from 185 to 211 ft.		
Well 20/2-13H1		
City of Tacoma, well 4A. Altitude about 245 feet. Drilled by N. C. Jannsen in 1930.		
Sand	48	48
Gravel	3	51
Gravel and sand	20	71
"Hardpan"	1	72
Gravel and sand	4	76
Sand	5	81
Gravel and "hardpan"	3	84
Gravel, clean	2	86
Gravel and "hardpan"	26	112
Gravel, fine, and sand	34	146
Clay, blue	5	151
Sand, hard	16	167
Gravel, cemented	11	178
Gravel, clean	4	182
Gravel, cemented	9	191

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-13H1--Continued		
Sand, cemented	11	202
Gravel, cemented	2	204
Gravel and boulders, cemented	26	230
Clay, hard	4	234
Gravel, cemented	5	239
Clay, sticky	4	243
Gravel and boulders, cemented	17	260
Sand and gravel, loose	5	265
Sand, fine, and hard	29	294

Casing, 38- to 26-inch to 204 ft; perforated from 60 to 76 ft, 83 to 121 ft, 125 to 146 ft, and 153 to 184 ft.

Well 20/2-13J1

City of Tacoma, well 6A. Altitude 267.23 feet. Drilled by C. V. Enloe, 1939.

Materials	Thickness (feet)	Depth (feet)
Sand, fine, brown	30	30
Sand, fine, with some pea gravel	38	68
Sand, gravel, and cobbles; water-bearing	9	77
Gravel and sand, cemented	7	84
Gravel and sand, coarse, water-bearing	6	90
Gravel and sand, cemented	5	95
Gravel and sand, loose, and water-bearing	12	107
Sand, brown, packed	6	113
Sand, gray, packed	25	138
Gravel and sand	15	153
Gravel, black, tightly cemented (no sand)	29	182
Sand with some gravel; hard, cemented, streaked with clay	21	203
Sand, gravel, and boulders, with hard clay	10	213
Sand, hard, black	7	220
Sand, gray, and gravel; cemented	6	226
Clay, bluish gray	129	355

Casing, 38-inch outer casing to 101 ft, 26-inch to 183 ft; perforated from 91 to 125 and 141 to 175 ft; plugged with concrete at 179 ft.

Well 20/2-13J2

City of Tacoma, well 11-A. Altitude about 269 feet. Drilled in 1950.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel, coarse	10	10
Sand, silty, yellow brown, occasional small pebble	48	58
Sand and some fine gravel, water-bearing	25	83

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-13J2--Continued		
Sand and gravel	12	95
Sand and gravel, water-bearing	5	100
Gravel, coarse, clean, water-bearing	14	114
Gravel, "hardpan," some clay	6	120
Sand	3	123
Sand and gravel, hard	3	126
Sand and fine gravel	4	130
Sand, fine	10	140
Gravel, cemented, some clay	10	150
Sand, fine	1	151

Casing, 36-inch outer casing to 92 ft, 26-inch casing to 92½ ft; screen from 92½ to 112½ ft.

Well 20/2-13R1

South Tacoma Ice Co. Altitude about 275 feet. Drilled in 1929.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel	60	60
Sand	8	68
Sand and gravel	22	90
Gravel, coarse	25	115
Sand	15	130
Gravel	10	140

Casing, 6-inch.

Well 20/2-14A1

University Place Water Co. Altitude about 220 feet. Drilled in 1945.

Materials	Thickness (feet)	Depth (feet)
Soil and sand	8	8
"Hardpan"	10	18
Sand and gravel; water-bearing	30	48
Gravel to sand; water-bearing	22	70

Casing, 10-inch to 50 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-14A2		
University Place Water Co. Altitude about 220 feet. Drilled in 1945.		
Soil and sand	6	6
"Hardpan"	10	16
Sand and some gravel	31	47
Gravel and sand; water-bearing	28	75
Casing, 10-inch to 75 ft; perforated 56 to 71 ft.		
Well 20/2-14A3		
University Place Water Co. Altitude about 220 feet. Drilled in 1935.		
Dug, no record	13	13
"Hardpan"	17	30
Casing, 10-inch.		
Well 20/2-14D1		
City of Fircrest. Altitude about 370 feet. Drilled by Pete Sylte, 1962.		
Gravel, cemented ("hardpan")	104	104
Sand and gravel, gray, some clay	24	128
Sand and gravel, brown, some clay	8	136
Sand and gravel	19	155
Sand and coarse gravel; water-bearing	2	157
Sand, some gravel; water-bearing	21	178
Sand and coarse gravel; water-bearing	17	195
Sand and fine gravel; water-bearing	20	215
Sand, fine, brownish-black	49	264
Casing, 10-inch to 8-inch; perforated 179-197 ft.		
Well 20/2-15C1		
University Place Water Co. Altitude about 400 feet. Drilled in 1956.		
Sand and gravel	3	3
Clay, sandy, and gravel	51	54
Gravel and sand, hard	9	63
"Hardpan"	39	102

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-15C1--Continued		
Sand and gravel	4	106
Sand	12	118
"Hardpan"	42	160
Sand, tight, some gravel	39	199
Sand and gravel, dirty	6	205
Sand, some gravel	15	220
Clay	2	222
Sand, some gravel	27	249
Sand and gravel	39	288

Casing, 10-inch.

Well 20/2-15C2

H. L. Larson. Altitude about 400 feet. Drilled by L. R. Gaudio.

"Hardpan"	106	106
Sand and gravel, cemented	15	121
Sand, hardpacked	9	130
Gravel, cemented	4	134
Sand and gravel, cemented	28	162
Sand, dry	6	168
Sand and some gravel, dry	8	176
Sand, dry	17	193
Sand and gravel, dry	13	206
Sand and gravel; water-bearing	2	208
Sand with water	21	229
Sand and gravel, cemented	3	232
Sand and gravel, cemented, blue	16	248
Sand and gravel, blue; water-bearing	4	252

Casing, 6-inch to 252 ft.

Well 20/2-15L1

J. Nelson. Altitude about 410 feet. Drilled by N. C. Jannsen Drilling Co. in 1938.

Clay	2	2
Boulders	15	17
Gravel, cemented	14	31
Gravel	98	129
Sand	5	134
Gravel	25	159
Sand and clay	11	170
Gravel, sand, and clay	13	183

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-15L1--Continued		
Sand and clay	14	197
Sand, yellow	17	214
Sand	33	247
Gravel, fine	1	248
Sand, with coarse gravel	3	251

Casing, 8- to 6-inch to 251 ft.

Well 20/2-15M1

J. W. Forsythe. Altitude about 410 feet. Drilled in 1940.

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	65	65
Sand and gravel, loose	145	210
Sand, fine, blue	60	270
Sand and some gravel	25	295
Gravel, cemented	20	315
Clay, blue	20	335
Gravel, cemented, wood at 385 ft	105	440

Casing, 36-inch to 191 ft, 8-inch to 440 ft.

Well 20/2-16A1

University Place Water Co., well 6. Altitude about 310 feet. Drilled by Charles Weller in 1951.

Materials	Thickness (feet)	Depth (feet)
Sand	27	27
"Hardpan"	14	41
Gravel and sand	4	45
Sand	73	118
Gravel, cemented	3	121
Sand and gravel	1	122
Gravel, cemented	6	128
Sand	7	135
Gravel, cemented	5	140
Sand	15	155
Gravel, cemented	2	157
Sand and gravel	1	158
Gravel and sand, gravel up to 3 inches in diameter	13	171

Casing, 8-inch to 162 ft; screen from 161 to 171 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-16A2		
University Place Water Co., well 7. Altitude about 310 feet. Drilled by Pete Sylte in 1948.		
Topsoil	4	4
Gravel, cemented	14	18
Sand, dry	11	29
Sand and gravel, cemented	21	50
Sand, dry	55	105
Sand, small flow of water	18	123
Sand, gravel, good flow of water	5	128
Sand, fine, heavy	13	141
Sand, dirty, some gravel; water-bearing	22	163
Gravel, coarse, little sand; water-bearing	13	176
Casing, 8-inch to 175 ft; perforated from 162 to 175 ft.		
Well 20/2-16G1		
University Place School District 83. Altitude about 250 feet. Drilled by F. R. Worthen in 1955.		
"Hardpan"	33	33
Sand and gravel, muddy	38	71
"Hardpan," blue	9	80
Sand and gravel, coarse, considerable water	3	83
Gravel and sand, coarse, considerable water	2	85
Sand, coarse	14	99
Gravel, coarse, some water	12	111
"Hardpan," blue, and gravel	5	116
Gravel, coarse; water-bearing	10	126
Sand and gravel, some water	7	133
Clay, blue	17	150
Casing, 16-inch 0 to 15 ft, 10-inch 0 to 138 ft; perforated 80 to 85 ft, 99 to 111 ft, 116 to 133 ft.		
Well 20/2-16L1		
C. C. Curran. Altitude about 230 feet. Drilled by H. R. Battell in 1954.		
Topsoil	12	12
Sand	7	19
Sand and clay	10	29
Silt and sand	30	59
Sand and gravel	3	62
Casing, 8-inch to 62 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-16M1		
Sunset Beach Improvement Club. Altitude about 120 feet. Drilled by Richardson Well Drilling Co. in 1952.		
Clay, yellow, and gravel	5	5
Clay, blue	63	68
"Hardpan"	7	75
Clay, blue, and gravel	9	84
Sand; water-bearing	6	90
Clay, brown, sand, silt, and bits of wood	15	105
Sand and gravel, coarse; water-bearing	2	107
"Hardpan"	8	115
Sand and gravel, loose; water-bearing	3	118
Casing, 8-inch.		
Well 20/2-20P1		
Pioneer Sand and Gravel Co. Altitude about 25 feet. Drilled by N. C. Jannsen Drilling Co. in 1940.		
Sand and gravel	110	110
Shale (clay)	80	190
Gravel; water-bearing	2	192
Clay, blue, and gravel	223	415
Gravel; water-bearing	10	425
Clay, blue, and boulders	41	466
Gravel; water-bearing	69	535
Gravel, with some coarse sand; water-bearing	265	800
Shale	40	840
Gravel, fine, dark, angular; water-bearing	180	1,020
Casing, 22-inch 0 to 110 ft, 16-inch 0 to 535 ft, and 12-inch 520 to 1,020 ft; perforated from 260 to 330, 535 to 800, and 840 to 1,020 ft.		
Well 20/2-21P3		
New Tacoma Cemetery. Altitude about 240 feet. Drilled by L. R. Gaudio.		
Gravel and sand	35	35
"Hardpan"	7	42
Sand and gravel	52	94
Clay, yellow	18	112
Clay, silty, blue	23	135
Sand and gravel-layers of clay	18	153

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-21P3--Continued		
Sand	4	157
Clay, blue	3	160
"Hardpan," blue	10	170
Sand and gravel	8	178
Sand, gravel and pumice	5	183
Gravel and sand, coarse, loose	4	187
Clay, blue	21	208
Gravel and sand, loose	1	209
"Hardpan"	9	218

Casing, 12-inch to 202 ft, screened.

Well 20/2-22C1

Truman Drum. Altitude about 395 feet. Drilled by Pete Sylte in 1947.

Materials	Thickness (feet)	Depth (feet)
Dug hole	53	53
Sand, dry, packed	72	125
Sand and gravel, cemented	72	197
Sand and gravel, cemented	23	220
Sand, and a little small gravel	10	230
Clay, sandy	30	260

Casing, 6-inch to 260 ft; perforated and screen 220 to 230 ft.

Well 20/2-22N1

Charles Wright Academy. Altitude about 230 feet. Drilled in 1957.

Materials	Thickness (feet)	Depth (feet)
Topsoil and gravel	3	3
"Hardpan"	10	13
Clay and gravel	23	36
Sand, clay, fine gravel	39	75
Sand, fine, silty; water-bearing	14	89
Sand and gravel, fine	3	92
Clay, sand, and gravel	4	96
Clay, sand, and gravel, blue	31	127
Clay, sandy, blue	18	145
Clay, sand, and gravel	8	153
"Hardpan"	9	162
Clay, sand, and gravel	5	167
"Hardpan"	2	169
Sand, coarse to fine, and gravel	3	172

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-23K1		
Hartts Bros. Altitude about 195 feet. Drilled by Service Hardware and Implement Co. in 1954.		
Clay and rocks	14	14
Gravel, hard; water-bearing	11	25
Gravel, soft; water-bearing	4	29
Gravel, hard; water-bearing	4	33
Gravel, soft	4	37
Gravel, hard	13	50
Gravel, loose, and sand; water-bearing	4	54
Casing, 8-inch.		
Well 20/2-24A2		
Northern Pacific Ry. Altitude about 252 feet. Drilled by N. C. Jannsen Drilling Co. in 1928.		
Dug, no record	40	40
Sand, fine to coarse, a few cobbles	10	50
Sand and gravel, with cobbles	50	100
Sand and gravel, cemented, some blue clay	13	113
Gravel; water-bearing	1	114
Sand, gravel, and clay "hardpan"	16	130
"Quicksand"	1	131
"Hardpan"	4	135
Gravel; water-bearing	2	137
"Hardpan"	2	139
Sand, red, compact	6	145
Sand and gravel, packed	7	152
Gravel; water-bearing	15	167
Sand and some fine gravel	20	187
Clay, blue	1	188
Gravel and sand; water-bearing	5	193
"Hardpan"	3	196
Casing, 18-inch to 152 ft, 15-inch 144 to 196 ft.		
Well 20/2-24F1		
Andrew Sims. Altitude about 295 feet. Dug about 1910.		
"Hardpan"	10	10
Gravel, cemented	10	20
Sand	47	67
Casing, 48-inch.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-25K1		
Melvin Chase. Altitude is 231.02 feet. Drilled in 1959.		
Topsoil	8	8
Gravel, some clay; water-bearing	14	22
Gravel, clean	9	31

Casing, 10-inch to 31 ft; perforated 22 to 30 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/2-25P1		
Leo Chase. Altitude about 246.05 feet. Drilled by L. R. Gaudio in 1948.		
Soil and gravel	16	16
Clay, sand, and gravel	4	20
Gravel; water-bearing	33	53
Sand and gravel; water-bearing	9	62

Casing, 10-inch to 62 ft; perforated from 40 to 60 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/2-25P3		
Flett Dairy. Altitude about 248 feet. Drilled by L. R. Gaudio in 1959.		
No record	4	4
Gravel, cemented	6	10
Gravel, cemented, and boulders	14	24
Gravel, coarse, rocks	5	29
Sand; water-bearing	5	34
Sand	3	37
Gravel	2	39
Sand, gravel	3	42
Sand, tight, gravel	11	53
Gravel, sediment	17	70
Gravel	1	71
"Hardpan"	3	74
Gravel, sediment	19	93
Sand and clay	2	95
Clay with gravel	21	116
Clay and sand	4	120
Sand	1	121

Casing, 12-inch to 105 ft; perforated 67 to 92 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-26J3		
Richard Hay. Altitude is 245.42 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Topsoil	13	13
"Hardpan"	17	30
Sand and clay	17	47
Clay, brown, and sand	3	50
Clay, gray	3	53
Sand and water	7	60
Gravel; water-bearing	3	63
Sand	-	-
Casing, 6-inch to 64 ft.		
Well 20/2-26J4		
--Croft. Altitude about 245 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Topsoil	8	8
Gravel, "hardpan"	8	16
Sand, gravel, clay, loose	10	26
Sand, gravel, clay, loose; water-bearing	9	35
Sand and gravel, clean	-	-
Casing, 6-inch.		
Well 20/2-26L2		
Hjalmar Hanson. Altitude about 220 feet. Drilled by Richardson Well Drilling Co. in 1959.		
Topsoil	2	2
Clay and gravel	20	22
"Hardpan"	20	42
Sand, fine and coarse	6	48
Sand, coarse	5	53
Casing 6-inch.		
Well 20/2-26M1		
Lakewood Water District. Altitude about 215 feet. Drilled by L. R. Gaudio.		
Gravel; water-bearing	40	40
"Hardpan"	30	70

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-26M1--Continued		
Sand and gravel, muddy	11	81
Gravel, coarse	4	85
"Hardpan," cemented gravel	14	99
Sand and gravel	4	103
Gravel, cemented	23	126
Clay, blue	60	186
"Hardpan," layers of muddy sand and gravel	14	200
Gravel, cemented	10	210
"Hardpan" and cemented gravel	25	235
Gravel, cemented	7	242
Sand and gravel	9	251
"Hardpan"	3	254
Sand, muddy, wood, and layers of clay	11	265
Sand, gravel, and some clay	14	279
Gravel, coarse	5	284
Clay, sandy, green	9	293
Clay, sandy, gray	32	325
Clay, sandy, brown	11	336
Sand, fine, hardpacked, muddy	12	348
Clay, sticky, blue	12	360
Clay layers and hardpacked sand	15	375
Sand, hardpacked	15	390
Sand, muddy	13	403
Clay, sandy	5	408
Sand, muddy, black	17	425
Clay	5	430
Gravel and sand with some clay	10	440
Gravel, coarse	4	444
"Hardpan"	2	446
Gravel, coarse; water-bearing	15	461
Clay	9	470
"Hardpan"	78	548
"Hardpan," sandy, gravel at bottom	11	559
"Hardpan" with sand and gravel beds	25	584
Sand, muddy, and chunks of clay	14	598
Gravel, coarse, and sand (cemented)	8	606
Clay, sandy, brown	14	620
Clay, green, blue	5	625

Casing, 10-inch to 523 ft; perforated 440 to 460 ft and 490 to 515 ft.

Well 20/2-26N1

E. V. Grubert. Altitude is 239.13 feet. Drilled by L. R. Gaudio.

Materials	Thickness (feet)	Depth (feet)
Topsoil	5	5
"Hardpan," yellow	35	40

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-26N1--Continued		
Sand and gravel, dirty; water-bearing	5	45
Sand and gravel, layer of clay	15	60
Gravel, cemented	5	65
Gravel, loose	3	68
Sand and gravel, tight	3	71
Sand and gravel, loose; water-bearing	8	79

Casing, 8-inch.

Well 20/2-26P7

Max Hopp. Altitude about 250 feet. Drilled by Herb Battell in 1956.

Gravel	10	10
Gravel, hard	11	21
Clay, sandy	26	47
Sand, gray	10	57
"Hardpan"	4	61
Clay, blue	1	62
Gravel, coarse	4	66

Casing, 6-inch to 66 ft.

Well 20/2-26Q4

Joe Bricker. Altitude is 230.55 feet. Drilled by Tacoma Pump Co. in 1959.

Topsoil	4	4
Sand and gravel	12	16
Clay and sand	9	25
Clay and sand; water-bearing	11	36
Sand; water-bearing	18	54
Sand, fine, and clay; water-bearing	36	90
Clay, blue	1	91
Sand, gravel; water-bearing	3	94

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-26Q5		
C. Kiphart. Altitude about 230 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1959.		
Topsoil	8	8
Clay and sand	14	22
"Hardpan"	4	26
Sand; water-bearing	24	50
Gravel; water-bearing	3	53
Casing, 6-inch.		
Well 20/2-26Q6		
Fitzpatrick and McIntyre. Altitude about 240 feet.		
Clay and gravel	23	23
Clay, sandy	10	33
Sand, fine, coarse; water-bearing	7	40
Casing, 6-inch.		
Well 20/2-26Q7		
S. L. Rowland. Altitude about 235 feet. Drilled by Richardson Well Drilling Co. in 1956.		
Topsoil	3	3
Sand and gravel	6	9
Clay, blue, sand and gravel	29	38
"Hardpan"	32	70
Sand, heaving	4	74
"Hardpan"	13	87
Sand, heaving	1	88
"Hardpan," sand streaks	6	94
No log	19	113
Sand, fine, coarse	3	116
Casing, 6-inch.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-26R1		
William Steinhoff. Altitude about 230 feet. Drilled by Service Hardware and Implement Co. in 1950.		
Topsoil	5	5
Gravel, hardpacked	86	91
Casing, 6-inch to 91 ft.		
Well 20/2-26R2		
Paul Stump. Altitude is 242.57 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1951.		
Open hole	19	19
Sand	22	41
Clay	1	42
Gravel	2	44
Casing 6-inch.		
Well 20/2-26R3		
Dick Inderbitzin. Altitude about 243 feet. Drilled by Tacoma Pump and Well Drilling Co.		
Topsoil	10	10
"Hardpan"	11	21
Sand, clay, and water	24	45
Gravel and water	10	55
Casing, 6-inch.		
Well 20/2-27K1		
J. T. Garoutte. Altitude about 215 feet. Drilled by Service Hardware and Implement Co. in 1954.		
No record	16	16
Gravel, cemented	14	30
Sand and clay	36	66
Gravel and clay	26	92
Clay and sand	18	110
Clay	5	115
Sand and clay	37	152

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-27K1--Continued		
Clay; little water	21	173
Clay	18	191
Sand and clay	9	200
Gravel, cemented; water-bearing	12	212
Clay, sand, and gravel	13	225

Casing, 6-inch to 225 ft.

Well 20/2-29Q1

West Tacoma Newsprint Co., well 1. Altitude about 19 feet. Drilled by N. C. Jannsen Drilling Co. in 1937.

Gravel, coarse, silt, and wood	45	45
Clay, streaks of sand	48	93
Clay	101	194
Gravel, coarse	16	210
Clay	34	244
Gravel	20	264
Clay	242	506
Sand	6	512
Clay	28	540
Gravel, cemented	8	548

Casing, 34-inch 0 to 90 ft, 26-inch 0 to 287 ft, 24-inch 283 to 326 ft, and 10-inch 320 to 542 ft. When rehabilitated in 1952, number changes to 29Q3; 12-inch casing extends from 0 to 75 ft, 8-inch from 75 to 275 ft; perforated from 189 to 219 and 240 to 270 ft. Depth of well 275 ft.

Well 20/2-29Q2

West Tacoma Newsprint Co., well 2. Altitude about 14 feet. Drilled by N. C. Jannsen Drilling Co. in 1937.

Boulders gravel, and sand	50	50
Gravel	25	75
Clay	15	90
Clay, sandy	74	164
Gravel	9	173
Clay	10	183
Gravel	53	236
Clay	31	267
Sand and fine gravel	20	287
Clay	45	332

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-29Q2--Continued		
Sand	10	342
Clay	70	412
"Hardpan"	25	437
Gravel and boulders	22	459
Sand and clay	36	495
Gravel; water-bearing	10	505
Sand and boulders	19	524
Gravel and sand	19	543
Clay	5	548
Sand	133	681
Clay	21	702
Gravel	14	716
Clay	8	724
Gravel and sand	51	775
Clay and sand	65	840
Sand	8	848
Gravel and sand	6	854

Casing, 36-inch 0 to 100 ft, 34-inch 0 to 18 ft, 18-inch 0 to 500 ft, 12-inch 500 to 800 ft; perforated from 500 to 775 ft.

Well 20/2-32B1

West Tacoma Newsprint Co., well 3. Altitude about 22 feet. Drilled by N. C. Jannsen Drilling Co. in 1948.

"Muck"	16	16
Gravel	79	95
Clay	50	145
Shale and gravel	36	181
Clay, blue, some gravel	63	244
Clay, sandy	129	373
Silt	45	418
Shale, sandy	22	440
Silt	12	452
Gravel and clay	12	464
Silt	18	482
Shale, sandy	68	550
Boulder	10	560
Gravel; water-bearing	8	568
Shale	7	575
Gravel; water-bearing	19	594
Shale	24	618
Shale, gravelly	15	633
Shale	10	643
Gravel; water-bearing	21	664
Boulders	18	682

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-32B1--Continued		
Gravel and boulders	20	702
Sand, packed, and gravel	10	712
Gravel and boulders	34	746
Gravel	14	760
Gravel, coarse, and shale	47	807
Shale	33	840
Sand and gravel; water-bearing	40	880
Shale	15	895
Gravel	20	915
Shale, gravelly	30	945
Shale, soft	12	957
Shale, gravelly	64	1,021
Gravel; water-bearing	7	1,028
Shale	5	1,033
Gravel; water-bearing	79	1,112
Shale	60	1,172

Casing, 18-inch 0 to 520 ft, 12-inch 476 go 1,172 ft; perforated from 554 to 849 and 988 to 1,093 ft.

Well 20/2-32B2

West Tacoma Newsprint Co., well 4. Altitude about 35 feet. Drilled by L. R. Gaudio in 1959.

Materials	Thickness (feet)	Depth (feet)
Clay, silty	10	10
Gravel and boulders	5	15
Gravel, coarse	44	59
Clay, sandy, blue	21	80
Clay, blue	67	147
Sand, hardpacked, clay	13	160
Sand, hardpacked, blue clay	10	170
Clay, hardpacked, sandy	25	195
Sand, fine, hardpacked	65	260
Clay, blue	250	510
Gravel, hardpacked, cemented	5	515
Clay and large rocks	15	530
Clay, blue	15	545
Sand, fine silty	9	554
Clay, sandy, blue	27	581
Sand, silty, fine	63	644
Clay, sandy	10	654
Sand, hardpacked, fine	4	658
Sand, coarse and layers of clay	9	667
Sand, fine-packed	22	689
Clay, hard, sandy	21	710

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-32B2--Continued		
"Hardpan," sandy	8	718
Sand	15	733
Clay, sandy	4	737
Sand and gravel, layers of "hardpan;" water-bearing	12	749
Sand and gravel	9	758
Gravel, with some sand	17	775
Sand and gravel (finer with depth)	21	796

Casing, 20-, 16-, and 8-inch diameter to 744 ft; perforated from 744 to 794 ft.

Well 20/2-32Q2

G. Taylor. Altitude about 305 feet. Drilled by Tacoma Pump and Drilling Co. in 1953.

Soil	3	3
Sand and gravel, hardpacked, dry	17	20
Sand and gravel, some clay	27	47
"Hardpan"	7	54
Sand and gravel, some clay	26	80
Clay, sandy	18	98
Sand and gravel, clean, water-bearing	17	115

Casing, 6-inch to 115 ft.

Well 20/2-34B1

Ray Noble. Altitude about 250 feet. Drilled by Service Hardware and Implement Co. in 1950.

Gravel, hardpacked, dry	55	55
Clay	10	65
Gravel, water-bearing	7	72

Casing, 6-inch to 72 ft.

Well 20/2-34E1

Lakewood Water District, test well 5. Altitude about 240 feet. Drilled by L. R. Gaudio in 1950.

Soil	2	2
Sand and small rock	18	20

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-34E1--Continued		
Sand, some dirt, loose rock, pea gravel	6	26
Gravel, loose, fine, and sand	20	46
Sand	4	50
Sand, loose, and gravel	4	54
Gravel, cemented with brown clay	32	86
Gravel, loose, sand, and clay	5	91
Sand	4	95
Gravel, loose, sand, and clay	14	109
Sand, medium to fine	5	114
Sand, coarse, and fine gravel	4	118
Sand, coarse, fine gravel, brown clay	11	129
Gravel, sand, and brown clay	21	150
Sand and gravel, and purple clay	10	160
Sand, and very little small gravel	5	165
Sand, heaving	7	172
Gravel, cemented	16	188
Gravel, loose	2	190
Sand and gravel, loose	12	202
Sand and a few rocks	5	207
Sand, loose, and rocks	4	211
Gravel and some loose sand	21	232
Gravel, loose, and some sand	19	251
Gravel, fine to coarse	11	262
Gravel, coarse	20	282
Sand, heaving	5	287

Casing, 10-inch; perforated from 190 to 200, and 212 to 250 ft.

Well 20/2-34E2

Lakewood Water District, well 1. Altitude about 240 feet. Drilled by Washington Pump and Drilling Co. in 1950.

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Sand and gravel, small	4	6
Sand and gravel, coarse	14	20
Sand and gravel, fine	6	26
Sand and gravel, loose	20	46
Sand	4	50
Sand, loose and gravel	4	54
Gravel, cemented with brown clay	32	86
Gravel, loose	5	91
Sand	4	95
Gravel, loose, sand and clay	14	109
Sand	5	114
Sand, coarse, and fine gravel	4	118
Sand, coarse and fine gravel, clay	11	129

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-34E2--Continued		
Gravel, coarse, sand and clay	21	150
Clay, purple, some sand and gravel	10	160
Sand, some gravel	5	165
Sand, loose	7	172
Gravel, loosely cemented	16	188
No record	2	190
Sand and gravel, loose	12	202
Sand and some coarse gravel	5	207
Sand and gravel	4	211
Gravel, boulders, and sand	21	232
Gravel, loose, few boulders, some sand	18	250
Gravel, fine to medium	15	265
Gravel, coarse to cobble size	2	267

Casing, 36-inch 0 to 58 ft, 24-inch 0 to 223 ft, 18-inch 0 to 173½ ft, and 12-inch; perforated from 210 to 267 ft.

Well 20/2-35D1

H. R. Hall. Altitude is 255.21 feet. Drilled by Richardson Well Drilling Co. in 1952.

Old well	52	52
Sand and gravel	2	54
Clay, yellow, and gravel	9	63
Clay, yellow	4	67
Sand and gravel	10	77
"Hardpan"	3	80

Casing, 6-inch to 78 ft.

Well 20/2-35G1

A. W. Freckleton. Altitude is 260.02 feet. Drilled by Herb Battell in 1957.

Sand and gravel	5	5
Sand	9	14
Sand and gravel	11	25
Clay, hard, and gravel	6	31
Clay, hard, and sand	11	42
Sand, fine; water-bearing	5	47
Gravel, cemented	1	48
Sand and brown clay; water-bearing	19	67
Gravel and sand	7	74

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-35G2		
A. W. Freckleton. Altitude is 226.49 feet. Drilled by U. S. Geological in 1959.		
Topsoil with gravel	1	1
Clay, gray, and cobbles, pebbles	1	2
Clay, dirty, sand, cobbles to 6-inch	1	3
Sand, gray	5	8
Casing, 1½-inch pipe driven to 8 ft.		
Well 20/2-35P1		
Pasadena Co., Inc. (Lakewood Community Center). Altitude is 258 feet. Drilled by N. C. Jannsen Drilling Co. in 1937.		
Gravel, with boulders	49	49
Sand	21	70
Clay, blue, a little gravel mixed with clay below 150 ft	164	234
Gravel and sand	16	250
Clay	6	256
Sand and gravel	82	338
Gravel; water-bearing	3	341
Clay, sandy	43	384
Clay	10	394
Sand, brown	91	485
Gravel, cemented	20	505
Clay, sandy, with gravel	80	585
Sand, yellow; water-bearing	52	637
Sand, black; water-bearing	131	768
Casing, 10-inch 0-180 ft, 8-inch 151 to 480 ft, 6-inch 457 to 576 ft, and 4-inch 536 to 768 ft; perforated from 576 to 637, and 664 to 747 ft.		
Well 20/2-36B2		
Mountain View Memorial Park. Altitude about 230 feet. Drilled by L. R. Gaudio.		
"Hardpan" and boulders	18	18
Gravel, static water level, 7 ft	4	22
Sand and gravel, tight	7	29
Sand and gravel, loose	4	33
Gravel	49	82
"Hardpan," yellow, static water level 135 ft	4	86
Sand, gray, with gravel beds	21	107

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-36B2--Continued		
Clay, sand, gravel	2	109
Peat, brown, wood fragments	3	112
Sand, gray, with pebbles	8	120
Clay, green to white	8	128
"Hardpan," blue	2	130
Sand, greenish, with gravel	8	138
"Hardpan," yellow	3	141
Sand, some pebbles, small amount of clay	7	148
Clay, brownish black with some gravel	2	150
Gravel, yellow	8	158
Clay, yellow, with cobbles and sand	7	165
Sand with pebbles, loose	2	167
Gravel and sand, cemented, yellow	6	173
Gravel and sand, gray	10	183

Casing, 12-inch to 183 ft; perforated 134 to 138 ft, 154 to 158 ft, 165 to 167 ft, 170 to 181 ft.

Well 20/2-36F2

Mountain View Memorial Park. Altitude about 230 feet. Drilled by L. R. Gaudio in 1954.

Peat	6	6
Sand and gravel	2	8
Sand	8	16
Sand and gravel, up to $1\frac{1}{2}$-inch	10	26
Gravel, up to 8-inch	6	32
Sand	8	40
Clay, sandy, blue	46	86
Gravel, coarse; dirty blue sand	22	108
Sand, dirty	21	129
Boulders, up to 9-inch, brownish sand and gravel	24	153
Gravel and clay	2	155

Casing, 12-inch to 155 ft; perforated 135 to 155 ft.

Well 20/2-36F3

Mountain View Memorial Park. Altitude is 231.68 feet. Drilled by L. R. Gaudio in 1956.

Peat	8	8
Sand and gravel, dirty	36	44
Clay, blue	41	85

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/2-36F3--Continued		
Gravel and sand, dirty	23	108
Clay, silty	6	114
Sand, silty, brown	8	122
Clay, sandy, and gravel	4	126
Gravel, coarse, and sand, cemented in streaks	29	155

Casing, 12-inch to 155 ft.

Well 20/2-36G1

Mountain View Memorial Park. Altitude about 230 feet. Drilled by L. R. Gaudio in 1954.

Materials	Thickness (feet)	Depth (feet)
Peat	5	5
Sand and gravel, brown	13	18
Gravel, coarse, and sand	7	25
Boulders and sand, tight	6	31
Sand and gravel, tight, blue (pieces of wood)	11	42
Clay, sandy	-	-

Casing, 12-inch to 42 ft; perforated 18 to 38 ft.

Well 20/2-36L1

Mountain View Memorial Park. Altitude is 269.55. Drilled by Richardson and Weber in 1941.

Materials	Thickness (feet)	Depth (feet)
Gravel	-	-
Sand	-	-
Clay	-	80
"Hardpan"	17	97
(?)	26	123
Sand, coarse	13	136
Clay	3	139
"Quicksand"	33	172
Clay	26	198
Gravel	4	202

Casing, 8-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-1L1		
Kazue Yotsuuye (Brookville Gardens). Altitude about 15 feet. Drilled by L. R. Gaudio in 1952.		
Sand	30	30
Clay	11	41
Sand and clay, hard	9	50
Clay, sandy, and streaks of clay	90	140
Sand, hard	25	165
Clay	4	169
Sand and streaks of clay	16	185

Casing, 10-inch to 157 ft, 6-inch to 185 ft; perforated 154 to 185 ft.

Well 20/3-1R1

Century Amusement Co., Inc. Altitude about 20 feet. Drilled by F. H. Jensen.

Materials	Thickness (feet)	Depth (feet)
Gravel (fill)	3	3
Muck and sand	3	6
Gravel, fine, and sand	9	15
Gravel, slightly coarser	3	18
Sand, soft	3	21
Sand and silt	15	36
Clay, gray, muck, silt and sand	6	42
Sand and clay, fine hardpacked	2	44
Clay, dark gray, brownish muck, silt and sand	27	71
Sand, fine, black, porous	6	77
Sand and clay	2	79
Sand, silt, and shells	6	85
Sand	7	92
Sand, mucky, and shells	10	102
Clay, soft, dark bluish, with silty sand	4	106
Clay, muck, and some sand	9	115
Silt	6	121
Silt and soft clay	4	125
Sand, fine and silty, gray, and numerous shells	51	176
Sand, lumps of "fatty" clay, fine, gray	7	183
Clay	3	186
Sand and clay, "hole stands"	10	196
Clay, gray and yellow, with wood particles	17	213
Clay, yellow, and fine sand	5	218
Sand, coarser, and occasional small pebbles	34	252

Casing, 2-inch to 238 ft; screen from 238 to 250 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-2Q1		
George Kowascki. Altitude about 15 feet. Drilled by J. J. Bell and Son, 1950.		
Soil and clay	5	5
Silt, brown, heavy with clay	11	16
Sand, fine, gray; water-bearing	3	19
Clay, gumbo, and wood	36	55
Sand, dirty; water-bearing	17	72
Sand, clean; water-bearing	10	82
Sand, dirty	-	-

Casing, 8-inch, set to 72 ft; 0.020 slot screen from 72 to 82 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/3-3L1		
City of Tacoma, Sewer Division. Altitude about 10 feet. Drilled by L. R. Gaudio in 1960.		
Silt and sand	42	42
Sand, black, and small gravel	8	50
Sand, silty	70	120
Gravel, coarse, tight	10	130
Gravel, coarse, brown	20	150
Sand, blue	3	153
"Hardpan," sandy	22	175
"Hardpan"	2	177
Sand and gravel, cemented	21	198
Sand, coarse	11	209
Sand and coarse gravel, cemented	27	236
Sand and clay	4	240
"Hardpan"	6	246
Gravel, coarse, cemented	21	267
Sand and gravel, tight	3	270
Gravel, large, coarse	9	279
"Hardpan"	26	305
Sand and gravel, tight	25	330
"Hardpan"	3	333
Clay, sticky	11	344
Sand and little gravel	36	380
Clay, sandy, blue	10	390
Clay, blue	6	396
"Hardpan"	36	432
Clay, sticky	11	443
"Hardpan"	14	457
Clay, hardpacked, sandy	18	475
"Hardpan," blue	12	487
"Hardpan"	3	490

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-3L1--Continued		
Gravel, coarse, tight	20	510
Gravel and coarse sand, very tight	3	513
Gravel, coarse, and sand	10	523
Gravel, coarse, and sand, tight	2	525
"Hardpan," layers; cemented gravel	9	534

Casing, 12-inch to 534 ft; perforated 515 to 527 ft.

Well 20/3-4D1

Tacoma Savings and Loan Association, well 1. Altitude about 120 feet. Drilled by N. C. Jannsen Drilling Co.

Clay, blue	6	6
Sand and gravel	12	18
Clay, yellowish; sand	14	32
Sand, fine, yellowish	8	40
Sand, blue and gray	22	62
Sand, hardpacked, yellowish; some coarse sand	33	95
Gravel, hardpacked, coarse sand	13	108
Sand and gravel	7	115
Sand, finer	11	126
Sand, coarse; little gravel	10	136
Sand, some gravel	12	148
Sand and gravel; some coarse and large	26	174
Sand and gravel	21	195
Sand, fine; some gravel	7	202

Casing to 202 ft; perforated 165 to 185 ft.

Well 20/3-4D2

Tacoma Savings and Loan Association, well 2. Altitude about 120 feet. Drilled by N. C. Jannsen Drilling Co.

Gravel	25	25
Clay, yellowish	20	45
Clay, gray	20	65
Sand, hardpacked	25	90
Gravel and hardpacked sand	18	108
Sand and water, gravel	17	125
Gravel, large; some sand	20	145
Sand	2	147

Casing to 147 ft; screen from 127 to 147 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Well 20/3-4G1

Northwest Door Co. Altitude about 25 feet. Drilled in 1941.

Materials	Thickness (feet)	Depth (feet)
Sand, black, salt water	161	161
Silt, brown	17	178
Sand, coarse, and gravel, salt water	8	186
Peat, brown	3	189
Sand and gravel, coarse, fresh water	7	196
Sand, yellow, and clay	79	275
"Hardpan," brown	35	310
"Hardpan," gray	65	375
Clay, blue, and silty sand	48	423
Sand, cemented, and gravel	6	429
"Hardpan," blue, and large rocks	149	578
Gravel, cemented, hard	5	583
Sand, coarse, and gravel; water-bearing	29	612
Clay, brown, laminated, and sand	12	624
Sand, brown, and very fine silty	10	634
Clay, brown, and rocks	6	640

Casing, 12 to 8-inch to 620 ft.

Well 20/3-4H2

St. Paul and Tacoma Lumber Co. Altitude about 12 feet. Drilled by N. C. Jannsen in 1940.

Materials	Thickness (feet)	Depth (feet)
Sand, wood, and mud	84	84
Gravel, sand, and mud	185	269
Gravel, cemented	20	289
Clay and boulders	13	302
Gravel	12	314
Clay	6	320
Gravel	7	327
"Hardpan"	113	440
Clay and boulders	20	460
Gravel and boulders	127	587
Rock	5	592
Shale	90	682
Gravel	132	814
Shale	7	821
Sand	65	886
Gravel	37	923
Clay, blue	44	967
Clay and boulders	47	1,014
Gravel	17	1,031
Shale	72	1,103
Gravel and sand	21	1,124

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-4H2--Continued		
Shale	92	1,216
Sand	4	1,220
Clay	28	1,248
Gravel and sand	52	1,300
Shale	51	1,351
Clay, sand	104	1,455
Gravel and boulders	39	1,494
Clay and boulders	7	1,501

Casing, 16-inch to 600 ft, 12-inch from 587 to 1,501 ft; perforated from 655 to 665 ft, 775 to 839 ft, 847 to 919 ft, 937 to 982 ft, 999 to 1,031 ft, 1,263 to 1,295 ft, and from 1,455 to 1,486 ft.

Well 20/3-4J2

Carstens Packing Co. Altitude about 12 feet. Drilled by N. C. Jannsen Drilling Co. in 1936.

Materials	Thickness (feet)	Depth (feet)
Sand, silt, logs	70	70
Sand	60	130
Sand, black	125	255
Gravel, coarse	7	262
Boulders, in part cemented with clay	84	346
Clay and boulders	75	421
Boulders	17	438
Sand, gray; water-bearing	8	446
Boulders	24	470
Gravel and cobbles; water-bearing	25	495
Boulders; water-bearing	29	524
Boulders and gravel	8	532
Gravel, cemented	6	538
Boulders	15	553
Boulders and clay	22	575
Boulders	21	596
Clay	29	625
Gravel; water-bearing	15	640
Clay	65	705

Casing, 10-inch from 0 to 276 ft, 8-inch from 267 to 640 ft; perforated from 356 to 640 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-4J3		
Carstens Packing Co. Altitude about 10 feet. Drilled by L. R. Gaudio in 1958.		
Sand, muddy	30	30
Sand, fine, black and coarse gravel	45	75
Sand, fine, black, muddy	90	165
Sand, fine and small gravel	74	239
Clay, brown	23	262
Gravel, cemented	16	278
Clay	5	283
Gravel, cemented	27	310
Clay, sandy	7	317
Gravel, cemented, some water	27	344
Sand; water-bearing	25	369
Clay	10	379
Sand and gravel; water-bearing	9	388
"Hardpan"	9	397
Sand and gravel; water-bearing	38	435
"Hardpan"	12	447
Sand and gravel; water-bearing	10	457
"Hardpan"	9	466
Clay	4	470
Gravel and sand, cemented	30	500
Gravel and sand, clean; water-bearing	30	530
Gravel and sand, tight	14	544
Sand, coarse	3	547

Casing, 12- to 10-inch to 547 ft; perforated 500 to 530 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/3-4P2		
Harmon Manufacturing Co. Altitude about 10 feet. Drilled by J. J. Bell and Son in 1940.		
Cinders (fill)	8	8
Clay, blue, sandy, with shells	20	28
Gravel, cemented, brown; water-bearing	39	67
"Hardpan" and clay	4	71
"Hardpan," yellow	69	140
Sand and gravel, coarse, yellow; water-bearing	5	145
"Hardpan," yellow	33	178
Shale, hard, yellow	17	195
Sand and gravel, hard, yellow	29	224
Sand and gravel, yellow; water-bearing	14	238
Sand, brown, well flowing 135 gpm	12	250

Casing, 12- to 10-inch to 250 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-4Q1		
Wheeler-Osgood Sales Corp. Altitude about 8 feet. Drilled by E. F. Lawson.		
Silt and sand	25	25
Sand, streaks of "hardpan"	175	200
"Hardpan"	60	260
Clay, blue, sandy	3	263
Gravel, coarse; water-bearing	2	265
"Hardpan," yellow	7	272
Clay, sticky, yellow	3	275
Clay, blue	3	278
"Hardpan"	28	306
Clay, brown and blue	14	320
Gravel, coarse; water-bearing	8	328
"Hardpan"	7	335
Sand, packed	16	351
Sand, loose	64	415
Gravel and cobbles	15	430
"Hardpan"	59	489
Gravel, coarse; water-bearing	3	492
Casing, 10-inch outer casing from 0 to 313 ft, and 8-inch from 0 to 490 ft.		
Well 20/3-7F1		
Allenmore Golf Course. Altitude about 320 feet. Drilled in 1931.		
No record	12	12
"Hardpan"	15	27
"Quicksand," fine	23	50
"Hardpan"	37	87
Sand and gravel, some boulders; water-bearing	65	152
"Hardpan"	8	160
Casing, 12- to 10-inch.		
Well 20/3-7G1		
Allenmore Golf Course. Altitude about 380 feet. Drilled by P. Sylte in 1948.		
Soil	4	4
"Hardpan"	11	15
Sand and gravel, cemented	37	52
Sand and gravel, dry	73	125
Sand and gravel, cemented	5	130

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-7G1--Continued		
Sand and gravel, small flow of water	22	152
Sand and gravel, cemented	2	154
Gravel, coarse; water-bearing	16	170
Sand, fine; very little water	17	187
Gravel, cemented	39	226
Sand and silt	10	236
"Hardpan" and boulders	30	266
Sand, cemented, small flow of water	4	270

Casing, 10-inch to 270 ft; perforated from 155 to 169 ft.

Well 20/3-7N2

Pacific Match Co. Altitude about 255 feet. Drilled in 1936.

Materials	Thickness (feet)	Depth (feet)
Fill (?)	20	20
Sand	21	41
Gravel, coarse	23	64
"Hardpan"	20	84
Clay, blue	5	89
Sand, very fine	21	110
"Hardpan"	45	155
Sand	15	170
Gravel	35	205

Casing, 10- to 8-inch; perforated from 140 to 155, 170 to 180, and 185 to 200 ft.

Well 20/3-7Q1

Tacoma Milk Producers Association. Altitude about 255 feet. Drilled by N. C. Jannsen Drilling Co. in 1954.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel	19	19
Boulders	4	23
No record	7	30
Sand and gravel, some water	27	57
Gravel; water-bearing	10	67
Gravel	13	80
Sand and gravel	14	94
Silt, sand, and clay	7	101
Sand, gravel, and clay	8	109
Clay, sandy	12	121
Gravel and sand; water-bearing	5	126
Gravel, coarse, and sand; water-bearing	15	141

Casing, 8- to 6-inch to 141 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-7R1		
City of Tacoma. Altitude about 249 feet. Drilled by N. C. Jannsen Drilling Co. in 1930.		
Gravel	31	31
Gravel and sand	15	46
Gravel and clay	12	58
Gravel, cemented	7	65
Gravel and clay	5	70
Gravel, cemented	20	90
Well 20/3-8K1		
J. E. Berkheimer Manufacturing Co. Altitude about 230 feet. Drilled by N. C. Jannsen Drilling Co. in 1928.		
No record	30	30
Gravel	8	38
Clay	3	41
Sand and boulders	4	45
Sand and gravel, hard	6	51
Gravel, hard; some water	19	70
"Hardpan"	1	71
Gravel, loose	1	72
Clay, brown	9	81
Gravel, hard	6	87
Gravel	18	105
Boulders	2	107
Casing, 12- to 8-inch to 107 ft.		
Well 20/3-8R1		
City of Tacoma, well T-1. Altitude about 290 feet. Drilled in 1948.		
Gravel and fill	15	15
Sand	2	17
Gravel and sand	7	24
Sand, silty	17	41
Gravel	9	50
Gravel, cemented	1	51
Sand, cemented	22	73
Gravel, hard, cemented	19	92
Sand and clay	3	95
Gravel, coarse, clay streak at 106 ft	24	119
Gravel and clay, cemented	9	128
Gravel, coarse	7	135

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-8R1--Continued		
Gravel, cemented	3	138
Gravel, coarse	2	140
Sand, cemented	11	151
Gravel and sand	21	172
Gravel, cemented	3	175
Sand and clay, layered	9	184
Clay	3	187
Sand and gravel	6	193
Gravel, cemented	3	196
Sand and gravel	2	198
Sand, cemented, some gravel	10	208
Clay	3	211
Sand, fine to coarse	6	217
Clay and gravel	3	220
Sand, fine	1	221

Casing, 8- to 6-inch.

Well 20/3-9A1

Container Corp. of America. Altitude about 20 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1948.

Sand, clay, wood,muck, and fill	40	40
Clay and gravel	10	50
Gravel; water-bearing	2	52
Sand and gravel; water-bearing	8	60
Gravel, "hardpan"	11	71
Clay, blue	9	80
Gravel, "hardpan"	17	97
Gravel (80 percent), and sand	8	105
Sand (80 percent), and gravel	12	117
Sand and gravel	8	125
Sand and gravel, dirty	7	132
Gravel, coarse, clean	5	137
Gravel, hardpacked	10	147
"Hardpan"	3	150
Gravel, clean, and sand	25	175

Casing, 8-inch to 171 ft; 0.120 slot screen from 171 to 175 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-9A3		
Container Corp. of America. Altitude about 20 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1954.		
Soil and fill	4	4
Clay and muck	33	37
Gravel and clay	12	49
Sand and gravel, cemented	24	73
Clay	11	84
Sand and gravel	2	86
"Hardpan"	4	90
Sand and gravel, cemented	5	95
"Hardpan"	4	99
Sand and gravel, cemented	6	105
"Hardpan"	3	108
Sand and gravel, packed	1	109
Sand and gravel, coarse, some clay	3	112
Sand and gravel, slightly cemented	16	128
"Hardpan," large rocks	1	129
Sand and gravel, cemented	12	141
"Hardpan"	4	145
Sand and gravel, cemented	2	147
"Hardpan"	2	149
Sand, cemented	1	150
"Hardpan"	2	152
Sand and gravel, cemented	2	154
Sand, loose, coarse	6	160
Sand and gravel, cemented	3	163
Sand, coarse, with gravel and clay	7	170
Sand and gravel, coarse	15	185
Clay	3	188
Sand and gravel, packed	1	189
Clay and gravel	1	190
Sand and gravel, cemented	4	194
Sand and gravel, coarse	10	204
Sand and gravel, cemented	2	206
Gravel and sand	2	208
Sand, loose	3	211
Sand, cemented	1	212
Sand and coarse gravel, mostly sand	11	223
Sand and gravel, coarse	7	230
Sand and clay, some large rocks	4	234
Clay, sandy	9	243
Gravel, with some sand	2	245
Sand, very little gravel, some clay	2	247
Gravel, some sand	1	248
Sand and large gravel, some clay	5	253
Sand and gravel, cemented	1	254
Clay	5	259
"Hardpan"	18	277

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-9A3--Continued		
Sand and gravel, cemented	3	280
Clay	8	288
Sand and gravel, coarse, with clay	15	303
Clay	9	312
"Hardpan"	8	320

Casing, 12-inch to 320 ft; perforated from 199 to 200 ft, 224 to 230 ft, and 244 to 248 ft.

Well 20/3-9C2

Cammarano Bros. Altitude about 30 feet. Western Drilling and Equipment Co. in 1937.

Materials	Thickness (feet)	Depth (feet)
Clay, silty, gray	10	10
"Hardpan"	16	26
Gravel; water-bearing	2	28
Gravel	20	48
Clay, silty, gray and blue	30	78
Gravel	12	90
Rocks, coarse, sand; water-bearing	19	109
Clay, green, and rocks	4	113
Sand and gravel	16	129
Sand and gravel, loose; water-bearing	9	138
"Hardpan"	7	145
Sand, gravel and clay; water-bearing	36	181
Sand, hardpacked, gravel and clay; water-bearing	9	190
Gravel, pea; water-bearing	1	191
Gravel and sand mixed with clay	7	198
Sand and gravel	17	215
Sand, fine, hardpacked	48	263
Sand, fine, small amount of gravel	28	291
Sand, coarse; water-bearing	6	297
Sand, fine, and gravel	4	301

Casing, 8-inch 0 to 145 ft, 6-inch 0 to 290 ft; screened 290 to 300 ft.

Well 20/3-9D2

Carling Brewing Co., well 1. Altitude about 80 feet. Drilled by C. E. Miller in 1936.

Materials	Thickness (feet)	Depth (feet)
Clay	6	6
Clay and sand	22	28
Gravel	6	34
Sand and gravel, tight	29	63
Clay, blue	7	70
Gravel, "hardpan"	15	85

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-9D2--Continued		
Gravel, loose; water-bearing	19	104
Clay, carbonaceous	1	105
Clay, "hardpan," gray	25	130
Gravel	4	134
Gravel, coarse	2	136
Gravel, fine to coarse	6	142
"Hardpan" and clay	2	144
Sand, coarse, and gravel	9	153
Gravel, some clay	2	155
Gravel, tight	15	170
Sand and gravel, loose; water-bearing	8	178
Gravel, tight	6	184
Gravel, loose; water-bearing	14	198
Gravel, tight	4	202
Clay, "hardpan"	2	204
Gravel, tight	4	208
Clay, "hardpan"	11	219
Sand, loose; water-bearing	1	220
Gravel, tight	2	222
Clay, "hardpan"	13	235
Sand and gravel	5	240
Sand, coarse, and gravel	5	245
"Hardpan," and cement gravel	2	247

Casing, 10-inch.

Well 20/3-9D3

Carling Brewing Co., well 5. Altitude is 110.94 feet. Drilled by N. C. Jannsen Drilling Co. in 1949.

Materials	Thickness (feet)	Depth (feet)
Sand and gravel, hardpacked	260	260
Clay	15	275
Sand and gravel, coarse	15	290
Gravel and clay	10	300
Gravel and clay, with sand	45	345
Sand	5	350
Clay, sandy	25	375
Sand	63	438
Sand and gravel	122	560
Sand, coarse	91	651
Clay	26	677

Casing, 22-inch outer casing from 0 to 107 ft, 14-inch casing from 0 to 235 ft, 12-inch from 235 to 677 ft; perforated from 405 to 652 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-9D4		
Carling Brewing Co., well 4. Altitude is 105.95 feet. Drilled by N. C. Jannsen Drilling Co. in 1948.		
"Hardpan," clay, and boulders	100	100
Gravel, hard, cemented	20	120
Clay, wood	5	125
Clay and "hardpan"	9	134
Gravel and boulders	26	160
Gravel with sand	30	190
Gravel and sand, fine	30	220
Sand, hardpacked, gray, sand with gravel	20	240
Sand and gravel	40	280
Sand, fine, with clay	14	294
Clay shot with gravel	26	320
Clay, sandy	20	340
Sand, fine	20	360
Clay, sandy	15	375
Gravel	55	430
Sand and gravel; water-bearing	90	520
Clay	20	540

Casing, 20inch to 12-inch to 540 ft; perforated 379 to 540 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/3-9E3		
Pacific Refrigerating Co. Altitude about 145 feet. Drilled by R. J. Strasser in 1935.		
No record	18	18
Gravel, cemented	18	36
Gravel, loose	34	70
Gravel, with boulders	22	92
Sand and gravel, cemented	4	96
Gravel; water-bearing	9	105
Sand	4	109
Gravel, cemented	9	118
Gravel, loose; water-bearing	14	132
Clay, blue	5	137
Gravel, cemented	11	148
Boulder, "granite"	4	152
Gravel, loose; water-bearing	8	160
Gravel, cemented	13	173
Sand and clay	11	184
Gravel, cemented	10	194
Boulders	11	205
Gravel, loose; water-bearing	4	209
Gravel, cemented	7	216
Sand and gravel; water-bearing	20	236

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-9E3--Continued		
Sand and gravel, packed	9	245
Gravel, loose; water-bearing	14	259

Casing, 12-inch from 0 to 129½, 10-inch from 123 to 168, and 8-inch from 161 to 259 ft; perforated from 204 to 217 ft, 200 to 235 ft, and 242 to 256 ft.

Well 20/3-9F1

Silver Springs Brewing Co. Altitude about 40 feet. Drilled by P. Sylte in 1950.

Materials	Thickness (feet)	Depth (feet)
Fill dirt, gravel and clay	23	23
Clay, brown	13	36
"Hardpan"	35	71
Clay, sandy	21	92
"Hardpan"	73	165
Gravel, sandy, small flow of water	1	166
"Hardpan"	4	170
Gravel, sandy, and clay	25	195
Clay, blue	7	202
"Hardpan"	4	206
Gravel, cemented	11	217
Clay, brown, and a little gravel	6	223
"Hardpan"	4	227
Gravel, and blue clay	59	286
Sand, hardpacked	53	339
Sand, gray, and clay	14	353
Sand and gravel, hardpacked	16	369
Sand, fine to coarse, and small gravel, small flow of water	1	370
Gravel, cemented	45	415
Sand, heaving	4	419
Sand, hardpacked, some clay	13	432
Gravel, cemented	23	455
Clay, blue	12	467
Sand and gravel, cemented	7	474
Clay, sandy	18	492
Sand and gravel, cemented	105	597
Sand and gravel, good flow of water	12	609
"Hardpan"	9	618

Casing, 8-inch from 0 to 560 ft, and 6-inch from 560 to 595 ft; 0.020 slot screen from 595 to 610 ft. Open hole (?) 610 to 618 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-10B1		
Medosweet-Foremost Dairies. Altitude about 25 feet. Drilled by P. Sylte in 1951.		
Soil and clay	8	8
Sand and gravel, cemented	18	26
"Hardpan"	9	35
Sand and gravel, muddy, little water	9	44
Clay and gravel	13	57
Sand and gravel, little water	2	59
Gravel, and clay, hard	19	78
Clay and gravel, soft, little water	18	96
Sand and gravel, cemented	20	116
Sand, hard, dry	10	126
Sand and gravel, little water	10	136
Clay, blue, and gravel	46	182
Clay, green, and gravel	29	211
Sand and gravel	6	217
Sand and gravel, cemented	18	235
Sand and gravel, small flow of water	2	237
Sand, fine, small flow of water	5	242
Sand and gravel, flowing	6	248
Clay	7	255
Sand, black, and gravel, flowing	8	263
Clay and gravel	6	269
Clay and gravel, open hole	6	275

Casing, 10-inch to 269 ft; perforated 247 to 264 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/3-11C1		
The Milwaukee Road. Altitude about 20 feet. Drilled by F. H. Jensen.		
Silt and fine sand	42	42
Clay and silt	8	50
Sand, coarse	12	62
Sand, fine, wood particles, shell and clay	11	73
Silt and clay, many shells	19	92
Sand and shells	2	94
Sand, fine, fairly clean, shells	10	104
Silt, clay, and shells	15	119
Sand, medium, with clay and vegetable matter	5	124
Sand, fine to coarse	36	160

Casing, 3-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-11P1		
J. J. McDonald. Altitude about 25 feet. Drilled by Service Hardware and Implement Co.		
Soil	5	5
Gravel	15	20
"Hardpan"	10	30
Gravel, cemented	53	83
Gravel	5	88
Casing, 6-inch to 88 ft.		
Well 20/3-11P2		
Tony Banaszak. Altitude about 25 feet. Drilled by Service Hardware and Implement Co.		
Soil	9	9
Clay, brown, some water at 20 ft	11	20
Clay, blue	18	38
Gravel; water-bearing	3	41
Casing, 6-inch to 41 ft.		
Well 20/3-11P4		
E. Barker. Altitude about 25 feet. Drilled by Service Hardware and Implement Co.		
Clay	45	45
"Hardpan"	43	88
Gravel	2	90
Casing, 6-inch to 85 ft.		
Well 20/3-12C1		
Colonial Gardens. Altitude about 15 feet. Drilled by F. H. Jensen.		
Sand, fine, muck, some clay and wood	18	18
Clay and silt	12	30
Clay and silty sand	31	61
Sand, medium, some clay	17	78
Sand and fine, mucky clay	4	82
Sand, medium, many shells	5	87
Muck, many shells	5	92
Muck, soft, and clay with shells	9	101

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-12C1--Continued		
Clay, gray, hard and packed, shells and sand between layers	21	122
Clay and some coarse sand	8	130
Muck, sandy, very soft	4	134
Sand, hardpacked	9	143
Muck and clay	20	163
Sand, fine, with clay and some coarse sand	30	193
Clay	7	200
Sand, medium, and clay	3	203
Muck	7	210
Sand and clay	9	219
Sand, coarse	5	224
Sand, fine	6	230
Clay and fine sand	2	232
Sand, fine and open	3	235
Sand, medium	3	238
Sand, coarse	4	242
Sand, very fine, with occasional coarser sand	3	245
Sand, fine	14	259
Sand, medium	6	265
Sand, coarse	12	277
Sand, fine and mucky	-	-

Casing, 3-inch; screened at bottom.

Well 20/3-13G1

Leon P. Zabroski. Altitude about 20 feet. Drilled by Service Hardware and Implement Co. in 1951.

Soil and fine sand	20	20
Sands and clay; water-bearing	50	70
Sand, black; water-bearing: 20 percent shells from 83 to 86 ft	16	86

Casing, 8-inch.

Well 20/3-13H2

Walter Stemp. Altitude about 20 feet. Drilled by Service Hardware and Implement Co. in 1951.

Silt and sand	20	20
Clay, brown	10	30
Sand, coarse	8	38

Casing, 4-inch to 38 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-13H3		
Walter Stemp. Altitude about 20 feet. Drilled by Service Hardware and Implement Co. in 1950.		
Gravel and sand, hard, water in coarse sand at 40 ft	48	48
Clay	16	64
Sand, water-bearing	11	75

Casing, 6-inch to 75 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/3-13H4		
Walter Stemp. Altitude about 20 feet. Drilled by Service Hardware and Implement Co. in 1951.		
Gravel and sand, water at 40 ft	48	48
Clay	16	64
Sand; water-bearing	16	80
Clay and sand	173	253

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 20/3-14B1		
L. L. Jacobsen. Altitude about 175 feet. Drilled by Service Hardware and Implement Co. in 1951.		
Clay, yellow, sandy	23	23
Gravel, coarse	10	33
Gravel and clay	20	53
Boulders and sand	10	63
Gravel, sandy, black, and boulders	7	70
Gravel, sand, and boulders	8	78
Gravel and sand, yellow	18	96
Gravel, sand, and boulders	24	120
Gravel, coarse	14	134
Clay, sandy	11	145

Casing, 6-inch to 145 ft; perforated.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-14B2		
Harold Olsen. Altitude about 60 feet. Drilled by Service Hardware and Implement Co. in 1955.		
"Hardpan"	15	15
Gravel, cemented	11	26
Gravel, and boulders	10	36
Gravel, cemented; water at 46 ft	10	46
Gravel, hardpacked; water at 50 ft	9	55
Gravel, hard	8	63
Gravel, cemented; water-bearing	6	69
Rock and gravel, hardpacked	4	73
Gravel, hardpacked	7	80
Casing, 6-inch.		
Well 20/3-14C1		
Charles Rutheford. Altitude about 50 feet. Drilled by Service Hardware and Implement Co in 1951.		
Soil	18	18
Clay	18	36
---; water-bearing	6	42
Clay, hard, and "hardpan" and rock	58	100
Sand and gravel; water-bearing	5	105
Casing, 6-inch to 105 ft.		
Well 20/3-14C2		
N. M. Becker. Altitude about 40 feet. Drilled by Service Hardware and Implement Co.		
Soil	14	14
Clay, brown; water at 20 ft	6	20
Clay, blue	14	34
Gravel; water-bearing	4	38
Casing, 6-inch.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-14R1		
Dwight Robinson. Altitude about 260 feet. Drilled by C. Weller in 1951.		
Soil and loose gravel	3	3
Gravel, loose	25	28
Clay, blue	26	54
Sand, brown, clay, and gravel	4	58
Sand, brown	10	68
Sand and gravel	32	100
Sand, clay, and gravel	23	123
Clay and gravel	53	176
Clay, sand, and gravel	33	209
Clay and gravel	8	217
Sand, brown, and gravel	2	219
Clay and gravel	6	225
Sand, brown	1	226
Clay and gravel	4	230
Casing, 8-inch to 230 ft; perforated 192 to 226 ft.		
Well 20/3-18C1		
City of Tacoma, well T-10. Altitude about 310 feet. Drilled by Richardson Well Drilling Co. in 1952.		
Soil	5	5
"Hardpan," gray	19	24
Sand and gravel, with gray-green clay	38	62
Clay, sandy, with some gray gravel	34	96
Sand and gravel	4	100
Clay, sandy	32	132
Sand, dirty	14	146
"Hardpan," gray	7	153
Sand, streaks of gray gravel	27	180
Sand, gravel, coarse	5	185
Sand, coarse	-	-
Casing, 12-inch to 185 ft; perforated from 152 to 175 ft.		
Well 20/3-18C2		
City of Tacoma, well 12-A. Altitude about 309 feet. Drilled by Western Drilling Co. in 1957.		
Sand and gravel	11	11
Sand and gravel, cemented	38	49
Clay, sandy, some gravel	34	83

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-18C2--Continued		
Sand and gravel	4	87
Clay, sandy, to dirty sand	32	119
"Hardpan"	14	133
Sand, streaks of gravel	7	140
Sand, coarse, and gravel; water-bearing	27	167

Casing, 36-inch 0 to 133 ft, 30-inch 0 to 141 ft; screen, 141 to 167 ft.

Well 20/3-18D1

City of Tacoma, well 2-A. Altitude is 243.0 feet. Drilled by N. C. Jannsen in 1930.

Gravel	8	8
Sand and fine gravel	36	44
Gravel and sand, with some cobbles	14	58
Gravel, hard	2	60
Gravel and sand, with cobbles	14	74
Sand, clayey and hard, with streaks of blue or yellow clay	34	108
Sand and gravel, cemented	3	111
Gravel, clean, and coarse sand	21	132
"Mud" and gravel	7	139
Gravel and sand	5	144
Clay, blue	28	172

Casing, 38-inch casing originally from 0 to 59 ft, but has since dropped to a depth of 70± ft, 26-inch casing from 0 to 146 ft; perforations in 26-inch casing from 58 to 108 and 111 to 144 ft.

Well 20/3-18D2

City of Tacoma, well 2-B. Altitude about 245 feet. Drilled in 1949.

Soil, coarse gravel, and sand	15	15
Sand, silty, with streaks of fine sand and gravel	36	51
Gravel, hard, cemented	7	58
Gravel, clean, with cobbles; water-bearing	20	78
Clay and gravel	5	83

Casing, 36-inch 0 to 57½ ft, 30-inch 0 to 57 ft; 18-inch diameter screen from 57 to 78 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-18D3		
City of Tacoma, well 9-A. Altitude about 280 feet. Drilled in 1949.		
Soil, clay, and gravel	10	10
Sand, silty, with a few fine pebbles, tight	48	58
Sand and gravel, some water	22	80
Gravel and sand	8	88
"Hardpan"	2	90
Gravel (up to 6-inches) and sand, clean	18	108
Sand, coarse	2	110
Gravel and sand, tighter	9	119
Sand	2	121
"Hardpan," yellow	6	127
Casing, 52-inch from 0 to 40 ft, 42-inch 40 to 90 ft, and 26-inch diameter 0.187 slot screen from 90 to 113 ft.		
Well 20/3-18F2		
38th Street Golf Range. Altitude about 300 feet. Drilled by Richardson Well Drilling Co. in 1960.		
Topsoil and clay	3	3
Sand, clay, gravel	10	13
"Hardpan"	7	20
Sand, clay, gravel	7	27
Sand, clay, a little gravel	43	70
Sand and gravel (6 inches of water at 85 ft)	16	86
"Hardpan"	2	88
Sand, clay, gravel	22	110
Sand and gravel	7	117
Casing, 8-inch to 117 ft.		
Well 20/3-19F1		
City of Tacoma, well 5-A. Altitude about 266 feet. Drilled by N. C. Jannsen in 1930.		
Gravel	25	25
Sand, hard	22	47
Gravel, fine, and sand	7	54
Sand, fine	7	61
Gravel, clean and coarse; water-bearing	34	95

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-19F1--Continued		
Gravel and sand	26	121
Gravel, cemented	5	126
Gravel and sand	19	145
Clay and peat	4	149
Gravel, fine	5	154
Sand, fine	2	156
Gravel and sand	54	210
Sand, fine	32	242
Clay, laminated	1	243
Gravel and sand	19	262
Sand and clay	8	270
Cobbles, gravel, and sand	18	288
Cobbles and gravel	20	308
Gravel, clean, with sand	8	316
Sand, packed, and gravel	8	324
Sand, hard, and packed	29	353
Gravel and cobbles	1	354
Clay, hard, with streaks of lignite	24	378

Casing, 38- to 26-inch to 352 ft; perforated 65 to 145 ft, 160 to 210 ft, 246 to 262 ft, and 273 to 324 ft.

Well 20/3-19L1

City of Tacoma, well 9-A (old). Altitude about 273 feet. Drilled by C. V. Enloe, 1940.

Materials	Thickness (feet)	Depth (feet)
Gravel and cobbles	23	23
Sand, fine	14	37
Sand and gravel	6	43
Sand and fine gravel, hard	9	52
Sand, gravel and small cobbles	33	85
Gravel, cemented	21	106
Sand, black, with gravel and cobbles; water-bearing	42	148
Gravel, cemented	1	149
Clay, laminated (brownish gray with carbonaceous streaks)	21	170
Gravel, cemented	2	172
Sand, gravel, and cobbles cemented in streaks	46	218
Sand, cemented	33	251
Clay, streaks	3	254
Gravel, cemented	39	293

Casing, 38-inch 0 to 96 ft, 26-inch 0 to 266 ft; perforated from 106 to 149 and 172 to 218 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 20/3-19P1

City of Tacoma, well 1-A. Altitude about 261 feet. Drilled by N. C. Jannsen Drilling Co. in 1929.

Materials	Thickness (feet)	Depth (feet)
Gravel, coarse, with cobbles and some sand	14	14
Sand, fine, with some clay	20	34
Sand, cemented, and clay	3	37
Gravel and coarse sand, some cobbles and a little clay	25	62
Gravel, sand, and some clay, cemented	1	63
Gravel and coarse sand, with some cobbles and clay	28	91
Gravel, cemented, and clay	10	101
Gravel, coarse, with cobbles and coarse black sand	61	162
Gravel, coarse, with cobbles, cemented in streaks	22	184
Cobbles, with gravel and some sand	20	204
Cobbles and gravel, with blue and yellow clay	4	208
Cobbles, with gravel and some sand	19	227
Sand, coarse and packed, with fine gravel and clay	14	241
Gravel, coarse, and sand, cemented	11	252
Cobbles, gravel, and sand, some clay	44	296
Cobbles, coarse gravel, and sand, with streaks of clay	6	302
Cobbles, gravel, and sand, cemented	8	310

Casing, 38-inch from 0 to 100 ft, 24-inch 0 to 305 ft; perforated from 110 to 285 ft.

Well 20/3-23H1

A. Kapphahn. Altitude about 355 feet. Drilled by Service Hardware and Implement Co. in 1952.

Materials	Thickness (feet)	Depth (feet)
Soil	6	6
Gravel, cemented	82	88
"Hardpan" (clay?)	37	125
Gravel, cemented	108	233
Clay and sand	12	245
Clay, sand, and gravel	5	250
Clay and sand	4	254

Casing, 6-inch to 254 ft; perforated 239 to 254 ft.

Well 20/3-25C1

Summit Water and Supply Co., well 4. Altitude about 305 feet. Drilled by L. R. Gaudio in 1954.

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	32	32
Clay, sand and "hardpan"	126	158
Sand and gravel	1	159
"Hardpan"	2	161

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-25C1--Continued		
Sand and gravel, tight, little water	4	165
"Hardpan"	15	180
Clay	7	187
Sand, hard, tight	2	189
Gravel, cemented, gray	3	192
Sand and gravel, loose and large with depth, yellow; water-bearing	16	208
"Hardpan"	3	211
Gravel; water-bearing	3	214
"Hardpan," yellow	2	216
"Hardpan"	7	223
Sand and gravel, dirty; water-bearing	3	226
"Hardpan"	1	227

Casing, 12-inch to 227 ft.

Well 20/3-27E1

--Njystad. Altitude about 415 feet. Drilled by Service Hardware and Implement Co. in 1952.

Soil	3	3
Clay, yellow, "hardpan"	7	10
Clay and gravel, "hardpan"	15	25
Sand, blue, hard, some water at 35 ft	10	35
Gravel, cemented	15	50
Gravel, coarse, dry	20	70
Gravel, cemented	76	146
Gravel	41	187

Casing, 6-inch to 187 ft.

Well 20/3-28F1

Albertson's Food Centers Inc. Altitude about 380 feet. Drilled by Richardson Well Drilling Co. in 1956.

Fill dirt	8	8
Gravel, sand and clay	20	28
"Hardpan"	131	159
Clay, sand and gravel	7	166
Clay, sandy	13	179
Gravel, pea, some sand	3	182
Clay, sand, and gravel	-	-

Casing, 6-inch to 182 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 20/3-28K1

P. A. Carson. Altitude about 390 feet. Drilled by Ralph Charlton in 1950.

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	150	150
Gravel	30	180

Casing, 8-inch to 180 ft.

Well 20/3-30C4

City of Tacoma, well 8-A. Altitude about 267 feet. Drilled by C. V. Enloe in 1939.

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Sand and gravel, loose	51	53
Sand and gravel, harder	9	62
Sand and gravel, clay filled, till (?)	8	70
Sand, gravel, and clay	18	88
Gravel, cemented and hard	6	94
Sand and pea gravel, with some cobbles, loose and water-bearing	20	114
Gravel and coarse sand, with clay	11	125
Sand, coarse, and gravel	21	146
Sand and gravel with clay, hard (mud-cemented gravel)	14	160
Sand, gravel, and small cobbles, fairly loose	2	162
Gravel; water-bearing	12	174
Clay streak, cobble gravel, and sand	6	180
Gravel and sand, loose and water-bearing	41	221
Sand and gravel, very hard and packed	10	231
Gravel, cobbles, and a little sand; water-bearing	33	264
Gravel, cemented	38	302
Clay	5	307

Casing, 38-inch 0 to 99 ft, 26-inch 0 to 301 ft; perforated from 101 to 285 ft.

Well 20/3-30L4

City of Tacoma, well 18. Altitude about 258 feet. Drilled in 1907.

Materials	Thickness (feet)	Depth (feet)
Gravel and sand	37	37
Gravel, coarse, and sand	28	65
Clay	1	66
Sand and gravel	2	68
Clay	5	73
Sand and gravel	25	98
Gravel, very coarse, very little sand	5	103
Clay	1	104

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-30L4--Continued		
Lignite (?)	7	111
Clay, very hard	10	121
Well 20/3-30L5		
City of Tacoma, well 7-A. Altitude about 256 feet. Drilled by C. V. Enloe in 1938.		
No record	14	14
Sand and pebbles	16	30
Sand and gravel	12	42
Gravel, coarse	4	46
Gravel and cobbles	2	48
Sand and gravel	8	56
Gravel, hard, some sand	11	67
Gravel, hard	6	73
Sand, hard	1	74
Gravel and small cobbles; sand, hard	35	109
Sand, hard and cemented; fine gravel and clay	6	115
Sand, gravel, and boulders, cemented	3	118
Sand, with some fine gravel, cemented	7	125
Sand, hard	8	133
Gravel and sand	3	136
Sand and gravel, cemented	6	142
Gravel, cobbles, and sand, cemented	15	157
Sand and clay	2	159
Gravel and sand	9	168
Sand, hard	1	169
Gravel, cemented, very hard	10	179
Sand, hard	22	201
Gravel, fine, and sand, hard	4	205
Gravel, coarse, and sand, largely cemented, with loose water-bearing zones	14	219
Gravel and sand, loose	10	229
Gravel and small cobbles, loose	5	234
Clay, blue, and boulders, very hard	3	237
Gravel and sand, loose and water-bearing	42	279
Clay, hard, some sand, laminated, blue and gray	12	291
Shale, hard at top	9	300
Shale, with gravel	10	310
Clay, gray (boulder at 315 ft)	8	318
Gravel, cemented	13	331
Peat, sandy, brown	19	350

Casing, 38-inch 0 to 100 ft, 26-inch 0 to 307 ft; perforated 100 to 117 ft, 175 to 185 ft, 204 to 282 ft. Concrete plug below 298 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-30L6		
City of Tacoma, well 10B. Altitude about 257 feet. Drilled by L. R. Gaudio in 1956.		
Sand and gravel, coarse	18	18
Sand, coarse, and occasional boulder	6	24
Gravel, hard, cemented	11	35
Gravel, loose, coarse	4	39
Gravel, hard, cemented	2	41
Gravel, loose, coarse and boulders	18	59
Gravel, hard, cemented	3	62
Sand, medium blue	2	64
Clay	2	66
Gravel and sand, cemented	1	67
Gravel and sand, loose	2	69
Alternate streaks of hard and loose gravel and sand	14	83
Casing, 30-inch 0 to 46 ft, 18-inch 0 to 71 ft; perforations 50 to 60 ft and 71 to 81 ft.		
Well 20/3-30N1		
City of Tacoma, well 3-A. Altitude 270.9 feet. Drilled by N. C. Jannsen Drilling Co. in 1931.		
Gravel, hard and packed	20	20
Gravel, cemented	6	26
Gravel and sand	14	40
Gravel, hard and packed	10	50
Gravel and sand	40	90
Gravel, cemented	50	140
Gravel, fine, loosely cemented	4	144
Clay, brown	4	148
Clay, sandy, brown	13	161
Clay, hard, green	10	171
Clay, sticky, brown	11	182
Clay, sandy, brown	3	185
Clay, gummy, brown	14	199
Sand, gray	7	206
Peat	1	207
Sand, fine, green	14	221
Gravel and cobbles, cemented and weathered	16	237
Gravel, hard, and cemented	3	240
Sand, fine, yellow	2	242
Mud, coarse sand, and pebbles	9	251
Cobbles, gravel, and coarse sand	19	270
Cobbles, gravel, and coarse sand, "muddy water"	20	290
Cobbles, gravel, and some boulders, "mud, cemented"	15	305

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-30N1--Continued		
Cobbles, gravel, and sand	6	311
Shale, hard, green	3	314
Clay, sandy, green	44	358

Casing, 38-inch 0 to 73 ft, 26-inch 0 to 325 ft; perforated 59 to 140 ft, 221 to 240 ft, and from 251 to 311 ft.

Well 20/3-31F1

Lakewood Water District, test well 7. Altitude about 300 feet. Drilled by L. R. Gaudio in 1950.

Materials	Thickness (feet)	Depth (feet)
Soil and gravel	6	6
"Hardpan"	51	57
Sand and gravel	12	69
Sand and clay	3	72
Gravel, some sand and clay	8	80
Sand	7	87
Gravel and blue clay	2	89
Sand and gravel; water-bearing	8	97
Gravel, some sand, and clay; water-bearing	10	107
Gravel, loose; water-bearing	4	111
Sand and gravel, loose; water-bearing	5	116
Sand and gravel, some clay	22	138
Sand and gravel; water-bearing	22	160
Sand	5	165
Sand and gravel; water-bearing	8	173
Sand, fine	6	179
Sand	15	194
Clay, brown	6	200
"Hardpan," brown	9	209

Casing, 10-inch; perforated from 138 to 160 ft.

Well 20/3-31F2

Lakewoood Water District, well J. Altitude about 300 feet. Drilled by L. R. Gaudio in 1952.

Materials	Thickness (feet)	Depth (feet)
Soil	4	4
Sand and gravel	12	16
"Hardpan"	39	55
Sand and gravel, some clay	12	67
Sand and clay	3	70
Gravel, some sand, and clay	8	78
Sand	7	85

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-31F2--Continued		
Gravel and blue clay	2	87
Sand and gravel	8	95
Gravel, some sand and clay	10	105
Gravel, loose	4	109
Sand and gravel, loose	5	114
Sand and gravel, some clay	22	136
Sand and gravel	23	159

Casing, 36-inch 0 to 16 ft, 24-inch 0 to 138 ft, 18-inch 0 to 137 ft; 0.100 slot screen from 137 to 158 ft.

Well 20/3-31M1

R. G. Nobes. Altitude about 280 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1950.

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Gravel, dry	43	45
"Hardpan"	10	55
Sand and gravel	20	75

Casing, 6-inch to 75 ft.

Well 20/3-32D4

A. T. Kluss. Altitude about 314 feet. Drilled by L. V. Denny in 1940.

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	40	40
Gravel, cemented	15	55
Gravel, fine, angular, dark; water-bearing	20	75
Gravel, cemented	37	112
Gravel, loose; water-bearing	2	114

Casing, 5-inch to 114 ft; open bottom.

Well 20/3-32G1

J. L. Ryan. Altitude about 330 feet. Dug in 1940.

Materials	Thickness (feet)	Depth (feet)
Soil and clay	18	18
Clay, blue, and boulders	6	24
Clay, sand, packed	20	44
Gravel and sand	16	60

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-32G1--Continued		
Sand	5	65
Gravel and sand, gray	36	101

Casing, 48-inch.

Well 20/3-32M1

B. J. Holman. Altitude about 290 feet. Drilled in 1950.

Materials	Thickness (feet)	Depth (feet)
Peat	4	4
Clay, gray	1	5
Sand and gravel; water-bearing	2	7

Casing, 72-inch.

Well 20/3-34L1

Southeast Tacoma Mutual Water Co., well 2. Altitude about 410 feet. Drilled by P. Sylte in 1947.

Materials	Thickness (feet)	Depth (feet)
Soil	4	4
Gravel, cemented	31	35
"Hardpan," blue	40	75
Gravel, cemented	65	140
Sand and gravel, dry	20	160
Gravel, cemented	24	184
Sand and gravel, dirty, some water	7	191
Gravel, cemented	4	195
Sand and fine gravel, good flow of water	4	199
Gravel, good flow of water	3	202
Gravel, cemented	1	203
Gravel, coarse, good flow of water	9	212
Gravel, cemented	2	214
Sand and gravel, fair flow of water	2	216
Sand, dirty	7	223
Gravel, cemented	7	230
"Hardpan"	8	238
Gravel, cemented	29	267
Sand, fine	2	269
"Hardpan"	51	320
Sand and gravel, dirty	10	330
Silt	24	354
Quicksand	30	384
Sand	10	394

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-34L1--Continued		
Sand and gravel, fair flow of water	2	396
"Hardpan"	33	429
Sand and gravel	1	430
"Hardpan"	20	450
Silt and gravel	4	454
"Hardpan"	5	459
Sand and blue clay	11	470
"Hardpan"	11	481
Clay, green	4	485
"Hardpan," brown	20	505

Casing, 12-inch 0 to 150 ft, 10-inch 150 to 396 ft; perforated 196 to 215 ft. Open hole 396-505 ft.

Well 20/3-35G1

I. S. Broxson. Altitude about 425 feet. Dug in 1938.

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	40	40
Gravel, cemented	50	90
Gravel and sand	95	185

Casing, 36- to 24-inch concrete to 185 ft.

Well 20/3-35L1

--Smith. Altitude about 420 feet. Drilled by Service Hardware and Implement Co. in 1953.

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	13	13
Gravel, cemented	29	42
Gravel, cemented, and boulders	33	75
"Hardpan"	11	86
Gravel, cemented	47	133
Gravel, hardpacked	7	140
Gravel, cemented	8	148
Gravel, hardpacked	16	164
Gravel, cemented	5	169
Gravel, cemented, a little water at 174	8	177
Gravel; water-bearing	10	187

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/3-35R1		
A. E. Koval. Altitude about 445 feet. Drilled by L. R. Gaudio in 1952.		
Clay, sandy	20	20
"Hardpan"	123	143
Sand and gravel, cemented	22	165
"Hardpan"	8	173
Sand, fine; water-bearing	28	201
Sand, dirty, fine	30	231
"Hardpan"	5	236
Sand, clay, no water	7	243
"Hardpan"	13	256
Sand, gravel, cemented; water-bearing	14	270
"Hardpan"	8	278
Clay, yellow, some gravel	9	287
Sand, black, cemented gravel	9	296
"Hardpan"	19	315
Casing, 6-inch.		
Well 20/4-1D1		
R. B. Twaddle. Altitude about 75 feet. Dug in 1947.		
Soil	2	2
Sand	10	12
Clay	6	18
Casing, 36-inch to 18 ft.		
Well 20/4-1M1		
Roy Ray. Altitude about 60 feet. Driven in 1958.		
Topsoil	10	10
Sand; water-bearing	24	34
Casing, 3-inch; perforated 28 to 34 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-3R1		
L. Reisinger. Altitude about 330 feet. Drilled by Service Hardware and Implement Co. in 1953.		
Gravel, boulders, and clay	14	14
Gravel and clay	8	22
Gravel, hard	12	34
Gravel, very hard	4	38
Gravel, hard	27	65
Sand, brown	4	69
Gravel, hard	5	74
Gravel and boulders	8	82
Gravel, hard	22	104
Gravel and clay	16	120
Gravel, cemented	11	131
Gravel and clay, bailed 20 gpm for 30 minutes with dd of 12 ft. Static water level about 113 ft	7	138
No record	11	149
Gravel, hard, and clay, water at 167 ft	36	185
Gravel, fine, hard	19	204
Gravel, hard, with clay, a little water at 225 ft	25	229
No record	9	238
Gravel, fine, and coarse sand	2	240
Gravel and clay	5	245
Gravel, very hard	7	252
Gravel, hard, some clay	21	273
No record	36	309
Gravel, hard	7	316
Sand, clay, and rock	3	319
Gravel and clay	8	327
No record	44	371
Casing, 10- to 8-inch to 362 ft; perforated from 65 to 70 ft, 80 to 95 ft, 120 to 123 ft, 130 to 175 ft, 180 to 192 ft, and 220 to 240 ft.		
Well 20/4-5E1		
Fusfield and Oppheim (Richfield Service Station). Altitude about 30 feet. Drilled by N. C. Jannsen Drilling Co. in 1930.		
Clay, sand, and gravel	18	18
Sand and gravel	6	24
Sand, gravel, and silt	14	38
Sand and gravel	22	60
Sand and silt	20	80
Sand, loose	25	105
Clay, sandy	14	119
Silt	37	156
Sand, clay, and silt	15	171

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-5E1--Continued		
Silt	20	191
Clay, sandy	9	200
Clay	29	229
Clay, some gravel	11	240
Clay	110	350

Casing, 4-inch.

Well 20/4-5Q2

Town of Milton, well 2. Altitude about 50 feet. Drilled by Pete Sylte in 1945.

Materials	Thickness (feet)	Depth (feet)
Soil	5	5
Sand, dry	7	12
Sand, dirty	20	32
Sand, coarse, some gravel; water-bearing	40	72
Sand, fine, muddy, small flow of water	22	94
Sand, very fine, blue	5	99
Silt, blue, dry	21	120
Clay, hard, blue	52	172
Sand and silt, brown	1	173
Clay, sandy, brown	11	184
Sand, fine, blue	3	187
Silt, hard, blue, and some blue clay	32	219
Clay, blue	37	256
Silt, dry	2	258
Silt, dry, some pea gravel	20	278
Clay, sandy, small flow of water	10	288
Sand, fine, muddy, small flow of water	27	315
Sand, fine, gray	1	316
Sand, fine, muddy	16	332
Clay, blue	3	335
Clay, blue, and silt	55	390
Clay, blue	25	415
Sand, heaving	65	480
Quicksand	60	540

Casing, 12-inch 0 to 364 ft, 10-inch 364 to 529 ft, and 8-inch 529 to 540 ft; perforated 35 to 75 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)

Well 20/4-5Q3

Town of Milton, well 3. Altitude about 50 feet. Drilled by Pete Sylte in 1948.

Sand	6	6
Sand and gravel, "hardpan"	9	15
Sand; water-bearing	1	16
Sand and gravel, cemented	8	24
Sand and gravel; water-bearing	56	80

Casing, 10-inch to 80 ft; perforated 50 to 75 ft.

Well 20/4-5Q4

Town of Milton. Altitude about 70 feet. Drilled by Pete Sylte in 1951.

Dirt (fill)	6	6
Peat	5	11
Sand and gravel	14	25
Sand and small gravel	49	74
Sand	2	76

Casing, 12-inch to 76 ft; perforated 41 to 71 ft.

Well 20/4-5Q5

Town of Milton. Altitude about 50 feet. Drilled by L. R. Gaudio in 1958.

"Hardpan"	15	15
Clay, sandy, yellow	5	20
Sand, some gravel	9	29
Sand and gravel	18	47
Clay, sandy, brown	6	53
Sand, medium to fine, brown	12	65
Sand, some gravel	5	70
Sand, medium to coarse, very few pebbles	23	93
Sand, fine, brown	4	97
Sand, tight, dirty	1	98

Casing, 10-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Well 20/4-5Q6

Town of Milton, well 4. Altitude about 50 feet. Drilled in 1958.

Materials	Thickness (feet)	Depth (feet)
Fill dirt	8	8
Sand, silt, and clay	12	20
Sand, medium to coarse	20	40
Sand, coarse, few pebbles	13	53
Tight cemented streak	-	53
Sand, coarse, few pebbles	17	70
Sand, medium to coarse	6	76
Clay, silty, brown	4	80

Casing, 18-inch to 43 ft; screened 47 to 73 ft.

Well 20/4-7Q1

L. V. Ambuehl. Altitude about 24 feet. Drilled by J. L. Bell Drilling Co. in 1960.

Materials	Thickness (feet)	Depth (feet)
Topsoil	2	2
Silt, brown	22	24
Sand and gravel, gray, some water	16	40
Clay, blue, and silt	41	81
Silt, blue and fine sand, clay; water-bearing	33	114
Sand, fine; water-bearing	6	120
Clay, blue	43	163
Sand, blue; water-bearing	27	190

Casing, 8-inch to 170 ft; perforated 170 to 190 ft.

Well 20/4-8M1

Akinobu Yotsuuye. Altitude about 25 feet. Drilled by J. L. Bell Drilling Co. in 1959.

Materials	Thickness (feet)	Depth (feet)
Topsoil	1	1
Sand, brown, and clay	13	14
Clay and wood	2	16
Clay, silty, gray	25	41
Wood	1	42
Clay, brown, and wood	38	80
Clay, silty, blue; wood and shells; water-bearing	16	96
Sand, very fine, blue	5	101
Clay, blue	14	115
Silt, blue	25	140
Silt, blue, lots of wood	6	146

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-8M1--Continued		
Sand, very fine, blue; water-bearing	7	153
Sand, medium-grained; water-bearing	16	168

Casing, 8-inch to 153 ft; 15-foot screen.

Well 20/4-10M1

Mountain View-Edgewood Water District. Altitude about 360 feet. Drilled in 1953.

Soil and sandy clay	17	17
Clay, sandy, and small gravel	9	26
Gravel, sand, and brown clay	37	63
Gravel and sand	4	67
Gravel, sand, and light brown clay	64	131
Gravel, a little clay and sand, 3-inch diatomite layer at 141 ft	10	141
Gravel, clay, and sand; water-bearing	4	145
Gravel, sand, and clay	3	148
Clay, gray, and sand	3	151
Clay, brown, and gravel	2	153
Gravel, sand, and clay	21	174
Gravel, a little sand and clay; water-bearing	5	179
"Hardpan"	1	180
Gravel, clay, and sand, hard, streaks of water-bearing material, 181 to 186 ft	16	196
Gravel, cemented, yellow	9	205

Well 20/4-12A1

D. L. Cartwright. Altitude about 65 feet. Drilled by Service Hardware and Implement Co. in 1954.

Sand, silt, clay, and peat	282	282
Sand and gravel, cemented (till?)	23	305
Sand; water-bearing	1	306
Clay	2	308

Casing, 8-inch to 308 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-15N1		
Mountain View-Edgewood Water District. Altitude about 75 feet. Drilled by Service Hardware and Implement Co. in 1953.		
Gravel, clay, boulders, sand	22	22
Clay, soft, yellow, some gravel and sand	5	27
Gravel, 8-inch, with sand, gray clay	3	30
Gravel and little sand; water-bearing	26	56
Gravel, sand, trace of clay; no water	3	59
Gravel, gray sand; water-streak of clay at 67 ft	11	70
Gravel, gray sand; water-bearing	12	82
Gravel, clay, gray sand	12	94
Casing, 12-inch to 93 ft; perforated 70 to 82 ft.		
Well 20/4-16P3		
David Heath. Altitude about 30 feet. Drilled by Gordon Jones.		
Topsoil	6	6
Sand, silt, logs; water-bearing	174	180
Gravel, pea, flow 5 gpm	1	181
Sand, fine	49	230
Gravel, flow 11 gpm	-	-
Well 20/4-17F1		
Western Washington Experiment Station. Altitude about 25 feet. Drilled by N. C. Jannsen in 1950.		
Sand and clay	95	95
Gravel, small, and sand	20	115
Sand and clay	122	237
Sand, fine	58	295
Sand, coarse	45	340
Sand, fine, and clay	50	390
Gravel, small, coarse sand	68	458
Clay	42	500

Casing, 18- to 10-inch to 475 ft; perforated 390 to 458 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-17K1		
Arnold Kaelin. Altitude about 25 feet. Drilled by F. Jensen in 1932.		
No record	25	25
Clay, reddish, fine sand	15	40
Clay	5	45
Clay, soft, fine sand	6	51
Clay, hard in part, gray	10	61
Silt, dark, and gray clay	4	65
Sand, coarse, packed	3	67
Muck	4	71
Clay, soft, dark blue	5	76
Sand, medium to coarse	5	81
Silt, clay, coarse sand	10	91
Silt and clay	3	94
Sand, medium-grained, hardpacked	2	96
Muck	5	101
Muck and clay, with shells	5	106
Silt and clay	67	173
Sand, coarse	1	174
Silt and clay	12	186
Sand; water-bearing	21	207
Silt, soft and mucky	30	237
Silt, hardpacked	10	247
Clay and silt, hardpacked	8	255
Silt, coarser, contains one 6-inch streak of packed fine gravel	12	267

Casing, 2-inch to 182 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/4-17M1		
Western Washington Experiment Station. Altitude about 25 feet. Drilled by J. C. Jannsen in 1949.		
Clay, sandy	30	30
Sand	120	150
Clay, sandy	30	180
Sand	30	210
Clay	27	237
Clay, sandy	43	280
Sand, coarse	90	370
Clay, sandy	20	390

Casing, 18- to 10-inch to 390 ft; perforated 280 to 380 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-18H1		
Puyallup Dairy Farm. Altitude about 25 feet. Drilled by N. C. Jannsen in 1924.		
Clay, sandy	22	22
Sand	40	62
Sand, black	28	90
Sand	61	151
Clay, sandy	29	180
Sand, clay at 428 ft	248	428
Clay, sandy	25	453
Clay	59	512
No record	38	550
Casing, 8-inch to 550 ft; perforated 275 to 290 ft.		
Well 20/4-8J1		
--Kriesman. Altitude about 25 feet. Drilled by Ralph Charlton in 1947.		
Sand	175	175
Sand, coarse	25	200
Casing, 6-inch to 200 ft.		
Well 20/4-18N1		
J. S. Sasaki. Altitude about 20 feet. Drilled by J. L. Bell in 1960.		
Topsoil	2	2
Silt, brown, and clay	17	19
Silt, gray, and clay; water-bearing	26	45
Silt, blue	35	80
Clay	10	90
Sand and silt, blue, shells and wood	34	124
Clay, brown, and silt	15	139
Sand, very fine, blue; water-bearing	7	146
Silt, gray, and clay	12	158
Sand, some clay	4	162
Sand, fine; water-bearing	11	173
Casing, 8-inch to 158 ft; perforated 158 to 173 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-20C1		
Stanley Sulkosky. Altitude about 25 feet. Drilled by Richardson Well Drilling Co. in 1952.		
Loam, sandy	10	10
Sand, mucky; water-bearing	30	40
Sand, heaving	10	50
Clay, sand, gravel	15	65
Clay, sand; water-bearing	48	113
Clay and sand	65	178
Sand, heaving	40	218
Sand, coarse, and gravel	5	223
Clay, sand, and gravel	17	240
Clay, sandy	6	246
Clay, sand, and gravel	15	261
Clay, sandy	7	268
Clay	11	279
Clay, sandy	5	284
Clay, sand, gravel	3	287
Sand, some gravel	9	296
Sand and clay	8	304
Clay, sandy	102	406
Sand, heaving	18	424
Clay, blue	3	427
Clay, sandy	37	464
Clay, fine, blue	67	531
Clay, sticky, blue	16	547
Gravel and clay	30	577
Sand, silt; water-bearing	2	579
Clay, sand, gravel	2	781
Sand; water-bearing	4	785
Clay, sand, gravel	14	799
Sand, gravel; water-bearing	2	801

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 20/4-20J1		
W. G. Knott. Altitude about 30 feet. Drilled by Service Hardware and Implement Co. in 1953.		
No record	171	171
Clay and brown sand	18	189
Sand, brown, can drill open hole	21	210
Sand, brown to gray, can drill open hole	7	217
Sand, brown	19	236
Clay, brown, and sand	10	246
Sand, black, and clay	19	265

Casing, 4-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-20K1		
E. R. Partridge. Altitude about 25 feet. Drilled by Nels Nelson in 1948.		
Soil	12	12
Silt and fine sand	80	92
Clay, brown	13	105
Sand, fine, black	40	145
Sand, black; water-bearing	11	156
Clay, blue	4	160
Sand, fine	81	241
Clay, blue	5	246
Sand; water-bearing	17	263
Gravel; water-bearing	4	267
Casing, 6-inch to 267 ft; open bottom.		
Well 20/4-21N1		
J. C. Franzen. Altitude about 25 feet. Drilled by Nels Nelson in 1946.		
Soil and clay	12	12
Sand, fine; water-bearing	58	70
Silt, fine	42	112
Sand and gravel; water-bearing	8	120
Clay	7	127
Silt, fine	71	198
Sand, fine	6	204
Silt, fine	38	242
Sand, fine	6	248
Sand and gravel	6	254
Sand, fine	42	296
Gravel, coarse; water-bearing	2	298
Casing, 6-inch to 298 ft; open bottom.		
Well 20/4-21P1		
Eugene Gambriel. Altitude about 25 feet. Drilled by Nels Nelson in 1946.		
Soil and clay	10	10
Sand, fine; water-bearing	52	62
Silt, fine	98	160
Clay, blue	2	162
Silt, fine	28	190

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-21P1--Continued		
Sand; water-bearing	33	223
Gravel; water-bearing	7	230

Casing, 6-inch to 230 ft.

Well 20/4-23N1

A. G. Stone. Altitude about 35 feet. Drilled by Nels Nelson in 1946.

Soil	12	12
Sand, fine, brown	25	37
Silt, fine	43	80
Sand, fine, black	15	95
Sand, black, gravel; water-bearing	12	107
Clay, brown, and silt	78	185
Sand, coarse, brown; water-bearing	21	206
Silt, brown	12	218
Sand, coarse, black; water-bearing	2	220
Gravel; water-bearing	2	222

Casing, 6-inch to 222 ft.

Well 20/4-24B1

Fibreboard Products, Inc. Altitude about 60 feet. Drilled by N. C. Jannsen in 1938.

No record	45	45
Peat	15	60
Sand, fine, and carbonized wood	70	130
Silt, gritty, gray, some carbonized wood	38	168
Silt, very fine, gray	60	228
Gravel, coarse, dark, and subangular	4	232
Sand, compact, dark gray	59	291
Clay, silty, gray	6	297
Sand, dark gray, some pebbles	75	372
Gravel, coarse, dark, and subangular; water-bearing	70	442
Sand	20	462

Casing, 16-inch to 462 ft. Concrete plug at 462 ft; perforated.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-24B2		
Fibreboard Products, Inc. Altitude about 60 feet. Drilled by N. C. Jannsen in 1938.		
Clay	34	34
Gravel and boulders, some wood	60	94
Shale	34	128
Shale, sandy	6	134
Sand, compacted	17	151
Sand	35	186
Mud, soft	28	214
Sand, compacted	12	226
Sand and gravel	7	233
Sand, compacted	27	260
Gravel	22	282
Sand	84	366
Gravel, clean	70	436
Sand	20	456

Casing, 18- to 12-inch to 456 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/4-24F3		
Standard Brands of California, Inc., well 3. Altitude about 61 feet. Drilled by N. C. Jannsen in 1926.		
Clay	25	25
Gravel and sand	32	57
Sand, fine	15	72
Gravel and sand	18	90
Sand	15	105
Gravel and sand	15	120
Sand	20	140
Gravel and sand	37	177
Sand	17	194
Mud, blue	13	207
Sand	15	222
Gravel and sand	16	238
Sand	8	246
Gravel and sand	23	269
Sand, fine	24	293
Sand	15	308
Sand, hard	7	315
Sand, fine	84	399
Sand	11	410
Sand, fine	25	435
Sand, hard	20	455
Gravel, clean	7	462
Gravel, coarse; water-bearing	46	508

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-24F3--Continued		
Clay, sticky, blue	64	572

Casing, 18-inch to 562 ft; perforated 462 to 508 ft.

Well 20/4-25J1

L. O. Faunce. Altitude about 75 feet. Drilled.

Loam and clay	80	80
Sand, coarse	30	110
Clay, brown	15	125
Sand and gravel	4	129

Casing, 8-inch.

Well 20/4-25P1

Ed Noble. Altitude about 75 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1953.

Topsoil	5	5
Logs	4	9
Clay, sandy	11	20
Sand, gravel; water-bearing	30	50
Clay	25	75
Clay, sand and gravel	15	90
Sand, coarse	2	92

Casing, 6-inch to 92 ft.

Well 20/4-26R1

F. E. Sandford. Altitude about 70 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1946.

Soil	4	4
Clay	16	20
Clay and sand	20	40
Sand and gravel	5	45
Sand, silty	15	60
Silt and sand, heaving	50	110
Gravel, coarse	2	112

Casing, 6-inch to 112 ft; open bottom.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-27J1		
Puyallup Ice Co. Altitude about 50 feet. Drilled by L. R. Gaudio in 1953.		
Sand	20	20
Clay, sandy	20	40
Clay, soft, sandy, and rocks	46	86
Sand and gravel up to 3 inches, dark gray	6	92
Sand, fine, and clay	34	126
Sand, clay, and rocks	4	130
Sand and clay	20	150
Sand and gravel	5	155
Clay	30	185
Sand and clay	22	207
Sand and gravel, dirty	6	213
Sand and gravel, finer near 221 ft	8	221
Clay	6	227
Sand and gravel	6	233
Casing, 12-inch.		
Well 20/4-28E1		
F. J. Plottenberger. Altitude about 37 feet. Driven in 1942.		
Silt and clay	20	20
Gravel	3	23
Clay	56	79
Gravel	3	82
Casing, 2-inch.		
Well 20/4-28H4		
Puyallup Ice Co. Altitude about 45 feet. Drilled by R. R. Charlton in 1948.		
Gravel, water	45	45
Sand and clay	203	248
Gravel	5	253
Casing, 6-inch to 253 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-28J1		
Puyallup Ice Co. Altitude about 45 feet. Drilled by R. R. Charlton in 1948.		
Clay, sandy	45	45
Gravel, fine, iron in water	40	85
Sand and clay	162	247
Gravel and sand, clean; water-bearing	5	252
Casing, 6-inch.		
Well 20/4-29F1		
A. R. Hartman. Altitude about 30 feet. Drilled by R. R. Charlton in 1946.		
Sand	250	250
Clay	8	258
Gravel	7	265
Casing, 6-inch 0 to 172 ft, 4-inch 172 to 265 ft.		
Well 20/4-30J1		
Charles Waldherr. Altitude about 160 feet. Drilled by Duane Willson in 1960.		
Fill	10	10
"Hardpan," blue	44	54
"Hardpan," softer, yellow	31	85
Sand and gravel; water, 5 to 10 gpm	12	97
Gravel, coarse	-	97
Casing, 6-inch to 95 ft.		
Well 20/4-30L1		
V. Kershner. Altitude about 355 feet. Drilled by Richardson Well Drilling Co. in 1956.		
Topsoil	3	3
Clay, sand, and gravel	21	24
Sand and clay	39	63
Clay, sand, gravel; hard streaks	35	98
"Hardpan"	36	134
Sand, gravel, streaks of clay	6	140
Casing, 6-inch to 140 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-31D1		
Summit Water and Supply Co., well 2. Altitude about 380 feet. Drilled by L. R. Gaudio in 1950.		
Soil	7	7
Till	23	30
Sand, a little pea gravel	19	49
Sand and brown clay	2	51
"Hardpan," gray	39	90
Gravel with clay, loose	3	93
"Hardpan," gray	17	110
"Hardpan," yellow	16	126
"Hardpan," gray	8	134
"Hardpan," yellow	10	144
"Hardpan," gray	29	173
Sand and gravel; water-bearing	9	182
Gravel, cemented, gray	48	230
Gravel, gray, and clay	8	238
Gravel and clay	30	268
"Hardpan," yellow	22	290
Gravel, cemented	21	311

Casing, 12-inch; perforated 90 to 100 ft, and 171 to 184 ft.

Materials	Thickness (feet)	Depth (feet)
Well 20/4-31G1		
J. J. Lyon. Altitude about 350 feet. Drilled by Service Hardware and Implement Co. in 1952.		
Sand, gravel, and clay	16	16
"Hardpan"	21	37
Gravel, cemented	5	42
"Hardpan," boulders	4	46
Gravel, hard, and boulders	15	61
Gravel, hardpacked, and clay boulder at 70 ft	12	73
Gravel, hardpacked, and clay	3	76
"Hardpan," rocky	26	102
Gravel, hardpacked, with clay	10	112
Gravel, some water	14	126

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Well 20/4-31G2

James Brown. Altitude about 340 feet. Drilled by Service Hardware and Implement Co.

Materials	Thickness (feet)	Depth (feet)
No record	48	48
Gravel; water-bearing	5	53
Gravel, a little clay	8	61
Gravel and sand, loose	8	69
Clay and gravel	4	73
Lava (?) red; a little water	11	84
Gravel, cemented	3	87
Gravel; water-bearing	6	93

Casing, 6-inch to 93 ft.

Well 20/4-32J1

City of Puyallup. Altitude about 210 feet. Drilled by N. C. Jannsen in 1945.

Materials	Thickness (feet)	Depth (feet)
Clay and peat	23	23
Sand, fine gravel, clay (water flowed about 10 gpm at 36 ft)	13	36
Sand and gravel	10	46
Sand, medium to coarse	4	50
Sand and some gravel	13	63
Sand, fine	10	73
Gravel	1	74
Sand, fine	4	78
Clay, fine sand, and gravel	29	107
Gravel, coarse	1	108
Sand	4	112
Clay, sand, and gravel	3	115
Sand and gravel (water, 1,500 gpm)	11	126
Sand and gravel	9	135
Gravel, coarse	10	145
Gravel and sand (water flowing about 500 gpm)	7	152
Gravel and clean sand	10	162
Clay, blue	2	164

Casing, 12-inch 0 to 126 ft, 139 to 162 ft, 16-inch 126 to 139 ft; perforated 46 to 78 ft.

Well 20/4-34C1

Lutheran Welfare Society. Altitude about 50 feet. Drilled by E. J. Webber in 1947.

Materials	Thickness (feet)	Depth (feet)
Sand	34	34
Sand, a little gravel; water-bearing	2	36

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-34C1--Continued		
Sand; water-bearing	94	130
Clay, sandy	24	154
Sand	18	172
Clay, brown, and sand	18	190
"Quicksand"	13	203
Clay and gravel	2	205
Clay, fine, sandy	42	247
Silt, fine, heaving	5	252
Clay, blue	8	260
Gravel, some sand	4	264

Casing, 6-inch to 264 ft; open bottom.

Well 20/4-34E1

John Mladinich. Altitude about 50 feet. Drilled by Service Hardware and Implement Co. in 1952.

Sand, silt, clay	26	26
Sand	1	27
Sand, silt, clay	10	37
Gravel and sand, packed	6	43

Casing, 6-inch to 43 ft.

Well 20/4-34G1

City of Puyallup. Altitude about 150 feet. Drilled by L. R. Gaudio, 1962.

"Hardpan"	40	40
Sand, gravel, clay	15	55
Sand and clay	10	65
Sand, gravel, clay	20	85
Sand, gravel, clay, cemented	69	154
Sand and gravel	3	157
Sand and gravel, clay streaks	17	174
Sand and garvel, cemented	14	188
Sand and gravel	4	192
Sand and gravel, cemented	18	210
Sand and gravel	13	223
Clay	3	226
Sand and gravel	8	234
Sand and gravel, cemented	14	248
Clay	7	255

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-34G1--Continued		
Sand and gravel	10	265
Sand and gravel, clay streaks	29	294
Sand, some gravel; water-bearing	33	327
Clay and silt	8	335
Sand and gravel, some clay	14	349
Sand, some gravel	18	367
Clay and peat	5	372
Sand, gravel, silt	50	422
Sand and gravel	55	477
Silt and clay	3	480
Sand, some tough layers	13	493
Sand and gravel	20	513
Sand, silt, and clay	4	517
Sand and gravel	3	520
Sand and silt	15	535
Sand and gravel	38	573
Gravel, cemented	1	574

Casing, 16-inch to 330 ft, 12-inch to 563 ft; screened 563 to 573 ft.

Well 20/4-35D1

Arthur Sandberg. Altitude about 65 feet. Drilled by Service Hardware and Implement Co. in 1955.

Materials	Thickness (feet)	Depth (feet)
Open hole	40	40
Gravel	28	68
Clay and sand	12	80
Sand and gravel	5	85
Clay	8	93
Sand	7	100
Gravel	3	103
Clay, silt, and sand	22	125
Sand	8	133
Sand and shells	13	146
Sand, fine	15	161

Casing, 8-inch to 161 ft; perforated 38 to 50 and 100 to 125 ft.

Well 20/4-35J2

A. H. Peterson. Altitude about 205 feet. Drilled by Service Hardware and Implement Co. in 1953.

Materials	Thickness (feet)	Depth (feet)
Clay	43	43
Clay and sand	12	55

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-35J2--Continued		
Gravel, cemented, and boulders	44	99
Gravel, cemented; water-bearing	31	130
"Hardpan"	8	138
Gravel, cemented, and boulders	4	142
Boulders	2	144
Gravel, cemented, and boulders; water-bearing	49	193
Gravel; water-bearing	2	195

Casing, 6-inch to 195 ft.

Well 20/4-35L1

C. R. Johnson. Altitude about 340 feet. Drilled by R. R. Charlton in 1947.

"Hardpan"	11	11
Gravel	11	22
Clay, blue, and gravel	16	38

Casing, 8-inch to 38 ft; perforated 11 to 16 ft.

Well 20/4-35R1

A. J. Kolowinski. Altitude about 315 feet. Drilled by Richardson Well Drilling Co. in 1957.

Sand	22	22
Clay, sand, gravel	8	30
Clay, sandy	37	67
Clay, sand, gravel	2	69
Clay, sandy	5	74
Sand, dirty; water, 10 gpm	1	75
Clay, sand, gravel	5	80
Rock, cemented	7	87
Clay, sandy, and gravel, hard	33	120
Clay, sandy	70	190
"Hardpan"	25	215
Clay, sand, gravel	18	233
"Hardpan"	24	257
"Hardpan," brown	13	270
Clay, gritty, brown, and gravel	7	277
Sand, water	1	278
"Hardpan"	10	288

Casing, 6-inch to 288 ft.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/4-36A1		
Don Swanson. Altitude about 70 feet. Drilled by Pete Sylte in 1946.		
Soil	5	5
Clay and sand	12	17
Sand, muddy; water-bearing	78	95
Sand and gravel; water-bearing	5	100
Casing, 6-inch to 100 ft.		
Well 20/4-36G1		
Emil Johnson. Altitude about 80 feet. Drilled by Nels Nelson in 1946.		
Sand, fine	14	14
Gravel; water-bearing	4	18
Clay and gravel	55	73
Sand; water-bearing	5	78
Sand and gravel; water-bearing	17	95
Casing, 6-inch to 95 ft.		
Well 20/4-36H3		
L. L. Wade. Altitude about 76 feet. Drilled by Pete Sylte in 1946.		
Soil	4	4
Sand	7	11
Sand and clay	16	27
Sand and gravel; water-bearing	8	35
Sand, gravel, and clay	35	70
Sand and gravel; water-bearing	16	86
Casing, 8-inch to 86 ft; open bottom.		
Well 20/5-3N1		
O. E. McAllister. Altitude about 505 feet. Dug by owner in 1948.		
Soil	12	12
"Hardpan"	40	52
Sand and gravel; water-bearing	3	55
Casing, 42-inch to 12 ft.		

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/5-5J1		
Lake Tapps Water Co. Altitude about 570 feet. Drilled by L. R. Gaudio in 1955.		
"Hardpan"	84	84
Sand and gravel	10	94
Gravel, cemented	3	97
Casing, 10-inch to 88 ft; screened from 88 to 97 ft.		
Well 20/5-7D1		
Dieringer School District 343. Altitude about 65 feet. Drilled by Service Hardware and Implement Co. in 1954.		
Clay and silty sand (cedar log at 60 ft)	90	90
Sand, fine; water flows	40	130
Clay, soft, brown; rocks and gravel	20	150
Gravel, hardpacked with clay; water flows 200 gpm	76	226
Clay, sand layers; water-bearing	87	313
Clay and till, sand layers	73	386
Clay	22	408
Sand, thin layers	-	408
Casing, 12 to 10-inch to 408 ft; perforated 215 to 238 and 245 to 286 ft.		
Well 20/5-17M1		
Lake Tapps Development Co. Altitude about 655 feet. Drilled by L. R. Gaudio.		
Gravel, large rocks	14	14
"Hardpan," gravel, large rocks	25	39
Gravel, cemented	318	357
Sand, brown, and gravel; water-bearing	25	382
Casing, 10-inch.		
Well 20/5-28F1		
Bonney Lake Water Co. Altitude about 643 feet. Drilled by Nicholson Drilling Co. in 1959.		
Till, large boulders	71	71
"Hardpan," blue	67	138

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/5-28F1--Continued		
Unknown	11	149
Sand, fine, brown and dirty gravel	13	162
"Hardpan," blue	28	190
Sand, dirty, yellow, and gravel	20	210
"Hardpan," yellow	18	228
Silt, clayey, brown, and fine gravel	4	232
"Hardpan," gravelly	30	262
"Rock" volcanic agglomerate "mud flow"	33	295
Sand, hard, with large andesite boulders	5	300
Sand, fine, blue; water-bearing	-	-
Sand, clean	1	301
Gravel and sand, coarse; boulders to 4-inch diameter, silty sand matrix with some clay	36	337

Casing, 10-inch to 270 ft, 8-inch 264 to 335 ft; perforated 200 to 335 ft.

Well 20/5-28N1

Bonney Lake Water Co. Altitude about 675 feet. Drilled by Pete Sylte in 1950.

Materials	Thickness (feet)	Depth (feet)
Gravel and sand, dry	13	13
Sand, brown	3	16
Gravel, cemented	83	99
Gravel, dry, and sand	10	109
Gravel, cemented	28	137
Sand, dry and gravel	7	144
Gravel, cemented	7	151
Gravel, dry	7	158
Sand	4	162
Gravel	20	182
Gravel, cemented	18	200
Sand, muddy, and gravel	3	203
Clay, brown, and gravel	47	250
Sand, muddy	9	259
Sand, coarse, muddy	1	260
Clay, brown, and gravel	10	270
Gravel, cemented	16	286
Gravel, muddy	1	287
Gravel, cemented	10	297
Gravel and clay	33	330
Sand, muddy and gravel	4	334
Sand	6	340
Sand and gravel, cemented	10	350
Gravel, cemented	15	365
Clay and gravel	24	389
Gravel, cemented	7	396

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/5-28N1--Continued		
Sand and gravel	2	398
Gravel, cemented	2	400
Clay, brown	12	412
Sand, hardpacked, brown	5	417

Casing, 8-inch to 417 ft; per forated 396 to 398 ft.

Well 20/5-30B1

J. G. Magee. Altitude about 65 feet. Drilled by Pete Sylte in 1945.

Materials	Thickness (feet)	Depth (feet)
Topsoil	4	4
Sand, dry	11	15
Sand; water-bearing	29	44
Clay, sandy, blue	60	104
Sand, fine, muddy; water-bearing	45	149
Gravel, pea-size; small amount of sand	1	150

Casing, 6-inch to 150 ft.

Well 20/5-30E1

Lewis Ryan. Altitude about 75 feet. Drilled by Service Hardware and Implement Co.

Materials	Thickness (feet)	Depth (feet)
Soil, sandy	25	25
Sand, fine, black; water-bearing	3	28
Clay, with rock	97	125
Gravel; water-bearing	6	131

Casing, 6-inch to 131 ft.

Well 20/5-31H1

D. P. Rager. Altitude about 85 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1947.

Materials	Thickness (feet)	Depth (feet)
Soil	6	6
Sand, dirty; water-bearing	15	21
Clay, silty, blue	57	78
Clay, blue, sand and gravel	6	84
Sand and gravel; water-bearing	8	92
Sand and gravel, tight; water-bearing	43	135
Clay, sandy, brown	15	150

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/5-31H1--Continued		
Sand and gravel, dirty	31	181
Sand and gravel; water-bearing	3	184

Casing, 6-inch to 184 ft.

Well 20/5-32M1

Harry Lions. Altitude about 85 feet. Drilled in 1946.

Sand	20	20
Gravel	10	30
Sand	5	35
Clay	60	95
Gravel, pea-size, and sand	20	115
Clay	25	140
Sand and gravel	4	144

Casing, 4-inch to 144 ft.

Well 20/5-33E1

William Rehberg. Altitude about 580 feet. Drilled by O. J. Kesti.

Gravel, loose	22	22
"Hardpan"	48	70
Gravel, loose, and "hardpan"	130	200
Gravel; water-bearing	7	207

Casing, 6-inch to 207 ft.

Well 20/5-34R2

L. C. Morton. Altitude about 630 feet. Drilled by Tacoma Pump and Well Drilling Co. in 1949.

Topsoil	4	4
"Hardpan," "clayey," brown	34	38
"Hardpan," blue	27	65
Clay, sandy	7	72
"Hardpan," rocky	49	121
Gravel, clean	11	132
Gravel, clean, coarse; water-bearing	2	134

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 20/5-34R3		
H. O. Wetrich. Altitude about 600 feet. Drilled by Northwest Well Drilling Co.		
No record	80	80
Sand; water-bearing	65	145
Clay, blue	-	-
Gravel	-	192

Casing, 6-inch.

Materials	Thickness (feet)	Depth (feet)
Well 20/5-35R1		
Ruth Torgerson. Altitude about 615 feet. Drilled by Western Drilling and Equipment Co. in 1958.		
"Hardpan"	25	25
"Hardpan," sandy	23	48
Sand water-bearing	7	55
Clay and sand; water-bearing	46	101
Gravel, cemented	12	113

Casing, 6-inches to 113 ft.

Materials	Thickness (feet)	Depth (feet)
Well 21/2-23G1		
L. J. Wingard. Altitude about 140 feet. Drilled by N. C. Jannsen in 1931.		
Clay and gravel	10	10
Clay, blue	93	103
Sand and gravel	8	111
Sand, hard	24	135
Sand	23	158
Sand, fine	35	193
Clay, blue	10	203
Sand, hard, with some shale (?) and streaks of gravel	114	317
Gravel, cemented	106	423

Casing, 6-inch.

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 21/3-16N1		
Hyada Mutual Water Co., well 3. Altitude about 90 feet. Drilled by L. R. Gaudio in 1957.		
Gravel	4	4
Clay and gravel	11	15
"Hardpan"	44	59
Clay, sandy, yellow	4	63
"Hardpan"	33	96
Sand and gravel, packed	11	107
"Hardpan"	8	115
Clay, blue	10	125
Clay, brown	5	130
"Hardpan," brown; water-bearing	6	136
"Hardpan," blue	2	138
Clay and gravel, brown	12	150
Clay	5	155
Sand, coarse, and gravel	3	158
"Hardpan" and gravel, thin layers	12	170
Sand and gravel	37	207
Casing, 8-inch to 207 ft; perforated 160 to 195 ft.		
Well 21/3-16N2		
Hyada Mutual Water Co. Altitude about 90 feet. Drilled by L. R. Gaudio in 1960.		
Dirt and gravel	32	32
Till, yellow brown	51	83
Gravel, "hardpan"	11	94
Sand and gravel	1	95
"Hardpan"	13	108
Sand and gravel	3	111
Gravel, cemented, and sand, coarse, gray, pebbles	44	155
Sand, quartzose, and pebbles	12	167
"Hardpan," yellow	6	173
Sand with gravel beds, yellow	64	237
Sand, black and yellow grains	13	250
Sand, clay, pebbles	5	255
Sand, gray, with beds of silt and ashy clay	45	300
"Hardpan," blue	10	310
"Hardpan," yellow	6	316
Gravel, cemented	15	331
Sand, coarse, yellowish	7	338
"Hardpan," yellow	2	340
Sand and gravel	10	350
Sand, medium	2	352
"Hardpan," blue	8	360
Clay, silty, blue	10	370

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 21/3-16N2--Continued		
Clay, gray	25	395
Clay, sandy, gray	5	400
Sand, coarse, gray	12	412
Clay, gray	1	413
Gravel, cobbles, and coarse sand	6	419

Casing, 8-inch.

Well 21/3-16P2

Hyada Mutual Water Co., well 2. Altitude about 310 feet. Drilled by L. R. Gaudio in 1947.

Materials	Thickness (feet)	Depth (feet)
Boulders and sand	45	45
Gravel, fine; water-bearing	13	58
Gravel, fine, sand; water-bearing	25	83
Sand and blue clay	27	110
Sand and heavy gravel	2	112
Boulders, thin sand zones and streaks of clay	111	223
Gravel and sand; water-bearing	30	253
Sand, thin layers of clay	35	288
Gravel; water-bearing	6	294

Casing, 8-inch to 294 ft.

Well 21/3-22Q1

National Oyster Co. Altitude about 15 feet. Drilled in 1950.

Materials	Thickness (feet)	Depth (feet)
"Hardpan," layered with gravel	24	24
Gravel	42	66
Gravel, coarse; water-bearing	9	75

Casing, 6-inch to 75 ft.

Well 21/3-25L1

Woodworth Co. Altitude about 125 feet. Drilled by G. H. Hillman in 1953.

Materials	Thickness (feet)	Depth (feet)
Sand, gravel and clay, dry	16	16
Sand, some clay	13	29
Sand, clay; water-bearing	15	44
Sand, clean, gravel; water-bearing	1	45
Sand and clay; water-bearing	5	50

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 21/3-25L1--Continued		
Sand, gravel; water, fairly clean	2	52
Clay, sandy, blue	10	62
Sand, gravel; water-bearing	1	63
Sand, dry, clay, thin layers of sand with water	24	87
Sand, dry, hardpacked, gravel and clay	24	111
Sand, hardpacked, gravel, clay; water-bearing	9	120
Sand, cleaner; gravel and water	2	122
Sand, cleaner; gravel, slightly looser	8	130
Gravel, loose, coarse, sand; water-bearing	2	132
Clay, hardpacked; water-bearing	10	142
Gravel, loose, water, some clay	2	144
Sand, gravel and clay, hardpacked	8	152
Sand, fine, gravel and clay; water-bearing	6	158
Sand, fine, gravel and clay; loose, with more water	6	164
Clay; less water	6	170
Sand, blue, gravel and clay, looser	3	173
Sand, loose, clean and gravel; water-bearing	7	180
Clay, hardpacked	3	183
Gravel, loose, coarse and sand; water-bearing	10	193
Clay, blue	3	196

Casing, 8-inch to 193 ft.

Well 21/3-26N1

City of Tacoma, tideflats, well 1. Altitude 10.9 feet. Drilled by N. C. Jannsen in 1927.

Materials	Thickness (feet)	Depth (feet)
Pit	10	10
Sand	132	142
Sand and sandy clay	20	162
Sand	20	182
Clay	20	202
Clay, sandy	24	226
Clay	64	290
Sand, fine	20	310
Sand and gravel, in streaks	30	340
Clay, contains marine shells	92	432
Clay, sandy	16	448
Clay, sticky, blue	2	450
Clay	6	456
Gravel	2	458
Clay	10	468
Gravel, loose; water-bearing	17	485
Sand and gravel	21	506
Gravel, loose; water-bearing	14	520
Gravel and cemented gravel	10	530
Gravel and streaks of blue clay	12	542

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 21/3-26N1--Continued		
Sand and gravel, hard	15	557
Sand, hard	5	562
Gravel, coarse, and sand	9	571
Gravel, coarse	17	588
Gravel, cemented	4	592
Gravel, cemented, and boulders	16	608
Clay, blue	6	614
Boulders	4	618
Clay, blue	7	625
Clay, blue, and sand	12	637
Clay, blue	8	645
Sand	8	653
Sand, compact	7	660
Gravel and sand; water-bearing	6	666
Gravel, coarse; water-bearing	12	678
Gravel and sand	6	684
Gravel, coarse; water-bearing	52	736
Gravel, coarse, with sand	4	740
Gravel, cemented	4	744
Sand, fine	12	756
Sand (log at 758 ft)	2	758
Shale (?)	4	762
Sand	2	764
Shale (?)	21	785

Casing, 24-inch to 779 ft; perforated 465 to 595 ft.

Well 21/3-27J1

Hooker Chemical Corp. Altitude about 10 feet. Drilled by N. C. Jannsen in 1938.

Materials	Thickness (feet)	Depth (feet)
Sand and wood	86	86
Clay, sandy, blue	61	147
Gravel, cemented	27	174
Gravel and clay	16	190
Gravel, cemented, and boulders	53	243
Gravel	19	262
Gravel, cemented	4	266
Gravel, loose, with boulders	38	304
Gravel	24	328
"Hardpan"	24	352
Wood	2	354
Gravel	20	374
Clay, blue	24	398
Clay and gravel	16	414
Gravel, cemented	6	420
Gravel	10	430

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 21/3-27J1--Continued		
Gravel and clay	10	440
Clay, sandy	14	454
Clay, blue	73	527
Gravel	18	545
Shale (?) green	25	570
Sand, fine	40	610
Sandstone (?)	10	620
Clay, blue	137	757
Gravel; water-bearing	53	810
Clay	90	900
Sand and gravel	6	906
Clay	16	922
Gravel, cemented	12	934
Gravel and clay	14	948
Clay, sandy	20	968
Gravel	4	972
Clay, hard, and gravel	36	1,008
Clay	4	1,012
Gravel, cemented; water-bearing	123	1,135
Clay and gravel	3	1,138
Sand and gravel	8	1,146
Clay and gravel	70	1,216

Casing, 18-inch, 0 to 247 ft; 16-inch, 220 to 660 ft; 12-inch, 0 to 100 ft; 10-inch, 100 to 1,157 ft; perforated 757 to 763 ft, 792 to 810 ft, 965 to 975 ft, 1,000 to 1,025 ft, 1,070 to 1,093 ft, and 1,120 to 1,145 ft.

Well 21/3-35B1

Buffelen Woodworking Co. Altitude about 7 feet. Drilled by N. C. Jannsen in 1927.

Materials	Thickness (feet)	Depth (feet)
Clay	45	45
Sand	43	88
Clay	164	252
Sand, brown, some gravel	50	302
Sand	28	330
Sand, fine	86	416
Clay, blue	30	446
Sand	12	458
Clay	23	481
Gravel and boulders	53	534
Clay	27	561
Gravel, cemented	29	590
Clay	153	743
Sandstone (?)	27	770
Sand, gravel, and cobbles	42	812

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 21/3-35B1--Continued		
Sand, hard; log at bottom	8	820
Gravel	15	835
Gravel, clean	21	856

Casing, 18-inch to 782 ft, 12-inch 750 to 856 ft; perforated 835 to 850 ft.

Well 21/3-36L1

Kaiser Aluminum Corp. Altitude about 19 feet. Drilled by A. A. Durand and Son in 1952.

Materials	Thickness (feet)	Depth (feet)
Sand, fine, silty, gray	30	30
Clay and silt, brown	10	40
Sand, fine to medium, contains some coarse sand and pebbles	85	125
Sand, medium to coarse, gray, contains pebbles and many shell fragments	5	130
Sand, fine to medium, gray	50	180
Sand, fine to coarse, gravel	57	237
Silt and very fine sand	53	290
Sand, fine to medium, gray	25	315
Sand, coarse (uniform), gray	29	344
Clay and silt, hard, brown, laminated, contains wood fragments	8	352
Sand, fine, gray	148	500
Silt and very fine sand, brown, several shell fragments	40	540
Silt and clay, brown	70	610
Boulders, gravel, and sand	5	615
Clay, gray	70	685
Clay, silt, and very fine gray sand	35	720
Silt and very fine gray sand	15	735
Clay and silt	40	775
Silt and very fine sand, gray	105	880
Sand, very fine to fine, gray	27	907
Sand, medium to coarse	23	930
Sand, medium	20	950

Casing, 8-inch.

Well 21/3-36L2

Kaiser Aluminum Corp. Altitude about 15 feet. Drilled by N. C. Jannsen in 1942.

Materials	Thickness (feet)	Depth (feet)
Clay	29	29
Sand	11	40
Clay	18	58
Sand	8	66
Gravel	6	72

Table 7.--Drillers' logs of representative wells.--Continued

Materials	Thickness (feet)	Depth (feet)
Well 21/3-36L2--Continued		
Clay	9	81
Gravel	57	138
Clay	72	210
Sand	16	226
Clay	82	308
Sand	222	530
Clay	96	626
Gravel	38	664
Clay	18	682
Gravel	32	714
Sand	28	742
Gravel	30	772
Sand	6	778
Gravel	50	828
Cap rock (?)	8	836

Casing, 24- to 18-inch.

Well 21/3-36P1

Kaiser Aluminum Corp. Altitude about 19 feet. Drilled by N. C. Jannsen in 1942.

Clay	28	28
Sand	20	48
Clay	18	66
Sand	23	89
Clay	15	104
Sand	6	110
Clay	37	147
Shale (?)	30	177
Sand	28	205
Clay	20	225
Sand	16	241
Gravel	47	288
Sand	177	465
Gravel, fine	44	509
Sand	6	515
Clay	105	620
Gravel; water-bearing	60	680
Clay	62	742
Gravel; water-bearing	11	753
Clay	29	782
Gravel; water-bearing	32	814
Gravel, cemented	10	824

Casing, 18-inch to 824 ft.

Table 8.--Chemical analyses

Well	Depth (feet)	Date of collection	Analyst	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
16/3-22A2	426	2-8-61	GS	48	48	--	0.26	26	3.7
16/4-5D1	116	12-15-60	GS	49	50	-	.23	21	12
18/2-34E1	21	1946	NP	-	14	-	-	5.0	5.0
18/2-34Q5	149	11-28-60	GS	49	31	-	.15	10	4.6
18/4-10Q1	98	11-28-60	GS	49	33	-	T.5	16	6.3
19/1-34G1	36	11-10-47	GS	51	23	0.0	0.0	12	3.9
		1-26-49	GS	-	21	-	-	11	3.8
		5-26-50	GS	58	21	-	.03	10	3.6
		7-23-52	GS	56	21	-	.05	11	4.5
		9-10-53	GS	52	22	-	.07	11	3.6
		9-13-54	GS	51	21	-	.06	11	3.6
		10-10-55	GS	51	19	-	.02	12	3.3
		11-6-56	GS	51	17	-	.05	12	3.0
		1-13-58	GS	53	16	-	.04	12	3.7
19/2-1K2	175	7-31-50	NW	-	31	.10	T.1	9.3	5.8
		12-23-55	NW	-	52	-	T.18	11	5.9
19/2-2M2	572	1958	NW	-	40	-	T.1	8	5.4
19/2-10F5	503	3-22-60	GS	56	41	-	.46	9	5.2
19/2-10L1	638	12-23-55	NW	-	46	-	T.06	7.9	5.9
19/2-12A1	141	11-12-59	GS	52	24	-	.47	17	4.3
		9-22-60	GS	52	28	-	.03	16	5.5
		9-20-61	GS	52	29	-	.02	18	3.9
19/2-13G1	200	5-27-48	GS	52	37	-	.01	9.6	4.6
		7-21-49	GS	52	36	-	.05	11	4.6
		6-22-50	GS	50	35	-	.05	10	4.6
		1-5-51	GS	52	35	-	.01	9.8	4.5
		3-13-52	GS	-	34	-	.04	10	4.9
		12-10-52	GS	52	33	-	.04	11	5.1
		11-19-53	GS	-	36	-	.04	11	5.2
		11-5-54	GS	54	33	-	.06	11	5.5
		10-18-55	GS	52	29	-	.00	10	4.9

of water from wells and springs.

Parts per million													
Sodium (Na)	Potassium (K)	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO3)	Phosphate (PO4)	Dissolved solids (calculated)	Hardness (as CaCO3)	Specific conductance (Micromhos at 25°C)	pH	Color
25	2.0	160	0	1.4	3.2	0.1	0.2	0.39	189	80	249	7.7	20
10	2.5	142	0	1.2	2.5	.1	.1	.26	170	100	223	7.4	5
-	-	38	0	2.0	9.0	-	-	-	-	33	-	-	-
5.1	1.3	63	0	.4	2.8	.1	.6	.26	87	44	110	7.5	5
6.4	2.9	96	0	3.0	2.5	.1	.1	.49	118	66	160	7.8	5
-	-	36	0	15	8.2	.1	3.1	-	-	46	121	6.5	-
-	-	39	0	14	6.1	.1	2.0	-	-	43	118	7.5	-
4.7	2.2	38	0	13	4.8	.2	1.2	-	79	40	105	6.9	-
5.6	.8	40	0	14	5.0	.1	3.2	-	85	46	121	7.0	5
5.4	.7	42	0	13	4.7	.1	3.4	-	85	42	119	6.6	3
4.5	.7	36	0	15	4.9	.1	1.9	-	80	42	114	7.5	5
5.4	1.0	40	0	13	4.5	-	3.6	-	82	44	121	6.5	0
5.0	.6	38	0	15	4.5	-	1.5	-	78	42	117	6.3	0
5.4	.7	41	0	14	4.5	-	3.8	-	80	45	122	6.5	5
9.3		71	0	5.8	6.3	-	Tr	-	103	47	-	7.7	-
11		76	0	4.4	6.8	-	.0	-	129	52	-	7.5	0
16		77	4	2.0	7.9	.0	Tr	-	121	42	-	7.5	-
6.1	1.5	67	0	2.1	2.2	.1	.5	.28	101	44	119	7.5	5
14		77	0	2.6	6.8	-	-	-	122	44	-	7.4	0
8.7	2.7	83	0	5.2	6.2	.0	.2	-	110	60	165	7.8	0
7.0	2.9	82	0	5.8	3.8	.1	.1	-	109	62	155	7.8	5
6.7	2.8	83	0	7.6	3.0	.1	.2	-	112	61	151	7.7	0
-	-	62	0	3.0	2.8	.1	.2	-	-	43	111	7.0	-
-	-	62	0	4.8	3.0	.1	1.0	-	-	46	123	7.5	-
4.9	2.2	60	0	4.2	3.1	.2	1.1	-	95	44	115	7.0	-
5.3	3.4	61	0	5.0	2.9	.3	.8	-	97	43	112	7.7	5
5.4	2.2	65	0	5.8	2.8	.0	.9	-	98	45	117	7.6	2
5.4	2.2	62	0	6.4	3.2	.1	1.2	-	98	48	126	7.3	5
5.8	1.9	62	0	5.1	2.6	.1	1.0	-	99	49	121	7.6	3
6.5	1.7	62	0	6.6	3.5	.1	1.5	-	100	50	127	7.2	5
5.5	2.1	61	0	5.9	3.0	-	1.6	-	92	45	123	7.4	0

Table 8.--Chemical analyses

Well	Depth (feet)	Date of collection	Analyst	Temperature (°F)					
					Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
		12-10-56	GS	54	30	0.0	0.02	11	4.8
		10-14-57	GS	52	-	-	-	12	5.2
		11-5-58	GS	54	35	-	.01	12	4.7
		11-12-59	GS	52	33	-	-	12	4.1
		9-21-60	GS	52	33	-	-	12	5.3
		9-20-60	GS	54	33	-	-	12	4.9
19/2-13G2	298	7-21-49	GS	52	29	-	.03	14	5.3
		6-22-50	GS	50	28	-	.06	13	5.4
		1-5-51	GS	52	29	-	.04	16	6.6
		3-13-52	GS	-	27	-	.06	13	5.6
		12-10-52	GS	54	26	-	.06	12	5.4
		11-19-53	GS	-	28	-	.07	13	5.3
		11-5-54	GS	55	26	-	.05	13	5.9
		10-18-55	GS	53	26	-	.03	13	5.1
		12-10-56	GS	54	25	-	.01	15	5.8
		10-14-57	GS	54	-	-	.01	14	6.4
		11-5-58	GS	54	28	-	.08	16	4.9
		11-12-59	GS	54	32	-	.01	15	5.5
		9-21-60	GS	54	26	-	.01	14	5.2
		9-20-61	GS	55	27	-	-	14	5.5
19/2-14B2	110	3-28-51	NW	-	32	-	T	12	4.2
		12-23-55	NW	-	51	-	T.34	13	5.1
19/2-14L1	220	11-13-59	GS	50	24	-	.03	7	3.3
		9-22-60	GS	52	29	-	.04	7	3.6
		9-20-61	GS	52	28	-	.01	7	3.9
19/2-14L2	435	11-5-58	GS	48	33	-	.35	10	4.4
		11-13-59	GS	50	35	-	.27	9	5.0
		9-22-60	GS	52	33	-	.23	9	5.1
		9-20-61	GS	54	32	-	.21	9	4.9
19/2-16R1	224	12-26-55	NW	-	40	-	T.08	8.7	5.3
19/2-18Q1	239	4-3-42	GS	-	31	-	-	10	5.8
		11-10-47	GS	52	36	-	-	14	6.0
		5-26-50	GS	54	9.2	-	T.60	9.1	3.2
		5-2-51	GS	53	30	-	1.1	9.8	5.2
		7-23-52	GS	-	30	-	.09	9.4	6.2
		9-10-53	GS	53	31	-	1.2	9.4	5.2

of water from wells and springs.--Continued

Parts per million													
Sodium (Na)	Potassium (K)	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO3)	Phosphate (PO4)	Dissolved solids (calculated)	Hardness (as CaCO3)	Specific conductance (Micromhos at 25°C)	pH	Color
5.4	2.1	62	0	5.9	3	0.0	1.2	0.00	94	47	123	7.4	0
5.4	2.2	60	0	6.3	3.2	.1	1.8	-	-	51	127	7.6	0
5.3	2.3	64	0	5.7	3.2	.1	1.4	-	102	50	124	7.8	5
5.4	1	63	0	5.7	2.5	-	1.5	-	96	47	129	7.8	0
5.8	2.4	64	0	7.2	3.2	.1	2.6	-	104	52	136	7.8	5
5.8	2.3	64	0	7.2	3.5	.1	1.1	-	102	50	127	7.3	5
-	-	66	0	6.3	4.1	.2	4.3	-	-	57	143	7.2	-
5.2	2.4	64	0	6.9	4.0	.2	4.9	-	102	55	140	7.0	-
6.0	3.8	74	0	9.1	4.5	.3	11	-	123	67	164	7.4	5
5.5	1.6	68	0	8.7	3.9	.0	4.4	-	103	56	141	7.4	3
5.1	1.7	62	0	7.7	3.9	.1	3.0	-	95	52	134	7.4	7
5.6	1.7	60	0	7.3	3.7	.1	3.3	-	98	54	133	7.4	3
5.1	1.6	60	0	8.1	4.0	.1	4.3	-	98	57	137	7.0	5
5.5	1.9	60	0	8.3	4.0	.0	5.7	-	100	53	139	7.2	0
5.7	1.9	65	0	10	4.8	.0	6.5	-	107	61	155	7.1	0
5.9	1.9	64	0	9.1	4.5	.1	7.6	-	-	61	157	7.4	0
5.6	1.9	63	0	9.2	4.5	.1	5.4	-	107	60	147	7.2	0
5.6	1.9	66	0	9.2	5.0	.1	5.2	-	113	60	155	7.2	0
5.7	1.9	63	0	8.8	4.0	.0	4.4	-	101	56	146	7.3	0
5.8	2.0	64	0	8.8	3.8	.1	3.9	-	103	58	141	7.1	0
6.7		52	0	7.1	7.7	.0	.1	-	96	47	-	-	-
6.6		59	0	8.7	7.5	-	-	-	122	53	-	6.7	0
4.9	1.9	48	0	2.7	2.2	.0	.1	-	70	31	92	7.6	0
5.1	2.2	49	0	3.2	1.5	.1	-	-	76	32	95	7.6	5
5.5	2.2	52	0	3.2	3.0	.1	-	-	79	34	93	7.4	0
7.0	2.0	65	0	1.6	2.0	.1	.2	-	92	43	115	7.4	5
6.9	2.3	69	0	2.6	1.8	.2	-	-	98	43	120	7.6	5
7.1	2.4	70	0	2.6	1.5	.1	.2	-	95	44	121	7.7	5
6.8	2.3	66	0	3.4	3.0	.1	.1	-	95	43	115	7.4	5
12		68	0	4.1	6.8	-	0	-	111	43	-	7.3	-
5.4	1.4	70	0	1.7	2.0	.1	.0	-	92	49	119	-	-
-	-	72	0	7.4	3.0	.1	.3	-	-	60	137	7.9	-
4.5	3.2	38	0	8.4	4.4	.4	.3	-	61	36	93	7.0	-
5.0	4.5	70	0	1.6	2.3	.2	.1	-	93	46	138	7.6	3
5.2	1.6	68	0	1.9	2.5	.1	.1	-	91	49	114	7.3	5
5.0	2.0	69	0	.8	2.0	.1	.2	-	90	45	110	7.6	3

Table 8.--Chemical analyses

Well	Depth (feet)	Date of collection	Analyst	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
		9-13-54	GS	54	31	--	0.86	9.6	5.6
		10-10-55	GS	53	26	-	T.43	11	4.7
19/2-19B1	224	4-3-42	GS	-	33	-	-	10	5.5
		11-10-47	GS	51	34	-	T5.1	14	7.5
		1-26-49	GS	-	33	-	-	10	5.2
		4-18-51	GS	53	31	-	T.67	14	7.8
		7-23-52	GS	55	31	-	.13	13	7.3
		9-10-53	GS	53	33	-	T.54	11	5.6
		9-13-54	GS	53	32	-	T8.1	12	6.3
19/2-19F1	229	11-10-47	GS	51	31	-	T.62	11	5.5
		1-26-49	GS	-	21	-	-	11	4.1
		5-26-50	GS	54	31	-	T7.1	11	5.7
		4-19-51	GS	-	30	-	T.94	11	5.2
		7-24-52	GS	55	30	-	T7.6	11	6.3
		9-10-53	GS	52	33	-	.05	11	5.1
		9-13-54	GS	52	27	-	T1.5	12	6.2
		3-24-59	GS	56	30	-	.66	12	5.3
		10-26-59	GS	52	31	-	.45	12	5.7
19/2-19Q1s	-	11-10-47	GS	53	11	-	.02	8.1	3.1
		1-26-49	GS	-	11	-	-	8.3	3.2
		5-31-50	GS	54	11	-	.01	8.2	3.2
		4-18-51	GS	54	8.4	-	.11	8.2	3.1
		7-24-52	GS	55	8.1	-	.05	9.0	4.1
		9-10-53	GS	57	11	-	.04	8.5	3.2
		9-13-54	GS	57	11	-	.07	9.2	3.5
		10-10-55	GS	-	10	-	.01	9.1	2.9
		11-6-56	GS	-	7	-	.05	8.5	3.3
		1-13-58	GS	55	9.6	-	.05	9.7	2.9
		3-24-59	GS	-	8.2	-	.03	9.0	3.4
		9-13-60	GS	54	11	-	.03	11	4.0
19/2-23H1	158	11-6-58	GS	52	43	-	.46	10	4.9
		11-16-59	GS	54	37	-	.57	8.5	4.9
		9-23-60	GS	52	42	-	.49	8.0	5.0
		9-21-61	GS	52	42	-	.13	9.0	4.1
19/2-24A1	91	11-12-59	GS	50	25	-	.02	11	4.9
		9-22-60	GS	52	23	-	.05	11	5.1

of water from wells and springs.--Continued

Parts per million													
Sodium (Na)	Potassium (K)	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO3)	Phosphate (PO4)	Dissolved solids (calculated)	Hardness (as CaCO3)	Specific conductance (Micromhos at 25°C)	pH	Color
4.3	1.5	68	0	1.6	2.5	0.1	0.1	0.00	90	47	111	7.4	5
5.5	1.7	67	0	3.5	2.8	.1	.7	-	89	47	120	7.3	15
5.4	1.4	68	0	1.6	2.1	.1	.0	-	93	48	116	-	-
-	-	64	0	24.	2.6	.1	.1	-	-	66	158	7.3	-
-	-	66	0	1.5	2.4	.1	.2	-	-	46	111	7.5	-
5.5	5.1	66	0	24	2.7	.2	.3	-	123	67	158	7.3	5
5.9	2.1	68	0	18	3.2	.1	.4	-	114	62	145	7.4	5
5.5	2.0	67	0	8.3	2.5	.1	.3	-	101	50	127	7.6	5
4.9	2.3	64	0	13	2.8	.1	.2	-	105	56	137	7.2	5
-	-	68	0	3.5	2.8	.0	.2	-	-	50	117	7.5	-
-	-	59	0	3.6	3.3	.2	.0	-	-	44	108	6.9	-
4.5	4.5	65	0	3.4	3.2	.2	.2	-	96	51	119	7.3	-
5.0	4.2	69	0	2.6	2.9	.1	.3	-	96	49	115	7.4	10
5.3	1.7	71	0	4.2	2.9	.1	.1	-	97	53	120	7.4	5
5.1	1.6	68	0	1.7	2.5	.1	.2	-	94	48	115	7.4	3
4.7	1.1	66	0	3.5	3.2	.1	.2	-	91	55	118	7.1	10
5.1	1.7	70	0	3.0	3.0	.0	.4	-	94	52	126	7.2	5
5.4	1.7	72	0	3.3	2.8	.0	.1	-	97	54	131	7.4	5
-	-	46	0	4.0	3.3	0.0	.3	-	-	33	87	6.9	-
-	-	44	0	4.5	3.3	.1	.4	-	-	34	89	7.4	-
4.3	1.8	41	0	5.8	3.8	.1	.3	-	59	34	87	7.0	-
4.0	2.6	40	0	5.8	3.7	.1	.3	-	56	33	84	6.8	5
5.0	.8	48	0	5.8	3.8	.1	.4	-	61	39	93	7.0	5
5.0	.6	48	0	5.3	3.1	.1	.7	-	61	34	93	7.1	3
4.5	.7	44	0	6.6	3.8	.1	.1	-	61	37	95	6.6	5
5.0	1.0	44	0	5.4	3.0	.0	.4	-	59	35	95	6.8	0
4.8	.6	44	0	6.1	3.5	.0	.1	-	56	35	94	6.8	5
4.9	.9	45	0	6.5	3.5	.0	.8	-	61	36	98	6.8	0
4.8	1	46	0	6.2	3.5	.0	.8	-	60	36	99	6.7	0
5.7	.9	57	0	6.4	3.0	.2	.7	-	71	44	117	6.7	0
9.1	3.2	79	0	.8	1.5	.2	.5	-	112	45	127	7.3	5
9.1	2.6	74	0	.4	1.5	.0	.4	-	101	41	129	7.3	5
8.7	2.6	70	0	1.0	1.2	.2	.3	-	104	40	123	7.3	5
8.9	2.8	68	0	2.4	1.5	.2	.1	-	104	39	115	7.3	10
4.5	.9	63	0	5.1	3.0	.1	.5	-	86	48	125	6.8	0
4.6	1.2	62	0	5.2	3.0	.0	.8	-	85	48	121	7.2	5

Table 8.--Chemical analyses

Well	Depth (feet)	Date of collection	Analyst	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
19/2-27G1	1,008	1944	USA	-	47	--	T0	9.0	5.0
		11-10-47	GS	53	53	-	.06	7.8	5.2
		1-26-49	GS	-	48	-	-	8.0	5.0
		5-26-50	GS	53	42	-	-	9.4	5.9
		4-18-51	GS	53	48	-	.44	7.8	5.0
		7-24-52	GS	55	48	-	.06	8.4	6.2
		9-8-53	GS	53	50	-	.13	8.2	5.4
		9-13-54	GS	54	48	-	T1.00	9	5.3
19/2-30B2	10	1943	-	-	8	-	-	8.0	3.0
		10-26-59	GS	54	15	-	.08	14	4.2
19/2-31J1	1,000	1942	USA	-	26	-	T.2	7.0	3.0
		5-27-50	GS	53	46	-	T8.4	5.8	3.8
		4-18-51	GS	54	42	-	T.92	5.6	3.8
		7-24-52	GS	55	42	-	T2.5	6.4	4.4
		9-10-53	GS	-	48	-	T2.2	5.8	3.3
		9-13-54	GS	53	43	-	T1.4	6.4	4.4
		10-10-55	GS	53	39	-	T.99	5.6	2.9
		10-26-59	GS	54	42	-	T5.2	6	3.0
19/2-32H2	1,340	1943	USA	-	42	-	T0	8.0	5.0
		11-10-47	GS	51	31	-	.02	12	6.5
		1-26-49	GS	-	27	-	-	14	7.3
		5-27-50	GS	52	30	-	.03	13	7.2
		4-18-51	GS	52	26	-	.05	15	8.7
		7-23-52	GS	55	28	-	.18	13	7.7
		9-10-53	GS	53	27	-	.36	15	8.0
		9-13-54	GS	52	26	-	1.5	16	8.6
		10-10-55	GS	51	24	-	.84	15	7.7
		11-6-56	GS	51	23	-	.02	16	8.5
		1-13-58	GS	53	22	-	.06	17	8.4
19/3-18M1	550	5-27-48	GS	50	49	-	.03	7.8	4.8
		7-21-49	GS	52	48	-	.04	8.0	4.4
		6-22-50	GS	50	46	-	.05	7.8	4.6
		1-5-51	GS	50	47	-	.02	7.3	4.7
		3-18-52	GS	50	44	-	.06	7.8	5.0
		12-10-52	GS	51	43	-	.04	7.6	4.9
		11-19-53	GS	-	46	-	.08	7.6	5.0
		11-5-54	GS	54	41	-	.09	9.0	5.8
		10-18-55	GS	50	37	-	.03	7.7	4.4

of water from wells and springs.--Continued

Parts per million											Specific conductance (Micromhos at 25°C)	pH	Color
Sodium (Na)	Potassium (K)	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO3)	Phosphate (PO4)	Dissolved solids (calculated)	Hardness (as CaCO3)			
8.0		63	0	4.0	0	0	--	--	104	43	--	6.5	-
-	-	66	0	2.6	2.3	.2	.0	-	-	41	112	7.7	-
-	-	65	0	2.3	2.5	.1	.3	-	-	40	112	7.2	-
7.1	3.7	70	0	4.1	2.7	.1	.2	-	110	48	121	7.7	-
7.2	5.3	68	0	3.1	2.4	.1	.2	-	113	40	113	7.7	5
7.1	2.6	66	0	3.5	3.0	.1	.1	-	112	46	115	7.4	5
7.2	2.5	73	0	2.9	2.2	.2	.1	-	115	43	116	7.5	3
6.3	2.7	66	0	4.0	2.4	.2	.0	-	110	44	117	7.3	5
2.0		37	0	7.0	2.0	-	.0	-	48	32	-	6.8	-
5.8	1.3	59	0	11	3.5	.0	2.5	-	86	52	134	6.8	5
3.0		44	0	5.0	2.0	-	.35	-	68	30	-	-	-
4.6	4.5	43	0	4.2	3.0	.2	.1	-	94	30	80	7.1	-
4.7	3.7	45	0	3.3	3.0	.1	.2	-	89	30	78	7.3	15
4.9	2.1	46	0	3.9	2.1	.1	.2	-	89	34	80	7.5	5
4.7	2.1	47	0	3.0	2.2	.2	.2	-	93	28	79	7.5	7
4.2	.7	42	0	3.7	2.2	.1	.1	-	86	34	81	7.3	5
4.9	2.1	40	0	3.6	1.8	.1	.4	-	80	26	80	7.3	20
4.4	2.4	42	0	3.3	2.0	.0	.2	-	84	28	80	7.8	20
7.0		59	0	4.0	3.0	-	0	-	98	41	-	7.4	-
-	-	70	0	5.5	3.8	.1	1.2	-	-	57	130	7.3	-
-	-	81	0	6.0	3.7	.1	3.2	-	-	65	156	6.8	-
5.2	2.2	78	0	5.9	3.6	.1	1.1	-	107	62	140	7.3	-
5.8	3.5	94	0	5.5	4.9	.1	1.9	-	118	73	164	7.3	3
5.7	2.0	84	0	6.0	3.5	.1	2.0	-	109	64	153	7.3	5
5.7	1.4	96	0	5.2	3.4	.1	1.2	-	114	70	163	7.2	3
5.3	1.4	96	0	5.8	3.0	.1	.5	-	114	75	172	7.3	5
5.9	1.5	91	0	5.1	3.0	-	1.4	-	109	69	166	7.3	0
5.7	1.3	92	0	5.8	3.5	-	1.4	-	110	75	169	7.1	5
5.9	1.5	96	0	6.0	3.8	-	1.2	-	113	77	173	7.2	0
-	-	65	0	2.5	1.8	.1	.0	-	-	39	110	7.1	-
-	-	58	0	1.6	1.9	.2	.0	-	-	38	113	7.5	-
7.4	1.8	66	0	1.7	1.9	.2	.1	-	104	38	110	7.3	-
7.6	4.2	66	0	2.6	1.9	.4	.2	-	108	38	106	7.7	8
7.6	1.6	68	0	2.5	1.7	.2	.1	-	104	40	110	7.8	3
7.2	1.7	64	0	2.2	1.9	.1	.0	-	100	39	110	7.3	5
7.8	1.7	66	0	2.0	1.6	.2	.2	-	105	40	110	7.8	3
6.8	1.6	66	0	2.6	2.8	.1	.3	-	103	49	114	7.5	5
7.9	1.8	64	0	2.3	1.8	.1	.4	-	95	37	111	7.4	0

Table 8.--Chemical analyses

Well	Depth (feet)	Date of collection	Analyst	Temperature (°F)	Silica (SiO2)	Aluminum (Al)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
		12-10-56	GS	52	41	--	0.01	7.7	4.8
		10-14-57	GS	52	-	-	.00	8.7	5.7
		11-5-58	GS	52	44	-	.05	8.5	4.2
		11-12-59	GS	50	37	-	.01	8.0	4.4
		9-21-60	GS	52	43	-	.05	8.0	4.4
		9-20-61	GS	55	42	-	.01	10	3.9
19/6-4M1	305	12-18-59	GS	51	39	-	.08	22	9.1
		7-13-60	GS	53	-	-	-	22	-
19/6-18L1s	-	1946	NP	-	15	-	T0	8.0	2.0
20/2-9C1	481	11-4-38	GS	52	51	-	.28	10	6.4
20/2-13J2	113	2-4-53	B	-	22	.5	T.05	9.9	9.4
		4-21-58	B	-	23	.2	T.05	15	9.0
		3-22-60	GS	56	28	-	.00	16	10
		10-25-60	GS	54	28	-	.04	16	11
20/2-15C1	288	6-21-60	GS	56	32	-	.10	8	7.1
20/2-24A2	196	1946	NP	-	22	-	T2.00	9.0	4.0
20/2-27Q1s	-	7-16-46	WS	-	11	.4	T.2	11	4.4
20/2-29Q1	548	10-1-38	GS	51	45	-	.07	18	5.8
20/2-29Q2	854	10-1-38	GS	53	46	-	.07	12	6.2
20/2-32B1	1,172	10-1-38	GS	54	50	-	.04	11	5.9
20/2-33E1s	-	10-4-38	GS	54	19	-	.01	8.4	3.4
20/2-34E1	287	7-31-50[b]	NW	-	41	-	T.2	8.7	6.2
		7-31-50[c]	NW	-	52	.1	T.1	8.4	5.8
		12-23-55	NW	-	45	-	T.05	8.4	4.6
20/2-34E2	267	12-23-55	NW	-	51	-	T.18	8.6	4.5

b - Sample from aquifer between 190 and 200 feet.
c - Sample from aquifer between 212 and 250 feet.

of water from wells and springs.--Continued

Parts per million													
Sodium (Na)	Potassium (K)	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO3)	Phosphate (PO4)	Dissolved solids (calculated)	Hardness (as CaCO3)	Specific conductance (Micromhos at 25°C)	pH	Color
8.0	1.5	65	0	2.2	1.8	0.1	0.1	--	99	39	111	7.2	5
7.3	1.5	65	0	2.0	1.8	.1	.2	-	-	45	116	7.5	5
7.2	1.5	64	0	2.1	2.0	.1	.2	-	102	38	107	7.4	5
7.4	1.6	64	0	1.8	2.0	.0	.0	-	94	38	113	7.8	0
7.8	1.8	63	0	2.2	2.2	.2	.2	-	101	38	111	7.8	5
7.2	1.6	66	0	2.8	2.0	.2	.3	-	103	41	111	7.6	0
7	1.4	112	0	10	3.5	.3	.1	.03	147	92	209	6.8	5
-	-	120	0	-	-	-	-	-	-	98	215	7.0	-
7.0		39	0	0	9.0	-	-	-	60	31	-	7.8	-
16	2.2	101	0	.4	1.9	.2	.8	-	139	51	-	-	-
16		46	0	-	5.7	.2	4.4	0	91	63	-	7.5	-
10		67	0	15	7.5	.15	8.4	1.2	123	74	-	7.4	-
8.0	1.7	80	0	18	7.2	.1	10	.08	138	82	212	7.2	0
7.1	1.7	78	0	17	9.5	.1	9.2	.10	138	86	212	7.1	0
5.0	1.2	55	0	7.8	3.5	.1	2.1	.13	94	49	122	7.0	0
12		64	0	0	10	.0	-	-	91	39	-	7.2	-
5.6		36	11	10	3.8	.0	-	.04	76	-	-	-	-
10	3.9	108	0	1.2	2.8	-	.4	.0	140	69	-	-	8
7.6	1.6	84	0	2.1	2.2	.0	-	.0	119	55	-	-	4
9.2	1.8	84	0	1.8	2.0	-	-	.5	123	52	-	-	5
5.0	1.4	46	0	4.1	3.0	.0	.5	-	68	35	-	-	0
8.7		64	0	5.4	5.8	-	-	-	108	47	-	7.6	-
8.4		62	0	5.6	5.8	-	-	-	118	45	-	7.6	-
14		66	0	4.6	7.5	-	-	.0	118	40	-	7.2	-
14		71	0	4.4	5.5	-	-	-	124	40	-	7.3	0

Table 8.--Chemical analyses

Well	Depth (feet)	Date of collection	Analyst	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
20/3-18D3	127	10-12-49	NW	-	24	0.1	T0.05	8.5	7.2
		4-21-52	GS	50	31	-	.11	8.8	8.0
		2-4-53	B	-	28	.7	T.17	8.1	7.9
		9-27-56	B	-	31	.6	T.05	10	10
		4-21-58	B	-	26	.1	T.05	11	4.8
20/3-19F1	378	1-4-39	GS	-	28	-	T.04	11	6.7
		10-4-48	NW	-	27	-	0	12	7.7
20/3-19P1	310	10-27-31	GS	-	25	-	T.29	7.9	4.4
		1-4-39	GS	48	24	-	T.04	7.2	4
20/3-30N1	325	1-4-39	GS	-	26	-	T.06	8.9	4.8
20/3-31F1	209	12-30-50[c]	NW	-	29	.1	T.15	8.1	5.3
		1-2-51[b]	NW	-	33	.1	T.1	8.7	5.8
20/3-31F2	159	12-23-55	NW	-	33	-	T.04	9.6	5.8
20/4-24B2	456	12-2-59	GS	55	45	-	.10	18	5.3
20/4-24F3	572	1-11-38	GS	53	44	-	T.14	18	6.3
20/4-32J1s	-	1-11-38	GS	46	30	-	T.13	9.2	5.7
20/5-18Q1s	-	1944	M	-	19	-	-	14	5.0
21/3-16N1	207	12-3-59	GS	50	39	-	.10	40	43
		6-2-60	GS	53	41	-	T.78	54	81
		10-31-60	GS	52	39	-	T3.7	50	74
21/3-26N1	785	1-13-38	GS	-	32	-	T.05	16	6.1
		12-29-44	GS	-	39	-	T1.5	21	6.6
		2-7-55	B	-	54	.14	T.25	14	5.5
21/3-35B1	856	2- -39	B	-	24	-	T5.5	17	4.2
		12-18-59	GS	63	46	-	.18	16	2.5

Analyst: B - Bennetts Chemical Laboratory
GS - Geological Survey
M - The Milwaukee Road
NP - Northern Pacific Railway
NW - Northwest Laboratories
USA- United States Army
WS - Washington State Department of Health

b - Sample from aquifer between 89 and 116 feet.
c - Sample from aquifer between 138 and 160 feet.

of water from wells and springs.--Continued

Parts per million													
Sodium (Na)	Potassium (K)	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO3)	Phosphate (PO4)	Dissolved solids (calculated)	Hardness (as CaCO3)	Specific conductance (Micromhos at 25°C)	pH	Color
4.0		51	0	8.9	6.2	0.0	3.2	0.0	87	51	0	7.2	-
5.5	1.2	54	0	11	5.3	.1	4.3	-	102	55	131	7.3	3
17		43	0	-	5.4	.2	5.3	0	94	53	-	7.8	-
6.3		65	0	10	7.9	.1	2.5	.05	111	66	-	7.2	-
6.6		46	0	6.6	3.3	.2	4.0	1.6	88	47	-	7.6	-
4.9	1.4	58	0	7.0	4.2	.3	4.9	-	97	55	-	-	-
9.4		56	0	8.9	9.5	0	17	-	120	61	-	7.1	-
4.1	1.4	38	0	4.9	4	-	5.3	-	76	38	-	-	-
3.4	1.2	35	0	4.2	3.3	-	6	-	71	34	-	-	-
4.2	.9	54	0	2.8	2.6	-	.9	-	78	42	-	-	-
6.6		50	0	6.1	6.4	0	.1	-	86	42	-	7.3	-
5.2		50	0	6.5	6.4	0	.1	-	91	46	-	7.7	-
9.0		62	0	4.8	8.2	0	0	-	102	48	-	7.2	0
42	5.2	185	0	.9	7.5	.3	.2	2.2	218	67	303	7.4	5
59	4.3	222	0	1.8	13	0	0	-	256	71	-	-	-
4.5	1.6	59	0	4.2	2.1	0	.3	-	87	46	-	-	-
6	-	73	0	5.0	5.0	-	-	-	90	55	-	-	-
306	3.5	92	0	103	535	.3	.1	.15	1,120	276	2,040	6.9	0
572	5.1	83	0	174	1,050	.1	.1	.04	2,020	470	3,550	6.6	5
484	4.1	89	0	146	880	.5	1.7	.05	1,730	429	3,050	7.1	5
51	2.4	188	5	1.5	12	0	0	-	219	65	-	-	-
53	2.2	199	0	1.6	17	.2	3.4	-	242	80	368	-	-
79		188	0	.4	7.5	.9	.8	1.2	258	58	-	7.8	-
80		183	0	1.4	16	-	-	-	240	60	-	-	-
58	3.4	193	0	.4	14	.3	.4	1.7	238	50	350	7.8	30

Iron:

Unless otherwise noted, the sample was clear and sediment-free when collected, and the amount of iron reported is that in solution at the time of collection. Values preceded by "T" indicate "total" iron, which includes amounts in solution, in suspension, and in sediment at the time of collection. "T" also is used for analyses having no description of sample appearance when collected.

Table 9.--Partial chemical analyses of water from wells.
(Results in parts per million, except as indicated. Analytical results are based on field methods, and are approximated.)

Well number	Depth (feet)	Date of collection	Bicarbonate (HCO3)	Chloride (Cl)	Hardness (as CaCO3)	Specific conductance (micromhos at 25°C)
16/3-6E1	135	2-8-61	79	7	70	170
		1- -62	78	10	70	-
6L1	190	4-13-62	81	6	50	140
7F1	37	2-8-61	98	7	80	200
13D1	263	2-8-61	280	5	180	410
14C1	295	1- -62	180	4	85	260
14F1	47	4-17-62	180	6	100	270
16/4-3M1	14	4-13-62	25	4	15	-
4R1	132	1- -62	85	6	50	-
6Q1	109	9-19-60	180	5	120	270
7R1	125	4-13-62	180	5	110	280
9J1	158	4-13-62	100	4	130	-
11Q3	45	4-13-62	110	5	75	180
14F1	190	1- -62	49	7	50	140
17/2-1M3	160	4-12-62	87	10	70	190
11R1	103	4-12-62	130	7	85	200
12K1	149	4-12-62	170	7	120	270
16Q5	96	4-12-62	110	6	75	190
26D3	100	4-12-62	170	43	200	510
17/3-2R1	578	1- -62	160	32	65	320
4N1	258	4-12-62	100	6	60	170
16Q2	190	4-12-62	87	17	90	230
22Q1	29	2-8-61	35	4	25	64
33N1	104	4-13-62	93	8	60	160
17/4-1R2	120	4-13-62	88	-	10	-
2J1	140	10-10-60	86	6	65	160
6F1	100	1- -62	150	4	100	-

Table 9.--Partial chemical analyses of water from wells.--Continued

(Results in parts per million, except as indicated. Analytical results are based on field methods, and are approximated.)

Well number	Depth (feet)	Date of collection	Bicarbonate (HCO_3)	Chloride (Cl)	Hardness (as $CaCO_3$)	Specific conductance (micromhos at 25°C)
8D1	68	10-10-62	150	12	110	290
22K1	125	4-13-62	120	6	140	180
27G1	203	4-13-62	110	-	70	-
30B1	25	9-16-62	240	8	180	360
30D1	62	9-16-62	76	5	55	140
30M2	103	4-13-62	130	5	75	200
31N1	100	2-8-61	160	11	100	230
31N2	125	9-22-60	180	16	120	320
17/5-6M1	301	4-13-62	130	7	20	250
7K1	182	1- -62	49	5	40	-
18/3-12N1	410	1- -62	97	4	55	140
18/4-1A1	260	4-18-62	98	6	55	160
7M1	214	4-12-62	99	6	120	160
14F1	160	4-18-62	72	7	50	120
32A1	167	1- -62	110	4	55	170
33E1	251	1- -62	69	5	55	-
33N1	162	1- -62	180	3	95	240
18/5-30F2	155	4-18-62	89	5	60	150
19/1-22P1	252	2-6-61	32	9	140	340
22P2	266	2-6-61	28	8	130	310
27C2	331	2-6-61	65	12	80	190
34P1	141	2-6-61	55	5	50	130
19/2-5D1	207	2-6-61	95	1	65	160
6P1	247	2-6-61	95	2	65	150
19/3-3G2	422	4-17-62	98	6	65	170

Table 9.--Partial chemical analyses of water from wells.--Continued
(Results in parts per million, except as indicated. Analytical results are based on field methods, and are approximated.)

Well number	Depth (feet)	Date of collection	Bicarbonate (HCO_3)	Chloride (Cl)	Hardness (as $CaCO_3$)	Specific conductance (micromhos at 25°C)
20C2	117	10-14-60	55	5	45	110
20G1	39	10-14-60	47	6	110	94
20G2	44	10-10-60	43	5	35	90
20K2	35	10-14-60	-	-	-	130
20L1	97	10-10-60	120	6	80	180
21F1	-	10-14-60	22	7	75	94
23C1	550	4-12-62	70	5	40	120
28B2	125	4-12-62	49	7	40	97
19/4-7D1	326	4-18-62	96	7	60	170
19P1	21	5-5-60	-	-	-	75
23C1	388	4-18-62	67	6	40	110
24A3	145	4-18-62	140	8	40	240
31C1	150	4-12-62	59	6	45	120
19/5-6M4	111	8-31-62	160	14	110	240
20/2-9C1	481	2-6-61	100	3	50	160
9C2	606	2-6-61	100	2	50	130
16M1	118	2-6-61	57	6	55	140
20P1	1,020	2-6-61	80	3	45	130
25E1	330	5-5-59	56	3	35	100
25L1	35	5-6-59	34	6	35	120
25P1	62	5-6-59	61	8	65	180
		12-28-59	53	12	95	240
26J1	38	5-6-59	55	12	85	140
		12-28-59	71	10	80	180
26J2	34	12-28-59	39	11	55	140
26N1	79	12-28-59	61	8	55	140
26P1	45	5-11-59	56	7	40	110
		12-28-59	65	7	50	150

Table 9.--Partial chemical analyses of water from wells.--Continued
(Results in parts per million, except as indicated. Analytical results are based on field methods, and are approximated.)

Well number	Depth (feet)	Date of collection	Bicarbonate (HCO3)	Chloride (Cl)	Hardness (as CaCO3)	Specific conductance (micromhos at 25°C)
26P2	120	5-14-59	58	6	45	140
		12-28-59	61	7	50	120
26P3	37	12-28-59	61	7	55	130
26P6	34	12-28-59	58	8	70	170
26Q2	42	12-28-59	83	11	90	190
26R2	44	12-28-59	83	12	90	210
26R4	74	12-28-59	65	10	70	160
29Q3	275	2-6-61	110	10	70	190
32B1	1,172	2-6-61	87	3	50	130
35C4	58	12-28-59	66	17	130	300
35D1	80	5-10-59	45	9	50	160
		12-28-59	60	9	60	140
35G1	74	12-28-59	57	6	40	110
35K1	79	12-28-59	75	8	65	130
36B1	33	12-28-59	61	9	55	130
36F3	155	5-10-59	68	8	60	150
		5-12-59	58	11	65	160
20/3-1L1	185	5-19-62	130	-	-	400
3L1	534	10-19-60	-	3	-	140
		4-24-62	79	5	40	130
		5-21-62	82	-	-	130
3M1	400	10-19-60	-	5	-	130
		5-21-62	82	-	-	120
3R1	-	10-19-60	-	3	-	150
		5-21-62	97	-	-	150
4G1	600	10-31-60	-	3	-	140
4J3	547	10-19-60	-	11	-	160
		5-21-62	82	-	-	210
4P1	385	10-31-60	-	4	-	150
4Q1	492	10-19-60	-	3	-	130

Table 9.--Partial chemical analyses of water from wells.--Continued

(Results in parts per million, except as indicated. Analytical results are based on field methods, and are approximated.)

Well number	Depth (feet)	Date of collection	Bicarbonate (HCO_3)	Chloride (Cl)	Hardness (as $CaCO_3$)	Specific conductance (micromhos at 25°C)
		10-31-60	-	4	-	130
9C2	301	10-19-60	-	4	-	130
		5-21-62	82	-	-	130
9D2	247	5-21-62	87	-	-	140
9D4	540	10-19-60	-	4	-	140
9F1	618	10-19-60	-	3	-	130
		5-21-62	82	-	-	120
10B1	275	10-19-60	-	3	-	130
		5-21-62	86	-	-	120
12C1	277	5-19-62	130	-	-	300
25N1	248	4-12-62	78	8	55	150
20/4-7J2	46	8-31-62	220	14	110	320
7Q1	190	4-24-62	170	10	80	-
12A1	308	4-24-62	130	6	65	200
16P1	175	8-31-62	180	14	96	260
17F1	500	4-24-62	210	10	100	340
18P1	366	5-19-62	130	-	-	220
25G1	164	4-24-62	130	8	90	210
26D1	218	4-24-62	130	7	75	210
30L1	140	4-20-62	44	6	35	140
34G1	574	5-19-62	85	-	-	140
36H3	86	8-31-62	100	14	65	180
20/5-28F1	337	4-24-62	81	7	60	140
21/3-16L1	184	7-30-59	-	160	-	670
		6-5-60	-	140	-	670
		7-5-60	-	230	-	1,000
		8-11-60	-	240	-	-
16L2	-	7-30-59	-	93	-	520

Table 9.--Partial chemical analyses of water from wells.--Continued
(Results in parts per million, except as indicated. Analytical results are based on field methods, and are approximated.)

Well number	Depth (feet)	Date of collection	Bicarbonate (HCO_3)	Chloride (Cl)	Hardness (as $CaCO_3$)	Specific conductance (micromhos at 25°C)
		7-4-61	-	10	80	-
		9-27-62	98	15	90	-
26Q1	450	10-21-60	-	50	-	460
36P1	824	10-19-50	-	10	-	250

Table 9.--Partial chemical analyses of water from wells.--Continued
(Results in parts per million, except as indicated. Analytical results are based on field methods, and are approximated.)

Well number	Depth (feet)	Date of collection	Bicarbonate (HCO_3)	Chloride (Cl)	Hardness (as $CaCO_3$)	Specific conductance (micromhos at 25°C)
		6-5-60	-	32	-	300
		7-5-60	-	140	-	740
		8-11-60	-	240	-	-
		9-11-60	-	110	-	580
16N1	207	7-30-59	-	54	-	340 10:41 am
		7-30-59	-	51	-	340 10:42 am
		7-30-59	-	51	-	330 10:43 am
		7-30-59	-	51	-	340 10:45 am
		7-30-59	-	580	-	2,200 11:00 am
		7-30-59	-	670	-	2,200 11:15 am
		7-30-59	-	750	-	2,400 11:30 am
		7-30-59	-	790	-	2,500 11:45 am
		7-30-59	-	820	-	2,600 12:00 n
		7-30-59	-	840	-	2,700 12:30 pm
		7-30-59	-	880	-	2,800 1:00 pm
		7-30-59	-	920	-	3,000 2:00 pm
		7-30-59	-	960	-	3,100 3:00 pm
		7-30-59	-	980	-	3,400 4:00 pm
16P1	272	7-30-59	-	18	-	270
		6-4-60	-	17	-	240
		7-5-60	-	18	-	230
		8-11-60	-	19	-	-
		9-11-60	-	18	-	250
		7-4-61	-	19	100	-
16P2	294	7-30-59	-	400	-	1,600
		6-4-60	-	8	-	200
		7-5-50	-	270	-	1,200
		8-11-60	-	770	-	-
		9-11-60	-	58	-	390
		7-6-61	-	22	50	-
16P3	269	5-13-61	-	10	-	-