Geology and Ground-Water Conditions of Clark County Washington, with a Description of a Major Alluvial Aquifer Along the Columbia River

By M. J. MUNDORFF

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By M. J. Mundorff

ABSTRACT

This report presents the results of an investigation of the ground-water resources of the populated parts of Clark County. Yields adequate for irrigation can be obtained from wells in most farmed areas in Clark County, Wash. The total available supply is sufficient for all foreseeable irrigation developments. In a few local areas aquifers are fine-grained, and yields of individual wells are low.

An enormous ground-water supply is available from a major alluvial aquifer underlying the flood plain of the Columbia River in the vicinity of Vancouver, Camas, and Washougal, where the aquifer is recharged, in part, by infiltration from the river. Yields of individual wells are large, ranging to as much as 4,000 gpm (gallons per minute).

Clark County lies along the western flank of the Cascade Range in the structural lowland (Willamette-Puget trough) between those mountains and the Coast Ranges to the west. The area covered by the report includes the urban, the suburban, and most of the agricultural lands in the county. These lands lie on a series of nearly flat plains and benches which rise steplike from the level of the Columbia River (a few feet above sea level) to about 800 feet above sea level.

Clark County is drained by the Columbia River (the trunk stream of the Pacific Northwest) and its tributaries. The Columbia River forms the southern and western boundaries of the county.

Although the climate of the county is considered to be humid, the precipitation ranging from about 37 to more than 110 inches annually in various parts of the county, the unequal seasonal distribution (about 1.5 inches total for July and August in the agricultural area) makes irrigation highly desirable for most crops and essential for some specialized crops.

Consolidated rocks of Eocene to Miocene age, chiefly volcanic lava flows and pyroclastics but including some sedimentary strata, crop out in the foothills of the Cascades in the eastern part of the county and underlie the younger, unconsolidated rocks in the lowlands to the west.

At most places small to moderate quantities of water can be obtained from fractures in the older consolidated rocks. However, in the populated parts of the county, these rocks generally are overlain by considerable thicknesses of more permeable materials, and few wells have been drilled in them. Springs and dug wells yield an ample domestic supply at a number of outlying farms in the foothills.

The younger (Pliocene to Recent) unconsolidated materials were deposited chiefly by streams in the basin formed by downwarping of the older rocks. However, some lake deposits and glacial drift also are included. The oldest unit of this group, the lower member of the Troutdale formation of Pliocene age, consists chiefly of clay, silt, and fine sand but includes lenses of coarser sand and, rarely, gravel. The maximum known thickness of the lower member of the Troutdale formation is about 660 feet. This unit is not a good aquifer because most of the strata are fine grained. However, at a few places drilled wells have penetrated lenses of coarser grained materials in these deposits and have obtained small to moderate amounts of water from them.

The upper member of the Troutdale formation consists almost entirely of lightly to moderately cemented gravel, of which the most striking feature is the presence of a considerable percentage of quartzite pebbles. The average thickness of the upper member of the Troutdale may originally have been 300 to 400 feet. The member crops out over considerable areas in the county and, where conditions of topography and exposure are optimum, has been very deeply weathered. It is suggested that the upper member of the Troutdale formation may prove to be of early Pleistocene age. This member is one of the best aquifers in the county; here, more drilled wells have been completed in this unit than in any other—most irrigation supplies are obtained from it. The best aquifers are the cleaner, uncemented or only lightly cemented sand and gravel layers below the weathered zone. Yields of several hundred gallons per minute are common and some wells yield more than 1,000 gpm from the upper member of the Troutdale.

Basaltic lava flows (Boring lava) overlie the Troutdale formation at a few places. The flows were extruded from local vents (on the western end of Prune Hill, on Green Mountain north of Camas, on Brunner Hill, and at Battle Ground Lake) which cut through the Troutdale and the older formations, and lava flows, scoria, and cinders were spread over relatively small areas.

The Boring lava is generally a moderately good aquifer; it yields water from vesicular, scoriaceous, and cinder zones. Because most of the relatively small area of outcrop in the county is sparsely inhabited hill land, few wells obtain water from the Boring lava.

Glacial drift, including till, glaciofluvial outwash, and deposits of glacial lakes or ponds, blanket much of the area north and northeast of Battle Ground. The glacial drift was deposited by or derived from a broad thick lobe of ice (probably more than 15 miles wide at places and more than 1,000 feet thick) which extended into the area from the Mount St. Helens-Mount Adams area. The glaciofluvial-outwash deposits underlying Chelatchie Prairie and Yacolt basin are permeable and probably are good aquifers, but few wells have been drilled in these areas and the deposits are largely untested as a source of ground water. Except for the glaciofluvial outwash the glacial deposits are unimportant as aquifers.

Gravel, sand, silt, and clay were deposited as a great deltaic fan of the Columbia River downstream from the mouth of the gorge near Washougal. These deposits commonly lie directly on the upper member of the Troutdale formation, but at a few places lie on other rocks. The base of the deltaic deposits extends below sea level along the course of the ancestral Columbia River but is generally 100 to 220 feet above sea level in adjacent areas that underlie much of the Fourth Plains area. The deposits are very coarse toward the apex of the delta or fan but become progressively finer away from the apex. After the fan was deposited, the Columbia River cut down through it to largely reoccupy the former channel and leave a series of wide benches and terraces.

The coarser phases of these deltaic deposits are extremely permeable and yield large quantities of water. Many domestic and a number of irrigation supplies are obtained from them, although much of the rural part of the county is underlain by the finer grained phases. Some broad benches are underlain by the coarser, more permeable strata which lie above the zone of saturation. The largest supplies are obtained along the valley of the Columbia River at Washougal, Camas, and Vancouver, where most industrial and municipal wells obtain water from these deposits. Yields are commonly more than 1,000 gpm with drawdowns of only a few feet. Several wells have yielded more than 4,000 gpm.

Surface-water resources of the county are very large; the average discharge of the Columbia River at The Dalles is about 194,000 cfs (cubic feet per second). Other streams tributary to the Columbia River also are important as possible sources of supply.

The occurrence of ground water in various parts of the county is directly related to the character of the rock and to landforms.

The foothills area is underlain chiefly by consolidated rocks of volcanic origin which will yield only small to moderate supplies of water from joints and other fractures. These rocks generally are deeply weathered, and the residuum yields small supplies (but generally ample for domestic use) to dug wells. The area is sparsely inhabited and the few water supplies are obtained mostly from dug wells or springs. In the larger intermontane valleys, water supplies are obtained from fluvial and glaciofluvial sand and gravel which were deposited over the valley floors. Although moderate to large supplies probably are available at several places, generally only small supplies, for domestic use, have been developed.

In the alluvial plains and benches, which include most of the farmlands in the county, wells obtain water from sand and gravel strata at depths less than 300 feet. The Troutdale bench, which ranges from about 400 to 1,000 feet above sea level, is the highest. It extends from Camas and Washougal, in a direction slightly west of north, to the Lewis River between Woodland and Fargher Lake. The entire bench is underlain by the Troutdale formation, which has been weathered to depths of 100 feet or more. At some places, particularly in areas of higher elevation, weathering has reached or nearly reached the base of the upper member of the Troutdale; as the weathering reduces the permeability, and as the lower member of the Troutdale is not a good aquifer, little or no water has been obtained. At other places, particularly in areas of lower altitude, weathering has been less deep, and moderate supplies are obtained from the upper member of the Troutdale. A few wells obtain small to moderate yields from the Boring lava, and some wells obtain scanty to moderately small supplies (maximum 35 gpm) from the volcanic rocks beneath the Troutdale formation.

The Fourth Plains area lies chiefly between the altitudes of 150 and 300 feet and includes most of the better grade of farmland and most of the irrigation wells. There are two important aquifers in the area: (a) the Pleistocene alluvial deposits which are utilized for most domestic and some irrigation supplies; and (b) the upper member of the Troutdale formation, which is utilized for most irrigation and municipal supplies. The Pleistocene alluvial deposits in general form a blanket, from a few feet to about 200 feet thick, over the Fourth Plains area. However, where they are thickest and most permeable, the ground water drains out readily and the water table generally is far below the surface, so that these deposits are dry or saturated only near the base. Where the deposits are thin or are finer grained and therefore less permeable, perched or semiperched ground water is obtained from lenses of coarser grained materials. Most of the irrigation wells tapping these deposits are in the area between Burntbridge and Salmon Creeks.

Most wells penetrating the upper member of the Troutdale formation anywhere in the Fourth Plains area except in the area northwest of Pioneer furnish several hundred to 1,000 gpm. Total annual recharge to the principal aquifers in the upper member of the Troutdale formation in the Fourth Plains area is estimated to be about 150,000 acre-feet. A large part of this ground water is recoverable.

The lowland and flood-plain areas along the Columbia, the Lewis, and the East Fork of the Lewis River are underlain by alluvial deposits including silt, sand, and gravel ranging from a few feet to more than 100 feet in thickness. The coarser grained strata are extremely permeable and yield very large amounts of water. West of Vancouver, coarse sand and gravel in the Troutdale formation underlie the alluvial deposits and also yield large amounts of water. Many wells in the vicinities of Camas and Vancouver yield more than 1,000 gpm, and several wells were tested at rates of 4,000 gpm or more. Specific capacities (yield in gallons per minute per foot of drawdown) commonly are several hundred and for a few wells exceed 1,000. Recharge is derived in part from underflow from upland areas to the north and east but also in part from the Columbia River.

The chemical quality of the ground water in Clark County is such that the water is suitable in most respects for all uses.

Domestic and stock use of ground water in the county is estimated to be 3.6 mgd (million gallons per day). Public-supply systems use an average of about 9 mgd of water, of which more than 7 mgd is ground water obtained from wells and springs. Much of the water used by industry is obtained from wells. Industrial use of ground water, which is concentrated in the Vancouver and Camas areas, totals about 75 mgd. Records of the State of Washington Department of Conservation, Division of Water Resources, showed that 137 farms irrigated more than 3,000 acres from wells in 1955. This report lists 172 irrigation wells, which annually pump an estimated 8,000 to 10,000 acre-feet.

INTRODUCTION

PURPOSE AND SCOPE OF THE INVESTIGATION

The investigation of the ground-water resources in the Fourth Plains area of Clark County was undertaken at the request of the U.S. Bureau of Reclamation for the purpose of determining whether ground-water supplies were sufficient for irrigation of the area. In order to determine the lateral extent and continuity of the aquifers and to define the areas of recharge, it was necessary to extend the study somewhat beyond the irrigable area.

Because of the interest of the State and Federal governments in the water resources of the area, the investigation was extended further to include all the heavily populated area of the county, and was supported in part by funds from the program conducted by the U.S. Geological Survey in cooperation with the Washington Department of Conservation, Division of Water Resources.

A large number of wells were canvassed; depths of wells, water levels, discharge of springs, and dry-weather discharge of streams were measured; well logs were collected from drillers, and the geology was mapped. These data were analyzed and interpreted in terms of ground-water occurrence and availability. Most of the wells were canvassed during 1949 and 1950, although considerable field work was done during 1954 and 1955.

LOCATION AND EXTENT OF THE AREA

Clark County is in the southernmost part of the State on the west flank of the Cascade Range. The county lies chiefly within the northward continuation of the same structural basin that contains the Willamette Valley in Oregon. Vancouver, the largest city in Clark County, is on the north bank of the Columbia River, across the river from Portland, Oreg. The Columbia River forms the southern boundary of Clark County and of the State of Washington. A few miles west of Vancouver the Columbia River turns northward and thus also forms the western boundary of the county. The Lewis River forms the northern boundary and the meridian between Ranges 4 and 5 E. forms the eastern boundary.

The area covered by the investigation (fig. 1) includes most of the county except the thinly populated hilly and mountainous sections. However, fieldwork was concentrated in the dominantly agricultural areas which appeared to be amenable to irrigation; the largest, lying north and east of Vancouver, is the Fourth Plains area and contains about 50,000 acres of irrigable land.

WELL- AND SPRING-NUMBERING SYSTEM

Well numbers used by the Geological Survey in the State of Washington are based on and show locations of wells according to the rectangular system for subdivision of public land, which indicates township, range, section, and 40-acre tract within the section. For example, in the well number 3/2–15P1, the part preceding the hyphen indicates successively the township and range (T. 3 N., R. 2 E.) north and east of the Willamette base line and meridian. Because all townships in Washington are north of the Willamette base line the letter "N," indicating north, is omitted; and because most of the State is east of the Willamette meridian the letter "E" is omitted for those ranges east of the Willamette meridian, but "W" is included when the range lies west of the Willamette meridian. The first number following the hyphen indicates the section. In the example cited above, the well is

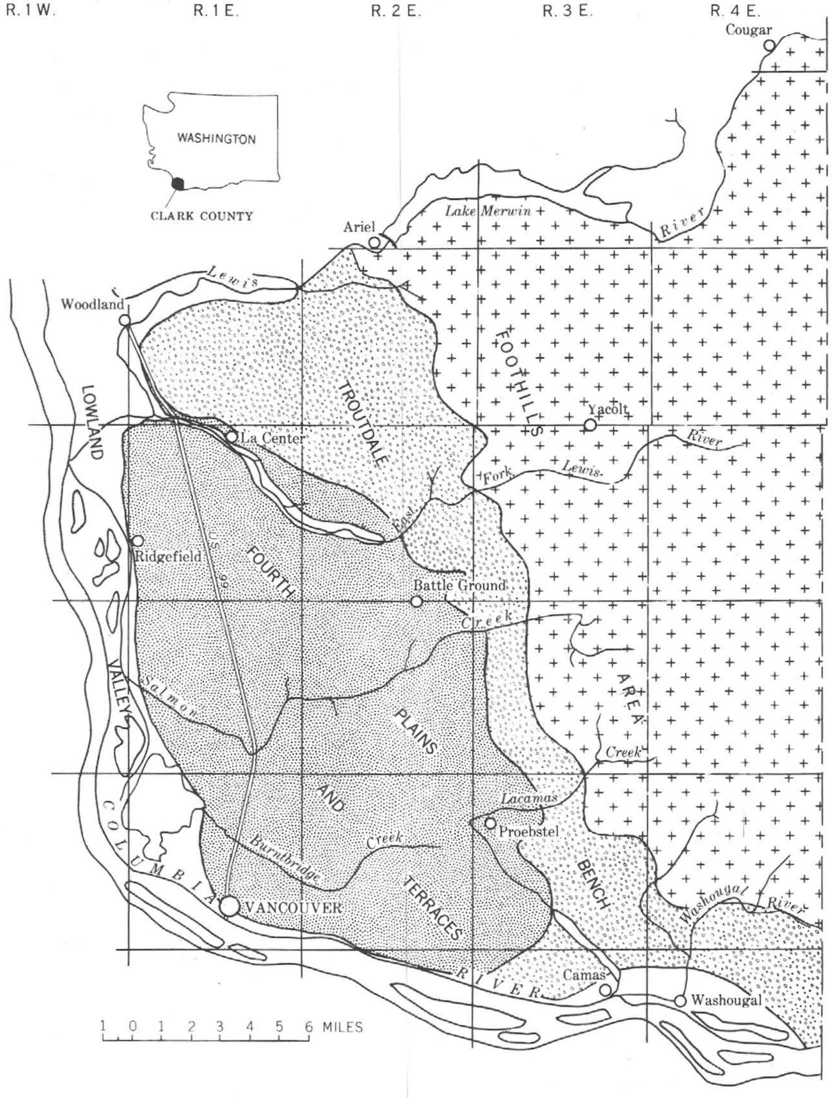

FIGURE 1.—Map showing physiographic divisions and ground-water areas of Clark County, Wash.

in sec. 15. Each section is divided into 40-acre tracts and each of these is assigned a letter, beginning with A in the northeast corner, and ending with R in the southeast corner. The 40-acre tracts are lettered serially in the same sequence used in numbering sections within a township. The letters "I" and "O" are omitted because of the likelihood of mistaking them for "one" and "zero." The last number (1) is the serial number of the well in the particular 40-acre tract. In the cited example, the designation "–15P1" indicates that the well is in the SE¼SW¼ sec. 15 and that it is the first well to be canvassed within that 40-acre tract. The next well to be canvassed there would, of course, be designated 3/2–15P2.

Springs are numbered in the same manner except that the letter "s" is added following the complete number. That is, the first spring recorded in the SE¼SW¼ sec. 15 would have the number 3/2–15P1s. Geologic features are also numbered in the same way but with small letters of the alphabet instead of numbers. Thus, the first outcrop described in the SE¼SW¼ would have the number 3/2–15Pa and the second outcrop would have the number 3/2–15Pb.

PREVIOUS INVESTIGATIONS

There have been no previous investigations of ground water in the county; however, some of the hydrologic information obtained during the course of this investigation was used in a report on the water resources of the Portland-Vancouver area by Griffin and others (1956). A few geologic reports briefly mention localities in Clark County, and some more detailed reports cover small parts of the county. On the State geologic map (Culver, 1936) the geology of Clark County is shown but is greatly generalized. Geologic reports containing some information on Clark County include those by Shedd (1903, 1910), Darton (1909), Landes (1911), Leighton (1919), Allison (1935, 1936), Hodge (1938), Felts (1939), Treasher (1942a), Wilkinson and others (1946), and Baldwin and Lowry (1952).

ACKNOWLEDGMENTS

The well records were obtained chiefly from well owners and users and from well drillers. The friendly cooperation of these people and other residents in the area is gratefully acknowledged. Additional well data were obtained from the files of the Washington State Department of Conservation, Division of Water Resources, and the cooperation of the personnel of that department also is greatly appreciated.

CLIMATE

Clark County has the mild, equable climate typical of northwestern Oregon and western Washington. The chief characteristics are the mild wet winters and moderately warm dry summers. The climate of the county shows clearly the orographic influence of the northward-trending Cascade Range to the east and the parallel Coast Ranges to the west.

Data on the weather were obtained by the U.S. Weather Bureau at the stations shown in table 1. The locations of these stations are shown on figure 4. Annual precipitation at Vancouver, Battle Ground, and Ariel Dam for all years of record, is shown graphically in figure 2.

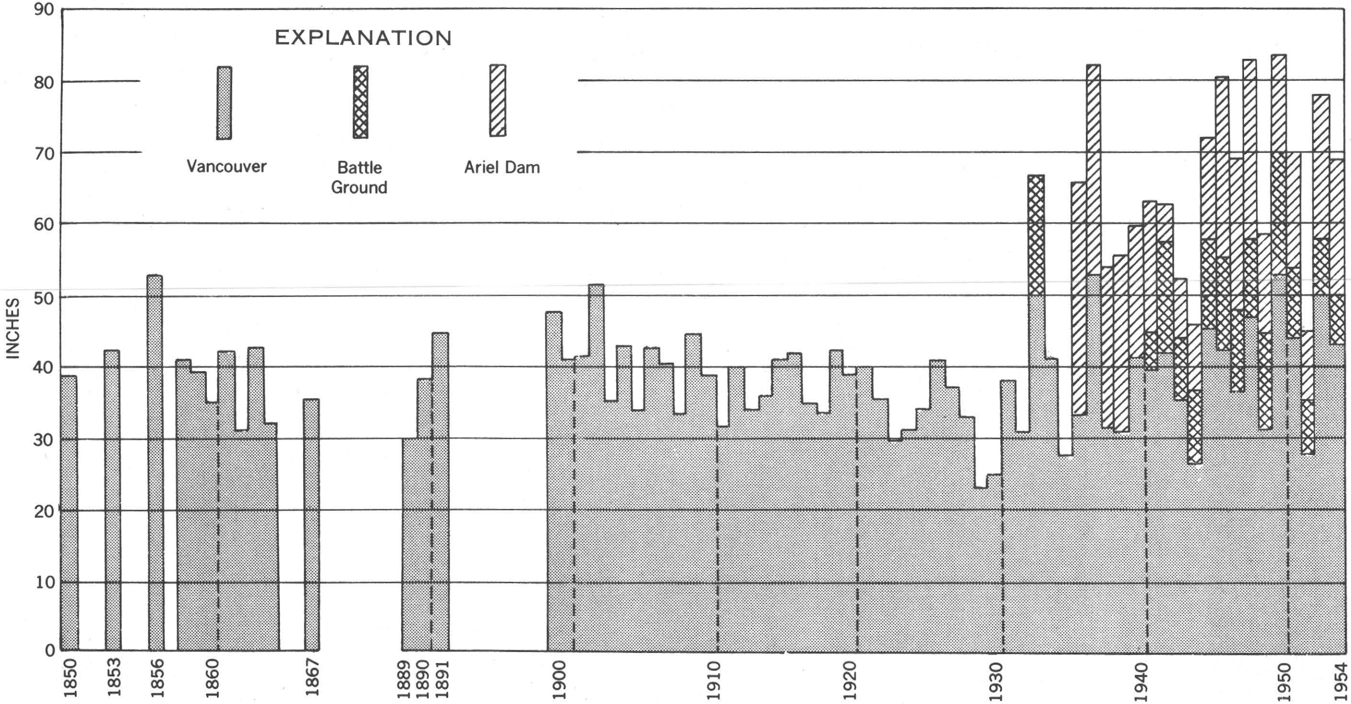

FIGURE 2.—Annual precipitation at Vancouver, Battle Ground, and Ariel Dam.

TABLE 1.—*U.S. Weather Bureau stations, active through 1955 and discontinued, in the Clark County area*

[Includes some years of partial or incomplete records]

Station	Altitude (feet)	Precipitation: Years of record	Precipitation: Period	Precipitation: Average annual (inches)	Mean annual temperature (°F)
Ariel Dam	224	20	1932-55	66.09	
Battle Ground	295	17	1934-39, 1940-55	47.22	
Cougar 5E	630	23	?	114.65	
La Center	200	41	1896-1923, 1925-40	48.85	50.5
Mount Pleasant	650	22	1900-21	56.84	51.6
Vancouver	100	71	1849-68, 1888-92, 1898-1955	37.32	52.5
Yacolt	737	32	1912-46	75.76	

PRECIPITATION

Most of the precipitation in Clark County is caused by the passage of low-pressure areas along a fairly well-defined path from the north Pacific Ocean eastward over the continent. The usual summer and early autumn path of these storm centers is to the north of Clark County and the State, so that there is little precipitation during this period. The rainy season begins in autumn, usually in the latter part of September or in October, when the storm path shifts southward. This season generally continues until March or April. Almost exactly 75 percent of the precipitation in Clark County normally occurs during the 6-month period from October 1 to March 31. The remaining 6 months, from April 1 to September 30, receive only 25 percent of the precipitation, and the average precipitation in the 2-month period of July–August is only 3.2 percent of the average annual precipitation. It is this shortage of rainfall during the growing season that makes supplemental irrigation so beneficial in Clark County. The seasonal distribution of precipitation at Vancouver is illustrated in figure 3, which shows the maximum and minimum of record and the average monthly precipitation. Shown also are the ranges for the lowest 25 percent, the highest 25 percent, and the middle 50 percent of years of record. It is important to irrigation that precipitation in July and August was average or below in 75 percent of the years. The average for these months has been raised considerably by unusually heavy rainfall in relatively few years.

The average annual precipitation in Clark County differs greatly from place to place, and this difference is directly related to orographic effects of the two bordering mountain ranges. Average annual precipitation on much of the Coast Ranges to the west and on the Cascade Range to the east exceeds 100 inches. Precipitation at lower altitudes and toward the center of the basin between the two mountain ranges is much less. Precipitation at the Vancouver weather station, least of

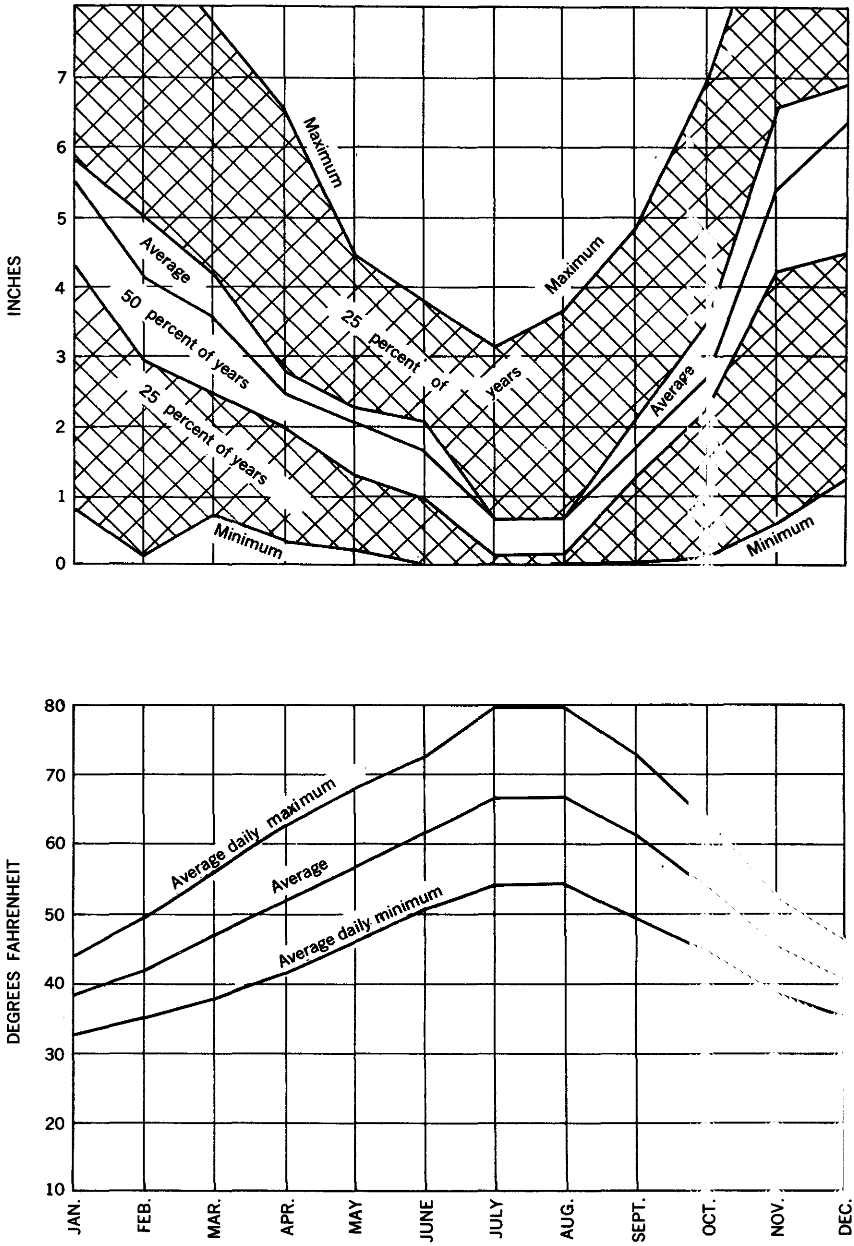

FIGURE 3.—Climatological data for Vancouver. Monthly precipitation, 73 years of record. Monthly temperature, 58 years of record.

any in Clark County, averages only about 37 inches annually. At Battle Ground, 12.3 miles northeast of Vancouver, the average annual precipitation is more than 47 inches and at Yacolt, 21 miles northeast of Vancouver, the average is more than 75 inches. The isohyetal map, figure 4, illustrates the distribution of the average annual precipitation in Clark County. The average precipitation ranges from 37 inches at Vancouver to more than 114 inches in the extreme northeast corner

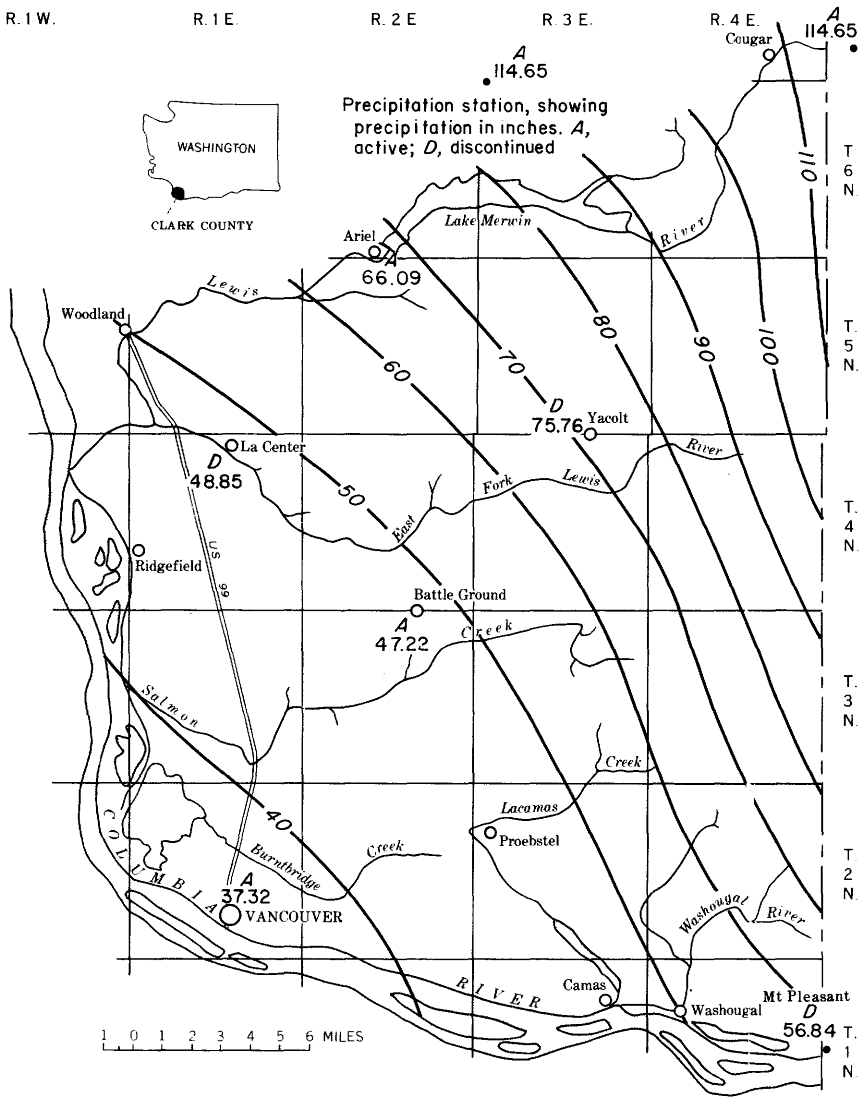

Figure 4.—Isohyetal map of Clark County showing average annual precipitation.

of the county. Precipitation data for both active and discontinued stations are summarized in table 2.

Although the range in annual precipitation is great, the range during the growing season is less. For example, average precipitation for July and August combined ranges only from 1.40 inches at Vancouver, to 2.77 inches at Cougar.

TEMPERATURE

Temperature data are available for only three weather stations in Clark County: Vancouver, La Center, and Mount Pleasant; all these are at low altitudes. The data for the three stations are summarized in table 2. Records of these stations suggest that temperatures throughout the populated areas of the county are remarkably uniform. If data for higher elevations were available, a considerably greater range would be shown.

At Vancouver the mean annual temperature is 52.5° F, only slightly greater than that at La Center and Mount Pleasant. January is the coldest month, with an average temperature of 38.4° F. July and August are the warmest months, with an average temperature of 66.8° F and 66.9° F respectively. Thus, the difference between the average temperatures of the coldest and the warmest months is only 28.5° F. Average, average maximum, and average minimum monthly temperatures at Vancouver are shown in figure 3.

Average temperatures, however, give only a partial picture. The annual and seasonal extremes, the duration of these extremes, the day-to-day variation, and the diurnal variation also are important. These factors are easy to measure but difficult to present statistically; however, some are enlightening. At Vancouver for the period 1931–52, the average maximum temperature for August was 80° F. In only 2 of the 22 years was the average maximum for August more than 83° F. During the same period the average minimum temperature for January was 34.6° F. In only 5 of the 22 years was the average minimum for the month less than 31° F.

GROWING SEASON, SNOWFALL, AND EVAPORATION

At Vancouver the average date of the last killing frost in the spring is March 29. The average date of the first killing frost in the autumn is November 13. On this basis the average length of the growing season is 229 days; however, most crops have matured long before the first autumn frost so that this date is not very important except, perhaps, for pastures. The last frost in spring is important because it determines the date on which it is comparatively safe to plant crops. For 55 years of record at Vancouver through 1952, the latest date for a killing frost in the spring is April 29. During more than 75 percent

TABLE 2.—*Weather data, U.S. Weather Bureau stations*

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Average monthly and annual precipitation, in inches, Clark County area													
Ariel Dam	8.19	7.97	7.47	4.24	2.82	2.84	1.00	1.14	2.68	6.43	9.80	11.51	66.09
Battle Ground	5.80	4.40	4.99	3.14	3.03	2.43	.47	.70	2.32	4.68	6.90	8.36	47.22
Cougar, 5E	14.96	13.08	14.60	7.69	4.92	4.02	1.24	1.53	4.15	10.90	16.48	21.08	114.65
La Center	6.85	5.81	4.89	3.38	2.71	1.90	.71	1.04	2.64	4.09	7.61	7.22	48.85
Mount Pleasant	7.91	6.11	5.76	4.37	3.77	2.75	1.12	1.06	3.03	4.48	8.91	7.57	56.84
Vancouver	5.54	4.14	3.57	2.48	2.08	1.68	.71	.69	1.79	2.72	5.53	6.39	37.32
Yacolt	10.74	8.55	8.89	5.47	3.58	2.85	.94	1.35	3.38	6.35	10.71	12.95	75.76
Average	8.57	7.15	7.17	4.40	3.27	2.64	.88	1.07	2.86	5.66	9.42	10.73	63.82
Average monthly and annual temperatures, in degrees Fahrenheit, Clark County area													
La Center	37.4	40.4	44.3	49.4	54.4	59.7	64.2	64.2	58.6	51.2	43.6	39.7	50.5
Mount Pleasant	37.6	40.4	46.0	50.8	54.8	60.0	64.8	65.5	60.8	54.2	45.6	39.0	51.6
Vancouver	38.4	41.8	47.0	52.0	57.0	62.0	66.8	66.9	61.4	54.3	45.5	40.4	52.5
Average total evaporation, in inches, western Washington [Measured in standard Weather Bureau class A land pan, 4-foot diameter]													
Seattle Maple Leaf Reservoir	[1] 0.50	0.89	1.76	2.91	4.40	4.77	6.28	4.97	3.25	1.55	0.65	0.53	----------
Wind River (Skamania County)	--------	--------	--------	3.20	4.86	5.55	7.07	6.82	3.50	1.57	--------	--------	----------

[1] Estimated for this report.

of the time no killing frost has occurred after April 15, and since 1927, only twice has a killing frost occurred after April 10.

Average annual snowfall at Vancouver is about 8.4 inches. Snowfall at other weather stations in the county ranges from 8.9 inches at Mount Pleasant to 22.5 inches at Yacolt. These stations are all at comparatively low altitudes; Yacolt, the highest, is 737 feet above sea level. At higher altitudes snowfall is much greater, probably exceeding 200 inches at 3,000 feet.

There are no Weather Bureau evaporation stations in Clark County. The nearest station is at Wind River, in Skamania County. Evaporation rates at Seattle Maple Leaf Reservoir probably are also comparable to those in Clark County. Average monthly evaporation at the two stations is given in table 2. At the Seattle station average evaporation is given for every month except January. Adding an estimated 0.50 inch for January gives an average annual evaporation of 32.46 inches. Weather Bureau evaporation data are based on records of evaporation from the Weather Bureau's class A land pan. A coefficient of 0.70 commonly is applied to evaporation figures from this type of record to reduce them to equivalent reservoir-evaporation figures; thus, average annual reservoir evaporation at Seattle would be about 22.6 inches. Evaporation, as shown in figure 5, commonly exceeds precipitation in the months of May, June, July, and August, that is, throughout most of the growing season.

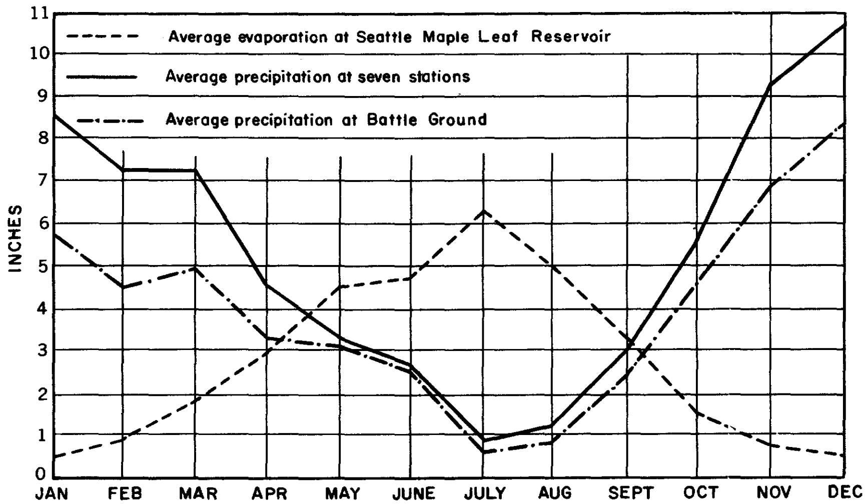

FIGURE 5.—Average precipitation at seven stations, and at Battle Ground and average evaporation at Seattle Maple Leaf Reservoir. (Records from U.S. Weather Bureau.)

ECONOMIC DEVELOPMENT

Economic development in Clark County is well diversified. Agriculture is secondary in total value of products to industry.

AGRICULTURE

Most of the farmland lies in the southwestern part of the county on terraces and terrace plains ranging from about 30 to 800 feet above sea level. The hilly and mountainous areas in the northern and eastern parts of the county chiefly are forested or logged-off brush lands in which farming is confined to the larger valleys.

Dairy products make up more than 40 percent of the value of farm products sold. Livestock and poultry products are second and third in value, respectively. Orchard crops, berries, and vegetables also are important crops. Part of the reason for the rapid increase in irrigation is the type of crops produced. Pasture for livestock, including dairy cattle, and berries and vegetable crops require supplemental water during the dry summer.

INDUSTRY

Industry, although based to a considerable extent on the availability of cheap electrical power and of raw materials and on harbor facilities for ocean-going shipping, is based also upon the ready availability of large supplies of ground water. The chief industries are the manufacture of aluminum, chemicals, paper and allied products, lumber and plywood, and food products. Vancouver and Camas are the largest industrial centers.

PHYSIOGRAPHY

Clark County lies in the long structural basin (Willamette-Puget trough) between the Coast Ranges on the west and the parallel Cascade Range on the east. The Columbia River, which is the major trunk stream of the Pacific Northwest, cuts through both mountain systems and crosses the trough to empty into the Pacific Ocean to the west. Clark County is bounded on the south and west by the Columbia River and is drained by streams tributary to that river.

The western and more thickly populated half of the county consists of a series of nearly flat plains and benches rising steplike from the level of the Columbia River (fig. 1). These range in elevation from only a few feet to about 800 feet above sea level. The eastern half of the county consists of foothills along the western slope of the Cascade Range. The boundary between these two distinctly different physiographic units trends roughly 20° west of north from Washougal and passes a few miles east of Battle Ground.

FOOTHILLS AREA

The foothills area of Clark County is part of the Middle Cascade Mountains section of the Sierra-Cascade Mountains province as defined by Fenneman (1917). The part of this section within Clark County lies entirely on the west slope of the Cascade Range. The topography of the foothills has been produced chiefly by erosion, in contrast to the topography of the plains to the west which in considerable part is depositional.

The foothills area as a whole presents the appearance of a maturely, and in some places sharply, dissected westward-sloping plateau. Along the eastern margin of the county some of the higher peaks rise to altitudes of nearly 4,000 feet. Peaks between 2,000 and 3,000 feet in altitude are common. Some of the lower hills are moderately rounded, but many of the higher ones are flat-topped and bounded by steep scarps. Scarps which descend 1,000 feet in a lateral distance of half a mile are not uncommon.

A few ridges are hogbacks formed by differential erosion of dipping strata. Other hills and mountains have been formed by volcanic activity. Tumtum Mountain, which rises to about 1,950 feet at the northeastern end of Chelatchie Prairie, is a volcanic cone practically unmarked by erosion. A postulated fault trace along the southeastern edge of Chelatchie Prairie (p. 29) passes beneath Tumtum Mountain, and the volcanic material probably came up along the fault plane.

Within the foothills area are several large flat-bottomed basins, the largest of which are Chelatchie Prairie and the Yacolt basin. Chelatchie Prairie is about 5 miles long and averages nearly three-quarters of a mile in width. The altitude of the prairie ranges from about 400 feet at the southwest end to nearly 600 feet at the northeast. The Yacolt basin is about 4 miles long and averages nearly a mile in width. The altitude of the floor ranges from about 600 feet at the southeast end to more than 700 feet at the northwest end. Neither of these basins can be explained on the basis of ordinary stream erosion. It seems probable that both basins, and probably several other smaller ones, were formed by faulting and partial filling with alluvium at the base of the fault scarps.

In the Yacolt-Amboy-Fargher Lake area the topography has been modified by glaciation. A great tongue of ice apparently came down the Lewis River valley and covered a considerable part of northeastern Clark County. The most prominent glacial features are the rounded rock hills and spurs (rock drumlins), many of them elongated in the direction of ice movement. They are especially numerous along the north flank of Chelatchie Prairie, and between Amboy and Fargher Lake. Generally they are covered with a blanket of till. Rock drumlins are especially noticeable immediately north of Amboy and along Cedar Creek west of Amboy.

Ice-marginal drainage channels were cut high on the flanks of Green Mountain northwest of Amboy and on the north flank of Bells Mountain along the south side of the East Fork of the Lewis River. Smaller channels, now abandoned, are found at a number of other places.

The very irregular, knobby topography west of Fargher Lake appears to be due to deposition of ground moraine over the irregular erosion surface on the Troutdale formation and the old volcanic and consolidated sedimentary rocks. Hummocky ground moraine also is conspicuous along the East Fork of the Lewis River about 4 miles southeast of Yacolt.

Several major drainage changes were probably caused by the glaciation. Prior to glaciation, the Lewis River probably flowed southwestward through Chelatchie Prairie and down the valley now occupied by Cedar Creek west of Amboy. The East Fork of the Lewis River is believed to have entered Lewis River at Amboy. The opposed courses of Cedar and Yacolt Creeks near Yacolt are striking examples of the changes produced by glaciation.

ALLUVIAL BENCHES AND PLAINS AREA

The foothills area gives way rather abruptly to the alluvial plains. Generally the boundary is marked by a pronounced change in slope and a change in lithology from the volcanic rocks of the foothills to the unconsolidated and semiconsolidated sedimentary rocks of the plains. However, in the area north of the East Fork of the Lewis River, between Battle Ground and Ariel Dam, the contact between the Troutdale formation and the older rocks is covered by glacial drift and the physiographic boundary is rather indefinite.

TROUTDALE BENCH

The highest plain or bench is formed almost entirely on the moderately eroded and very deeply weathered surface of the Troutdale formation. This bench extends from the extreme southeastern corner of the county at Mount Pleasant westward toward Camas, then northwestward toward Proebstel, then northward toward Battle Ground. At Battle Ground the boundary between this bench and the foothills continues in a northerly direction to the Lewis River, but its boundary with the lower plains swings northwestward to Woodland. The segment from Proebstel to Battle Ground is known as Fifth Plain and the segment north of the East Fork of the Lewis River is known as the Highland Area. From Mount Pleasant to Battle Ground, a distance of some 20 miles, the bench is fairly uniform in width, generally about

2 miles wide; northward and northwestward from Battle Ground its maximum width is about 7 miles.

The altitude of the bench is uniform throughout most of its length, though the two ends are somewhat higher.

At Mount Pleasant the Troutdale formation is partly covered by younger volcanic rocks (Boring lava). The surface of the Troutdale bench ranges in altitude from 600 to 900 feet at the contact with the Boring lava to about 500 feet at its outer, southwestern margin. Northwestward from this point the altitude of the flat upland segments between erosion channels generally ranges from 400 to 600 feet. The outward slope (away from the foothills) is moderate, and generally is not more than about 50 feet per mile. North and northwest of Battle Ground the surface of the bench rises somewhat, and it is highest along the northward-facing scarp about a mile south of the Lewis River. It seems probable that the Troutdale bench abutted the hills to the north and northwest in southern Cowlitz County and sloped southwestward to the East Fork of the Lewis River. The Lewis River has cut down approximately along the contact of the Troutdale formation with the older volcanic rocks which form the hills and has left only a few isolated patches of the Troutdale formation on the north side of the river. The altitude along the scarp that forms the northern margin of the bench is generally not more than 800 feet, and from that scarp the surface, between present erosion channels, slopes slightly west to south, to an altitude of 500 or 600 feet, at an average of about 100 feet per mile.

Whether the flat westward- and southwestward-sloping remnants of the Troutdale bench represent the original depositional slope on the Troutdale formation or whether the deposits were tilted is not certain. At some other places, however, it is apparent that the Troutdale formation has been gently warped and folded.

For almost its entire length the Troutdale bench is separated from the lower plains by a scarp 100 to 200 feet high. This scarp is believed to be largely of structural origin, probably chiefly a downwarping to the west, but in part it may also have been caused by downfaulting to the west.

FOURTH PLAINS AREA AND TERRACES

A broad plain south and west of the Troutdale bench is known as Fourth Plains. During late Pleistocene time, alluvium of the Columbia River, possibly glacial outwash from eastern Washington, filled the area to a level which now stands approximately 300 feet above sea level. The constructional surface on this fill is not, and probably never was, entirely level; at the highest surfaces, as on Mill Plain, it now reaches an altitude of about 315 feet, although a few ridges attain a height of 340 feet above sea level. (See also p. 21.) At other places the original surface apparently was as much as 50 feet lower.

While the Columbia River was building its great fan or delta at the mouth of the gorge, tributary streams downstream from the gorge were choked with the debris and were forced to aggrade their courses. Deposits of these tributary streams, including the Washougal and the Little Washougal Rivers, Salmon Creek, the East Fork of the Lewis River, the Lewis River, and many smaller streams interfingered with the deposits of the Columbia River around the margins of the area of alluviation. Generally these subsidiary fans have slopes steeper than that of the Columbia River fan but they show a marked decrease in slope near their toes. Upstream along the tributaries the fans merge with remnants of terraces formed along the stream channels at the same time the fans were built.

The largest fan is at Battle Ground, where the East Fork of the Lewis River debouched on the plain; other, smaller tributaries built fans that coalesce with it northwest of Battle Ground. The toe of the Battle Ground fan, where it coalesces with the Columbia River fan, locally called the Portland Delta, is at an altitude of about 270 feet; eastward, scattered remnants reach an altitude of about 450 feet at Heisson. Upstream from Heisson the East Fork of the Lewis River flows through a narrow canyon and the fan materials there are preserved in only a few terrace remnants. At least the uppermost part of the fill in the broad Yacolt basin appears to have been aggraded to the level of the fan surface. Because the Yacolt basin is believed to have been formed by downfaulting along the west flank of the basin, at a time much earlier than that during which the Portland Delta and the Battle Ground fan were being formed, the bulk of the fill in the Yacolt basin probably is older than the fan materials and the Portland Delta.

Undoubtedly the Lewis River built a fan or delta at Woodland which was subsequently removed by the downcutting Columbia River. Terrace remnants occur on both sides of the river sloping upstream from Woodland. The surficial deposits underlying the broad terrace at Yale, in Cowlitz County, and the Chelatchie Prairie, at the head of Cedar Creek, are remnants of this fill. Both are at altitudes of 420 to 500 feet. Another conspicuous fan was formed between Lacamas Lake and Proebstel by a stream or streams which headed in the mountains to the east.

The Fourth Plains area includes both the remnants of the original alluvial fill and several of the higher terraces cut when the Columbia River reexcavated the fill.

When the Columbia River began to cut down, its course was northwest from Camas through the channel now occupied by Lacamas Lake and lower Lacamas Creek, and thence westward to Orchards. At Orchards the channel divides, one branch continuing generally westward along the Burntbridge Creek channel, the other trending slightly west of north to Salmon Creek. At Salmon Creek this northern channel also divides, one branch continuing almost due northward to the East Fork of the Lewis River, the other swinging westward to form the Salmon Creek channel. Downcutting seems to have been fairly continuous; there is little evidence of long stillstands of base level as has been postulated by some writers. Terrace remnants are found at almost every level below the original surface of the fill. North of Proebstel remnants are 255 to 270 feet above sea level, and 2 miles southeast of Orchards an isolated terrace remnant is about 250 feet above sea level. The channel floor south of the last-mentioned terrace is at an altitude of 225 to 230 feet. This floor is continuous with the surface on a terrace remnant to the southeast along the southwest side of the Lacamas Creek channel. The altitude of the floor becomes progressively higher upstream, reaching 250 feet just west of the northwest end of Lacamas Lake. In general, all terraces that can be traced for any considerable distance slope downstream at a gradient of about 3 to 4 feet per mile.

The channel northward from Orchards apparently was abandoned first. The divide between it and the main channel down Burntbridge Creek, about half a mile northeast of Orchards, is at an altitude of slightly more than 210 feet, about 15 feet higher than the floor of the Burntbridge Creek channel. At Salmon Creek the floor of the northern channel is at an altitude of about 195 feet. The branch of the channel that extends north between Salmon Creek and the East Fork of the Lewis River, may have been abandoned slightly earlier; the divide on this channel is at an altitude of slightly more than 200 feet, although later erosion has cut a narrow drainage outlet slightly below 200 feet.

Protruding through the Pleistocene fill and rising 100 to 150 feet above the level of the plain are several hills of the Troutdale formation. Well logs indicate that these hills are structural highs, although erosion may have had some part in increasing their prominence. One of the more striking of these is a smooth domelike hill about 3 miles west of Battle Ground. Most of the others form a series of low hills extending from Salmon Creek, just east of U.S. Highway 99, northwest to the Lewis River immediately below its junction with the East Fork.

Within an area of nearly 10 square miles, a few miles northeast of Vancouver, a series of unusual ridges rises above the general level of

Fourth Plains. They occur chiefly in sections 7 and 18, T. 2 N., R. 2 E. and in sections, 1, 2, 11, 12, 13, and 14, T.2 N., R. 1 E. Mostly they are long and very narrow, roughly parallel, with closed depressions between them. Many of the depressions contain ponds fed by ground water. The ridges in the southern part of this area trend generally westward; those farther north trend northwestward. Some of the ridges are so elongated as to have been confused with eskers.

It is the writer's belief that these ridges and the intervening depressions are chiefly erosional features formed by the Columbia River at flood stage. None of the closed depressions are found above 280 feet nor below 230 feet, and the ridges are all at altitudes about 230 feet. It seems probable that the general level of the channels was about 240 feet when the flood or floods occurred. On the other hand, the level could have been at 250 feet or higher and some of the scouring could have taken place later when the channels had been lowered to about 240 feet above sea level. Floodwater probably reached an altitude of 280 feet or more with a depth of at least 30 feet and possibly as much as 50 feet.

An interesting feature of these ridges, but one difficult to explain, is the height of the ridge tops. Several of them rise above 330 feet and one rises to an altitude of 355 feet. This is higher than the highest points on Mill Plain or on the plain about Brush Prairie—plains which are believed to preserve the original constructional surface. Of course, a rapidly growing delta or alluvial fan is not built as a smooth plain, and it is to be expected that the axis of a delta would be somewhat higher than the flanks; so it may be that these ridges are axial remnants; however, it would be unusual for a flood or floods to cut down along this higher axis and leave the slightly lower surfaces on either side untouched. A possible alternative explanation is that these ridge tops were formed at about the same altitude as the surrounding plains, but that subsequently there has been slight warping of the alluvial plains in the area of the ridges.

The course of the Columbia River across the Fourth Plains area was abandoned and the former course from Camas to Vancouver resumed because the Troutdale formation was more resistant to erosion than the alluvial deposits which had filled in the former course. The floor of the abandoned channel at Camas, at an altitude of 210 to 220 feet, is cut on hard sandstone of the Troutdale formation. About half a mile north of Camas at the southeast end of Lacamas Lake, the floor of the channel dropped sharply to less than 190 feet, either because the Troutdale formation was softer northwest of this point, or because the surface of the Troutdale formation sloped to the northwest.

The present divide between the drainage of Burntbridge and Lacamas Creeks is a drained bottom-land area south of Orchards and Sifton and is at an altitude of about 195 feet, some 10 feet higher than Lacamas Lake. The position of the divide is somewhat anomalous, as the channel floor of the ancestral Columbia River originally must have sloped from the lake westward past Orchards. It is possible that after the Columbia River was diverted from the channel Lacamas Creek flowed into Burntbridge Creek. Eventually, however, the course of Lacamas Creek, between Orchards and Sifton, was aggraded until the creek was diverted into Lacamas Lake, and from there it cut a canyon to the Washougal River. A possible alternative explanation is that the warping postulated to explain the ridges, only a mile or two to the west, also caused the diversion.

The divide between the Lacamas Lake channel and the Columbia River is at an altitude of approximately 215 feet; however, inasmuch as the general downstream slope of terrace remnants along the Lacamas Creek channel is 3 to 4 feet per mile, it seems likely that all the terraces down to an altitude of 160 feet, immediately north of Vancouver, were formed before diversion of the Columbia from the Lacamas Creek channel.

After diversion of the Columbia River at Camas to approximately its present course, terraces were formed at various levels below 215 feet as the river continued to cut down. Terrace remnants are found at altitudes of approximately 190, 175, 150, 130, 110, 75, 60, 50, and 40 feet. Terrace remnants at slightly different altitudes may actually be parts of the same terrace. For example, a terrace remnant whose surface is at an altitude of about 60 feet at Camas may be equivalent to a terrace remnant with an altitude of about 50 feet, 10 miles downstream near Vancouver. The gradient of the present flood plain of the Columbia River is only a few tenths of a foot per mile and the downstream slope of the lower terraces is much less than that of the higher terraces. Most of the present flood plain lies between elevations of 25 and 30 feet above sea level.

Scattered over the land surface in the Fourth Plains area are large erratic boulders, which consist of types of rock that are different from the bedrock in the area; some basalt boulders also are found. Many of the erratic boulders are of coarse-grained granitic rocks. At some places these boulders lie on gravel, but at other places they lie on fine sand or silt deposits. Erratic boulders were found in Clark County at various altitudes ranging from 190 to 360 feet above sea level. Although erratic boulders were found in most parts of the Fourth Plains area, the largest concentration is along the Lacamas Lake channel between Lacamas Lake and Orchards, where boulder fields and boulder trains were found. Most of the boulders here are of basalt or other volcanic rock types, but many are of granitic rock. The boulders along this channel may have been rolled along the bottom of the channel by flood waters, but the boulders resting on fine sand and silt must have been rafted into place, presumably by ice.

Erratics in the Portland-Vancouver area were described by Allison (1933, 1935) and others. Most investigators believe that all the erratics were rafted into the area at about the same time and because the erratics are found at many different altitudes and range from about 35 to more than 400 feet above sea level have postulated either a gigantic flood or a lake in which floating ice dropped boulders and other debris on the bottom. The supposed lake would have been formed by damming of the Columbia River downstream from the Portland-Vancouver area. However, it is possible, even probable, that erratics were carried into the area more or less continuously during deposition of the Portland Delta. Erratic boulders found in gravel quarries, many feet below the present land surface, appear to support this hypothesis. The Willamette River in Oregon must have been ponded by the rapid accumulation of the Portland Delta; ice floating in the lake formed south of Portland dropped erratics as far south as Eugene, Oreg. (Allison, 1935).

GEOLOGIC SETTING

The ground-water conditions in any area are directly related to the geology of that area. The depths of the aquifers, their thickness, and their lateral distribution and continuity are determined by the mode of origin of the materials, by their environment at the time of deposition, and by their subsequent history. Aquifer permeability (ability of an aquifer to transmit water) is dependent upon the size and amount of pores and the way in which the pores are interconnected. The initial permeability of the aquifer, however, may be modified by later geologic processes such as cementation, solution, and weathering—processes which change the size or degree of interconnection of the pore spaces. Recharge of water to the aquifer, discharge of water from the aquifer, and movement of water through the aquifer are related to distribution of the geologic units at the surface, to the underlying geologic structure, and to the physiography of the area.

Thus, a thorough and detailed knowledge of the geology, the geologic history, and the physiography of an area is an essential requirement for an understanding of the hydrology of the area.

RÉSUMÉ OF GEOLOGY

The rock units in Clark County consist of two general types. The older consolidated rocks, which are chiefly volcanic, generally form the foothills and underlie the younger unconsolidated and semiconsolidated gravel, sand, silt, and clay which form the terraces and plains. These younger sedimentary deposits are the chief aquifers in the county.

The older consolidated rocks, of Eocene to Miocene age, include lava flows, agglomerates, tuffs, and breccias, and probably some interbedded sedimentary rocks. Overlying the older consolidated rocks, in basins formed chiefly by folding and faulting of these rocks, are silt, sand, and gravel of the Troutdale formation. At a few places younger volcanic rocks, chiefly lava flows, tuffs, and breccias, overlie the older volcanic rocks and the Troutdale formation. Most of the southwestern part of the county is covered by alluvial deposits of sand and gravel which form terraces and plains up to an altitude of approximately 325 feet. The stratigraphic relations of the rock formations cited above are shown on figure 6 (see also pl. 1). Their lithologic description and water-bearing characteristics are outlined in table 3, and the places where they are exposed in the project area are shown in plate 2.

GEOLOGIC HISTORY

The oldest rocks in Clark County and, therefore, those containing the earliest geologic record are the basalt lava flows, breccias, and associated sedimentary rocks of the Goble volcanic series of late Eocene age. From the Eocene epoch through the Miocene epoch widespread vulcanism alternated with deposition of sedimentary strata which included both marine and nonmarine deposits. Probably some folding and faulting occurred at intervals, but there is no clear record of deformation until about the end of the Oligocene epoch, when the area was uplifted and the rocks were folded. Undoubtedly many parts of the area had been subjected to some erosion at various times during the Eocene and Oligocene epochs, but the end of the Oligocene was marked by a considerable period of erosion.

In Miocene time, following deformation and erosion of the Eocene and Oligocene rocks, basalt and andesite lava flows (Columbia River basalt) erupted and spread out over the surface, forming the great lava plateaus of eastern Washington and Oregon as well as the less extensive flows in western parts of these states.

It is probable that the rocks were folded and faulted during at least the latter part of this period of vulcanism. In late Miocene and early Pliocene time a basin was formed in the Portland-Vancouver area by downwarping or faulting. At least 1,000 feet of clay, silt, and sand (lower member of the Troutdale formation) accumulated in a lake or estuary. Deposition, probably contemporaneous with subsidence, is indicated by lenses of coarser grained materials which were deposited only in shallow water and are now found at different depths in wells.

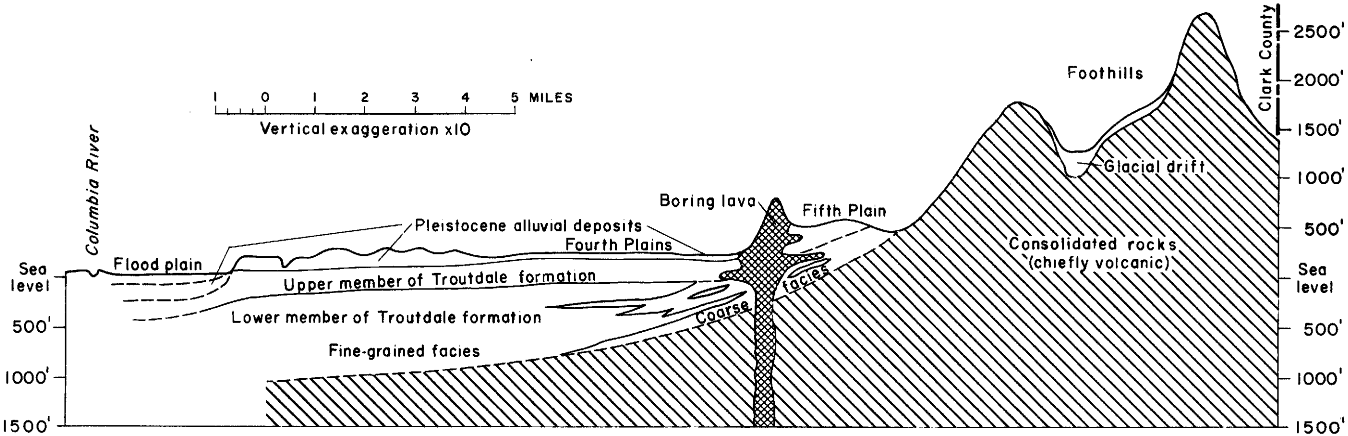

FIGURE 6.—Generalized east-west section across Clark County.

TABLE 3.—*Summary of rock formations and their water-bearing characteristics*

Age	Formation		Lithologic description	Water-bearing characteristics
Recent	Alluvium		Flood-plain and stream-channel deposits of silt, clay, sand, and gravel. Mostly basaltic and andesitic rock materials. Generally well sorted and stratified.	Moderately large yields (300 or 400 gpm) are obtained from shallow wells in the coarse sand and gravel along the Lewis and the East Fork of the Lewis Rivers.
Pleistocene	Stream, alluvial-fan, and terrace deposits		Stratified, crossbedded, and lenticular deposits of clay, silt, sand, and gravel. Chiefly volcanic materials, mostly basaltic. Generally loose or only very slightly cemented. Predominantly coarse-grained materials, near mouth of Columbia Gorge at Camas, becomes progressively finer downstream.	Large yields are obtained from gravel and coarse sand where these strata are in the zone of saturation. Very large yields are obtained in the flood plain of the Columbia River at Camas and Vancouver (as much as 1,000 gpm per ft of drawdown).
Pleistocene	Glacial drift		Glacial till, silt, and clay; outwash sand and gravel, poorly to well stratified, deltaic, and lenticular. Mostly volcanic materials, a few fragments of granitic rocks. At places rather deeply weathered.	Sand and gravel should yield moderate to large supplies at Chelatchie Prairie and Yacolt basin and from terrace deposits along Cedar Creek, the Lewis River, and the East Fork of the Lewis River.
Pleistocene	Boring lava		Gray, highly vesiculated basalt lava flows, with some red scoria, cinders, ash, and other pyroclastic materials. Generally fresh unaltered. Weathers to chocolate-brown loamy soil.	Moderately permeable; water level far below surface at some places. Relatively few inhabitants because of hilly terrane, therefore not utilized greatly. Moderate yields obtained where pumping lifts are not too great.
Pliocene	Troutdale formation	Upper member	Predominantly cemented sandy gravel with considerable amount of quartzite pebbles and cobbles. Some lenses of sandstone. Deeply weathered (red, orange, yellow, brown) in many areas.	Unweathered, lightly cemented phases yield large supplies (more than 1,000 gpm to some wells). Majority of irrigation wells in county are in this aquifer. Weathered, indurated, and finer grained phases yield much less.
Pliocene	Troutdale formation	Lower member	Predominantly fine sand, silt, and clay; only about 1½ percent of materials penetrated were logged as "gravel" or "sand and gravel."	Small yields obtained from fine sands. Moderate yields (as much as a few hundred gpm) are obtained from scattered lenses of gravel.
Eocene to Miocene	Older consolidated rocks		Basalt and andesite lava flows, pyroclastics, tuff, shale, and agglomerate. Generally dense and moderately hard, or hard.	Upper weathered zone yields small supplies for domestic use. Unweathered rock at depth generally yields small supplies. At a few favorable locations large yields might be obtained. Very few wells obtain water from these rocks.

The source of the sediments probably was to the east, because the materials in the lower member of the Troutdale become coarser in that direction. Quartzite pebbles and cobbles in these deposits near Camas indicate that the ancestral Columbia River was discharging into this basin.

Contemporaneously with deposition of these mostly fine-grained materials in the southwestern part of Clark County, much of the eastern part of the area was weathered and eroded.

In later Pliocene or possible early Pleistocene time depositional conditions changed very markedly. Widespread deposits of coarse gravel (upper member of the Troutdale formation) were laid down as a great fluviatile piedmont fan along the western foot of the Cascade Mountains. This gravel blanket originally covered most of the western two-thirds of Clark County and extended many miles to the north and to the south. The source of the gravel was chiefly the Cascade Range to the east. In Clark County the gravel contains a considerable proportion of quartzite pebbles and cobbles which were apparently brought from northeastern Washington by the Columbia River. The gravel may have resulted entirely from stream erosion or it may have originated as a result of glacial action, possibly from the earliest glaciation in the Pleistocene epoch.

During the latter part of this time interval, numerous volcanoes became active and extruded basalt flows, scoria, and breccia (Boring lava), which at places are interbedded with the gravel, although at most places they overlie the gravel; these volcanic rocks, unlike the Miocene volcanic rocks, were extruded from many cones and did not spread far from their individual sources.

Following deposition of the gravel, the strata were warped and gently folded. Faulting also took place. A long period of weathering and erosion followed, during which the gravel in exposed locations was decayed so completely as to obliterate the original shapes and textures, except for pebbles and cobbles of quartzite, which are virtually unchanged.

Later in Pleistocene time, an ice tongue moved down the valley of the Lewis River from the vicinity of Mount St. Helens and Mount Adams into the northeast corner of Clark County. At its maximum extent the glacier covered the Chelatchie Prairie-Yacolt basin area and almost overrode Yacolt Mountain. The ice sheet extended southward across the valley of the East Fork of the Lewis River at least as far downstream as Lewisville Park immediately north of Battle Ground. Northwestward, a tongue of ice extended down the Lewis River, possibly almost to Woodland. Differences in altitudes of exposures of glacial till indicate that the ice sheet was 1,000 to 1,200 feet thick in the vicinity of Chelatchie Prairie. Tumtum Mountain, (fig. 22) at the eastern end of Chelatchie Prairie, was built as a volcanic cone on top of the glacial deposits after the glacier had melted back.

Sometime during the Pleistocene epoch, the Columbia River cut a broad valley in the Troutdale formation somewhat deeper than the present valley. In late Pleistocene (possibly Wisconsin) time, the Columbia River began to build a great delta, or fan, downstream from the mouth of the gorge near Washougal. Perhaps it was dammed in some downstream reach or perhaps it carried an overload of debris; whatever the reason, the river filled the valley with coarse sand and gravel and then spread out over the bordering lowlands; it deposited coarse-grained materials near the mouth of the Columbia Gorge and finer grained materials farther away. The source of the clastic materials apparently was the ice sheet that occupied northeastern Washing-

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ton during this period. The delta was built up to an altitude of somewhat more than 350 feet; then conditions changed, the Columbia River began to cut away the delta, and eventually it returned to approximately its former channel.

STRUCTURE

The attitude of the beds and the areal relations of the various rock types clearly indicate that the rock units of Eocene to Miocene age, collectively mapped as "older consolidated rocks" have been considerably deformed, by both folding and faulting. Because these rocks are relatively unimportant as aquifers, no attempt was made to study their structure in detail.

Because the younger deposits are very important aquifers, their structure was given critical study. In particular, the structure of the Troutdale formation strongly influences ground-water occurrence and movement. The Troutdale formation accumulated in a broad shallow basin, possibly 15 to 20 miles wide. The base of the Troutdale around the margins of the basin, in Clark County, ranges generally from 400 to 800 feet above sea level. The lowest known point of the basin, from the Ladd well in Portland, Oreg. (Piper, 1942, p. 132), is about 1,080 feet below sea level. Hence the present westward slope of the basin floor underlying the Troutdale is about 100 feet per mile.

The lithology of the Troutdale indicates that it was deposited chiefly in shallow water; thus it is apparent that downwarping occurred more or less simultaneously with deposition. The Troutdale formation also apparently has been folded slightly. In some places the structure is reflected in the topography. The low round hill 2 miles southwest of Battle Ground apparently is a small domal structure, for the log of well 3/2–5R1 indicates that the top of the lower member of the Troutdale is considerably higher beneath this hill than in surrounding areas. Several hills and ridges extend along a line from Salmon Creek near U.S. Highway 99, northwest to the mouth of the East Fork of the Lewis River (near Allen Canyon) between Ridgefield and La Center; well logs indicate that this topographic high also reflects the underlying structure. Contours on the top of the lower member of the Troutdale formation are shown on figure 7.

Several faults that cut the older consolidated rocks and the Troutdale formation are shown on plate 2. Generally the actual fault trace is obscured by a deeply weathered mantle, by soil creep, and by landslides, and the faults have been inferred chiefly from the topography and derangement of the drainage. However, slickensided and sheared zones were found at a few places.

The faults mapped are believed to be normal faults; the actual amount of displacement is not known but for some of them must have

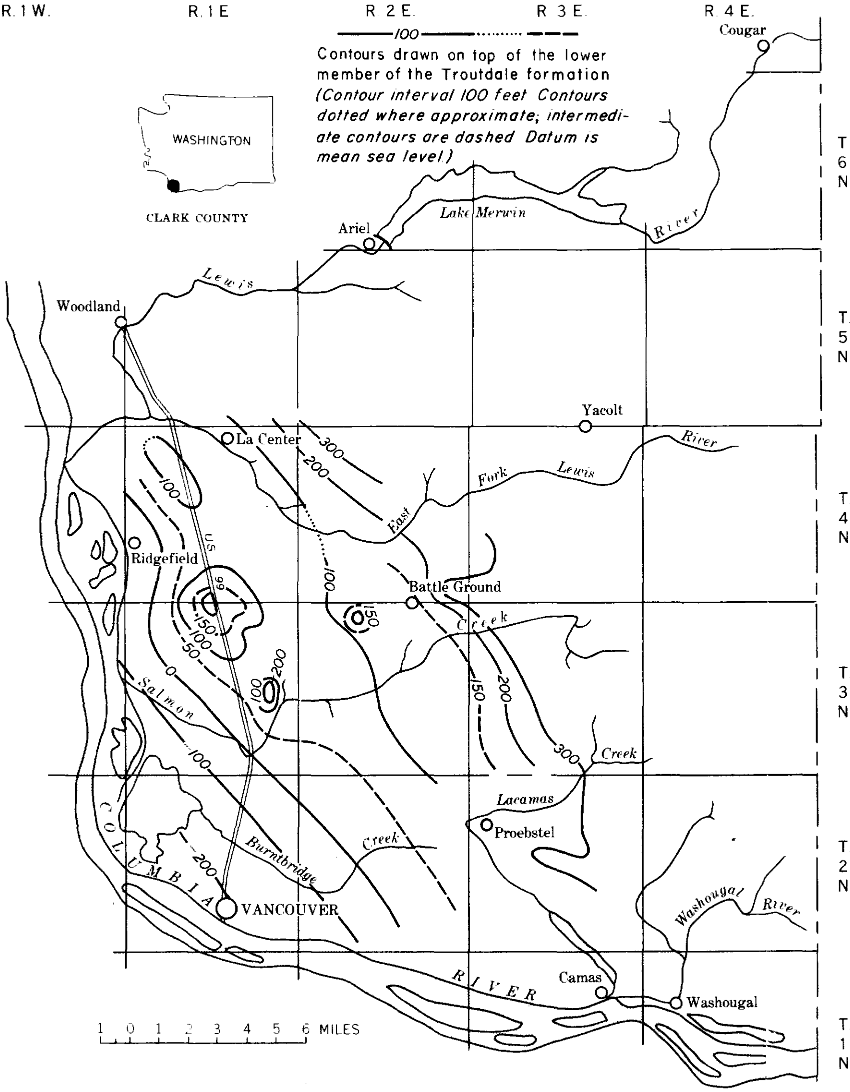

FIGURE 7.—Contours on top of lower member of Troutdale formation in Clark County.

been many hundreds of feet. The fault or fault zone extending along the southeast margin of Chelatchie Prairie is one of the most prominent. The same fault, or a parallel one, is believed to extend from Amboy southwest to Fargher Lake. Chelatchie Prairie and Fargher Lake were formed in the down-dropped block. A parallel fault about 1 mile southeast of the Chelatchie fault is suggested by the topography and drainage.

Another conspicuous fault is responsible for the Yacolt basin. This fault extends northwest along the western margin of the basin. Although the trace has been shown on plate 2 for a distance of 7 or 8 miles, the topography and drainage suggest that the fault zone may actually extend several miles farther at its southeastern end. A parallel fault forms a somewhat smaller basin along upper Salmon Creek near Venersborg about 5 miles southwest of the Yacolt fault. This fault zone is also along the southwestern margin of the basin.

Two faults nearly at right angles were mapped at Camas. The one extending in a northwest direction is the more clearly defined. Slickensides and sheared zones mark the fault trace at its southeastern end along Lacamas Creek. The other fault, which extends northeastward from Camas is less clearly marked. It has been postulated in part on topographic expression, but chiefly on a presumed offset in sandstone beds in the Troutdale formation. These beds appear to have been uplifted to the northwest of the fault.

The mapped faults are in two groups, one trending north 45° to 80° E., the other trending north 35° to 45° W.

THE ROCK FORMATIONS AND THEIR WATER-BEARING CHARACTERISTICS

Differences between rock types have a marked effect on the occurrence of ground water. In addition, physical and chemical changes of the rock units subsequent to their genesis may modify their water-bearing characteristics very greatly. For example, nearly impermeable crystalline rocks may become much more permeable by the fracturing, shearing, and faulting which accompany deformation of the earth. On the other hand, these same openings may later be sealed with minerals deposited from solutions circulating through them, and the permeability then again becomes very low. Sand and gravel strata which were very permeable when deposited may be compacted by weight of overlying material and also may have their pore space greatly reduced by deposition of minerals between the grains. Thus, sandstone and conglomerate are generally much less porous and permeable than loose sand and gravel. However, subsequent to compaction and cementation the porosities and permeabilities of sandstone and conglomerate may be increased by fracturing.

Weathering processes, generally confined to the upper 100 feet of material, can greatly modify the water-bearing characteristics of the parent rock. At many places, the permeability and effective porosity of crystalline rocks—originally very low—has increased greatly when the rock is changed, through chemical and mechanical processes, to a mixture of clay and grit. Contrariwise, the storage capacity, porosity, and permeability of loose sand and gravel generally are reduced greatly by weathering processes. Thus, the water-bearing characteristics of the rock formations in Clark County depend not only on the present type of the rock, but also on its history.

OLDER CONSOLIDATED ROCKS

The oldest rocks in the group probably belong to the Goble volcanic Eocene to Miocene age. Included in the group are the Goble volcanic series, the Eagle Creek formation, the Keechelus andesitic series (Skamania andesite series of Felts, 1939), the Columbia River basalt, and intrusive rocks of one or two areas such as the Silver Star granodiorite stock (Felts, 1939). With a few exceptions these older consolidated rocks crop out only in the foothills and in the mountainous northern and eastern parts of the county. Because these areas are largely uninhabited, the rocks are not economically important as aquifers. Therefore, no attempt was made during the present investigation to delineate precisely the individual units.

The oldest rocks in the group probably belong to the Goble volcanic series. This series was described as follows (Wilkinson and others, 1946, p. 4):

> The name Goble volcanic series is herein proposed by Lowery and Baldwin for a thick section of basaltic flows, pyroclastics, and minor amounts of sediments all of which are well exposed in the vicinity of Goble, Oreg., just north of the St. Helens quadrangle as well as elsewhere along both the Oregon and Washington sides of the Columbia River * * *. Studies of the faunas in the sediments underlying and overlying Goble volcanic rocks indicate that the series is interfingered with the marine Cowlitz formation of upper Eocene age and is unconformably overlain by beds tentatively correlated with the Gries Ranch stage of the lower Oligocene.

Volcanic rocks and associated breccias, tuffs, and conglomerates, tentatively correlated with the Goble volcanic series, crop out in southeastern Clark County in the vicinity of Camas and Washougal and in the extreme northern and northeastern part of the county.

Vitric tuffs belonging to the Eagle Creek formation were mapped by Felts (1939) in Skamania County a few miles east of the eastern margin of Clark County. It is probable that some of the tuffs in Clark County belong to this formation, but in this report they are not separated from tuffs in the underlying Goble volcanic series and in the overlying andesite.

Andesite is by far the most extensive volcanic rock in Clark County. It crops out in irregular patches immediately east of Woodland and Highland, south of Lake Merwin, and occupies an area 6 to 10 miles wide along almost the entire eastern margin of the county. The andesite ranges from medium to very fine grained (sometimes almost glassy), is very commonly porphyritic, and is medium to brownish gray. At a few places the andesite is fairly massive, and at a few places weathering along joints has produced a columnar structure; however, at many places the andesite has been considerably sheared and fractured.

The andesite in Skamania County immediately adjacent to the eastern boundary of Clark County was mapped by Felts (1939) under the name Skamania andesite series and was correlated by Felts with the Keechelus andesitic series of central Washington.

At a few places, fine-grained black, locally vesicular basalt crops out. Generally the basalt has the columnar structure so characteristic of the Columbia River basalt; it is believed to be correlative with that series. The basalt exposed along the railroad about 1 mile north of Ridgefield probably belongs to this series, as possibly does the basalt exposed at several places between Camas and Washougal.

An area of intrusive granodiorite, mapped by Felts (1939) in T. 3 N., R. 5 E., in Skamania County, is known to extend southwestward into Clark County; however, that extension is not within the area shown on the map accompanying this report.

In general, except for the Columbia River basalt and possibly some of the coarse-grained pyroclastic rocks, the consolidated rocks described above are poor aquifers. The rocks have been considerably jointed and sheared, but secondary mineralization and alteration have sealed most of these openings. At places these rocks are weathered to depths of several tens of feet below the surface, and considerable quantities of water are stored in the saturated subsoil. Where this zone is sufficiently thick, dug wells generally yield supplies adequate for domestic use. The unweathered rock beneath generally holds little water in storage, and wells drilled into it commonly yield only enough water for limited domestic use.

In some areas, particularly in eastern Washington, the Columbia River basalt is a very productive aquifier. Ground water in the basalt occurs chiefly in the vesicular, broken, and brecciated upper parts of the individual lava flows, immediately below the bases of the overlying flows. However, not all these interflow zones are good aquifiers. In Clark County, very few wells have been drilled into the Columbia River basalt.

The older consolidated rocks crop out chiefly in the thinly populated foothills and nonpopulated mountains. Water supplies in these areas generally are obtained from springs and dug wells, and at most places are adequate. Yields of the few wells that have been drilled into these rocks are small.

TROUTDALE FORMATION

The name Troutdale was applied by Hodge (1938) to alluvial sand and gravel deposited as a "great piedmont fan" on the west side of the Cascades. It was named for the excellent exposures found near Troutdale, Oreg.

The Troutdale formation, which consists of semiconsolidated clay, silt, sand, and gravel, is the most widespread formation and its upper unit is the most productive aquifer in the county, although the actual outcrop area of the Troutdale formation in Clark County is smaller than that of the Pleistocene terrace deposits.

The Troutdale formation crops out in a belt extending from the southeastern corner of the county, at Mount Pleasant, where it is 2 or 3 miles wide, westward to Camas, and thence northward to Battle Ground. At Battle Ground the belt of outcrop broadens and swings westward to form a broad highland between the East Fork of the Lewis River and the Lewis River that extends to the flood plain of the Columbia. South of this upland, and west of the belt of Troutdale between Camas and Battle Ground, the Troutdale formation is overlain by as much as 150 feet of unconsolidated silt, sand, and gravel. However, the Troutdale formation is exposed at numerous places in the southward- and westward-facing scarps along the flood plain of the Columbia River, in the valleys of several streams where the overlying alluvial deposits have been cut through by the streams, and in several low hills which protrude through these deposits.

LOWER MEMBER OF THE TROUTDALE FORMATION

In Clark County the Troutdale formation consists of two members distinguishable on the basis of lithology. The lower member, through most of the county, consists almost entirely of fine-grained materials. However, in the vicinity of Camas and, in general, eastward toward the foothills of the Cascade Mountains, the fine-grained materials near the top of the lower member of the Troutdale formation may grade into coarser sand and gravel which are not distinguishable lithologically from the materials in the upper member of the Troutdale formation. It should be noted that the thickest sections of course materials correlated with the upper member of the Troutdale were found near the eastern margin of outcrop of the Troutdale formation. It is possible that some of the deeper sand and gravel strata at those places are age-equivalents of fine-grained sedimentary materials farther to the west which have been designated as the lower member of the Troutdale formation.

The lower member of the Troutdale formation crops out in only a few places where folding has elevated the deeper strata. In the upwarp forming the highland north of the East Fork of the Lewis River the unit is exposed at several places (fig. 10). Good exposures are found in the bluffs overlooking the river and in some of the tributary canyons on the north side of the river. Especially good exposures

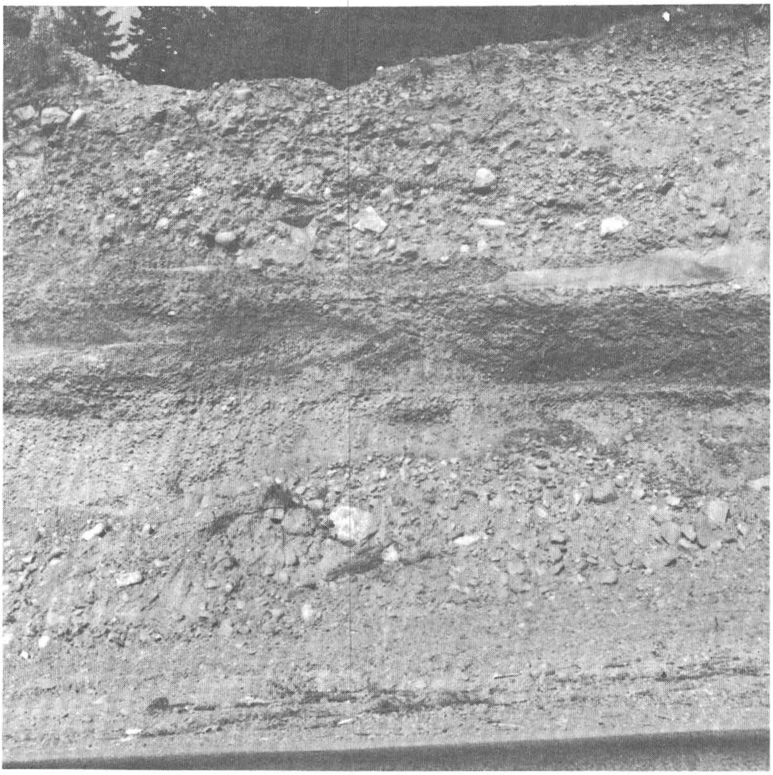

FIGURE 8.—Fresh-appearing river-terrace gravels overlying upper member of the Troutdale formation at well 4/2-27Ba, near Lewisville Park. The Troutdale is lenticular moderately weathered, rusty red and brown to yellow conglomerate containing much quartzite.

FIGURE 9.—Very deeply weathered, red, brown, and orange conglomerate of the Troutdale formation in Mount Norway area (1/4–2Ra). View is 45° slope (cut by road grader blade) showing outline of completely rotted volcanic pebbles and cobbles. Quartzite pebble at pick point is unweathered.

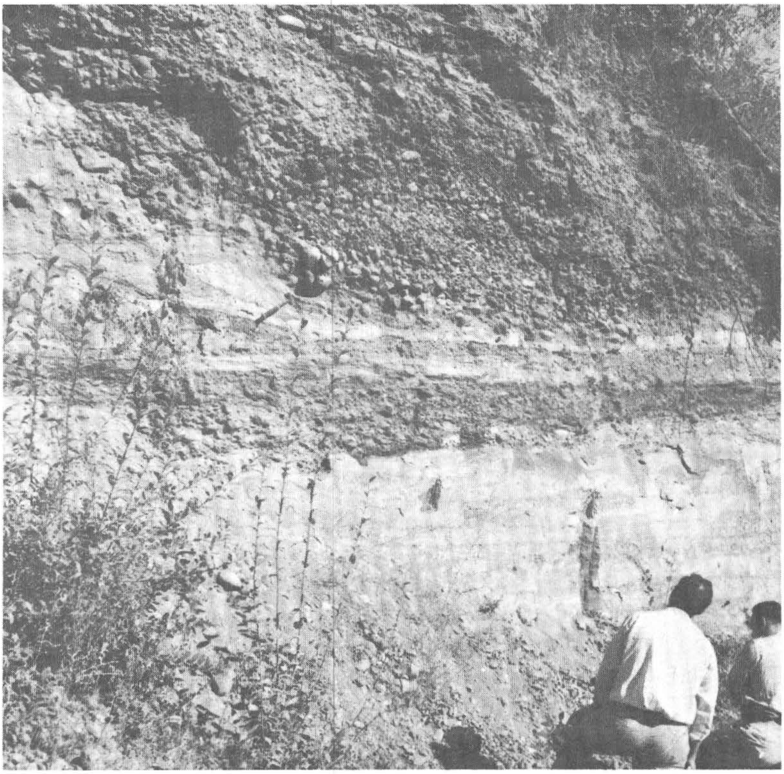

FIGURE 10.—Upper member of Troutdale unconformably overlying lower member of Troutdale 2 miles east of La Center (5/1-36Na). Upper Troutdale is deeply weathered, cemented quartzite gravel; lower Troutdale is stratified fine-grained blue silty clay and bluish-green clay.

FIGURE 11.—Deeply weathered quartzite-bearing conglomerate of the Troutdale overlying older volcanic rock on east flank of Prune Hill near Cames (1/3-10Ea). Angular blocks of lava in base of Troutdale; red to purplish-red soil zone at top of volcanic rocks.

are found near Daybreak Bridge in sec. 20, T. 4 N., R. 2 E., and at the county road crossing an unnamed creek near the southwest corner of sec. 36, T. 5 N., R. 1 E. Other outcrops were found along the south bank of Lewis River in the SE¼ sec. 31, T. 5 N., R. 1 E.; along the railroad in the SE¼ sec. 1; and in the NE¼ sec. 12, T. 4 N., R. 1 W. where 20 to 40 feet of light-buff to blue laminated silty clay is exposed, overlain by typical weathered and cemented gravel of the upper member of the Troutdale. The following section probably is fairly representative of the lower member of the Troutdale:

Partial section exposed in bluff on north side of the East Fork of the Lewis River, 100 yards upstream from Daybreak Bridge, sec. 20, T. 4 N., R. 2 E.

[Altitude at top of section about 185 ft]

	Feet
Top of scarp.	
Pleistocene terrace gravel:	
Soil, gray, gravelly and bouldery	1.5–2
Gravel, coarse, bouldery; interstices filled with pebbles and sand; stained a rusty color; lightly cemented, moderately open; appears to be very permeable	4
Unconformity.	
Troutdale formation:	
Lower member:	
Sand, fine-grained; gray at base, rusty near and at top	3
Clay, silty, blue, hard, tough; no bedding apparent, but some zones more sandy, softer (poorly exposed)	16
Sand, micaceous, very fine, tough, compact; gray with orange streaks along some layers; finely laminated. Sand (feldspathic?) breaks down completely when rubbed between fingers; can feel no grit	7
Sand, silty, very fine grained; light gray with yellow and orange streaks. Section not well exposed at any one place, but occasional exposures at different places and levels along escarpment give a composite section	35
Clay, sandy, tough, compact, gray and yellow to orange-gray, thinly stratified; sand very fine-grained	10
Sand, silty, fine-grained, gray to orange or red; moderately loose except that some layers are harder because of greater proportion of clay; some layers cemented with iron	6
Clay, sandy, tough, compact; blue to gray to reddish-gray and brownish-gray from iron stain; stratified, with lenses of very tough blue-gray and sandy clay	2.5

A number of wells have penetrated to considerable depths in the lower member of the Troutdale formation; these give additional information on the character, extent, and thickness of the unit. Logs of wells 3/1–3M1, 4A1, 7D2, 24L1; 3/2–5R1, 14P1; 4/1–5E1, 20C1, 26M1, and 4/2–9E1 (table 17) show the general character of the materials in the lower member of the Troutdale formation.

The maximum thickness of the lower member of the Troutdale formation in Clark County is not known, because wells in the center of the basin do not completely penetrate it. The greatest thickness was at well 3/1–24L1, where 663 feet of clay and sand were penetrated between 85 and 748 feet below the surface without reaching formations older than the Troutdale. Piper (1942, p. 34) cited the log of the Ladd well in Portland, Oreg. This well was drilled in sec. 36, T. 1 N., R. 1 E., about 8 miles south of Vancouver, and probably entered the Columbia River basalt at a depth of 1,300 feet. The interval from 405 to 1,300 feet probably is correlative with the lower member of the Troutdale formation in Clark County.

The Troutdale formation, as named and described by Hodge (1938, p. 873), was considered to be Pleistocene age. However, plant fossils from the Troutdale formation at localities along the Sandy River several miles upstream from Troutdale, Oreg., were considered to be of Pliocene age by Chaney (1944, p. 323–353). Plant fossils were also collected from the Troutdale formation at a locality near Woodland, Wash., and these also indicate a Pliocene age (Wilkinson and others, 1946, p. 28).

It is the belief of the writer that the outcrops at the Woodland locality and at the localities along the Sandy River in Oregon are of the lower member of the Troutdale formation. The very sharp break in lithology which is observed at most places between the lower and upper member of the Troutdale (fig. 10) suggests the possibility of a considerable difference in age. Certainly a very great change in depositional conditions is indicated. Such a great flood of gravel suddenly appearing in the downstream reaches of the Columbia River would seem to require an explanation, and one that seems obvious to the writer is that this gravel was outwash from a continental ice sheet in the upper Columbia River basin during early or middle Pleistocene time. However, the age of the upper member of the Troutdale formation has not been determined, as yet, nor is enough other information available to make possible a definite conclusion as to its age and origin.

UPPER MEMBER OF THE TROUTDALE FORMATION

The upper member of the Troutdale formation is the member generally exposed at the surface. It is predominantly a cemented gravel or semiconsolidated conglomerate, with scattered lenses and stringers of sand. At most places the matrix in the gravel consists of medium- to coarse-grained sand, derived chiefly from volcanic rocks, with minor amounts of quartz sand. The gravel is chiefly of volcanic origin, with basalt and andesite (some porphyritic) rocks predominating. However, the most distinctive characteristic is the presence of considerable amounts of pebbles and cobbles of metamorphic and igneous rocks which are probably foreign to the area. That is, bedrock of these types is unknown within the drainage area. Many different rocks are represented, including several varieties of granite, diorite, gneiss, schist, and slate, but the most striking and most abundant foreign constituent is buff or pink quartzite, occurring as pebbles and cobbles.

The cementing materials are in part iron oxides and in part clay minerals formed as alteration products during weathering, but in some places the chief cementing material appears to be silica.

The upper member of the Troutdale is very deeply weathered except at places where it has been protected from weathering by overlying deposits. As seen in numerous road cuts and similar exposures, the upper 8 to 10 feet of this material is a silty residual clay with not even the pebble outlines remaining; only occasional quartzite pebbles remain to indicate the true nature of the outcrops. At depths of 12 to 15 feet, pebble outlines are well preserved. At still greater depths below the top of the weathered profile, rotten pebbles and cobbles can be dug out of the matrix. Because erosion has removed varying thicknesses of material, any part of the weathered profile may be exposed in stream and road cuts.

Most outcrops of the upper member of the Troutdale formation are predominantly gravel (or were gravel before being weathered to clay), with sand lenses comprising only 10 to 20 percent of the total. However, in and immediately north of Camas, a bed of coarse cemented gritty sandstone containing only a few pebbles extends over a square mile or more and forms a bench at an altitude of 200 to 300 feet. Although the sandstone bed may be considerably more extensive, its actual extent cannot be determined, because it is overlain by other deposits. A pebbly sandstone, or conglomerate very similar in appearance, but with a larger proportion of pebbles and cobbles, crops out in Lacamas Creek, about 4½ miles northwest of Camas, in the SE¼ of sec. 20; although volcanic pebbles predominate, quartzite pebbles and cobbles also were noted. The sandstone is light green where newly exposed, but changes to yellow or reddish brown upon continued exposure.

The large member of erratics (quartzite, granite, gneiss, schist, and other rock types) found nearly everywhere in the upper member of the Troutdale formation, indicate that the formation was deposited by a major stream (presumably the Columbia River or an ancestral Columbia River) flowing from east of the Cascade Range.

The upper member of the Troutdale formation was deposited in a very broad shallow valley; the outcrop belt is as much as 15 miles wide in Clark County and extends for a width of at least an additional 5 miles on the west side of the Columbia River in Oregon (Wilkinson and others, 1946, geologic map of the St. Helens quadrangle).

Almost all wells obtaining water from the Troutdale formation do so from the upper member. The average thickness of the upper member may originally have been 300 to 400 feet. Wells 2/2–30C1 and 2/2–30K1, a few miles east of Vancouver, penetrate 231 and 234 feet, respectively, of the upper member of the Troutdale formation without reaching its base. The log of well 1/3–3M1 shows the thickest known section of the upper member of the Troutdale formation, with 395 feet of clay and cemented gravel overlying volcanic rocks; the lower member of the Troutdale formation apparently is absent at this place. Nearly 7 miles north, well 2/3–3D1 penetrated 290 feet of the upper member of the Troutdale formation before entering volcanic rocks. Through much of the area, particularly in the Fourth Plains area, a very considerable part of the upper member of the Troutdale formation has been removed by erosion, and the average thickness in that area may not be more than about 100 to 150 feet.

The upper member of the Troutdale formation originally consisted almost entirely of sand and gravel, frequently lightly to moderately cemented. Probably less than 5 percent of the unit consisted of finer grained materials. However, some of the well logs are misleading in that they show many feet of soil, clay, sandy clay, or silt in the upper part, whereas nearby outcrops show that this material actually is deeply weathered, almost completely altered and decomposed sand and gravel. This is particularly true of the Fifth Plain area between Camas and Battle Ground and in the upland east and northeast of La Center. In both these areas the Troutdale formation appears to have been exposed to a long and continuous period of weathering.

Some of the flat upland surface between drainage channels may be approximately the original depositional surface of the formation. At other places a considerable part of the upper member of the Troutdale formation was removed prior to significant weathering or early in the weathering period. Outcrops and well logs in the upland areas show that weathering has progressed to depths of more than 100 feet.

WATER SUPPLY

The sand and gravel strata in the upper member of the Troutdale formation generally have a moderate to high permeability, except in zones where the permeability has been reduced by compaction, cementation, weathering, and other geologic processes. Cementation has greatly reduced the permeability of some strata, but generally other strata above or below are only slightly cemented, so that wells drilled a few tens of feet below the water table in the upper member of the Troutdale formation usually yield moderate to large supplies of water, except where this unit has been deeply weathered. At some places, as on the upland east of La Center, the upper member of the Troutdale formation has been weathered from the land surface to the base of the unit and yields little water to wells.

The upper member of the Troutdale formation is the most important aquifer through most of Clark County, and many hundreds of wells have been drilled into it. Well records tabulated in this report (table 15) include 60 wells in this unit which are reported to be capable of yielding 100 gpm (gallons per minute) or more. Of these 60 wells, 18 are reported to have yields ranging from 200 to 499 gpm, and for 7 of the reported yields range from 500 to 3,000 gpm. Depths to the bottom of the aquifer range from 17 to 285 feet, except for one well which obtains water from several aquifers at depths of 123 to 406 feet below land surface.

The lower member of the Troutdale formation is a very poor source of water in most places. Table 4 lists 39 wells which were drilled into it, none of the wells completely penetrating the formation. The average thickness of the lower member of the Troutdale formation penetrated in the 39 wells was 169 feet. Of these 39 wells, gravel of the lower member of the Troutdale formation was reported in only 8. The gravel, or gravel and sand, penetrated in these wells totaled only 100 feet out of an aggregate of 6,610 feet of material penetrated, or barely 1½ percent of the deposits reached in the lower member of the Troutdale formation. Although considerable sand is shown in the logs, the frequent description of the sand as "fine," "quicksand," or "heaving," indicates that the materials were very fine grained. This is in marked contrast to the very high proportion of gravel and coarse sand penetrated in the upper member of the Troutdale formation, and is the reason for the great difference in water-yielding ability of the two units. Few wells obtain more than small yields from the lower member of the Troutdale formation, and development of even these small amounts has been difficult in some of them because of the fineness of the sand.

BORING LAVA

The Boring lava was named by Treasher (1942a, p. 10) for the late Pliocene or early Pleistocene volcanic rocks which were extruded from numerous vents over a considerable area in the vicinity of Portland, Oreg. The name of the lava was derived from the type occurrence in the Boring Hills southeast of Portland.

In Clark County the Boring lava crops out as irregular isolated bodies in a belt extending from Mount Pleasant in the southeast corner of the county to the East Fork of the Lewis River near Battle Ground in the center of the county. The largest area is north of Battle Ground, where the formation covers about 6 square miles,

TABLE 4.—*Wells penetrating the lower member of the Troutdale formation*

Well	Depth (feet)	Yield (gpm)	Lower member of Troutdale, in feet			
			From—	To—	Total thickness	Gravel
2/3-5P1	290	[1] 300	260	290	30	0
3/1-4A1	385	----------	172	385	213	0
7D2	471	[2] 360	204	471	267	6
3M1	393	----------	193	393	200	0
23R1	268	----------	122	268	146	0
24H2	108	----------	63	108	45	0
24L1	748	[1] 100	85	748	663	0
3/2-3E1	177	[1] 100	139	177	38	0
5R1	400	----------	110	400	290	0
9H1	195	----------	159	195	36	0
14P1	215	----------	170	215	45	0
25L1	305	[2] 300	148	305	157	0
27F1	253	----------	153	253	100	[3] 3
28C2	247	[2] 120	190(?)	247	57	33
4/1-5E1	300	20	140	300	160	4
7H1	359	----------	238(?)	359	121	21
7R1	203	2½	165	203	38	0
8M1	406	10+	140	406	266	0
8N1	257	7	150	257	107	0
11B1	135	0	47	135	88	0
11B2	141	0	21	141	120	0
16C1	274	10	170	274	104	0
16D1	277	10	215	277	62	0
17H1	660	0	130	660	530	0
17H2	209	30	107	209	102	0
17H3	200	30	87	200	113	0
17Q1	360	53	190(?)	370	180	0
20C1	343	60	180	343	163	8
26M1	675	[2] 150	162	675	513	11
4/2-8K1	129	Small	58	129	71	0
9E1	495	Small	113	495	382	0
11F1	328	([4])	45	328	283	0
16D1	125	----------	80	125	45	0
18D1	183	7½	80	183	103	0
22H1	240	[1] 130	37	240	203	0
34R1	301	[1] 200	165	301	136	0
4/3-30J1	200	----------	50	200	150	0
5/1-34G2	231	75	0	231	231	14
35P1	212	[2] 15	160	212	52	0

[1] No water from lower member of the Troutdale formation.
[2] Most of water obtained from upper member of Troutdale formation.
[3] Reported in the well log as sand and gravel.
[4] Discharge rate not measured; very small.

chiefly as tabular lava flows. However, the rugged hills in secs. 24 and 25, T. 4 N., R. 2 E., appear to mark centers of extrusion. Battle Ground Lake, in sec. 30, T. 4 N., R. 3 E., is an excellent example of a crater lake. (Contrary to local popular belief the lake is not "bottomless"; maximum depth determined by sounding was 56 feet.) To the southeast, Green Mountain and Brunner Hill are made up of volcanic rocks with a lava flow or flows extending a short distance from the center of extrusion. The west and southwest flank of Prune Hill, just west of Camas, is a similar type of occurrence, which differs, however, in that considerable amounts of red scoria are associated with the lavas. Mount Norway, Nichols Hill, and Bear Prairie, are capped by Boring lava flows.

At most places the Boring lava is a gray, finely vesiculated (sometimes termed "inflated") basalt. The basalt has a characteristic and distinctive appearance and generally is readily recognizable in the

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field. Along the north flank of Prune Hill immediately west of Camas, very red, scoriaceous lava forms a vertical cliff. Pebbles and cobbles of gravels of the upper member of the Troutdale formation are imbedded in and coated by the scoria, having been picked up and incorporated into the scoria as it broke through and spilled out at the surface.

The Boring lava overlies the upper member of the Troutdale formation at numerous places, but at a few places well logs show the upper member of the Troutdale formation both below and above Boring lava. It is not certain whether the gravel was deposited on the lava or whether the lava was injected into the gravel as sills. The log of well 2/3–8Q1, about half a mile north of the base of Green Mountain, shows alternating intervals of rock and sand or gravel. Logs of several wells north of Battle Ground (4/2–25K1, 35H1, 35H2) show the upper member of the Troutdale formation both above and below the Boring lava. If this lava was injected as sills, then there is no known instance in Clark County in which any part of the Troutdale formation was deposited after emplacement of the Boring lava. However, a report by Wilkinson and others (1946, p. 29) describes a volcanic breccia interbedded in the Troutdale formation a few miles north of Clark County, along U.S. Highway 99 about 1 mile north of Woodland. The volcanic breccia overlies sandstone and shale which may belong to the lower member of the Troutdale formation. Overlying the breccia are sand and gravel that reach an altitude of about 750 feet, nearly 600 feet above the top of the volcanic breccia. The volcanic breccia was correlated with the Boring lava by Wilkinson and others (1946, p. 30), and if this correlation is correct, extrusion of Boring lava extended from some time during deposition of the lower member of the Troutdale formation until after deposition of most or all of the upper member of the Troutdale formation.

Weathering of the Boring lava results in a brown loamy soil and a dark chocolate-brown clayey subsoil which is somewhat mottled and rather gritty. Maximum weathered depth observed was about 10 feet, but locally it is probably considerably deeper. Records of wells on Prune Hill, for example, indicate that the Boring lava is weathered to a depth of 25 or 30 feet.

The Boring lava, which covers approximately 15 square miles in Clark County, generally is a fairly good aquifer; apparently the vesicular and scoriaceous zones common at the tops of flows are moderately permeable. The cinders, ash, and other pyroclastics reported in well logs apparently also serve as aquifers. However, because much of the area it underlies is rugged hill land with few inhabitants, comparatively few wells have been drilled or dug in this formation. Water levels in wells in the Boring lava on the west end of Prune Hill range from about 300 to 400 feet below the surface. Apparently, continuity of vertical jointing of the lava permits downward percolation of water without too much hindrance. Thus, there is no perched ground water in the Prune Hill area, and, although the Boring lava is weathered to depths of 25 to 30 feet locally, attempts to obtain water from the weathered zone have not been successful. However, wells dug in most other areas underlain by Boring lava have yielded sufficient water for domestic use. Depths of these wells generally range from 20 to 40 feet. Locally several wells drilled through the Boring lava have obtained water from underlying gravel of Troutdale age.

GLACIAL DRIFT

Drift was deposited in northeastern Clark County by glaciers that extended down valleys from the Cascade Range lying to the east. The most extensive deposits were formed by a lobe of ice that extended down the Lewis River from Mount St. Helens.

It is quite possible that the area was glaciated more than once; however, distinction of different glacial advances was not attempted for this report. The ice apparently spread south and west in a very broad lobe in northeastern Clark County, and the immediate walls of the Lewis River valley were overtopped by ice many hundreds of feet thick. Not all the area has been mapped, so the total extent of the ice is not known; however, in the Battle Ground-Yacolt-Amboy-Ariel Dam area it must have been more than 15 miles wide and at places more than 1,000 feet thick. The main lobe of the ice advanced 3 to 4 miles westward beyond Fargher Lake, on a front extending from the East Fork of the Lewis River, near the county-owned Lewisville Park, northward across Lewis River west of Ariel. Along the Lewis River the ice apparently advanced several miles farther west, because till is found on the valley wall 1 mile east of Woodland. South of Yacolt, an ice tongue apparently extended eastward up the East Fork of the Lewis River.

The area shown on the map as glacial drift totals about 110 square miles and includes both till and outwash deposits. At most places the till is fairly thin but at other places it is 30 to 40 feet thick. The till forms a blanket over the area that was occupied by the ice, except where it has been removed by erosion from steep slopes and in stream valleys; it has been weathered rather deeply as has the underlying rock. At places, especially where the till is thin and vegetative cover is heavy, it is difficult to delineate the exact areas occupied by till.

Typically, the till is an intimate mixture of mineral dust, grit, and larger fragments ground and churned by the ice into a tough brown concretelike mass (fig. 12). Because of the almost complete lack of

FIGURE 12.—Glacial till in bluff above East Fork of Lewis River (4/2-14Ea). Very hard, tough, very rude stratification at some places. Gravel, cobbles, and boulders in a brown sand and silt matrix. Greatly weathered toward top of section.

sorting, the till is dense and compact. At most places the fragments and boulders in the till consist chiefly of volcanic materials (fig. 12) with some sedimentary rock fragments including shale and siltstone; however, at several localities near the western margin of the glacial drift the till contains scattered pebbles of quartzite and granitic rocks. The only places where these pebbles have been noted are in areas where the drift is underlain by the Troutdale formation, and undoubtedly the quartzite and granite were derived from the Troutdale.

Generally the till is gravelly and bouldery; boulders more than 8 feet across were observed; however, the texture of the till varies considerably from place to place, and clayey till with relatively few pebbles and cobbles was noted in several outcrops. At low altitudes, the till in most shallow exposures is brown and moderately to greatly weathered. In many exposures at higher altitudes the till is very deeply weathered, with some pebbles nearly completely decayed. On the other hand, in exposures along the East Fork of the Lewis River

FIGURE 13.—Tough brown glacial till overlying weathered volcanic rocks 2½ miles southeast of Yacolt in East Fork of Lewis River valley (4/3–13Ga). Till contains only volcanic pebbles.

where bluffs are as high as 200 feet, till exposed toward the center of the cliff is tough, gray, and comparatively fresh. The difference in degree of weathering is due at least in part to the length of time and conditions of exposure to weathering. It is also possible that more than one age of till is represented.

The till overlies the Troutdale formation in the area north of Battle Ground. At the few exposures where till can be observed resting directly upon the Troutdale formation, the greater weathering of the underlying Troutable formation indicates a lapse of considerable geologic time between the deposition of the Troutdale formation and the entry of the ice sheet into the area. The physiographic relations and degree of weathering indicate that the till is considerably older than the Pleistocene alluvial deposits which are probably of Wisconsin age.

Associated with the till are outwash deposits consisting of sand, sand and gravel, and laminated silt (figs. 14 and 15). Excellent exposures of deltaic sand and gravel and finely laminated silt occur up Canyon Creek east of Tumtum Mountain. The sand and gravel underlying Chelatchie Prairie and the Yacolt basin are chiefly outwash

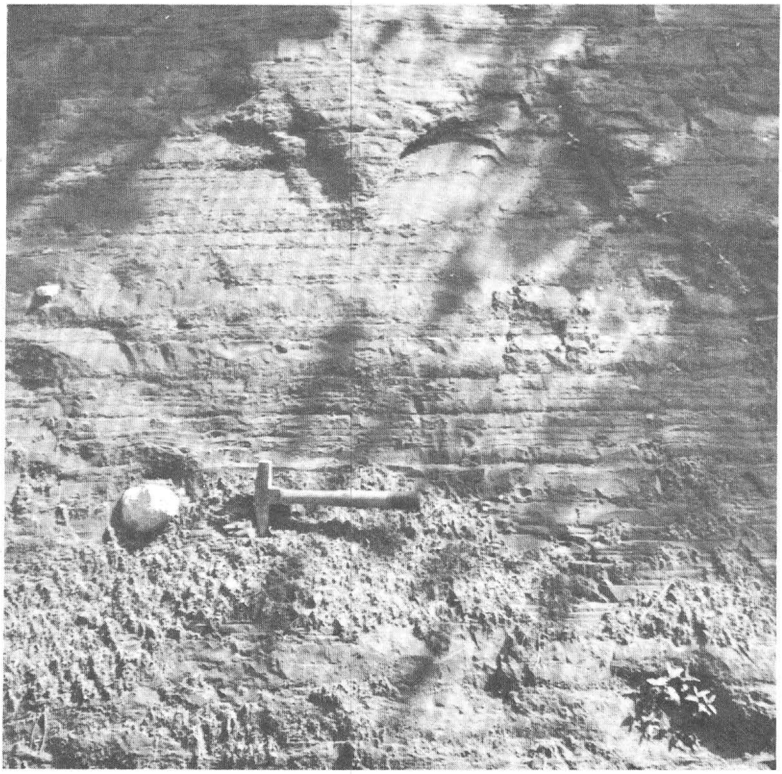

FIGURE 14.—Laminated glacial silt and fine sand deposited in lake (5/4–2Ka) formed by damming of Canyon Creek by ice tongue from Mount St. Helens. Icerafted pebbles and cobbles are scattered through silt and sand.

deposits; sand and gravel deposits, which form terraces along Cedar Creek downstream from Amboy (figs. 15 and 8) also are glacial outwash.

The areas of outwash most important hydrologically are Chelatchie Prairie and Yacolt basin. Fargher Lake basin also contains a deep fill, of unknown depth, but this fill apparently is all of fine-grained material, as inferred from a report that a well in the basin was drilled to a depth of 550 feet entirely in fine-grained materials and in quicksand to the bottom. Chelatchie Prairie, the Yacolt basin, and Fargher Lake all are basins formed by faulting. The thickness of alluvial fill in the Yacolt basin is not known, but it could be as much as several hundred feet. In Chelatchie Prairie, well 5/4–7M1 which penetrated 217 feet of sand and gravel was drilled to 598 feet and ended in consolidated rock; it was reported to have been tested at 800 gpm with a 60-ft drawdown. The well is cased to the bottom and the casing is perforated at five zones in the gravel and one zone (near the bottom)

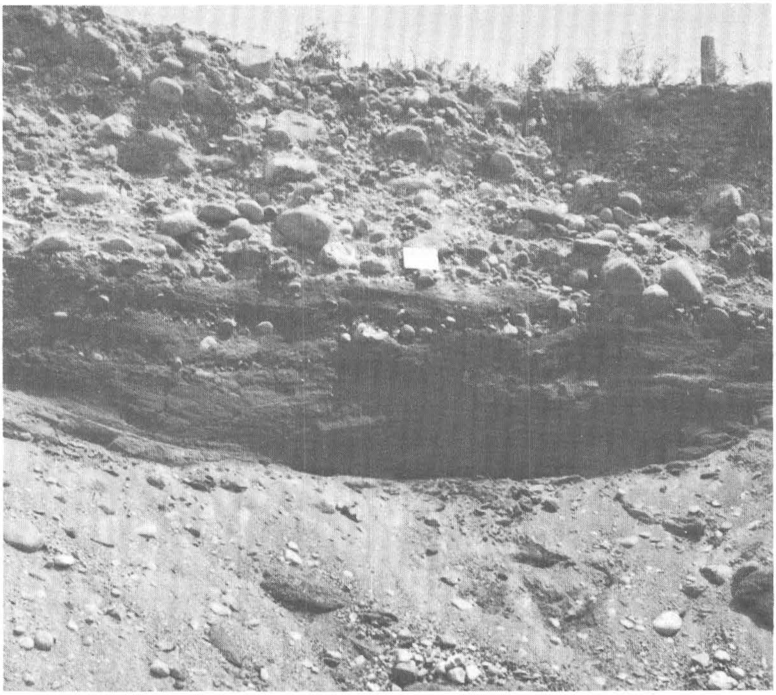

FIGURE 15.—Stratified lenticular glacial outwash in gravel pit along Cedar Creek 1½ miles northwest of Amboy (5/4-8Na). Dark layer below upper coarse gravel is brick red to tan and gray crossbedded sand.

in the consolidated rock. Probably most of the water from this well is obtained from the gravel.

PLEISTOCENE ALLUVIAL DEPOSITS

The Pleistocene alluvial deposits crop out as broad plains and terraces in the southwestern part of the county at altitudes ranging from a few feet to about 370 feet above sea level. Nearly one-third of the county is underlain by these deposits. The name "Portland Delta gravels" was applied to them by Buwalda and Moore (1930). Other authors have called them "Portland gravels" (Treasher, 1942b; Baldwin and Lowry, 1952) and "terrace deposits and related alluvial materials" (Piper, 1942, p. 32–34).

In the Portland-Vancouver area the alluvial deposits accumulated in the valley of the Columbia River downstream from the outlet to the upper gorge which is at the eastern edge of Clark County. Whether the valley was submerged by a change in sea level, as is thought by some, or the river was simply loaded so heavily that it could not carry all its load downstream from the constricted upper gorge is not known. Whatever the reason for sedimentation, it appears that the deposits accumulated as a great delta or deltaic fan at the mouth of the gorge. The deposits at the mouth of the gorge, or in the vicinity of Camas, are very coarse grained and contain a large proportion of gravel. Downstream the materials are progressively finer, and northwest of Vancouver they consist chiefly of sand.

The materials are predominantly basaltic but also include considerable quartz and mica. At places occasional granitic and quartzite pebbles are found, but generally these are much less plentiful than in the Troutdale formation. Pebbles and cobbles of Boring lava, including both the dark-gray basaltic and the red scoriaceous types, are common.

The sand and gravel everywhere is comparatively fresh and unweathered. Although occasional rotted pebbles are found, these apparently have been reworked from an older deposit, probably the Troutdale formation. In general, the materials are well sorted, but the degree of sorting is much better in the finer grained phases than in the coarse. At a few places the gravels are lightly cemented, but not enough so that the porosity is greatly reduced.

Deltaic bedding was observed at almost every place where the structure could be seen; it occurs both in coarse sand and gravel and in the fine sand and silt (fig. 18). Foresets in some of the coarser deposits are 20 to 25 feet long, and slope as much as 25° (fig. 19). At a number

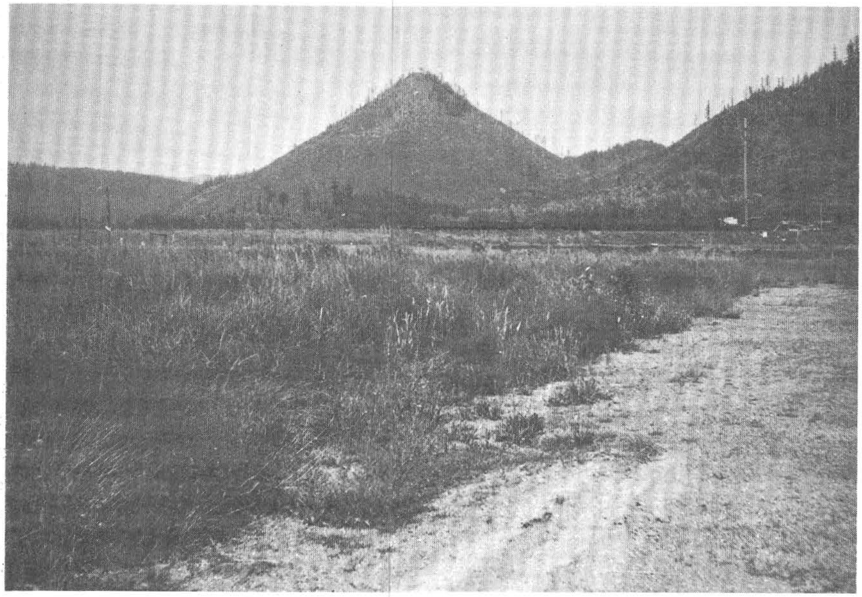

FIGURE 16.—Tumtum Mountain, at east end of Chelatchie Prairie, a volcanic cone built on a glacial-drift plain.

FIGURE 17.—Pleistocene alluvial deposits overlying conglomerate of upper member of Troutdale formation 5 miles northwest of Battle Ground (4/2–18La). Troutdale is greatly weathered, orange, yellow, and brown. Alluvial deposits are fine-grained, well-stratified, brown to tan and gray sand and silt.

of places topset, foreset, and bottomset beds are all well developed in the same section.

Except for a few small areas where they overlie volcanic rocks, the Pleistocene alluvial deposits overlie the Troutdale formation (fig. 17). The contact is marked by an erosional unconformity, although throughout much of the Fourth Plains and Mill Plain areas the top of the Troutdale formation is quite regular, generally ranging from 100 to 200 feet above sea level, with a gentle slope to the southwest. The valley of the ancestral Columbia River appears to have been roughly in the same location as the present valley; wells on the present flood plain at Vancouver penetrate as much as 173 feet of Pleistocene alluvial deposits (well 2/1–16C1) before reaching the top of the Troutdale, 138 feet below sea level. Apparently, however, at Vancouver the northeast wall of this ancestral valley, formed by a buried Troutdale escarpment, lay northeast of the present escarpment, and extended in nearly a straight line from a point about half a mile northwest of Van-

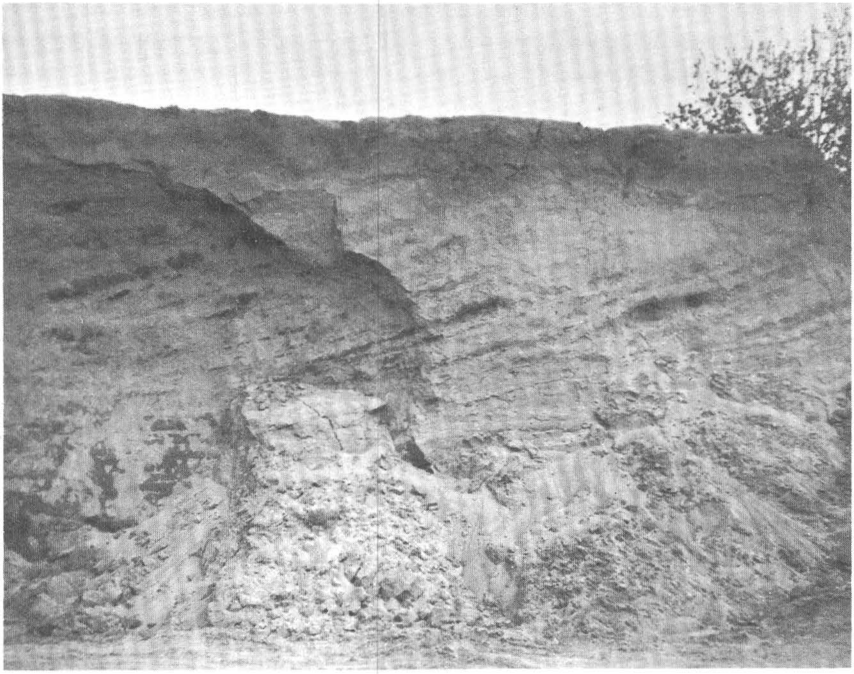

FIGURE 18.—Pleistocene alluvial deposits, fine- to medium-grained, exposed in cut through long narrow ridge 3 miles northeast of Vancouver (2/1-12Na). Top of section includes topset, foreset, and bottomset beds inclined to north. Base of section is horizontally bedded sand.

FIGURE 19.—Pleistocene alluvial deposits along highway 2½ miles east of Vancouver (2/2-31Da). Coarse clean terrace gravels; foreset beds incline 22° to the west and are overlain by horizontally stratified sand.

couver Junction, southeast through Vancouver Junction, to the northwest corner of sec. 31, T. 2 N., R. 2 E.

The thickest known section of the Pleistocene alluvial deposits is in the triangular terrace block bounded on the northeast by the buried Troutdale escarpment and on the south and west by the escarpment of the present flood plain. Several wells of the city of Vancouver (wells 2/1–15Q1, 23Q1, 23Q3, 23Q4, and 23R1) penetrate 220 to 273 feet of these deposits before reaching the Troutdale. The base of the Pleistocene alluvial deposits ranges from 45 to 53 feet below sea level in these 5 wells, and as the highest point on the terrace within the block is about 290 feet, the present maximum thickness is believed to be about 340 feet. As the log of well 2/1–16C1, near the center of the ancestral valley, shows the base of the sand and gravel of the Pleistocene alluvial deposits to be 138 feet below sea level, the maximum thickness of the Pleistocene alluvial deposits probably was more than 400 feet after deposition of the alluvium and before reexcavation of the valley by the Columbia River.

The highest point on the delta surface was at the apex in the mouth of the gorge. Remnants of the Pleistocene alluvial deposits have been found at altitudes as high as 370 feet near Camas, Wash., and Troutdale, Oreg.

During the period following accumulation of the delta deposits, and during downcutting of these deposits by the Columbia River, some of the materials were reworked by the normal cut and fill processes by which terraces are formed. The author made no attempt to distinguish between the reworked materials and the original delta deposits.

WATER SUPPLY

The coarser sand and gravel phases of the Pleistocene alluvial deposits are extremely permeable and yield large quantities of water wherever an appreciable thickness is saturated. As the deposits become progressively finer grained downstream (westward) from the mouth of the Columbia gorge in the vicinity of Washougal and Camas, the most permeable materials are found within the wedge-shaped area between Washougal, Vancouver, and Brush Prairie. Northwest of an arc connecting Brush Prairie and Vancouver the deposits generally are fine sand and silt and are much less permeable.

Through much of the area, the base of these deposits is 100 to 200 feet above river level, and either they are above the zone of saturation or only their bottom few feet (on top of the weathered Troutdale) is saturated. Therefore, although the deposits are exceedingly permeable, only small to moderate yields can be obtained. Where the Pleistocene alluvial deposits filled the valley of the ancestral Columbia River (which was cut into the Troutdale formation) the deposits extend 60 to 100 feet below river level and are saturated. Many wells have been drilled into the Pleistocene alluvial deposits at Washougal, Camas, and in the vicinity of Vancouver. Few have failed to yield 1,000 gpm or more, and some yield as much 1,000 gpm per foot of drawdown. Well records tabulated in this report include those of 45 municipal and industrial wells in the Camas-Washougal and Vancouver areas with a reported yield of 1,000 gpm or more. Yield and drawdown data both are given for 36 municipal and industrial wells of which a few yield slightly less than 1,000 gpm. The average yield of the 36 wells is 1,583 gpm with an average drawdown of 11 feet. Elimination of the two least productive wells leaves an average yield of 1,610 gpm with an average drawdown of 8 feet.

Yields from the finer grained phases of the Pleistocene alluvial deposits are much less, but there are several dozen shallow wells (less than 50 feet deep) north of Vancouver that obtain 40 to 150 gpm from permeable sand layers in the Pleistocene alluvial deposits.

Along the broad shallow channel now occupied by Burntbridge Creek in secs. 10, 11, 14, 15, 19, 20, 21, and 30, T. 2 N., R. 2 E., a considerable number of dug wells obtain moderately large yields from coarse sand and gravel. These materials were reworked chiefly from alluvial delta deposits but also in part from the upper member of the Troutdale formation, at the time the channel was cut into the Troutdale formation by the Columbia River. The reworked gravels are comparatively shallow, 10 to 22 feet thick, and apparently directly overlie the Troutdale formation. The dug wells generally range from 10 to 20 feet deep, and yields commonly are 100 to 200 gpm with only a few feet of drawdown. Locations of these and other shallow irrigation wells in the Pleistocene alluvial deposits are shown on figure 20.

ALLUVIAL-FAN AND ASSOCIATED DEPOSITS

The deposits included with this group are the fans, terrace deposits, and basin fill which accumulated along streams tributary to the Columbia River downstream from the gorge. Deposits of these tributary streams, including the Washougal and Little Washougal Rivers, Salmon Creek, the East Fork of the Lewis River, Cedar Creek, Lewis River, and many smaller streams, interfinger with the deposits of the Columbia River around the margins of the area of alluviation. Although these deposits cannot be distinguished from the Pleistocene alluvial deposits on the basis of well logs or well cuttings where they occur below the surface, at many places the surficial beds can be differentiated on the basis of topography and lithologic characteristics.

The largest fans are the Proebstel and the Battle Ground fans, deposited by streams running off Livingston Mountain and by the East

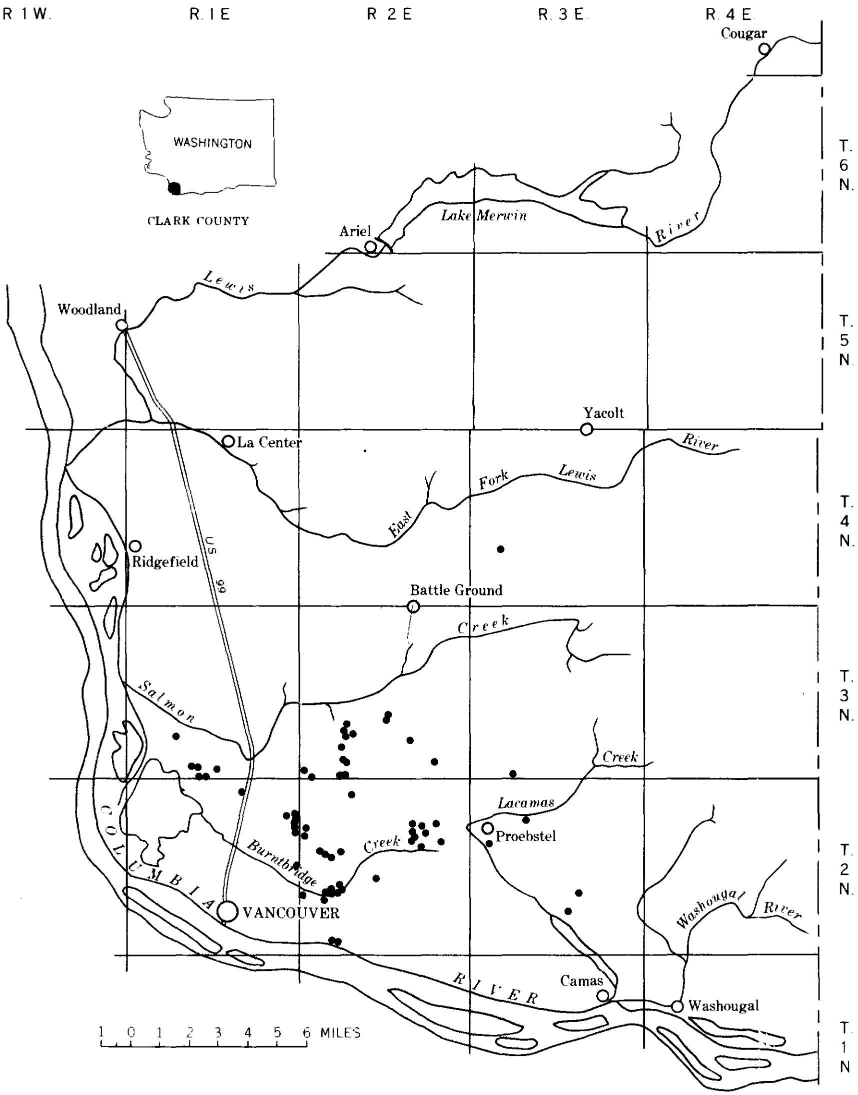

FIGURE 20.—Map showing location of shallow irrigation wells in Pleistocene alluvial deposits. (Includes infiltration trenches, dug wells, and drilled wells less than 50 ft deep.)

Fork of the Lewis River, respectively. Terrace remnants are graded upstream from these fans. The fan at the mouth of Lewis River was removed by downcutting of the Columbia River, but a number of terrace remnants are preserved upstream from Woodland. Terraces along Cedar Creek and Chelatchie Prairie consist chiefly of glacial outwash but are veneered with fine- to medium-grained brown sand which probably correlates with these deposits. Yacolt basin, in the drainage of the East Fork of the Lewis River, also is veneered with fine- to medium-grained brown sand. The surface of the Yacolt basin apparently grades downstream to the Battle Ground fan (p. 19). The surficial deposits of the Fargher Lake bottom also probably belong to the same group of deposits.

The materials in the margins of the Battle Ground and the Proebstel fans are fine-grained sands and silts. Toward the apexes of the fans and in the terraces along the stream channels, the materials are much coarser and grade to coarse sand and gravel.

A number of domestic water supplies have been obtained from these deposits, mostly from dug wells. The terrace sand and gravel along the streams probably are moderately permeable and would yield fairly large supplies.

TERRACE DEPOSITS

In addition to the terraces and terrace deposits described with the Pleistocene alluvial deposits and alluvial fan deposits, several terrace remnants border the East Fork of the Lewis River north of Battle Ground. These terraces, like the others, were formed following alluviation of the area when the Columbia River began to cut down through the alluvial deposits. However, unlike the other terrace deposits which consist largely of reworked materials from the adjacent alluvial deposits, those along the East Fork of the Lewis River differ markedly from adjacent deposits, and therefore have been mapped separately.

These terrace deposits consist of very coarse gravel in a sandy matrix. Pebbles include quartzite and granitic types apparently reworked from the Troutdale formation and the glacial drift. At most places the deposit is poorly sorted and only crudely stratified. The coarse texture and the lithology is in great contrast to the texture and lithology of the adjacent Pleistocene alluvial deposits and alluvial-fan deposits which consist of very fine sand (basaltic and andesitic) and silt and clay.

No records were obtained of wells in these deposits. Undoubtedly the gravel is very permeable, except where its base extends below river level.

RECENT ALLUVIUM

Deposits of alluvium of Recent age are confined chiefly to the flood plains and low terraces along rivers and creeks in the area. The largest deposit is west of Vancouver along the Columbia River. Other deposits were mapped along the Lewis River, the East Fork of the Lewis River, and Salmon Creek. Small deposits are found along the Little

Washougal and the Washougal Rivers and some of the smaller streams, but these generally are too small to show on the map.

Along the Columbia River the deposits apparently are predominantly fine-grained, chiefly medium- to fine-grained sand and silt. A few wells have been completed in them, and most of these are for domestic purposes.

Along the East Fork of the Lewis River and the Lewis River the deposits range from coarse sand to sand and gravel. The deposits are moderately permeable and yields of several hundred gallons a minute probably could be obtained at many places.

SURFACE-WATER RESOURCES

The entire county is drained by the Columbia River and its tributaries. In addition to its prime importance as a source of water, the Columbia River serves as a control for the movement of all other water in the county. All surface streams discharge into it, and it is base level for ground water so that any ground water leaving the county does so by discharging into the Columbia River or its tributaries. At some places, particularly at Vancouver, where ground-water withdrawals are heavy, Columbia River water recharges the aquifers bordering the river.

The principal tributaries in or bordering Clark County are the Lewis and the Washougal Rivers. Other important streams that are tributary to these or to other streams tributary to the Columbia River are the East Fork of the Lewis River, the Little Washougal River, and Salmon Creek. In 1958 the Water Resources Division of the U.S. Geological Survey maintained gaging stations on all these streams except the Little Washougal River and also on the main stem of the Columbia River at The Dalles, Oreg. Detailed records for stations on these streams are given in the annual Water-Supply Papers, "Surface-water supply of the United States, part 14, Pacific slope basins in Oregon and lower Columbia River basin." A summary of stream-discharge data is given in table 5, and some of the most important characteristics of these streams are given following table 5.

COLUMBIA RIVER

This river, which forms the southern and western boundaries of the county, is the main trunk stream in the Pacific Northwest. At The Dalles, 85 miles upstream from Vancouver, the average discharge for the 80-year period 1878–1958 was 195,100 cfs (cubic feet per second). The main use of water in the lower reaches of the Columbia River is for power generation and navigation; actual withdrawal is very small. Mean discharge by mouths for the 1951 water year (Oct. 1950 through Sept. 1951) is shown in figure 21. Although the discharge for 1951

TABLE 5.—*Summary of stream-discharge data*

Stream	Gaging station	Records used	Drainage area (sq mi)	Discharge (cfs)		
				Maximum	Minimum	Average
Columbia River	11 miles east of The Dalles, Oreg.	1878–1958	237,000	1,240,000	35,000	195,100
Washougal River	4 miles northeast of Washougal, Wash.	1944–58	108	17,700	41	896
Little Washougal River.	2½ miles north of Washougal, Wash.	1951–55	23.8	1,620	4.1	----------
Salmon Creek	4 miles east of Battle Ground, Wash.	1943–58	18.3	1,500	1.3	61.4
Lewis River	Ariel, Wash	1922–58	731	129,000	[1] 0	4,709
Cedar Creek	2½ miles southeast of Ariel, Wash.	1951–55	41.3	1,900	4.6	----------
East Fork Lewis River	1½ miles northeast of Heisson, Wash.	1929–58	125	15,600	29	744

[1] Periods of no flow caused by regulation of Ariel Dam during construction.

was about 16 percent above average, the graph is fairly typical of the seasonal distribution. Discharge is lowest in September and October; it is highest during May, June, and July because of snowmelt in the mountains.

WASHOUGAL RIVER

The Washougal River heads in the foothills in southeastern Clark County and southwestern Skamania County and enters the Columbia River at Camas. Average discharge at the station about 8.5 miles upstream from the mouth of the river is nearly 900 cfs. Discharge responds very quickly to precipitation and ground-water storage in the bedrock is apparently small.

LITTLE WASHOUGAL RIVER

The Little Washougal River drains an area underlain chiefly by volcanic rocks directly north of Camas and Washougal and enters the Washougal River a few miles upstream from the Columbia River. The city of Camas diverts some water from the headwaters for public supply. Low flow is sustained to a limited extent by discharge from the Troutdale formation along the lower reaches.

SALMON CREEK

Salmon Creek rises in the foothills in eastern Clark County. The basin upstream from the gaging station is underlain chiefly by volcanic rocks. Average discharge at the station east of Battle Ground, approximately 14 miles upstream from the mouth of the creek, is about 61 cfs. The graph in figure 21 shows the marked seasonal difference in discharge. Discharge in July, August, and September 1951 was less than 2 percent of the discharge for the winter months of November, December, and January 1950–51. It is apparent that ground-water storage in the bedrock is very small.

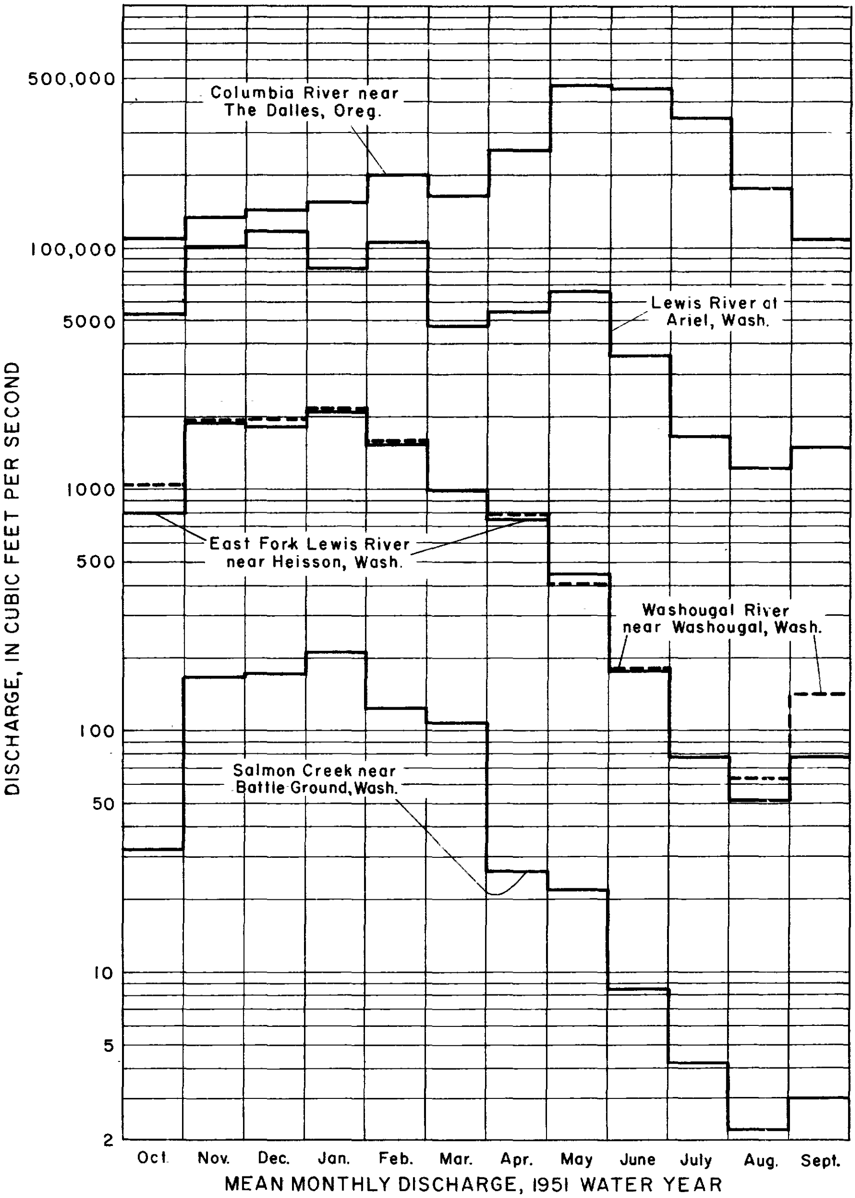

FIGURE 21.—Mean monthly discharge, 1951 water year.

LEWIS RIVER

Lewis River, which forms the northern boundary of the county, rises on the slopes of Mount Adams. Principal water use is for power generation. There are practically no withdrawals or diversions from the river. The average discharge, half a mile below Ariel Dam, about 19 miles upstream from the mouth of the river, is approximately 4,700 cfs. The graph in figure 21, showing mean discharge by months for the 1951 water year, indicates that precipitation is the chief factor in seasonal distribution of runoff, with peak discharge coming in the rainy winter months. However, spring snowmelt on the flanks of Mount Adams and Mount St. Helens causes a secondary period of high discharge in April and May.

CEDAR CREEK

The Cedar Creek basin is underlain chiefly by volcanic rocks but the trunk stream, including the main tributary, Chelatchie Creek, flows through basins underlain by alluvial fill. The alluvial fill apparently contains a great deal of water in storage, and discharge from these underground reservoirs during dry periods sustains runoff at a somewhat higher rate in Cedar Creek than in comparable streams in the area not having such underground reservoirs.

EAST FORK OF THE LEWIS RIVER

The East Fork of the Lewis River heads in the foothills along the west slope of the Cascade Mountains in the eastern part of Clark County and in Skamania County to the east of Clark County. The basin is underlain almost entirely by volcanic rocks. Average discharge at the station near Heisson, about 16 miles above the mouth of the river, is approximately 740 cfs. The graph in figure 21 shows that seasonal distribution of runoff is directly related to precipitation. Most of the basin is apparently at too low an altitude to be greatly influenced by snowmelt.

GROUND-WATER RESOURCES

Ground water is the most important source of water supply in Clark County. Nearly all domestic supplies, most industrial and municipal supplies, and more than half the irrigation supplies are obtained from ground-water sources.

In its occurrence ground water obeys certain physical laws or principles. Because ground water occurs beneath the land surface and cannot be observed directly, to many people it seems mysterious and unpredictable. However, if it seems to occur or to behave unpredictably, it is not because it violates any law or principle, but rather because the conditions relating to its occurrence are unknown or have been misinterpreted.

A knowledge of the governing principles is indispensable to an understanding of the occurrence of ground water. (See Meinzer, 1923a, b) for a detailed discussion of the principles governing the occurrence and movement of ground water.)

PRINCIPLES OF GROUND-WATER OCCURRENCE

Subsurface water is generally considered to include all water beneath the earth's surface contained in the interstices of the rock or rock materials. Subsurface water can be divided into two classes, (a) ground water, which is water in the zone of saturation, and (b) vadose water, which is the water in the zone of aeration (in the soil and subsoil above the zone of saturation).

SOURCE

Most ground water is derived from precipitation. A small amount may be connate water, trapped in sedimentary beds at the time they were deposited. Connate water is most often found in sedimentary materials that were deposited in lakes or oceans. A small additional amount of ground water is juvenile water derived from within the earth itself. In Clark County practically all the ground water is derived from precipitation except at a few places where some water probably is diluted connate water.

Average annual precipitation in Clark County ranges from slightly less than 40 to more than 100 inches (fig. 4); however, precipitation over most of the populated and agricultural areas ranges from slightly less than 40 to about 60 inches annually. Of the rainfall that reaches the earth's surface, a part runs off directly into streams, another part moves laterally through the soil and subsoil to the streams, part is held within the pores of soil and subsoil, and later evaporated or transpired, and part percolates downward to the zone of saturation to become ground water. The ground water moves toward surface outlets in springs or streams, or toward wells; as it approaches the natural outlets it may lie at depths shallow enough for part to be discharged by evapotranspiration.

OCCURRENCE

Large quantities of ground water are contained below the surface of the earth in openings or interstices in the rocks in the zone of saturation. In unconsolidated rocks such as gravel, sand, clay, and silt, the interstices are openings or pores between the grains. Crystalline rocks such as granite, gneiss, and schist have little pore space between the component grains. In these rocks the joints and other fractures are the principal interstices. Consolidated sedimentary rocks such as conglomerate, sandstone, and shale have had their primary porosity (space between the grains) reduced by compaction and by deposition of minerals between the grains. In these rocks, as in crystalline rocks, the interstices are mostly in fractures.

Volcanic rocks are a somewhat special case. In unconsolidated fragmental volcanic rocks such as tuff, cinders, and breccia, the interstices are between the grains, just as in gravel and sand. Volcanic lava flows, on the other hand, are crystalline rocks and the crystals or grains are interlocked so tightly that there are no interstices between the grains. However, many lava flows, especially of basalt, are porous in their upper part. Expanding gases leave bubble holes (vesicles) in the lava as it chills. As the surface solidified the still molten lava beneath exerted pressure and churned and brecciated the chilled crust. Tiny cracks connecting the vesicles formed, and at places molten lava flowed out from between walls of cooled rock and left hollow tubes. When the next lava flow spread out over the very irregular surface of the lava beneath, the viscous lava was chilled very quickly at the contact with the comparatively cool rock beneath and therefore was unable to fill all the irregularities of the former surface. It is these irregular porous zones at the tops of successive lava flows that serve as aquifers in the basalt. Other interstices include joints formed during and after cooling of the lava.

The porosity of a rock is the percentage of the total volume that is occupied by the interstices. Porosities of rock (and rock materials) have a wide range: from considerably more than 50 percent in some clay to less than 1 percent in some massive crystalline rocks such as granite or the dense parts of lava flows. The porosities of clean uniform-sized sand or gravel commonly are between 20 and 40 percent. The addition of a comparatively small percentage of fine sand, silt, or clay to such a sand or gravel reduces the porosity considerably. When sand and clay are cemented or compacted to form sandstone and shale, their porosity is greatly reduced.

A saturated rock (or rock material such as sand and clay) may have a large porosity and yet yield little water even though allowed to drain for a long time. For example, clay having a high porosity might yield little water because of the smallness of the pores, the water being retained because of molecular attraction. Some water also may be retained in a rock because the interstices are isolated or poorly interconnected. Even in a clean coarse well-sorted sand an appreciable part of the water will be retained as a thin film on the surface of the grains, and thicker films will be retained at the intersections of the surfaces of the grains. The ratio of the volume of water yielded, by gravity drainage, to the total volume of rock is known as the specific yield and is expressed as a percentage (see Glossary, p. 111).

One of the most important characteristics of an aquifer is its permeability—that is, its ability to transmit water. This characteristic may have little relation to porosity; for example, clay having a porosity of 50 percent may transmit water very slowly or not at all under the gradients that exist in nature, whereas sand or gravel having a porosity half as great may transmit large quantities of water in a short time. In silt and extremely fine sand the pores are larger and friction is less than in clay, but it may still be so great that water is transmitted very slowly. Clean well-sorted medium- or coarse-grained sand and gravel will transmit water very rapidly, but an admixture of a small amount of clay or fine sand will greatly reduce their permeability.

The concepts of porosity, specific yield, and permeability apply particularly to more or less homogeneous materials such as soil, clay, sand, gravel, and semiconsolidated sand and gravel. It is more difficult to apply these concepts to rocks in which the interstices consist entirely of joints, cleavage planes, and similar openings, because these rocks generally are nonhomogeneous.

The movement of ground water in most places is due entirely to the force of gravity, and ordinarily the velocity of flow varies directly with the hydraulic gradient. That is, doubling the hydraulic gradient will double the velocity of ground-water movement, other factors remaining the same. Under usual conditions the points or areas of ground-water discharge are at lower elevations than the points or areas of recharge.

In a humid or subhumid area, such as in Clark County, recharge to the ground-water body takes place in the interstream areas. The ground water discharges into the perennial streams and lakes and the lowest points on the water table are at these places. Rainwater percolates downward to the water table and then moves laterally down gradient toward the points of discharge in streams, lakes, or swamps. The streams contribute to ground-water recharge only in periods of floods, when they recharge the rock materials along their channels. This water generally drains back quickly into the streams when the floods pass.

THE WATER TABLE

Part of the rain falling on an area percolates downward through the soil until it reaches the zone of saturation, within which all the pores and interstices are completely filled with water under hydrostatic pressure. The surface of the zone of saturation is the water table. The water occurring under water-table conditions is not confined, and the water surface rises or falls as water is added to or discharged from the aquifer (fig. 22). The water table is not a stationary surface but is continually fluctuating, rising during and immediately after periods of rainfall and declining during periods of fair weather. In humid regions, such as in Clark County, the water table is an undulating surface, usually reflecting, in a subdued way, the irregularities of the topography. The relief—that is, the difference in elevation between high and low points—of the water table generally is much less than the relief of the topography.

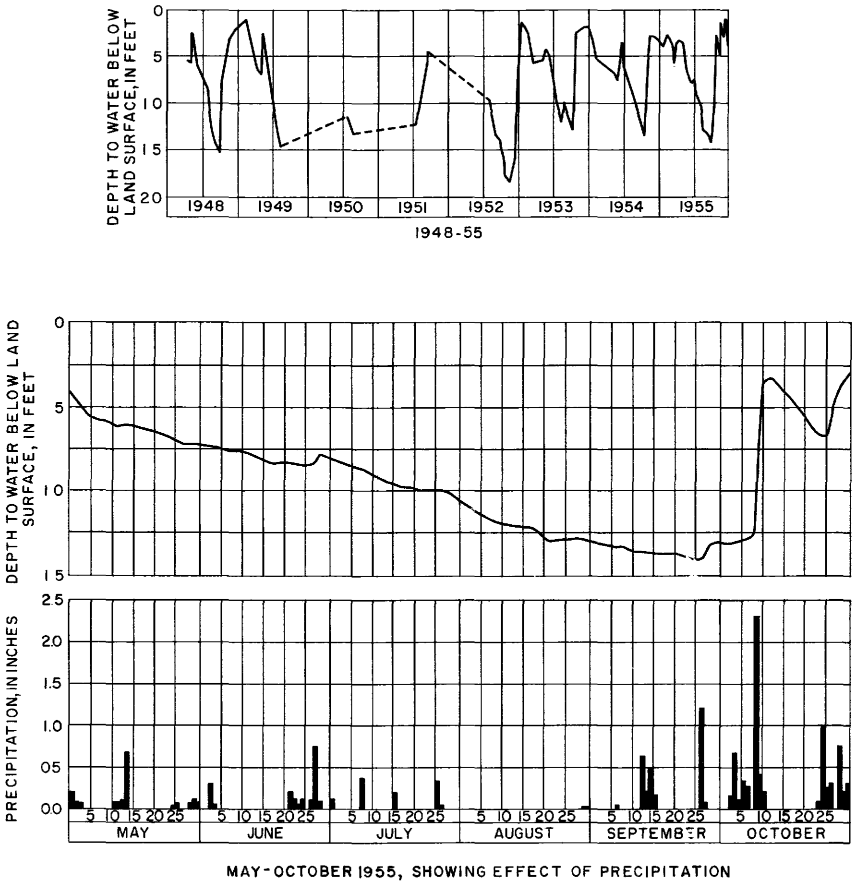

FIGURE 22.—Hydrographs of well 2/3–26Q2.

The depth to water and the general shape of the water table depend chiefly upon the climate, the topography, and the character of the rocks. In places the rocks are more or less homogeneous over considerable areas, so that precipitation and topography largely determine the depth to and shape of the water table. At other places the rock materials differ considerably in porosity and permeability, and the shape and slope of the water table is influenced to some extent by these lateral and vertical differences.

PERCHED GROUND WATER

At some places precipitation falling on an area is prevented from percolating freely downward to the main water table because of the presence of a body of impermeable or poorly permeable rocks. At such places a second zone of saturation may be perched on the strata of low permeability above the main water table.

A body of ground water is not considered to be perched unless there is unsaturated material between it and the main body of ground water. Many perched aquifers are seasonal; during the rainy season they may be a few to more than 10 feet thick and of large areal extent, but during the dry season they drain laterally, or vertically if the perching layer is somewhat permeable, and may become unsaturated. Other perched ground-water bodies may be permanent aquifers of large extent and considerable thickness and may support important ground-water developments.

ARTESIAN PRESSURE

Water entering the ground in an area of recharge, after it becomes a part of the ground-water body, moves laterally to some point or area of discharge. This movement is always in the direction of declining head. In such underground travel the water may pass beneath a layer that is only slightly permeable. If the aquifer beneath this layer is so completely saturated that the water exerts a hydrostatic pressure upward on the base of the confining layer, the ground water is under artesian pressure, and water will then rise above the bottom of the confining layer in wells tapping the aquifer.

If the hydrostatic pressure is sufficient, the water will rise above the surface and the well will flow. All wells in which the water level rises above the confining bed are artesian wells. The height to which water will rise in wells drilled into an artesian aquifer at various places defines an imaginary plane termed "the piezometric surface." Whether an artesian well will flow at the surface depends to a considerable extent upon the topography and in some places, upon the season of the year. Two wells may be drilled into the same aquifer only a few tens of feet apart but at different altitudes; the one in the valley will flow, the other on the terrace will not. A third well on the slope between the two may flow during late winter and spring but cease to flow as the water level declines in summer and fall.

Most artesian aquifers have nonartesian (water-table) extensions; most frequently these are in the area of outcrop where recharge takes place. Moreover, at some places the unit may extend entirely above the zone of saturation; in such a place, of course, it is no longer an aquifer.

OCCURRENCE IN CLARK COUNTY

Ground water in Clark County is derived from precipitation—directly from rain and snow falling on the area, indirectly from streams fed by rainfall and snowfall on adjacent areas. It moves by gravity through subsurface interstices from areas of recharge to places of discharge. The recharge, movement, and discharge of water and the quantity and quality of water available are directly related to the character of the rock and to landforms. The occurrence of ground water in each of the geologic terranes in Clark County is described below. The areas are shown in figure 1.

GROUND WATER IN THE FOOTHILLS AREA

The foothills area comprises roughly the eastern half of Clark County as shown in figure 1. The hills and mountains are sparsely populated; the only inhabitants are a few farmers and timber workers. The consolidated rocks that underlie the area are chiefly volcanic in origin, and generally do not yield large amounts of water, although at a few places moderate amounts probably could be developed from some of the volcanic rocks. However, very few wells have been drilled into the consolidated rocks. Most water supplies are obtained from springs or dug wells. On the gentler slopes where the farms and homesteads are located, weathering of the rock generally is moderately deep, so that dug wells almost always yield an adequate supply of water. Most of the springs utilized are in draws and are fed by water percolating downward through the weathered mantle or rock. The water levels in wells are apt to be low, and the flow of springs tend to diminish after a dry summer and autumn. The quality of the water is generally very good.

INTERMONTANE VALLEYS

The intermontane valleys range in size from small creek valleys to basins several square miles in area. Chelatchie Prairie and the Yacolt basin, each covering 2 or 3 square miles, are the largest of these. Most of the valleys are farmed to some extent, and are inhabited also by loggers, lumber workers, and suburban residents.

The valleys are cut into the consolidated volcanic and sedimentary rocks that form the hills and mountains. However, most of the valleys contain fluvial and glaciofluvial sand and gravel capable of yielding larger amounts of ground water than does the underlying rock. The amount of water available depends generally upon the thickness of the deposits; small to moderate supplies are available where the deposits are thin and larger supplies where they are thick.

Along the Washougal and Little Washougal Rivers a few farmers and suburban residents utilize springs and wells yielding water from sand and gravel. Most of the wells are dug and are not more than 20 to 25 feet deep. Probably moderately large yields could be obtained at places along these streams.

A few drilled wells and a number of dug wells and springs are utilized by residents along the East Fork of the Lewis River east of Heisson. Although only small amounts of water are used or needed, the terrace deposits appear to be permeable enough to yield moderately large quantities of water.

So far, as known, no wells have been drilled in the Yacolt basin, and only a few on Chelatchie Prairie. Most water supplies are obtained from wells dug into the sand and gravel. The dug wells generally range from 10 to 30 feet in depth and yield a supply adequate for domestic use. Well 5/4–7M1, which is 598 feet deep, furnishes the only record of strata underlying Chelatchie Prairie. (For location of well 5/4–7M1 and of other wells cited in text and tables, see pl. 3.) The log of this well shows alluvial materials to a depth of 217 feet, with water-bearing gravel at several horizons. The well was tested for 1 hour at 800 gpm with 60 feet of drawdown, but it is not known what proportion of the water was coming from the gravel and what from the rock below the gravel. Undoubtedly, however, the gravel would yield large supplies to properly constructed wells.

GROUND WATER IN THE ALLUVIAL PLAINS AND BENCHES

The alluvial plains and benches include most of the farmlands in the county. The majority of the irrigation wells, most domestic wells, a considerable number of municipal wells, and a few industrial wells are located in these areas. Ground water is obtained from sand and gravel strata generally ranging in thickness from a few to about 300 feet.

TROUTDALE BENCH

The Troutdale bench includes the bench extending northward from Woodburn Hill north of Washougal to Battle Ground Lake and the highland north of the East Fork of the Lewis River extending from Woodland to Fargher Lake. It includes also Prune Hill and the upland bench immediately south of Mount Norway (pl. 2). The unit is shown in figure 1.

Woodburn Hill, at the southeast end of the bench, is underlain by volcanic lava flows. A number of wells have been drilled into the rock and most of them yield an adequate amount of water for domestic use. The largest yield reported, about 35 gpm, is from well 1/3–1H1. Yields from a few wells are reported to be scanty or inadequate. Drilled wells are as much as 401 feet deep; dug wells range from about 20 to about 50 feet in depth. A number of wells have been drilled on Prune Hill; they generally obtain water from the upper member of the Troutdale formation or the Boring lava. The water level is only slightly higher beneath Prune Hill than in the surrounding plains and therefore is generally far below the surface, although some perched water is obtained from the weathered part of the upper member of the Troutdale formation at higher levels on the southeastern part of Prune Hill. Wells range in depth from 210 to 798 feet and water levels are as much as 500 feet below the surface. Yields generally are adequate, but the great depth to water makes it expensive to develop larger supplies. Larger yields are obtained from wells drilled on the low Troutdale bench in sections 33 and 34 at the northwest foot of Prune Hill. Drilled wells in that area range from about 50 to 220 feet in depth and the largest yield reported is from well 1/3–4C1 which was tested at 550 gpm with a drawdown of 18 feet. This well is 220 feet deep and encountered water-bearing gravel at 140 and 193 feet.

A few wells have been drilled in the upper member of the Troutdale formation on the high Troutdale bench south of Mount Norway and Nichols Hill. Drilled wells range from about 80 to 180 feet in depth. The largest yield is from well 1/4–9B1 which is reported to have been tested at 225 gpm with 40 feet of drawdown. Dug wells on this bench generally range from 25 to 50 feet in depth and yield adequate to ample supplies.

A considerable number of wells have been drilled in the upper member of the Troutdale formation north of Woodburn Hill and in the vicinity of Fern Prairie. Depths range from about 40 to more than 200 feet. The largest yield reported is 240 gpm with a drawdown of 175 feet from well 2/3–14N1. However, wells with yields reported as "30 gpm with 3 inches drawdown," "20 gpm with 10 feet of drawdown," "20 gpm with no drawdown" apparently have a greater specific capacity (yield in gallons a minute per foot of drawdown) than well 2/3–14N1. The casing of well 2/3–14N1 is perforated; most of the other wells are neither perforated nor screened and undoubtedly could yield much larger supplies if completed as described in the section of the report on well construction. Dug wells range in depth from about 15 to 50 feet and generally yield adequate supplies for domestic and limited irrigation use. However, the upper part of the upper member of the Troutdale formation has been weathered in this area; this weathering has reduced the permeability so that the shallow wells generally do not yield as much water as the deeper ones.

Between Munsell Hill and Battle Ground Lake most wells are dug, and most of the comparatively few drilled wells are used for domestic purposes. The drilled wells range in depth from about 60 to 200 feet. Most of them obtain their water from sand and gravel in the Troutdale formation and most of them are reported to yield "plenty of water" or to have a "large supply." Several are reported to have "no drawdown" when bailed or pumped. The largest yield reported, from well 4/3–29B1, was 350 gpm with 10 feet of drawdown. Most of the wells are completed with open-end casing only; larger yields could be obtained by use of a screen or perforations of correct size.

Dug wells generally are from 15 to 40 feet in depth. Most of these yield an adequate supply; the largest yield reported, 100 gpm with

4-foot drawdown, is from well 3/3–32P1, 15 feet deep. A few wells along the eastern edge of the bench, where the Troutdale formation is thin, were drilled through the Troutdale formation and obtain water from the volcanic rocks beneath. Most of these are reported to have adequate yields.

The highland bench between Lewis River and the East Fork of the Lewis River extending from Battle Ground and Fargher Lake on the east to Woodland on the west is underlain chiefly by the Troutdale formation. On the higher parts of the bench the Troutdale has been deeply weathered, and the surface has been considerably dissected. Weathering has progressed so far and so deep that the upper 50 to 100 feet of the Troutdale is of low permeability and yields only small amounts of water. In this area, as in most other places, the lower member of the Troutdale is fine grained and generally yields only small amounts of water. Where weathering has progressed to the base, or nearly to the base, of the upper member of the Troutdale formation it is difficult to develop even moderate yields of water. The best supplies are obtained from sand and gravel near the base of the upper member. Drilled wells generally range from 60 to 160 feet in depth. A few have been drilled deeper, into the lower member of the Troutdale formation. In some of these wells the water was salty; in others the materials penetrated were so fine grained as to yield little or no water. Dug wells are in the weathered upper member of the Troutdale formation and generally range from 10 to 50 feet in depth. Because of their large storage capacity, resulting from their large diameter, they usually yield supplies adequate for domestic use.

On the lower slopes and terraces of the Highland area, the upper member of the Troutdale formation has not weathered so deeply, and somewhat larger yields can be obtained.

The volcanic rocks which underlie the Troutdale formation protrude through it at a few places. A few wells are drilled into these rocks where they are exposed at the surface or where the overlying Troutdale is thin. Generally the yields from such wells do not exceed a few gallons per minute.

FOURTH PLAINS AREA

The Fourth Plains area, as used in this report, includes the remnants of the Portland delta and the terraces formed during degradation of that delta. Most of the Fourth Plains area lies between 150 and 300 feet above sea level, but lower terraces occupy limited areas ranging downward to about 25 feet in altitude. The Fourth Plains area is bounded on the east and north by the Troutdale bench extending north from Prune Hill to Battle Ground and thence northwest to

Woodland. The southern and western boundaries are formed by the flood plain of the Columbia River.

The Fourth Plains area contains the majority of the better grade of farmlands and most irrigation wells are in this area. There are two important aquifers: (a) the Pleistocene alluvial deposits which are utilized for the majority of domestic and some irrigation supplies, and (b) the upper member of the Troutdale formation which is utilized for most irrigation and municipal supplies.

The Pleistocene alluvial deposits, in general, form a blanket over the Fourth Plains area ranging from a few feet to about 200 feet in thickness. However, where the deposits are thickest and most permeable, the ground water drains out readily, so that they are dry or are saturated only near the base. Where the deposits are thin, or are finer grained and therefore less permeable, perched ground water is obtained from lenses of coarser grained materials.

Almost everywhere in the area the upper member of the Troutdale formation is an important aquifer. The unit ranges generally from 125 to 200 feet in thickness and consists predominantly of sand and gravel which at most places is saturated. At some places the upper strata have been weathered enough to reduce their permeability. Some of the deeper strata have had their permeability reduced by cementation. However, almost everywhere in the Fourth Plains area except in the area northwest of Pioneer, beds of loose coarse permeable sand and gravel are found at some level. Ground-water occurrences in the Fourth Plains area are shown diagrammatically in figures 23, 24, 25, and 26.

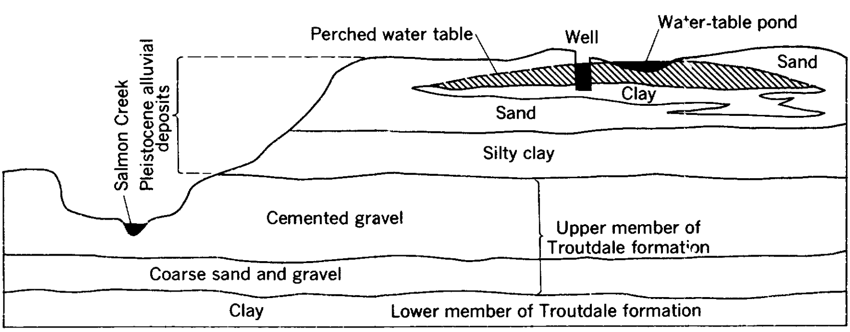

FIGURE 23.—Generalized section showing well supplied by water perched above main body of ground water on impervious clay layer in area north of Vancouver. The perched water is recharged by precipitation on immediate area. After reaching perched water table, water moves laterally to edges of clay layer and then percolates downward to main body of ground water. The perched water table declines greatly every autumn and yield then becomes very small.

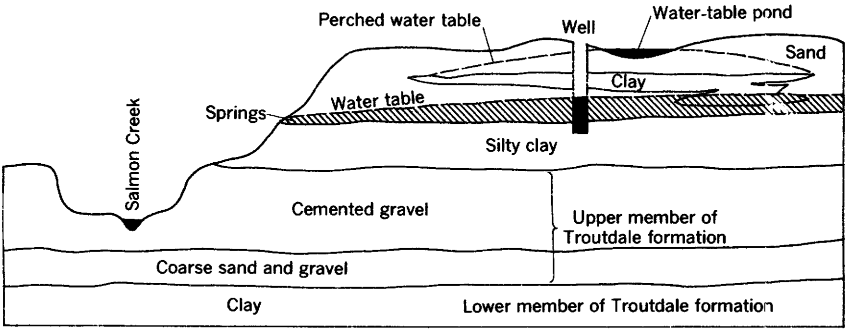

FIGURE 24.—Generalized section showing well which has been deepened and which now obtains water from main body of unconfined ground water in area north of Vancouver. The perched ground water is shut out by well casing. If well were not cased, water from perched horizon would run down inside of well to join water below. Recharge to water table is from leakage from perched ground water and from direct precipitation where clay layer is absent.

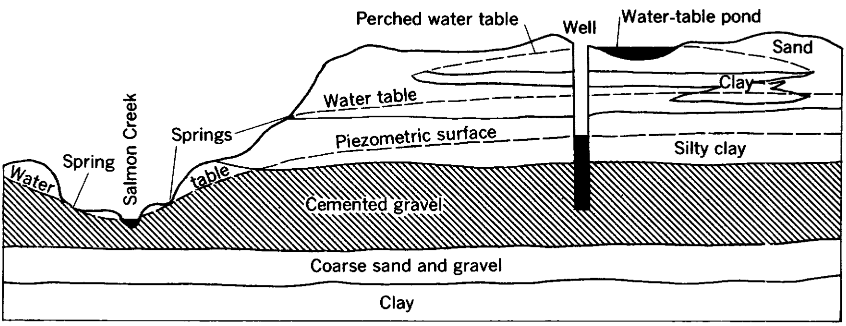

FIGURE 25.—Generalized section showing well which has been deepened because water table in area north of Vancouver declined so much during an extended period of drought that yield became insufficient. The deepened well (artesian) is supplied by water confined in cemented gravel. Cemented gravel is not a very good aquifer; it yields only enough water for domestic and stock use. However, the piezometric surface fluctuates only very slightly, hence it is a more dependable supply. The silty clay grades into sand a few miles away and recharge to cemented gravel is from precipitation which percolates downward through sand in that area.

RECHARGE

Recharge is derived chiefly from precipitation that falls on the area (fig. 22). It is possible that some recharge is derived also from runoff from adjacent slopes bordering the Fourth Plains area to the east and north but such recharge probably constitutes a very small part of the total.

Precipitation on the area probably averages about 45 inches annually (fig. 4). Over much of the Fourth Plains area, the soils are coarse sand and gravel, and in some large parts of the area such as Mill Plain and the vicinity of Orchards northward to Battle Ground, there is practically no direct surface runoff. Through much of the rest of the area the materials range from silt to sand of moderately high vertical permeability and the amount of direct runoff is small.

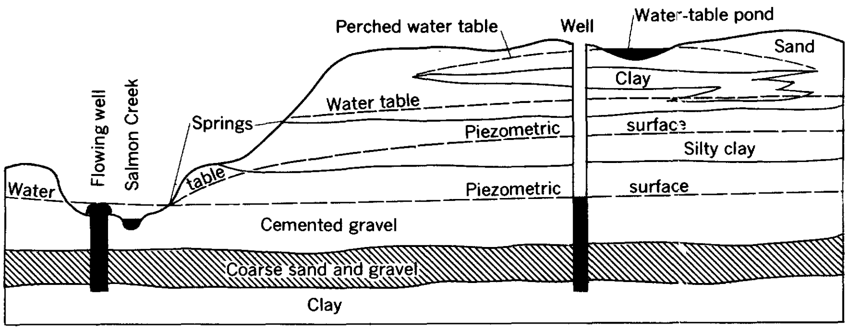

FIGURE 26.—Generalized section showing well in area north of Vancouver which was deepened still further because larger supply of water was needed for irrigation. A layer of very permeable sand and gravel was penetrated beneath cemented gravel. Water rose in casing above aquifer, so the aquifer is classified as artesian, although static water level is lower than when well was in shallower aquifer. However, aquifer is so permeable that drawdown is very small when well is pumped at yield required (50 gpm), and pumping level is higher at that rate than it was when 5 gpm was pumped from cemented gravel.

It is probable that, in the area as a whole, direct runoff does not average more than 1 or 2 inches per year. However, runoff from springs and seeps fed by shallow perched ground water undoubtedly is considerably greater.

Consumptive-use data are not available for Clark County, but data from other areas indicate that the average annual consumptive use in the entire Fourth Plains area, including both cultivated and noncultivated land, is between 15 and 20 inches.

If consumptive use and direct runoff are assumed to total 20 inches annually, approximately 25 inches of precipitation becomes ground water. This is more than 2 acre-feet per acre, or about 1,300 acre-feet per square mile. Annual recharge on the total of about 185 square miles included in the Fourth Plains area would be about 240,000 acre-feet; however, a considerable part of this probably enters perched aquifers, whence much of it is discharged rather quickly into the streams.

MOVEMENT AND DISCHARGE

Except for the small amount that runs off directly, precipitation falling on the area enters the soil and subsoil to replace soil moisture that may have been depleted by evaporation or transpiration. Water in excess of that required to replace the deficiency in soil moisture percolates downward to the water table. After reaching the water table it percolates laterally toward the points or areas of discharge, which are always at a lower altitude than the recharge area. Rate of movement of the ground water generally is rather slow; in the Fourth Plains area the rate is estimated to range between a fraction of a foot and several feet per day, except at a few places where it is higher, perhaps as much as 100 feet per day.

The shape of the water table in the shallow aquifers is, to a considerable extent, a subdued reflection of the surface topography. The lowest points on the water table are along the stream courses where the ground water discharges, and the highest points are beneath the higher lands between the streams. Because of the complexity of the topography in the Fourth Plains area it was not feasible to show the shape of the water table. Water levels of wells in the deeper aquifers in the Troutdale formation, especially where the water in these aquifers is confined, are more uniform. However, because of the lenticular character of the deposits, wells of the same depth a short distance apart may obtain water from different lenses within the aquifer and thus may have considerably different water levels. The actual path a particle of water follows from its point of entrance into the formation to its point of discharge may be quite complex. The water-level contours shown on plate 3, representing the height to which water will rise in wells that end in the principal aquifer in the upper member of the Troutdale formation, therefore, are considerably generalized.

At most places other, lesser aquifers, both in the Pleistocene alluvial deposits and near the top of the Troutdale formation, occur above the principal aquifer. Water levels of wells ending in these shallower aquifers generally are higher than water levels in the principal aquifer.

The Columbia River is the ultimate drain for all surface and ground-water discharge from the County. Although some ground water may discharge directly into the Columbia River, a great deal reaches the surface through seeps and springs which feed the tributary streams which in turn discharge into the Columbia River. Measurement of total ground-water discharge from the Fourth Plains area is not feasible and was not attempted; however, certain components were measured and estimates were made of other components.

Spring discharge.—Springs are common where the Troutdale formation is exposed along the flanks of the valleys, particularly along the Columbia River, Salmon Creek, and the East Fork of the Lewis River. Especially notable are the series of springs that discharge along the scarp extending from the eastern edge of Vancouver to Prune Hill, a distance of about 6 miles. Most of the springs discharge at an altitude of about 150 to 175 feet and the water apparently is discharging from the base of the alluvial deposits and the top of the upper member of the Troutdale formation. The water table is held at this high level by relatively impermeable materials at and near the top of the Troutdale formation. During the period April 11 to 19, 1949, the flow of most of the larger springs along this reach was measured and estimates were made of the flow of the smaller springs. Although the measuring points were along creeks a few hundred feet to about one-eighth mile downstream from the head of the creek there was no precipitation during this period and there had been none for the previous 9 days, so that the water measured was entirely ground-water discharge. The following table lists the springs and the measured or estimated discharge.

TABLE 6.—*Discharge of springs and spring-fed creeks between Prune Hill and the eastern edge of Vancouver, April 11–19, 1949*

Spring	Location and (or) owner	Distance from Ellsworth Mill Plain road, (miles)	Discharge: Cubic feet per second	Discharge: Gallons per minute
1/3-7G1s	1.0 mile east of Fisher	4.01 east	1.16	520
1/3-7F2s	0.9 mile east of Fisher	3.91 east	.41	185
1/3-7F1s	0.75 mile east of Fisher	3.75 east	[1] .22	[1] 100
1/3-7E1s	At Ten Mile Tavern	3.44 east	1.22	550
1/2-12B1s	Mrs. Emma Allen residence	2.90 east	[1] .5	[1] 225
1/2-12C1s		2.65 east	.62	280
1/2-2Q1s	Dawson residence	1.98 east	[1] 1.5	[1] 675
1/2-2M1s	0.6 mile east of State hatchery	1.39 east	3.92	1,760
1/2-3J2s	E. Wood and E. B. Wood	1.22 east	1.48	665
1/2-3K	Creek near State hatchery	.85 east	13.5	6,050
1/2-F1s	0.6 mile west of State hatchery	.60 east	1.36	610
1/2-3E1s	Near L. Maynard residence	.25 east	[1] .45	[1] 200
1/2-4B2s	Dr. Brougher residence	.10 west	.45	200
1/2-4B1s	Near Felix Baranovich residence	.32 west	2.96	1,330
1/2-33M1s, L1s, P1s	Ellsworth Springs	.60 west	4.64	[2] 2,085
1/2-4D1s	Near Russell Landing	.78 west	[1] .16	[1] 75
2/2-32Q1s	Near Hahn's Chrysanthemum Gardens	1.22 west	[1] .11	[1] 50
2/2-31J1s	Near Columbia Marine Service	1.96 west	[1] .22	[1] 100

[1] Estimated.
[2] Measured by city of Vancouver, Oct. 15, 1945.

The total discharge along this line was almost 35 cfs, more than 5½ cfs per mile. Beginning at the eastern edge of Vancouver in sec. 31, T. 2 N., R. 2 E., and extending northwest to the mouth of Burntbridge Creek at Vancouver Junction is a stretch of the escarpment in which there are no springs. Ground-water underflow from Fourth Plains into the Columbia River in this reach is entirely underground because the Troutdale formation is not exposed, and the overlying alluvial deposits are permeable sand and gravel which permit the ground water to reach the Columbia River without coming to the land surface.

North of Vancouver Junction the Troutdale formation is again exposed in the bluff overlooking the flood plain and a few small springs discharge some ground water; however, most of the ground-water discharge in this area is into the Burntbridge, Salmon, Whipple, Gee, and other Creeks south of the East Fork of the Lewis River.

Of the springs that discharge into the East Fork of the Lewis River, measurements were made on only a few. Ground-water discharge in the reach of the river between La Center and Battle Ground probably is comparable to the discharge into the Columbia River between Vancouver and Prune Hill.

Records are not available regarding fluctuations in discharge rate of the springs. Undoubtedly the measurements made were of neither the highest nor the lowest rates of discharge but possibly were of rates somewhat above average. If it is assumed that ground-water discharge from the measured 6-mile reach is representative of discharge from the Fourth Plains area along the entire reach of nearly 30 miles bordering the Columbia River, then total discharge from the base of the Pleistocene alluvial deposits and the shallower aquifers in the upper member of the Troutdale formation might be about 150 cfs, or more than 100,000 acre-feet per year. In addition to the spring discharge from the base of the Pleistocene alluvial deposits and the top of the Troutdale, there undoubtedly is a great deal of underflow from the area, both from shallow perched aquifers and through the deeper aquifers in the upper member of the Troutdale formation. Underflow through the deeper aquifers cannot be measured and is difficult to estimate. However, some idea of discharge from both the shallow and the deeper aquifers can be gained by studying stream-discharge records.

Ground-water component of streamflow.—During periods of fair weather, the flow of most streams is maintained by discharge from seeps and springs. Lakes and swamps under natural conditions, and manmade reservoirs, also help to maintain base flow. The relation of fairweather discharge of a stream to the altitude of the water table is shown in figure 27. On this graph the discharge of Salmon Creek at station LC 373, 4 miles east of Battle Ground, in the NE¼NW¼ sec. 4, T. 3 N., R. 3 E., is plotted against water levels in well 2/3–26Q2, a 21-foot well about 1 mile southeast of Fern Prairie. A fairly well-defined relation between the two is shown even though the materials

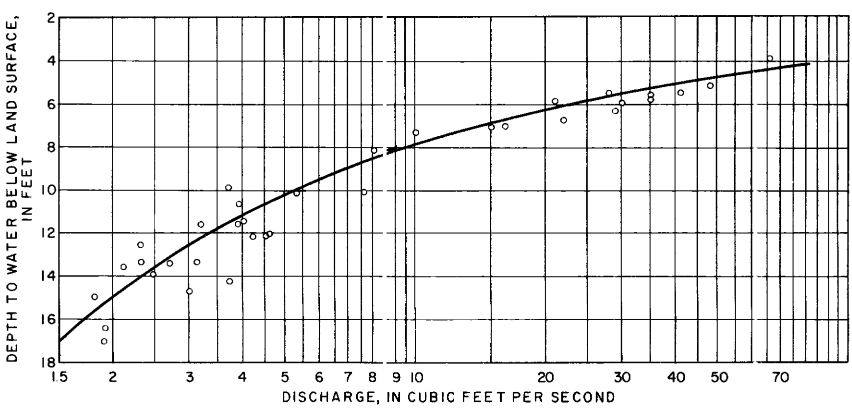

FIGURE 27.—Relation of flow of Salmon Creek at gaging station LC 373 near Battle Ground to water level in wel 2/3–26Q2.

tapped by the well are not in hydraulic contact with the stream. Where continuous records of streamflow are available the ground-water component of streamflow generally can be determined with a reasonable degree of accuracy. Unfortunately, continuous records of flow are not available for the smaller streams in Clark County, and all the gaging stations are upstream from the alluvial-plains area. However, by correlating short records in the alluvial-plains area with longer ones at nearby stations, rough estimates of ground-water discharge can be made.

The gaging station LC 373, upstream from the alluvial-plains area, has been maintained since October 1943. Discharge hydrographs for the period October 1943–October 1954 were used in constructing the baseflow recession curve shown in figure 28. Upstream from

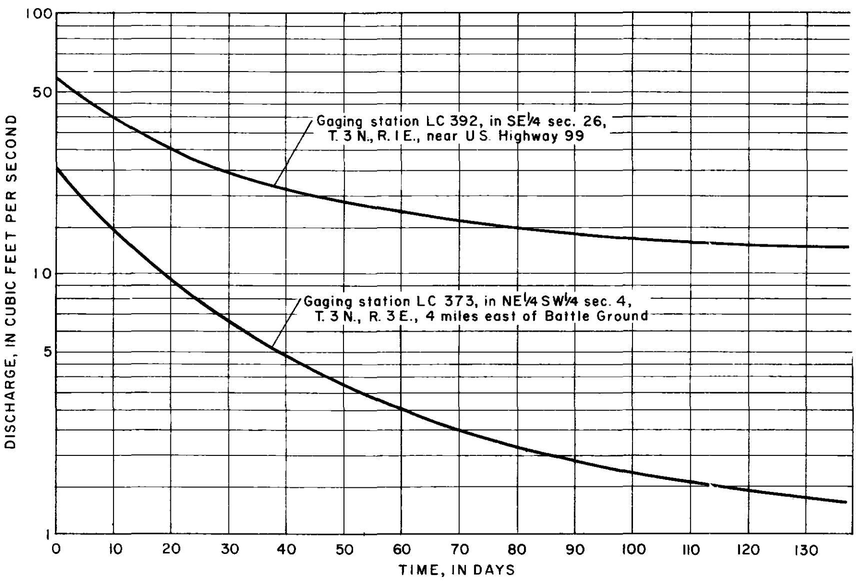

FIGURE 28.—Base-flow recession curves for two stations on Salmon Creek.

gaging station LC 373 the Salmon Creek basin is underlain almost entirely by volcanic rocks. The deep soil and subsoil on the gentler slopes can hold considerable water, but the unweathered bedrock beneath is comparatively impervious. The combination of a shallow pervious mantle and relatively impervious rock beneath results in a low direct-surface runoff and a high subsurface runoff that rapidly depletes itself.

Within the Fourth Plains area, occasional streamflow measurements were made at several different places downstream from gaging station LC 373. In 1951, a recorder was maintained at gaging station LC 392, in the SE¼ sec. 26, T. 3 N., R. 1 E., a short distance upstream from the bridge on U. S. Highway 99. The base-flow recession curve for Salmon Creek at station LC 392, shown on figure 28 along with the one at station LC 373, was constructed by using the hydrograph obtained in 1951 together with occasional measurements made at other times.

The hydrographs of flow in Salmon Creek at the two gaging stations, LC 373 and LC 392, are shown on figure 29 for the period June–September 1951. The relation of precipitation and temperature to

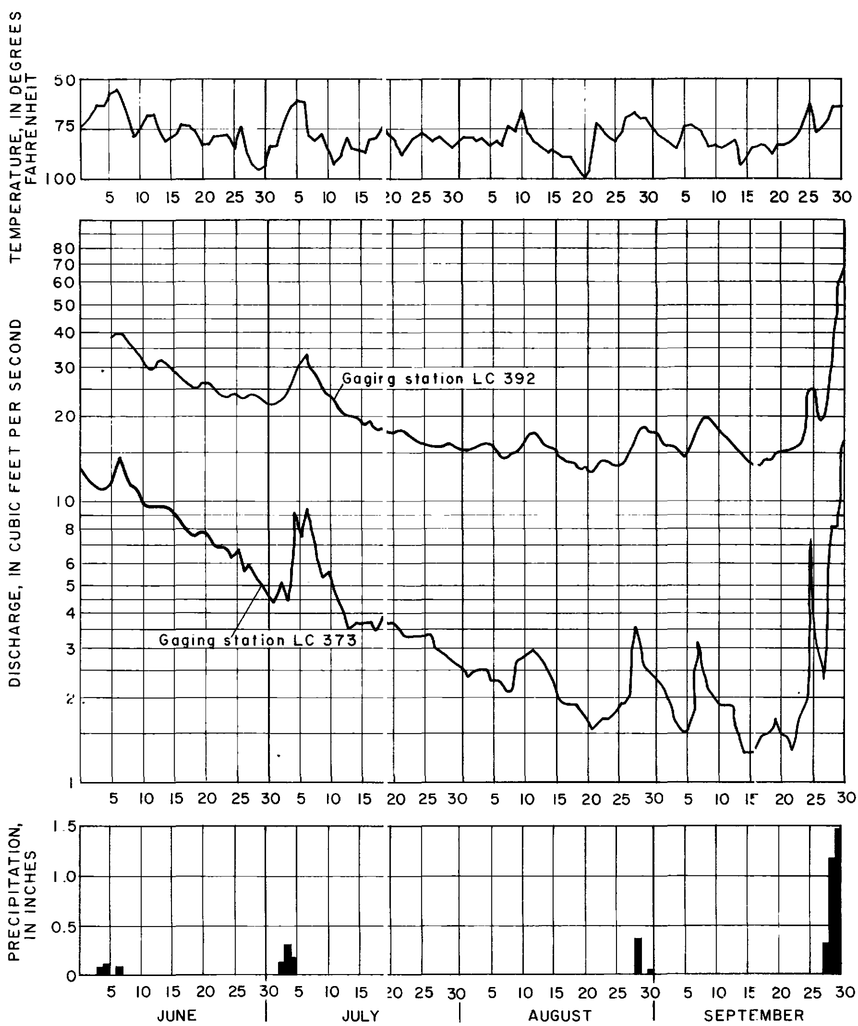

FIGURE 29.—Discharge at two stations on Salmon Creek and precipitation and maximum temperature at Battle Ground, 1951.

discharge also is shown on figure 29. The daily precipitation and temperature, in degrees Fahrenheit, are those recorded at the weather station at Battle Ground. In 1950, occasional measurements of streamflow were made at gaging station LC 393, a short distance downstream from station LC 392. On figure 30, the few measurements obtained at station LC 393 during the period May–September 1950 are com-

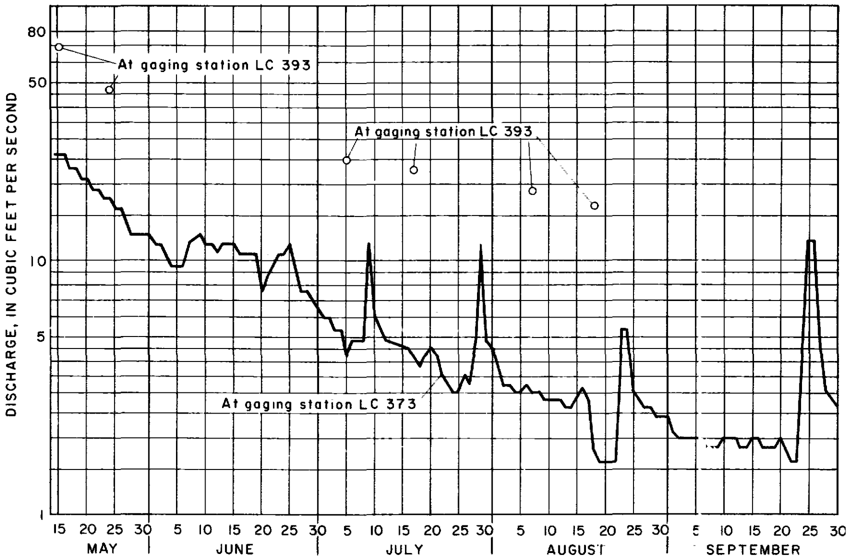

FIGURE 30.—Discharge of Salmon Creek, 1950.

pared with the hydrograph for station LC 373, southeast of Battle Ground for the same period.

Downstream from gaging station LC 373, but above stations LC 392 and 393, the Salmon Creek basin is within the plains area. It is underlain by porous soil and subsoil conducive to percolation. Little water runs off directly; however, at places, relatively impermeable silt or clay lenses or the weathered upper part of the Troutdale are at shallow depth and impede downward movement of the ground water. These silty and clayey layers cause bodies of shallow perched ground water whose water levels rise rapidly during rainy periods and decline steadily during periods of fair weather. The hydrograph of well 2/3–26Q2 (fig. 22), 21 feet deep, illustrates this cycle.

In comparing the hydrology of the Salmon Creek basin above gaging station LC 373 with that of the part of the basin between LC 373 and LC 392 or LC 393 (that is, within the plains area), it would seem obvious that a larger proportion of precipitation in the downstream reach becomes ground-water recharge, ultimately to reappear in the stream as base flow. However, when base flows at the upstream station are compared to those at the downstream station (fig. 29) it is seen that, except at very low rates of discharge, the downstream stations have a smaller base flow per square mile of drainage area. For example, the streamflow at station LC 392 on June 10, 1951, was 30.9 cfs (fig. 31). At station LC 373 on that date, the flow was 9.7 cfs. The ground-water effluent to the stream between the two stations was, therefore, 21.2 cfs. The drainage area above station LC 373 is 18.3 square miles and that between stations LC 392 and LC 373 is 70.1 square miles. The base flow, per square mile, above LC 373 was, therefore, 0.53 cfs and below LC 373 it was 0.30 cfs. Values of analogous streamflow during relatively low rate of discharge are reversed. On September 15, 1959, base flow above station LC 373 was 0.07 cfs per square mile and the base flow below station LC 373 was 0.2 cfs per square mile. The probable explanation is that some of the recharge in the Fourth Plains area does not reappear as base flow but percolates downward to recharge deeper aquifers and also that the ground-water discharge to the stream in the plains area is slower because ground-water gradients are lower in the plains area.

The relation between base flows at upstream and downstream stations is more clearly understood by comparing simultaneous flows from the recession curves or from miscellaneous measurements at each station. This relation is presented graphically by the curved line in figure 31. The data shown graphically in figure 29, plus a few measurements from station LC 375, were used in constructing this curve; station LC 375, on Salmon Creek, is about 3½ miles downstream from station LC 373.

In figure 31, the straight line across the graph at a 45° angle is an equal-yield line, corrected for the difference in average precipitation on the area above each station. That is, simultaneous discharges from the two stations would plot along this line if the discharge were directly in proportion to drainage area. The correction for lesser average precipitation in that part of the basin downstream from station LC 373 was made by subtracting the estimated average annual consumptive use in the area from the average annual precipitation for each area. Consumptive use was estimated at 20 inches based on data, not here presented, supplied by the Department of the Army, Corps of Engineers. The residual precipitation above the downstream station was expressed as a percentage of the residual precipitation above the upstream station, and the equal-yield line was shifted to the left accordingly. If the basin above station LC 373 is considered as the standard and if only base flows at the two stations LC 373 and LC 392 are compared, the equal-yield line may be considered as a "potential base flow" line for base flows at station LC 392. It repre-

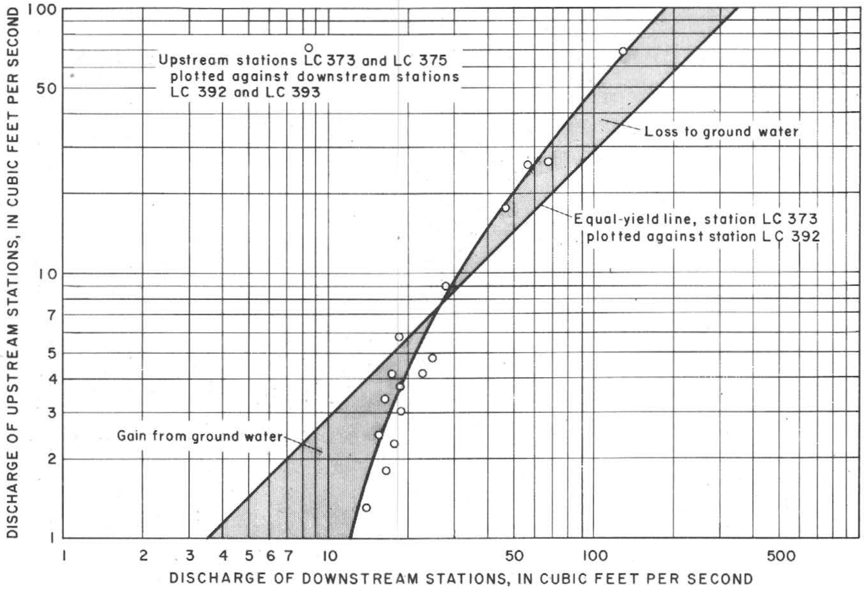

FIGURE 31.—Comparison of base flow of Salmon Creek at upstream and downstream stations.

sents the amount of base flow that would occcr if all the precipitation that enters aquifers feeding the stream discharged to the stream at the same rate at downstream stations as they do at upstream stations. The difference beween the potential base-flow line and the actual relation between base flows at upstream and downstream stations can be explained by differences in the hydrology of the two basins.

Figure 31 shows that (a) for rates of flow from 12 to 26.5 cfs at station LC 392 the actual flow is greater than the potential flow, (b) for rates of actual flow greater than 26.5 cfs the actual flow is less than the potential flow, and (c) for rates of actual flow greater than about 170 cfs, the potential flow is greater than the actual flow by an approximately fixed amount, of about 150 cfs. With regard to the first two features: below 26.5 cfs of actual flow, more water apparently is discharged into the stream than can be accounted for. Above 26.5 cfs of actual flow, less water is discharged to the stream than should be on the basis of the potential flow line; therefore, some loss other than by percolation to the stream is indicated.

As for loss from the shallow body other than to the stream—it has been explained (p. 75) that deeper aquifers largely discharge directly into the Columbia River, and recharge to these, in large part, is derived from overlying shallow aquifers. To complicate this picture, however, a part of the discharge from the deeper aquifers enters Salmon Creek, as illustrated diagrammatically in figures 25 and 26.

Although the discharge from shallow aquifers both to the stream and to deeper aquifers varies greatly because water levels fluctuate over a wide range, the head on the deeper aquifers fluctuates very little and consequently the rate of discharge from these deeper aquifers both to the Salmon Creek and to the Columbia River is fairly constant.

On the basis of the foregoing discussion, under those conditions where actual base flow is less than potential base flow, the difference is explained by loss of water from the shallow aquifers to the deeper aquifers in an amount greater than the amount gained by the stream from the deeper aquifers. Conversely, when the actual base flow is greater than the potential base flow, more water is added to the stream than can originate from the shallow aquifers. This difference is made up of discharge from deeper aquifers to the stream during those periods of low level in the shallow aquifers when water loss from them to the deeper aquifers is relatively small.

As both the loss from the shallow to the deeper aquifers and from the shallow aquifers to the stream are dependent, in part, on the head (or position of water level) in the shallow aquifers, it follows that there should be some type of definite relationship between the actual base flow in Salmon Creek and that part of the potential base flow that is lost to the deeper aquifers.

Using data supplied by figure 31, and disregarding for the moment the fact that actual base flow includes the increment contributed to the stream from deeper aquifers, the actual base flow was plotted against the difference between actual and potential base flow (fig. 32).

The point in figure 32 where the curve crosses the zero ordinate represents the base flow when the actual and potential base flows are equal; that is, when the loss from shallow to deep zones is exactly balanced by the contribution from the deeper aquifers to Salmon Creek. The curve indicates this situation occurs at an actual base flow of 26.5 cfs.

Another item shown by the curves in figures 31 and 32 is of interest. It will be noted that, at an actual base flow of about 12 cfs, the potential base flow is about 3.5 cfs, and the difference between actual and potential base flows is about 8.5 cfs. That is, at a base flow of about 12 cfs, the gain to the stream from the deeper aquifers exceeds the loss from the shallow to the deeper aquifers by about 8.5 cfs. Thus, at a discharge of 12 cfs, the contribution to the stream from the deeper aquifers cannot be less than 8.5 cfs, nor can it exceed 12 cfs. The contribution of the deeper aquifers therefore probably is between 9 and 10 cfs.

In table 7 the average monthly base flow and potential base flow at the downstream station were obtained by selecting values from the base-flow relation graph in figure 31 that corresponded to the average

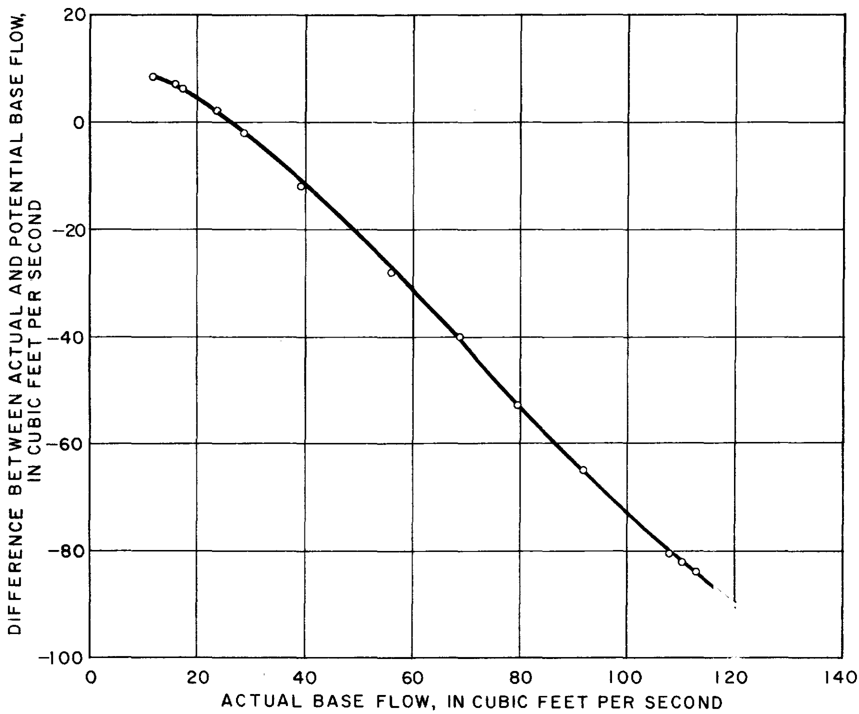

FIGURE 32.—Actual base flow at station LC 392 (from base-flow relation curve) compared with difference between actual and potential base flow. Negative ordinates indicate that actual base flow is less than potential base flow and show loss to deeper aquifers.

monthly base flow at the upstream station LC 373 which were determined from hydrographs for the period 1944–54.

Line D of table 7, difference between actual and potential base flow at station LC 392, gives the amount of water lost by deep percolation; water that presumably percolates downward into the Troutdale formation and moves southwestward to discharge directly into the Columbia River. The average monthly loss during the year is 38 cfs, which is more than 27,000 acre-feet. The drainage area of Salmon Creek above station LC 392 within the Fourth Plains area is about 40 square miles. The ground water lost to deep percolation thus would be a little more than 1 acre-foot per acre. Actual recharge to the deeper aquifers would be the amount lost to deep percolation plus the discharge from the deeper aquifers into Salmon Creek, or 50 cfs, which is equivalent to about 1.4 acre-feet per acre.

The foregoing estimates were based largely on the unproved assumption that differences between base flow from the plains area and from the foothills area are caused for the most part by loss of water to deep percolation. A corollary to that assumption is that evapo-

TABLE 7.—*Average base flow, in cubic feet per second, at various stations on Salmon Creek*

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
A. Base flow at LC 373, near Battle Ground												
8.7	31	55	57	60	54	38	24	14.5	6.3	3.3	2.7	29.5
B. Base flow at LC 392 [From base-flow relation curve, fig. 32]												
28.5	69	110	115	120	108	80	56	39	24	17.5	16	65.2
C. Potential base flow at LC 392 [From straight-line graph, fig. 32]												
30.5	109	192	199	210	189	133	84	51	22	11.5	9.5	--------
D. Difference between potential and actual base flow at LC 392 (C−B) [Lost to deep percolation]												
2	40	82	84	90	81	53	28	12	−2	−6	−6.5	38
E. Ground-water recharge to deeper aquifers (D+10)												
12	50	92	94	100	91	63	38	22	8	4	3.5	48

transpiration per unit area in the plains area is no greater than in the foothills area, an assumption that appears to be reasonable but has not been proved; furthermore, the estimates were on incomplete field data. For these reasons they should be considered as rough estimates only.

QUANTITY AVAILABLE

It has been shown that discharge from the shallower aquifers, including perched aquifers, dwindles to only a few cubic feet per second during periods of prolonged dry weather. However, even though natural discharge from these aquifers is comparatively small, there probably are large quantities of water available in storage which could be utilized by wells. If the average saturated thickness of the shallow aquifers is only 20 feet at low stage, there still would be about 5 acre-feet of water per acre in storage. At some places the saturated thickness may be less, but generally it probably is more than that. Water withdrawn from shallow storage during summer months would be replenished early in the winter.

It was estimated that annual recharge to the deeper aquifers within the Salmon Creek drainage is more than 1⅓ acre-feet per acre. Of the total, more than 1 acre-foot per acre is believed to move southwestward and to discharge into the Columbia River, while the remainder discharges into Salmon Creek. Projecting the rate of recharge to include all the Fourth Plains area (about 180 square miles), the total annual recharge would be more than 150,000 acre-feet. It seems probable that a large part of this ground water could be recovered through wells if it were needed.

LOWLAND AND FLOOD-PLAIN AREAS

The lowlands and flood plains included in this section are those of the Columbia River, the Lewis River, and the East Fork of the Lewis River. The valley floors are underlain by silt, sand, gravel, and boulders deposited in stream channels and on the adjacent flood plains. These alluvial deposits range in thickness from a few feet to more than 100 feet. The coarser grained strata are extremely permeable and yield very large amounts of water. At some places coarse sand and gravel in the Troutdale formation underlie the alluvial deposits and also yield large amounts of water.

COLUMBIA RIVER LOWLAND

The flood plain of the Columbia River on the Clark County (Washington) side of the river ranges from a few hundred feet to slightly more than 3 miles in width. Actually, the usable flood plain on this side of the river is confined largely to two locations: a strip extending nearly 6 miles eastward from Camas, and an area extending some 7 or 8 miles southeast and northwest of Vancouver.

Vancouver area.—The eastern limit of the flood plain at Vancouver is about 3 miles east of the Interstate Bridge at Vancouver. From a narrow point at its eastern end the flood plain broadens to a width of about three-quarters of a mile half way to the bridge. Northwest of the bridge the flood plain broadens to about 3 miles in width. Although the flood plain continues northwestward beyond the northwest corner of the county, beyond a point about 4 or 5 miles northwest of the bridge the surface is low and is covered largely by lakes and swamps.

The aquifers underlying the slope and benches on which the city of Vancouver lies are hydraulically continuous with the aquifers underlying the flood plain and in this report are considered with the aquifers in the lowland area. As was explained in the section on geology, the valley wall of the ancestral Columbia River extends northwestward from a point in the NW¼ sec. 31, T. 2 N., R. 2 E., to Vancouver Junction.

Approximately 70 wells have been drilled in the lowland area at Vancouver. Most of the wells obtain water from Recent alluvium and the Pleistocene alluvial deposits, although some wells have been drilled through these deposits into the upper part of the Troutdale formation. On the flood plain the top of the Troutdale formation ranges from 100 to 120 feet below the land surface (70 to 90 feet below sea level). On the terraces the depth to the top of the Troutdale is as much as 273 feet, depending upon the altitude of the land surface. The top of the Troutdale formation apparently rises slightly toward the northeast, and is about 45 to 55 feet below sea level in the north part of Vancouver.

At the east end of the Vancouver area the Pleistocene deposits consist almost entirely of gravel and sand. This is illustrated by the logs of wells 2/1–23Q1 to Q4, 23R1, 26G1, 36B1 to B8 (city of Vancouver), wells 2/1–35F1 to F4 (Buffalo Electro-Chemical Co.), and wells 2/1–27M1 to M8 (Columbia River Paper Mills). Westward the upper strata are fine-grained sand or silt, and the top of the gravel is at progressively greater depths as shown by the log of well 2/1–28G3 (Port of Vancouver) and by the logs of wells 2/1–21N1 and N2 (The Carborundum Co.). About 2 miles northwestward, as indicated by the logs of wells in secs. 18 and 19, T. 2 N., R. 1 E. (Aluminum Co. of America), the gravel of Pleistocene age has largely pinched out between the thickening sand and silt section and the nearly horizontal upper surface of the Troutdale formation.

Nearly 50 industrial, municipal, and institutional wells, with yields as much as 4,600 gpm, have been drilled into the Pleistocene sand and gravel deposits. Of 21 municipal and industrial wells for which both yield and drawdown data were reported the average yield is 1,560 gpm with an average drawdown of 8.3 feet. All these wells were completed by perforating the casings; the wide range in drawdown in wells only short distances apart indicates that some of the wells have a low efficiency. Several wells were reported to yield 2,000 gpm with a 4-foot drawdown. Wells 2/1–21N1 and N2 were reported to yield 1,600 and 1,540 gpm, respectively, both with a 1½-foot drawdown. Wells 2/1–35F3 and F4 were reported to yield 4,000 gpm each, with drawdowns of 4 and 3 feet, respectively. Wells 2/1–27M7 and M8 were reported to yield 4,600 gpm but the drawdowns are not known. From the yield-drawdown data it would appear that maximum specific capacities exceed 1,000 gpm per foot; although aquifer tests have not been made, these data suggest that coefficients of transmissibilities are about 2 or 3 million gpd per ft (gallons per day per foot).

The gravel strata tapped by wells of the Aluminum Co. of America (locations are shown in fig. 33) are believed to be in the upper part of the Troutdale formation. The top of these gravel strata range from 96 to 107 feet below the surface, or about 67 to 88 feet below sea level. In 1954, pumping tests were made on some of the wells by John W. Robinson, consulting geologist of Tacoma, Wash., and by the Aluminum Co. of America. The data obtained during these tests have been analyzed by the writer. Precise evaluation of hydrologic

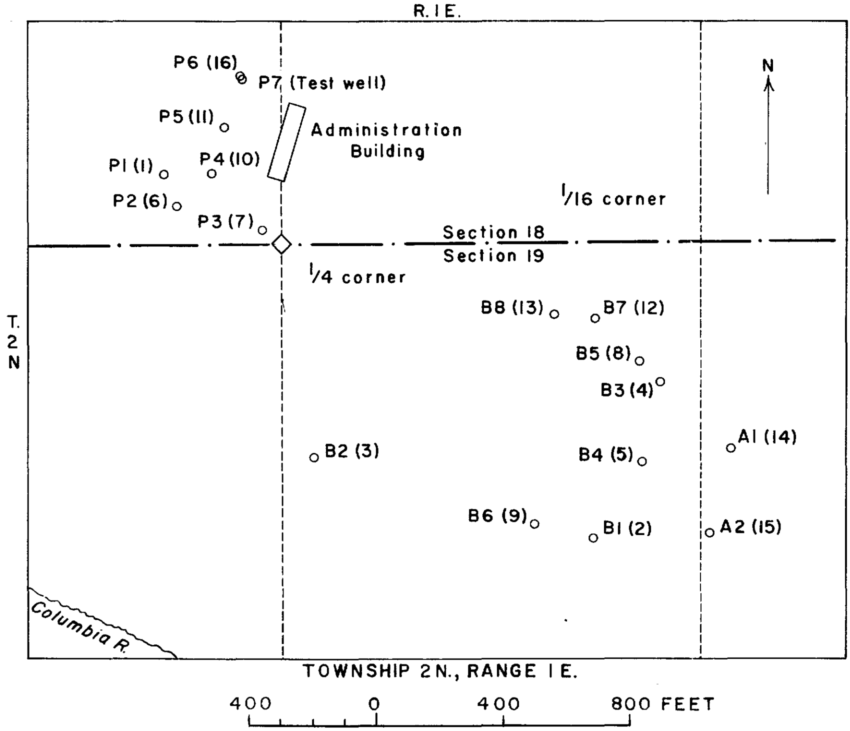

FIGURE 33.—Sketch map showing location of Aluminum Co. of America wells. Numerals in parentheses represent company well numbers.

factors was precluded by the physical conditions prevailing during the tests. Operation of the plant could not be interrupted and various individual wells and well groups, which are on automatic operation, cut off and on at frequent intervals. The general trend of water-level fluctuations in the wells closely parallel tidal fluctuations in the Columbia River and this trend must be compensated. However, the data obtained did permit determinations of approximate values for coefficients of transmissibility and storage.

Although the sand overlying the aquifer at the Aluminum Co. plant is not impermeable and water falling on the area can percolate downward, the transmissibility of the aquifer is so much greater than the transmissibility of the overlying sand that the aquifer reacts as an artesian aquifer during pumping. The aquifer apparently is recharged indirectly from the nearby Columbia River, through the overlying sand. Because of the very great difference between the horizontal permeability of the gravel and the vertical permeability of the overlying sand (probably about 1,000 to 1), the effective distance to the recharge boundary is several times the distance of the wells from the river. Eastward toward Vancouver the aquifer is directly overlain by Pleistocene gravel aquifers, which apparently are recharged directly by the Columbia River. Relation of the river stage to the altitude of the water table at Vancouver is shown on figure 34.

Because of the high transmissibility of the aquifers at the aluminum plant and the moderately low coefficient of storage, the cone of pressure relief surrounding a pumped well expands very rapidly and reaches a source of recharge within a short time after pumping begins. For that reason, only the first few minutes of the pumping test could be used for evaluating aquifer characteristics. Water-level recorders were maintained on wells 2/1–19B2 and 18P2 and on 18P7 at various times. Drawdowns in these observation wells due to pumping of the different wells and pairs of wells are shown in the traces on the recorder charts. Transmissibilities determined by analysis of these data appear to be fairly reliable. Table 8 lists pertinent data.

TABLE 8.—*Aquifer-test data, wells of the Aluminum Co. of America at Vancouver, Wash.*

Pumping well			Observation well	
Number	Yield (gpm)	Distance from observation well (feet)	Drawdown at end of 20 min., 1.39×10^{-2} day (feet)	Drawdown divided by yield
Analysis of data shown on figure 35				
			Well 2/1–19B2	
2/1–19B3 19B5	1,700	1,110	0.28	1.65×10^{-4}
19B1 19B6	2,000	785	.40	2.00×10^{-4}
19B4	770	1,025	.15	1.95×10^{-4}
18P6	4,300	1,240	.65	1.51×10^{-4}
Analysis of data shown on figure 36				
			Well 2/1–18P2	
2/1–19B3 19B5	1,700	1,585	0.17	1.0×10^{-4}
19B1 19B6	2,000	1,575	.18	$.9\times10^{-4}$
19B4	770	1,675	.085	1.10×10^{-4}
18P6	4,000	460	1.00	2.5×10^{-4}
Analysis of data shown on figure 37				
			Well 2/1–18P7	
2/1–19B4	770	1,760	0.08	1.03×10^{-4}
18P6	4,000	13	1.76	4.4×10^{-4}
19B1 19B6	1,750	1,780	.18	1.03×10^{-4}

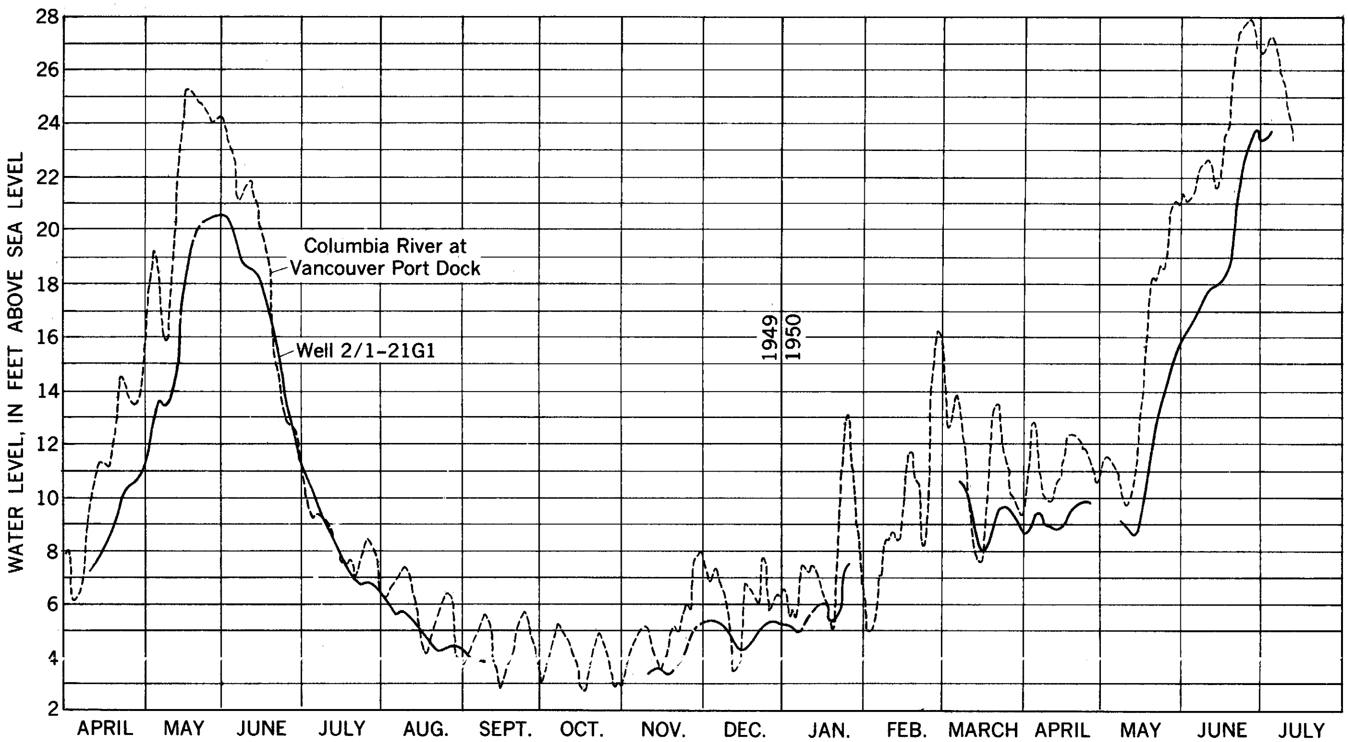

FIGURE 34.—Stage of Columbia River and water level in well 2/1-21G1, 1949–50.

The transmissibility and coefficient of storage determined from observations in well 2/1–19B2 while wells 2/1–19B1 and B6, B3 and B5, 19B4, and 18P6 were pumped either individually or in pairs at different rates, were computed graphically (fig. 35). The equation used

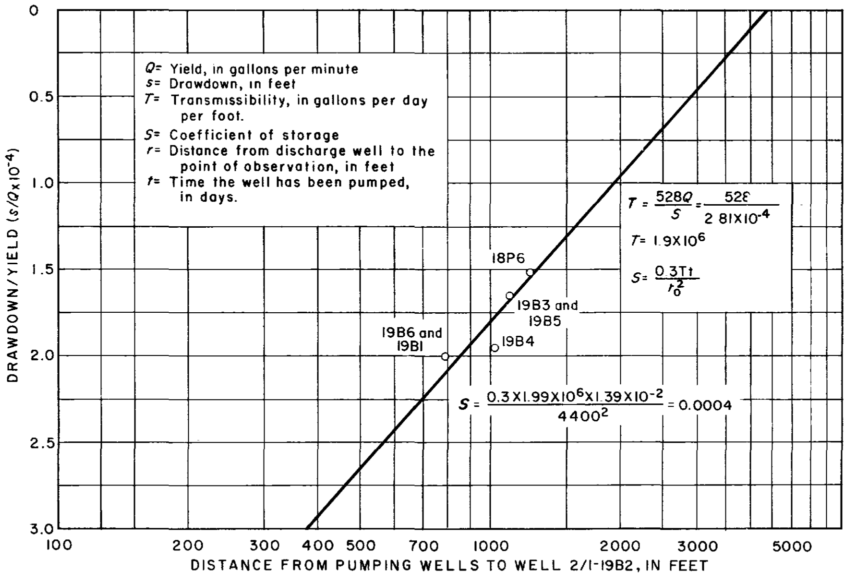

FIGURE 35.—Drawdowns in well 2/1-19B2 caused by pumping of wells 19B3 and 19B5, 19B1 and 19B6, 19B4, and 18P6.

for computing transmissibility was adapted from Cooper and Jacob (1946, p. 526–534):

$$T=\frac{528Q\log_{10}\frac{r_2}{r_1}}{s_1-s_2}$$

The above equation was applied by selecting a convenient interval of time after pumping began, in this case 20 minutes, and determining the drawdown produced in the observation well by pumping other wells or pairs of wells. It should be pointed out that pumping of the wells (or pairs) was done at different times and the drawdown resulting was caused only by that particular well (or pair). The wells were pumped at different rates, and as the drawdown in an observation well is directly proportional to the rate of pumping, each drawdown was divided by the respective pumping rate so that each would be on an equivalent basis. The drawdown divided by yield

$$\frac{s}{Q}$$

was plotted on the arithmetic scale on semilog-coordinate paper, and the distance from the pumped well to the observation well (r) was plotted on the logarithmic scale. A straight line through the plotted points defines the locus of all possible values of

$$\frac{s}{Q}$$

and r. By selecting r_2 and r_1 one log cycle apart, the equation given above reduces to

$$T=\frac{528}{\Delta s_Q}$$

where

$$\frac{\Delta s}{Q}$$

is the change in this factor over a log cycle.

For the test data on figure 35, Δs is 2.81×10^{-4}, making $T=1.9\times10^{6}$ gpd per foot.

The equation used to compute the coefficient of storage is

$$S=\frac{0.3Tt}{r_0^2}$$

where r_0 is the value of r at the zero intercept. Because the drawdowns in well 2/1–19B2 were measured at the end of a 20-minute pumping period, t is taken as 20 minutes or 1.39×10^{-2} day. With these data inserted into the equation, $S=4.15\times10^{-4}$.

Figure 36 shows the plotted data obtained from observations at well 2/1–18P2 while wells 2/1–19B1 and B6, B3 and B5, and 19B4, and 18P6 were pumped either individually or in pairs. Similarly, on figure 37, data are shown that were obtained from observations at well 2/1–18P7 while wells 19B4 and 18P6 were pumped individually and also while wells 19B1 and B6 were pumped simultaneously.

An aquifer test made Oct. 20, 1954, on well 2/1–18P6 with observations on well 2/1–18P7 and on 2/1–18P2 also appears to give reliable results. Data obtained during the test are shown on the following table. The graphical analysis of these data is shown on figure 38.

After well 2/1–18P6 had discontinued pumping at a rate of 3,000 gpm. the recovery, 20 minutes later, in well 18P7, 13 feet distant, was 1.50 feet and the recovery in well 18P2, 460 feet distant, was 0.78 feet. The slope of the line connecting these two points on the graph is 0.46 feet per log cycle. Evaluation of the expression $528/\Delta s$ shows a

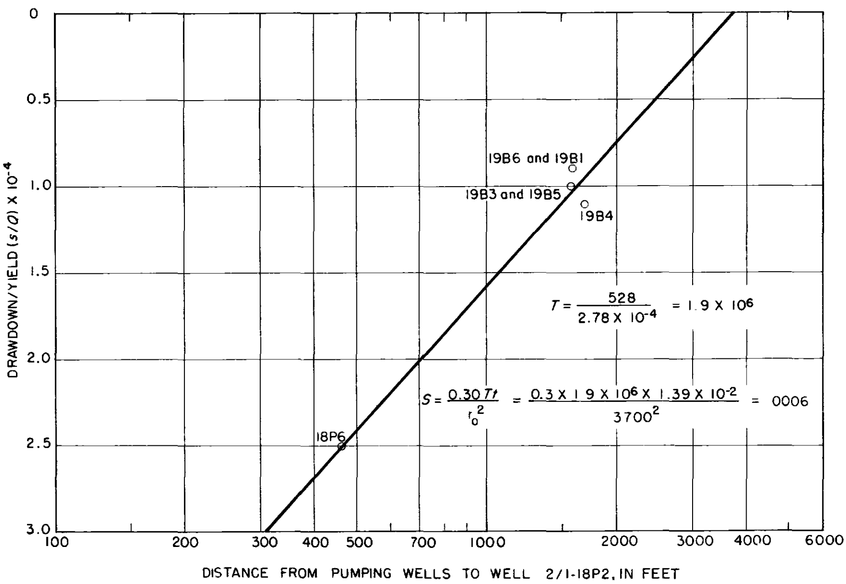

FIGURE 36.—Drawdowns in well 2/1–18P2 caused by pumping of wells 18P6, 19B4, 19B3 and 19B5, 19B1 and 19B6. Letter symbols same as in figure 35.

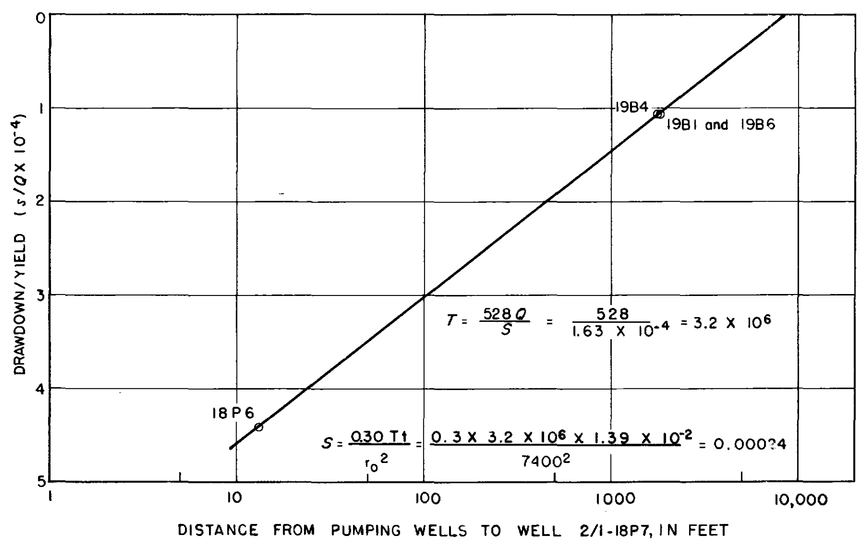

FIGURE 37.—Drawdowns in well 2/1–18P7 caused by pumping of wells 19B4, 18P6, and 19B1 and 19B6. Letter symbols same as in figure 35.

transmissibility of 3.4×10^6. Similarly, the recovery measurements on wells 18P7 and 18P2 after well 18P6 had discontinued pumping at a rate of 4,000 gpm were plotted. These data fall on a line, the slope

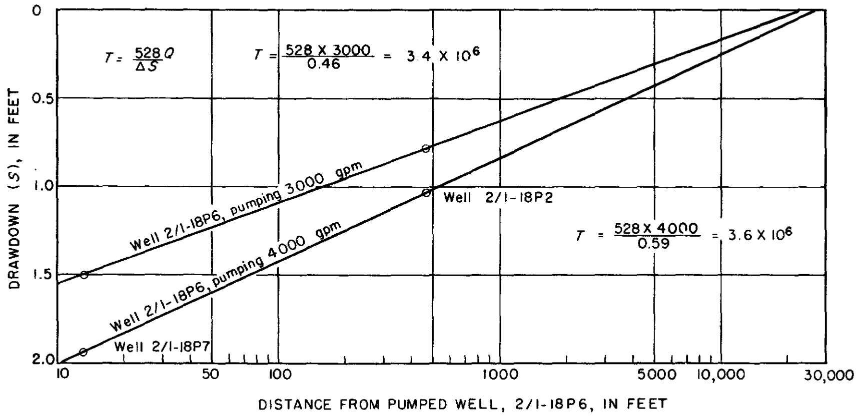

FIGURE 38.—Aquifer test on well 2/1-18P6, Vancouver, Oct. 20, 1954.

TABLE 9.—*Aquifer-test data for well 2/1-18P6*

Time	Well	Water level (feet)	Drawdown (−)or recovery(+) (feet)	Tidal correction (feet)	Corrected drawdown or recovery (feet)
a.m.					
[1] 9:45	2/1-18P7	28.45			
[2] 10:15	2/1-18P7	28.46			
10:40	2/1-18P7	28.50			
10:41	2/1-18P2	29.03			
[3] 10:45	2/1-18P7	27.26	+1.24	0	+1.24
11:02	2/1-18P7	26.97	+1.53	−.03	+1.50
11:02	2/1-18P2	28.22	+.81	−.03	+.78
11:30	2/1-18P7	27.05			
11:33	2/1-18P7	26.94			
11:33	2/1-18P2	28.05			
[4] 11:45	2/1-18P7	28.81	−1.87	−.02	−1.89
11:54	2/1-18P2	29.07	−1.02	−.03	−1.05
[5] 12:00 m	2/1-18P2	29.06			
p.m.					
12:20	2/1-18P2	28.00	+1.06	−.03	+1.03
12:20	2/1-18P7	26.84	+1.97	−.03	+1.94

[1] Started pumping well 2/1-18P6 at 9:30 a.m. at 3,000 gpm.
[2] Low tide at 10:00 a.m.
[3] Stopped pumping well 2/1-18P6 at 10:42 a.m.
[4] Started pumping well 2/1-18P6 at 11:34 a.m. at 4,000 gpm.
[5] Stopped pumping well 2/1-18P6 at 12:00 m.

of which is 0.59 feet per log cycle. The transmissibility, derived from these data, is therefore 3.6×10^6.

Three other aquifer tests were run on wells of the Aluminum Co. of America in 1954. At different times, well 2/1-19B5 was pumped and water levels were measured in well 19B3, well 19B3 was pumped and measurements made in well 19B5, and well 19A1 was pumped and levels were measured in well 19A2. The following table lists the coefficients of transmissibility and storage determined from all the foregoing aquifer tests.

The data in table 10 indicates that aquifer transmissibility is fairly uniform from well to well throughout the well field, and that large

TABLE 10—*Summary of aquifer-test data for wells of the Aluminum Co. of America at Vancouver, Wash.*

Pumped well	Observation well			
	No.	Distance from pumped well (feet)	Coefficient of —	
			Transmissibility	Storage
2/1-19B5	2/1-19B3	85	2.9×10^6	0.0003
19B3	19B5	85	2.3×10^6	.00017
19A1	19A2	285	3.3×10^6	.00055
2/1-19B3, B5 19B6, 19B1 19B4 18P6	19B2		1.9×10^6	.0004
2/1-18B3, 19B5 19B6, 19B1 19B4 18P6	18P2		1.9×10^6	.0006
2/1-19B6, 19B1 19B4 18P6	18P7		3.2×10^6	.00024
2/1-18P6	2/1-18P7 18P2		[1] 3.5×10^6	

[1] Average on two tests shown on figure 38.

quantities of water are available in the Columbia River lowland. With a very large source of recharge close at hand (minimum flow of the Columbia River is about 35,000 cfs), with a static head of 70 to 80 feet above the top of the aquifer and with transmissibilities ranging from 2 to 4 mgd (million gallons per day) per foot, yields of about 50 to 100 mgd might be obtained per mile length of lowland along the river. Total potential yield for the 7- to 8-mile strip might approach half a billion gallons a day.

Camas-Washougal area.—The strip of Columbia River valley lowland which terminates abruptly, at the western edge of Camas, against the volcanic rocks forming Prune Hill extends nearly 3 miles upstream from Washougal, a total length of about 6 miles. The average width of this strip is about 1 mile, but except for a narrow strip along the Columbia River, the alluvium forms a bench considerably above the present-day flood line. The Washougal River, which enters the valley of the Columbia midway along this stretch, apparently built a broad but very short fan into the Columbia River valley at this point. The alluvial materials underlying the bench apparently were deposited chiefly as a fan by the Washougal River. Surface exposures and well logs indicate that these materials are almost entirely coarse sand and gravel, with some boulder horizons.

Approximately 25 wells have been drilled in the lowland in the Camas-Washougal area. Although a few of these wells apparently entered the upper member of the Troutdale formation at elevations of 20 to 40 feet below sea level, almost all ground-water supplies have been developed in the overlying Pleistocene alluvium. The wells range in depth from 41 to 142 feet and average about 100 feet. Yields are as great at 2,600 gpm.

The largest development of ground water was made by the Crown-Zellerbach Corp., which has 9 wells yielding 1,220 to 2,600 gpm, with a reported average of 2,080 gpm. Drawdowns range from 4 to 11 and average 6.7 feet. The best reported specific capacity is 525 gpm per foot, 2,100 gpm with a 4-foot drawdown. All these wells are in a small area near the western end of the alluvial bench, within a few hundred feet of the Washougal River.

The city of Camas has three wells a short distance east of the Crown-Zellerbach wells. When tested, these wells reportedly ranged in yield from 1,200 to 1,800 gpm. The Columbia Water Co., which supplies the town of Washougal, has 2 wells about 1 mile east and 3 wells about 3 miles east of the Crown-Zellerbach wells. The yields of these wells range from 625 to 1,200 gpm.

All the wells described above were completed with perforated casings instead of well screens; it is likely that even larger specific capacities generally would result if screens, of the proper slot size, were used. Although no aquifer tests were made in the area, it is obvious that coefficients of transmissibility are very high, probably about the same as in the Vancouver area where they range from 2 to 4 mgd per foot.

Recharge to the alluvial bench is from precipitation on the bench, from seepage from streams rising on Mount Norway and Nichols Hill, and from infiltration induced from the Washougal and Columbia Rivers. Logs of wells indicate that there is good hydraulic connection between the aquifers and the rivers. Reported static levels, measured at the time the wells were drilled, obviously are related to river stage; this relation also indicates good hydraulic connection. The Crown-Zellerbach Co. pumps 20 mgd from a very small area, apparently without excessive interference between wells. It seems obvious that the source of a large part of this water is the Washougal River. The wells of the city of Camas and two wells of the Columbia Water Co. are about midway between the Washougal and Columbia Rivers; pumping of these wells probably induces infiltration from both rivers. The other three Columbia Water Co. wells are on the bank of the Washougal River, near the apex of the fan.

Many other locations on the alluvial bench would be suitable for ground-water development. The potential yield along the 6-mile reach is probably at least several hundred million gallons a day.

EAST FORK OF THE LEWIS RIVER FLOOD PLAIN

The East Fork of the Lewis River flows in a flood plain underlain by stream alluvium from La Center upstream to Lewisville Park, directly north of Battle Ground. The average width of the flood plain in this 6-mile reach is more than half a mile. Upstream from the park the river is confined to a much narrower valley, with alluvial terrace remnants at places forming the stream banks within the valley. The alluvial deposits are coarse and permeable, and although shallow, are capable of yielding moderately large supplies of water. Only a few wells have been dug or drilled into them. Yield data have been reported for only three wells tapping these deposits, as follows: well 4/1–13J1, 364 gpm with a 1½-foot drawdown; well 4/2–19C1, 147 gpm; well 4/2–22H1, 130 gpm with a 15-foot drawdown. It is very likely that comparable yields could be obtained from wells at many other places along the flood plain.

LEWIS RIVER FLOOD PLAIN

The Lewis River, which forms the boundary between Clark and Cowlitz Counties, enters the flood plain of the Columbia River at Woodland. Below Woodland the combined flood plain, which is 2 to 3 miles wide, lies almost entirely within Cowlitz County. More than a dozen wells ranging in depth from 12 to 40 feet have been dug or drilled on the flood plain for irrigation purposes, all within Cowlitz County. The records indicate that the alluvial deposits are much finer grained than those at Vancouver or Camas. However, 13 wells reportedly range in yield from 150 to 500 gpm and average nearly 325 gpm.

From Woodland to a point about 6 miles upstream the flood plain averages about three quarters of a mile in width and a considerable part is in Clark County. Although several wells have been dug or drilled on the flood plain in Clark County, these are chiefly for domestic and stock use. In sec. 18, T. 5 N., R. 1 E., in Cowlitz County two wells, both 40 feet deep have been drilled on the flood plain for irrigation use. Of these, one has a reported yield of 400 gpm with 6 feet of drawdown and the other has a reported yield of 300 gpm with 5 feet of drawdown. The aquifers tapped by them are coarse sand and gravel. Moderately large to large yields probably can be obtained at most places from the alluvial deposits in the flood plain of the Lewis River.

CHEMICAL QUALITY OF GROUND WATER

The chemical quality of ground water is very important to all water users, because certain mineral elements are detrimental or injurious if present in too great a concentration. In most respects the water in Clark County is suitable for all uses.

Water vapor in the air contains no minerals; however, as it collects into raindrops and snowflakes and falls to the ground it picks up some atmospheric gases and dust particles which in part dissolve, so that rainwater generally has a very small amount of dissolved mineral matter. More important, the rainwater contains appreciable amounts of carbon dioxide and oxygen which aid the water in dissolving minerals from the soil and rock with which it comes in contact. Acids formed by decomposition of vegetation are picked up by the water as it percolates through the soil, and these also increase the ability of the water to dissolve minerals.

There is a wide range in the solubility of minerals, and the presence or absence of readily soluble minerals is an important factor in determining whether the ground water will contain a large or a small amount of dissolved mineral matter. The lithologic character of the formation through which the ground water percolates is an important factor in shaping the chemical character of the water. The concentration and kind of minerals dissolved in the water determines the hardness, salinity, iron content, corrosiveness, and other characteristics of the water. Chemical characteristics of the ground water in the various formations were discussed briefly in the section on water-bearing characteristics of the rock formation.

Table 18 lists 12 partial or comprehensive analyses of ground water in Clark County. In addition to these analyses, chloride and hardness (expressed as $CaCO_3$ were determined by field methods for a number of water samples; results of these tests, which are only approximate, are given in parts per million (ppm) in table 19.

HARDNESS

Hardness of water is caused by soap-consuming and scale-forming materials, chiefly calcium and magnesium. Water that is hard requires large amounts of soap to form a lather. Hard water also produces scaly deposits in pipes and tanks with which it comes in contact, especially when the water is heated while in contact with the pipes and tanks.

Most of the water samples that were tested for hardness in Clark County are in the categories of soft (0–60 ppm) or moderately hard (61–120 ppm). Of the 12 analyses and 254 field tests, 83 were of soft water, 168 were of moderately hard water, and 15 were of hard water (121–180 ppm). Most of the wells yielding soft water are less than 50 feet deep; this fact suggests that the distance traversed and length of time that water is in contact with the rock are factors in determining how much calcium and magnesium will go into solution.

The hardest water tested had a hardness of 170 ppm, which is not excessive in comparison with that of water used in many other parts of the United States. Therefore, although hardness of ground water in Clark County may present a problem to a few users, it will give little or no trouble to most users.

CHLORIDE

Chloride in ground water commonly is thought of as being present as a result of the solution of sodium chloride (common salt). Of 266 water samples analyzed for chloride, only 13, less than 5 percent, contained more than 20 ppm of chloride. Only one sample had a chloride content of more than 75 ppm. This sample, from well 4/3–18N2, a flowing well reported to be 580 feet deep, had a chloride content of 224 ppm. However, several drillers have reported water too salty for use in a few wells drilled north of the East Fork of the Lewis River. The saline water in that area apparently comes from the lower part of the Troutdale formation.

The U.S. Public Health Service (1943) recommends that the chloride content of public water supplies preferably should not exceed 250 ppm. No known public or private domestic supplies in the county approach the limit.

IRON

In general use of the water, more trouble is caused by excessive amounts of iron in ground water than by any other mineral or chemical characteristic.

Iron is not known to be injurious to health (Negus, 1938, p. 253) nor is it known to affect adversely the use of the water for irrigation. However, excessive amounts will produce certain undesirable effects. Excessive iron in drinking water gives the water a taste that is unpleasant to most people. It causes a yellow or reddish stain on plumbing fixtures and cooking utensils, and stains clothes washed in the water. Many industrial processes cannot tolerate excessive iron in the water.

According to the U.S. Public Health Service drinking-water standards, an iron and manganese content of more than 0.3 ppm is undesirable. Concentrations of iron that will be detrimental for industrial use depends upon the nature of the industry, but for many industrial uses iron in excess of 0.3 ppm is highly undesirable. Of the 8 water samples for which iron was determined, 3 had an iron content of more than that amount. No field tests were made for iron, but a number of users reported objectionable amounts of iron in the water.

Treatment of water for removal of iron is relatively simple. The most common method is aeration and filtration. Ordinary zeolite water softeners also will remove the iron if the concentration is not more than about 1 ppm and the iron is in a reduced state. Iron removal in large municipal and industrial supplies is generally accomplished by aeration which oxidizes the iron and causes it to precipitate. Subsequent filtration removes the precipitate.

FLUORIDE

Fluoride in water in excess of about 1 ppm may cause the dental defect known as mottled enamel if children use the water during the formation of the teeth (Dean, 1936). The severity and percentage of incidence increase markedly with an increase in fluoride content until at 6 ppm an incidence of 100 percent is not unusual.

Water containing small amounts of fluoride, however, was reported by Dean (1942) to be beneficial in prevention of dental decay. It has been shown that school children using water containing about 1 ppm of fluoride experience only one-half to one-third as much dental decay as comparable groups using water that contains no fluoride.

Fluoride determinations were made in 9 of the 12 analyses of ground water given in table 18. The concentrations of fluoride range from 0 to 0.6 ppm and thus are well below the harmful range.

CORROSIVENESS

Oxygen, carbon dioxide, and vegetable acids are the principal constituents of ground water that cause corrosive deterioration of well casing, pump pipes, pumps, tanks and water pipes in distribution systems. Often, however, the deterioration is not as objectionable as is the presence of the iron which stains utensils, plumbing fixtures, and laundry by going into solution in the process of the deterioration.

Water from shallow depths usually is more corrosive than that from greater depths. Rainwater contains considerable oxygen and carbon dioxide. As the water percolates downward through the soil and rocks, the free oxygen combines with organic and inorganic materials. The reaction of carbon dioxide with water forms carbonic acid which, in turn, reacts with various minerals to form bicarbonates. The farther the water percolates into the ground, the less free oxygen and carbon dioxide remain to cause corrosion. For this reason hard water, whose carbon dioxide has been used up in dissolving minerals and whose oxygen content also has been reduced, is generally less corrosive than water of low mineral content and hardness.

The pH of a water is a measure of its acidity or corrosiveness. Water having a pH of less than 7 is acidic in reaction, and one having a pH of more than 7 is alkaline in reaction. PH determinations were made on 11 of the 12 samples given in table 18. Of these, the pH of only 2 is less than 7. Hence, only 2 of 11 water samples are likely to be corrosive. However, the water from many of the shallow wells is probably somewhat corrosive.

SUITABILITY OF WATER FOR IRRIGATION

Several chemical factors affect the suitability of water for agricultural use. The most important are (a) the total concentration of soluble salts, (b) the relative proportion of sodium to other cations, and (c) the concentration of boron.

The concentration of soluble salts (dissolved solids) is reported in parts per million in table 18. The specific conductance of the water also is an indication of the concentration of soluble salts. When specific conductance has not been determined, its value in micromhos per centimeters can be approximated by multiplying total solids in parts per million by the factor 1.6. According to Agriculture Handbook No. 60 (U.S. Salinity Laboratory staff, 1954, p. 71), water having a conductivity of less than 750 micromhos per centimeter generally is satisfactory for irrigation insofar as salt content is concerned. The highest conductivity measured in ground water of Clark County is 376 micromhos. The highest concentration of dissolved solids determined is 238 ppm, equivalent to a conductivity of approximately 380 micromhos. Thus, all the water samples tested contain far less dissolved solids than the upper limit given for satisfactory irrigation use.

The relative proportion of sodium to other cations is known as percent sodium. However, a better index as to the sodium (alkali) hazard of a water is given by the sodium-adsorption-ratio (SAR), which is related to the adsorption of sodium by the soil. This ratio is defined by the equation:

$$SAR=\frac{Na^{+}}{\sqrt{\frac{Ca^{+2}+Mg^{+2}}{2}}}$$

in which the concentration of the respective ions is expressed in milliequivalents per liter. Sodium-adsorption-ratios are given for 9 ground-water samples in table 18. None of these values are more than 0.5, which, according to the classification given in Agriculture Handbook No. 60 (p. 80), is an extremely low sodium (alkali) hazard.

Although boron is essential to normal growth of plants, the amount required is very small. An excess of boron is very injurious to some plants. According to Scofield and Wilcox (1931, p. 3), irrigation water with boron concentration of less than 0.5 ppm is considered as most desirable water, with respect to boron, for even the most sensitive crops. The maximum boron concentration of any of the water samples from Clark County was 0.02 ppm.

The chemical quality of all the ground water used in Clark County is considered very satisfactory for irrigating all types of plants.

UTILIZATION OF GROUND WATER

The use of ground water exceeds the use of surface water in Clark County, both in number of supplies and in total quantity. Chief uses include domestic, municipal, industrial, and irrigation. Total ground-water consumption probably is more than 100 mgd, or somewhat more than 110,000 acre-feet per year (see also fig. 39).

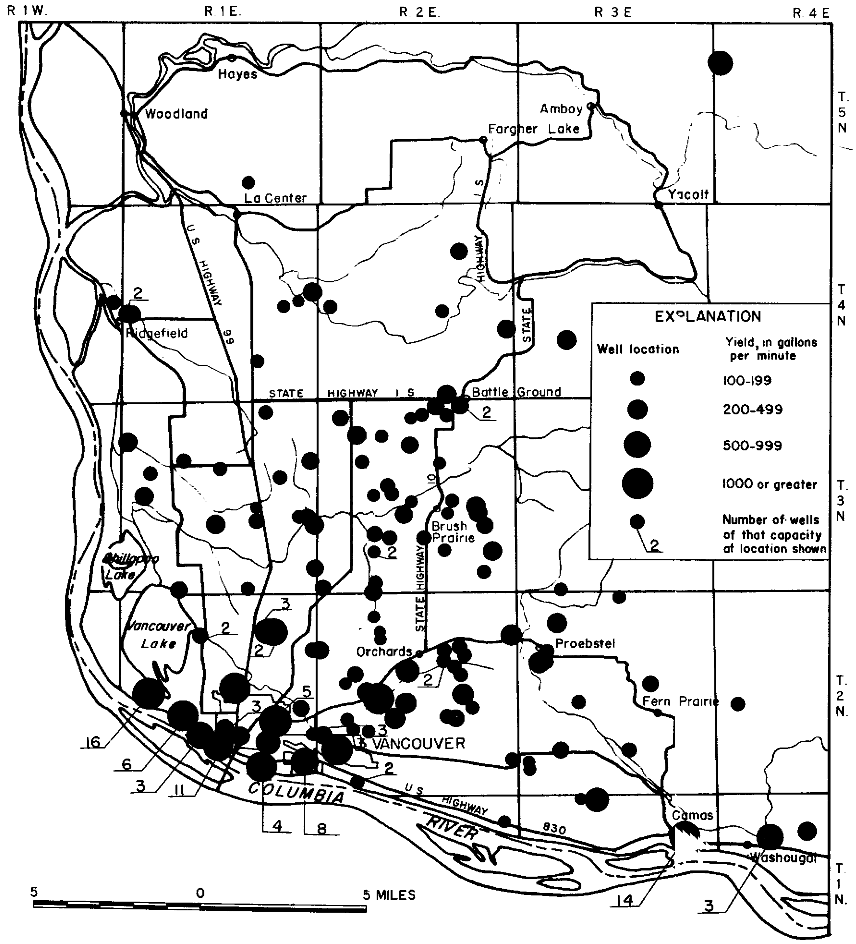

FIGURE 39.—Wells in Clark County capable of yielding 100 gpm or more. Numbers indicate number of wells of that capacity at location shown.

DOMESTIC SUPPLIES

By far the largest number of wells in Clark County are used for domestic purposes. The tabulation of wells in this report includes only a small percentage of all the domestic wells in the county. On the basis of rural population (more than 38,000 in 1950) it is estimated that there are 10,000 to 12,000 domestic wells in the county. Probably the majority of domestic wells are dug, but several thousand are drilled. There are comparatively few driven or bored (augured) wells. Several hundred springs also are used, chiefly in the upland and foothills areas.

Assuming a total of 12,000 rural domestic wells and an average usage of 300 gpd per well, the average ground-water withdrawal for rural domestic and stock use is 3.6 mgd.

PUBLIC SUPPLIES

There are eight public water-supply systems in the county, with a combined average demand of about 9.5 mgd. Of the eight, one is owned by a public utility district, one is privately owned, and six are municipally owned. Six of the systems are supplied entirely from wells and springs, one is supplied from a creek, and one is supplied in part from creeks and in part from wells. Ground water is the source of about 90 percent of the water used for public supply. The following table summarizes the data for these eight systems.

TABLE 11.—*Public water supplies in Clark County*

Town or locality	Population served	Source of supply	Capacity (mgd)	Average use (mgd)	Treatment
Battle Ground	[1] 850	2 wells	0.8	0.06	Chlorination.
Camas	5,600	Boulder and Jones Creeks.		2.5	Do.
		3 wells	4.3		None.
Hazlewood Utility District.	[1] 4,000	4 wells	?	[1] 1.0	None(?).
La Center	195	Wells	[1] .7	.025	None.
Ridgefield	800	3 wells		.075	Do.
Vancouver	50,500	3 springs	2.5	5.4	Chlorination
		17 wells	57		None.
Washougal	1,400	Wells	3.13	.42	Do.
Yacolt	330	Big Creek		[1] .03	Do.

[1] Estimated.

In addition to these public water-supply systems in which water is sold to regular customers through distribution mains, there are a number of public supply systems for schools, hospitals, parks, and similar places. In table 15, use of water from wells supplying these latter places is listed as "institutional." Total ground-water usage by such institutions probably is 0.2 to 0.5 mgd.

INDUSTRIAL SUPPLIES

A large part of the water used by industry is obtained from ground-water sources, although the largest user, the Crown-Zellerbach Corp., at Camas, uses both surface and ground-water sources. The chief industrial uses are for manufacture or processing of pulp and paper, aluminum, chemicals, and food and drink products, concrete and brick products, and lumber and plywood. Table 12 gives data pertinent to the larger industrial supplies in the county.

TABLE 12—*Industrial water supplies in Clark County*

Name	Location	Source	Average use (gpd)
Crown-Zellerbach Corp	Camas	Surface	66,000,000
		9 wells	20,000,000
Columbia River Paper Mills	Vancouver	8 wells	24,000,000
Aluminum Co. of America	do	15 wells	16,000,000
Great Western Malting Co	do	3 wells	4,960,000
Vancouver Plywood Co	do	Wells [1]	4,330,000
Buffalo Electro-Chemical Co	do	4 wells	2,880,000
Port of Vancouver	do	1 well	[2] 1,330,000
Carborundum Co	do	2 wells	1,000,000
Interstate Brewery Co	do	2 wells	500,000
Spokane, Portland, and Seattle RR	do	2 wells	[2] 300,000
Bonneville Power Administration	do	1 well	
Harbor Plywood Corp	Amboy	1 well	[2] 220,000
Clark County Public Utility Dist. 1	Vancouver	2 wells [3]	
Northern Pacific RR	Ridgefield	1 well	[2] 82,000
Vancouver Ice and Cold Storage	Vancouver		
Clark County Dairyman's Assoc	Battle Ground	2 wells	
Du Bois Lumber Co	Vancouver		
C. A. Robinson	Pioneer	1 well	

[1] Supplied by Vancouver Port Authority.
[2] Quantity allotted by State on certificate of water right.
[3] Used for heat-pump system, returned to ground.

In addition to the industries listed there are many smaller industries which use ground-water supplies in their operations. The total ground water use by the industries listed in the table is about 75 mgd, or 84,000 acre-feet per year. The smaller industries not listed probably use several additional million gallons a day.

Industrial use is concentrated chiefly in two areas on the flood plain of the Columbia River—at Camas and at Vancouver. Use at Camas, almost entirely by the Crown-Zellerbach Corp., is about 20 mgd (22,400 acre-feet per year). Industrial use at Vancouver totals more than 55 mgd (61,600 acre-feet per year). Most of the wells in these two areas obtain water from gravel aquifers in the Pleistocene terrace deposits, although a few wells also tap aquifers in the gravel of the upper member of the Troutdale formation. Because of the very great transmissibility of the aquifers, much of the water withdrawn is recharged by lateral percolation from the Columbia River and there has been no undue lowering of the water table. Potential ground-water supplies in both the Vancouver and Camas areas probably are many times greater than the quantity now being used. (See also p. 84–95.)

IRRIGATION SUPPLIES

The upland plains and benches in Clark County are ideally suited to irrigation. According to the U.S. Bureau of Reclamation unpublished report "Lewis River basin, Washington, reconnaissance report" some 30,000 acres on the alluvial plains below an altitude of 300 feet south of the East Fork of the Lewis River are irrigable. Additional irrigable lands are located on the higher benches north of the East Fork, on alluvial terraces north and east of Battle Ground, in the vicinity of Yacolt, on the Chelatchie Prairie and on the Fifth Plain area between Camas and Battle Ground.

Irrigation in Clark County, as in most of western Washington, has increased very rapidly since World War II. U.S. Bureau of Census reports show 20 farms irrigated 194 acres in 1945. By 1950 the number of irrigated farms had increased to 80, with 1,228 acres under irrigation. (These figures include farms being supplied by water from both surface- and ground-water sources.) Of the 80 farms representing an aggregate of 624 acres, that were irrigated in 1950, 45 were supplied by wells and 8 by springs. Records of the Washington State Department of Conservation show 137 farms with 3,082 acres irrigated from wells in 1955. The increase in irrigation and in use of ground water for irrigation from 1935 to 1955 is shown graphically in figure 40. The map of Clark County, figure 41, shows the locations of 172 irrigation wells. The difference in numbers (137 farms to 172 wells) is due in part to the fact that some farms have more than one irrigation well, but is also due in part to the failure of some farmers to apply for water rights. The total amount of ground water used for irrigation in Clark County is not known but may be about 8,000 to 10,000 acre-feet annually.

The chief source of ground water for irrigation is the gravel of the upper member of the Troutdale formation. More than 110 irrigation wells have been drilled into this unit and yields are as much as 1,000 gpm. Few wells are screened; some are not even perforated, and many are inadequately perforated opposite the aquifer. There is no doubt that many of the wells would yield much larger amounts of water if they were completed with more adequate openings into the aquifer.

At a number of places sand and gravel aquifers in the Pleistocene alluvial deposits supply moderate to large yields of water for irrigation. Most of the wells are shallow dug wells on benches; yields of several hundred gallons a minute have been reported. Most of the irrigation wells drawing water from these deposits are in the area between Burntbridge and Salmon Creeks extending from Felida to Proebstel.

The glaciofluvial deposits underlying Chelatchie and Yacolt Prairies are capable of yielding moderate to large supplies of water for irrigation, although only a few irrigation wells have been constructed in these areas. Seven irrigation wells along the Lewis River and the East Fork of the Lewis River obtain water from the alluvial deposits. Yields of as much as 364 gpm have been reported for wells less than

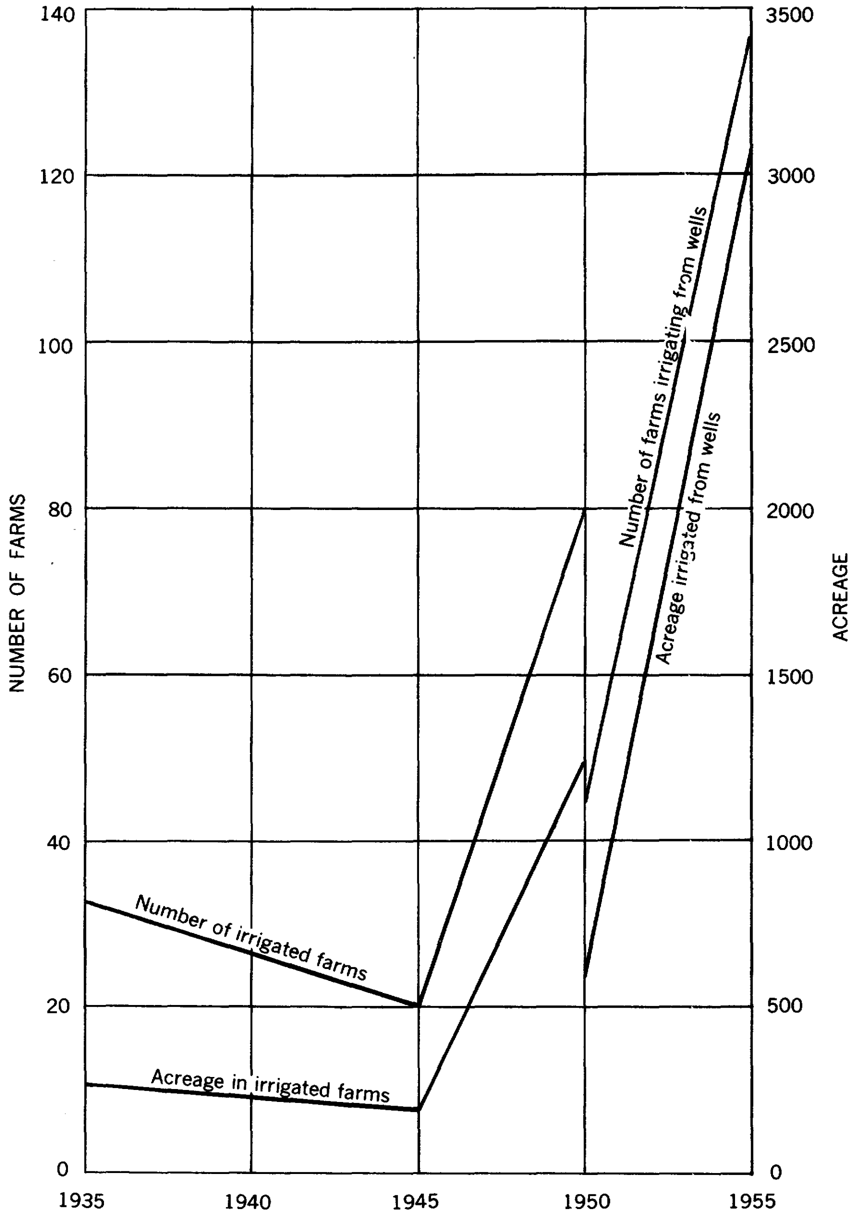

FIGURE 40.—Increase in irrigation in Clark County. (Data for 1935, 1945, 1950 from U.S. Bureau of Census reports. Data for 1955 from Washington Department of Conservation, Division of Water Resources.)

50 feet deep. All these deposits are capable of supplying much more water than is now being withdrawn from them.

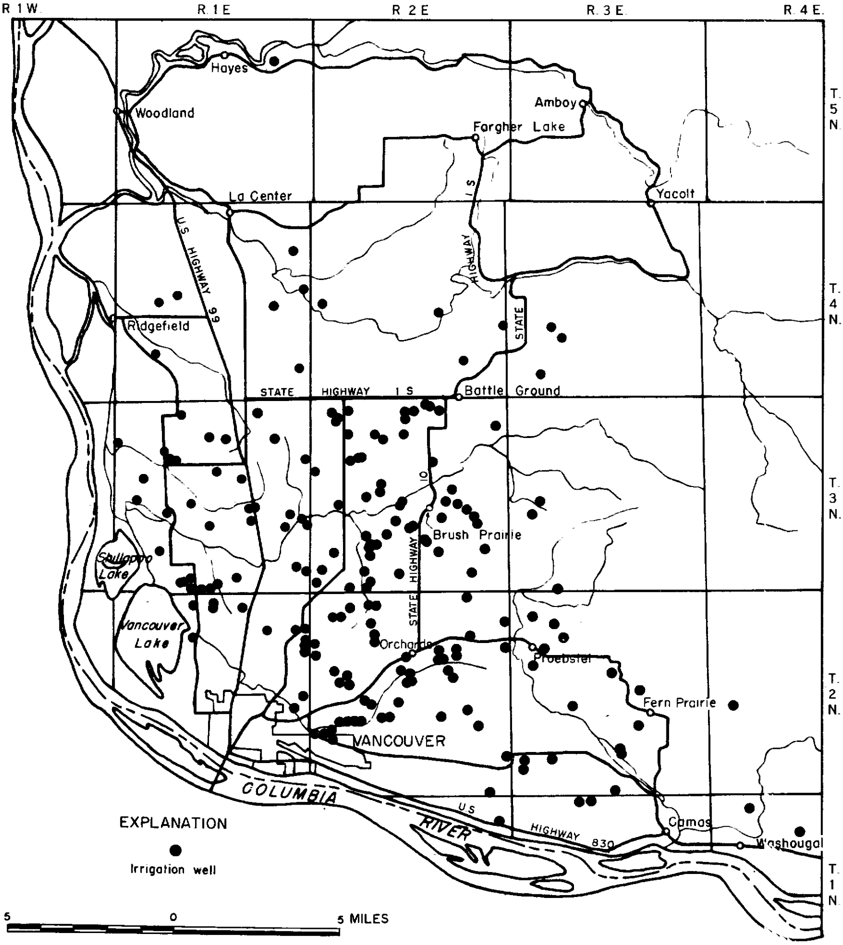

FIGURE 41.—Irrigation wells in Clark County.

DEVELOPMENT OF GROUND-WATER SUPPLIES

Many wells in Clark County yield less water than the owner or user wants and needs. Many others that yield the needed amount do so only at the expense of a large drawdown which results in increased pumping costs. Probably the majority of wells that are inadequate could have produced an adequate yield if they had been properly constructed and developed. Good well construction is based on a clear understanding of what happens in the aquifer in the vicinity of the pumped well.

WELL HYDRAULICS

The general principles governing the occurrence of ground water were given in a previous section of the report (p. 61–65). These principles may be briefly summarized as follows: Ground water occurs in the interstices (openings) of the rocks beneath the earth's surface within the zone of saturation. Where the surface of the zone of saturation is in permeable material and can move up or down depending on recharge from precipitation and on discharge, the surface (as defined by water levels in wells) is termed "the water table." During its travel underground water may pass beneath a layer that is only slightly permeable. If the aquifer beneath this layer is saturated and the water exerts a hydrostatic pressure upward on the base of the confining layer, the ground water is under artesian pressure. If a tightly cased well is drilled into the aquifer, water will rise above the confining layer. The water levels of a number of wells penetrating an artesian aquifer defines an imaginary surface termed the "piezometric surface."

The same principles that govern the movement of water underground, from the area of recharge to the point or area of natural discharge, govern the movement of water to a well when pumping begins. As soon as pumping begins, the water level drops from its static position to a new level (pumping level) which is not fixed, but which continually declines as long as the well is pumped at a constant rate (until a source of recharge is intercepted). Water entering the well flows from all directions toward the well, and because the cross-sectional area through which the water moves is progressively smaller nearer the well, the gradient toward the well is progressively greater. The area in which the water level declines (the area of influence) assumes the shape of an inverted cone (fig. 42). When pumping first begins, the pumping level drops rapidly and the cone of depression expands rapidly. As pumping continues and the area of influence becomes larger, the rate of decline of the water level and of the expansion of the cone of depression becomes much slower. These relations are shown in figure 42. It is obvious that the drawdown in a well is not constant, but continually increases as long as pumping continues at the same rate, until the cone of depression reaches a source of recharge. If the pumping level is held constant before the cone of depression reaches a source of recharge, the discharge rate will then decrease. A common method of comparing the relative water-yielding ability of several wells is to compare their specific capacities. However, the specific capacities determined will vary with the length of time a well is pumped.

WELL CONSTRUCTION

In figure 42 and in the previous discussion, water is assumed to flow into the well without the entrance loss which is generally caused by the presence of a casing or screen; it is assumed the well was drilled

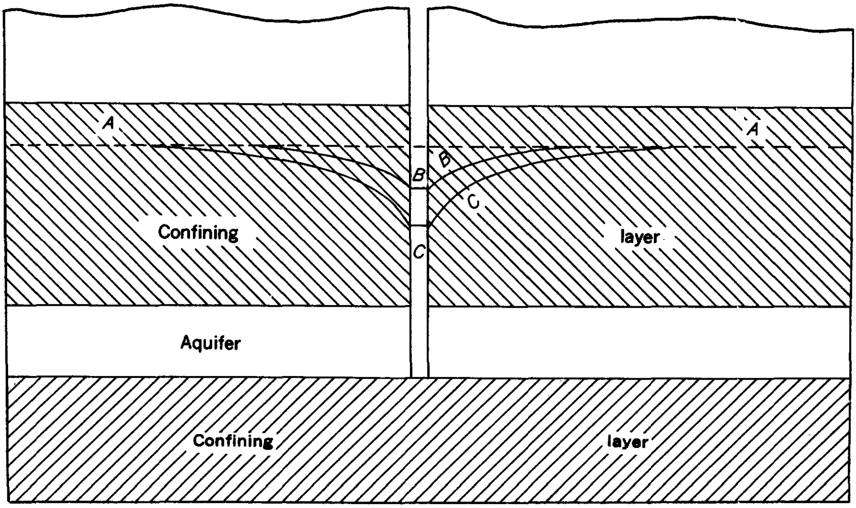

FIGURE 42.—Diagrammatic section showing piezometric surface of an artesian aquifer before and after pumping a well whose casing is perforated through the full thickness of an aquifer. (*A–A'*, static water level or piezometric surface before pumping begins; *B–B'*, water level after pumping one hour; *C–C'*, water level after pumping 10 hours.)

without disturbing the aquifer surrounding the hole, and without the necessity of using a screen or casing. Where the aquifer is consolidated, it may be possible to construct such a well, but in Clark County where the aquifer nearly always consists of loose or only slightly consolidated sand or gravel, a slotted casing or screen is needed to keep the well open and still permit water to enter. Ideally, a casing should hold back the formation without interfering appreciably with the flow of water into the well. With the proper type of well construction and development, this objective can be approached; however, it is unfortunate that, because of improper construction and development, many wells have a low efficiency. Many wells fail to yield the required amount of water because of excessive drawdown due to entrance loss; others that yield sufficient water do so only because the drawdown is much greater than it should be, and this results in increased pumping costs. Many wells, because the openings into the casing are inadequate to permit free entrance of water into the well, will yield only 10 or 20 percent of the water that the aquifer is capable of delivering to them. This is particularly true of wells that draw all their water through the open bottom of the casing, or through an inadequate number of perforations, as illustrated in figures 43 and 44. Where an open casing is used, water must not only converge radially towards the well, but must also converge vertically toward the bottom of the casing. For example, in an aquifer 10 feet thick penetrated by a well 8 inches in diameter, the surface area of

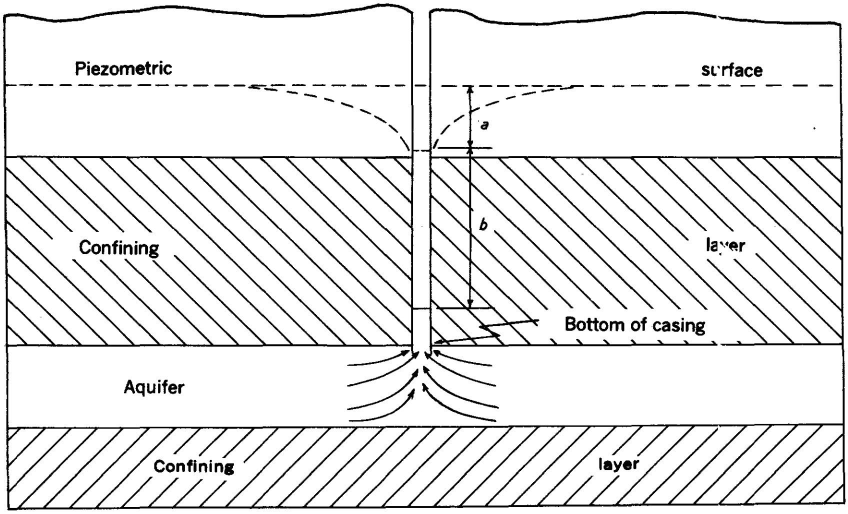

FIGURE 43.—Diagrammatic section showing drawdown in a pumped well into which water can enter only through the open end of the casing. (*a*, drawdown in aquifer; *b*, drawdown due to entrance loss into casing because of convergence of flow lines toward the open end of the casing.)

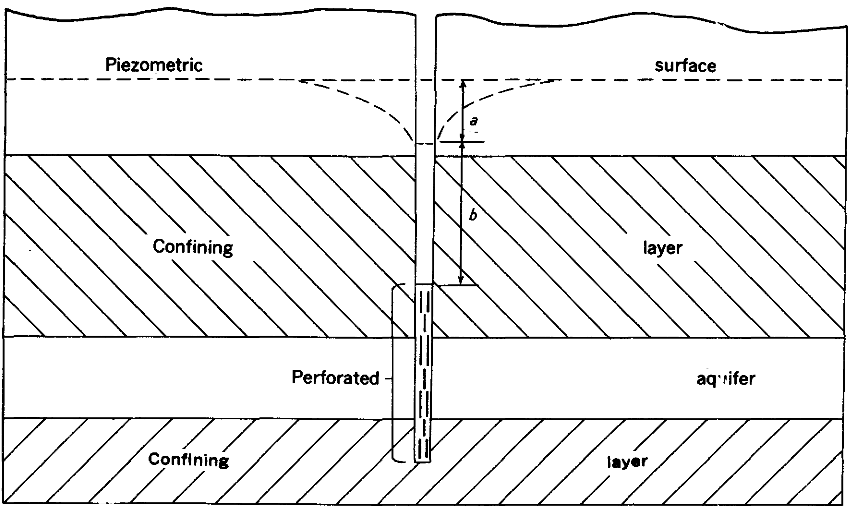

FIGURE 44.—Diagrammatic section showing drawdown in a pumped well having insufficient number of perforations opposite aquifer. (*a*, drawdown in aquifer; *b*, drawdown due to entrance loss into casing because of convergence of flow lines toward the slots (fig. 45). More than half the perforations are in nonproductive zones.)

the well bore adjacent to the casing is 21 square feet, which is the area through which the water would enter if there were no casing to impede the flow of water into the well. With only the bottom of the casing open, the water must flow into the well through an area of only 0.35 square foot, less than 2 percent of the area of water-bearing formation that would be open to the well under ideal conditions.

In wells having perforated casings the number and spacing of perforations vary a great deal. A common arrangement is a row of 6 to 8 perforations around the circumference, one row per foot of casing. A common size of perforation is ⅜ by 1½ inches. In an aquifer 10 feet thick this spacing gives a total of only 60 to 80 perforations, each having an area of slightly more than one-half square inch. Assuming an area of half a square inch, the total area of perforation would be about one-half square foot, only slightly more area than the open end of an 8-inch casing. Actually, the jagged slot left by most perforators is somewhat less than the nominal size. The head loss due to convergence of water toward these scattered openings (as illustrated in fig. 45) is very great. Very often perforated casing is set opposite non-water-yielding materials; although the total area

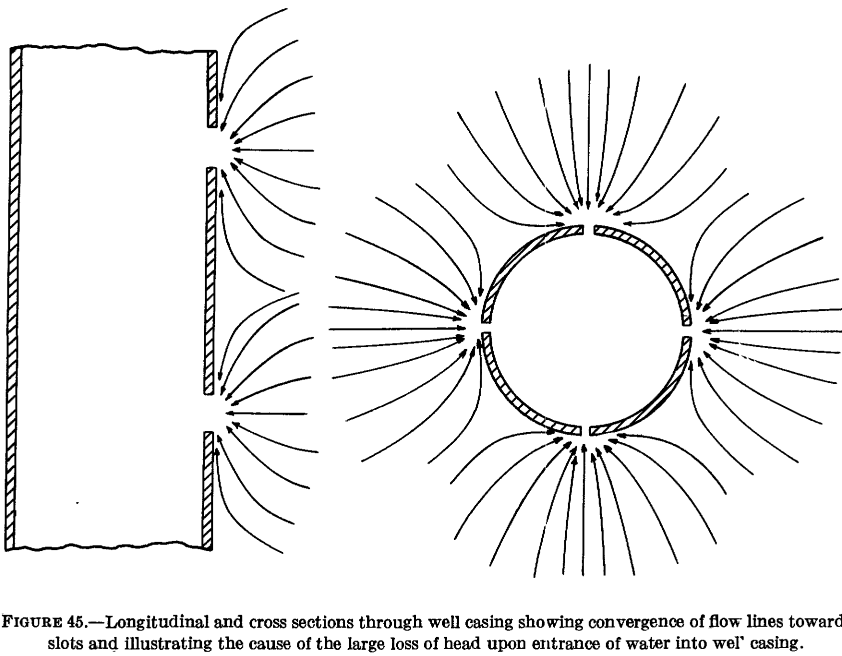

FIGURE 45.—Longitudinal and cross sections through well casing showing convergence of flow lines towards slots and illustrating the cause of the large loss of head upon entrance of water into well casing.

of perforation may appear to be large in such wells, the effective area actually is very much smaller.

With sand-size materials, maximum yields can be obtained by use of a screen of the proper size. General practice now is to use a size of opening that will permit passage of the finer grained 60 to 80 percent of the material into the well. Development of the well by surging, bailing, pumping, or by other means washes the finer grains into the well where they are removed and leaves a coarser and much more permeable sand zone surrounding the screen. With wire-wound screens, a type very commonly used, the width of the wire is about the same regardless of the width of opening or space between each turn. Thus the ratio of opening to total area of the screen varies almost directly as the slot size. Table 12 gives the approximate open area for well screens of various slot sizes.

TABLE 13.—*Relation of open area of screen to well diameter and slot size*

[Adapted from Edward E. Johnson Catalog 148]

Well diameter (inches)	Slot size					
	10	20	40	60	80	100
	Open area of screen, in square feet per 10-foot length of screen					
6	1.475	2.68	4.53	5.90	6.93	7.75
8	1.96	3.57	6.03	7.85	9.27	10.33
10	2.48	4.52	7.67	10.00	11.73	13.08
12	2.95	5.35	9.07	11.80	12.07	13.75
14	3.46	6.30	10.67	11.90	14.20	16.08

Perforated casings are used instead of screens only when the granular material is coarse. Slots cut with a casing knife generally are 3/8 inch wide or wider. Preperforated slots are usually cut in widths ranging as low as 1/8 inch. The width of slot probably should be of a size that will retain about 20 to 40 percent of the grains. The number of perforations should be the maximum number that can be cut without rupturing the casing, especially if the aquifer is thin. Generally preperforated casing allows a larger area of opening per square foot than can be attained with a casing knife after the casing is in place. Where the aquifer is thin, use of preperforated casing is especially advantageous. Table 14 gives approximate open area for various arrangements of perforations.

TABLE 14.—*Open area of perforations in well casings*

Casing, inside diameter (inches)	Open area of perforations, in square feet per 10-foot length of perforated casing					
	Preperforated casing, 1/4x6 inches, one row per foot		Knife-cut perforations, 3/8x1 1/2 inches			
			Slots spaced 6 inches between centers, around casing		Slots spaced 3 inches between centers, around casing	
	Slots spaced 2 inches between centers around casing	Slots spaced 4 inches between centers around casing	one row per foot	Two rows per foot	One row per foot	Two rows per foot
6	1.04	0.52	0.11	0.22	0.22	0.44
8	1.35	.68	.16	.32	.32	.64
10	1.66	.83	.19	.38	.38	.76
12	2.08	1.04	.23	.46	.46	.92
14	2.45	1.23	.27	.54	.54	1.08
16	2.81	1.41	.31	.62	.62	1.24

WELL DEVELOPMENT

After the well is drilled and the screen set or the casing perforated, the well is developed to remove the finer grained materials in the aquifer adjacent to the well. This generally has two beneficial results: (a) the specific capacity of the well is increased by increasing the transmissibility of the aquifer in the immediate vicinity of the well, and (b) the finer particles, which might have injured the pump if they had remained to be pumped out during operation of the well, are removed. Development of the well is usually accomplished by surging, bailing, or pumping and backwashing. Surging is usually done by fastening a tight-fitting plunger to the drill stem so that water is alternately drawn from and forced back through the screen (or perforations) into the formation as the plunger is churned up and down. The material close to the well is kept agitated and the finer particles are drawn into the well. These settle to the bottom of the well, from where they are removed by bailing. Rapid bailing in itself serves to some extent to agitate the fine-grained materials and to draw them into the well, but generally bailing is not as effective as surging. In the pumping and backwashing method the pump is operated momentarily to draw water in through the screen; it is then shut off to allow the water in the pump column to surge back down the well. This method is most effective when the tail pipe is opposite the aquifer.

GLOSSARY

Aquifer. A formation, group of formations, or part of a formation that is water bearing (Meinzer, 1923b, p. 30).

Area of influence. The area beneath which ground-water or pressure-surface contours are modified by pumping (Tolman, 1937, p. 557).

Base flow. The discharge entering stream channels from ground water or other delayed sources (Am. Soc. Civil Eng., 1949, p. 106).

Base flow recession curve. On a hydrograph, that part of the descending limb from the point of inflection to the time when direct runoff has ceased (Am. Soc. Civil Eng., 1949, p. 55).

Coefficient of permeability. The rate of flow of water, in gallons a day, through a cross-sectional area of 1 square foot under a hydraulic gradient of 100 per cent at a temperature of 60° F. (Stearns, 1928, p. 148).

Coefficient of storage. The volume of water of a certain density released from storage within the column of aquifer underlying a unit surface area during a decline in head of unity (Jacob, 1940, p. 573).

Coefficient of transmissibility. The number of gallons of water which will move in 1 day through a vertical strip of the aquifer 1 foot wide and having the thickness of the aquifer when the hydraulic gradient is unity. The coefficient of transmissibility quantitatively describes the ability of the whole aquifer to transmit water (Theis, 1935). In this report, to compute the coefficient of transmissibility, water-level and yield data were analyzed by using the nonequilibrium formula of Theis (1935) and the graphical solutions of Cooper and Jacob (1946). The formulas used are:

$$T=\frac{528Q\log_{10}\frac{r^2}{r^1}}{s_1-s_2}=\frac{528Q}{\Delta s}$$

and

$$S=\frac{0.3Tt}{r_0^2}$$

where:

T = the coefficient of transmissibility, in gallons per day per foot
S = the coefficient of storage
Q = the discharge of the pumped well, in gallons per minute
Δs = the change in drawdown, in feet per log cycle
t = time since pumping began, in days
r = distance, in feet, of observation point of drawdown from center of pumping
r_0 = distance, in feet, at which drawdown is zero

Consumptive use. The quantity of water transpired and evaporated from a cropped area or the normal loss of water from the soil by evaporation and plant transpiration (Blaney, 1951a).

Cone of pressure relief. An imaginary surface indicating pressure-relief conditions in a confined aquifer due to pumping or during well flow (Tolman, 1937, p. 58–59).

Drawdown. Lowering of the water level in a well caused by pumping (Tolman, 1937, p. 558).

Ground water. That part of subsurface water which is in the zone of saturation (Meinzer, 1923a, p. 38–39).

Hydrostatic pressure. The pressure exerted by the water at any given point in a body of water at rest. That of ground water generally is due to the weight of water at higher levels in the same zone of saturation (Meinzer, 1923b, p. 37).

Hydraulic gradient. A profile showing the static level of water at all points on the profile. Hydraulic gradient of ground water records the head consumed by friction of flow between any selected points on the profile. For percolating water the slope is expressed by h/l where h is the difference in elevation between any two points and l is the distance between them. The water table registers the hydraulic gradients of free ground water, and the pressure surface those of confined water (Tolman, 1937, p. 560).

Isohyetal line. An isohyetal line, or an isohyet, is a line on a land or water surface along which all points recieve the same amount of precipitation (Meinzer, 1923b, p. 15).

Juvenile water. Water that is derived from the interior of the earth and has not previously existed as atmospheric or surface water (Meinzer, 1923b, p. 31).

Permeability. The volume of a fluid of unit viscosity passing through a unit cross section of the medium in unit time under the action of a unit-pressure gradient (Muskat, 1936).

Piezometric surface of an aquifer. An imaginery surface that everywhere coincides with the static level of the water in the aquifer (Meinzer, 1923b, p. 39).

Sodium-adsorption-ratio. A ratio for soil extracts and irrigation water used to express the relative activity of sodium ions in exchange reactions with the soil complex—all concentrations of ions expressed in equivalents per million (U.S. Salinity Laboratory Staff, 1954, p. 156).

$$SAR=\frac{Na^{+}}{\sqrt{\frac{Ca^{+2}+Mg^{+2}}{2}}}$$

Specific capacity. The discharge of a well expressed as rate of yield per unit of drawdown, generally gallons a minute per foot of drawdown (Tolman, 1937, p. 563).

Specific yield. The quantity of water that a formation will yield under the pull of gravity if it is first saturated and then allowed to drain; the ratio, expressed in percent, of the volume of the water to the total volume of the formation that is drained (Stearns, 1928, p. 144).

Stillstand. To remain stationary with respect to sea level or to the center of the earth (Merriam-Webster, 1952, p. 2477).

Transpiration. The quantity of water absorbed by the crop and transpired and used directly in the building of plant tissue, in a specified time. It does not include soil evaporation (Blaney, 1951b).

Vadose water. Water in the zone of aeration (Meinzer, 1923b, p. 22).

Zone of aeration. The zone in which the interstices of the functional permeable rocks are not filled (except temporarily) with water. The water is under pressure less than atmospheric (Meinzer, 1923b, p. 21).

Zone of saturation. The zone in which the functional permeable rocks are saturated with water under pressure equal to or greater than atmospheric (Meinzer, 1923b, p. 21).

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BASIC DATA

TABLE 15.—*Records of representative wells in Clark County, Wash.*

[Locations of wells are shown on pl. 3]

Topography: Ba, basin; Fp, flood plain; H, hill; S, slope; T, terrace; Ub, upland bench; Uc, upland channel; Up, upland plain.
Altitude (approximate): Land-surface datum at well from barometric traverses or interpolated from topographic maps.
Type of well: Bd, bored; Dg, dug; Dn, driven; Dr, drilled.
Depth of well and casing: Recorded to nearest whole foot below land surface. Query indicates uncertainty on part of informant.
Water level: Measurements are in feet below land-surface datum. Those measurements expressed in feet and decimal fractions of feet were made by the Geological Survey; measurements recorded to nearest whole foot were reported by owner, tenant, or driller. The dates of such measurements often are not known. A flowing well whose static head is known has "+" preceding the water level indicating static head in feet above land-surface datum. A flowing well whose static head is not known is indicated by "Flows."
Type of pump: C, centrifugal; J, jet-centrifugal; N, none; P, lift or jack (plunger); Sc, screw; Sub, submersible; T, deep-well turbine.
Use of water: D, domestic; De, destroyed; Ind, industrial; Inst, institutional; Irr, irrigation; NU, not in use; PS, public supply; S, stock.
Remarks: Most of information reported by driller or owner. C, comprehensive chemical analyses in table 18; Cp, partial chemical analyses in table 19, dd, drawdown; gpm, gallons per minute; L. log in table 17; Temp, Temperature in ° F.

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 1 N., R. 2 E.																
1G1	Gus Bekter	Up	270	Dg	53						48.1	4-5-49	N			
1G2	do	Up	270	Dr	243	4				Sand (?)	198		P	¾	D	Sand at bottom caves occasionally. Cp.
1K1	Fisher Grange	S	230	Dr	145	6				Gravel, cemented.					Inst	L.
1L1	R. I. Madison	S	210	Dg	33	30					15.5	4-4-49	P	⅓	D	Cp.
1Q1	E. A. Scott	S	185	Dr	142	4				Gravel and boulders.			T	5	D, Irr	Cp.
1R1	Mrs. Julia Brown	S	210	Dg	18	60				do	8.4	6-2-49	C	½	D	Very large boulders of Boring lava, only slightly water worn, exposed nearby. Large supply of water reported.
2B1	Charles E. Runyan.	S	260	Dr	88	6	84(?)			Sand and gravel.	58		J	1	D	L.
2B2	Guy Wilson	S	247	Dr	72	6	60(?)	58	2	Sand	57.8	10-3-50			D	Large supply reported at 60 ft. but well deepened later.
2G1	K. R. Steen	S	190	Dr	35	4				Gravel	32	10-3-50	J	⅓	D	
2Q1	J. W. Barnes	T	40	Dr	112	6				do			P	¾	D	
2Q2	Bob Eldred	S	110	Dr	61	6				do			J	½	D	

3E1	G. C. Dowd	T	34	Dr	46	6	46	44	2	Sand, black	26	------	J	¾	D	Bailer test, "no" dd. L.
3F1	John Emory	T	65	Dg	12	24	12(?)	------	------	------	10	------	J	½	D	
3G1	State Trout Hatchery.	T	60	Dr	75	6	------	------	------	------	35	------	------	------	D	Cp.
3K1	S. Unander	T	44	Dr	55	6	55	26	29	Gravel	24	------	------	------	D	Bailer test, 2-ft dd. L.
4A1	R. Roberts	S	170	Dr	61	6	61	52	9	do	46	------	J	⅓	D	Bailer test, 3-ft dd. L.
4A2	Vraspir	Up	180	Dr	50	6	------	28	22	do	28	------	J	⅓	D	Pumped 20 gpm, "no" dd.
4B1	S. A. Warner	T	89	Dr	49	6	49	------	------	------	29	------	J	1	D	
4B2	do	T	110	Dr	53	6	------	------	------	Gravel	35	------	P	½	D	
4B3	Louis Cannell	T	115	Dr	55	6	53	50	5	Sand, black (and gravel?).	18	------	J	------	D	Bailer test, "no" dd. L.
4C1	H. B. Stapleton	T	110	Dr	34	6	34	24	10	Sand and gravel.	13	------	J	½	D	Bailer test, 12-ft dd. L.
4C2	R. Farmer	T	100	Dr	66	6	55	61	5	Gravel	33	------	J	1	D	Bailer test, 12-ft dd. L.
4D1	B. L. Mitts	S	88	Dr	82	6	------	------	------	do	53.2	10- 2-50	J	¾	D	Cp.
4D2	A. J. Witchell	T	92	Dr	114	6	114	95	11	Sand and gravel.	60	------	J	------	D	Bailer test, 25 gpm, 15-ft dd. L.
12D1	A. L. Karnath	T	100	Dg	62	------	------	------	------	Gravel	56	------	J	½	D	
T. 1 N., R. 3 E.																
1B1	H. A. Hewett	H	425	Dr	157	6	------	------	------	------	------	------	J	------	D	Well deepened from 28 ft.
1B2	R. G. Knutsen	H	430	Dr	157	6	157	150	7	Gravel	20	------	P	1	D	Clay and sand to 110 ft, clay and gravel from 110 to 150 ft.
1B3	Woodburn School.	Up	365	Dr	65(?)	6	------	------	------	Rock(?)	------	------	J	¾	Inst	Clay, pebbles, and quicksand to 60 ft; solid brown rock breaking in square pieces from 60 to 80 ft. Well filled to 65(?) ft.
1H1	Ray DeBoever	H	510	Dr	110	6	------	70	40	Rock	------	------	Sc	3	D, S	Reported to yield 35 gpm.
3D1	Paul Rainey	S	420	Dr	255	6	------	250	5	do	232.59	4-29-49	P	½	D	Cp.
3M1	Ray Brown and others.	H	710	Dr	798	6	385	------	------	Volcanic rock.	500	------	P	5	D	Supplies three families. Cp, L.
4C1	Harry Brietbarth	Up	295	Dr	220	8	220	140	35	Gravel	112	May 1953	T	20	Irr	Yield 550 gpm, 18-ft dd. L.
4D1	Chares Farrell	Up	285	Dg	15	48	------	------	------	------	2.63	4-21-49	------	------	------	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 1 N., R. 3 E.—Con.																
4F1	Camas Dairy Farm.	S	360	Dg, Dr	225	6				Gravel, cemented.	178.26	4-29-49	P	2	D, S	Rock ledge from 40 to 80 ft.
4G1	John Schick	S	370	Dg	25	48				do	20		N	D		
4L1	L. Fischer	S	395	Dr	225	6				Gravel, cemented.	180		P	1	D	Water reported to come from cemented gravel below rock ledge.
4R1	E. J. Lewis	H	725	Dg	20	96				Clay	9.17	4-20-49	P	¼	D	
5A1	Don Rainey	Up	272	Dr	190	8	190	158	32	Gravel, cemented.	50	January 1952	T	10	D, Irr	Pumped 125 gpm, 135-ft dd. L.
5C1	Webberly	Up	290	Dr		6							N			
5L1	A. L. Summers	Up	325	Dr	55	6				Gravel	10		J	¼	D	Penetrated boulders.
5M1	K. L. Edwards	Up	300	Dr	185	6							J	3	D	
5Q1	Andy Baker	S	480	Dr	392	6				Rock	300		P	2	D, S	Penetrated volcanic rock at 26 ft. Can be pumped dry.
5Q2	do	S	380	Dr	210	10				Gravel, cemented.	95	July 1954	P	2	D, S	Supplies one home and 30 head of stock.
6C1	Emil Myer	Up	270	Dr	95	4					86.40	4-28-49	J	¾	D	
6K1	Ray Arvidson	Up	250	Dg	30	30	30			Sand and gravel.	22		C	½	D	
6L1	O. Arvidson	Up	260	Dr	142	6				Gravel			P			
6M1	R. G. Tuttle	Up	240	Dr	135	6-4	135	130	5	do	118		P	1	D	Hard cemented gravel at 40 and 90 ft.
6M2	E. R. Colby	Up	245	Dr	134	6	134	128	6	do	120				D	Bailer test, 8-ft dd. L.
8B1	Walter Houston	H	540	Dr	402	6		25	377	Rock			P	3	D	Clay from 0 to 25 ft, rock from 25 to 402 ft. Supplies 10 families. C.
8B2	R. B. Johnston	H	490	Dr	390(?)					do			P	1	D	
8J1	Riverview School	S	390	Dr	375	6				do						Clay from 0 to 10 ft, red-rock from 10 to 120 ft, gray rock from 120 to 375 ft.

9C1	Roy Gordon	Up	640	Dr	185	6	-------	-------	-------	Gravel, weathered.	-------	-------	-------	-------	-------	
9D1	T. L. McDonough	H	545	Dr	515	6	-------	-------	-------	"Sandstone"	125(?)	-------	P	2	D	
9D2	C. Hein	Up	535	Dr	398	6	70	385	-------	Rock, creviced,	385	Oct. 51	P	1½	D	Bailed 20 gpm for 4 hrs no detectable dd. L.
9F1	Pete Hansen	H	505	Dr	225	6	-------	-------	-------	Clay(?)	163	4-21-49	P	-------	D	
10D2	W. G. Powell	H	715	Dr	242	6	240	-------	-------	-------	239	-------	N	-------	NU	L.
11J1	Crown-Zellerbach Corp., well 1.	T	50	Dr	90	12	90	50	40	Gravel	32.5	5- 8-39	T	100	Ind	Pumped 1,700 gpm, 5-ft dd. L.
11J2	Well 2	T	50	Dr	88	16	88(?)	53	27	do	44	11-19-39	T	125	Ind	Pumped 2,000 gpm, 4-ft dd. L.
11J3	Well 3	T	50	Dr	91	16	90	43	39	do	35	5-12-40	T	125	Ind	Pumped 2,300 gpm, 5-ft dd. L.
11J4	Well 4	T	50	Dr	88	18	88(?)	37	43	Gravel, some sand.	40	2-28-46	T	150	Ind	Pumped 2,000 gpm, 9-ft dd. L.
11J5	Well 5	T	50	Dr	83(?)	18	83	45	-------	Gravel	37	4-22-46	T	150	Ind	Pumped 2,600 gpm, 7-ft dd.
11J6	Well 6	T	50	Dr	90	18	90(?)	40	50	do	21	6-21-46	T	150	Ind	Pumped 2,400 gpm, 8-ft dd. L.
11J7	Well 7	T	50	Dr	88	18	88(?)	36	52	do	36	11- 2-46	T	150	Ind	Pumped 2,400 gpm, 11-ft dd. L.
11J8	Crown-Zellerbach Corp.	T	40	Dr	140	18-12	140	-------	-------	do	47	-------	-------	-------	Ind	Pumped 1,220 gpm, 7-ft dd. L.
12K1	Columbia Water Co., well 4.	T	50	Dr	101	12	101(?)	33	61	Gravel and sand.	33	7-10-47	T	50	PS	Pumped 1,000 gpm, 36-ft dd. L.
12K2	Well 5	T	50	Dr	101	12	101(?)	-------	-------	do	-------	-------	-------	-------	PS	Pumped 1,200 gpm, 10-ft dd.
12M1	City of Camas	T	50	Dr	80(?)	-------	-------	-------	-------	Gravel(?)	-------	-------	T	120(?)	PS	
12M2	do	T	35	Dr	80(?)	12	-------	-------	-------	do	-------	-------	T	150(?)	PS	
12M3	do	T	35	Dr	78	14	78	47	23	Gravel	42	-------	T	100	PS	Pumped 1,800 gpm, 7-ft dd. L.
12M4	Crown-Zellerbach Corp.	T	35	Dr	66	18	66(?)	31	31	Gravel and sand.	6	3-25-46	N	-------	De	Pumped 2,100 gpm, 23-ft dd. Reported to yield river water. L.
12M5	Crown-Zellerbach Corp.	T	35	Dr	131	18	122	-------	-------	Gravel	-------	-------	-------	-------	Ind	Pumped 2,100 gpm, 4-ft dd. L.
T. 1 N., R. 4 E.																
2E1	H. J. Kyes	H	775	Dg	50	36	50(?)	-------	-------	Sand	23.6	7-20-49	N	-------	-------	
2E2	do	H	775	Dg	14	-------	-------	-------	-------	Sand, red	11	-------	J	½	D	
2M1	E. Bailey	H	760	Dg	31	24	31(?)	-------	-------	Clay	23.7	7-20-49	J	¼	D	Cp.
3B1	J. B. Knight	H	800	Dg	24	-------	-------	-------	-------	Rock	20.8	do	J	½	D	Pumped 36 hr, "no" dd. Cp.
3C1	P. Murray	H	750	Dg	38	48	38(?)	-------	-------	Clay	27.7	do	N	-------	D	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 1 N., R. 4 E.—Con.																
3K1	S. Brandt	H	700	Dg	63		0			do	43.7	7-20-49	N		D	
4F1	H. C. Young	H	565	Dr	150	6				Gravel	40		P	1	D	Pumped 3 hrs at 16 gpm, 20-ft dd. Cp.
4N1	R. P. Sumner	S	310	Dr	84	6				Rock	39		J	½	D	
5E1	Richard Beaver	H	440	Dr	122	6	24	98	24	Rock, hard	30	July 52	T	5	Irr	Pumped 50 gpm, 85-ft dd. L.
6C1	J. S. Robson	Ub	480	Dr	113	6				Gravel, cemented.			P	¾	D	Plenty of water reported.
6D1	George Stewart	Ub	480	Dg	19	36	19			Quicksand	8.83	6-1-49			D	Do.
7A1	Mike Wilsey	S	150	Dr	72	6				Shale	10		J	⅓	D	Soft blue shale reported from 35 to 72 ft.
8E1	S. Thrall	T	53	Dg	24	30	24(?)			Gravel	18.6	7-21-49	P	¼	D	
8K1	Columbia Water Co., well 1.	T	90	Dr	142	12	142(?)	65	37	do			T	40	PS	Pumped 750 gpm, 5-ft dd. L.
8K2	do	T	90	Dr	140	12-10				do			T	30	PS	
8K3	do	T	90	Dr	140	12				do			T	40	PS	
8K4	do	T	90	Dr	109					do					NU	Abandoned, not enough water. L.
9B1	E. L. Eldridge	Ub	240	Dr	180	10	180	165	15	Sand and gravel.	110		T	15	Irr	Pumped 225 gpm, 40-ft dd. L.
9E1	L. Wilson	T	130	Dr	90	6	85	80	10	Sand	51		J	1	D	Bailer test, "no" dd. L.
9L1	S. W. Coumans	T	100	Dr	84	6	84	80	4	Gravel	46		J	½	D	Bailer test, "no" dd. L.
11B1	A. R. Hilton	H	765	Dr	96	6					56		P	⅓	D	
12A1	C. H. Byrum	H	860	Dg	42	48(?)				Sand	27.1	7-21-49	P		D	
14A1	A. Rasmor	H	570	Dg	80					Gravel, cemented.	60		J	½	D	Cp.
14C1	G. L. Jensen	Ub	506	Dg	45					do	41.1	7-21-49	P	½	D	
14H1	C. H. Wright	Ub	510	Dg	30					do	26.8	do	P	½	D	
15H1	V. H. Keller	S	300	Dr	151	6				Gravel	140		P	1	D	
16H1	T. Kerr	T	45	Dr	41	6	40	39	2	Sand, black	4				D	Bailer test, "no" dd. L.
24D1	Walter Nydegger	Fp	45	Dr	67	6		64	3	do			J	2	D	Cemeted gravel from 20 to 64 ft, sand 64 to 67 ft.

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24F1	H. Knight	Fp	45	Dg	17	30	17	----		Gravel	15.3	7-21-49	P	¼	D	Pumped 1 hr, 1½-ft dd. Cp.
24G1	A. F. Moon	T	95	Dr	94	6	14	----		Gravel, cemented.	----	----	J	½	D	
T. 2 N., R. 1 W.																
12R1	Fred Niday	Fp	20	Dr	272	6	272	----		----	----	----	N	----	De	Abandoned; quicksand. L.
T. 2 N., R. 1 E.																
1A1	F. W. Hunter	Up	275	Dg	38	12	----	----		Sand	18	----	C	----	D	
1J1	L. L. Davenport	S	275	Dg	26	30	----	----		Gravel	15	----	C	¼	D	Cp.
1P1	H. R. Robinson	Up	275	Dg	33	10	----	----		do	19.4	4-20-49	C	½	D	
2A1	J. M. Roberts	Up	220	Dg	26	----	----	----		Sand	22	----	J	⅓	D	Cp.
2K1	R. Clauson	Up	220	Dg	48	30	----	----		do	32	----	P	¾	D	Cp.
2M1	E. Nylander	Up	230	Dg	31	----	----	----		do	22	----	P	----	D	
2P1	Gus Hockinson	Up	230	Dr	176	6	176	----		Sand, black	130	----	----	----	----	Bailer test, "no" dd. L.
3D1	M. Resch	Up	220	Dr	157	6	----	----		Gravel	80(?)	----	P	1	D	
3E1	Orion W. Wiedman.	Up	220	Dr	159	6	154	154	----	Sand	136	----	----	----	D, Irr	Bailer test, 12½ gpm. L.
3E2	Floyd W. Loomis	Up	220	Dr	148	6	148	138	10	Gravel	136	----	----	----	D, Irr	Report "no" dd. L
3G1	L. Andreason	Up	190	Dr	200	6	----	----		----	70	----	P	----	D	
3H1	Harry O. Anderson.	Up	225	Dg	25	36	25	10	15	Sand	9	7-10-52	----	----	D, Irr	Yield 5 gpm, 6-ft dd.
3M1	L. Eaten	Up	215	Dr	132	----	----	----		Rock(?)	120	----	P	1	D	
4F1	W. Stark	Up	200	Dr	210	6	----	----		Sand	180	----	P	2	D	
4F2	R. B. Jamison	Up	210	Dr	214	6	209	209	5	Gravel	168	----	T	3	D, Irr	Bailer test, "no" dd. L.
4G1	L. Dietrich	Up	215	Dr	180	6	----	----		do	150	----	P	1	D	Cp.
4G2	Forest Chisholm	Up	220	Dr	160	6	148(?)	148	12	Gravel, cemented.	148	----	P	½	D	
9A1	W. E. Edmiston	Up	160	Dr	130	6	----	----		Sand	100	----	P	1	D	Pumped 12 hrs, "no" dd.
9B1	H. Cross	S	110	Dg	10	48	----	----		do	3	----	C	¼	D	
9F1	E. G. Keaton	T	52	Dr	125	6	----	----		Gravel	----	----	J	½	D	
9F2	Fruit Valley Nursery.	Fp	45	Dr	112	6	112	35	77+	Sand and gravel.	40	October 1950	T	5	Irr	Pumped 80 gpm, 20-ft dd. L.
9Q1	C. L. Firestone	T	35	Dg	37	6	----	----		Sand	10	----	J	½	D	
10A1	T. Mortendyke	Up	205	Dr	139	6	139	136	3	Sand, black	123	----	J	5	D(?)	Bailer test, "no" dd. L.
10B1	H. Hedin	Up	190	Dn	25	1(?)	----	----		Sand	18	----	C	⅛	D	
10C1	O. Kellet	Up	220	Dr	165	6	----	----		do	143	----	J	2	D	
10K1	R. V. Rankin	T	185	Dg	27	36	27	----		do	18	----	C	¼	D	Cp.
10K2	L. A. Hinkle	T	170	Dr	123	6	123	115	8	Gravel	105	----	J	----	D	Pumped 10 gpm. L.
10Q1	E. McCall	T	170	Dr	135	3(?)	----	----		do	----	----	P	----	D	
10Q2	J. Voeller	T	180	Dr	168	6	16	154	14	Sand, black	123	----	J	⅛	D	Bailer test, 10-ft dd. L.
11A1	J. H. Higgenbottom.	Up	238	Dg	36	36	----	----		do	24	----	J	⅛	D	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 2 N., R. 1 E.—Con.																
11B1	SW. Wash. Experiment Station.	Up	258	Dr	255	12	255	225	13	Sand and gravel.	160.62	12-14-55	T	------	Irr	Pumped 625 gpm, 2-ft dd. L.
11C1	Clark County PUD 1.	Up	228	Dr	198	10	198(?)	147	47	Gravel	119	------	T	------	PS	Pumped 380 gpm, 47-ft dd. C,L.
11C2	Clark County PUD 1, well 2.	Up	225	Dr	211	10	211(?)	155	50	Gravel	120	------	------	------	PS	Pumped 460 gpm, 19½-ft dd. L.
11C3	Well 3	Up	228	Dr	223	10	223(?)	148	73	do	------	------	------	------	PS	Pumped 479 gpm, 45-ft dd. L.
11C4	Well 4	Up	235	Dr	221	16–12	221	190	30	Sand and gravel.	134.60	4-13-56	------	------	------	Pumped about 1,000 gpm, with 48-ft dd. L.
11D1	H. Moor	Up	210	Dg	272	4(?)	------	------	------	Sand, black	7.1	5-25-49	J	⅛	D	Cp.
11E2	R. F. Mahan	Up	320	Dr	211	6	209	204	7	Gravel	191	------	------	------	D	Bailer test, "no" dd L.
11H1	S. M. Cummings	S	260	Dg	53	18	------	------	------	------	35	------	J	3½	D	Cp.
12A1	C. F. Larson	Up	280	Dg	50	48	------	------	------	------	35	------	J	¼	D	
12A2	F. Welch	Up	280	Dg	37	6	------	19	18	Sand	19.0	7-1-49	T	¼	Irr	Operates six 7.5-gpm sprinklers.
12A3	Floyd Welch	Up	270	Dr	45	6	45	22	23	Sand, fine	22	------	------	------	Irr	Pumped 4 hrs at 80 gpm. L.
12B1	M. J. Morse	Up	270	Dr	46	8	46	------	------	------	16	------	J	3	Irr	L.
12F1	C. A. Whitcomb	Up	260	Dg	20	12	------	------	------	Sand	3.0	4-8-49	C	2	------	
12G1	W. T. Sjostrand	Up	275	Dg	24	36	------	------	------	------	8	------	P	------	D	
12H1	C. Copeland	H	280	Dg	46	6	------	------	------	Gravel	37	------	J	¾	D	
12H3	Clarence Copeland	H	285	Dg	30	36–12	30	15	15	Sand, black	15	------	C	3	Irr	Pumped 50 gpm. 6-ft dd. L.
12J1	C. S. Barker	H	270	Dg	22	36–12	22	7	15	do	7	------	C	3	Irr	Pumped 50 gpm, 8-ft dd.
12J2	M. A. Curtin	H	270	Dr	47	12–11	47	32	13	Sand, black	8	------	------	------	Irr	Pumped 140 gpm, 12½-ft dd. L.
								45	2	Sand, red.						
13A1	R. W. Anderson	Up	275	Dg	18	30	18	------	------	Gravel	9.8	4-7-49	------	------	------	
13K1	H. W. Brodes	S	265	Dg	27	30	27	------	------	do	23	------	N	------	------	
13P1	M. T. Seldy	Up	240	Dg	26	36	------	------	------	------	16	------	P	------	D	
13P2	D. H. Moreland	Up	230	Dg	20	30	------	------	------	------	9.9	4-6-49	N	------	------	
14C1	E. Osborn	S	210	Dr	200	6	------	------	------	Gravel	138	------	J	2	------	Cp.

14P1	Jarvis	S	95	Dr	107	6	107	98	9	Sand, black	82					Bailer test, "no" dd L.
15G1	R. D. Spencer	S	63	Dg	26	36	26			Gravel	22.3	5-24-49	N			
15Q1	City of Vancouver	T	214	Dr	278	18	278	202	76	Sand and gravel	204		T		PS	Pumped 2,000 gpm, 13-ft dd. L.
16B1	Fred Koerner	T	70	Dr	142	6	142	139	3	Gravel	57		J	½	D	Cp, L.
16C1	John E. Duggan	T	35	Dr	211	8	208	204	7	Sand, black			J	1	D, S	Bailer test, "no" dd. L.
16K1	T. White	T	40	Dr	67	6	67	63	4	Gravel	42		J	1	D	Bailer test, 9-ft dd. L.
16P1	Chester Nelson	T	40	Dr	56	6	56	35	21	do	33					Bailer test, 5-ft dd. L.
18P1	Aluminum Co. of America well 1.	Fp	28	Dr	134	12	134	114	11	Gravel and sand.	22		T	75	Ind	Pumped 1,200 gpm, 10-ft dd. L.
18P2	Well 6	Fp	28	Dr	135	20	135	113	7	Gravel	26		T	300	Ind	Pumped 3,000 gpm, 20-ft dd. L.
18P3	Well 7	Fp	28	Dr	137	20	137	109	9	do	25		T	300	Ind	Pumped 3, 000 gpm, 16-ft dd. L.
18P4	Well 10	Fp	32.5	Dr	133	16	133	130	12	Sand and gravel.	22	May 1950.	T		Ind	Pumped 1,500 gpm 5-ft dd. L.
18P5	Well 11	Fp	32.7	Dr	133	15	133	130	11	do	19	do	T		Ind	Pumped 150 gpm, 3-ft dd. L.
18P6	Well 16	Fp	31.6	Dr	160	24	118	156	34	do	26	October 1954.	T		Ind	Pumped 3,000 gpm 3-ft dd. L.
18P7	Aluminum Co. of America.	Fp	32	Dr	150	6		145	5	do	30				NU	Test well; "no" dd. after pumping 1 hr at 30 gpm. L.
18R1	Bonneville Power Administration.	Fp	27	Dr	140	10	140	117	15	Gravel	21.4	9-16-40	T		Ind	Pumped 300 gpm, 4-ft dd. L.
19A1	Aluminum Co. of America well 14.	Fp	34.4	Dr	119	16	119	103	16	Sand and gravel.	19	May 1953.	T		Ind	Pumped 1,500 gpm, 2½-ft dd. L.
19A2	Well 15	Fp	32.7	Dr	130	16	130	108	22	do		June 1953.	T		Ind	Pumped 1,500 gpm, 2-ft dd. L.
19B1	Aluminum Co. of America well 2.	Fp	30	Dr	136	12	136	120	8	Gravel	26		T		Ind	Pumped 1,100 gpm, 4-ft dd. C, L.
19B2	Well 3	Fp	30	Dr	138	12	138	120	10	do	28.5		T	60	Ind	Pumped 850 gpm, 9-ft dd. L.
19B3	Well 4	Fp	28	Dr	111	12	111	91	20	do	21		T	60(?)	Ind	Pumped 1,200 gpm, 3½-ft dd. C, L.
19B4	Well 5	Fp	28	Dr	122	12	122	96	21	do	25.5		T	50	Ind	Pumped 1,200 gpm, 5-ft dd. C, L.
19B5	Well 8	Fp	30	Dr	114	19	114	91	16	Sand and gravel.						Pumped 1,100 gpm, 7-ft dd.
19B6	Well 9	Fp	30	Dr	136	19-12	136	121	11	do	22					Pumped 1,100 gpm, 9-ft dd.
19B7	Well 12	Fp	31.6	Dr	116	12	116	98	18	do	20	April 1952	T		Ind	Pumped 1,100 gpm, 2-ft dd. L.
19B8	Well 13	Fp	29.2	Dr	117	12	117	99	18	do	19	do	T		Ind	Pumped 1,100 gpm, 2-ft dd. L.
21A1	S.P. and S. R.R. (Roundhouse).	S	65	Dr	130	18	130	111	19	Gravel	60		T	40	Ind	Pumped 800 gpm, ½-ft dd. L.
21C1	Malcolm Johnson	T	45	Dg, Dn	40	48-2	40			do	36.26	4-6-49	N		NU	Dug 18.6 ft; driven point in bottom.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 2 N., R. 1 E.—Con.																
21C2	Federal Housing Authority, well 11.	T	48	Dr	151	12	151	71	56	do	35	-----	T	50(?)	PS	Pumped 1,000 gpm, 34-ft dd. Cp, L.
21F1	Well 10	T	48	Dr	128	12	128	50	78	do	32	-----	T	50	PS	Pumped 1,000 gpm, 8-ft dd. L.
21G1	Ervin J. Dell	T	48	Dg, Dr	60	20–6	60	-----	-----	do	42.18	4- 8-49	N	-----	NU	Hydrograph.
21N1	Carborundum Co.	Fp	33	Dr	95	18	71	67	28	do	29.5	-----	T	-----	Ind	Pumped 1,600 gpm, 1½-ft dd. L.
21N2	do	Fp	33	Dr	105	18	105	84	21	do	22	-----	T	-----	Ind	Pumped 1,540 gpm, 1½-ft dd. L.
21N3	S. P. and S. R.R.	Fp	30	Dr	100	18(?)	-----	-----	-----	do	-----	-----	T	20	Ind	
23K1	Clark County Shop.	T	190	Dr	225	8(?)	-----	-----	-----	do	-----	-----	T	7½	Ind	Cp.
23Q1	City of Vancouver, well 1.	T	175	Dr	250	16	250	188	32	do	168	1938	T	150	PS	Pumped 2,000 gpm, 4-ft dd. L.
23Q2	City of Vancouver.	S	182	Dg, Dr	238	48–18	238(?)	-----	-----	Gravel	-----	-----	T	75	PS	Dug to 160 ft; drilled to 238 ft.
23Q3	Well 3	S	223	Dr	280	16	280	225	48	Gravel and sand.	216	-----	T	-----	PS	Pumped 2,000 gpm, 4-ft dd. L.
23Q4	Well 4	S	185	Dr	243	18	243	190	44	do	169	-----	T	-----	PS	Pumped 2,000 gpm, 4-ft dd. L.
23R1	Well 5	S	185	Dr	240	14–10	240	192	40	do	178	-----	T	100	PS	Pumped 1,200 gpm, 3½-ft dd. L.
24A1	T. G. Foster	Up	240	Dg	28	36	28	-----	-----	Sand	19	-----	C	1½	D, Irr	Irrigates one-half acre.
24C2	R. Bowen	S	215	Dr	139	6	135	-----	-----	do	89	-----	P	1	-----	
24D1	Fred Clinski	S	190	Dg	22	48	22	-----	-----	do	10.7	4- 6-49	J	¾	-----	
24G1	W. C. Goheen	S	135	Dg	12	30	-----	-----	-----	Gravel	6	-----	C	¾	-----	
24K1	Vancouver School District 37.	S	170	Dr	167	10	167	129	38	do	71	November 1955	-----	-----	Irr	Pumped 300 gpm, 50-ft dd. L.
26G1	City of Vancouver.	T	138	Dr	165	12	-----	-----	-----	do	-----	-----	N	-----	PS De	Formerly pumped 1,440 gpm.
26G2	State Blind School.	T	160	Dr	220	12	-----	-----	-----	do	-----	-----	T	-----	Inst	Cp.
27F1	County Courthouse.	S	70	Dr	111	8	111	-----	-----	do	-----	-----	T	-----	Inst	
27H1	Clark Co. PUD no 1.	S	95	Dr	144	10	144	119	21	Sand and gravel.	98	September 1955	-----	-----	Ind	Pumped 600 gpm, 3.5-ft dd. L.

27H2	do	S	95	Dr	137	10	137	120	13	do	91	do			Ind	Pumped 650 gpm, 3-ft dd. L.
27L1	Interstate Brewery Co.	Fp	40	Dr	108	8(?)	108(?)	80	23	do	35		T	50	Ind	C, L.
27L2	do	Fp	40	Dg, Dr	98	8(?)	98(?)			do			T	38	Ind	C.
27M1	Columbia River Paper Mills, well 6A.	Fp Fp Fp	25 25	Dr	70	16	70			Gravel			T	75	Ind	
27M2	Well 2	Fp	25	Dr	90	16	90			do			T	75	Ind	
27M3	Well 3		25	Dr	90	16	90			do			T	75	Ind	
27M4	Well 4			Dr	90	16	90			Gravel			T	75	Ind	
27M5	Well 5	Fp	25	Dr	90	16	90			do			T	100(?)	Ind	
27M6	Well 6	Fp	25	Dr	75	12	75			do			T		Ind	
27M7	Well 7	Fp	28	Dr	150	26-20	150	4	109	do	22		T	200	Ind	Pumped 4,600 gpm, L.
27M8	Well 8	Fp	28	Dr	137	26		50	62	do	22		T	200	Ind	Do.
28G1	Great Western Malting Co.	Fp	28	Dr	105	10	105			do	26.53	3-16-49	T	20		
28G2	do	Fp	28	Dr	119	12	119	60	58	do	30		T	75		Perforated from 70 to 116 ft. Pumped 4 hrs at 800+ gpm, "no" dd.
28G3	Port of Vancouver Terminal 2.	Fp	28	Dr	80	18				do	28				NU	Pumped 2,000 gpm, 8¾-ft dd. Cp, L.
28G4	Great Western Malting Co.	Fp	30	Dr	115	18	114	40	65	do	25				Ind	Pumped 900 gpm, 2-ft dd.
28G5	Port of Vancouver	Fp	28	Dr	110	18				do			T		Ind	Pumped 2,000 gpm.
28G6	do	Fp	28	Dr	100	18				do			T		Ind	Pumped 2,000 gpm. Supplies Vancouver Plywood Co.
28J1	Vancouver Ice & Cold Storage Co.	Fp	20	Dr	82	6				do	20(?)		T	7½		Pumped 150 gpm, "no" dd. Water gets muddy in spring when river rises.
28J2	Dubois Lumber Co.	Fp	20	Dg	32	36				do						Water level reported to rise and fall with river.
35F1	Buffalo Electro-Chemical Co.	Fp	30	Dr	160	26	143	15 71	50 29	Gravel and sand.	25				Ind	Pumped 1,200 gpm, 90-ft dd. L.
35F2	do	Fp	29.2	Dr	160					do	12	7- 4-51				Test well. L.
35F3	do	Fp	30	Dr	96	26	96	26 63	30 33	Sand and gravel.	27	10-12-51	T	350	Ind	Pumped 8 hrs at 4,000 gpm, 3-ft dd. L.
35F4	do	Fp	30	Dr	85	26	85	25 63	29 18	do	27	11- 7-51	T	350	Ind	Pumped 8 hrs at 4,000 gpm, 4-ft dd. L.
36B1	City of Vancouver, well 1.	T	48	Dr	132	12	132	45	87	Gravel and sand.	37	7-23-42	T	150	PS	Pumped 1,000 gpm, 17-ft dd. L.
36B2	Well 2	T	54	Dr	130	12	120	60	70	do	44	8- 2-42	T	150	PS	Pumped 1,000 gpm, 5-ft dd. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 2 N., R. 1 E.—Con.	City of Vancouver—Con.															
36B3	Well 3	T	52	Dr	128	12	128	80	48	Gravel	44.5	8- 8-42	T	150	PS	Pumped 1,000 gpm, 4-ft dd. L.
36B4	Well 4	T	56	Dr	130	12	130	65	65	Sand and gravel.	49.34	3-29-49	T	150	PS	Pumped 1,000 gpm, 5-ft dd. L.
36B5	Well 5	T	50	Dr	124	12	124	69	55	Gravel	39	8-24-43	T	100	PS	Pumped 1,000 gpm, 17-ft dd. L.
36B6	Well 6	T	52	Dr	122	12	122	77	45	do	50.92	4- 6-49	T	100	PS	Pumped 1,000 gpm, 18-ft dd. L.
36B7	Well 7	T	45	Dr	129	12	126	84	42	do	39.31	4- 6-49	T	100	PS	Pumped 1,000 gpm, 16-ft dd. L.
36B8	Well 8	T	55	Dr	127	20	127	92	35	do	53		T		PS	Pumped 1,000 gpm, 19-ft dd. L.
T. 2 N., R. 2 E.																
1D1	J. D. Tyler	Up	278	Dg	37	6	37(?)				23.8	4-14-49	J	1/3	D	
1F2	A. Germain	Up	265	Dr	64	6				Gravel	41		J	1/4	D	
1G1	F. Leslie	Up	258	Dg	24	6				do	8		J	1/4	D	Cp.
1H1	Jack Unruh	Up	255	Dr	31	6				do	9		J	1/3	D, S	Irrigates garden.
1N1	S. C. Nielson	Up	255	Dg	22					do	17.4	4-14-49	C	1/4	D	Goes dry in September.
1R1	H. R. Siegburg	Up	240	Dr	84	8		60	24	Gravel and sand.	13.5		T	2	Irr	Pumped 37 gpm, 32-ft dd. L.
2A1	R. Massey	Up	280	Dg	21	36				Gravel	16		P	1/4		
2B1	R. L. and F. E. Divine.	Up	280	Dr	128	6	128			Sand, black	58		J	1½	D, Irr	Bailer test, 50-ft dd at 27 gpm. L.
2C1	O. J. Lougheed	Up	283	Dr	120	6				Gravel	45		J	1		Cp.
2F1	C. Sample	Up	272	Dg	16	48				do	11.2	4-15-49	P			
2J1	E. Skeeters	Up	265	Dg	21	30					14.6	4-14-49	J	1/3		Cp.
2Q1	C. L. Engle	Up	252	Dr	73	6	73	71	2	Sand, black	49		J	1/4		L.
2Q2	J. Norby	Up	253	Dr	71	6	70	68	3	do	32		J	1/2		Bailer test, 13-ft dd. Cp. L.
3A1	Earl Simpson	Up	278	Dg	43	48				Sand	40		P			
3B1	E. Anderson	Up	270	Dg	70	24				do	66		J	1/3		
3D1	C. V. Dunn	Up	262	Dr	69	10				Gravel	59		J			Cp.
3E1	A. Barnes	Up	262	Dr	96	3				Sand	51		P	3/4		
3F1	W. Myers	Up	264	Dr	142	6	142	138	4	Gravel	87					Bailer test, 20-ft dd. L.

3J1	H. Wilson	Up	262	Dr	73	6				do	48		J	½		Cp.
3N1	Vancouver Municipal Airport.	Up	250	Dr	129	6	129	120	9	do			J	¾	D	L.
3R1	H. S. Fenton	Up	245	Dr	145	6	145	142	3	Sand, black	78		J	3		Bailer test, 11-ft dd. L.
4D1	W. C. Schmidt	Uc	218	Dr	89	6				Gravel	65		J	¾		
4E1	Ed Drasler	Uc	208	Dr	76	6	76	73	3	do	26		J	¼	D, S	Bailer test, "no" dd. L.
4G1	A. Martin	Up	230	Dg	21	36				do	16.4	4–19–49	C	¼		Cp.
4G2	J. Kindsfather	Up	232	Dr	87	6	87	85	2	do	51		J	¾		Bailer test, 19-ft dd. L.
4G3	Alvin Bunch	Up	235	Dr	105	5	105	102	3	do	45		J	½	D	L.
4M1	A. Koski	Uc	205	Dg	30	32				do	22		J	½		Cp.
4N1	E. Hilberg	Uc	211	Dr	93	6	93	90	3	Sand	50		P	½		Bailer test, 16-ft dd. Cp, L.
4Q1	O. Peters	Uc	220	Dg	24	48				Gravel	19		J	⅓		
5E1	L. E. Nevill	Up	250	Dg	18	36				do	14		C	⅓		
5G1	C. Hilberg	S	221	Dg	13	36				Sand, black	6		P	¼		Cp.
5G2	H. I. and J. L. Sneed.	Up	198	Dr	99	8–6	99	97	2	Sand and gravel.	38.6	September 1953	T	5		Pumped 60 gpm, 2.3-ft dd. L.
5H1	H. C. Lloyd	Up	202	Dg		36	27	25	2	Sand	20	October 1953				Pumped 40 gpm, 5½-ft dd. L.
5K1	E. A. Keranen	Up	210	Dr	86	6	86	79	7	Gravel	51		J	1½	D, Irr	Pumped 25 gpm, little dd.
5P1	A. Menger	Uc	252	Dr	100	6				do			J	½		
5Q1	A. P. Bomber	Up	238	Dr	143	6	143	115	29	do	67		Sub		D, Irr	Pumped 50 gpm, 48-ft dd. L.
6A1	Elmer Christiansen.	Up	242	Dg	22	12	22(?)			Clay(?)	8		J	¼		Pumped 10 gpm, "no" dd.
6C1	S. E. Heston	Up	260	Dg	23	48				Sand	8		P	¼		Cp
6E1	Mrs. B. Maxwell	Up	270	Dg	32	10	32(?)			do	8		C	¼		
6G1	F. D. Frazer	Up	265	Dr	135	6				Sand, black	110		J	1½		Cp.
6J1	P. Christensen	Up	260	Dr	133	6	130	130	3	Sand	101	April 1949	T			Bailer test, "no" dd. L.
6K1	W. Hamburg	Up	260	Dr	156	6	156	142	14	Sand and gravel.	90		Sc	2	D, S, Irr	Irrigates 1½ acres. Pumped 25 gpm, 8-ft dd. Cp.
7C1	G. S. Kelly	Up	300	Dg	55	36				Sand	43		P	½	D	
7D1	Nels Carlson	Up	290	Dr	174	6	168	172	2	Gravel	130		P	½	D	Bailer test, "no" dd. L.
7D2	O. Brekke	Up	288	Dr	174	6	173	169	5	do	137		P	1	D	Bailer test, "no" dd Cp. L.
7G1	W. White	Up	305	Dg	49	36				Sand	40.7	4– 8–49	J	½	D	
7J1	Joe J. Shefchek	Up	265	Dr	30	12				Gravel	24		P	¼	D	
7J2	C. Shefchek	H	301	Dr	90	12				Sand	60		J	½	D	
7K1	O. R. Wood	Up	265	Dg	20	30				Gravel	16		P	⅓	D	
7L1	G. E. Sellman	S	290	Dg	32	30				Sand	24		J	¾	D	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 2 N., R. 2 E.—Con.																
7M1	W. A. Lindeman	H	290	Dr	48	12	48	14	34	do	4		C	12	Irr	Pumped 145 gpm, 20-ft dd. L.
7N1	J. J. Fox	Up	265	Dr	32	5				Gravel	14		P	¼	D	
7N2	J. A. Dennis	Up	270	Dg	21	60–27		10	12	Sand	15.54	4–24–51	C		D. Irr	Clay from 0 to 10 ft. sand from 10 to 22 ft. well filled to 21 ft. Pumped 14 gpm, 6-ft dd.
7R1	L. H. Runger	Up	295	Dr	54	30				Gravel and sand.	36	do	J	½	D	
8A1	A. W. Farmer	Uc	215	Dg	18	36				Sand	10		J	½	D	
8A2	Kenneth Menger	Up	225	Dr	168	6	168	166	2	Sand and gravel.	48		T	7½	Irr	Pumped 125 gmp, 64 ft dd. L.
8B1	E. Podhora	Up	240	Dg	12	30				Sand	9		P		D	
8B2	A. W. Clark	Up	230	Dr	145	6	143	143	2	Sand, black	98(?)		J	1	D	Bailer test, 8-ft dd. L.
8B3	E. Podhora	Up	245	Dr	133	6				Gravel	53		J	1	D	
8H1	H. E. and R. L. Schultz.	Up	225	Dr	126	6	126	85	41	Sand and gravel.	48	April 1955	T	7½	Irr	Pumped 154 gpm, 32-ft dd. L.
8J1	Jack Klineline	Up	255	Dg	33	8					16		J	½	D	
8L1	G. E. English	Up	275	Dr	210	6							P	1	D	
8M1	W. V. Slothower	Up	268	Dg	12	36				Sand	9		P	¼	D	
8N1	M. O. Elgin	Up	292	Dr	49	8				Gravel	37		J	½	D	
8N2	Walnut Grove School.	Up	290	Dr	208	6	203	195	13	do	135				Inst	Bailer test, 17-ft dd. L.
8Q1	C. L. Harris	Up	275	Dg	40	30				Sand	15		J	1	D	
9A1	W. G. Holzhauer	Uc	220	Dg	38	32				Gravel	23		J	1	D	
9D1	J. B. Coffield	Uc	213	Dr	117	6		108	9	do	47		J	1	D	Cp, L.
9D2	T. Blair	Uc	220	Dg	27	36				do	23		J	½	D	
9D3	Frank Houn	Uc	215	Dr	92	6	92	87	5	do			J		D	Bailer test, "no" dd. L.
9E1	C. W. Deming	Uc	225	Dr	151	6				do	63		J	½	D	
9F1	B. L. Rushing	Uc	215	Dr	140	6				Sand			P	¾	D	
9G1	Thomas Morton	Uc	217	Dg	32	36				Gravel	29		P	¼	D	Cp.
9G2	Ed Ferguson	Uc	215	Dg	30	12				do	18		J		D	
9J1	H. D. Peden	Uc	220	Dr	60	6	60	56	4	Gravel	30		J	⅓	D	Bailer test, 11-ft dd. L.
9K1	M. Scherdnik	Uc	225	Dg	35	30					27.5				D	

9K2	H. C. Carter	Uc	218	Dr	130	6	130	125	5	Sand, black	65		J	1	D	Bailer test, 16-ft dd. L.
9K3	C. H. Cooper	Uc	220	Dr	124	6				Sand	50		J	½	D	
9M1	Jay Turbush	Up	231	Dr	140	6	140	139	1	Sand, black	70		J	½		Bailer test, 16-ft dd. Cp. L.
9N1	H. Rice	Up	235	Dg	29	30					24.4	4-11-49	J	⅓	D	Cp.
9P1	L. M. Smith	Up	236	Dr	102	6				Gravel			J	½	D	Cp.
9Q1	W. T. Rhinehardt	Up	232	Dg	78	30				do	70		P	¾	D	Cp.
9R1	Schlitz and Stotts	Uc	220	Dr (?)	85	6(?)				Gravel (?)			J	3	PS	Well number refers to two identical wells 20 ft apart; water supply for Orchards.
9R2	C. L. Lewis	Uc	220	Dr	76	6	76			Gravel	51		J	1	D	
9R3	M. C. Blair	Up	225	Dr	89	6	88	65	23	do	65		T	3½	Irr	Pumped 50 gpm, "no" dd. L.
10A1	W. J. Fleming	Up	240	Dr	52	6				Sand	40		J	½	D	
10B1	F.L. McElkest	Up	245	Dr	97	6					40		J	½	D	
10D1	L. V. Whatley	Uc	221	Dr	94	6	94	82	12	Sand, black	58		J	1½		Bailer test, "no" dd, Cp, L.
10D2	R. Britzman	Uc	215	Dg	29	48				Gravel	25		J	⅓	D	
10F1	R. E. Watzig	Uc	217	Dr	81	6	81	75	6	Gravel (?)	59		J	1½	D	Bailer test, "no" dd.
10H1	Carl Leho	Uc	222	Dg	16	6				Gravel	6		J	¼	D Irr (?)	
10H2	E. Seastrom	Up	225	Dn	65	36				Sand	55		J	½	D	Cp.
10J1	M. L. Rogers	Uc	209	Dr	57	6	57			Gravel	47		J	½	D	
10J2	John R. Harding	Uc	215	Dg	14	48		9	7	Gravel, fine	12		C	3	Irr	Pumped 100 gpm, little dd.
10K1	W. E. Hanson	Uc	215	Dg	25	36				Gravel	16		P	¼	D	
10K2	W. H. Joines	Uc	215	Dr	78	6	78				63		J	½	D	Bailer test, 15-ft dd.
10L1	Wilson Worley	Uc	218	Dr	69	6	69	67	2	Gravel	39		J	½	D	Bailer test, 10-ft dd. Supplies 5 families, 2 stores. L.
10L2	C. A. Larson	Uc	218	Dr	64	6	64	58	6	do	50		J	½	D	Bailer test, "no" dd. Cp, L.
10L3	F. H. Baker	Uc	218	Dr	63	6	62	58	5	Sand, black	51½		J	1	D	Bailer test, "no" dd. L.
10M2	O. H. Snyder	Uc	220	Dr	66	6	66	63	3	Gravel	53		J	⅓	D	Bailer test, "no" dd. Cp, L.
10N1	John Feltz	Uc	220	Dg	26	48				do	21.45	3-24-49	C		D	
10P1	F. T. Munroe	Uc	217	Dr	90	6				do	60		P	½	D	
10P2	A. L. Edwards	Uc	215	Dr	64	6	64	50	14	do	59		J	½	D	Bailer test, 7-ft dd. L.
10R2	Stuchini	Uc	203	Dr	75	6	75	70	5	Sand, black	45		J	⅓	D	Bailer test, "no" dd. L.
10R3	J. C. Harding	Uc	205	Dg	10	48		3	7	Gravel	6		C	5	Irr	Pumped 100 gpm, little dd.
10R4	Elmer Yielding	Uc	205	Dg	44	36	44	40	4	Sand and gravel	33	1-20-53		2	Irr	Pumped 4 hrs at 40 gpm, 3-ft dd. L.
11A1	Roy Purdham	Up	245	Dr	120	6				Gravel	30(?)		C		D	
11D1	Frank Johnston	Up	230	Dg	60	30				do	43		J	¼	D	
11D2	G. Abernathy	Up	242	Dr	80	4					35		J	¼	D	Cp.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 2 N., R. 2 E.—Con.																
11E1	R. H. DuPuis	Uc	225	Dg	17	6				Gravel	8		C	¼	D	
11E2	C. Holter	Up	225	Dr	50	6	50	44	6	Sand, black	26.5		J	½	D	Bailer test, "no" dd. L.
11H1	L. A. Webster	Up	220	Dr	40	6	40	40		Sand	20	March 1954			D	Pumped 35 gpm, 5-ft dd.
11J1	George Snyder	Uc	220	Dr	39	6	39			Gravel	16.00	5- 4-49	J	½	D	Bailer test, "no" dd.
11L1	Bill Price	Uc	215	Dg	10	360 by 600 pit				do	0.0	3-22-49	C	7½	Irr	Irrigated 17 acres in 1948.
11P1	C. J. Krout	Uc	200	Dg	12	144 by 240 pit				do			C	7½	Irr	
12D1	George Sprague	Up	252	Dr	57	6	57			Gravel	25		J	½	D	Large supply reported.
12D2	Harold Crooker	Up	252	Dr	53	6	53			do	33		J	¼	D	Large supply reported; water reported to be soft and to contain no iron.
12G1	George Snyder	Uc	221	Dr	75	8					27(?)		P	1½	D, S	Cp.
12H1	D. M. Shattuck	Uc	220	Dr	91	8	90	76	15	Gravel, loose			T	5	Irr	Pumped 230 gpm, 64-ft dd. L.
12J1	Proebstel Community Church	Uc	215	Dr	38	6	35(?)	38	4	Gravel	10.14	5- 4-49			Inst	Pumped 30 gpm, small dd. L.
12N1	S. Hudlicky	Uc	205	Dg	14	24				do	1.5	3-30-49	P	¼	D	
12P1	C. H. Deffenbaugh	Uc	210	Dr	44	6				do	12		J	½	D	
13D1	W. Kunze	Uc	205	Dg	10	96				do	7				Irr(?)	
13D2	D. Kunze	Uc	198	Dr	96	8	96	84	12	do	39		T	5		Bailer test, 9-ft dd Cp. L.
13F1	C. H. Deffenbaugh	Uc	200	Dr	26	5				do	8		J	½	D	
13K2	Stickney Dairy	Uc	220	Dr	90	6				do	45		J	1½	D, S	Cp.
14D1	J. L. Frame	Uc	195	Dr	55	6	55	45	10	Sand	35		J		D	Bailer test, 3-ft dd. L.
14D2	do	Uc	195	Dg	12	144 by 168 pit				Gravel	Near surface		C	7½	Irr	Reported to operate 13 sprinklers.

14F1	Charles Krout	Uc	200	Dg	8	180 by 360 pit				do.	do.		C	5	Irr	Reported to operate 20 sprinklers.
15D1	Alfred Campbell	Uc	215	Dg	14					do.	13.20	3-24-49	P		D	Water temp 49°. Cp.
15L1	C. W. Bristol	Uc	210	Dg	10	12				do.	4.78		J		D	Supplies 3 families.
15M1	S. H. Wright	Uc	205	Dr	97	6	97			do.	30	3-24-49	T	3	Irr	Pumped 40 gpm, 10-ft dd. owner plans to irrigate 8 acres.
15P1	Jacob Dietz	Up	222	Dr	73	6	73	69	4	Sand, black	56.83	do.	J			Bailer test, 8-ft dd Cp. L.
16E2	W. Beerbaum	Up	235	Dg	20	7				Sand	15		P		D	
16G1	D. R. Irving	Uc	230	Dr	87	6				Gravel	62		J	2		Pumped 20 gpm, 5-ft dd.
16G2	do.	Uc	210	Dr	145	8	145	120	25	Sand and gravel.	31		T	10	Irr	Pumped 300 gpm, 41½-ft dd. L.
16H1	C. P. McMillan	Up	200	Dr	86	6	87	58	28	Gravel	43	May 1950	J	1		Pumped 30 gpm, 10-ft dd. L.
16J1	M. M. Van Fleet and Clyde Parker.	Up	205	Dr	71	6	71	70	1	do.	40	January 1953	J	1½		Pumped 23 gpm, "no" dd. L.
16M1	Evergreen Packing Co.	Uc	220	Dr	149	6					130(?)		T	5	Ind	
16M2	R. W. Huffaker	Uc	220	Dg	11	30					6.46	3-24-49	J	¼	D	
16N1	A. J. Kaufmann	Up	263	Dr	200	8	200			Gravel	120	1954	T	10	Irr	Pumped 150 gpm, 8-ft dd. L.
16R1	C. K. Boesch and others.	Uc	205	Dr	76	6		56	20	do.	37.73	3-21-49	J	1¼	D	Supplies seven families.
17B1	C. V. Decker	Up	260	Dg	33	14				Sand	18	4- 4-49	J	½	D	
17C1	C. M. Elgin	Up	265	Dg	40	10				do.	25		J	¾	D	
17D1	M. McCarty	Up	280	Dg	20	30				do.	6		J		D	
17E1	Joe Woody	Up	265	Dg	24	12				Gravel	17		J	½	D	
17E2	E. G. and D. M. McIntosh.	Up	265	Dg	20	14	20	14	6	Sand			C	3	Irr	Pumped 5 hr at 110 gpm, 8-ft dd.
17F1	W. J. Gablehouse	Up	255	Dg	20	48					12		J	¼	D	Cp.
17G1	M. S. Stivison	Up	255	Dg	13	36				Sand	6.0	4-11-49	J	½	D	
17H1	V. G. Stamper	Up	235	Dg(?)	30	8				do.	14		J	½	D	Cp.
17M1	N. G. Nellis	Up	262	Dg	28	12	28				9	August 1952				Pumped 30 gpm, 1-ft dd.
18A1	Frank Lyle	Up	290	Dg	30	36				Sand	24		P	½	D	Cp.
18C1	R. O. Nelson	Up	285	Dr	185	4							P	½	D	
18D1	V. J. Faneuf	Up	270	Dg	16	36					7.1	4- 7-49	C			
18G1	W. F. Kunze	B	280	Dr	35	11	35	10	25	Sand	15	August 1953			D, Irr.	Pumped 60 gpm, 4-ft dd. L.
18J1	G. E. Gould	Up	255	Dg	22	24				Gravel	10		J	⅛	D	
18J2	H. C. Schill	Up	255	Dg	18	12	18	4	9	Sand	4.5	June 1955				Pumped 50 gpm, 8-ft dd. L.
18J3	R. C. Washburn	Up	232	Dg	28	30-8		27	1	Gravel, fine	9.1	7-15-49	C	3	Irr	Pumped 75 gpm, 12-ft dd.
18L1	E. E. Huckins	Up	280	Dg	34	36				Gravel	29.5		P		D	
18L3	Otto Kunze	Up	280	Dg	35	48				Sand	30		J	½	D	Cp.
18N1	David Banning	Up	265	Dg	5	30					1.4	4- 6-49	C	¼	D	Cp.
18P1	G. A. Bouma	Up	255	Dg	14	30					7.42	3-24-49	J	½	D	
18Q1	H. B. Klineline	Up	250	Dr	24	6				Gravel	6		P	½	D	Cp.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 2 N., R. 2 E.—Con.																
18Q3	Perry Casaw	Up	258	Bd	25	------	------	------	------	Sand	18	------	J	¼	D	Cp.
19A1	W. M. Johnston	Up	220	Dg	15	30	------	------	------	Gravel, cemented.	8	------	P	¼	D	
19B1	Harry Sevier	Up	235	Dr	122	6	------	------	------	------	88.34	3-24-49	------	------	------	
19D1	W. M. Aldrich	Up	240	Dr	160	4	------	------	------	Gravel	------	------	P	------	------	Cp.
19F1	A-1 Dairy Farm	Up	210	Dr	117	6	------	------	------	------	------	------	T	5	D, S	
19F2	M. Rossiter	Uc	185	Dr	90	6	------	------	------	Sand	------	------	J	1	D	Cp.
19F3	H. H. Bolton	Uc	185	Dr	64	6	64	58	6	Sand, black	34	------	J	------	D	Bailer test, 3-ft dd. L.
19G2	E. M. Munson	Up	190	Dg	20	36	------	------	------	Sand	12	------	J	¼	D	Cp.
19G3	John Yinger	Up	205	Dr	80	6	64	71	9	Sand and gravel.	52	------	------	------	D	Bailer test, 10-ft dd. L.
19H1	A. F. Lippart	Up	215	Dg	18	36	------	------	------	Gravel	1.64	3-18-49	J	¾	D	
19H2	Mrs. E. L. Stout	Up	215	Dr	93	6	------	------	------	do	------	------	------	------	D	Report plenty of water.
19H3	John Shierman	Up	210	Dr	88	6	87	84	4	Sand, black	33	------	J	½	D	Bailer test, 5-ft dd. L.
19H4	Evergreen Concrete Products Co.	Up	210	Dg	25	30	------	------	------	------	8.78	3-23-49	J	½	D	
19J2	L. W. Sensiba	Uc	215	Dr	80	6	80	78	2	Gravel	45	------	J	------	De	Bailer test, 15-ft dd. L.
19L1	J. W. Bolton	Uc	185	Dr	68	6	68	65	3	Sand	38	------	J	⅛	D	Do.
19M1	Brookside Tile Co.	Uc	180	Dg	18	36	18	------	------	Gravel	10.62	3-18-49	J	2	Ind	Cp.
19Q1	T. Ezetta	Uc	193	Dr	102	6	------	------	------	do	28	------	------	------	D	
19R1	do	Uc	170	Dg	11	60	------	------	------	do	4.56	3-23-49	C	10	Irr	
20A1	Royal Oaks Country Club.	Uc	210	Dr	73	6	------	------	------	------	------	------	J	¾	Inst	Use at club house.
20A2	do	Uc	210	Dr	221	12-10	221	65 172	30 44	Gravel	40.12	3-18-49	T	100	Irr	Pumped 1,000 gpm, 22-ft dd. C.L.
20B2	A. C. Davis	Up	220	Dn	10	¾	10	------	------	Sand	------	------	P	------	D	Water temp 48°.
20D1	M. K. Nagel	Up	215	Dr	75	6	------	------	------	------	------	------	J	1	D,S	
20D2	do	Up	220	Dr	147	10	147	81	66	Sand and gravel.	50	November 1951	T	20	------	Pumped 1,400 gpm, 54-ft dd. L.
20E1	C. Albrecht	Up	207	Dr	59	6	58	58	1	Sand, black	47	------	------	------	------	Bailer test, "no" dd. L.
20J1	B. F. Swift	Uc	180	Dg	22	30	------	------	------	Gravel	11.04	3-23-49	------	------	------	

20M1	Fred Palena	Uc	198	Dr	68	6				Sand or gravel.	40		J		D	
20N1	K. Ono	Uc	170	Dg	12	36	12			Gravel	3.1	3-18-49	C	7½	Irr	Irrigates 12 acres.
20N2	Fred Palena	Uc	170	Dg	15	36				do			C	10	Irr	
20N3	Frank Beccaria	Uc	170	Dg	15	36	15			do	3		C	10	Irr	
20P1	Louie Molinari	Uc	168	Dg	10	72				do	1.74	3-21-49	C	10	Irr	
20P2	W. M. Scoville	Uc	175	Dr	35	6					7.62	3-21-49	J	½	D	Cp.
20P3	Frank Natta	Uc	168	Dg	8	48 by 72	8			Gravel	1.3	3-21-49	C	10	Irr	Irrigates 22 acres.
20Q1	W. M. Scoville	Uc	170	Dg	10	48							N			Owner plans to use for irrigation in 1949.
21A1	L. C. Peterson	Uc	202	Dr	100(?)	6							J	½	D	
21G1	Seth Marion	Uc	203	Dg	15										Irr	Infiltration trench; 50 by 25 ft. Pumped 250 gpm.
21J1	H. Passut	Uc	202	Dr	33	6	33			Gravel			N		NU	Insufficient supply reported. L.
21L1	Seth Marion	Uc	198	Dr	65	6		55	10	do	35		T		D,S	
21M1	S. Shanko	Uc	185	Dr	30	6				Gravel and boulders.	20.7	6-13-49	N		NU	Large supply reported.
21N1	R. A. Laws	S	180	Dr	60	6	60	40	20	Gravel	13	June 1955	T	5	Irr	Pumped 79 gpm, 10½-ft dd. L.
21P1	S. J. Marrion	S	200	Dr	89	8	89	48	41	do	47	November 1954			Irr	Pumped 428 gpm, 23-ft dd. L.
21R1	William Brown	Up	250	Dg	42	36				do	39		J	½	D	
22A1	George Fisher	Up	240	Dr	114	6	58	99	15	do	84		J	1	D	Bauer test, 5-ft dd. L.
22A2	do	Up	243	Dr	65	6	65	56	9	Sand	50		N			L.
22B1	John Jasker	Up	225	Dg	40	30				Gravel	34		P		D	Water temp 49°.
22E1	Alfred Adolfson	Uc	208	Dg	15	30				do	4.65	3-21-49	J		D	Cp.
22F1	W. E. Gamble	Uc	222	Dg	20	30				do	13.36	do	J	¼	D	
22F2	George Waddle	Up	215	Dg	18	30				do	11				D	Plenty of water reported.
22G1	L. A. Barrett	Up	230	Dr	90	6				do			J	1	D	
22J1	Dewey Kitchell	Up	242	Dr	104	6	104	71	33	do	70	April 1950	T	5	Irr	Pumped 90 gpm, 25-ft dd. L.
22L1	C. H. Carlson	Uc	225	Dr	96	6				do			J	1½	D	Good supply reported.
22M1	Fenton Black	Uc	208	Dg	22	30				do	6.64	3-21-49	N			
22M2	C. J. Atkins	Up	235	Dg	25	30				do	19		J	½	D	Cp.
22N1	John Kapitanovich.	Up	240	Bd	24	8				do	19		C	1½	D	
22Q1	W. F. Bennet	Up	290	Dr	115	6				do	91.0	3-29-49	J	½	D	Cp.
23B1	K. A. David	Up	243	Dg, Dr	50	6				Sand	46		J	½	D	Reported to hold up under continuous pumping.
23D1	J. E. Bevins	Up	242	Dg, Dr	57	36-9					45.07	3-24-49	J	½		
23D2	E. M. Henderson	Up	243	Dr	109	6(?)				Gravel	74		J	1	D	
23D3	C. Timmel	Up	244	Dr	103	6	103	101	2	Sand, black	75		J	1	D	Bailer test, 3-ft dd. L.
23E1	H. W. Sherril	Up	238	Dr	99	6	87	97	2	do	74		J		D	Bailer test, "no" dd. Cp, L.
23F1	Ross Tatreau	Up	230	Dg, Dr	45	36-12				Sand	35			¾		
23F2	Lester Courtney	Up	236	Dr	78	6		70	8	Gravel	16(?)		J	⅓	D	Large supply reported. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 2 N., R. 2 E.—Con.																
23G1	R. L. Dewey	Up	240	Dr	127	4	------	------	------	------	67	------	P	------	D, S	
23G2	Mrs. L. E. Olsen	Up	248	Dr	128	8	128	105	15	Gravel	90	July 1952	T	10	Irr	Pumped 4 hrs at 125 gpm, 5-ft dd. L.
23K1	Ross Tatreau	Up	230	Dr	115	6	------	------	------	Sand	53	------	J	------	D, S	Large supply reported.
23M1	George Casteel	Up	240	Dg	50	------	------	------	------	Sand, coarse	47	------	J	¾	D, S	
23N1	A. W. Nelson	Up	300	Dr	160	5	------	------	------	Gravel	------	------	P	1	D	
23P1	Evergreen School	Up	307	Dr	220	8	220	185	35	do	151	------	T	20	Inst	Pumped 250 gpm, 32-ft dd. water temp 52°. L.
24E1	O. H. Stricker	Up	235	Dr	54	6	------	------	------	------	10	------	J	⅓	D	
24E2	W. C. Ireton	Up	236	Dr	47	6	44	44	3	Gravel	32	------	J	⅓	D	Bailer test, 9-ft dd. L.
24F1	L. E. Frohm	Up	245	------	40	4	------	------	------	do	26	------	J	¼	D	
24H1	Charles True	Up	273	Dr	93	6	------	------	------	do	75	------	J	1	D	Bailer test, "no" dd. Cp.
24M1	J. H. Rabbe	Up	256	Dr	118	6	------		------	Sand, coarse	77.52	3–23–49	P	2½	D, S	Large supply reported.
24N1	George Wright	Up	295	Dr	113	6	------	------	------	Gravel	96	------	J	¾	D	
24N2	G. B. Wright	Up	296	Dr	172	6	172	160	12	do	150	August 1955.	------	------	------	Pumped 60 gpm, "no" dd. L.
24P1	Anna Rate	Up	310	Dr	80	4	------	------	------	do	45	------	J	1	D	Cp.
24R1	J. J. Young	Up	285	Dr	91	6	------	------	------	Sand	77	------	J	------	D	
24R2	Ted Miller	Up	279	Dr	87	6	------	------	------	------	73	------	J	1½	D	
25G1	John Hart	Up	295	Dr	165	6	------	------	------	Gravel	125	------	J	1	D	
25H1	Mrs. Esther Holtz	Up	285	Dr	82	6	------	------	------	------	------	------	J	¾	D	Plenty of water reported.
25J1	Alfred Kern	Up	285	Dr	150	6	143	143	2	Sand, black	93	------	J	1	D	Bailer test, 16-ft dd. L.
25L1	G. J. Haagen	Up	300	Dr	160	6	------	------	------	------	140	------	J	2	D	
25R1	R. H. Johnson	Up	295	Dr	197	8	197	152	45	Sand and gravel.	130	------	------	------	D, Irr.	Pumped 150 gpm, 30-ft dd. L.
26D1	T. W. Royston	Up	305	Dr	101	6	------	------	------	Sand	88	------	J	½	D	Cp.
27A1	George Borpasl	Up	305	Dr	130	6	------	------	------	do	113	------	J	½	D	
27D1	M. C. Timmerman.	Up	310	Dr	114	4	------	------	------	Sand and gravel.	100	------	J	¾	D	
27H1	W. L. Tyler	Up	305	Dr	95	5	------	------	------	Gravel	87	------	J	¾	D	

27M1	L. C. Bybee	Up	295	Dr	102	6				Sand and gravel.			J	½	D	
27N1	R. Rosen	Up	300	Dr	170	6				Gravel			J	1	D	Cp.
27N2	J. L. Dyal	Up	305	Dr	186	6							P	¾	D	Cp.
28A1	H. L. Drake	Up	305	Dr	109					Gravel, fine	100.5	3-28-49	J	½	D	
28C1	Seth Marion	Up	298	Dr	178	6					118		P		D	
28E1	C. P. Teske	Up	260	Dr	142	6	142	140	2	Sand, black	124		P	¾	D	Bailer test, "no" dd. L.
28G1	J. T. Livingston	Up	285	Dr	139	4				Gravel, cemented.	103.15	3-25-49	P	¾	D	
28H1	M. D. Nelson	Up	305	Dr	120	6					112		P	¾	D	Cp.
28H2	M. G. Minton	Up	305	Dr	178	4					150		J	1	D	Plenty of water reported.
28M1	H. Siemer	Up	315	Dr	132	8				Gravel	126		P	¾	D	
28M2	W. Preston	Up	315	Dr	180	6	174	161	19	do	174		P	2	D	Bailer test, "no" dd. L.
28N1	R. D. Boley	Up	305	Dg	40(?)	30				do	20.03	3-25-49	N			
28P1	Edger O. Gibson	Up	310	Dr	178	6				do	138		P	1	D	Cp.
28Q1	C. Brenna	Up	305	Dr	130	6				do	108		P	¾	D	
29H1	John Coop	Up	305	Dr	186	6					169.55	3-25-49	P		D	Cp.
29K1	do	Up	305	Dr	176	6				Sand, blue			P	½		
29N1	Federal Housing Authority.	Up	300	Dr	174	6	174			Sand	156		N		De (PS)	
30B1	Pete Caviale	Uc	170	Dr	121	10					4.98	3-23-49	P	7½	Irr	Pumped 100 gpm, 60-ft dd. Not in use, 1949.
30B2	do	Uc	165	Dg	12	48				Gravel	6		C	10	Irr	Pumped 175 gpm, 4½-ft dd.
30C1	Federal Housing Authority.	Uc	185	Dr	300	12-10	300	69 232	3 26	Gravel, cemented.	108			25	NU (PS)	Pumped 275 gpm, 82-ft dd. L.
30D1	Robert Nieman	Uc	170	Dg	22	30	22	22		Gravel	12.85	3-23-49	C	5	Irr	Supplied five 30-gpm sprayers.
30G1	Frank Natta	Up	305	Dr	146	6							P			"First water" reported found at 146 ft.
30J1	Alvin C. Shagren	Up	300	Dr	206	6					194.85	3-25-49	N			
30J2	Bert Anderson	Up	305	Dr	211	6					171(?)		P	2	D	"First water" reported found at 140 ft.
30K1	Park Hill Cemetery.	Up	298	Dr	396	16	284	235 260	13 15	Gravel	194		T		Irr	Pumped 1,000 gpm, 90-ft dd. L.
30Q1	Federal Housing Authority.	Up	295	Dr	257	12							N		NU	Pumped 135 gpm.
31D1	M. Mercer	S	155	Dr	180	6				Gravel	140		J	3		
31J1	F. W. Shannon	S	155	Dr	93	6				do	73		P	¾	D	Cp.
32E1	M. Carson	Up	185	Dr	137	6	132	131	6	Sand, black	122		J	½	D	Pumped 8 gpm, 5-ft dd. L.
32F1	Edward Schwind	Up	280	Dr	193	6	192	177	16	Gravel	166		T	5		Pumped 38 gpm, 3-ft dd. Cp, L.
32F2	do	Up	280	Dr	187	6	187			do	164.5		P	1½		Bailer test, 3-ft dd. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 2 N., R. 2 E.—Con.																
32K1	C. D. Root	S	260	Dg	20	30				do	22.95	3-31-49	C	½		
32M1	Ralph Montag and others.	S	150	Dg	30	12	30					1949	C	3	D, Irr	Pumped 120 gpm, 18-ft dd.
32P1	Dr. H. Leiser	S	135	Dr	100	6					25		J	5	D	
32Q1	Ralph Hahn	S	130	Dr	65	6(?)				Gravel			J	1½	D	
32R1	W. P. Davis	S	155	Dr	86	6				do	63		J	1½	D	
33B1	E. Kunnas	Up	305	Dg, Dr	135	30-6				do	115		J	1	D	Dug to 50 ft.
33H1	L. O. Matchett	Up	300	Dr	125	4				do	119		J	1	D	Cp.
33K1	T. Putnam	Up	295	Dr	160	6	158	154	6	do	149(?)		P	1	D	Bailer test, "no" dd. L.
33R1	C. W. Barrone	S	195	Dr	52	6	51	50	2	Sand, black	15		J	3	D	Bailer test, "no" dd. L.
34B1	A. F. Black	Up	300	Dr	170	6				Gravel	152.5	1946	P	¾	D	
34C1	Groth	Up	310	Dr	171	4					162		T	2	D	
34C2	M. Johnson	Up	310	Dr	135	4				Gravel			P	½		Cp.
34E1	M. H. Simonds	Up	303	Dr	122	4				Sand and gravel.	98		J	¾	D	Supplies 2 families. Cp.
34G1	Nick Stanke	Up	300	Dr	164	6				Sand			J	1½	D	
34G2	O. C. Tangermann.	Up	300	Dr	175	6					160		P	¾	D	Cp.
34M1	August Meyer	Up	295	Dr	145	6				Gravel			P	1	D	Plenty of water reported.
34P1	Spencer Biddle	S	242	Dr	78	6	76	72	6	do	48		P	¾	D	Bailer test, "no" dd. L.
35A1	M. C. Sampson	Up	303	Dr	193	6				do	153		P	¾		Cp.
35C1	W. S. Olsen	Up	305	Dr	170	6	170	161	9	do	161					Bailer test, "no" dd. L.
35C2	W. H. Davis	Up	305	Dr	185	6				do	165		J	½	D	Water temp 49°, Cp.
35D1	N. Stein	Up	308	Dr	180	6				do	173		P	2	D	
35E1	C. L. Hopfe	Up	310	Dr	98	6					94		J	1		
35H1	W. C. DeLocey	Up	303	Dr	188	6				do			P	3		
35M1	R. O. Norelius	Up	298	Dr	185	8				Gravel, fine	155		T	3		Cp.
36B1	W. L. Moreland	Up	295	Dr	153	6		107	46	Gravel	140		J	1	D	Pumped 12 gpm., "no" dd. L.
36C1	Mill Plain High School.	Up	295	Dr	190	6				Gravel			P	3	Inst	Cp.

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36H1	H. S. Whetzel	Up	285	Dr	250	6	-------	-------	-------	-------	-------	-------	P	-------	D	Adequate supply reported.
36P1	John McGillivray	Up	285	Dr	238	8	238	232	6	Gravel	158	-------	T	5	D, Irr	Bailer test, 10-ft dd. Cp, L.
36Q1	Ralph Starr	Up	275	Dr	187	4	-------	-------	-------	Sand	157	-------	P	1½	D	
36R1	O. C. Tiffany	Up	275	Dr	156	6-5	-------	-------	-------	Gravel	138	-------	P	-------	-------	--
T. 2 N., R. 3 E.																
3D1	Camp Killpack	H	465	Dr	516	6	-------	503	13	Lava	126	7-15-43	T	5	Inst	Pumped 3 hrs at 70 gpm, 30-ft dd. L.
4D1	Ben Rapakko	S	390	Dg	22	48	-------	-------	-------	Gravel	4	-------	C	-------	D	Well taps Troutdale formation. Large supply reported.
4E1	John Beall	S	315	Dg	15	32	15	-------	-------	do	4	-------	C	-------	D	Do.
4K1	Joe Kaleta	S	385	Dr	250	6	247	245	2	do	175	-------	J	3	D	Bailer test, 37-ft dd. Cp, L.
4L1	John Beall	S	335	Dr	190	6	-------	-------	-------	-------	-------	-------	J	2(?)	-------	
4Q1	Stan Nygren	S	350	Dg	16	36	16	-------	-------	Clay and gravel.	4.78	5- 4-49	P	½	D	Well taps Troutdale formation.
4Q2	Mrs. Marie Ubacz.	S	333	Dg	11	60	-------	-------	-------	do	5.24	5-16-49	J	-------	D	
5P1	S. V. Haagen	-------	285	Dr	290	8	290	75	22	-------	58	2- 9-53	T	15	Irr	Pumped 8 hrs at 300 gpm, 12-ft dd. L.
5R1	E. L. Bellamy	Up	305	Dr	144	6	144	140	4	Sand and gravel.	85	-------	J	½	D	Soft water reported. L.
6E2	A. Grobli	Up	265	Dg	17	30	17	-------	-------	Clay	9.24	5-16-49	J	½	D	
6J1	L. E. Munson	Up	283	Dr	77(?)	6	-------	-------	-------	-------	33(?)	-------	J	1	-------	
6K1	Carl Anderson	Up	272	Dr	93	6	69	70	23	Rock(?)	68	-------	J	1	D, Irr	Large supply reported. Bailer test, 15-ft dd. C, L.
6Q1	Mrs. Alice Snyder.	Up	270	Dg	18	48	5	-------	-------	-------	7.12	5-17-49	C	-------	D	Soft water reported.
6R1	K. Jacobs	Up	275	Dr	61	5	61	56	5	Gravel	22	-------	-------	-------	-------	Bailer test, 18-ft dd. L.
7A1	W. A. Soliday	Up	270	Dr	47	6	46	42	5	Sand, black	27	-------	J	½	D	Bailer test, 8-ft dd. L.
7B1	P. C. Rothermel	Up	260	Dr	77	6	-------	-------	-------	Gravel	62	-------	J	-------	D	
7J1	James Higgins	Up	256	Dr	110	6	100	80	30	do	41	-------	-------	2	D, Irr	Pumped 50 gpm, 75-ft dd. L.
7K1	E. E. Peppers	Up	233	Dg	27	30-8	27	-------	-------	-------	24.60	5- 3-49	C	-------	D	
7L1	D. M. Shattuck	Uc	218	Dr	62	6	59	56	6	Sand, black	32	-------	J	1	D	Bailer test, "no" dd. L
7L2	Ed Karnath	Uc	218	Dg	13	36	13	-------	-------	-------	3.21	5- 3-49	C	-------	D	
7R2	John Meisner	Up	250	Dr	88	6	88	75	13	Gravel	47.5	-------	J	¾	D	Pumped 4 hrs at 60 gpm, 20-ft dd. L.
8E1	R. H. Paulson	Up	251	Dr	88	6	82	83	5	do	38	-------	J	2	D	Cp. L.
8F1	John Vassel	Up	280	Dg	20	24	20	-------	-------	Sand	7.40	5- 4-49	C	-------	D	Water reported to contain iron.
8H1	H. W. Lange	Up	303	Dg	15	36	15	-------	-------	-------	4.28	5- 4-49	C	-------	D, Irr	Do.
8K1	M. W. Andrew	Up	320	Dr	136	6	136	130	6	Sand and gravel(?).	91	-------	J	1	D	Bailer test, 5-ft dd. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 2 N., R. 3 E.—Con.																
8M1	C. O. Wilson	Up	263	Dr	111	6	99	70	2	Gravel	48		J	2	D	Pumped 20 gpm, 18-ft dd. Cp, L.
8Q1	W. R. Smith	Up	320	Dr	130	6	130	115	15	do	94.59	5-16-49	J	1	D	Pumped 20 gpm, "no" dd. Cp, L.
9D1	Charles Oslund	S	290	Dg	12	48				Gravel, cemented.	8		C	¼	D	Good supply reported.
9G1	G. L. Oslund	S	275	Dg	9	30				do	6				D	Do.
12G1	S. Rasmussen	H	1,640	Dg	22					Sand and gravel.	13.2	7-26-49	N			
14N1	Myers Bros.	Up	390	Dr	213	8	213	200	13	Gravel	25	June 1953	T	30	Irr	Pumped 240 gpm, 175-ft dd. L.
15E1	H. H. Ralliff	Up	390	Dr	123	6-4	123			Sand and gravel.	90	7-26-49	J		D, Irr	Pumped 18 gpm, 9-ft dd.
16B1	W. J. Matson	Up	355	Dg	28	30					19				D	Cp.
16C1	L.G. Munger	Up	340	Dg	45	36	45			Sand	40				D	
17D1	Roy Sutter	Up	265	Dr	140	6							P	1	D	Can by pumped dry.
17Q1	Roy Baker	Up	211	Dr	54	6				Sand and gravel.	20		J		D	
18A1	J. E. Sturgeon	S	253	Dr	94	6	94			Gravel, coarse.	49		J		D	Pumps 100 gpm. Water very muddy after 1949 earthquake. L.
18B1	Alfred Anderson	Up	200	Dg	9	20	None	6	3	Clay, hard, and gravel.	4	September 1955				Pumped 500 gpm, 3½-ft dd. L.
18N1	K. W. McKenzie	Uc	215	Dr	60	6	60			Gravel	27.16	5-9-49	J	1	D	
19D1	Miss Margaret Whipple.	S	230	Dr	87	6-4				do	35		P	¾		Large supply reported.
19K1	Lester Strunk	Up	230	Dr	17	48				Clay and gravel.	8.84	5-9-49	P			
20H1	A. F. and L. W. Lechtenberg.	Uc	205	Dr	60	8-6	60			Gravel, cemented.	7		C	1	S, Irr	Pumped 24 hrs at 60 gpm, 4-ft dd.
20J1	F. L. Groth	Uc	190	Dr	38	6	38	36	2	Gravel	2.99	5-9-49	P	¼	D	Large supply reported. L.
20R1	Lacamas Camp ground.	Uc	190	Dr	29	6				do	10		C	⅛	Inst	
21E1	A. F. Lechtenberg	S	225	Dr	70	6					25				D, S	

21J1	Adolph Paris	S	352	Dr,Dg	100	18-6	100	------	------	Gravel	10.17	5-10-49	J	------	D	Pumped 1 hr at 30 gpm, 3-inch dd. Cp
21L1	M. F. Wolff	S	240	Dg	24	30	24	------	------	do	0 12	Spring Autumn	------	------	D	Large supply reported.
21R1	C. B. Mays	S	280	Dr	63	4	------	------	------	Sand and gravel.	30	------	J	½	D,S	
22G1	Roy King	Ub	435	Dg	21	48	------	------	------	------	7.98	5-10-49	P	¼	------	Adequate supply reported.
22H1	Myers Bros	Ub	414	Dr	142	6	142	128	14	Sand, black	87	------	P	1½	D, S	Bailer test, 20-ft dd. L.
22J1	Fern Prairie Church of God.	Ub	429	Dr	55	6	30(?)	------	------	------	16.79	5-10-49	P	¼	Inst	
22J2	W. X. Wilson	Ub	425	Dr	42	6	30(?)	------	------	Gravel	19	------	J	½	D	
22J3	Fern Prairie School.	Ub	430	Dr	155	6	------	------	------	------	------	------	P	1½	D	
22J4	E. A. Richards	Ub	433	Dr	142	6	142	------	------	Gravel	43	5-10-49	P	¾	D	Pumped 6 hrs at 20 gpm 10-ft dd.
22M1	Nick Beres	S	340	Dg	15	60	------	------	------	------	1.50	5-3-49	C	¼	D	Water level reported to drop 10 ft in autumn.
22M2	E. Wilson	S	380	Dr	135	6	------	------	------	------	------	------	P	⅛	D	
22N1	Frank DeTemple	S	300	Dr	58	6	------	------	------	------	------	------	P	------	D	Owner reported well can't be pumped dry.
22R1	Ray Meyers	Ub	415	Dg	10	------	------	------	------	Gravel, cemented.	------	------	------	------	Irr	Infiltration trench, 20 by 15 ft. Yield 25 gpm.
23M1	R. Marple	Ub	430	Dg	21	39	12	------	------	Clay and gravel.	7.71	5-10-49	J	½	D, S	
23Q1	Ivan Robison	S	465	Dg	43	36	------	------	------	Gravel	33.45	5-16-49	J	½	D	Cp.
23R1	William Steuer	S	470	Dr	58	6	40	------	------	Clay and gravel.	38	------	J	½	D	
24G1	G. F. Messick	H	715	Dg	17	36	------	------	------	Gravel and clay.	6.25	5-16-49	C	⅛	D	
24L1	C. M. Howell	H	700	Dg	29	------	------	------	------	Clay	22.5	7-25-49	P	½	D	
24M1	R. L. Barnett	H	656	Dg	40	36	------	------	------	do	28	------	J	¼	D	Cp.
24N1	Joe Wagoner	H	650	Dg	30	36	6	------	------	Clay and gravel.	16.70	5-16-49	J	½	D	
24Q1	J. S. Harrigan	S	460	Dg	22	72	22	------	------	Sand and gravel.	7.2	7-26-49	J	½	D	Pumped 3 hr, 14-ft dd. Cp.
25J1	E. Crowson	S	310	Dg.	52	------	------	------	------	Gravel	40.8	7-25-49	J	2	D	
25Q1	Harry Thornton	H	410	Dr	115	6-5	------	112	3	do	98	------	J	1	D	Pumped 20 gpm, 20-ft dd. L.
25Q2	A. J. Rocheford	S	370	Dr	145	6	99	99	46	Rock, volcanic.	108	------	P	¾	D	Bailer test, 8-ft dd. L.
25R1	J. B. Fields	S	190	Dr	213	6	208	------	------	do	+46	------	------	------	D	Flows 1½ gpm into tank 25 ft above surface.
25R2	M. G. Dole	S	208	Dr	208	6	------	203	5	do	+25	------	------	------	------	Flows 5 gpm, water temp 54°. L.
26A1	Mrs. Nellie Stevenson.	Ub	440	Dr	155	6	------	------	------	------	------	------	J	1	------	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 2 N., R. 3 E.—Con.																
26B1	Edger Webberly	Ub	430	Dr	150	8		132	3	Sand and gravel.	132		J		D	Cemented gravel from 60 to 132 ft.
26G1	F. B. Platt	Ub	425	Dr	150	8					138		Sc	3	D, Irr	Irrigates garden.
26J1	Jack Hahn	Ub	425	Dg	42	48	3				18.98	6- 1-49	J	⅛	D	
26K1	Grove Airport	Ub	425	Dr	185	6					100		J	1		
26L1	R. V. Brown	Ub	404	Dr	150	6	145				120	9-10-48	P	1		Water reported to be soft and to contain no iron.
26P1	William Pickett	S	365	Dr	70	6				Sand and gravel.	58		J	½		Aquifer is fine black gravel and sand below 8 ft of cemented gravel. Pumped 20 gpm, "no"dd. L.
26Q1	H. W. Pepper	Ub	420	Dr	165	6	112			Gravel	143		P	¾		
26Q2	do	Ub	418	Dg	21	54					7.08	6- 2-49	C	¼	D, S	Water temp 49°.
26Q3	William Pickett	Ub	400	Dr	115			115		Gravel	95		P		D	Adequate supply reported.
27B1	Henry Myers	Ub	420	Dg	27	60					13.09	6- 3-49	N		D	
27L1	C. B. Roberts	Up	280	Dg	22	30-8	17	16		Gravel	13		J	5	Irr	Pumped 12 hr at 150 gpm, 3-ft dd.
27P1	Elite Hereford Ranch.	S	270	Dg, 75; Dr, 400.	400	8	130	371	29	Rock, hard, black and gray.	39	April 1955.			Irr	Pumped 73 gpm, 150-ft dd. L.
29E1	H. W. Kramer	Up	275	Dg	50	6					46		J	½	D	
29L1	D. F. Strunk	Up	255	Dg	16	30				Sand and gravel.	8.28	4-27-49			D	
29M1	Frank B. Marchbanks.	Up	284	Dr	114	4					95		P	¾	D	"First water" reported at 60 ft.
29M2	R. S. Hitchcock	Up	280	Dr	94	4	94			Sand	75		P		D	Adequate but not large supply reported. Well probably partially filled with sand.

29N1	Ed Knobel	Up	283	Dr	126	6	-------	-------	-------	Gravel	100	-------	P	-------	D	Bailer test, "no" dd. Loose gravel reported to about 85 ft, above cemented gravel, above coarse, sharp gravel.
29P1	S. L. Strunk	Up	252	Dr	180	8	180	105	75	Clay, sand, and gravel.	80	June 1952	-------	-------	Irr	Pumped 220 gpm, 90-ft dd. L.
29Q1	Fred Schick	Up	245	Dr	89	6	89	86	3	Gravel	59	-------	-------	-------	D	Pumped 15 gpm, 14-ft dd. L.
29R1	S. Sterkson	S	285	Dg	24	24–12	24	-------	-------	-------	9.21	4–27–49	J	-------	D	
29R2	H. C. Quick	S	295	Dr	50	6	50	49	1	Gravel	42	-------	J	½	-------	Bailer test, "no" dd. L.
30C1	Harry Friberg	Up	285	Dr	110	6	-------	-------	-------	-------	30(?)	-------	J	1	D	Large supply reported.
30D1	Mrs. A. A. Smith	Up	290	Dr	114	6	-------	-------	-------	-------	-------	-------	P	1	D	
30J1	Clark County quarry.	Up	280	Dg	7	36	7	-------	-------	Sand and gravel.	73(?)	5–9–49	C	¾	D	Well is in bottom of 70±-ft gravel quarry. Water level 2.67 ft below top of curbing.
30J2	Ralph Mayhew	Up	280	Dr	92	4(?)	-------	-------	-------	do.	-------	-------	P	1	D	Plenty of water reported for garden and lawn.
30P1	F. E. English	Up	288	Dr	135	6	135	105	30	Gravel, loose	110	-------	T	3	D,Irr	Pumped 150 gpm, 10-ft dd. Water temp 52°, L.
31B1	Henry Shoenig	Up	288	Dr	114	6	-------	-------	-------	-------	-------	-------	P	-------	D	
31C1	V. H. Davis	Up	287	Dr	135	6	135	106	29	Sand and gravel.	-------	-------	T	3	D,Irr	Pumped 50 gpm, little dd. L.
31D1	C. I. Baker	Up	287	Dr	165	6	-------	-------	-------	-------	-------	-------	P	1	D	Water reported to be hard. Cp.
31D2	J. A. Ferguson	Up	288	Dr	114	5	-------	110	4	Gravel, cemented.	84	-------	J	-------	D	
31G1	John J. Frost	Up	280	Dr	180	4	-------	-------	-------	-------	-------	-------	P	-------	D	
31J1	C. R. Dickinson	Up	275	Dr	65	6	-------	-------	-------	-------	45	-------	J	½	D	Adequate supply reported.
31N1	D. B. Webster	Up	276	Dr	148	4	-------	-------	-------	Gravel(?)	120	-------	-------	-------	-------	
31P1	Emil Myer	Up	278	Dr	93	6	-------	-------	-------	Gravel	75.71	4–28–49	J	¾	D	
32A1	Richard Ochs	S	270	Dr	94	6	-------	-------	-------	-------	-------	-------	J	-------	D	Plenty of water reported.
32E1	W. W. Barger	Up	279	Dr	133	6	-------	-------	-------	Gravel, coarse	100	-------	J	-------	D	Pumped 30 gpm, "no dd."
32M1	P. E. Friberg	Up	269	Dr	74	6	74	72	2	Sand and gravel.	35	-------	J	-------	D	Loose gravel penetrated to 45 ft, and cemented gravel from 45 to 72 ft.
32N1	A. R. Myers	Up	272	Dg,Dr	42	4	-------	-------	-------	"Sandstone"	39.75	4–29–49	P	½	D	
32P1	J. O. Foster	Up	275	Dg	39	60	-------	-------	-------	Sand and clay	9.28	do.	J	½	D	Water level reported to drop 25 ft during summer.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 2 N., R. 3 E.—Con.																
32Q1	J. T. Armstrong	Up	272	Dr	143	6	140	142	1	Gravel	100		P	1	D	Bailer test, 21-ft dd. Cp, L.
33C1	R. D. O'Harra	S	300	Dr,Bd	102	6				Sand(?)	59		J	1	D	L.
33C2	I. R. Nichols	S	310	Dr	170	6										
33Q1	Al Decker	S	335	Dr	147	6				Sand and clay			P	1	D	L.
33R1	Farris Craner	S	345	Dr	160	6	141	141	3		116.50	4-29-49	J	1½	D	Same strata encountered as in well 33Q1.
34M1	Lester Hunt	Up	360	Dg	28					Clay	16		C	½	D	Plenty of water reported.
34N1	E. H. White	S	388	Dg	36	120-48				do.	9.70	4-29-49	J		D	
34N2	do.	S	390	Dr	112	8	112	105	7	Clay and gravel.	95		T	5	Irr	Pumped 63 gpm, 15-ft dd. L.
35J1	V. W. Buttler	Ub	395	Dr	401	6	28	350		Basalt			P	1	D	Small supply reported.
35L1	John Turpin	S	340	Dg	25	48	10	10		"Sandstone"				¼		Well reportedly can be pumped dry.
35R1	Carl Buhman	Ub	395	Dg	49	36				do.	25.33	5-12-49	J	⅓	D	Well reported never to have gone dry.
36B1	Joe Embler	Ub	420	Dr	75	6				do.			J	¾	D	Water reported to be slightly hard and to contain some iron.
26F1	Verner Smith	Ub	440	Dg	30	36				Clay	15				D	Water level reported to be low in autumn.
36F2	Lewis Albert	Ub	430	Dr	67	6	67			Gravel	21.06	6-2-49	P		D	
36L1	Melvin Clapp	Ub	410	Dr	194	6-4	193			Sand, black	85.25	6-1-49	N		NU	Bailer test, 11-ft dd. L.
33Q1	Pat Monaghan	Ub	385	Dr	60	6				Sand and gravel.	19		J	½	D	Large supply reported.
13E1	J. A. Bateman	H	1,100	Dg	24					Clay	6.4	7-15-49	P		D	
18H1	G. Folsom	S	750	Dg	35					Clay and rock	22.3	7-26-49	N			
18M1	H. Peuro	S	725	Dg	30					Clay	27.2	do.	P	½	D	
19E1	W. R. Cotter	S	375	Dg	14	33				Gravel	11.3	do.	P	¼	D	Cp.
23H1	A. M. Hannigan	H	1,040	Dg	40	36				Sand, black	32		C	½	D	Water reported to be oily.
24G1	N. Hagenson	H	1,130	Dg	18	42				Clay	8.2	7-15-49	J	½	D	Cp.

25N1	Dr. Sheppard	S	280	Dr	68	6				Gravel, cemented.	30		J	1	D	
27Q1	C. L. Lynch	Fp	195	Dr	220	6	120			Gravel	9		J	½	D	Reportedly pumped 9 gpm, 120-ft dd.
29G1	P. Krohn	S	540	Dg	14	36				Gravel	4		J	¼	D	
29L1	O. G. Parfitt	S	470	Dr	111	6				Basalt	21		J	½	D	Bailer test, "no" dd.
30F1	G. St. Clair	S	438	Dg	24	60				Clay	19.1	7-25-49	P	⅓	D	Six gpm with 5-ft dd reported after pumping 2 hrs. Cp.
30J1	C. Allen	S	490	Dg	18					Gravel	12.2	do	J	¼	D	
31Q1	E. S. Borjesson	Ub	440	Dr	181	6	178			Gravel, cemented.	162		P	1	D	Soil and sand penetrated to 71 ft, cemented gravel to bottom. Pumped 12 gpm, 6-ft dd.
32E1	E. Templer	Ub	325	Dg	36	48				do	32.8	7-25-49	J	1	D	
32E2	do	Up	352	Dr	310	6	80				103	August 1955				Not used owing to poor yield.
32F1	E. J. Luthy	S	150	Dr	94	6	62			Sand	38		P	¾	D	Bailer test, 12-ft dd.
32M1	E. Templer	S	246	Dg	20	30				Clay	10		P	¼	D	
33A1	W. L. Croswell	Ub	705	Dr	170	6							J	1½	D	Water reported to cause green coloration. Cp.
33C1	F. L. Young	Ub	665	Dg	24					Clay	12.2	7-20-49	P	½	D	No apparent dd. Cp.
33Q1	V. A. Lommen	S	630	Dg	40	48				do	15		J	½	D	Pumped 5 hrs at 10 gpm, ⅙-ft dd.
35G1	H. C. Kendall	Ub	1,000	Dr	80	6				Rock, volcanic.	70		J	1½	D	No apparent dd. Cp.
36G1	H. A. Hutchinson	S	300	Dg	14	36				Sand and gravel.	7		P	¼	D	
T. 3 N., R. 1 W.																
1J1	A. Raz	S	115	Dr	102	6				Gravel	50		J	1	D	Cp.
12H1	A. Mattler	T	101	Dr	115	6				do	75		J	1½	D	
T. 3 N., R. 1 E.																
1A1	J. Lang	S	265	Dr	96	6				Sand	65		J	½	D	
1B1	R. Blake	S	275	Dr	99	6	98	88	11	Sand, black	85		J	1	D	Bailer test, "no" dd. L.
1C1	J. J. Hare	Up	280	Dr	127	6				Gravel	89		J	2	D	
1C2	O. G. Beherns	Up	293	Dr	161	6	161	150	11	do	94				D	Bailer test, 10-ft dd. L.
1E1	J. C. Walton	Up	282	Dr	125	3				Sand	95		P	1	D	
1M1	Mrs. C. M. Foster	Up	287	Dr	130	6	130	110	20	Sand and gravel.	95		J	1½	D	Water reported to be moderately hard. L.
1R1	O. Shores	S	245	Dr	90	6	90	85	5	Sand, black	70				D	Bailer test, 6-ft. dd L.
2B1	L. Adkins	Up	278	Dr	136	6				Gravel	96		J	1½	D	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 3 N., R. 1 E.—Con.																
2B2	J. Scott	Up	280	Dg	40	48				Sand	30		P		D	
2E1	H. Jones	Up	275	Dr	160	6	159	157	3	Gravel	125					Bailer test, 13-ft dd. L.
2F1	H. S. Jones	Up	290	Dr	154	5	154				68		T	5	D, Irr	Pumped 108 gpm, 28-ft dd. L.
2K1	A. M. Samuels	S	290	Dr	123	6	123	112	11	Sand, black	101		P	¾	D	Bailer test, 2-ft dd. L.
2Q1	A. A. Stumph	Up	280	Dr	107	6	107	105	2	do.			J(?)	1½	D	L.
2R1	Kenneth Shores	S	245	Dr	105	6	104	92	13	Sand and gravel.	74		J		D	Bailer test, 14-ft dd. L.
3A1	T. Johnson	Up	265	Dg	28	30	28			Gravel	16		J	⅛	D	Cp.
3H1	C. Reinseth	S	225	Dg	16	10	16			Sand	11		C	¾	D	Cp.
3M1	E. Dollson	Up	315	Dr	393	6	393			Sand and gravel.			P	15	D	Plugged at 320 ft. L.
3N1	W. M. Hoffman	S	320	Dr	117	6	117	113	4	Sand, black	39		J	1	D	Bailer test, "no" dd. Cp, L.
4A1	Lambert School	S	375	Dr	385	6	384	380	5	do.	309					Bailer test, 11-ft dd. L.
4A2	G. Rau	S	370	Dr	365	6				Gravel	230		P	5	D, S	
4E1	L. W. Nieman	Up	250	Dr	160	6	160	139	21	Gravel and sand.	132	10-10-51	T	5	Irr	Pumped 4 hr at 30 gpm, 25-ft dd. L.
4F1	H. A. Herman	S	333	Dr	192	6	192	189	3	Sand, black	167		P	¾	D	Bailer test, 12½-ft dd. L.
4K1	O. Knutsen	H	410	Dr	147	6				Gravel			P		D	
4M1	Jacob Ryt	S	225	Dg	22	30	22			Sand	5		C	¼	D	
5D1	G. B. Baxter	S	235	Dg	18	48	18			do.	6		C	¼	D	
5E1	B. Sonney	Up	238	Dr	185	6	185	165	20	Gravel	166		J(?)	3		Bailer test, 4-ft dd. L.
5H1	L. Holley	Up	250	Dr	160	6	160	158	2	Sand, black	80		P	1	D	Bailer test, 16-ft dd. L.
5L1	C. J. Fitz	Up	225	Dg	21	36	21			Sand	19		P		D	Cp.
5Q1	W. P. Hilley	Up	240	Dg	30	48	30			do.	15		C	⅛	D	
6E1	John Roth	S	155	Dr	122	6	122	121	1	Sand, black	64		Sc	3		Bailer test, 14-ft dd. L.
6H1	Nelson	S	208	Dr	161	6	161	159	2	Sand and gravel.	147		P	2		Bailer test, 3-ft dd. L.
6K1	F. Walter	S	205	Dg	22	36				Sand	12		P		D	

6R1	W. Schleicher	Up	190	Dg	22	48				do	6		C	¼	D	
7D1	F. A. Krieger	T	115	Dr	127	6				do	87		P	1	D	
7D2	Arnold Mettler	S	115	Dr	471	10–8	450	123	5	Gravel	100		T	25	Irr	Pumped 360 gpm, 26-ft dd. L.
								268	2							
								363	14							
								403	3							
8F1	L. H. Sinclair	S	185	Dr	155	6				Sand	150		P	¾	D	
8K1	J. S. England	S	180	Dr	144	6	144	134	10	Gravel, cemented.	137		P		D	Bailer test, "no" dd. L.
8K2	Ernest Brown	Up	175	Dr	148	6	148	125	23	Gravel	120	1953			Irr	Pumped 12 hrs at 51 gpm, 23-ft dd. L.
8L1	James and Nora McElligott.	S	183	Dr	298	10	258	110	145	Sand and gravel.	122	7–15–53				Pumped 160 gpm, 33-ft dd. L.
8M1	L. R. Thurman	S	165	Dg	28	48				Sand	18		C	½	D	Cp.
8N1	E. J. Grant	S	110	Dg	25	30	25			do	1		C	¼	D	Cp.
8Q2	Sara School Dist.	S	155	Dr	150	6				Sand and gravel.	95		P	1	Inst	L.
8R1	E. T. Royle	Up	180	Dr	370	8–6									Irr	
9A1	L. Parmantier	S	295	Dr	182	6	182	171	11	Gravel	132		P	2		Bailer test, 10-ft dd. Cp, L.
9A2	John Heidecker	S	285	Dr	210	8	210				140		T	5	Irr	Pumped 30 gpm, 60-ft dd. L.
9H1	L. L. Oslin	S	275	Dg	21	48				Sand and clay	16.8	5–16–49	C	⅓	D	Large supply. Reported. Cp.
9K1	J. Gaul	S	255	Dg	38	48				do	22		J	⅓	D	
10A1	I. Jacobs	S	240	Dg	30	36				Gravel	5		C	¼	D	Cp.
10A2	A. Flory	S	263	Dr	100	6	100	97	3	do	63		J	⅓	D	Bailer test, 25-ft dd. L.
10B1	Thomsen	S	295	Dr	166	6	167	150	17	Gravel, cemented.	109		P	½	D	Bailer test, 11-ft dd. L.
10C2	C. H. and Amelia Reese.	S	305	Dr	168	8	168	137	31	Gravel	125		T	7½	D, Irr	Pumped 30 gpm, 40 ft dd. L.
10G1	R. Garrison	S	310	Dr	156	6				do	141		P	¾	D	Cp.
10H1	L. H. Wilson	S	290	Dr	132	6	132	120	12	Gravel	100		J	1½	D	Pumped 19 gpm, 12-ft dd. Cp, L.
10H2	J. H. Dooley	S	300	Dr	164	6	163	162	2	Sand, black	94		P	¾	D	Bailer test, 16-ft dd. L.
10J1	George Prom	S	300	Dr	173	6	173	166	7	Gravel, loose	123					Bailer test, "no" dd. L.
10M1	Schimmelpfenig	H	336	Dr	178	6	178	145	33	Gravel	163		J	2	D	Bailer test, 7-ft dd. L.
10N2	H. F. Boutwell	H	325	Dr	194	6				do	175		P	¾	D	Pumped 12 gpm, 10-ft dd. L.
10P1	D. L. Belknap	H	335	Dr	192	6	192	149	43	do	171		P	1	D	Bailer test, 5-ft dd. Cp, L.
10R1	Baker School District.	S	300	Dr	134	6	133	126	8	Sand, black	88					Bailer test, 8-ft dd. L.
11A1	H. L. Stuart	Up	270	Dr	168	6	168	163	5	Sand and gravel.	96	August 1954				Pumped 60 gpm, 16-ft dd. L.
11B1	W. Worthington	Up	290	Dr	100	6				Gravel	85		P	½	D	
11D1	F. R. Moudry	Up	240	Dr	141	6	141	139	2	Sand, black	61		J	3	D	Bailer test, 30-ft dd. L.
1F1	C. H. Rigsby	Up	295	Dr	138	6	138	133	5	Gravel	111		P	¾	D	Bailer test, "no" dd. Cp, L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 3 N., R. 1 E.—Con.																
11M1	W. Brewster	S	300	Dr	136	6	135	129	7	Sand, black	88		P	1	D	Bailer test, 9-ft dd. L.
11N1	O. Grub	S	280	Dr	130	4				Gravel	70		P	¾	D	
11N2	J. H. Hubbard	S	275	Dr	125	6	125	108	17	Sand and gravel.			J	1½	D	Bailer test, 6-ft dd. L.
11Q1	H. Carpenter	S	275	Dr	133	6	131	117	16	do	98		J		D	Bailer test, 3-ft dd. L.
11Q2	John Sohn	S	275	Dr	117	6	117	110	7	Sand, black	77.5					Bailer test, 8-ft dd. L.
12C1	L. Resleff	S	280	Dr	139	6				Sand	78		P	1	D	
12E1	J. V. Ramsey	S	280	Dr	112	6				Gravel	80		J	1	D	
12N1	J. O. Dodson	S	265	Dg	29	36				Sand	21.9	5-13-49	C	1	D	
12R1	O. P. Stark	S	260	Dr	215	8	215	196	13	Gravel	94		T	15	Irr	Pumped 150 gpm, 14-ft dd. L.
13E1	J. A. Fields	Up	272	Dg	14	30				do	6		J	⅓	D	
14D1	P. F. Brown	Up	280	Dr	150	6				Sand	115		P	1½	D	Cp.
14J1	H. P. Calvin	Up	250	Dr	192	6-4	192(?)	168	33	Gravel	181		P	½	D	Bailer test, "no" dd.; well deepened to 201 ft. Cp, L.
15B1	W. F. Leichtnan	Up	300	Dg	17	48				Clay	7					
15H1	A. Moulton	Up	294	Dr	170	6				do	130		P	3		Cp.
15H2	do	Up	296	Dr	220	8	219				130		T	15	Irr	Cp, L.
15P1	W. R. Chilveck	Up	200	Dr	147	6				Gravel	135		P	1½	D(?)	
15R1	D. Bottemiller	S	260	Dg	20	60				Sand	10		C	⅓	D	
16C1	H. E. Davis	Up	215	Dg	23	36	24			do	10.3	5-16-49	C	¼	D	Cp.
16H1	Chester Wrenn	H	335	Dr	219	6-4	219	195	24	Gravel(?)	196		P	1	D	Bailer test, 6-ft dd. L.
17F1	D. P. Piechioni	Up	175	Dr	186	6	186	181	5	Gravel	121		P	¾	D	Bailer test, 54-ft dd. L.
17K1	D. Coons	Up	180	Dg	28	30	28			Sand	16.1	5-12-49	J	½	D	
18D1	P. Nichols	Up	79	Dr	94	6				Gravel	66		J	2	D(?)	
18G2	M. W. Schimmelpfinnig.	Up	139	Dr	120	6				do	100		J	1	D(?)	
18H1	O. E. Devers	Up	175	Dr	100	6				Sand	70		J	1	D	
18H2	F. M. McWilliams.	Up	170	Dr	196	6-4	196	191	5	Gravel	129	April 1952				Pumped 70 gpm, 24-ft dd. L.
18J1	Valley Erwin	Up	175	Dr	187	6	187	180	7	Sand, black	146		P	1	D	Bailer test, 35-ft dd. L.
18J2	C. W. Hartman	Up	160	Dr	181	6	181	174	7	Gravel	119		P	1	D	Bailer test, 37-ft dd. L.
18Q1	C. E. Grelle	Up	130	Dr	302	10	302	255	47	do	112		T	25	Irr	Pumped 250 gpm, 58-ft dd. L.

19R1	Z. Herzog	Up	171	Dr	165	6	165	162	3	do	153		P	2½	D	Pumped 12 gpm, "no" dd. Cp, L.
20C1	A. G. Maki and C. O. Mickey.	Up	170	Dr	183	6	183	178	5	Sand and gravel.	143		T	7	D, Irr	Pumped 75 gpm, 30-ft dd. L.
20F1	H. Engler	Up	168	Dr	150	6				Gravel	137		P	½	D	Cp.
20G1	E. E. McIrvin	Up	170	Dr	166	6	166	163	3	do	140		Sc	5	D, Irr	Operates four sprinklers plus four hoses. L.
20J1	A. H. Sasse	S	80	Dr	88	6	88	75	11	do	50		J	1	D	L.
20P1	J. H. Ryan	S	195	Dg	20	30	20			Sand	16		C	¾	D	Cp.
21B1	M. H. Sunden	S	165	Dg	25	30	25			Sand	10		C	⅓	D	
21E1	A. E. Pauley	Up	175	Dg	22	30	22			do	12.7	5-20-49	C	¼	D	Cp.
21G1	L. W. Ross	Up	165	Dg	45	30	45			do	25.0	5-19-49	J	½	D	
21Q1	W. E. Bliss	S	170	Dr	172	6	172			Gravel	155		P	5		Very large supply reported.
21R1	George Kapitanovich.	Up	175	Dr	165	8	165	155	10	do	150		T		Irr.	Dd 10 ft at 220 gpm. L.
22D1	J. L. Bleth	Up	165	Dg	33	48				Sand	23		J	½	D	Reportedly can be pumped dry.
22L1	W. Gueffroy	Up	185	Dg	24	30	24			Clay	12		J	¼	D	
22P1	J. D. Sullivan	Up	187	Dg	35	36	35	25	10+	Sand	15	August 1954				Pumped 35 gpm, 10-ft dd. L.
22Q1	W. Bryant	Up	192	Dg	20	6				do	4		C	¼	D	
23E1	J. A. Heidecker	Up	205	Dr	175	6	175	95 138	22 37	Sand and gravel.	120	6-10-52			D, Irr	Pumped 4 hrs at 100 gpm. 40-ft dd. L.
23J1	Dick Tompkins	H	315	Dr	271	6	271			Gravel	243		P	3	D	Water reported to be hard.
23J2	Lee Hixon	H	310	Dg, Bd	111	36	97	85	9	do			J	1	D	Partial log.
23J3	Ray Ellis	H	325	Dr	98	6	98			Sand and gravel.	84		J	1	D	Water reported to be soft.
23M1	L. B. Hathaway	Up	200	Dg	24	30				Sand	18.6	5-19-49	J	⅓	D	
23M2	do	Up	205	Dr	171	8	171	156	15	Gravel	128		T	15	Irr	Pumped 175 gpm, 25-ft dd, L.
23R1	John Schreiber	H	290	Dr	268	6	268			Sand	231					Bailer test, report "no" dd. L.
24H2	J. Brougher	T	155	Dr	108	6	108	104	4	Sand, black	8		J	2		Bailer test, 38-ft dd. L.
24K1	R. H. Todd	Fp	140	Dr	85	6	85	84	1	Sand, red	Flows		C	½	D	Reported to flow 15 gpm. L.
24K2	R. J. Darling		125	Dr	90	12	58	69	21	Shale	1	February 1956	T	10	Irr	Pumped 170 gpm, 61-ft dd. L.
24L1	do	S	155	Dr	748	12	70	78	7	Sand and gravel.	12	September 1952	T	7½	D, Irr	Pumped 100 gpm, 43-ft dd. L.
24N1	Harley Mays	S	205	Dr	205	6	205	203	2	Sand, coarse	150(?)		T	3	Irr	Pumped 4 hrs at 40 gpm, 15-ft dd.
24R1	F. Hannam	Up	215	Dg	50					Sand	38		J	½	D	Cp.
24R2	E. R. Kadow	Up	225	Dr	179	8	179	80	60	Gravel, cemented.	73	July 1949	T	15	D, Irr	Pumped 4 hrs at 365 gpm, 65-ft dd. L.
25A1	R. Mitchell	Up	217	Dg	20					Sand	12		C	⅓	D	Cp.
25G1	A. R. Smoole	Up	217	Dr	92	6	92	75	17	Sand and gravel.	65	November 1952				Pumped 40 gpm, 15-ft dd. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 3 N., R. 1 E.—Con.																
25M1	L. A. Tesch	T	105	Dr	64	6	------	57	7	Gravel	------	------	------	------	------	Cp, L.
25Q1	Jacob Schwann	S	200	Dr	108	6	108	80	28	Sand and gravel.	78	------	J	1½	D	Bailer test, 10-ft dd. L.
26B1	A. Neuman	S	200	Dg	23	30	------	------	------	Clay	12	------	C	⅓	D	
26C1	F. L. Davies	Up	195	Dr	169	6	169	140	29	Sand and gravel.	133.0	10-15-50	T	3	D	L.
27E1	C. T. Brandt	Up	182	Dg	45	60	------	------	------	Sand	30	------	J	¼	D	Cp.
27F1	Mrs. M. W. Scott.	Up	190	Dg	27	24(?)	------	------	------	do	12	------	C	⅓	D	
29F1	W. Fuestman	Up	195	Dg	27	30	27	------	------	do	25.7	5-20-49	J	⅓	D	
29K1	E. McErvin	Up	215	Dg	45	30	45	------	------	do	32	------	J	⅓	D	
29K2	F. W. Tripp	Up	205	Dg	42	54-33	42	31	11	do	28.75	------	------	------	Irr	Pumped 65 gpm, 4-ft dd.
30A1	Z. Herzog	Up	165	Dr	160	6	------	------	------	Gravel	151	------	P	5	D, S	
32A1	R. Hopfe	Up	210	Dg	39	30	------	------	------	Sand	35	------	J	1	D	
32J1	F. J. Erickson	Up	207	Dg	50	48	------	------	------	do	45	------	P	------	D	
32J2	W. H. Yost	Up	198	Dr	178	6	178	160	18	Gravel and sand.	------	------	Sub	2⅓	D	L.
32K1	M. H. Anderson	S	160	Dr	97	6	------	------	------	Gravel	50	------	J	¼	D	
32R1	Clinton C. Warren.	S	50	Dr	187	8	80	185	2	Gravel and sand.	12	------	Sc	3	D	Pumped 2 hrs at 200 gpm, 68-ft dd. L.
33A1	D. Posey	S	160	Dg	58	8	------	------	------	Sand	46	------	J	⅓	D	Cp.
33D1	G. Van Volkenberg.	Up	215	Dr	198	6	186	193	5	Gravel	150	------	P	1	D	Pumped 15 gpm, "no" dd. L.
33E1	C. E. Dabney	Up	210	Dg	40	36	------	------	------	Sand	36	------	J	⅙	D	
33G1	E. Moran	Up	225	Dg	35	30	------	------	------	Sand	25	------	J	⅓	D	
33L1	A. M. Schultz	Up	210	Dg	39	40	39	20	20	Sand, coarse	19	------	C	5	Irr	Pumped 12 hrs at 60 gpm, 16-ft dd.
33M1	M. J. Seida	Up	215	Dr	33	24-11	33	24	5	Sand	14	------	C	5	Irr	Pumped 60 gpm, 15-ft dd.
33M2	R. A. Garner	Up	215	Dg	40	48	40	27	12	Sand, black	28	------	C	3	D, Irr	Pumped 50 gpm, 5-ft dd. L.
33P1	Alex Vernon	Up	210	Dg	32	42-12	32	20	12	Sand, coarse, black.	18	------	C	3	Irr	Pumped 50 gpm, 7-ft dd.

33Q1	Wil-Mar Dairy	Up	210	Dg, Dr	48	60-8	48	28	20	Sand	36		C	5	Irr	Pump located 28 ft below surface. Irrigates 20 acres pasture. C.
33R1	W. E. Kennedy	Up	225	Dr	245	8-6	245	212	33	Gravel	137		T	10	Irr	Pumped 160 gpm, 18-ft dd. Irrigates 18 acres. L.
34G1	F. Kluttenhoff	Up	170	Dr	212	6				do	118				Irr	L.
34G2	Paul Borchers	Up	160	Dr	129	6	129	112	17	do	107		J	1	D	Bailer test, 11-ft dd. L.
34M1	Rudolph Evans	Up	185	Dg	19	60	19				10		C	5	Irr	Pumped 72 gpm, 7-ft dd.
34Q1	J. H. Swarner	Up	205	Dg	50					Sand	35		J	⅓	D	
34Q2	R. I. Chambers	Up	190	Dg	35	48				do	29		J	⅓	D	
34R1	Clark County PUD 1.	Up	195	Dr	275	12	275	135	20	Sand and gravel.			T	60	Ind	L.
35B1	J. Hannah	Fp	90	Dr	46	6				Gravel	22		J	½	D	
35D1	Thomas Christiansen.	S	76	Dr	59	6	59	55	4	Sand, black	43		J	½	D	Bailer test, "no" dd. L.
35L1	J. L. Nordstrom	Up	160	Dr	106	6				Sand	80		J	1	D	Cp.
35P1	Columbia Winery	S	180	Dr	122	6	119	110	12	Sand, black	77		T	3	Ind	Bailer test, 15-ft dd. L.
36A1	Arnold Ueltschi	Up	250	Dr	200	8	200	150	45	Sand and cemented gravel.	87	March 1954			Irr	Pumped 225 gpm, 10-ft dd. L.
36B1	J. J. and D. H. Herman.	S	210	Dr	97	6	97				40			3	D, Irr	Pumped 65 gpm, little dd. L.
36H1	Arnold Ueltschi	Up	250	Dg	60	42				Sand	50		J	⅓	D	Cp.
36P1	Adams and Johnson.	Up	300	Dr	168	6				do			P	¾	D	
36P2	W. L. Dillon	Up	315	Dr	200	6	200	198	2	Gravel	149		P	5	D	Soil from 0 to 4 ft, sand from 4 to 98 ft. Bailer test, "no" dd.
36R1	C. E. LaLonde	Up	250	Dg	42	30				Sand	26		J	½	D	Cp.
T. 3 N., R. 2 E.																
1C1	H. Simonson	S	350	Dg	16	30				Rock(?)	10		C	¼	D	Cp.
1J1	R. G. Hayes	Up	285	Dr	101	8				Sand	51		P	2	D	Cp.
1N1	E. Matson	Up	275	Dg	25	34				Gravel	10		J	½	D	Cp.
1Q2	T. L. Roberts	Up	275	Dr	59	6	59	52	7	do	22	4-9-52	T	3	Irr	Pumped 10 hrs at 41.5 gpm, 32-ft dd. L.
2A1	Ed Parvi	Up	300	Dg	35	30				do	4		J	⅓	D	
2D1	Clark County Co-op.	Up	295	Dr	140	12-8(?)		136(?)	4(?)	Sand and gravel.	51	4-6-49	T		PS	Water level measured 15 min after pumping stopped. Water temp 51.5°. Reported to use about 60,000 gpd. C.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 3 N., R. 2 E.—Con.																
2D2	----do----	Up	295	Dr	140	8	------	------	------	----do----	40	------	T	7½	PS	
2D3	D. Primley	Up	290	Dr	35	6	34	33	2	Sand, black	15	------	------	------	------	Bailer test, "no" dd. L.
2F1	H. S. Gish	Up	286	Dr	74	6	73	59	15	Gravel	38	------	J	1	D	Bailer test, 5-ft dd. L.
2L1	J. Kertis	Up	284	Dr	78	6	------	------	------	----do----	60	------	J	1	D	
3B1	Town of Battle Ground.	Up	284	Dr	144	8	144	95	20	Sand and gravel.	48.1	March 1954	T	30	D, Irr	Pumped 332 gpm, 42.2-ft dd. L.
3B2	----do----	Up	284	Dr	153	12	------	92	46	Gravel	49.08	12-14-55	------	------	------	Well now abandoned.
3B3	----do----	Up	284	Dr	152	12	144	105	47	Sand and gravel.	54	September 1954	T	30	D, Irr	Pumped 400 gpm, 52-ft dd. L.
3C1	Fred Vandermast	Up	282	Dr	82	6	82	55	27	Gravel	42	5-20-49	J	1	D	Bailer test, 8-ft dd. L.
3E1	C. A. Remy	Up	275	Dr	177	8	177	54	60	Gravel, cemented.	47	------	T	5	Irr	Pumped 100 gpm, 88-ft dd. L.
								114	25	Sand and gravel.						
3H1	J. H. Babcock	Up	284	Dr	82	6	------	------	------	Gravel	45	------	J	¾	D	Cp.
3H2	----do----	Up	285	Dr	103	8	103	------	------	------	40	------	------	------	Irr	Pumped 175 gpm, 19-ft dd.
3L1	F. Condon	Up	279	Dg	16	24	16	------	------	Sand	3	------	C	¼	D	
3R1	E. Anderson	Up	275	Dr	63	6	50	------	------	----do----	45	------	J	1	D	Pumped 10 gpm, "no" dd. L.
4A1	P. Smith	Up	270	Dr	88	6	------	------	------	Gravel	75	------	J	1	D	
4C1	L. Towle	Up	260	Dr	125	6	------	------	------	----do----	80	------	J	1	D	Cp.
4H2	Arthur Leggett	Up	275	Dr	177	6	177	93	84	Sand and gravel.	46	February 1953	T	5	------	Pumped 56 gpm, 120-ft dd. L.
4J1	F. W. Hollenbeck	Up	275	Dr	94	6	94	76	18	Gravel	59	------	J	1	D	Bailer test, 14-ft dd. L.
4J2	H. C. Sholund	Up	270	Dr	126	6	126	82	44	Sand and gravel.	57	February 1953	------	------	------	Pumped 125 gpm, 12-ft dd. L.
4N1	M. Webber	Up	285	Dr	106	6	------	------	------	Gravel	90	------	P	¾	D	Cp.
4Q1	W. M. Meisner	Up	279	Dg	25	30	------	------	------	Sand	12	------	C	½	D	Cp.
5A1	Robert Laughlin	Up	260	Dr	104	6	104	------	------	Sand and gravel.	74	------	J	1	D	Pumped 20 gpm, 20-ft dd.
5D1	S. L. Dollar	Up	218	Dr	199	6	198	------	------	Gravel	121	------	J	1	D	Bailer test, 13-ft dd.

5E1	Leonard Walther	Up	220	Dr	70	6		23	8	Sand	18		J	2	Irr	Pumped 38 gpm, 15-ft dd. L.
								31	35	Gravel and sand.						
5M1	C. V. Hill	Up	220	Dr	80	6	80	14(?)	66(?)	Gravel	20		J	¾	D	Bailer test, "no" dd. L.
5P1	P. J. Meilicke	S	245	Dr	59	6				do	24		J	¾	D	
5R1	M. M. Morgan	S	365	Dr	400	6		390	10	do	160					Plenty of water reported. L.
6A1	M. C. Bradford	Up	211	Dg	22	30				do	6		J	¼	D	
6B1	W. Hesley	Up	200	Dr	68	6				do	45		P		D	Cp.
6G1	A. P. and Martha McDaniel.	Up	200	Dr	217	8	217	208	4	Sand, blue, coarse.	3	May 1954				Pumped 210 gpm, 18-ft dd. L.
6J1	E. McErvin	Up	210	Dg	17	30	17			Sand	9.0	4-29-49	P	¼	D	
6J2	H. C. Dugger	Up	205	Dr	74	6	74	17	57	Gravel and sand.	10		T	3	Irr	L.
6J3	P. W. Helphrey		210	Dr	82	7	82				12	3- 3-53				Pumped 80 gpm, 35-ft dd.
6M1	G. Casteel	S	268	Dr	103	6				Sand	84		J	½	D	
6N1	O. Williams	S	255	Dr	87	5				Gravel	72		P		D	
6Q1	L. E. Mason	Up	190	Dg	12	30				Sand	8		J	⅓	D	Cp.
7E1	A. Thompson	S	250	Dr	163	6	163			do	98		J	1	D	Bailer test, 15-ft dd. Cp. L.
7J1	H. Kielman	Up	210	Dg	16	34	16			do	8		P	¼	D	
7Q1	G. A. Greenwood	Up	195	Dg	14	30	14			do	7.55	4-28-49	J	½	D	Cp.
8A1	R. B. Agard	T	275	Dr	170	8	170	130	24	Sand and gravel.	78	October 1954	T	10	Irr	Pumped 150 gpm, 28-ft dd. L.
8D1	G. Homar	Up	220	Dg	17	48				Sand	3		P		D	Cp.
8D2	R. C. Chapman	Up	220	Dr	127	10	127	100	25	Gravel	36	September 1953	T		Irr	Pumped 255 gpm, 63-ft dd. L.
8M1	J. R. Tappan	Up	231	Dr	112	6	112				40	June 1955	T		Irr	Pumped 100 gpm, 58-ft dd. L.
8N1	G. H. White	Up	233	Dg	19					Sand	15		P		D	
8P1	E. R. Williams	Up	240	Dr	85	6	85				36		T	5	D, Irr	Pumped 70 gpm, little dd.
8P2	Claud A. DeWitt	Up	240	Dr	128	6	128(?)				43	1953		1½	D, Irr	Bailed 30 gpm without noticeable dd.
9A1	Clarence Larsen	Up	280	Dr	150	10	150	85	65	Sand and gravel.	87				Irr	Pumped 85 gpm, 43-ft dd. L.
9D1	L. A. Vallet	Up	285	Dr	134	6	130	92	35	Gravel, cemented.	92	October 1952	T	5	Irr	Pumped 40 gpm, 15-ft dd. L.
9H1	Columbia Academy.	Up	285	Dr	195	10-8	169	55	25	Sand and gravel.	93		T	7	Inst	Pumped 150 gpm, 34-ft dd. L.
								110	31							
9H2	do	Up	285	Dr	121	6	121			Gravel	85		T	5	Inst	Pumped 24 gpm, 15-ft dd.
9K1	L. A. Sittser	Up	285	Dg	17	30				do	7		C	¼	D	Cp.
9Q1	A. E. Fleek	Up	275	Dg	18	30				do	12		J	⅓	D	Cp.
10B1	H. H. Pollock	Up	285	Dg	22	30				do	9		J	⅓	D	
10F1	E. Gassoway	Up	291	Dr	95	6	90	85	10	do	75		J	¾	D	Bailer test 10-ft dd. L
10H1	Emil Wall	Up	275	Dr	79	6	79	70	9	Sand	44		J	1	D	Bailer test 25-ft dd. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 3 N., R. 2 E.—Con.																
10L2	M. S. Smart	Up	293	Dr	138	6	137	82	56	Gravel	85					Bailer test 12-ft dd. L.
10M1	A. F. Gilham	Up	282	Dr	117	6	117	113	4	do	79		J	½	D	Bailer test, 8-ft dd. L.
10P1	G. A. Rouse	Up	280	Dg	18	6				Sand	6		P		D	Cp.
10Q1	G. J. Kavodias	Up	284	Dr	99	6	99	90	9	Gravel	74		J	¾	D	Bailer test, 15-ft dd. L.
10Q2	W. R. Wendt	Up	285	Dr	150	10	150	130	15+	Sand and gravel.	78	July 1955			Irr	Pumped 125 gpm, 20-ft dd. L.
11C1	George Granlund	Up	285	Dr	91	6	91	78	13	Gravel	45		J	1	D	Bailer test, 22-ft dd. L.
11D1	C. Dietrich	S	275	Dr	90	6				do	65(?)		J	1	D	
11D2	do	S	285	Dr	83	6	78	78	5	Sand, black	42					Bailer test, 5-ft dd. L.
11E1	J. W. Hill	S	281	Dr	60	6	58	55	5	Gravel	44		J	½	D	Bailer test, "no" dd. L.
11G1	G. Green	Up	285	Dr	93	6				do	40		J	1	D	
11P1	A. W. Peter	Up	265	Dr	86	6	85	62	24	do	35		J	½	D	Bailer test, 25-ft dd. Cp. L.
12H1	E. Thorgeson	Up	265	Dg	34	30				do	7.3	4-22-49	C	½	D	Cp.
12R1	Earl McLavy	Up	254	Dr	45	6	43	43	2	Sand, black	7.56	6- 6-49	P		N	Bailer test, 12-ft dd. Water reported to contain too much iron for use. L.
12R2	do	Up	260	Dg	19	36	19			Gravel	3		J	1	D, S	
13B1	Ray Kielman	Up	270	Dr	89	6	89	86	3	Gravel	39		J	⅓	D	Bailer test 15-ft dd. Cp, L.
13E1	W. Thorgeson	Up	312	Dr	130	6				do	70		P	¾	D	
13J1	E. Mattila	Up	275	Dg	18	30				do	6.6	4-22-49	J	⅓	D	Cp.
13P1	L. Dietrich	Up	288	Dr	133	6	133	130	3	Sand, black	63.5		J	1	D	Bailer test, 8-ft dd. L.
14A1	R. J. Helms	Up	280	Dr	108	6	108	105	3	do	67.5		J	1	D	Bailer test, 10-ft dd. L.
14H1	P. Sample	Up	308	Dg	20	30					7		C	½	D	Cp.
14L1	M. D. Hance	Up	295	Dg	30	12				Sand	9		J	⅓	D	
14M1	W. Dethman	Up	300	Dr	105	5				do	92		J	1	D	
14P1	Arthur Tikka	Up	302	Dr	215	8	180	139 168	2 3	Gravel	67		T	7½	Irr	Irrigates 12 acres. Pumped 4 hrs at 60 gpm, 68-ft dd. L.
15G1	J. W. Pender	Fp	255	Dg	26	22	26			Gravel, "white".	16		P	½	D	
15Q1	H. Dixon	Up	284	Dr	93	6				Gravel	64		J	1	D	

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16K1	M. B. DeSpain	Up	270	Dg	19	24	19			do.	12.0	4-28-49	P		D	
16M1	C. Higdon	Up	264	Dg	20	72				Sand			J	1	D	Cp.
16M2	Clinton Higdon	Up	270	Dr	157	8	157	112 127	6 28	Gravel	78		T	10	Irr	Pumped 100 gpm, 42-ft dd. L.
17B1	H. Piper	Up	262	Dg	11	30				Sand	5.0	4-28-49	C	¼	D	
17D1	F. Thomas	Up	230	Dr	65	6	64	63	2	Sand, black	30		J	1	D	Bailer test, 14-ft dd. L.
17J1	W. M. Higdon	Up	261	Dr	116	6	116	90	26	Gravel	86		T	1½	D	Bailer test, 10-ft dd. Cp. L.
17K1	H. Eichmeier	Up	255	Dg	19	36	19			Sand	11.6	4-28-49	P		D	
17P1	D. B. Harris	Up	245	Dg	19	48					9		J	⅓	D	Cp.
17Q1	J. M. Morgan	Up	250	Dr	304	8	304	299	2	Gravel	78	April 1952	T	10	Irr	Pumped 140 gpm, 42-ft dd. L.
18C1	B. Sellinger	Up	200	Dr	52	6	52	46	6	Sand, black	22					Bailer test, "no" dd. L.
18C2	do.	Up	200	Dr	97	6	97	88	9	do.	37					Bailer test, "no" dd. L.
18D1	J. T. Pagel	Up	205	Dr	220	8	190	42 90	5 4	Sand and gravel. Sand, coarse.			T	5	Irr	Pumped 60 gpm, 20-ft dd. L.
18H1	C. E. Rogers	Up	220	Dg	18	30	18			Sand, black	9		C	⅓	D	Cp.
18Q1	R. P. Marquette	Up	200	Dr	45	6				Gravel	25		J	¼	D	Second water at 45 ft.
19A1	Ernest Dunlap	S	200	Dr	83	6		69	14	Sand and gravel.	30	September 1955	J	3	D	Pumped 60 gpm, dd not given. L.
19B1	L. L. Demming	S	210	Dr	66	6	66	58	8	Gravel	21		J		D	Bailer test, 31-ft dd. L.
19G1	H. L. McDowell	T	170	Dr	31	6	20	28	3	Sand and gravel.	13		C	⅓	D	Bailer test, "no" dd. Cp. L.
19J1	A. Cummings	T	210	Dg	36	36	36			Sand	28		J	1	D	Cp.
19P1	W. S. Gilmore	Up	255	Dr	119	6	119			Gravel	61					Bailer test, 8-ft dd.
19R1	C. Ramsden	Up	205	Dr	80	6	80			do.	15		J	1	D	Bailer test, 30-ft dd.
20A1	K. Dubro	Up	265	Dg	23	24-60				Sand	14		P	½	D	Cp.
20C1	C. W. Parker	Up	235	Dr	69	6	69	59	10	Gravel	48		J	¼	D	Bailer test, 20-gpm. Water reported to contain some iron. L.
21A1	J. Shefek	Up	290	Dr	143	6		143		do.	30		P	1½	D	Cp. L.
21A2	W. Lane	S	265	Dr	71	6	71	59	12	do.	39		J	½	D	Bailer test, 24-ft dd. L.
21A3	M. T. Radke	S	265	Dr	139	6	139	120	19	Sand and gravel	74	May 1955			Irr	Pumped 115 gpm, 41-ft dd. L.
21A4	S. E. Wellman	S	265	Dr	148	8	148	128	20	do.	77.2	June 1956			Irr	Pumped 75 gpm, 63-ft dd. L.
21C1	L. Kanes	Up	195	Dg	29	30	29			Sand	18.5	4-27-49	J	½	D	
21K1	Fred Moore	Up	290	Dr	290	12	290	253	37	Gravel	85	July 1955				Pumped 350 gpm, 13-ft dd. L.
21L1	G. W. Norene	Up	280	Dr	145	6				do.	70		P		D	Cp.
22C1	Daly & Dickson	Up	295	Dr	107	6				do.	78		J	1	D	
22F1	Andrew Erkkila	Up	297	Dr	120	6	120	107	13	do.	85					Bailer test, 11-ft dd. L.
22G1	W. A. Ovall	Up	298	Dg	22	30	22			Sand	12.1	4-21-49	J	½	D	Cp.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 3 N., R. 2 E.—Con.																
22J1	Jacob Henkel	Up	293	Dr	175	8	175	145	27	Sand and gravel.	70	April 1955	T	10	NU	Pumped 150 gpm, 140-ft dd. L.
22N1	Ernest W. Krage	Up	295	Dg	17	12	17	6	11	Sand	6				Irr	Pumped 50 gpm, 7-ft dd.
22N2	E. A. Erkkila	Up	295	Dg	20	12	20				9		C	2	Irr	Pumped 60 gpm, 10-ft dd.
22Q1	J. N. Koski	Up	297	Dg	17	48				Gravel	7		J	¼	D	Cp.
23B1	J. Markkanen	Up	300	Dg	45	30	45			Sand	20		J	⅓	D	
23B2	Victor Denn	Up	285	Dr	138	6	135	133	2	Gravel			T	10	Irr	Irrigates 13 acres.
23D1	K. H. Halleck	Up	292	Dr	93	6				Sand	75		J	½	D	Cp.
23D2	W. F. Messner, Jr.	Up	295	Dr	178	8	178	102	43	Gravel, muddy.	78		T	10	Irr	Pumped 128 gpm, 59-ft dd. L.
23F1	A. S. Kytola	Up	295	Dg	13	30				Sand	9		P	¾	D	Cp.
23H1	Axel Pelto	Up	295	Dr	194	8	193	186	8	Sand and gravel.	62	July 1954	J	3	D, Irr	Pumped 200 gpm, "no" dd. L.
23J1	E. Kreinbring	Up	285	Dr	139	6	139	135	4	Sand, black	79		J	1	D	Bailer test, 20-ft dd. Cp. L.
23J2	E. V. Kreinbring	Up	295	Dr	195	10	195	135	5	Gravel	68	12–54	T	10	Irr	Pumped 240 gpm, 85-ft dd. L.
23K1	F. H. Layman	Up	295	Dr	120	6				do	40		J	1¼	D	"No" dd after several weeks' pumping.
24A1	H. Hosney	Up	280	Dg	40	30	40			do	19		P	½	D	
24D1	P. Uskoski	Up	300	Dg	15	30	15				7.3	4–26–49	J	¼	D	
24L1	J. Bellcoft	Up	285	Dg	16	30	16			Sand	4.9	4–22–49	P	¼	D	Cp.
24N1	W. F. Bennett	Up	280	Dr	158	10	158	80	78	Sand and gravel.	59	May 1952	T	30	Irr	Pumped 420 gpm, 73-ft dd. L.
24R1	G. Hosney	Up	275	Dg	17	30	17			Sand	6		J	¼	D	Cp.
25H1	Jack Bechill	Up	261	Dr	111	6	111	65	46	Gravel	51		T	1¼		Pumped 150 gpm, 40-ft dd. L.
25L1	H. R. and Hilda E. Hosney.	Up	275	Dr	305	8	295	106	42	Gravel, cemented.	69		T	15	Irr	Pumped 300 gpm, 11-ft dd. L.
								151	143	Sand, fine.						
								294	11	Sand, coarse.						
25M1	W. Rostich	Up	276	Dg	12	30	12			Sand and gravel.	93		C	¼	D	Cp.
26D1	J. L. Vall	Up	290	Dg	12	30	12			Sand	3		C	¼	D	Cp.
26Q1	H. Cunningham	Up	283	Dg	10	30	10				6.55	4–18–49	P		D	

27E1	G. H. Benjamin	Up	287	Dg	37	30	37(?)				32		J	¼	D	Cp.
27F1	W. D. Andrews	Up	285	Dr	253	6	253	251	2	Gravel	80				Irr	Pumped 4 hrs at 170 gpm, 27-ft. dd. L.
27F2	do	Up	285	Dr	295	12	295	258	21	Sand and	74	Mar. 1953	T	50	Irr	Pumped 500 gpm. 52-ft dd. L.
27H1	V. S. Phipps	Up	285	Dg	12					Sand	5		J	1½		
27J1	G. H. Billings	Up	285	Dg	16			5	11	do	3		C	5	Irr	Trench 30 by 50 ft pumped 125 gpm, 7½-ft dd.
27Q1	W. M. Lahy	Up	284	Dg	19	30	19			do	13		J	¼	D	Cp.
28A1	R. V. Somerell	Up	286	Dr	164	6	163	150	14	Gravel	84		J	½	D	Bailer test, 12-ft dd. L.
28C1	A. Groth	Up	290	Dr	160	6				do	50(?)		P	¾	D	
28C2	A. A. Groth	Up	285	Dr	247	8	247	212	33	Sand and gravel.	82				Irr	Pumped 120 gpm L.
28G1	George Jaglski	Up	290	Dr	147	6				Sand	87		J	¾	D	
28G2	H. L. Grantham	Up	285	Dr	160	6	160	155	5	Gravel			P	1	D	Bailer test, "no" dd. L.
28K1	T. Baker	Up	287	Dr	134	6	134			do	74		J	1		Bailer test, 20-ft dd.
28N1	M. Zimmerman	Uc	215	Dr	70	4					9(?)		P	1	D	Cp.
28P1	J. Hebert	Uc	257	Dr	170	6	170	169	1	Gravel	470		J	½	D	Bailer test, 10-ft dd. Cp. L.
28Q1	A. Adams	Up	272	Dr	131	6	126	124	7	Sand, black	86		J	1	D	Bailer test, 15-ft dd L.
29A1	S. W. Femlen	Uc	210	Dr	58	6				Gravel	17		C	1	D	
29B1	F. W. Fleming	S	190	Dg	26	20-12	26				2	July 1954	C	2½	D	Pumped 245 gpm, 15-ft dd. L.
29D1	George Brown	Uc	192	Dg	17					Sand	11		P	⅛	D	Cp.
29G1	H. G. Folkerts	Uc	210	Dg	14	12		4	10	Sand, coarse	1		C	5	D, Irr	Pumped 100 gpm 7-ft dd.
29G2	do	Uc	190	Dg	17	36	17			Gravel	5		J	½	D	Cp.
29H1	L. D. Flindt	Up	195	Dg	23	36	23	19	4	Sand, coarse	9	Aug. 1953	C	3	Irr	Pumped 60 gpm, 5½-ft dd. L.
29K1	H. G. Folkerts	Uc	210	Dg	18	30					7		C	3	Irr	Pumped 90 gpm, 2-ft dd.
29M1	A. Naegeli	Up	224	Dr	115	6	115			Gravel	44		J	2	D	Bailer test, 28-ft dd. L.
29Q1	John J. Birren	Uc	195	Dg	21	36									Irr	
30A1	H. E. Hallowell	Up	210	Dg	12					Sand	8		J	¼	D	Cp.
30C1	C. M. Coffey	Up	242	Dr	110	6	109	105	5	Gravel	77(?)		J	1	D	Bailer test, 7-ft dd. Ll
30K1	Evelyn Berger	Up	240	Dr	107	6	107	100	7	do	40		J	3	Irr	Pumped 68 gpm, 55-ft dd. L.
30R1	R. M. Ward	Up	243	Dg	25	30	25			Sand	5		J	⅛	D	Cp.
31C1	I. B. Jones	Up	255	Dg	22	6	22			Gravel	15.5	4-20-49	N			
31D1	D. Berger	Up	236	Dr	52	8	52			Sand	42		J	⅓	D	
31F1	A. M. Goetz	Up	260	Dr	35	11	35	22	13	do					Irr	
31J1	W. Schinn	Up	247	Dg	18	30	18			Gravel	12		J	½	D	
31M1	J. L. Lee	Up	255	Dr	35	6	35	15	20	Sand	12		J	2	D	Pumped 40-gpm, 24-ft dd. L.
31P1	N. B. Johnston	Up	260	Dg	6	288 by 288 pit.							C	10	Irr	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 3 N., R. 2 E.—Con.																
32G1	C. Sodelund	Uc	200	Dg	20	12				Sand	7.2	7-14-49	C	2	Irr	Pumped 3-hr at 60 gpm, 11-ft dd. Cp.
32H1	L. B. Slothower	Uc	205	Dn	23	2				do	14.5		C	⅓	D	
32K1	N. E. Humphreys	Uc	200	Dg	10	36					6		C	5	Irr	Pumped 100 gpm, 1½-ft dd.
32N1	A. Howard	Up	247	Dg	14	10				Gravel	9		C	⅓	D	Cp.
32Q1	A. D. Schuller	Up	204	Dg	15	16	15				4	July 1953			Irr	Pumped 350 gpm 4-ft dd.
33B1	Allan Cody	Up	275	Dr.	165	6				Gravel	95		P	1	D	
33K1	Homer Mosier	Uc	222	Dr	107	6	107	103	4	Sand, black	38		J	1	D	Bailer test, 29-ft dd. Cp. L.
33M1	J. M. Harrington	Uc	213	Dr	87	5				Gravel	21		J	½	D	
33P2	J. Ingstrom	Uc	220	Dr	77	6	77	75	2	do	27		P	½	D	L.
33Q1	E. D. Andrew	Uc	220	Dg	30	30	30			do	23		J	⅛	D	
34D1	M. Chapman	Up	283	Dr	132	6				do	57		J	¾	D	
34E1	H. H. Cady	Up	275	Dr	122	6				do	60		J	1	D	Cp.
34L1	R. O. Woster	Up	260	Dr	135	6	134	126	9	Sand, black	79					Bailer test, 9-ft dd. L
34M1	J. H. Wells	Up	265	Dr	129	6				Sand	66		P	¾	D	
34M2	H. E. Wheelock	Up	265	Dr	120	6	120			do	82					Bailer test, 7-ft dd.
34N1	Frank Campbell	Up	260	Dr	128	6	128	116	12	Gravel	73		J	1½	D	Bailer test, 30-ft dd. L.
34P1	R. T. Gould	Up	252	Dr	146	6	126	124	22	Boulders and gravel	65		J		D	Bailer test, "no" dd. L.
34P2	Henry Thomas	Up	270	Dr	135	6	133	130	5	Sand, black	80					Bailer test, 15-ft dd. Cp. L.
35C1	Ed Lematta	Up	283	Dr	77	4				Gravel	53		J	⅓	D	Cp.
35E1	Frank Leahy	Up	275	Dg	18	30	18			do	9		C	½	D	
35H1	E. F. Dunning, Jr.	Up	270	Dg	8			5	3	do	4.5		C		Irr	Trench 30 by 15 ft, pumped 150 gpm. 1½-ft dd.
36D1	C. Donaldson	Up	280	Dg	42	33	42				22		J	1	D	Water temp 49°, Cp.
36H1	Anna Savage	Up	257	Dg	16	60	16			Sand	8.5	4-15-49	J	½	D	
36R1	R. J. Davis	Up	255	Dg	11	36	11			do	4.10	6- 8-49	C		D, Irr	Reportedly penetrated hardpan (cemented gravel?). Irrigates small garden. Cp.

T. 3 N., R. 3 E.																
3A1	W. A. Thompson	S	750	Dg	12	------	------	------	------	Clay	8.3	7-29-49	P	¼	D	
3Q1	F. Marini	S	560	Dg	35	------	------	------	------	Rock	31.5	7-29-49	N	------	------	Cp.
4A1	B. E. Elvestrom	S	420	Dg	18	30	18	------	------	Rock	14.8	8-1-49	J	½	D	
4M1	F. H. Getchell	S	435	Dg	19	30	------	------	------	Clay	13.8	8-1-49	N	------	------	Cp.
5K1	H. Handschin	S	395	Dg	26	30	------	------	------	Sand and gravel.	22.8	8-1-49	J	⅛	D	
6G1	E. G. King	S	480	Dg	28	------	------	------	------	Gravel	24.6	8-2-49	J	½	D	Cp.
7L1	Irving Matson	S	315	Dr	160	6	------	------	------	------	------	------	P	1	D	Reportedly can be pumped dry.
8J1	W. P. Harris	Ub	540	Dg	40	48	------	------	------	Sand	32.6	7-26-49	P	¾	D	
8L1	J. Miller	Ub	530	Dg	31	60	------	------	------	Gravel	21.6	7-26-49	P	¼	D	
8M1	H. Harlow	Ub	550	Dg	46	60	------	------	------	do	41.6	7-26-49	J	¾	D	
8Q1	W. E. Weisenborn	Ub	540	Dr	138	6	138	135	3	Sand, black	110	------	J	1½	D, Ind	Bailer test, 12-ft dd. Supplies two houses and a sawmill, L.
9K1	W. Arola	H	650	Dg	63	------	------	------	------	Sand	41.2	7-26-49	J	------	D	
16Q1	Hannes Eddy	S	510	Dr	60	6	------	50	10	Rock, volcanic	------	------	J	½	D,S	Plenty of water reported for large dairy and chicken farm.
17L1	Z. S. Sakrison	Ub	530	Dr	112	6	------	------	------	Rock(?)	62	------	J	------	D	Large supply reported.
17N1	William Ahola	Ub	530	Dr	102	6	102	93	9	Sand	67	------	J	1	D	Bailer test, 26-ft dd. Cp, L.
18P1	Hockinson School	Up	315	Dr	85	6	------	------	------	------	31	------	P	10	Inst	Reported to have been pumped for long periods at 20 gpm.
18R1	S. K. Bain	Ub	498	Dr	108	6	103	100	8	Sand, black	75	------	J	1	D	Bailer test, 5-ft dd. L.
19A1	Fred Laws	H	480	Dr	167	10	145	------	------	Gravel	47.6	3-18-52	------	------	------	L.
19C1	Hockinson Co-op.	Up	295	Dg,Dr	142	6-4	142	------	------	------	------	------	------	------	Ind	Large supply, reported, but turbid. Used for cooling.
19D1	A. Schimpf	Up	270	Dr	68	6	68	60	8	Gravel	21.60	6-9-49	J	½	D	Water temp 53.5°. Pumped 18 gpm, 15-ft dd, L.
19F1	Charles Lindstrom	Up	290	Dg	55	36	55	------	------	------	10	------	P	¼	D	Adequate supply which never fails reported.
19J1	C. R. Whitlock	Ub	468	Dr	192	6	------	------	------	Sand(?)	------	------	P	¾	D	Large supply reported.
19K1	Frank Crow	Up	302	Dr	79	6	------	75	4	Gravel	60	------	------	------	S, Irr	Yellow clay to 75 ft. Water reportedly contains too much iron for drinking.
20B1	Earl Bruley	Ub	525	Dg	27	48	------	------	------	------	25.34	6-7-49	J	½	D	
20C1	Ivan Lucas	Ub	525	Dg	30	36	30	------	------	Gravel and clay.	22	------	J	¼	D, S	Pumped 5 gpm 4-ft dd.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 3 N., R. 3 E.—Con.																
20K1	Henry Schlichting.	Ub	505	Dg	32	10	32	----	----	Sand(?)	20.96	6- 9-49	N	----	D	
21M1	John Huhtala	S	527	Dr	94	6	94	85	9	Gravel, cemented.	20	----	J	1	D	Pumped 15 gpm, 25-ft dd, L.
28D1	Watt Colson	Ub	484	Dr	160	8	50	50	----	Rock, volcanic.	9.14	6- 7-49	C	1/8	D, S	Pumped 4 hr, "no dd," Cp.
29C1	Warren Powell	Ub	470	Dg	31	48	----	----	----	----	23.61	6- 9-49	C	1/4	D	Good supply of soft water reported.
31B1	Oliver Kivinen	S	295	Dr	125	6	----	90	35	Gravel, hard(?).	----	----	J	1	D	Clay to 90 ft. Water reported to be soft, with no iron.
31D1	E. Matson	Up	257	Dg	13	30	13	----	----	----	7.41	6- 8-49	----	----	D	Water reported to have poor taste. Report can be pumped dry. Cp.
31G1	Matson Brothers	Up	270	Dg	44	42	----	44	----	Sand and gravel.	6	----	N	----	----	Blue clay to 44 ft. Very large supply reported.
31H1	Henry Schrader	S	375	Dg	22	48	----	----	----	----	19.13	6- 8-49	C	1/2	D	Water reported to be soft.
31J2	Agda Pietila	S	297	Dr	121	6	121	----	----	Sand and gravel.	60	----	J	1	D	Pumped 25 gpm, "no dd."
31J3	Andrew Cook	Up	297	Dr	60	6	----	----	----	do	40	----	J	1/2	D	Plenty of water reported.
31K1	Winfred Matson	Up	278	Dg	36	48	----	36	----	Sand	24	----	J	1	D	Soil from 0 to 8 ft; cemented gravel from 8 to 32 ft; sand from 32 to 36 ft.
31P1	Harry Lawson	Up	255	Dg	15	30	14	----	----	Clay and gravel.	9.30	6- 7-49	J	1/4	D	
32A1	Andrew Huntila	Ub	460	Dg	22	30	22	----	----	----	9.44	6- 7-49	P	1/4	D	
32D1	Nick Antila	S	415	Dg	22	48-60	4	----	----	----	14.75	6- 8-49	J		D	
32H1	Cook Brothers	Ub	440	Dg	20	48	----	20	----	Sand, black	9.60	6- 7-49	N	----	----	
32K1	Ray Hook	S	430	Dg	26	48	8	----	----	Gravel, cemented.	20	----	J	1/2	D	Layer of round boulders at 12 ft. Good supply reported.

32N1	C. R. Ellenwood, I. M. Brown.	Up	275	Dr	66	6	66	62	4	Sand, black	41.00	6-7-49	J	½	D	Bailer test, "no" dd. L.
32P1	E. E. Foreman	S	310	Dg	15	600					2		C	1½	Irr	Pumped 100 gpm, 4-ft dd.
33K1	G. Fimmel	S	383	Dg	17	24	17	17		Clay and gravel.	15.35	5-4-49	C		D	
33M1	Cook Bros. Dairy	Ub	460	Dg	18	48				do	4.62	do	P		S	
T. 4 N., R. 1 W.																
12H1	H. D. Perry	S	160	Dg	17	30				Gravel	15.2	9-9-49	P		D	
13J1	H. Hoord	S	80	Dg	14	48				do	4.5	do	J	½	D	
13Q1	Northern Pacific Ry.	T	40	Dr	109	12-10	109	105	4	Gravel and sand.	36	do	T	5	Ind	Pumped 254 gpm 27-ft dd, L.
T. 4 N., R. 1 E.																
1J1	I. D. Eagle	Up	262	Dg	45	42					43.6	8-31-49	J	⅓	D	
1Q1	William Beck	Ub	235	Dr	55	6				Gravel				⅓	D	
2B1	K. E. Anderson	Ub	300	Dr	212	8	212				160	February 1953	J	1½	D	
2D1	T. V. Doizab	S	140	Dg	28	36					21.3	8-30-49	J	⅓	D	
2H1	H. R. Buckley	Ub	178	Dg	54	30				Clay	48.3	8-16-49	J	1	D	
3F2	N. A. Rashford	S	90	Dg	18	36					14.6	9-6-49				
4L1	E. D. Taylor	Up	235	Dg	24					Clay	17.3	9-9-49	P	¼	D	
4N1	H. Stanley	Up	267	Dr	325	6				Sand			P	3	D	
5E1	L. R. Hussa	Up	235	Dr	300	8	299	296	4	Gravel and sand.	217		T		D	Cp, L.
5H1	G. Huston	Up	215	Dr	275	6				"Clay," blue	150		P	½	D	
5Q1	D. Smith	S	230	Dg	15					Gravel	8.5	9-9-49	P		D	
7H1	E. Johnson	Up	252	Dr	359	6-4	359			do			P	2	D	Bailer test, "no" dd. L.
7Q1	Arthur Whitler	Up	200	Dr	550	6-4	459						N		NU	500 gpd repored. L.
7R1	J. O. Downing	Up	255	Dr	203	6	203	188	15	Sand			P	¾	D	Pumped 2½ gpm. L.
8M1	C. L. Bisher	Up	255	Dr	406	6	406			do	235		P		D	Pumped 10 gpm, 15-ft dd. L.
8N1	W. Darr	Up	243	Dr	257	6				Gravel	223(?)		P	¾	D	Pumped 7 gpm. L.
9M1	A. L. Spencer	Up	264	Dr	130	6				Sand	50		P	1	D	
9R1	I. Winiger	Up	280	Dg	45					do	42.2	9-9-49	P	¼	D	
10N1	N. Anderson	S	200	Dg	18	42				Clay	13.2	9-9-49	P	¼	D	
11B1	O. P. Lewellen	S	120	Dr	135	6										Could not be developed. L.
11B2	do	S	40	Dr	141	6										Do.
11G1	do	Uc	16	Dr	45	6(?)									D	Bailed 2½ gpm. L.
12C1	W. E. Keys	S	205	Dr	184	6				Gravel	144		P	1½	D	
12G1	D. F. Shattuck	Up	210	Dr	190								T	1	D	
12G2	R. E. Jenkins	Up	210	Dr	200	6					160					Water reported to be corrosive.
12R1	A. Weber	Up	210	Dg	31	30				Clay	30.8	8-31-49	J	⅓	D	
13J1	W. C. Smith	Fp	30	Dg	6	36					2				Irr	Pumped at 364 gpm, 1½-ft dd.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 4 N., R. 1 E.—Con.																
15H1	T. Richards	Up	280	Dg	21	30				Sand	13.3	9-9-49	J	⅓	D	
15P1	G. G. Pittman	Up	285	Dr	360	6				do	230		P	2	D	
16C1	A. W. Sundvick	Up	272	Dr	274	6	274	258	14	do	250		P	1¼	D	Cp. L.
16D1	H. Weston	Up	265	Dr	277	6	277	256	14	do	250		P	¾	D	L.
16H1	S. D. Zimmerly	Up	280	Dr	630	6-3	630			do	190		P		D	Cp.
16Q1	E. Hardt	Up	270	Dg	30	48				do	12		C	⅓	D	
17E1	M. Starkey	Up	260	Dg	17					Gravel	15.6	9-9-49	P	¼	D	
17H1	C. B. Moffett	S	225	Dr	660	6-5	660						N		NU	No water reported. L.
17H2	do	S	225	Dr	209	6	209	190	19	Sand	194		P		D	Pumped 30 gpm. L.
17H3	do	S	200	Dr	200	12-6	200	173	27	do	173		P	5	D	Pumped 30 gpm. Cp. L.
17N1	D. G. Lane	Up	265	Dg	11	36-60				do	1.8	5-11-49	C	½	D	
17Q1	Paul and Marion Bellows.	S	210	Dr	360	6	360	190	170	Sand, fine	174	May 1953	T	10	D, Irr	Pumped 4 hrs at 53 gpm, 141-ft dd.
18E1	O. J. Shirley	S	135	Dg	40					Gravel, cemented.	33.5	9-9-49	J	⅓	D	
19E1	Town of Ridgefield.	S	40	Dg	35	120	34	8	27	Gravel, coarse	22		T	20	PS	Pumped 4 hrs at 250 gpm, 11-ft dd. Water temp 51°. Cp.
19E2	do	S	35	Dg	35	120	35	14		Gravel			C	45	PS	Pumped 12 hrs at 250 gpm, 6-ft dd.
19E3	do	S	35	Dr	65	10	65	50	6	do	38	May 1955			PS	Pumped 150 gpm, 16-ft dd. L.
19K1	G. Benedict	S	55	Dr	117	6				do	52		J	⅓	D	Cp.
19R1	A. F. Frewing	S	240	Dr	150	6	150	145	5	Gravel and sand.	122	September 1955			D	Pumped 36 gpm, 6-ft dd. L.
20C1	Pearl Talbert	Up	260	Dr	343	6	343	310	25	Sand	229		T		Irr	Pumped 60 gpm, 78-ft dd. L.
20E1	E. R. Northup	Up	220	Dg	32	48				do	21		C	¾	D	Cp.
20F1	C. Bramlett	Up	248	Dg	9	36				Gravel	5.9	5-11-49	C	¼	D	
20G1	John Ryf	Up	260	Dr	227	6	227			Gravel, cemented.			P	1½	D	Pumped 10 gpm. L.
21A1	A. Kapus	Up	272	Dr	196	6				Sand	189		P	1	D	
21E1	F. Forsberg	Up	258	Dr	119	6				Gravel	110		P	1	D	
21J1	C. Greeley	Up	283	Dr	210	6				Sand	180		P	3	D, S	
21L1	H. Lahti	Up	255	Dr	202	6				Gravel	174		P	1	D	Cp.

22A1	Jules Kercheart	Up	280	Dr	601	8	601	------	------	------	------	------	T	5	D, S	
22H1	F. Schweizer	Up	290	Dr	571	4	------	------	------	Sand	250	------	T	5	D, S	Used for dairy. Cp.
22L1	J. Glarum	Up	280	Dg	18	48	------	------	------	do	14	------	C	¼	D	
22N1	D. Hallowell	Up	270	Dr	185	6	------	100	------	Gravel	158	------	------	------	------	Cemented gravel from 85 to 185 ft. Pumped 1 hr at 30 gpm, 12-ft dd.
22N2	J. Timms	Up	275	Dr	174	6	174	169	5	Sand and gravel.	155	------	------	------	------	Bailer test, 4-ft dd. L.
23A1	William McKee	Up	300	Dr	340	8	340	312	11	Sand, coarse	275	------	T	6	Irr	Pumped 100 gpm, 10-ft dd. L.
23B1	L. Ogle	Up	295	Dg	31	30	------	------	------	Sand	17	------	C	⅓	D	Cp.
23D1	G. Coker	Up	295	Dg	20	30	------	------	------	Clay	6.1	5-10-49	J	½	D	
23H1	R. L. Deaver	Up	295	Dg	18	48	------	------	------	Sand	5.5	------	P	¼	D	Cp.
23R1	R. E. Walden	Up	285	Dg	18	36	------	------	------	do	15.3	5- 5-49	P	⅓	D	
25H1	M. W. Yankee	Up	218	Dr	63	6	------	------	------	Gravel	33	------	J	⅓	D	Cp.
26C1	A. Senti	Up	260	Dg	18	------	------	------	------	Sand	13	------	C	¼	D	Cp.
26H1	J. Lindvlon	Up	275	Dr	155	6	------	------	------	Gravel, cemented.	120	------	J(?)	1	D	
26M1	C. A. Robinson	Up	265	Dr	675	8	672	120	165	Sand and gravel.	96.70 102.95	4-23-51 12-13-55	Sub	5	Ind	Water reported to be high in iron and CO_2. Water temp 52°. Test pumped 2 hrs at 150 gpm. L.
27P1	Frank Bowles	Up	257	Dr	106	6	106	82	24	Sand and gravel.	82	6- 3-49	T(?)	1½	D	Bailer test, 4-ft dd. Cp. L.
27R1	J. H. Tucker	Up	270	Dr	131	6	131	125	6	Sand, black	73	------	J	1	D	Bailer test, 11-ft dd. Cp. L.
28D1	G. E. Moore	Up	270	Dr	180	6	------	------	------	Gravel	120	5-10-49	P	2	------	Pumped 8 hr, "no" dd.
28F1	A. Mann	Up	235	Dg	31	30	------	------	------	Clay	6.6	do	P	------	D	
28M1	H. Wells	S	210	Dg	16	30	------	------	------	Gravel	6.2	do	C	⅓	D	
28R1	J. H. Bloom	S	225	Dr	134	6	134	124	10	do	94	------	J	1	D	Bailer test, 13-ft dd. L.
29F1	J. E. Royle	S	180	Dr	131	6	131	110	21	do	71	------	P	2	D	Bailer test, 36-ft dd. L.
29G1	Fred Zink	Up	258	Dr	142	6	142	125	17	do	113	------	P	1	D	Bailer test, 9-ft dd. Cp. L.
29M1	D. F. Wells	Up	285	Dr	228	8-6	228	189	4	do	170	Dec. 1953	------	------	------	Pumped 40 gpm, 46-ft dd. Well originally drilled to 308 ft. L.
								198	30	Sand and gravel.						
29N1	L. Groat	Up	280	Dr	187	6	------	------	------	Gravel	170	------	P	1	------	
31B1	L. Anderson	Up	260	Dg	5	60	------	------	------	Sand	0	------	C	½	D	Cp.
32B1	B. Bartell	Up	280	Dr	154	6	------	------	------	Gravel	137	------	P	¾	D	Cp.
32J1	Lytle	Up	270	Dr	157	6	157	------	------	do	141	------	P	1½	D	Bailer test, 12-ft dd. L.
32L1	F. O. Hastings	Up	275	Dg	12	48	------	------	------	do	3	------	C	½	D	
32R1	E. C. Condon	Up	265	Dr	155	6	------	------	------	do	146	------	J	½	D	
32R2	A. Sandmann	Up	275	Dr	160	6	157	155	5	Sand, black	97	------	P	1	D	Bailer test, 12-ft dd. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 4 N., R. 1 E.—Con.																
33B1	Reuben Schwantes.	Up	228	Dg	25	48				Sand	19		C	½	D	
33J1	A. W. Bottemiller.	Up	268	Dg	24	48				Clay, sandy	12		C	½	D	
33J2	do	Up	262	Dr	133	6	133	130	3	Gravel	98		J	1½	D	Bailer test, 19-ft dd. L.
33M1	E. Sylvester	Up	275	Dr	125	6				do	40		P	1	D	Cp.
34D1	E. L. VanVolkenberg.	Up	225	Dg	22	48				do	4	5-10-49		⅓	D	Cp.
34F1	A. Bottemiller	Up	260	Dg	15	30				Sand	12.45	5-13-49	P		D	
34M1	E. Leopold	Up	275	Dr	127	6	126	116	11	Sand and gravel.	98					Bailer test, 12-ft dd. L.
35H1	L. Edwards	Up	283	Dr	115	6				Gravel	55		J	1	D	
35J1	S. J. Gurtle	Up	281	Dr	129	6				do	90		J	1	D	Cp.
35N1	Albert Ost	Up	275	Dr	129	6	129	126	3	Gravel(?)	94					Bailer test, 3-ft dd. Cp, L.
35R1	E. DeMaster	Up	287	Dr	131	6				Sand	91		P	¾	D	Cp.
36B1	Mrs. Johnson	S	230	Dr	127	8	115(?)	115	13	Gravel	62		T	7½	Irr	Pumped 75 gpm, 46-ft dd. L.
36C1	P. Armstrong	H	240	Dg	6						0		P	1		
36J1	H. A. Simonson	Up	235	Dg	18	30				Sand	4.2	5- 5-49	J	1	D	Cp.
36L1	W. H. Eccleston	Up	295	Dr	147	6	147			do	127		J	2	D	Bailer test, 6-ft dd.
36M1	T. Engleking	Up	285	Dr	135	6	133	130	5	Sand, black	105		P	2	D	Baler test, 12-ft dd. L.
36N1	V. Bales	Up	292	Dr	145	6	143	140	5	do	110		P	2	D	Bailer test, 16-ft dd. L.
T. 4 N., R. 2 E.																
2A1	F. Wayne	S	486	Dg	24	30					14.2	8-22-49	P	¼	D	
4L1	H. L. Batchelder	Ub	510	Dg	22	24				Clay	16.2	do			D	
6L1	C. Abrahamson	S	320	Dg	9	36				Sand	0.5	8-31-49			D	
6N1	C. Ottinger	S	400	Dg	18					Gravel	14.2	do	P	¼	D	
7J1	C. C. Anderson	Up	270	Dg	15	30-6				Sand	7.5	do				
8K1	H. Jaster	S	330	Dr	129	6	104			do	94		N		NU	Can be bailed dry. L.

9E1	John Anderson	S	430	Dr	495	6							N		De	Very salty water reported at 294 ft. L.
9H1	D. D. Gross	S	590	Dg	23	36				Sand	19.6	8-22-49	J	¾	D	
10R1	Gearhardt Person	S	460	Dg	36						11.6	do	P	¼	D	
11A1	H. Hartlow	S	380	Dg	16					Sand and gravel.	12.1	do	P		D	
11F1	R. Pender	S	404	Dr	328	6	280			Clay, blue	66(?)		P	½	D	Pumped 250 gallons per day. L.
11H1	R. C. Baker	S	425	Dg	31	30					24.3	8-18-49	P	¼	D	
12K1	C. Odem	S	707	Dr	75	6				Clay	45		J	½		
13G1	A. Blaker	S	390	Dg	29	36				do	25.5	8- 3-49	C(?)	½	D	Cp.
14A1	G. Shileika	S	430	Dg	30	36					23.2	8-18-49	J	⅓	D	
16B1	J. L. Hockinson	S	335	Dr	153	6				Gravel						Water reportedly struck at 101 ft; water drained out.
16B2	do	S	335	Dr	196	6				Sand						No water reported.
16D1	Fred Prew	S	290	Dr	125	6	125	116	9	do	95		P			Bailer test, 10-ft dd. L.
16H1	K. Ritzau	S	360	Dr	155	6				Gravel	142		T(?)	1½	D	
16P1	M. Besich	Up	293	Dr	112	6	111	104	8	do	92		J	1	D	Bailer test, 8-ft dd. Cp, L.
16R1	R. M. Brooks	Up	315	Dr	75	6				Sand	65.2	5- 3-49	J	2	D	Cp.
17B1	A. B. Shell	Up	296	Dr	119	6				do			P	½	D	
17L1	A. H. Bridge	Up	260	Dg	19	30				Clay	13.5	8-22-49	P	¼	D	
17N1	H. Ogden	Up	215	Dg	75	30				Gravel	69		J	¾	D	
17R1	Carl Wooldridge	Up	281	Dr	105	6				do	80		J	¾	D	
18D1	H. J. Maxwell	Up	230	Dr	183	6				Sand	163(?)		P	1	D	Pumped 7½ gpm. L.
18M1	W. C. Smith	Fp	40	Dg	5	36				Gravel	1.7	8-31-49	J	⅓	D	
19B1	W. E. Ennis	Fp	50	Dg	11	30				do	7		C	¼	D	
19C1	William C. Smith	Fp	50	Dg	15	36					12				Irr	Pumped at 147 gpm.
19J1	M. L. Amy	Fp	67	Dg	11	30				Gravel	8.0	5- 3-49	J	¼	D	Cp.
20A1	Lloyd Webb	Up	245	Dr	71	6	71	56	15	do	39.0	10- 3-50	J	½	D, S	Bailer test, 7-ft dd. L.
20C1	B. Norton	Up	270	Dr	101	6				do	57		J	2	D	Cp.
20Q1	C. H. Defrees	Fp	90	Dr	68	6				do	9		P	1	D	
21B1	L. Green	Up	260	Dr	73	6	73	67	6	Sand, black	47		J	½	D	Bailer test, "no dd." L.
21C1	L. Woodridge	Up	250	Dr	55	6	55	51	4	Gravel	25					Bailer test, 13-ft dd. L.
22E1	H. M. Nelson	Up	260	Dr	172	6	172	169	3		160		J	3	D	Pumped 96 hrs at 12½ gpm, "no" dd. Cp, L.
22H1	Lewisville Park	T	165	Dr	240	10-14(?)	48	22(?)	10	Sand	22		T	5	Inst	Pumped 130 gpm, 15-ft dd.
															Irr	Log of 240-ft test hole.
23B1	L. C. Gulde	S	475	Dr	137	6				Gravel	107		J	¾	D	
23D1	E. Potter	S	290	Dg	24	36				do	4		J	½	D	Cp.
24Q1	H. Jaske	Ub	600	Dr	87	6	24			Lava	66		J	½	D	Bailer test, 6-ft dd. L.

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 4 N., R. 2 E.—Con.																
24R1	Andy Hansen	S	540	Dr	180	8	159	45	--------	Rock and cinders.	33	March 1953	--------	--------	Irr	Pumped 420 gpm, 36-ft dd. L.
25K1	R. W. Linn	S	420	Dr	61	6	59	59	2	Sand, black	13	--------	J	¾	D	Bailer test, "no" dd.
25M1	F. Osban	S	385	Dg	40	36	--------	--------	--------	Gravel	28	--------	J	¼	D	Cp., L
26A1	C. Kunz	S	414	Dr	121	6	--------	--------	--------	do	96	--------	P	¾	D	Cp.
26F1	E. Meyer	S	376	Dr	106	6	--------	--------	--------	do	92	--------	P	1	D	Pumped 10 gpm, 3-ft dd. L.
26K1	M. F. Adams	S	385	Dr	107	6	--------	--------	--------	Gravel(?)	80	--------	P	--------	D	
26L1	W. A. Nelson	S	384	Dr	114	5	112	112	2	Gravel	88	--------	--------	--------	D	Could not bail dry at 20 gpm. L.
26N1	L. Bodin and G. Caines.	S	340	Dr	139	6	139	--------	--------	Gravel(?)	99	--------	T	3	D	Bailer test, "no" dd.
26Q1	Lester Burkey	S	360	Dr	56	6	--------	46	10	Clay and gravel.	10	--------	J	½	D	Pumped 6½ gpm. L.
26Q2	N. B. Edwards	S	360	Dr	131	6	131	119	4	Gravel, fine	77	--------	T	3	Irr	Pumped 48 gpm, 38-ft dd. L.
27Q1	Brosseau	S	314	Dr	107	6	--------	--------	--------	Sand	86	--------	J	¾	D	
28M1	H. Adam	Up	230	Dr	83	6	--------	--------	--------	do	66	--------	J	¾	D	Cp.
28Q1	H. Meyers	Up	250	Dr	89	6	--------	--------	--------	do	53	--------	J	1	D	Cp.
28Q2	C. Spicer	Up	270	Dr	90	6	89	55(?)	35(?)	Gravel	71	--------	P	⅛	D	Bailer test, 6-ft dd. L.
28R1	Robert Cresap	Up	247	Dr	66	6	58	62	4	Sand, black	24	--------	J	1	D	Bailer test, "no" dd. L.
29A1	E. Cook	Fp	100	Dg	20	30	--------	--------	--------	do	15	--------	C	½	D	
29P1	R. Luekke	Up	245	Dr	160	6	--------	--------	--------	do	110	--------	J	2	--------	
29R1	L. A. Ham	Up	265	Dg	65	36	--------	--------	--------	Clay	50	--------	P	--------	D	
30A1	C. Jernigan	Up	210	Dr	80	6	--------	--------	--------	Gravel	20	--------	J	1	D	
30C1	P. Yankee	Up	195	Dr	245	6	--------	--------	--------	Sand	15	--------	J	1	D	
30D1	Force	Up	210	Dr	66	6	--------	--------	--------	--------	36	--------	P	½	D	
30J1	G. Blake and R. Salt.	Up	230	Dr	80	4	--------	--------	--------	Gravel	45	--------	J	½	D	
30P1	J. T. Barnes	Up	195	Dr	47	6	--------	--------	--------	do	--------	--------	J	⅛	D	
31A1	O. F. Brookshire	Up	229	Dr	114	5	--------	--------	--------	do	85	--------	J	1	D	L.
31J1	H. A. Burke	Up	225	Dg	32	30	--------	--------	--------	--------	17.7	5-3-49	C	¼	D	Cp.
31K1	J. Lorentz	Uc	200	Dg	26	30	--------	--------	--------	Gravel	11	--------	P	¼	D	
32N1	S. L. Dollar	Up	220	Dr	129	6	128	--------	--------	Sand	77	--------	J	1	D	Bailer test, 23-ft dd.
32P1	J. LeFors	Up	230	Dr	72	5	--------	--------	--------	Gravel	12	--------	J	1	D	Pumped 8 hr. 60-ft dd.

33D1	L. Bates	Up	269	Dg	18	--	--	--	--	do.	10	--	P	⅛	D	Cp.
33D2	M. E. Rengo	Up	275	Dr	63	6	63	48	15	Gravel(?)	35	--	J	--	D	Bailer test, 10-ft dd. L.
33E1	K. R. Deffenbaugh.	Up	267	Dr	84	6	83	78	6	Sand, black	56	--	P	¾	D	Bailer test, 12-ft dd. L.
33G1	Floyd Wickersham.	Up	276	Dr	122	6	122	113	9	do.	92	--	--	--	--	Bailer test, "no" dd. L.
33N1	J. Eves	Up	258	Dr	94	6	91	--	--	Sand(?)	54	--	J	1	D	Pumped 10 gpm, 15-ft dd. L.
34A1	H. Matson	S	320	Dg	43	60	--	--	--	--	30.7	5-2-49	P	½	D	Cp.
34D1	K. Sonntag	Up	290	Dr	90	6	--	--	--	Gravel	90	--	J	1	D	
34D2	L. Sonntag	Up	290	Dr	90	6	90	88	2	Sand, black	74	--	J	⅛	D	Bailer test, 4-ft dd. L.
34M1	V. W. Milholland	Up	280	Dr	78	6	--	--	--	Gravel	43	--	J	1½	D	Cp.
34M2	F. Haines	Up	277	Dr	71	6	50	64	7	Gravel	46	--	J	1	D	Bailer test, 9-ft dd. L.
34R1	Battle Ground School.	Up	295	Dr	301	12	180	98 140	15 25	Gravel and boulders. Gravel	--	--	T	10	Inst	Pumped 200 gpm, 70-ft dd. L.
35E2	H. E. Reese	S	308	Dr	100	6	96	92	8	Sand, black	75	--	J	½	D	Bailer test, "no" dd. L.
35F1	R. Porter	S	312	Dr	57	6	57	53	4	do.	40	--	J	⅛	D	Do.
35G1	Daisy Bush	S	312	Dr	57	6	--	55	2	do.	27	--	P	--	D	Bailer test, 23-ft dd. L.
35G2	Chadwick	S	312	Dr	56	6	50	52	4	do.	33	--	--	--	--	Bailer test, "no" dd. L.
35G3	Robert Cresap	S	312	Dr	56	6	50	49	7	do.	30	--	--	--	--	Bailer test, 12-ft dd. L.
35H1	J. Scranton	S	315	Dr	58	6	56	56	2	do.	30	--	--	--	--	Bailer test, 6-ft dd. L.
35H2	O. Foeh	S	315	Dr	99	6	62	94	5	Sand and gravel.	68	--	J	1	D	Bailer test, 8-ft dd. L.
35L1	A. C. Zeller	S	305	Dr	100	6	--	--	--	Gravel	90	--	P	½	D	
35N1	Henry Rieck	Up	295	Dr	81	6	--	80	2	Sand and gravel.	40	--	--	--	--	
35P1	H. R. Morris	S	295	Dr	56	6	55	49	7	Sand, black	28	--	P	½	D	Bailer test, 9-ft dd. L.
35R1	A. Kalse	S	360	Dr	118	6	92	91	27	Lava	80	--	J	1	D	Bailer test, 7-ft dd. L.
36R1	A. Louto	S	455	Dg	37	6	--	--	--	Gravel	16	--	J	⅛	D	Cp.
T. 4 N., R. 3 E.																
2M1	W. V. Schuller	Ba	660	Dg	11	60	--	--	--	Gravel, cemented.	6.7	8-8-49	P	--	D	
3K1	V. E. Miller	H	1,040	Dg	11	30	--	--	--	Gravel	7.3	do.	P	--	D	
5E1	W. Long	S	1,100	Dg	28	--	--	--	--	Clay	16.9	8-9-49	P	--	D	
7D1	R. Roberts	S	900	Dg	14	--	--	--	--	Gravel	12.0	8-8-49	P	--	D	Cp.
8Q1	C. Reynolds	Fp	400	Dr	58	5	57	57	1	Sand, black	38	--	T(?)	1	D	Bailer test, 6-ft dd. reported. L.
10H1	I. F. Davies	H	980	Dg	19	--	--	--	--	Clay	14.9	8-8-49	P	--	D	Cp.
11A1	W. E. McCutcheon.	Ba	645	Dg	23	30	--	--	--	Gravel, cemented	17.4	do.	C	¾	D	Cp.
11E1	H. Teel	S	790	D	9	30	--	--	--	Gravel	6.2	do.	P	¼	D	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character of material	Water level: Depth	Water level: Date	Pump: Type	Pump: H.P.	Use	Remarks
T. 4 N., R. 3 E.—Con.																
11H1	A. Rast	Ba	625	Dg	9					Gravel	5.7	8-8-49	P	¼	D	Cp.
12N1	S. B. Knox	S	620	Dg	11					do	8.4	7-30-49	P		D	
13G1	R. C. Place	Ba	660	Dg	12	12				Gravel, cemented.	6		P		D	Well reportedly can't be pumped dry by hand pump.
17D1	A. J. Gatska	Fp	360	Dg	14	8				Gravel	6.8	8-2-49	P	¼	D	"No" dd reported.
17D2	C. Johnson	Fp	360	Dg	16	36					12.0	do	J	⅓	D	Do.
18N1	C. R. Horsch	S	418	Dg	32	36				Gravel(?)	27		P	¼	D	Cp.
18N2	do	S	425	Dr	580	6					Flows	8-2-49	N			Water flows over top of well. Cp.
18N3	H. W. Heisson	S	418	Dr	161	6	161				15		N		NU	Insufficient water reported. L.
19F1	R. E. Toevoner	S	440	Dr	48	6				Sand			J	½	D	Small supply reported.
19R1	Glenn Heagy	S	450	Dr	45	6					Flows	February 1955.			D	Flows 9 gpm.
20P1	Walter Ek	S	550	Dr	228	6	41	40	188	"Rock"	90	do	T	5	Irr	Pumped 33 gpm, 40-ft dd. L.
28E1	G. S. Carson	S	520	Dr	53	6	27	26		Lava	38		P	½	D	L.
28P1	H. Halvorsen	S	540	Dr	123	6				"Rock"	45		J	1	D	Reportedly pumps dry rapidly.
28R1	Winston	Ub	650	Dg	15					Clay	11.6	8-11-49	P		D	
29B1	E. M. Koski	S	510	Dr	140	8	53	140		Gravel	56				Irr	Pumped 350 gpm, 10-ft dd. L.
29M1	O. E. Poteet	S	550	Dr	250	6				Sand			P	½	D	
29P1	K. Graham	S	540	Dg	30	30				do	25.6	8-1-49	P	¼	D	
30B1	W. Adams	S	455	Dr	65	6					45		J	½	D	
30J1	A. Thom Estate	S	510	Dr	200	6	170	165	5	Sand			P	¾		L.
30K1	G. P. Hale	S	450	Dr	42	6				"Ash, volcanic."			P	½	D	
30Q1	Fred Duvall	S	463	Dr	173	4										L.
31G1	E. D. Jennison	Ub	540	Dg	19	30				Sand	17		P		D	
31Q1	W. Kangas	Ub	515	Dg	12					Clay	8.3	8-1-49	C	¼	D	
32E1	Andy Schmid	Up	600	Dg	12	48				Gravel	4.23	2-18-55	C		Irr	

33D1	H. J. Halverson, Jr.	S	500	Dr	205	6	-----	-----	-----	Lava	45	-----	P	¾	D	Rock and cinders to 200 ft; plastic clay to 205 ft. Cp.
33J1	R. Casteel	S	560	Dg	17	-----	-----	-----	-----	do	10.3	7-29-49	J	⅓	D	Pumped 1 hr, 4-ft dd.
34A1	M. C. Macy	S	960	Dg	6	-----	-----	-----	-----	Clay	0.5	7-29-49	P	¼	D	
T. 4 N., R. 4 E.																
32Q1	J. B. Williams	H	970	Dg	14	-----	-----	-----	-----	-----	4.5	8- 5-49	P	-----	D	Cp.
T. 5 N., R. 1 E.																
8R1	F. Paterson	T	32	Dr	55	6	-----	-----	-----	Gravel	42	-----	J	¼	D	
9H1	F. M. Grieger	T	45	Dr	149	6	149	140	9	do	40	-----	P	1½	D	Bailer test, "no"dd. L.
10K1	R. L. Clark	S	62	Dr	57	6	-----	-----	-----	do	35	-----	J	1¼	Irr	
11N1	G. A. Derry	T	180	Dr	152	-----	-----	-----	-----	-----	98	-----	P	1		
12A1	G. Forbes	S	100	Dr	155	6	-----	-----	-----	Lava	95	-----	J	1	D	
12E1	J. H. Hadka	S	52	Dr	70	6	-----	-----	-----	Gravel, cemented.	45	-----	J	⅓	D	Bailer test, "no"dd.
12K1	G. Pellham	S	360	Dr	166	6	88	148	18	Lava	108	-----	P	1	D	Pumped 4 gpm, 53-ft dd. L.
14B1	Adventist Church	S	232	Dr	-----	6	-----	-----	-----	-----	-----	-----	P	1	Inst	
14L1	F. Eversaul	Up	190	Dg	29	30	-----	-----	-----	Clay, blue	24.3	9- 6-49	N	-----	-----	
15H1	I. Zumstein	Up	210	Dg	28	-----	-----	-----	-----	Sand	24.2	9- 6-49	J	⅓	D	
16J1	C. Nehr	H	460	Dg	45	30	-----	-----	-----	Rock	41.0	9- 6-49	J	1	D	Eight-inch cavity reportedly penetrated at 38 ft.
17F1	W. Wheeler	S	110	Dr	37	6	-----	-----	-----	do	15.6	9- 6-49	P	-----	D	
19C1	A. Keller	T	40	Dr	55	6	-----	-----	-----	Sand	15	-----	N	-----	-----	
21E1	J. L. Fleson	H	800	Dg	27	-----	-----	-----	-----	Gravel	22.4	9- 6-49	N	-----	-----	
21F1	F. B. Goodwin	Ub	630	Dg	38	48	-----	-----	-----	Clay	33.6	9- 6-49	-----	-----	-----	
21Q1	J. Shaver	Ub	630	Dg	54	-----	-----	-----	-----	Gravel	46.3	9- 6-49	-----	-----	-----	
22A1	E. Pea	S	430	Dg	32	-----	-----	-----	-----	do	20.8	9- 6-49	N	-----	-----	
22L1	F. Knowles	Ub	640	Dg	24	-----	-----	-----	-----	do	16.5	9- 1-49	J	⅓	D	
23A1	Wesley Gettman	S	720	Dr	180	6	107	-----	-----	Clay	105	-----	-----	-----	D	Pumped 1 gpm. L.
23G1	R. Leadbetter	Ub	700	Dg	44	48	-----	-----	-----	Rock	41.5	9- 1-49	J	⅓	D	
24B1	D. C. Hudson	Ub	780	Dr	66	6	66	62	4	Sand and gravel.	37.3	10- 3-50	P	¾	D	Bailed dry at 2½ gpm. L.
24D1	H. Frank	Ub	760	Dg	41	36	-----	-----	-----	-----	35.5	9- 1-49	J	½	D	
24G1	M. Schillios	Ub	760	Dg	36	36	-----	-----	-----	Clay	29.3	8-30-49	J	¼	D	
26B1	A. Walson	Ub	640	Dg	35	-----	-----	-----	-----	do	31.4	9- 1-49	P	-----	D	
27J1	L. F. Farnsworth	Ub	620	Dg	54	-----	-----	-----	-----	do	47.6	8-22-49	J	⅓	D	Pumped 2½ hr at 4 gpm, 5-ft dd.
27M1	C. Howe	S	260	Dg	15	36	-----	-----	-----	Gravel	9.8	9- 6-49	C	½	D	
28D1	W. Hendricks	Up	650	Dg	54	48	-----	-----	-----	Clay	46.8	9- 6-49	J	¼	D	
33H1	D. Harmon	Up	265	Dg	42	36	-----	-----	-----	Gravel	38.4	9- 6-49	N	-----	-----	
33L1	Cedar Lodge Nursing Home.	Up	250	Dr	129	6	-----	-----	-----	do	89	-----	J	1½	Inst	
33R1	L. Troxel	S	140	Dr	96	6	-----	-----	-----	Basalt	40	-----	J	½	D	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 5 N., R. 1 E.—Con.																
34G2	Town of La Center	S	390	Dr	231	8	229	220	7	Sand and gravel.						Pumped 75 gpm, 85-ft dd. L.
								227	4	Sand, coarse						
34G3	do	S	400	Dr	252	8		240	8	Gravel	115	December 1955.			PS	Pumped 200 gpm. Water-level measurement by air pressure gage.
34P1	J. Larson	Up	225	Dg	52					do	27.8	9-1-49	N			
35K1	M. Fassler	S	320	Dg	50	36				Gravel	41.2	8-26-49	P	⅓	D	
35P1	R. E. Dalin	S	275	Dr	212	5				Sand	130	6-22-54	T	1½	D	Bailed 1,000 gph. L.
35R1	W. S. Gent	S	335	Dg, Dr	40	36-6				Clay	20.0	8-23-49	J	⅓	D	
35R2	C. A. Osborne	Ub	325	Dr	200	8	197			Sand	160	February 1954	P	1½	NU	Little dd after 1 hr bailing 10 gpm.
T. 5 N., R. 2 E.																
5H1	L. Holm	S	360	Dg	22	48				Sand and gravel.	18.3	8-25-49	P	¼	D	
8D1	E. Eaton	H	220	Dg	33	36				Clay	26.7	8-29-49	N			
8L1	J. F. Sherer	Ub	360	Dr	61	6				Sand, white	6		J	½	D	No. dd. reported.
9J1	J. Sager	Ub	595	Dg	40	30				Gravel	35.3	8-23-49	P	¼	D	
14F1	W. Harrington	S	473	Dg	23						14.3	8-17-49	P	¼	D	
15A1	B. Neal	S	410	Dg	15	36				Gravel	8.0	8-17-49	C	½	D	
16J1	Paul Current	Ba	810	Dg	16	36				do	12.0	8-24-49	P	¼	D	
18D1	H. Wik	S	430	Dg	15	30				Clay	12.0	8-29-49	C	¼	D	
18J1	D. Johnson	H	900	Dg	11					do	3.5	8-25-49	J	½	D	Pumped 2 hrs at 12 gpm, 6-ft dd.
19C1	E. Christianson	H	820	Dg	33	30				do	24.4	8-25-49	J	⅓	D	
19E1	A. Augusta	S	755	Dg	22	36				Sandstone	15.2	8-30-49	P	¼	D	Water reported to contain much iron and lime.
19R1	J. Loveless	S	760	Dg	40					Clay, red	34.2	8-30-49	J	½	D	Cp.
20C1	F. Johnson	S	790	Dg	25	30				Clay	13.6	8-25-49	N			
20R1	L. Breedlove	S	805	Dg	35					Sand	32.8	8-25-49	J	⅓	D	
21B1	C. Rich	Ba	850	Dg	22					Gravel	16.8	8-24-49	N			
21E1	C. McGinnis	S	830	Dg	27	36				Clay	22.8	8-25-49	P	¾	D	
22G1	L. Grantham	Ub	880	Dg	21					Gravel	14.1	8-23-49	J	⅓	D	

22Q1	F. Wendt	Ub	800	Dg	29	60				do	23.3	8-23-49	P		D	
23H1	T. Helser	S	680	Dg	10	30				Basalt	9.3	8-17-49	P		D	
23M1	R. Olsen	Ub	830	Dg	24	36				Sand	22.6	8-23-49				
24A1	D. Wheeler	S	930	Dg	21	30					16.7	8-17-49	N			
25M1	E. Decker	Ub	680	Dr	76	6				Sand			J	¾	D	
26A1	Seeley	S	690	Dr	164	6				Gravel	30		P	1	D	
26B1	Fargher Lake Grange.	S	690	Dr	80	6	80	64		Gravel and sand.			J	¾		L.
27A1	H. Cooper	Ub	800	Dg	30					Sand	22.3	8-23-49	J	⅛	D	
27E1	J. McClellan	Ub	800	Dg	33					Gravel, cemented.	25.3	8-23-49	J	⅛	D	
27P1	H. L. Crawford	Ub	730	Dg	26					Gravel	12.6	8-22-49	P	½	D	
28C1	A. Bennet	Ub	825	Dg	21	48					16.2	8-24-49	J	⅛	D	
28D1	F. M. Bremmer	Ub	805	Dr	113	6	113	90	23	Sand, black	88					Bailed 5 gpm, 20-ft dd. L.
29A1	T. Wollam	Ub	800	Dg	18	30				Gravel	15.6	8-31-49				
29D1	O. E. Wilson	Ub	775	Dg	42					Clay	37.6	8-31-49	N			
30A1	L. Brannfors	H	735	Dg	30	60				Clay and gravel.	24.7	8-31-49	N			
31Q1	M. Steudler	S	456	Dg	35					Gravel	32.8	8-31-49	J	½	D	
32L1	R. Skillings	Ub	675	Dg	43	36				do	27.6	8-22-49	P	1½		
32M1	R. Stevens	Ub	665	Dr	68	6					26		J	⅛	D	
32R1	R. Carey	Ub	640	Dg	24					Gravel	18.4	8-22-49	N			
33D1	M. I. Brouherd	Ub	720	Dg	55					Clay	26.3	8-16-49	P	½		
34A1	D. E. Hazen	Ba	600	Dg	18					Gravel, cemented.	11.2	8-22-49	P	¼	D	
35C1	E. D. Hazen	Ub	740	Dr	102	6				Sand and gravel.	Flows	8-22-49	J	1	D	Flows 1 gpm 0.5 ft above land surface.
T. 5 N., R. 3 E.																
1K1	C. Keenan	Ba	600	Dg	17	30				Gravel	14.2	8-16-49	P		D	
8P1	M. Wright	S	380	Dg	14					Clay	8.0	8-16-49	N			
10P1	H. C. Abell	Ba	420	Dg	15	48				do	10.8	8-15-49	J	½	D	
11G1	C. Olstead	Ba	476	Dr	48						38		J	¼	D	Cp.
11N1	G. Beebe	Ba	465	Dg	16	36				Sand	14.3	8-16-49	J	¼	D	
12C1	E. E. Downing	S	570	Dg	26					Gravel			P	¼	D	
12K1	B. Welch	Ba	515	Dg	32	30				do	24.3	8-16-49	J	⅛	D	Cp.
12Q1	C. Ost	Ba	502	Dr	35	6				do	22		J	⅛	D	
13D1	W. J. Wisner	Ba	484	Dg	15	30				Sand and gravel.	5.8	8-16-49	J	¼	D	
14B1	F. W. Senter	Ba	452	Dr	28	6				Gravel	10.7	8-16-49	C(?)	⅛		Pumped 40 gpm.
15G1	C. H. Brown	Ba	435	Dg	17	30				Clay	11.0	8-16-49	C	⅛		
15H1	A. Olstead	Ba	440	Dg	14	30				Sand and gravel.	7.5	8-16-49	J	½	D	Cp.
16A1	C. Ashbaugh	Ba	480	Dg	12	30				Clay	10.4	8-15-49	N			
16F1	E. Moon	S	460	Dg	23					Gravel, cemented.	18.7	8-15-49	P	¼	D	Cp.
16J1	L. George	Ba	420	Dg	14	72				Gravel	10.1	8-15-49	P	¼	D	
16L1	E. Moon	S	460	Dg	23	30				Clay(?)	14.3	8-15-49	C(?)	1½		Pumped 2 hrs at 20 gpm, 9-ft dd.
17A1	M. Abramson	S	430	Dg	12	36				Clay and gravel.	8.7	8-16-49	C	¼		
17H1	L. T. Cummings	S	400	Dg	8	60					6.6	8-16-49	J	½	D	

TABLE 15.—*Records of representative wells in Clark County, Wash.*—Continued

Well	Owner or tenant	Topography	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Water-bearing zone			Water level		Pump		Use	Remarks
								Depth to top (feet)	Thickness (feet)	Character of material	Depth	Date	Type	H.P.		
T. 5 N., R. 3 E.—Con.																
17P1	C. A. Boehn	S	440	Dg	19	36	------	------	------	Clay	11.3	8-17-49	P	¼	D	
18R1	W. H. Jones	S	630	Dg	24	30	------	------	------	Gravel	11.9	8-17-49	J	1	------	
19R1	H. S. Zassett	S	845	Dg	28	------	------	------	------	do	24.3	8-17-49	P	¼	D	
20A1	C. Hunter	S	480	Dr	76	6(?)	------	------	------	do	45	7-15-49	J	¾	D	Pumped 5 gpm, "no" dd. Cp.
20P1	R. V. Turner	H	785	Dg	21	------	------	------	------	do	16.8	8-15-49	J	⅓	D	
21G1	C. W. Burnett	S	450	Dg	9	36	------	------	------	Sand and gravel.	8.0	8-15-49	P	------	D	
21M1	M. Weston	S	500	Dg	50	------	------	------	------	------	38.8	8-15-49	P	¼	D	
21N1	L. Fudge	S	600	Dg	17	30	------	------	------	Gravel	10.2	8-15-49	P	½	D	
21Q1	T. Quimby	S	510	Dg	18	------	------	------	------	Rock	2.4	8-15-49	P	------	D	Cp.
22P1	D. Koplin	S	620	Dg	10	------	------	------	------	Gravel	6.8	8-15-49	P	------	D	
26P1	B. Raymond	H	730	Dg	25	------	------	------	------	do	21.8	8-15-49	P	------	D	
27H1	B. Weimer	H	680	Dg	17	------	------	------	------	Sand	10.8	8-15-49	J	½	D	Cp.
27M1	C. Wolff	S	730	Dg	21	36	------	------	------	Rock (?)	17.5	8-15-49	C	¾	D	
29F1	A. E. Jackson	H	920	Dg	23	------	------	------	------	Sand	17.6	8- 8-49	C	½	D	
31A1	P. Krier	S	820	Dg	25	------	------	------	------	Rock (?)	23.9	8- 9-49	P	------	D	
33F1	B. A. Ovall	S	1,000	Dg	29	------	------	------	------	Sand	14.0	8- 8-49	P	------	D	
34B1	O. Taude	Ba	700	Dg	22	------	------	------	------	Gravel, cemented.	18.2	8-15-49	P	------	D	Cp.
34N1	C. R. Miller	S	890	Dr	------	6	------	------	------	Sand	------	------	P	1	------	
T. 5 N., R. 4 E.																
7B1	L. Miller	Ba	570	Dg	30	72	------	------	------	------	23.8	8-16-49	P	------	D	Cp.
7F1	H. Manwell	Ba	550	Dg	23	30	------	------	------	Gravel	17.2	8-13-49	J	⅓	D	
7M1	Harbor Plywood Co.	Ba	520	Dr	598	12-6	553	73	------	Gravel and sand.	68	------	------	------	Ind	Pumped 1 hr at 800 gpm, 60-ft dd. L.
								557	------	Rock, black						
T. 6 N., R. 4 E.																
31N1	W. Musa	S	520	Dg	35	------	------	------	------	Gravel	28.3	8-16-49	J	⅓	D	Cp.

TABLE 16.—*Representative springs in Clark County, Wash.*

Yield: e, estimated.
Use: D, domestic; NU, not used; PS, public supply; S, stock.

Remarks: H, total hardness, and Cl, chloride, in parts per million; T, temperature ° F.

[Locations of springs are shown on pl. 3]

Spring	Owner or tenant	Altitude (feet)	Water-bearing material	Yield		Use	Remarks
				Gpm	Date		
T. 1 N., R. 2 E.							
2M1s		50	Sand	1,760	4-11-49	NU	Emerges at contact with underlying Troutdale formation.
2Q1s		50	Sand and gravel	675	do	NU	Do.
3D1s	John Emory	150	do			D	Emerges at contact with underlying Troutdale formation. Supplies nine families. H, 60; Cl, 6; T, 50.
3E1s		60	do	e200	4-11-49	NU	Discharges at contact with underlying Troutdale formation.
3F1s		45	do	610	do	NU	Do.
3G1s	State Trout Hatchery	70	do	e 1,200-1,500			Used for fish hatchery. Discharges at contact with underlying Troutdale formation.
3G2s		50	do	1,630	4-11-49	NU	Discharges at contact with underlying Troutdale formation.
3J1s		55	do	1,657	do	NU	Do.
3J2s	E. and E. B. Wood	50	do	665	4-18-49	NU	Do.
4B1s	Felix Baranovich	100	do	1,330	4-11-49		Do.
4B2s	Dr. Brougher	100	Sand	200	do		Do.
4D1s		100	Sand and gravel	e 75	4-15-49		Discharge at contact with underlying Troutdale formation.
5A1s	Clarence Jenkinson	95	do	2	4- 5-49	D	Do.
12B1s	Mrs. Emma Allen	120	Gravel	e 225	4-11-49	D	Do.
12C1s		100	Sand and gravel	280	do	NU	Do.
12A1s	George M. Robie	120	do	e 40	4-14-49	D	Discharges at contact with underlying Troutdale formation. Supplies cabins and store.
T. 1 N., R. 3 E.							
1C1s	N. E. Morris	330	Lava			D, S	Discharges at contact with underlying Troutdale formation. Dependable supply, used for dairy.
4J1s	Ed Crisman	520	Gravel			D	Seepage spring. Flow decreases during summer.
7E1s		50	Sand and gravel	550	4-11-49	NU	Discharges at contact with underlying Troutdale formation.
7F1s		60	do	e 100	4-18-49	NU	Do.
7F2s		60	do	185	do	NU	Do.
7G1s		60	do	520	4-19-49	NU	Do.

TABLE 16.—*Representative springs in Clark County, Wash.*—Continued

Spring	Owner or tenant	Altitude (feet)	Water-bearing material	Yield		Use	Remarks
				Gpm	Date		
T. 2 N., R. 2 E.							
31J1s		150	do	[e] 100	4-15-49		Discharges at contact with underlying Troutdale formation. T, 51.
32Q1s		145	do	[e] 50			Discharges at contact with underlying Troutdale formation.
33L1s 33M1s 33P1s	City of Vancouver (Ellsworth Springs).	190	do	2,085	10-15-45	PS	Discharges at contact with underlying Troutdale formation. Discharge was measured by city.
T. 2 N., R. 3 E.							
29B1s	L. W. Schnell	215	Sand and gravel			D	Seepage spring.
T. 3 N., R. 1 E.							
13J1s	B. W. Turnbull	225	Sand	2.5	4-28-49	D	Seepage spring. H, 70; C1, 3.
16R1s	J. Huisman	200	Sand and silt	3	5-18-49	D	Seepage spring. H, 90; C1, 3.
17A1s	W. T. Harold	170	Clay	1	5-16-49	D	H, 75; C1, 3.
25N1s	J. White	90	Sand	3	5-23-49	D	
29P1s	H. Messner	110	do			D, S	H, 85; C1, 5.
34D1s	V. C. Davis	90	do	3	5-20-49	D, S	H, 85; C1, 3.
T. 3 N., R. 2 E.							
20K1s	S. Davis	220				D, S	H, 90; C1, 5.
T. 3 N., R. 3 E.							
3P1s	C. Strom	480	Sand			D	
T. 4 N., R. 1 E.							
16N1s	H. Hardt	250	do	2	5-10-49		H, 70; C1, 3.
24C1s	J. Ludzenberger	150	Gravel	2	5- 9-49	D, S	H, 65; C1, 4.

T. 4 N., R. 2 E.							
25B1s	J. Shultz	550	Rock	1	5- 4-49	D, S	H, 45; C1, 4.
25Q1s	G. P. Ebert (Poverty Creek Spring).	370	Boring lava	400, Avg. during dry season.	1948-52		Discharge reported to range from 35 to 2,000 cubic feet per minute. Used for fish hatchery. Discharges at base of lava flow.
27C1s	H. Foster	250		2			H, 60; C1, 4.
27M1s	J. F. O'Daniell	250	Boring lava	[e] 400		D, S	Discharges at base of lava flow. H, 40; C1, 3.
T. 4 N., R. 3 E.							
9N1s	G. Gasiway	400	Rock	1	8- 2-49	D	
20N1s	B. Browning	460	Gravel	2	8- 2-49	D	
34Q1s	D. Nordquist	680	Rock	3		D	
T. 5 N., R. 1 E.							
23B1s	W. J. Richards	400	Sand	1	9- 6-49	D	
T. 5 N., R. 2 E.							
2C1s	R. Ruestig	1,150	Sand(?)	[e] ¼	8-17-49	D	
11F1s	M. L. Carter	310	Rock	[e] 12	8-16-49	D	
14Q1s	O. J. Brown	670	Gravel	2	8-17-49	D, S	
T. 5 N., R. 3 E.							
7E1s	T. Henderson	500	Rock	4	8-16-49	D, S	H, 30; C1, 4.
28F1s	J. Hiatt	700	do	1	8-15-49	D	
32A1s	J. Buck	950	do	1	8- 8-49	D	
33R1s	W. Newman	960	Gravel(?)	1	7-25-49	D	

TABLE 17.—*Materials penetrated by representative wells*

[Stratigraphic designations by M. J. Mundorff. Unless otherwise indicated, the designation Troutdale formation refers to the upper member of the Troutdale formation]

1/2-1K1

[Fisher Grange Hall. About 8 miles east of Vancouver and 0.6 mile north of Fisher. Altitude about 230 ft. Drilled by Hansen]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Sand and gravel	90	90	Clay, yellow	15	105
			Gravel, cemented	40	145

1/2-2B1

[Charles E. Runyan. About 7 miles east of Vancouver on Bella Vista Road. Altitude about 260 ft. Drilled by Bert Abrams, 1948. Casing, 6-in. to 84 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel, loose, and boulders	60	60	Gravel, packed	28	88
			Sand, loose, water-bearing	--------	88

1/2-3E1

[G. C. Dowd. About 6 miles east of Vancouver, near Ellsworth. Altitude about 34 ft. Drilled by A. C. Locey. Casing, 6-in. to 46-ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation:		
Soil	3	3	Clay, blue	7	36
Clay	7	10	Gravel	8	44
Sand	19	29	Sand, black	2	46

1/2-3K1

[S. Unander. About 6.5 miles east of Vancouver, across highway from State Trout Hatchery. Altitude about 44 ft. Drilled by A. C. Locey. Casing, 6-in. to 55-ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Recent alluvium—Continued		
Soil	2	2	Boulders and gravel	16	26
Clay, sandy	8	10	Gravel, loose, water-bearing	29	55

1/2-4A1

[R. Roberts. West Mill Plain District. About 0.3 mile west of Ellsworth Road along Sohns Road. Altitude about 170 ft. Drilled by A. C. Locey. Casing, 6-in. to 61 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Boulders	30	30	Gravel, cemented	22	52
			Gravel, water-bearing	9	61

1/2-4B3

[Louis Cannel. About 5 miles east of Vancouver, near Ellsworth. Altitude about 115 ft. Drilled by A. C. Locey. Casing, 6-in. to 53 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	6	6	Gravel, cemented	9	27
Gravel	12	18	Clay	14	41
			Gravel, loose	9	50
			Sand, black	5	55

1/2-4C1

[H. B. Stapleton. About 5 miles east of Vancouver, near Ellsworth. Altitude about 110 ft. Drilled by A. C. Locey. Casing, 6-in. to 34 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	6	6	Gravel, cemented	7	24
Gravel	11	17	Gravel, loose	8	32
			Sand, black	2	34

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

1/2-C2

[R. Farmer. About 5 miles east of Vancouver, near Ellsworth. Altitude about 100 ft. Drilled by A. C. Locey. Casing, 6-in. to 55 ft]

Pleistocene alluvial deposits:			Troutdale formation:		
Soil	8	8	Clay	15	55
Sand	20	28	Boulders	6	61
Gravel	12	40	Gravel	5	66

1/2-4D2

[A. J. Witchell. About 5 miles east of Vancouver, near Ellsworth. Altitude about 92 ft. Drilled by R. J. Strasser. Casing, 6-in. to 114 ft; perforated 75 to 105 ft]

Troutdale formation:			Troutdale formation—Con.		
Topsoil and clay	6	6	Sand, coarse, with a little gravel	7	60
Clay and some gravel	4	10	Gravel, cemented	35	95
Gravel and boulders with clay binder	24	34	Sand and gravel, water-bearing	11	106
Gravel, small caving	5	39	Gravel with clay binder	8	114
Gravel, cemented	14	53			

1/3-3M1

[Ray Brown and others. On Prune Hill. Altitude about 710 ft. Drilled by Pete Hanson. Casing, 6-in. to 385 ft]

Troutdale formation:			Tertiary volcanic rock: Rock, gray with layers of red, green, and black	403	798
Clay	75	75			
Gravel, cemented	320	395			

1/3-4C1

[Harry Breitbarth. About 2 miles northwest of Camas, south of County Road 119. Altitude about 295 ft. Drilled by J. E. Hansen, 1953. Casing, 8-in. to 220 ft; perforated from 155 to 175 ft, and from 195 to 218 ft]

Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil and clay	25	25	Gravel, water-bearing	35	175
Troutdale formation:			Clay and rocks	18	193
Boulders mixed with clay	75	100	Gravel and rocks, water-bearing	27	220
Gravel, cemented	40	140			

1/3-5A1

[Don Rainey, formerly owned by K. W. Brandstater. In Camas, Wash. Altitude about 272 ft. Drilled by Joe Hansen, 1952. Casing, 8-in. to 190 ft; perforated from 158 to 180 ft]

Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	3	3	Gravel, cemented	89	152
Clay, yellow	22	25	Rock, flat ledge	6	158
Troutdale formation:			Gravel, cemented, water-bearing	32	190
Clay, yellow, mixed with big rocks	38	63			

1/3-6M2

[E. R. Colby. About 0.5 mile east of Fisher Grange. Altitude about 245 ft. Drilled by A. C. Locey. Casing, 6-in. to 134 ft]

Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	5	5	Gravel, loose	20	90
Boulders	32	37	Boulders	9	99
Troutdale formation:			Gravel, cemented	29	128
Gravel, cemented	33	70	Gravel, water-bearing	6	134

TABLE 17.—*Materials penetrated by representative wells*—Continued

1/3-10D2

[W. G. Powell. Riverview Drive, on Prune Hill. Altitude about 715 ft. Drilled by A. C. Locey. Casing, 6-in. to 240 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Boring lava(?): Rock, red volcanic	8	160
Soil	6	6	Troutdale formation:		
Gravel	12	18	Gravel, cemented	11	171
Boulders	20	38	Boulders	12	183
Gravel, cemented	18	56	Gravel	28	211
Gravel	20	76	Gravel, sandy	30	241
Gravel, cemented	16	92	Sand, black	1	242
Boulders	13	105			
Gravel	47	152			

1/3-11J1

[Crown Zellerbach Corp. well 1. In Camas. Altitude about 50 ft. Drilled by R. J. Strasser, 1939. Casing, 12-in. to 90 ft; perforated 49 to 66 ft and 69 to 85 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con		
Gravel, loose, and boulders	8	8	Gravel, small, loose	15	65
Gravel, cemented(?), and gray boulders	42	50	Gravel, large, loose	10	75
			Troutdale formation: Gravel, cemented	15	90

1/3-11J2

[Crown Zellerbach Corp. well 2. In Camas. Altitude about 50 ft. Drilled by R. J. Strasser, 1939. Casing, 18-in. to 88 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel and large boulders	17	17	Gravel, loose, water-bearing	27	80
Gravel and boulders	36	53	Troutdale formation: Gravel with clay binder	8	88

1/3-11J3

[Crown Zellerbach Corp. well 3. In Camas. Altitude about 50 ft. Drilled by R. J. Strasser, 1940. Casing, 16-in. to 90 ft; perforated from 48 to 55 ft, from 56 to 63 ft, and from 72 to 85 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Fill	5	5	Pleistocene alluvial deposits—Con.		
Pleistocene alluvial deposits:			Gravel, water-bearing	15	63
Topsoil and gravel	3	8	Troutdale formation:		
Gravel, cemented(?), and boulders	35	43	Gravel, with clay binder	7	70
Gravel, loose, water-bearing	5	48	Gravel, loose	12	82
			Gravel, with clay binder	9	91

1/3-11J4

[Crown Zellerbach Corp. well 4. In Camas. Altitude about 50 ft. Drilled by R. J. Strasser, 1946. Casing, 18-in. to 88(?) ft; perforated from 41 to 77 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	4	4	Gravel, with some sand	8	66
Boulders and tight gravel	33	37	Gravel, no sand	14	80
Gravel, loose; water-bearing at 40 ft	21	58	Troutdale formation: Gravel, with clay binder	8	88

1/3-11J6

[Crown Zellerbach Corp. well 6. In Camas. Altitude about 50 ft. Drilled by R. J. Strasser, 1946. Casing, 18-in. to 90(?) ft; perforated from 40 to 45 ft, 49 to 57 ft, 69 to 77 ft, and 79 to 85 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel and boulders	24	24	Gravel, with binder	8	68
Gravel, with clay binder	16	40	Sand, coarse, and gravel; water-bearing	22	90
Gravel, small, water-bearing	20	60			

TABLE 17.—*Materials penetrated by representative wells*—Continued

1/3-11J7

[Crown Zellerbach Corp. well 7. In Camas. Altitude about 50 ft. Drilled by R. J. Strasser, 1946. Casing, 18-in. to 88 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	2	2	Sand and gravel, water-bearing	15	63
Gravel and boulders	28	30	Sand, coarse, and gravel	10	73
Gravel, large; water-bearing at 36 ft	13	43	Sand and gravel	9	82
Boulders, large	5	48	Gravel, large	6	88

1/3-11J8

[Crown Zellerbach Corp. In Camas. Altitude about 40 ft. Drilled by R. J. Strasser, 1952. Casing, 18-in. to 90 ft, 12-in. from 88 to 140 ft; perforated from 50 to 57 ft, from 60 to 68 ft, from 69 to 84 ft, from 115 to 119 ft, and from 119 to 128 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel, large, and boulders	9	9	Gravel, with binder	8	116
Gravel, large	5	14	Gravel, loose, water-bearing	12	128
Gravel, boulders, and binder	37	51	Troutdale formation:		
Gravel, loose, water-bearing	22	73	Clay, red	10	138
Gravel, with binder	22	95	Rock, brown	2	140
Gravel, large, with sand	13	108			

1/3-12K1

[Columbia Water Co. well 4. About 1 mile west of Washougal. Altitude about 50 ft. Drilled by R. J Strasser, 1947. Casing, 12-in. to 101 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	2	2	Gravel, with clay binder	4	98
Gravel and large boulders	12	14	Clay, blue	3	101
Gravel, cemented	19	33			
Sand and gravel	27	60			
Sand, coarse, and gravel; water-bearing	34	94			

1/3-12M3

[City of Camas. Southeast of Washougal River, at Oak Park. Altitude about 35 ft. Drilled by R. J. Strasser, 1946. Casing, 14-in. to 78 ft; perforated from 50 to 70 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	6	6	Sand and gravel	13	47
Gravel	9	15	Gravel, water-bearing	23	70
Gravel and boulders	8	23	Troutdale formation: Gravel, tight	8	78
Gravel	8	31			
Boulders and gravel	3	34			

1/3-12M4

[Crown Zellerbach Corp. Southeast of Washougal River at Oak Park. Altitude about 35 ft. Drilled by R. J. Strasser, 1946. Casing, 18-in. to 66(?) ft; perforated from 31 to 62 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel and boulders	18	18	Gravel and sand, water-bearing	31	62
Gravel (without boulders)	5	23	Troutdale formation: Clay, red	4	66
Clay, blue	8	31			

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
1/3-12M5					
[Crown Zellerbach Corp. In Camas. Altitude about 35 ft. Drilled by R. J. Strasser, 1953. Casing, 18-in. to 86 ft, 12-in. from 86 to 122 ft; perforated from 41 to 77 ft, 90 to 102 ft, 104 to 115 ft]					
Pleistocene alluvial deposits:			Troutdale formation: Rock, hard, gray	9	131
Gravel, large, binder	94	94			
Gravel, loose, small	16	110			
Gravel, cemented	12	122			
1/4-5E1					
[Richard Beaver. In Washougal. Altitude about 440 ft. Drilled by Joe Hansen, 1952. Casing, 6-in. to 24 ft]					
Older consolidated rocks:			Older consolidated rocks—Con.		
Rock and clay	24	24	Rock, hard, solid	98	122
1/4-8K1					
[Columbia Water Co. well 1. At Washougal, on river bank north of school. Altitude about 90 ft. Drilled by R. J. Strasser. Casing, 12-in to 142(?) ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Clay and boulders	10	10	Gravel, cemented	14	97
Gravel, cemented	10	20	Gravel, loose	5	102
Boulders	5	25	Gravel, cemented	12	114
Gravel, cemented	40	65	Clay, sandy, yellow	5	119
Gravel, loose, water-bearing	18	83	Gravel, cemented	2	121
			Sandstone, yellow	21	142
1/4-8K4					
[Columbia Water Co. At Washougal, on bank of river, north of school. Altitude about 90 ft. Drilled by R. J. Strasser]					
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay, sandy	4	4	Gravel, tight	3	81
Gravel and sand	5	9	Sand, coarse	2	83
Sand	2	11	Gravel, water-bearing	5	88
Boulders and gravel	9	20	Troutdale formation:		
Gravel, cemented	26	46	Gravel, cemented; no water	4	92
Boulders	10	56	Gravel, cemented, water-bearing	4	96
Gravel and sand	9	65	Gravel, cemented; no water	13	109
Gravel, loose, water-bearing	1	66			
Gravel, cemented	12	78			
1/4-9B1					
[E. L. Eldridge. About 2 miles northeast of Washougal. Altitude about 240 ft. Drilled by B. L. Price 1952. Casing, 10-in. to 180 ft]					
Topsoil	3	3	Troutdale formation—Con.		
Troutdale formation:			Silt, brown, and sand	95	165
Clay	17	20	Sand and gravel	13	178
Clay and broken rock	20	40	Sand	2	180
Clay, blue; some boulders	30	70			
1/4-9E1					
[L. Wilson. About 1 mile northeast of Washougal, north of golf course. Altitude about 130 ft. Drilled by A. C. Locey. Casing, 6-in. to 85 ft]					
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	7	7	Clay	7	50
Sand	8	15	Gravel	30	80
Gravel	28	43	Sand	10	90

TABLE 17.—*Materials penetrated by representative wells*—Continued

1/4-9L1

[S. W. Coumans. About 1 mile east of Washougal. Altitude about 100 ft. Drilled by A. C. Locey. Casing, 6-in. to 84 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Sand	33	33	Sand, fine (quicksand)	30	80
Clay	17	50	Gravel, pea size	4	84

1/4-16H1

[T. Kerr. About 1.5 miles east of Washougal, south of U.S. Highway 830. Altitude about 45 ft. Drilled by A. C. Locey. Casing, 6-in. to 40 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	2	2	Gravel	4	39
Gravel	20	22	Sand, black	2	41
Boulders	13	35			

2/1W-12R1

[Fred Niday. Near Vancouver Lake on River Road. Altitude about 20 ft. Drilled by A. C. Locey. Casing, 6-in. to 272 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation(?):		
Soil	21	21	Clay, blue	142	180
Sand, fine (quicksand)	17	38	Sand, fine (quicksand)	92	272

2/1-2P1

[Gus Hockinson. Poor Farm road near Totem Pole. Altitude about 230 ft. Drilled by A. C. Locey. Casing, 6-in. to 176 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	14	14	Gravel and sand	5	145
Sand	16	30	Gravel	13	158
Sand, fine (quicksand)	32	62	Gravel, cemented	7	165
Clay, blue	8	70	Gravel	8	173
Clay, yellow	15	85	Sand, black	3	176
Clay, sandy	20	105			
Sand	35	140			

2/1-3E1

[Orion W. Wiedman. About 4 miles north of Vancouver and 1 mile west of U.S. Highway 99. Altitude about 220 ft. Drilled by R. A. Jobes, 1949. Casing, 6-in. to 154 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Sand	55	55	Sand and gravel, water-bearing	20	135
Sand, water-bearing	3	58	Gravel, cemented	5	140
Clay	2	60	Sand and gravel, water-bearing	14	154
Sand, yellow	40	100	Sand, white, water-bearing	5	159
Troutdale formation:					
Sandstone	15	115			

2/1-3E2

[Floyd W. Loomis. About 4 miles north of Vancouver and 1 mile west of U.S. Highway 99. Altitude about 220 ft. Drilled by F. Wichersham, 1948. Casing, 6-in. to 148 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	5	5	Gravel, cemented	42	132
Sand, brown, and clay	85	90	Sand, gray, dry	6	138
			Gravel, loose, water-bearing	10	148

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-4F2

[R. B. Jamison. About 0.2 mile southwest of intersection of Lake and Hoyes Roads in Lake Shore District. Altitude about 210 ft. Drilled by A. C. Locey. Casing, 6-in. to 209 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	25	25	Clay	26	188
Sand	50	75	Troutdale formation:		
Gravel	53	128	Gravel, cemented	20	208
Clay	14	142	Sand	1	209
Sand	20	162	Gravel	5	214

2/1-9F2

[Fruit Valley Nursery. About 3 miles north of Vancouver, near east edge of Vancouver Lake. Altitude about 45 ft. Drilled by Joe Hansen, 1950. Casing, 6-in. to 112 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	15	15	Sand and gravel, water-bearing	12	112
Sand, dry	20	35			
Sand, water-bearing	65	100			

2/1-10A1

[F. Mortendyke. U.S. Highway 99, near Totem Pole Trailer Court. Altitude about 205 ft. Drilled by A. C. Locey. Casing, 6-in. to 139 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and sand	24	24	Gravel, cemented	8	136
Clay, sandy	9	33	Sand, black	3	139
Sand, black	9	42			
Clay	33	75			
Sand	53	128			

2/1-10K2

[L. A. Hinkle. About 0.25 mile southeast of Hazeldell School. Altitude about 170 ft. Drilled by R. A. Jobes. Casing, 6-in. to 123 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Sand	50	50	Gravel, cemented	20	115
Clay	20	70	Gravel, loose	8	123
Sand	25	95			

2/1-10Q2

[J. Voeller. About 0.5 mile south of Ludlum Road on west side of U.S. Highway 99. Hazeldell District. Altitude about 180 ft. Drilled by A. C. Locey. Casing, 6-in. to 165 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and sand	35	35	Gravel	12	130
Clay	83	118	Gravel, cemented	20	150
			Sand	4	154
			Sand, black	14	168

2/1-11B1

[Southwest Washington Experiment Station. About 3.5 miles north of Vancouver. Altitude about 258 ft Drilled by R. J. Strasser, 1955. Casing, 12-in. to 255 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Clay, sticky, yellow	9	126
Silt and clay	28	32	Sand, hard-packed (sandstone)	53	179
Sand, fine	41	73	Gravel, cemented	46	225
Clay, blue	17	90	Gravel, loose, and sand; water-bearing	13	238
Clay and silt	27	117	Gravel, hard, cemented	17	255

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-11C1

Clark County Public Utility District, well 1. About 3.5 miles north of Vancouver and 0.5 mile east of U.S. Highway 99. Altitude about 228 ft. Drilled by Pacific Drilling Co. Casing, 10-in. to 198(?) ft; perforated from 183 to 194 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Gravel, cemented	7	147
Clay, gray	24	27	Gravel, loose, and sand	3	150
Sand, yellow (water 20± gpm)	5	32	Gravel, loose	3	153
Clay, yellow (40 ft of 12-in. casing set to shut off water	8	40	Gravel, with small amount of sand and mica	39	192
Clay, sandy, yellow	50	90	Gravel and sand	2	194
Clay, sandy, gray	30	120	Sand, fine, black	4	198
Sand, gray, wet	20	140			

2/1-11C2

[Clark County Public Utility District, well 2. About 3.5 miles north of Vancouver and 0.5 mile east of U.S. Highway 99. Altitude about 225 ft. Drilled by Pacific Drilling Co. Casing, 10-in. to 211(?) ft; perforated from 194 to 209 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Soil	2	2	Clay, sandy, gray	32	122
Clay, brown	17	19	Sand, wet, gray	19	141
Sand, yellow (water 15-20 gpm)	1	20	Troutdale formation:		
Clay, gray (40 ft of 12-in. casing set to shut off water)	20	40	Gravel, cemented	6	147
Clay, sandy, yellow	50	90	Sand, gray, with some gravel	8	155
			Gravel	50	205
			Gravel and sand	6	211

2/1-11C3

[Clark County Public Utility District, well 3. About 3.5 miles north of Vancouver and 0.5 mile east of U.S. Highway 99. Altitude about 228 ft. Drilled by Pacific Drilling Co. Casing, 10(?)-in. to 223(?) ft; perforated from 180 to 190 ft and 210 to 220 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Soil	3	3	Clay, gray	31	123
Clay, gray	20	23	Clay, sandy, gray	11	134
Sand, silty, yellow (water in excess of 20 gpm)	8	31	Sand, gray	9	143
Clay, yellow (casing set to shut off water)	11	42	Troutdale formation:		
Clay, sandy, yellow	50	92	Gravel, cemented	5	148
			Gravel, loose	73	221
			Sand	2	223

2/1-11C4

[Clark County Public Utility District well 4. About 3.5 miles north of Vancouver and 0.5 mile east of U.S. Highway 99. Altitude about 235 ft. Drilled by R. J. Strasser, 1956. Casing, 16-in. to 177 ft, 12-in. from 174 to 221 ft; perforated from 191 to 220 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Gravel, large, with clay binder	19	168
Topsoil	10	10	Gravel, cemented	23	191
Sand and silt	42	52	Sand and gravel, water-bearing	27	218
Sand with clay binder	23	75	Gravel, cemented, tight	3	221
Troutdale formation:					
Clay, yellow	16	91			
Sand with clay binder	41	132			
Sand, hard-packed; some tight gravel	17	149			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-11E2

[R. F. Mahan. Ludlum Road in totem pole district. Altitude about 320 ft. Drilled by A. C. Locey. Casing, 6-in. to 209 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	6	6	Clay, sandy	23	130
Soil and sand	12	18	Sand	24	154
Sand	32	50	Clay, sandy	9	163
Sand, gravelly	33	83	Sand	41	204
Sand, fine (quicksand)	11	94	Gravel	7	211
Sand	13	107			

2/1-12A3

[Floyd Welch. About 4 miles northeast of Vancouver and 2.5 miles east of U.S. Highway 99. Altitude about 270 ft. Drilled by Joe Hansen. Casing, 6-in. to 45 ft; perforated from 24 to 45 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Topsoil	10	10	Sand, dry	12	22
			Sand (quicksand)	23	45

2/1-12B1

[M. J. Morse. About 4 miles northeast of Vancouver. Altitude about 270 ft. Drilled by George Zent, 1953. Casing, 8-in. to 46 ft; perforated from 31 to 44 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Topsoil	2	2	Sand, with thin clay streaks; water-bearing	16	31
Clay, sandy	13	15	Sand, water-bearing	15	46

2/1-12H3

[Clarence Copelan. About 4 miles north of Vancouver and 2.5 miles east of U.S. Highway 99. Altitude about 285 ft. Dug 1950. Casing, 36-in. concrete to 15 ft, 12-in. galvanized to 30 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Topsoil	2	2	Sand and clay	13	15
			Sand, black, water-bearing	15	30

2/1-12J2

[M. A. Curtin. About 4 miles north of Vancouver and 2.5 miles east of U.S. Highway 99. Altitude about 270 ft. Drilled by George Zent, 1951. Casing, 12-in. to 10 ft, 11-in. to 47 ft, perforated from 25 to 45 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Soil	2	2	Clay	14	32
Clay, sandy	8	10	Sand, black, water-bearing	13	45
Sand, water-bearing	8	18	Sand, red, water-bearing	2	47

2/1-14P1

[Jarvis. Near Leverich Park, Vancouver. Altitude about 95 ft. Drilled by A. C. Locey. Casing, 6-in. to 107 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation(?)—Con		
Soil	8	8	Sand	18	67
Sand	19	27	Gravel	12	79
Troutdale formation(?):			Boulders	11	90
Gravel	22	49	Gravel	8	98
			Sand, black	9	107

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-15Q1

[City of Vancouver. Near north edge of city, west of U.S. Highway 99. Altitude about 214 ft. Drilled by R. J. Strasser, 1945. Casing, 18-in. to 278 ft; perforated from 232 to 240 ft and 245 to 260 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Soil	3	3	Sand and coarse gravel; water-bearing	16	240
Gravel, pea	59	62	Gravel, fine	27	267
Sand, very fine, packed	140	202	Troutdale formation: Gravel, with fine yellow silt binder	11	278
Gravel, sand, water-bearing	10	212			
Sand, water-bearing	12	224			

2/1-16B1

[Fred Koerner. About 0.25 mile south of end of Mills Avenue, east of railroad tracks, Hazeldell District. Altitude about 70 ft. Drilled by R. A. Jobes. Casing, 6-in. to 142 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Clay and sand	40	40	Sand, fine (quicksand)	59	139
Sand, black (coarse quicksand)	40	80	Gravel	3	142

2/1-16C1

[John E. Duggan. About 0.5 mile north of western edge of Vancouver. Altitude about 35 ft. Drilled by A. C. Locey. Casing, 8-in. to 208 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Soil, sandy	29	29	Sand, fine (quicksand)	91	173
Sand	14	43	Troutdale formation:		
Gravel	2	45	Gravel, cemented	11	184
Sand, black	15	60	Gravel, loose	6	190
Sand, fine (quicksand)	2	62	Gravel, large	2	192
Sand, black	20	82	Gravel, cemented	12	204
			Sand, black	7	211

2/1-16K1

[T. White. About 0.5 mile northwest of Vancouver and 0.06 mile west of railroad. Altitude about 40 ft. Drilled by A. C. Locey. Casing, 6-in. to 67 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Soil	5	5	Sand	58	63
			Gravel	4	67

2/1-16P1

[Chester Nelson. About 0.2 mile west of railroad, at west end of 39th St. Altitude about 40 ft. Drilled by A. C. Locey. Casing, 6-in. to 56 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Soil	5	5	Clay	20	25
			Clay, sandy	10	35
			Gravel, loose	21	56

2/1-18P1

[Aluminum Co. of America well 1. About 3 miles west of Vancouver and 1,000 ft north of Columbia River. Altitude about 28 ft. Drilled by R. J. Strasser. Casing, 12-in. to 134 ft; perforated from 118 to 128 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Troutdale formation:		
Sand, dredged	5	5	Gravel and boulders, cemented	3	110
Clay, blue, and silt	35	40	Silt, sand, and gravel	4	114
Silt, gravelly	5	45	Gravel, loose, and sand; water-bearing	11	125
Silt, blue, and sand	25	70	Gravel, with clay binder	9	134
Clay, blue	5	75			
Silt and sand	32	107			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-18P2

[Aluminum Co. of America well 6. About 3.0 miles west of Vancouver and 1,000 ft north of Columbia River Altitude about 28 ft. Drilled by R. J. Strasser. Casing, 20-in. to 135 ft; perforated from 114 to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Recent alluvium—Continued		
Sand, dredged	5	5	Sand, packed	31	106
Silt, yellow, and clay	23	28	Troutdale formation:		
Clay, blue, and silt	20	48	Gravel, cemented	7	113
Sand, fine, and silt	21	69	Sand (quicksand), with gravel	7	120
Clay, hard	6	75	Gravel, with clay binder	15	135

2/1-18P3

[Aluminum Co. of America well 7. About 3 miles west of Vancouver and 1,000 ft north of Columbia River. Altitude about 28 ft. Drilled by R. J. Strasser. Casing, 20-in. to 137 ft; perforated from 109 to 114 ft and from 116 to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Sand, dredged	8	8	Sand, coarse	11	102
Clay and silt	28	36	Gravel, cemented	7	109
Sand, fine, and silt	55	91	Sand (quicksand) with gravel	9	118
			Troutdale formation: Gravel, with clay binder	19	137

2/1-18P4

[Aluminum Co. of America well 10. In Vancouver. Altitude is 32.5 ft. Drilled by R. J. Strasser, 1950. Casing, 16-in. to 133 ft; perforated from 119 to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Troutdale formation:		
			Gravel, cemented	14	118
Sand, dredge	9	9	Sand, water-bearing, and gravel	12	130
Clay	7	16	Gravel with binder	3	133
Sand with yellow silt	37	53			
Silt, blue, and sand	51	104			

2/1-18P5

[Aluminum Co. of America, well 11. In Vancouver. Altitude is 32.7 ft. Drilled by R. J. Strasser, 1950. Casing, 15-in. to 133 ft; perforated from 119 to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Sand, dredge	11	11	Clay, hard	6	85
Silt, yellow, and sand	25	36	Sand, blue, and silt	17	102
Sand, fine, blue	13	49	Troutdale formation:		
Silt, yellow, and sand	15	64	Gravel, cemented	17	119
Sand, fine, blue	15	79	Sand and gravel, water-bearing	11	130
			Gravel with binder	3	133

2/1-18P6

[Aluminum Co. of America, well 16. In Vancouver. Altitude is 31.6 ft. Drilled by R. J. Strasser, 1954. Casing, 24-in to 118 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Troutdale formation:		
			Gravel, with binder	10	106
Sand, dredged (filled)	12	12	Gravel, coarse, with clay binder	12	118
Sand, brown	3	15	Gravel, with binder; drilled ahead of casing	4	122
Silt and mucky sand	20	35	Gravel, water-bearing, and some sand	34	156
Sand, dirty, with wood fragments	55	90	Gravel with binder	4	160
Sand, clean, medium-size	6	96			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-18P7

[Aluminum Co. of America. In Vancouver. Altitude about 32 ft. Drilled by A. M. Jannsen. Casing, 6-in.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Fill, sandy	10	10	Sand, fine, blue	85	145
Clay, sandy, yellow	50	60	Troutdale formation: Sand, coarse, gray, and gravel; water-bearing	5	150

2/1-18R1

[Bonneville Power Administration, Alcoa Substation. About 0.5 mile north of Columbia River and 0.25 mile west of Lake Shillapoo. Altitude about 27 ft. Drilled by R. J. Strasser. Casing, 10-in to 140 ft; perforated from 118 to 133 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Troutdale formation:		
			Gravel, cemented	5	93
Clay, yellow (filled)	10	10	Sand, coarse, packed, with some gravel	24	117
Sand, gravelly, packed, yellow	20	30	Gravel, loose, water-bearing	6	123
Pleistocene alluvial deposits: Silt, packed, blue, with some gravel	58	88	Gravel, cemented	4	127
			Gravel, loose, water-bearing	5	132
			Gravel, cemented	8	140

2/1-19A1

[Aluminum Co. of America, well 14. In Vancouver. Altitude is 34.4 ft. Drilled by R. J. Strasser, 1953. Casing, 24-in, 0 to 24 ft; 16-in, 0 to 119 ft; perforated from 105 to 115 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Sand, dredge	4	4	Sand, packed	22	94
Clay, sandy	19	23	Troutdale formation:		
Sand	11	34	Gravel with clay binder	9	103
Clay, sandy	4	38	Sand and gravel, water-bearing	16	119
Sand, packed	13	51			
Silt and sand	21	72			

2/1-19A2

Aluminum Co. of America, well 15 in Vancouver. Altitude is 32.7 ft. Drilled by R. J. Strasser, 1953. Casing, 24-in, 0 to 24 ft; 16-in, 0 to 130 ft; perforated from 117 to 127 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Troutdale formation:		
Sand, dredge	7	7	Gravel with sandy clay binder	7	108
Clay, sandy	12	19	Gravel and sand, water-bearing	22	130
Sand and silt	11	30			
Sand, packed	71	101			

2/1-19B1

[Aluminum Co. of America, well 2. About 0.25 mile north of Columbia River and 2.5 miles west of Vancouver. Altitude about 30 ft. Drilled by R. J. Strasser. Casing, 12-in to 136 ft; perforated from 121 to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Pleistocene alluvial deposits:		
			Sand, packed	34	92
Sand, dredge	10	10	Sand	5	97
Soil	3	13	Silt, blue	13	110
Clay, yellow	24	37	Troutdale formation:		
Clay, blue, and silt	21	58	Gravel and sand, tight	10	120
			Gravel, loose, water-bearing	8	128
			Gravel, tight	8	136

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-19B2

Aluminum Co. of America, well 3. About 0.25 mile north of Columbia River and 2.5 miles west of Vancouver. Altitude about 30 ft. Drilled by R. J. Strasser. Casing, 12-in to 138 ft; perforated from 121 to 132 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Sand, dredged	10	10	Silt, blue	12	112
Soil	4	14	Troutdale formation:		
Clay, yellow	25	39	Sand, tight, and gravel with binder	8	120
Clay, blue, and silt	21	60	Gravel, loose, water-bearing	10	130
Pleistocene alluvial deposits:			Gravel with binder	8	138
Sand, packed	33	93			
Sand	7	100			

2/1-19B3

[Aluminum Co. of America well 4. About 0.25 mile north of Columbia River and 2.5 miles west of Vancouver. Altitude about 28 ft. Drilled by R. J. Strasser. Casing, 12-in to 111 ft; perforated from 96 to 106 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Sand, dredged	9	9	Silt and sand	55	91
Soil	4	13	Sand, coarse, and gravel; water-bearing	20	111
Clay, sandy	23	36			

2/1-19B4

[Aluminum Co. of America well 5. About 0.25 mile north of Columbia River and 2.5 miles west of Vancouver. Altitude about 28 ft. Drilled by R. J. Strasser. Casing, 12-in to 122 ft; perforated from 102 to 117 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Pleistocene alluvial deposits:		
Sand, dredged	8	8	Sand, coarse, and gravel; water-bearing	21	117
Soil	6	14	Troutdale formation: Gravel, with binder	5	122
Clay, sandy	24	38			
Silt, sandy	58	96			

2/1-19B7

[Aluminum Co. of America well 12. In Vancouver. Altitude is 31.6 ft. Drilled by R. J. Strasser, 1952. Casing, 20-in to 25 ft, 12-in to 116 ft; perforated from 104 to 114 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Sand, dredged	10	10	Sand, packed	34	93
Silt, sandy	23	33	Troutdale formation:		
Sand, packed	14	47	Gravel, cemented	5	98
Silt, sandy	12	59	Gravel, loose, and sand; water-bearing	18	116

2/1-19B8

[Aluminum Co. of America well 13. In Vancouver. Altitude is 29.2 ft. Drilled by R. J. Strasser, 1952. Casing, 20-in to 30 ft, 12-in to 117 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium and Pleistocene alluvial deposits:			Recent alluvium and Pleistocene alluvial deposits—Continued		
Sand, dredged	7	7	Sand, packed	37	92
Clay, sandy	9	16	Troutdale formation:		
Silt, sandy	39	55	Gravel, cemented	7	99
			Gravel, loose, and sand; water-bearing	18	117

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-21A1

[Spokane, Portland, and Seattle Railway Co. About 300 ft south of office, east of railroad, at roundhouse. Altitude about 65 ft. Drilled by R. J. Strasser. Casing, 18-in to 130 ft; perforated from 114 to 124 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Clay	12	12	Gravel, coarse, and sand; cemented	8	111
Sand, coarse	66	78	Gravel, coarse, with some sand; water-bearing	19	130
Sand, fine (quicksand)	3	81			
Gravel and sand	22	103			

2/1-21C2

[Federal Housing Authority well 11, Fruit Valley (operated by city of Vancouver). At intersection of LaFrambois Road and State Route 1 T. Altitude about 48 ft. Drilled by R. J. Strassser. Casing, 12-in to 151 ft; perforated from 100 to 109 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Soil and sand(?)	26	26	Recent alluvium and Pleistocene alluvial deposits—Continued		
Recent alluvium and Pleistocene alluvial deposits:			Sand, coarse, loose, with some gravel	20	116
Gravel	48	74	Sand, gray	5	121
Sand, fine, and gravel	22	96	Troutdale formation: Sand, fine, yellow	30	151

2/1-21F1

[Federal Housing Authority well 10, Fruit Valley (operated by city of Vancouver). South of LaFrambois Road, west of Vancouver. Altitude about 48 ft. Drilled by R. J. Strasser. Casing, 12-in to 128 ft; perforated from 105 to 116 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium: Soil and silt	20	20	Pleistocene alluvial deposits—Con.		
Pleistocene alluvial deposits:			Sand, coarse, and gravel; water-bearing	39	89
Sand, coarse, and gravel	30	50	Gravel, water-bearing	39	128

2/1-21N1

[Carborundum Co. About 1,000 ft north of Columbia River, 1.0 mile west of Vancouver. Altitude about 33 ft. Drilled by H. Bottner. Casing, 18-in to 71 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Pleistocene alluvial deposits:		
Sand	21	21	Sand	20	49
Clay, blue	8	29	Gravel, cemented	15	64
			Boulders	3	67
			Gravel, water-bearing	28	95

2/1-21N2

[Carborundum Co. About 1,000 ft north of Columbia River, 1.0 mile west of Vancouver. Altitude about 33 ft. Drilled by H. Bottner. Casing, 18-in to 105 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Pleistocene alluvial deposits—Continued		
Sand	18	18	Gravel, cemented	31	78
Clay, blue	6	24	Gravel, fine, and sand; water-bearing	6	84
Clay, brown, with boulders	12	36	Gravel, coarse, water-bearing	21	105
Pleistocene alluvial deposits:					
Sand	11	47			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-23Q1

[City of Vancouver well 1. Base of north side of ridge in eastern Vancouver, near Fourth Plain Road and E. Reserve St. Altitude about 175 ft. Drilled by R. J. Strasser. Casing, 16-in. to 250 ft]

Materials	Thickness (feet)	Depth (feet)	Materals	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	4	4	Gravel, water-bearing	32	220
Gravel, loose	36	40	Troutdale formation(?):		
Sand and silt	90	130	Gravel, coarse, with clay binder	16	236
Gravel and sand	25	155	Gravel, water-bearing	12	248
Gravel	5	160	Gravel and clay	2	250
Sand	28	188			

2/1-23Q3

[City of Vancouver well 3. On northeastern nose of ridge in eastern Vancouver, near Fourth Plain Road and E. Reserve St. Altitude about 223 ft. Drilled by R. J. Strasser. Casing, 16-in. to 280 ft; perforated from 227 to 243 ft and from 251 to 265 ft]

Materials	Thickness (feet)	Depth (feet)	Materals	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay	5	5	Sand, coarse	6	231
Gravel, with binder of clay, yellow	90	95	Gravel, water-bearing	7	238
Gravel, loose, with loose black sand	45	140	Gravel	12	250
Gravel, cemented	58	198	Sand, coarse	7	257
Sand, packed, yellow	16	214	Gravel, fairly loose, water-bearing	14	271
Sand, fine, and gravel	11	225	Gravel, water-bearing	2	273
			Troutdale formation: Gravel, cemented	7	280

2/1-23Q4

[City of Vancouver well 4. Base of north side of ridge in eastern Vancouver, near Fourth Plain Road and E. Reserve St. Altitude about 185 ft. Drilled by R. J. Strasser. Casing, 18-in. to 243 ft; perforated from 203 to 238 ft]

Materials	Thickness (feet)	Depth (feet)	Materals	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	2	2	Sand and gravel, water-bearing	44	234
Sand and silt	43	45	Troutdale formation: Gravel, with clay binder	9	243
Sand, coarse, and pea gravel	127	172			
Sand, fine, with some gravel	18	190			

2/1-23R1

[City of Vancouver well 5. Base of north side of ridge in eastern Vancouver. Vicinity of Fourth Plain Road and E. Reserve St. Altitude about 185 ft. Drilled by R. J. Strasser. Casing, 14-in. to 205 ft 10-in. from 202 to 240 ft; perforated from 205 to 214 ft, and from 226 to 235 ft]

Materials	Thickness (feet)	Depth (feet)	Materals	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel, pea, and sand	42	42	Sand, with some gravel	5	192
Gravel, loose	4	46	Sand and gravel, water-bearing	40	232
Gravel, pea, sand, and silt	94	140	Troutdale formation: Gravel, with clay binder	8	240
Sand	47	187			

2/1-24K1

[Vancouver School District 37, 2223 Kauffman Ave., Vancouver. Altitude about 170 ft. Drilled by H. I. Bottner, 1955. Casing, 10-in. to 167 ft; perforated from 154 to 158 ft]

Materials	Thickness (feet)	Depth (feet)	Materals	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Soil	5	5	Gravel, loose (water 50 to 75 gpm)	9	138
Gravel	5	10	Sand and gravel	16	154
Sand, coarse, water-bearing	10	20	Gravel, loose, clean, water-bearing	9	163
Sand, fine, yellow, water-bearing	63	83	Sand and gravel	4	167
Sand and gravel	12	95			
Troutdale formation:					
Gravel, cemented	34	129			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-27H1

[Clark County Public Utility District. In Vancouver. Altitude about 95 ft. Drilled by R. J. Strasser, 1955. Casing, 10-in. from 30 to 144 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pliestocene alluvial deposits—Con.		
Backfill of gravel and dirt	8	8	Clay, sandy, and gravel	28	100
Gravel, loose, sand, and some clay	28	36	Clay and gravel	5	105
Clay, sandy, and gravel	6	42	Gravel, cemented	14	119
Gravel, cemented	12	54	Sand, loose, and gravel; water-bearing	21	140
Sand, loose, and gravel	8	62	Sand, cemented, and gravel	4	144
Clay, sandy	10	72			

2/1-27H2

[Clark County Public Utility District. In Vancouver. Altitude about 95 ft. Drilled by R. J. Strasser, 1955. Casing, 10-in. to 137 ft; perforated from 120 to 133 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Fill of gravel and clay	15	15	Sand, brown	16	103
Clay, sandy, and gravel	5	20	Sand and gravel, clay binder	17	120
Clay, sandy	43	63	Sand, loose, and gravel; water-bearing	13	133
Clay, sandy, and gravel	2	65	Sand, loose, and gravel	4	137
Gravel, cemented	22	87			

2/1-27L1

[Interstate Brewery Co. In south part of Vancouver. Altitude about 40 ft. Casing, 12-in.; perforated from 60 to 70 ft and 80 to 103 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel, coarse	10	10	Gravel, cemented	10	80
Gravel, cemented	50	60	Sand, coarse, and gravel	23	103
Sand, coarse, and gravel; water-bearing	10	70	Troutdale formation: Gravel, with binder of fine yellow silt	5	108

2/1-27M7

[Columbia River Paper Mills well 7. In south part of Vancouver, near Columbia River. Altitude about 28 ft. Drilled by A. M. Jannsen. Casing, 26-in. to 137 ft, 20-in. from 132 to 150 ft; perforated from 22 to 125 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay	4	4	Gravel, loose	13	113
Gravel, loose	92	96	Troutdale formation: Gravel, cemented	37	150
Gravel, binder of clay	4	100			

2/1-27M8

[Columbia River Paper Mills well 8. In south part of Vancouver, near Columbia River, at intersection of 6th and Ingalls Sts. Altitude about 28 ft. Drilled by A. M. Jannsen]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel, cemented	50	50	Gravel, cemented	22	134
Gravel, water-bearing	62	112	Gravel, loose	3	137

2/1-28G3

[Port of Vancouver, terminal 2. Near Junction of U.S. Highways 99 and 830. Altitude about 28 ft. Casing, 18-in.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Pleistocene alluvial deposits—Con.		
Sand, filled	5	5	Gravel, water-bearing	25	77
Silt	40	45	Gravel, dirty	2	79
Pleistocene alluvial deposits:			Gravel, water-bearing	1	80
Sand, coarse, and fine gravel	7	52			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-35F1

[Buffalo Electro-Chemical Co. In southeast part of Vancouver at shipyards. Altitude about 30 ft. Drilled by A. M. Jannsen, 1949. Casing, 26-in. to 143 ft, perforated from 30 to 69 ft and from 83 to 97 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Fill	15	15	Pliestocene alluvial deposits—Con.		
Pleistocene alluvial deposits:			Gravel, small	3	74
Gravel and sand, water-bearing	18	33	Sand	3	77
Boulders, small, and sand	2	35	Gravel, small, and boulders	11	88
Gravel	7	42	Gravel, coarse	7	95
Gravel, fine, and sand	8	50	Gravel, pea	5	100
Boulders, small, and sand	3	53	Sand, fine, gray, and silt	2	102
Gravel and sand	12	65	Gravel, large	1	103
Gravel, cemented	6	71	Troutdale formation: Gravel cemented	57	160

2/1-35F2

[Buffalo Electro-Chemical Co., In southeast part of Vancouver at shipyards. Altitude 29.2 ft. Drilled by L. R. Gaudio, 1951.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Sand, fine, brown	9	9	Sand, fine, and some gravel	9	102
Gravel and sand; coarse	9	18	Troutdale formation:		
Gravel, as much as 4 in. to fine, with loose sand	32	50	Gravel, coarse, and cemented brown sand	12	114
Gravel and some sand; hardpacked	10	60	Sand, and some light brown gravel	2	116
Sand, fine, and some loose gravel	12	72	Gravel and sand, cemented; light brown clay	6	122
Sand and gravel, hardpacked	8	80	Sand, medium, and coarse brownish gravel	10	132
Sand, fine to medium, and gravel	10	90	Gravel, cemented, and sand; sandy streaks	28	160
Sand	3	93			

2/1-35F3

[Buffalo Electro-Chemical Co. In southeast part of Vancouver at shipyards. Altitude about 30 ft. Drilled by R. J. Strasser, 1951. Casing, 26-in. to 96 ft; perforated from 28 to 56 and 73 to 93 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Sand, fill	12	12	Pleistocene alluvial deposits—Con.		
Recent alluvium: Silt, blue	4	16	Gravel and sand, very loose, water-bearing	22	56
Pleistocene alluvial deposits:			Gravel, cemented	7	63
Gravel, clay binder	10	26	Gravel, loose, and fine brown sand; water-bearing	16	79
Gravel, loose, and sand; water-bearing	8	34	Gravel and sand, cemented	17	96

2/1-35F4

[Buffalo Electro-Chemical Co. In southeast part of Vancouver at shipyards. Altitude about 30 ft Drilled by R. J. Strasser, 1951. Casing, 26-in. to 85 ft; perforated from 30 to 67 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Sand, fill	13	13	Pleistocene alluvial deposits—Con.		
Recent alluvium: Silt, blue	2	15	Gravel and sand, very loose; water-bearing	18	54
Pleistocene alluvial deposits:			Gravel, cemented	9	63
Gravel, some clay binder	10	25	Gravel, loose, and very fine brown sand; water-bearing	18	81
Gravel and sand, loose; water-bearing at 34 ft	11	36	Gravel and sand, cemented	4	85

2/1-36B1

[City of Vancouver well 1. In McLoughlin Heights, near U.S. Highway 830. Altitude about 48 ft. Drilled by R. J. Strasser. Casing, 12-in. to 132 ft; perforated from 100 to 110 ft and 112 to 122 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel, fine, and clay	15	15	Gravel and sand, water-bearing	33	78
Gravel and sand	30	45	Gravel, water-bearing	54	132

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/1-36B2

[City of Vancouver well 2. In McLoughlin Heights, near U.S. Highway 830. Altitude about 54 ft. Drilled by R. J. Strasser. Casing, 12-in. to 120 ft; perforated from 90 to 105 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel, fine, and clay	11	11	Gravel and sand, water-bearing	21	76
Gravel, sand, and clay	31	42	Gravel, water-bearing	54	130
Gravel and sand	13	55			

2/1-36B3

[City of Vancouver well 3. In McLoughlin Heights, near U.S. Highway 830. Altitude about 52 ft. Drilled by R. J. Strasser. Casing, 12-in. to 128 ft; perforated from 92 to 110 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay	2	2	Gravel and sand	48	80
Gravel, fine	30	32	Gravel, water-bearing	48	128

2/1-36B4

[City of Vancouver well 4. In McLoughlin Heights, near U.S. Highway 830. Altitude about 56 ft. Drilled by R. J. Strasser. Casing, 12-in. to 130 ft; perforated from 92 to 107 ft and 109 to 120 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay	2	2	Sand and gravel, water-bearing	10	75
Gravel, fine	28	30	Sand and gravel	15	90
Sand	25	55	Gravel, water-bearing	40	130
Sand and gravel	10	65			

2/1-36B5

[City of Vancouver, well 5 in McLoughlin Heights, near U.S. Highway 830. Altitude about 50 ft. Drilled by R. J. Strasser. Casing, 12-in, to 124 ft; perforated from 80 to 92 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay and gravel, fine	5	5	Gravel and sand	33	69
Gravel, sand, and clay	31	36	Gravel, water-bearing	55	124

2/1-36B6

[City of Vancouver well 6. In McLoughlin Heights, near U.S. Highway 830. Altitude about 52 ft. Drilled by R. J. Strasser. Casing, 12-in. to 122 ft; perforated from 83 to 115 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay and gravel, fine	9	9	Gravel and sand	36	77
Gravel, sand, and clay	32	41	Gravel, water-bearing	45	122

2/1-36B7

[City of Vancouver well 7. In McLoughlin Heights, near U.S. Highway 830. Altitude about 45 ft. Drilled by R. J. Strasser. Casing, 12-in. to 126 ft; perforated from 77 to 83 ft and from 84 to 100 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Gravel, sand, and clay	26	26	Sand, coarse	32	116
Gravel and sand	58	84	Gravel(?), coarse	13	129

2/1-36B8

[City of Vancouver well 8. In McLoughlin Heights, near U.S. Highway 830. Altitude about 55 ft. Drilled By R. J. Strasser, 1952. Casing, 20-in. to 127 ft; perforated from 91 to 114 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay, with some gravel	18	18	Sand, coarse, clay, and some gravel; water-bearing	23	77
Gravel, with clay binder	13	31	Gravel, sand, and clay	15	92
Silt, sandy, and some gravel	13	44	Sand and gravel, water-bearing	35	127
Sand, gravel, and clay	10	54			

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
2/2-1R1					
[H. R. Sieburg. About 2.5 miles east of Orchards and 0.5 mile north of State Route 8A. Altitude about 240 ft. Drilled by P. J. Hansen, 1951. Casing, 8-in.]					
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil and some gravel	8	8	Hardpan, with clay and coarse rock	38	60
Gravel, coarse	14	22	Gravel and sand, water-bearing	24	84
2/2-2B1					
[R. L. and F. E. Divine. About 2 miles northeast of Orchards. Altitude about 280 ft. Drilled by G. A. Locey, 1947. Casing, 6-in. to 128 ft]					
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Soil	6	6	Sand, red, soupy	2	107
Gravel	16	22	Gravel, cemented	12	119
Clay	8	30	Gravel, loose	6	125
Sand	48	78	Gravel, cemented	1	126
Sand(?)	10	88	Sand, red, water-bearing	1	127
Troutdale formation:			Sand, black, water-bearing	1	128
Sand, yellow, soupy	17	105			
2/2-2Q1					
[C. L. Engle. In Sifton. Clark Chapel Road, about 0.04 mile north of State Route 8A. Altitude about 252 ft. Drilled by A. C. Locey. Casing, 6-in. to 73 ft]					
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	3	3	Boulders	6	54
Sand	7	10	Gravel	17	71
Gravel	38	48	Sand, black	2	73
2/2-2Q2					
[J. Norby. In Sifton. On Clark Chapel Road, 0.05 mile north of State Route 8A. Altitude about 253 ft. Drilled by A. C. Locey. Casing, 6-in. to 70 ft]					
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	3	3	Gravel	6	68
Gravel	45	48	Sand, black	3	71
Sand (quicksand)	14	62			
2/2-3F1					
[W. Myers. On Battle Ground highway, about 1.3 miles north of State Route 8A. Altitude about 264 ft. Drilled by A. C. Locey. Casing, 6-in. to 142 ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	6	6	Clay, blue	19	117
Sand	20	26	Gravel	5	122
Gravel	13	39	Gravel, cemented	6	128
Gravel, loose	49	88	Clay, yellow	10	138
Sand, fine (quicksand)	10	98	Gravel, fine	4	142
2/2-3N1					
[Vancouver Municipal Airport. On Battle Ground highway, about 0.9 mile north of State Route 8A. Altitude about 250 ft. Drilled by G. Zent. Casing, 6-in. to 129 ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	60	60	Clay, sandy	35	120
Sand, water-bearing	12	72	Gravel, water-bearing	9	129
Sand	13	85			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-3R1

[H. S. Fenton. Sifton. About 0.6 mile north of State Route 8A and 0.75 mile east of Battle Ground highway. Altitude about 245 ft. Drilled by A. C. Locey. Casing, 6-in. to 145 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	5	5	Clay, red	23	119
Sand and gravel	23	28	Sand	14	133
Sand (quicksand)	17	45	Gravel	9	142
Boulders	8	53	Sand, black	3	145
Clay, sandy	26	79			
Sand	17	96			

2/2-4E1

[Ed Drasler. On Glenwood Road, about 0.7 mile north of Five Corners, northwest of Orchards. Altitude about 208 ft. Drilled by R. A. Jobes. Casing, 6-in. to 76 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	25	25	Sand, yellow, and gravel	8	73
Sand (quicksand)	40	65	Gravel, water-bearing	3	76

2/2-4G2

[J. Kindsfather. About 1.7 miles north of Orchards and 0.5 mile west of Battle Ground highway. Altitude about 232 ft. Drilled by A. C. Locey. Casing, 6-in. to 87 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	20	20	Gravel, with clay binder	12	72
Gravel, water-bearing	20	40	Gravel, cemented	10	82
Sand, coarse (quicksand)	20	60	Gravel, loose	3	85
			Gravel, water-bearing	2	87

2/2-4G3

[Alvin Bunch. About 1.3 miles north of Orchards, on road 0.5 mile west of road from Orchards to Battle Ground. Altitude about 235 ft. Drilled by R. A. Jobes. Casing, 5-in. to 105 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	50	50	Sand, yellow	37	102
Sand, black (quicksand)	15	65	Gravel	3	105

2/2-4N1

[E. Hilberg. About 0.2 mile northwest of Five Corners, and 1.5 miles northwest of Orchards. Altitude about 211 ft. Drilled by A. C. Locey. Casing, 6-in. to 93 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Open pit	7	7	Troutdale formation:		
Pleistocene alluvial deposits:			Gravel	10	90
Sand	73	80	Sand, water-bearing	3	93

2/2-5G2

[H. I. and J. L. Sneed. In Vancouver. Altitude about 198 ft. Drilled by R. A. Jobes, 1953. Casing, 8-in. to 99 ft; perforated from 86 to 92 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
			Troutdale formation—Con.		
Pleistocene alluvival deposits:			Gravel, light-colored, and fine black sand	2	83
Sand	3	3	Gravel and sand	5	88
Clay	5	8	Gravel, fine, loose	3	91
Clay and sand, mixed	18	26	Gravel, cemented	6	97
Sand	44	70	Sand, white, and gravel; water-bearing	2	99
Troutdale formation:					
Sand and gravel mud	11	81			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-5H1

[H. Lloyd. In Vancouver. Altitude about 202 ft. Dug by James C. Lloyd, 1953. Casing, 36-in. to 27 ft. perforated from 20 to 27 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Dirt and gravel	3	3	Quicksand	2	25
Gravel	17	20	Sand, coarse, water-bearing	2	27
Sandstone	3	23	Clay, blue		Bottom

2/2-5Q1

[A. P. Bomber. About 1.5 miles northwest of Orchards. Altitude about 238 ft. Drilled by R. A. Jobes, 1944. Casing, 6-in. to 143 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay, yellow	18	18	Sand, fine, yellow (quicksand)	50	115
Clay, muddy, yellow	47	65	Troutdale formation: Gravel, water-bearing	29	143

2/2-6J1

[P. Christensen. About 2.7 miles east of U.S. Highway 99, along Tracy Road. Altitude about 260 ft. Drilled by A. C. Locey. Casing, 6-in. to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	12	12	Gravel, cemented	22	127
Sand	52	64	Gravel	3	130
Clay, sandy	41	105	Sand, black	3	133

2/2-7D1

[Nels Carlson. On County Farm Road, about 0.4 mile east of Manor highway. Altitude about 290 ft. Drilled by A. C. Locey. Casing, 6-in. to 168 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil, sandy	45	45	Sand	17	159
Gravel, water-bearing	67	112	Troutdale formation:		
Clay	30	142	Sand and gravel	13	172
			Gravel, water-bearing	2	174

2/2-7D2

[O. Brekke. On County Farm Road, about 0.5 mile east of Manor highway. Altitude about 288 ft. Drilled by A. C. Locey. Casing, 6-in. to 173 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	48	48	Sand (quicksand)	12	154
Sand, water-bearing	12	60	Troutdale formation:		
Sand	48	108	Gravel	15	169
Clay	34	142	Gravel, loose	5	174

2/2-7M1

[W. A. Lindeman. About 4 miles northeast of Vancouver and 2 miles east of U.S. Highway 99. Altitude about 290 ft. Drilled, 1952. Casing, 12-in. to 48 ft; perforated from 24 to 46 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	1	1	Clay, sandy	7	14
Clay	6	7	Sand, water-bearing	34	48

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-8A2

[Kenneth Menger. In Vancouver. Altitude about 225 ft. Drilled by Joe Hansen, 1954. Casing, 6-in. to 168 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	7	7	Sand, water-bearing, no gravel	71	166
Loam, sandy	18	25	Sand and light gravel; water-bearing	2	168
Clay, mixed, blue and yellow	35	60			
Sand and clay, mixed	35	95			

2/2-8B2.

[A. W. Clark. Just south of County Farm Road, about 0.4 mile west of Five Corners, northwest of Orchards. Altitude about 230 ft. Casing, 6-in. to 143 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Soil	8	8	Sand (quicksand)	23	92
Sand	12	20	Troutdale formation:		
Gravel	16	36	Gravel	18	110
Clay	26	62	Boulders	21	131
Gravel	7	69	Gravel	12	143
			Sand, black	2	145

2/2-8H1

[H. E. and R. L. Schultz. About 5 miles northeast of Vancouver. Altitude about 225 ft. Drilled by Joe Hansen, 1955. Casing, 6-in. to 126 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Topsoil	4	4	Sand, brown, and clay, mixed	50	85
Gravel, light-colored, and sand	18	22	Sand, water-bearing	30	115
Sand, water-bearing	10	32	Troutdale formation:		
Clay, yellow	3	35	Sand, water-bearing, and light-colored gravel	11	126

2/2-8N2

[Walnut Grove School. About 4.5 miles northeast of Vancouver, on County Road 69. Altitude about 290 ft. Drilled by A. C. Locey. Casing, 6-in. to 203 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	2	2	Clay, sandy	95	190
Clay, sandy	8	10	Sand (quicksand)	5	195
Sand	60	70	Gravel, water-bearing	13	208
Troutdale formation:					
Clay	25	95			

2/2-9D1

[J. B. Coffield. About 1.2 miles northwest of Orchards and 0.1 mile east of Five Corners. Altitude about 213 ft. Drilled by G. Zent.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Gravel	40	40	Sand, fine, white (quicksand)	68	108
			Troutdale formation: Gravel	9	117

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-9D3

[Frank Houn. Just off Glenwood Road, about 1.0 mile north of Five Corners, northwest of Orchards. Altitude about 215 ft. Drilled by R. A Jobes. Casing, 6 in. to 92 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Plesitocene alluvial deposits:			Pleistocene alluvial deposits—Continued		
Gravel, loose	47	47	Sand (quicksand)	40	87
			Troutdale formation: Gravel	5	92

2/2-9J1

[H. D. Peden. About 0.5 mile north of Orchards, on lane across from Ellsworth Rcad. Altitude about 220 ft. Drilled by A. C. Locey. Casing, 6-in. to 60 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation(?):		
Soil, sandy	10	10	Gravel	16	56
Gravel and sand	15	25	Gravel, water-bearing	4	60
Gravel and boulders	15	40			

2/2-9K2

[H. C. Carter. About 0.5 mile northwest of Orchards, on Fairlawn Road. Altitude about 218 ft. Drilled by A. C. Locey. Casing, 6-in. to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation(?)—Con.		
Soil	4	4	Boulders	8	69
Sand	12	16	Gravel	14	83
Gravel	28	44	Sand	30	113
Troutdale formation(?):			Gravel	12	125
Clay	17	61	Sand, black	5	130

2/2-9M1

[Jay Turbush. About 0.8 mile west of Orchards, on Glenwood Road. Altitude about 231 ft. Drilled by A. C. Locey. Casing, 6-in. to 140 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	7	7	Clay	10	71
Sand	18	25	Sand (quicksand)	28	99
Gravel	20	45	Gravel	16	115
Troutdale formation:			Gravel, cemented	11	126
Gravel, cemented	16	61	Gravel, sandy	13	139
			Sand, black	1	140

2/2-9R3

[M. C. Blair. In Orchards. Altitude about 225 ft. Drilled by Rupert Jobes, 1953. Casing, 6-in. to 88 ft; perforated from 70 to 84 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	20	20	Clay, yellow	4	50
Sand, water-bearing	13	33	Sand and gravel	15	65
Sand, black, water-bearing	4	37	Gravel, water-bearing	23	88
Clay, blue	9	46	Sand, black	1	89

2/2-10D1

[L. Whatley. County Farm road, 0.2 mile west of Battle Ground highway, northwest of Orchards. Altitude about 221 ft. Drilled by A. C. Locey. Casing, 6-in. to 94 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and sand	28	28	Gravel, cemented	18	82
Gravel	29	57	Sand, black	12	94
Sand	7	64			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-10L1

[Wilson Worley. In Orchards, at intersection of State Routes 1U and 8A. Altitude about 218 ft. Drilled by A. C. Locey. Casing, 6-in. to 69 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil, gravelly	6	6	Clay, blue	6	43
Sand	31	37	Sand, black (quicksand)	10	53
			Sand, yellow (quicksand)	14	67
			Gravel, water-bearing	2	69

2/2-10L2

[C. A. Larson. In Orchards, about 0.3 mile east of intersection of State Routes 1U and 8A. Altitude about 218 ft. Drilled by A. C. Locey. Casing, 6-in. to 64 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Open pit	30	30	Gravel, cemented	18	58
Sand and gravel	10	40	Gravel, loose	6	64

2/2-10L3

[F. H. Baker. Near Orchards, about 0.2 mile east of intersection of State Routes 1U and 8A. Altitude about 218 ft. Drilled by A. C. Locey. Casing, 6-in. to 62 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	8	8	Gravel and clay	6	38
Boulders	9	17	Boulders	4	42
Gravel	15	32	Gravel and clay	16	58
			Sand, black	5	63

2/2-10M2

[O. H. Snyder. Battle Ground highway, about 0.1 mile north of State Route 8A, near Orchards. Altitude about 220 ft. Drilled by A. C. Locey. Casing, 6-in. to 66 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and gravel	3	3	Gravel, cemented	21	63
Gravel	17	20	Gravel, water-bearing	3	66
Sand	22	42			

2/2-10P2

[A. L. Edwards. In Orchards, on State Route 8A. Altitude about 215 ft. Drilled by A. C. Locey. Casing, 6-in. to 64 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel, coarse	20	20	Gravel, cemented	5	40
Sand	15	35	Sand, black	4	44
			Gravel, cemented	6	50
			Gravel, loose	14	64

2/2-10R2

[Stuchini. About 0.5 mile south of State Route 8A, 0.9 mile east of Orchards. Altitude about 203 ft. Drilled by A. C. Locey. Casing, 6-in. to 75 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	9	9	Gravel, pea	12	56
Gravel	11	20	Clay	8	64
Clay	13	33	Gravel	6	70
Sand	11	44	Sand, black	5	75

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

2/2-10R4

[Elmer Yielding. About 1 mile east of Orchards. Altitude about 205 ft. Dug by Jack Hollenback, 1953. Casing, 36-in. to 44 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	4	4	Sand and clay	5	40
Gravel and rock	31	35	Sand and gravel	4	44

2/2-11E2

[C. Holter. About 1.5 miles east of Orchards on State Route 8A. Altitude about 225 ft. Drilled by A. C Locey. Casing, 6-in. to 50 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	6	6	Clay, blue	7	44
Sand	31	37	Sand, black	6	50

2/2-12H1

[D. M. Shattuck. About 1 mile northeast of Vancouver and 2 miles east of U.S. Highway 99. Altitude about 220 ft. Drilled by G. H. Locey, 1952. Casing, 8-in. to 90 ft; perforated from 50 to 90 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Soil, gravelly	4	4	Gravel, water-bearing	4	68
Gravel	14	18	Gravel and clay	5	73
Gravel, water-bearing	6	24	Gravel, water-bearing	1	74
Troutdale formation:			Gravel, cemented	2	76
Clay	24	48	Gravel; alternating layers of loose water-bearing gravel and cemented gravel	15	91
Gravel, cemented	5	53			
Gravel, water-bearing	6	59			
Gravel and clay	5	64			

2/2-12J1

[Proebstel Community church. About 0.5 mile west of Proebstel Store, near State Route 8A, about 3.5 miles east of Orchards. Altitude about 215 ft. Drilled by G. Zent]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:					
Soil	4	4			
Gravel	34	38			

2/2-13D2

[D. Kunze. About 0.5 mile south of State Route 8A and 2.1 miles east of Orchards. Altitude about 198 ft. Drilled by A. C. Locey. Casing, 8-in. to 96 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil and rock fragments, unclassified	6	6	Troutdale formation—Continued		
Troutdale formation:			Clay (shale)	3	56
			Clay and gravel	28	84
Gravel	47	53	Gravel, water-bearing	12	96

2/2-14D1

[J. L. Frame. About 0.5 mile south of Sifton. Altitude about 195 ft. Drilled by A. C. Locey. Casing, 6-in. to 55 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation(?):		
Soil	5	5	Clay and boulders	35	45
Clay	5	10	Sand, water-bearing	10	55

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-15P1

[Jacob Dietz. About 0.7 mile north of Burton School and 1.2 miles southeast of Orchards. Altitude about 222 ft. Drilled by A. C. Locey. Casing, 6-in. to 73 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	16	16	Clay	8	44
Gravel	20	36	Sand (quicksand)	16	60
			Gravel	9	69
			Sand, black	4	73

2/2-16G2

[D. R. Irving. About 0.5 mile southwest of Orchards. Altitude about 210 ft. Casing, 8-in. to 145 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	40	40	Sand and gravel, heaving	60	120
Sand, yellow	20	60	Sand and coarse gravel	20	140
			Sand and gravel, water-bearing	5	145

2/2-16H1

[C. P. McMillan. About 6 miles northeast of Vancouver. Altitude about 200 ft. Drilled by G. L. Zent, 1950. Casing, 6-in. to 87 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Clay, rocky	16	58
Gravel and clay	8	10	Gravel, water-bearing	28	86
Gravel, water-bearing	2	12			
Clay	30	42			

2/2-16J1

[M. M. VanFleet and Clyde Parker. About 6 miles northeast of Vancouver. Altitude about 205 feet. Drilled by G. H. Locey, 1953. Casing, 6-in. to 71 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil, gravelly	4	4	Gravel and sand	8	50
Gravel	14	18	Gravel and clay	4	54
Sand	4	22	Gravel and sand, water-bearing	16	70
Clay	20	42	Gravel, clean	1	71

2/2-16N1

[A. J. Kaufman. About 5 miles northeast of Vancouver. Altitude about 263 ft. Drilled in 1953. Casing, 8-in. to 200 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Quicksand	40	40	Gravel, cemented	60	100
			Gravel, water-bearing	50	150
			No record	50	200

2/2-18G1

[W. F. Kunze. About 3.5 miles northeast of Vancouver. Altitude about 280 ft. Drilled by G. L. Zent, 1953. Casing, 24-in. to 13 ft, 11-in. from 0 to 35 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	2	2	Sand, water-bearing	25	35
Clay, sandy	8	10			

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

2/2-18J2

[H. C. Schill, 4225 NE Buena Vista Road, Vancouver. Altitude about 255 ft. Dug well, 1955. Casing, 12-in. to 18 ft; perforated from 8 to 18 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Loam, sandy; water-bearing at 4 ft	7	7	Sand, water-bearing	11	18

2/2-19F3

[H. H. Bolton. On State Route 8A about 0.6 mile east of Clark County Road 69. Altitude about 185 ft. Drilled by A. C. Locey. Casing, 6-in. to 64 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	2	2	Sand (quicksand)	5	50
Clay, sandy	18	20	Gravel, loose	8	58
Clay, blue	10	30	Sand, black, water-bearing	6	64
Sand, gray	15	45			

2/2-19G3

[John Yinger. On Battle Ground highway near Andreson Road about 1.8 mile east of Vancouver. Altitude about 205 ft. Drilled by A. C. Locey. Casing, 6-in. to 64 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	12	12	Gravel, cemented	13	71
Sand	8	20	Gravel	8	79
Gravel	13	33	Sand, black	1	80
Clay	17	50			
Gravel	8	58			

2/2-19H3

[John Shierman. South of intersection of State Routes 1U and 8A. Altitude about 210 ft. Drilled by A. C. Locey. Casing, 6-in. to 87 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	4	4	Gravel	8	84
Gravel	31	35	Sand, black	4	88
Sand (quicksand)	5	40			
Clay, blue	10	50			
Sand (quicksand)	26	76			

2/2-19J2

[L. W. Sensiba. Andreson Road, about 0.4 mile south of State Route 8A. Altitude about 215 ft. Drilled by A. C. Locey. Casing, 6-in. to 80 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	12	12	Clay, sandy	12	78
Sand	52	64	Gravel, water-bearing	2	80
Gravel	2	66			

2/2-19L1

[J. W. Bolton. Andreson Road, off Fourth Plain Road. Altitude about 185 ft. Drilled by A. C. Locey. Casing, 6-in. to 68 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	5	5	Clay, blue	17	62
Gravel, coarse	13	18	Sand, fine	3	65
Sand, fine	23	41	Sand, coarse	3	68
Sand, blue	4	45			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-20A2

[Royal Oaks Country Club, Orchards. About 0.2 mile south of State Route 8A, about 1.6 miles southwest of Orchards. Altitude about 210 ft. Drilled by R. J. Strasser. Casing, 12 and 10-in. to 221 ft; perforated from 65 to 96 ft, from 170 to 198 ft, and from 200 to 216 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	2	2	Gravel, with clay binder	10	65
Gravel	6	8	Gravel and sand, water-bearing	30	95
Gravel and sand	12	20	Gravel, cemented	77	172
Sand	7	27	Gravel and sand, water-bearing	26	198
Sand and gravel	16	43	Gravel, water-bearing	18	216
Troutdale formation:			Gravel, with clay binder	5	221
Gravel, cemented	12	55			

2/2-20D2

[M. K. Nagel, 8104 NE Fourth Plain Road, Vancouver. Altitude about 220 ft. Drilled by B. L. Price, 1951. Casing, 10-in., 0–147 ft; perforated from 125 to 145 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Clay, sandy	60	81
Silt	18	21	Sand and gravel	66	147

2/2-20E1

[C. Albrecht. At intersection of Burton Road and State Route 1U, about 1.5 miles south of Walnut Grove. Altitude about 207 ft. Drilled by A. C. Locey. Casing, 6-in. to 58 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil and gravel	10	10	Gravel, cemented	19	49
Gravel	12	22	Gravel, loose	7	56
Troutdale formation:			Gravel	2	58
Clay	8	30	Sand, black	1	59

2/2-21J1

[H. Passut. About 1.8 miles south of Orchards at end of Orchards Road. Altitude about 202 ft. Drilled by A. C. Locey. Casing, 6-in. to 33 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil and gravel	10	10	Boulders	6	33
Sand and gravel	17	27			

2/2-21N1

[R. A. Laws. About 4 miles east of Vancouver. Altitude about 180 ft. Drilled by J. E. Hanson, 1955. Casing, 6-in. to 60 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Gravel, cemented	13	40
Gravel, heavy	15	18	Gravel, cemented, water-bearing	10	50
Gravel, light, water-bearing	5	23	Gravel, loose, water-bearing	10	60
Clay, blue	4	27	Clay at 60 ft.		

2/2-21P1

[S. J. Marrion. About 5 miles east of Vancouver. Altitude about 200 ft. Drilled by owner, 1954. Casing, 8-in. to 89 ft; perforated from 75 to 89 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	4	4	Gravel, cemented	24	48
Troutdale formation:			Gravel, cemented, water-bearing	7	55
Clay, yellow, and rock	18	22	Gravel, cemented; some black clay	10	65
Clay, yellow, and rock; some gravel	2	24	Gravel, washed, water-bearing	24	89

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-22A1

[George Fisher. About 1.6 miles southeast of Orchards and about 0.4 mile north of Clark County Road 109, on Clark County Road 111. Altitude about 240 ft. Drilled by A. C. Locey. Casing, 6-in. to 58 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Dug well, no record	56	56	Troutdale formation—Con.		
Troutdale formation:			Gravel and clay	24	99
Gravel, cemented	19	75	Gravel, water-bearing	15	114

2/2-22A2

[George Fisher. About 1.5 miles southeast of Orchards and 0.5 mile north of Clark County Road 109, on Clark County Road 111. Altitude about 243 ft. Drilled by A. C. Locey. Casing, 6-in. to 65 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	20	20	Clay and gravel	9	56
Sand and gravel	27	47	Sand, water-bearing	9	65

2/2-22J1

[Dewey Kitchell. About 6.5 miles east of Vancouver. Altitude about 242 ft. Drilled in 1950. Casing, 6-in. to 104 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	40	40	Troutdale formation—Con.		
Troutdale formation:			Gravel, water-bearing	33	104
Hardpan	31	71			

2/2-23D3

[C. Timmel. About 1.5 miles southeast of Orchards, at right-angle turn on County Road 111. Altitude about 244 ft. Drilled by A. C. Locey. Casing, 6-in. to 103 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	11	11	Gravel, cemented	26	97
Sand	20	31	Gravel	4	101
Gravel	10	41	Sand, black	2	103
Sand (quicksand)	30	71			

2/2-23E1

[H. W. Sherril. About 2 miles southeast of Orchards, on County Road 109, about 0.8 mile east of Burton School. Altitude about 238 ft. Drilled by A. C. Locey. Casing, 6-in. to 87 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	12	12	Gravel, cemented	27	97
Sand	20	32	Sand, black	2	99
Gravel	9	41			
Sand (quicksand)	29	70			

2/2-23F2

[Lester Courtney. About 2 miles southeast of Orchards, on County Road 109, about 0.9 mile east of Burton School. Altitude about 236 ft. Drilled by B. Abrams.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation(?):		
Gravel	20	20	Clay	10	70
Sand	40	60	Gravel, water-bearing	8	78

2/2-23G2

[Mrs. L. E. Olsen. About 2.5 miles southeast of Orchards. Altitude about 248 ft. Drilled by J. E. Hansen 1952. Casing, 8-in. to 128 ft; perforated from 112 to 120 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and clay	6	6	Clay, yellow	15	95
Gravel and boulders	39	45	Sand, water-bearing	10	105
Sand, water-bearing	35	80	Gravel, water-bearing	15	120
			Gravel, mixed with clay	8	128

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-23P1

[Evergreen school. About 6.5 miles east of Vancouver, on Clark County Road 108, and about 1.5 miles east of Clark County Road 104. Altitude about 307 ft. Drilled by P. J. Hansen. Casing, 8-in. to 220 ft; perforated from 185 to 195 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Sand and gravel	122	122	Troutdale formation:		
			Hardpan (cemented gravel)	15	137
			Sand, fine, and gravel	48	185
			Gravel, water-bearing	35	220

2/2-24E2

[W. C. Ireton. About 7 miles east of Vancouver, on Clark County Road 109, about 0.3 miles west of intersection with Clark County Road 7. Altitude about 236 ft. Drilled by A. C. Locey. Casing, 6-in. to 44 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	6	6	Gravel, cemented	6	44
Gravel	6	12	Gravel, with clay binder	3	47
Gravel, coarse	26	38			

2/2-24N2

[G. B. Wright. About 8 miles east of Vancouver. Altitude about 296 ft. Drilled by J. C. Hansen, 1955. Casing, 6-in. to 172 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Clay, yellow	18	140
Gravel, dry	67	70	Gravel, cemented	20	160
Sand and gravel	15	85	Gravel, loose, water-bearing	12	172
Sand, water-bearing	37	122			

2/2-25J1

[Alfred Kern. About 1.3 miles southwest of Harmony School and about 7 miles east of Vancouver, on Fisher Road near Mill Plain. Altitude about 285 ft. Drilled by A. C. Locey. Casing, 6-in. to 148 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	4	4	Gravel, cemented	13	100
Gravel	32	36	Boulders	26	126
Boulders	16	52	Gravel	12	138
Gravel, coarse	8	60	Sand	10	148
Sand	27	87	Sand, black	2	150

2/2-25R1

[R. H. Johnson. About 8 miles east of Vancouver and 2.5 miles north of U.S. Highway 830. Altitude about 295 ft. Drilled by Joe Hansen, 1953. Casing, 8-in. to 197 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Clay and big rocks	24	119
Gravel, light	12	15	Sand and clay	33	152
Rocks and gravel, mixed	35	50	Sand, water-bearing	27	179
Gravel, light, with sand	23	73	Sand, very little gravel	14	193
Clay	11	84	Gravel and sand, water-bearing	4	197
Clay and sand, mixed	11	95			

2/2-28E1

[C. P. Teske. West Mill Plain district, about 0.5 mile south of County Road 109 and 0.9 mile west of County Road 104. Altitude about 260 ft. Drilled by A. C. Locey. Casing, 6-in. to 142 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	7	7	Gravel	8	109
Sand	13	20	Boulders	14	123
Gravel	11	31	Gravel	17	140
Sand	16	47	Sand, black	2	142
Clay	33	80			
Sand (quicksand)	21	101			

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

2/2-28M2

[W. Preston. West Mill Plain district, at end of Cushing Road, off County Road 2. Altitude about 315 ft. Drilled by A. C. Locey. Casing, 6-in. to 174 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Clay, blue	4	142
Gravel	43	45	Clay, yellow	19	161
Sand	10	55	Gravel	19	180
Gravel	7	62			
Sand	8	70			
Sand and gravel	68	138			

2/2-30C1

[Federal Housing Authority. Ogden Meadows Well. At foot of escarpment about 0.3 mile north of Clark County Road 2 and 2.5 miles east of Vancouver. Altitude about 185 ft. Drilled by R. J. Strasser. Casing, 12-in. to 300 ft; 10-in. from 200 to 300 ft; perforated from 118 to 122 ft, from 124 to 130 ft, from 188 to 194 ft, from 204 to 215 ft, from 240 to 243 ft, and from 250 to 255 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	5	5	Gravel, cemented; water-bearing in upper 3 ft	131	200
Sand	64	69	Gravel, cemented, and clay	32	232
			Gravel, loose, water-bearing	13	245
			Gravel, loose	13	258
			Gravel, cemented	42	300

2/2-30K1

[Park Hill Cemetery. About 0.1 mile west of the cemetery. McLoughlin Heights, east of Vancouver. Altitude about 298 ft. Drilled by R. J. Strasser. Casing, 16-in. to 284 ft; perforated from 239 to 255 ft and from 260 to 275 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Gravel and boulders, cemented	28	190
Gravel with binder	23	25	Gravel, cemented	45	235
Sand, loose	7	32	Gravel and sand, water-bearing	13	248
Sand, dry, packed	68	100	Gravel, with some binder	12	260
Sand, heaved, water-bearing	20	120	Gravel, water-bearing	15	275
Sand, dry	25	145	Gravel, cemented	24	299
Gravel	5	150	Gravel and boulders, cemented	25	324
Sand	12	162	Gravel with binder	25	349
			Gravel, cemented, hard	7	356
			Sand, yellow	8	364
			Gravel, cemented, hard	32	396

2/2-32E1

[M. Carson. About 4 miles east of Vancouver along Morgan Road on escarpment. Altitude about 185 ft. Drilled by A. C. Locey. Casing, 6-in. to 132 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	8	8	Gravel	10	24
Sand	6	14	Clay	26	50
			Gravel	42	92
			Gravel and clay	27	119
			Gravel	12	131
			Sand, black	6	137

2/2-32F1

[Edward Schwind. Intersection of MacArthur Blvd. and Lieser Road, just south of McLoughlin Heights. Altitude about 280 ft. Drilled by A. C. Locey. Casing, 6-in. to 192 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Old well; no record	130	130	Troutdale formation:		
			Gravel and clay	16	146
			Gravel, cemented	31	177
			Gravel, water-bearing	16	193

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-32F2

[Edward Schwind. Intersection of MacArthur Blvd. and Lieser Road, just south of McLoughlin Heights. Altitude about 280 ft. Drilled by A. C. Locey. Casing, 6-in. to 187 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and sand	30	30	Clay	70	155
Gravel	45	75	Gravel	32	187
Sand	10	85			

2/2-33K1

[T. Putnam. Between West Mill Plain district and Ellsworth. About 0.2 mile west of Ellsworth Road on Sohns Road. Altitude about 295 ft. Drilled by A. C. Locey. Casing, 6-in. to 158 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Gravel, hard (cemented?)	8	154
Gravel	21	24	Gravel, loose	6	160
Gravel, hard	3	27			
"Dirt"	7	114			
Gravel	30	144			
"Dirt"	2	146			

2/2-33R1

[C. W. Barrone. On County Road 104, about 0.55 mile north of U.S. Highway 830 and 0.5 mile northwest of Ellsworth. Altitude about 195 ft. Drilled by A. C. Locey. Casing, 6-in. to 51 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposit:—Con.		
Soil	5	5	Gravel, coarse	14	39
Gravel	8	13	Sand	11	50
Sand	12	25	Sand, black	2	52

2/2-34P1

[Spencer Biddle. About 0.5 mile northeast of Ellsworth and 0.6 mile east of Clark County Road 104, on second street north of U.S. Highway 830. Altitude about 242 ft. Drilled by A. C. Locey. Casing, 6-in. to 76 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel and boulders	19	19	Clay	15	72
Gravel	17	36	Gravel	6	78
Gravel and boulders	2	38			
Gravel	19	57			

2/2-35C1

[W. S. Olsen. Mill Plain District, 7 miles east of Vancouver on Clark County Road 2. Altitude about 305 ft. Drilled by A. C. Locey. Casing, 6-in. to 170 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Gravel	97	97	No record; water-bearing	1	113
Troutdale formation:			Clay and boulders	12	125
Clay	11	108	Clay and gravel	36	161
Clay, sandy	4	112	Gravel, water-bearing	9	170

2/2-36B1

[W. L. Moreland. Across road from East Mill Plain School, about 0.3 mile north of intersection of County Roads 7 and 2. Altitude about 295 ft. Drilled by G. Zent]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation: Clay	19	85
Soil	2	2	Boring lava(?): Rock and clay	22	107
Sand and gravel	64	66	Troutdale formation: Gravel	46	153

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/2-36P1

[John McGillivray. South of East Mill Plain, about 0.2 mile west of County Road 7 on Fisher Road. Altitude about 285 ft. Drilled by A. C. Locey. Casing, 8-in. to 238 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Sand and gravel	39	140
Clay and boulders	69	72	Sand, water-bearing	31	171
Boring lava(?): Rock	29	101	Sand and gravel, water-bearing	20	191
			Gravel, loose	16	207
			Gravel, cemented	25	232
			Gravel, water-bearing	6	238

2/2-3D1

[U.S. Army, Camp Killpack. About 0.4 mile northeast of west entrance on southwest flank of Camp Hill. Altitude about 465 ft. Drilled by A. M. Jannsen]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation (Troutdale exposed):			Tertiary volcanic rocks:		
Old well, no record	125	125	Lava, red	213	503
Clay, red and blue, and gravel	75	200	Lava, water-bearing	13	516
Gravel	90	290			

2/3-4K1

[Joe Kaleta. About 0.3 mile west of Camp Killpack, just south of Pluss Road. Altitude about 385 ft. Drilled by G. Zent. Casing, 6-in. to 247 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Soil	10	10	Clay	95	240
Clay	20	30	Sand	5	245
Clay, sandy, and gravel	108	138	Gravel, water-bearing	2	247
Gravel	7	145	Clay	3	250

2/3-5P1

[S. V. Haagen. About 1.25 miles northeast of Proebstel. Altitude about 285 ft. Drilled by Floyd Wickersham, 1953. Casing, 8-in. to 177 ft, 6-in. from 177 to 290 ft; perforated from 75 to 175 ft, from 201 to 238 ft and from 253 to 270 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Topsoil	5	5	Upper member—Con.		
Clay, yellow	13	18	Gravel, cemented, water-bearing	104	201
Clay, blue	9	27	Gravel, fine, water-bearing	25	226
Troutdale formation:			Gravel, cemented, water-bearing	12	238
Upper member:			Sand, brown, water-bearing	15	253
Boulders, black	34	61	Gravel, water-bearing	7	260
Sand, fine, black, water-bearing	14	75	Lower member: Clay, blue	30	290
Boulders and gravel, water-bearing	22	97			

2/3-5R1

[E. L. Bellamy. About 1.2 miles west of Camp Killpack and 0.2 mile west of County Road 91 on County Road 96. Altitude about 305 ft. Drilled by G. Zent. Casing, 6 in. to 144 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Soil	3	3	Troutdale formation—Con.		
Troutdale formation:			Clay	14	140
Clay	17	20	Sand and gravel, water-bearing	4	144
Clay, rocky, and cemented weathered gravel	106	126			

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
2/3-6K1					
[Carl Anderson. About 1.0 mile north of Camp Killpack, on Rifle Range Road at intersection with County Road 99. Altitude about 272 ft. Drilled by A. C. Locey. Casing, 6-in. to 69 ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Gravel, cemented	11	57
Clay	29	32	Boulders	13	70
Sand and gravel	14	46	Boring lava(?): Rock	23	93
2/3-6R1					
[K. Jacobs. About 1 mile east of Orchards and 0.3 mile south of County Road 96. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 5-in. to 61 ft]					
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	8	8	Gravel, cemented	12	56
Clay, water-bearing(?)	22	30	Gravel, loose, water-bearing	5	61
Clay, blue	14	44			
2/3-7A1					
[W. A. Soliday. About 0.5 mile north of Proebstel and 0.5 mile east of Fifth Plain Creek. Altitude about 270 ft. Drilled by A. C. Locey. Casing, 6-in. to 46 ft]					
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	8	8	Gravel, cemented	22	42
Gravel, coarse	12	20	Sand, black	5	47
2/3-7J1					
[James Higgins. About 7 miles northwest of Camas and 0.25 mile east of Proebstel. Altitude about 256 ft. Drilled by George Kapitenorich, 1950. Casing, 6-in. to 100 ft]					
Pleistocene alluvial fan deposits:			Troutdale formation:		
Clay and gravel	40	40	Gravel, cemented	30	80
Gravel, loose, water-bearing	10	50	Gravel, water-bearing	30	110
2/3-7L1					
[D. M. Shattuck. About 0.5 mile northwest of Proebstel and 0.3 mile east of Fifth Plain Creek. Altitude about 218 ft. Drilled by A. C. Locey. Casing, 6-in. to 59 ft]					
Pleistocene alluvial deposits and Troutdale formation:			Pleistocene alluvial deposits and Troutdale formation—Con.		
Soil	3	3	Boulders	14	44
Sand and gravel	16	19	Gravel	12	56
Gravel, coarse	11	30	Sand, black	6	62
2/3-7R2					
[John Meisner. In Proebstel, just north of State Route 8A, and 0.6 mile east of Lacamas Creek. Altitude about 250 ft. Drilled by Pete Hansen. Casing, 6-in. to 88 ft]					
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Clay	58	58	Gravel, cemented, hard	5	68
Troutdale formation:			Sand, water-bearing	7	75
Sand, hard rock (?)	5	63	Gravel, coarse, loose	13	88
2/3-8E1					
[R. H. Paulson. About 0.5 mile northeast of Proebstel, on County Road 98. Altitude about 251 ft. Drilled by G. Zent. Casing, 6-in. to 82 ft]					
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	2	2	Gravel	45	73
Clay, sandy	16	18	Sand, coarse	8	81
Troutdale formation:			Clay, red	2	83
Clay, rocky	10	28	Gravel, water-bearing	5	88

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

2/3-8K1

[M. W. Andrew. About 0.7 mile east-northeast of Proebstel, off Manor highway. Altitude about 320 ft Drilled by A. C. Locey. Casing 6-in. to 136 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Clay, sandy	10	10	Gravel	14	115
Sand (quicksand)	28	38	Clay, sandy	4	119
Sand, blue	47	85	Gravel, cemented	11	130
Troutdale formation:			Sand, black, water-bearing	2	132
Gravel, cemented	13	98	No record; water-bearing	4	136
Gravel, water-bearing	3	101			

2/3-8M1

[C. O. Wilson. In Proebstel, about 0.4 mile west of State Route 8A on County Road 98. Altitude about 263 ft. Drilled by G. Zent. Casing, 6-in. to 99 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	2	2	Gravel	2	72
Clay	60	62	Clay, rocky	11	83
Troutdale formation:			Gravel, water-bearing	22	105
Gravel and sand	3	65	Sand, water-bearing	6	111
Clay, rocky	5	70			

2/3-8Q1

[W. R. Smith. About 1 mile east of Proebstel on State Route 8A. Altitude about 320 ft. Drilled by A. C. Locey. Casing, 6-in. to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	3	3	Boulders	7	97
Sand	35	38	Hardpan	10	107
Troutdale formation: Gravel	23	61	Boring lava(?): Rock	8	115
Boring lava(?): Rock	14	75	Troutdale formation: Gravel	15	130
Troutdale formation: Sand, hard	3	78			
Boring lava(?): Rock	12	90			

2/3-14N1

[Myers Bros. near Camas. Altitude about 390 ft. Drilled by B. L. Price, 1953. Casing, 8-in. to 213 ft; perforated from 175 to 185 ft and from 200 to 204 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation: Gravel	21	117
Topsoil	3	3	Boring lava(?): Rock	14	131
Clay	14	17	Troutdale formation:		
Troutdale formation:			Gravel and sand	24	155
Boulders	6	23	Sand, brown	10	165
Gravel	12	35	Gravel, muddy	10	175
Shale	21	56	Gravel and sand	10	185
Gravel	9	65	Gravel, cemented	15	200
Boring lava(?): Rock	31	96	Gravel, water-bearing	13	213

2/3-18A1

[J. E. Sturgeon. Southeast of Proebstel. Altitude about 253 ft. Drilled by Joe Hansen. Casing, 6-in. to 94 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits(?):			Troutdale formation—Con.		
Clay	12	12	Sand (quicksand)	2	82
Sand, water-bearing	2	14	Clay and gravel	8	90
Troutdale formation:			Gravel, coarse, loose, water-bearing	4	94
Gravel, cemented, water-bearing	66	80			

2/3-18B1

[Alfred Anderson. In Vancouver. Altitude about 200 ft. Dug by owner, 1955]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay	5	5	Gravel and boulders	3	9
Clay, hard, and gravel	1	6			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/3-20J1

[F. L. Groth. About 150 ft north of Lacamas Campground, near intersection of Lacamas Creek and County Road 116. Altitude about 190 ft. Drilled by B. Abrams. Casing, 6-in. to 38 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Boulders, water-bearing	20	20	Clay and gravel	6	36
Gravel, loose	10	30	Gravel, water-bearing	2	38

2/3-22H1

[Myers Brothers. About 0.5 mile north of Fern Prairie, on State Route 8A. Altitude about 414 ft. Drilled by A. C. Locey. Casing, 6-in. to 142 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	12	12	Clay, yellow	5	122
Gravel, loose	76	88	Gravel, cemented	6	128
Sand (quicksand)	10	98	Sand, black	14	142
Clay, blue	19	117			

2/3-25Q1

[Harry Thornton. About 2 miles southeast of Fern Prairie, on Hathaway Road. Altitude about 410 ft. Drilled by B. Abrams]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Dug well, no record	34	34	Clay, hard	9	60
Gravel, cemented	14	48	Gravel and boulders, packed	55	115
Boulders	3	51			

2/3-25Q2

[A. J. Rocheford. About 2 miles southeast of Fern Prairie, on Hathaway Road. Altitude about 370 ft. Drilled by A. C. Locey. Casing, 6-in. to 99 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Boring lava(?) or Tertiary volcanic rock(?): Rock, black, volcanic, hard	46	145
Soil	12	12			
Sand	20	32			
Clay	33	65			
Boulders	34	99			

2/3-25R2

[M. G. Dole. About 2.25 miles southeast of Fern Prairie, on County Road 30. Altitude about 208 ft. Drilled by Hamilton Locey]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Tertiary volcanics: Rock, volcanic, and soft volcanic ash	5	208
Gravel, stream	40	40			
Clay, sandy	163	203			

2/3-26Q1

[H. W. Pepper. About 2.5 miles north of Camas, on State Route 8A, 0.2 mile west of junction with County Road 134. Altitude about 420 ft. Drilled by A. C. Locey. Casing, 6-in. to 112 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	4	4	Rock	11	101
Clay	45	49	Gravel	9	110
Gravel	11	60	Sand, black	2	112
Clay	10	70	Boulders and clay	53	165
Gravel	20	90			

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/3-27P1

[Elite Hereford Ranch. In Camas. Altitude about 270 ft. Drilled by F. L. Warner, 1953. Casing, 8-in. to 130 ft; perforated from 71 to 75 ft]

Materials	Thickness (feet)	Depth (feet)
Dug to 75 ft; no record	75	75
Troutdale formation: Clay and sand	52	127
Older consolidated rocks:		
Rock (lava)	34	161
Clay, red	2	163
Rock, lava	19	182
Rock	2	184
Rock, brown, lava	22	206
Older consolidated rocks—Con.		
Lava, red, and clay	4	210
Rock, lava	7	280
Clay, black	6	286
Lava, red	3	289
Rock	52	341
Lava, red, soft	17	358
Rock, hard, black	13	371
Rock, hard, black and gray	29	400

2/3-29P1

[S. L. Strunk. About 4 miles northwest of Camas. Altitude about 252 ft. Drilled by Joe Hansen, 1952. Casing, 8-in. to 180 ft; perforated from 90 to 105 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Topsoil	3	3
Gravel, light	11	14
Gravel, heavy, with clay	4	18
Gravel, water-bearing, with sand	7	25
Troutdale formation:		
Clay, yellow	5	30
Clay, with big rocks	50	80
Gravel, water-bearing	25	105
Clay, with sand and rock	35	140
Sand, water-bearing	20	160
Sand and gravel, water-bearing	20	180

2/3-29Q1

[Fred Schick. About 1 mile west of Lacamas Lake and 0.6 mile east of County Road 115 on County Road 2. Altitude about 245 ft. Drilled by A. C. Locey. Casing, 6-in. to 89 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	25	25
Troutdale formation:		
Clay	5	30
Gravel, cemented	5	35
Clay, blue	7	42
Troutdale formation—Con.		
Clay, blue, and gravel	15	57
Sand, black, and gravel	7	64
Sand and gravel	9	73
Sand	13	86
Gravel, water-bearing	3	89

2/3-29R2

[H. C. Quick. About 1.0 mile west of Lacamas Lake and 1 mile east of County Road 115 Altitude about 295 ft. Drilled by A. C. Locey. Casing, 6-in. to 50 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: soil, sandy	15	15
Troutdale formation:		
Clay, water-bearing	9	24
Clay and sand	10	34
Troutdale formation—Con.		
Sand and gravel	13	47
Sand, coarse	2	49
Gravel, water-bearing	1	50

2/3-30P1

[F. E. English. About 5 miles northwest of Camas, on county road. Altitude about 238 ft. Drilled by Hansen, 1948. Casing, 6-in. to 135 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Topsoil	2	2
Gravel and sand	73	75
Troutdale formation:		
Clay and gravel	30	105
Gravel, water-bearing	30	135

2/3-31C1

[V. H. Davis. About 5 miles northwest of Camas, on County Road 2. Altitude about 287 ft. Drilled by Joe Hansen. Casing, 6-in. to 135 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
(Not logged)	10	10
Gravel and boulders	60	70
Troutdale formation:		
Clay and gravel, mixed	10	80
Troutdale formation—Con.		
Clay	8	88
Sand and clay	18	106
Sand and gravel, water-bearing	29	135

TABLE 17.—*Materials penetrated by representative wells*—Continued

2/3-32Q1

[J. T. Armstrong. About 1.5 miles northwest of Prune Hill and 0.6 mile west of County Road 122, on County Road 119. Altitude about 272 ft. Drilled by A. C. Locey. Casing, 6-in. to 140 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Clay and boulders	103	142
Clay, sandy	15	17	Gravel, loose, water-bearing	1	143
Gravel	3	20			
Clay	19	39			

2/3-33C1

[R. D. O'Harra. About 0.5 mile west of Lacamas Lake and 1.0 mile east of County Road 115, on County Road 2. Altitude about 300 ft. Drilled by owner]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Grit, intensely weathered	21	21	Rock, black, soft	4	102
Sand, fine (quicksand)	16	37			
Rock, intensely weathered, includes layer of very sticky chocolate-colored clay, about 26 to 28 inches thick	61	98			

2/3-33Q1

[Al Decker. About 1 mile north of Prune Hill and 0.5 mile east of intersection of County Roads 119 and 122 Altitude about 335 ft. Drilled by Joe Hansen and owner]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Clay, yellow	80	80	Grit, yellow, water-bearing	2	139
Ash, volcanic	20	100	Clay	8	147
Clay	37	137			

2/3-34N2

[E. H. White. About 2 miles northwest of Camas, on County Road 2. Altitude about 390 ft. Drilled by Joe Hansen, 1951. Casing, 8-in. to 112 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Topsoil	2	2	Clay and sand, mixed	10	105
Clay	23	25	Clay, some gravel; water-bearing	7	112
Clay, some gravel; water-bearing	10	35	Clay		--------
Clay, with boulders	60	95			

3/1-1B1

[R. Blake. About 6 miles southeast of Ridgefield and 1.4 miles west of Dollar Corner on Battle Ground Road. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 98 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Gravel, cemented	10	88
Sand	14	17	Sand, black	11	99
Clay	18	35			
Sand	43	78			

3/1-1C2

[O. G. Beherns. About 1.6 miles west of Dollar Corner, on Battle Ground Road. Altitude about 293 ft Drilled by A. C. Locey. Casing, 6-in. to 161 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Sand and clay	98	98	Sand (quicksand)	10	120
Troutdale formation:			Gravel, cemented	30	150
Gravel	12	110	Gravel, water-bearing	11	161

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

3/1-1M1

[Mrs. C. M. Foster. About 6 miles southeast of Ridgefield, at intersection of County Roads 61 and 62. Altitude about 287 ft. Drilled by R. A. Jobes. Casing, 6-in. to 130 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Sand, with clayey layers	90	90	Sand (quicksand)	5	110
Troutdale formation:			Sand, with small amount of gravel	20	130
Gravel, cemented, water-bearing	15	105			

3/1-12E1

[H. Jones. About 0.5 mile east of U.S. Highway 99 on Haggard Road. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in to 159 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	12	12	Gravel	33	105
Sand	30	42	Sand	28	133
Troutdale formation:			Clay	24	157
Gravel	23	65	Gravel	3	160
Boulders	7	72			

3/1-2F1

[H. S. Jones. About 4.5 miles north of Salmon Creek. Altitude about 290 ft. Drilled by Locey, 1952. Casing, 5-in. to 154 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil and clay	24	24	Gravel, loose	19	121
Sand and clay	66	90	Gravel, solid, and clay	16	137
Troutdale formation:			Gravel, loose	9	146
Gravel, solid (cemented?)	12	102	Rock, lava, solid(?)	8	154

3/1-2K1

[A. M. Samuels. In Goodhope District, about 0.5 mile northwest of intersection of County Roads 61 and 64. Altitude about 290 ft. Drilled by A. C. Locey. Casing, 6-in. to 123 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil and sand	12	12	Troutdale formation—Con.		
Troutdale formation:			Sand, coarse	8	110
			Gravel, water-bearing	2	112
Sand and gravel	40	52	Sand, black, water-bearing	11	123
Sand	50	102			

3/1-2Q1

A. A. Stumpf. About 1.5 miles west of Goodhope and 0.1 mile north of intersection of County Road 64 and Shreve Road. Altitude about 280 ft. Drilled by A. C. Locey. Casing, 6-in. to 107 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	4	4	Clay	26	75
Clay	10	14	Sand	23	98
Troutdale formation:			Gravel	7	105
Clay and boulders	18	32	Sand, black	2	107
Gravel	17	49			

3/1-2R1

[Kenneth Shores. About 1 mile west of Goodhope and 0.2 mile north of intersection of County Roads 64 and 61. Altitude about 245 ft. Drilled by A. C. Locey. Casing, 6-in. to 104 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Clay and gravel	8	78
Clay, yellow	32	35	Gravel	14	92
Sand	35	70	Sand, black, and gravel	13	105

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-2R2

[O. Shores. About 1 mile west of Goodhope and 0.1 mile northwest of intersection of County roads 64 and 61. Altitude about 245 ft. Drilled by A. C Locey. Casing, 6-in. to 90 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	10	10	Sand	19	64
Sand	30	40	Troutdale formation:		
Clay	5	45	Gravel	21	85
			Sand, black	5	90

3/1-3M1

[E. Dollson. About 0.9 mile west of old U.S. Highway 99, on south side of County Road 19. Altitude about 315 ft. Drilled by H. J. Ferron, 1952]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Continued		
Upper member:			Lower member:		
Clay	75	75	Clay	99	292
Gravel, cemented	103	178	Sand, water-bearing	30	322
Gravel, loose, water-bearing	15	193	Clay	8	330
			Sand, water-bearing	1	331
			Clay	56	387
			Sand, water-bearing	6	393

3/1-3N1

[W.M. Hoffman. About 5 miles southeast of Ridgefield and 0.8 mile west of U.S. Highway 99, on County Road 64. Altitude about 320 ft. Drilled by A.C . Locey. Casing, 6-in. to 117 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Continued		
Soil	15	15	Clay, yellow	15	50
Clay	5	20	Gravel, cemented	55	105
Sand	5	25	Gravel, loose	8	113
Clay, blue	10	35	Sand, black	4	117

3/1-4A1

[Lambert School. About 4 miles southeast of Ridgefield, on west side of County Road 19. Altitude about 375 ft. Drilled by A. C. Locey. Casing, 6-in. to 384 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Continued		
Upper member:			Lower member:		
Soil	12	12	Clay	34	206
Clay	63	75	Sand (quicksand)	2	208
Sand	30	105	Clay	82	290
Gravel and rock	45	150	Sand (quicksand)	30	320
Gravel	22	172	Clay	60	380
			Sand, black	5	385

3/1-4E1

[L. W. Nieman. About 0.5 miles southeast of Ridgefield, on State Route 1T. Altitude about 250 ft. Drilled by G. H. Locey, 1951. Casing, 6-in. to 160 ft; perforated from 138 to 160 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Soil	18	18	Gravel and sand, water-bearing	1	140
Sand, water-bearing	4	22	Gravel, cemented	14	154
Clay	45	67	Gravel, water-bearing	1	155
Troutdale formation:			Gravel, cemented	1	156
Sand and gravel, with boulders; water-bearing	4	71	Gravel, water-bearing	4	160
Gravel, cemented	68	139			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-4F1

[H. A. Herman. About 4 miles southeast of Ridgefield, 0.3 mile east of eastern intersection of State Route 1T and Haggard Road (County Road 19). Altitude about 333 ft. Drilled by A. C. Locey. Casing, 6-in. to 192 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Soil	12	12	Sand (quicksand)	78	169
Sand	20	32	Boulders	12	181
Troutdale formation:			Gravel	8	189
Gravel	13	45	Sand, black	3	192
Clay	46	91			

3/1-5E1

[B. Sonney. About 3.5 miles southeast of Ridgefield, 0.3 mile west of State Route 1T, or County Road 15. Altitude about 238 ft. Drilled by A. C. Locey. Casing, 6-in. to 185 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Gravel	27	165
Clay, sandy	6	8	Gravel, water,bearing	20	185
Sand (quicksand), water-bearing	22	30			
Clay	80	110			
Sand	28	138			

3/1-5H1

[L. Holley. About 1.0 mile west of Lambert, 0.2 mile north of County Road 19 on State Route 1T. Altitude about 250 ft. Drilled by A. C. Locey. Casing, 6-in. to 160 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	12	12	Gravel and rock	35	140
Clay	63	75	Gravel, cemented	11	151
Sand	30	105	Gravel loose	7	158
			Sand, black	2	160

3/1-6E1

[John Roth. About 2.3 miles northwest of Sara, on County Road 15. Altitude about 155 ft. Drilled by A. C. Locey. Casing, 6-in. to 122 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Gravel	34	99
Sand	6	8	Clay	4	103
Clay	52	60	Gravel	18	121
Sand	5	65	Sand, black	1	122

3/1-6H1

[Nelson. About 3.5 miles south of Ridgefield and 0.6 mile west of State Route 1T, on County Road 15. Altitude about 208 ft. Drilled by A. C. Locey. Casing, 6-in. to 161 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	12	12	Gravel	12	137
Sand, yellow	33	45	Boulders	7	144
Sand, blue	15	60	Gravel, cemented	15	159
Clay, blue	40	100	Sand and gravel, water-bearing	2	161
Troutdale formation:					
Clay, yellow, and boulders	25	125			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-7D2

[Arnold Mettler. About 4 miles south of Ridgefield and 3.5 miles west of U.S. Highway 99. Altitude about 115 ft. Drilled in 1952. Casing, 10-in. to 120 ft, 8-in. to 450 ft. Bottom 21 ft of uncased hole filled with gravel; perforated from 123 to 128 ft, from 226 to 270 ft, from 365 to 375 ft. and from 404 to 406 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	1	1	Lower member:		
Clay	26	27	Sand, very fine, gravel and clay	18	222
Sand, fine, brown	18	45	Sand, very fine, and hard-packed sand	46	268
Sand, fine	33	78	Gravel, water-bearing (bailer test approximately 60-70 gpm)	2	270
Clay, blue	7	85	Clay blue	35	305
Troutdale formation:			Shale	7	312
Upper member:			Clay, blue, and sand	49	361
Gravel and clay	6	91	Sand, very fine; blue clay binder	1	362
Gravel, cemented	19	110	Gravel	1	363
Sand, brown, with a little gravel	5	115	Sand and scattered rough gravel	14	377
Gravel, cemented	8	123	Clay	25	402
Gravel, water-bearing (bailer test approximately 40 gpm)	5	128	Sand	1	403
Gravel, cemented	4	132	Gravel	3	406
Gravel and fine sand	3	135	Sand	42	448
Clay, white, very soft	12	147	Clay, blue	15	463
Gravel, cemented	23	170	Shale	8	471
Gravel, with blue clay binder	25	195			
Gravel, cemented	9	204			

3/1-8K1

[J. S. England. About 0.3 mile north of Sara School, on State Route 1T. Altitude about 180 ft. Drilled by A. C. Locey. Casing, 6-in. to 144 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and sand	25	25	Gravel, cemented	11	104
Clay, sandy	9	34	Clay, sandy	15	119
Sand (quicksand)	59	93	Sand and gravel, cemented	15	134
			Gravel, cemented	10	144

3/1-8K2

[Ernest Brown. About 0.5 mile north of Whipple Creek, on State Route 1T. Altitude about 175 ft. Drilled by J. E. Hansen, 1953. Casing, 6-in. to 148 ft; perforated from 133 to 146 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Clay	19	19	Clay, blue, water-bearing	71	118
Sand (quicksand), water-bearing	28	47	Sand	5	123
			Sand and clay, water-bearing	2	125
			Troutdale formation: Gravel	23	148

3/1-8L1

[James and Nora McElligott. About 4.5 miles south of Ridgefield. Altitude about 183 ft. Drilled by H. I. Bottner Drilling Co. Casing, 10-in. to 258 ft; perforated from 145 to 150 ft and from 161 to 175 ft; 8-in. perforated liner from 194 to 198, and from 249 to 254 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil and clay	27	27	Upper member—Con.		
"Quicksand," brown	30	57	Gravel, cemented	20	195
Clay, gray, and sand	40	97	Gravel and sand	2	197
Clay, blue	13	110	Gravel, cemented	53	250
Troutdale formation:			Gravel, water-bearing, and sand	5	255
Upper member:			Lower member:		
Gravel, cemented	35	145	Sandstone, fine, brown	15	270
Gravel, water-bearing	5	150	Clay, blue	15	285
Gravel, cemented	11	161	Sand, gray	13	298
Gravel, water-bearing, and sand	14	175			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-8Q2

[Sara School Dist. In Sara, on State Route 1T. Altitude about 155 ft. Drilled by Pete Hansen]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation: Gravel, loose sand, and cemented gravel	55	150
Silt and clay	80	80			
Clay	15	95			

3/1-9A1

[L. Parmantier. About 1 mile south-southwest of Lambert and 0.2 mile south of County Road 64. Altitude about 295 ft. Drilled by A. C. Locey. Casing, 6-in. to 182 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	21	21	Gravel and sand	14	97
Clay, sandy	26	47	Gravel, cemented	33	130
Troutdale formation:			Boulders and clay	24	154
Gravel, cemented	13	60	Gravel, loose	17	171
Boulders, shot	23	83	Gravel	11	182

3/1-10A2

[A. Flory. About 1 mile north of Baker and 0.2 mile east of intersection of U.S. Highway 99 and County Road 64. Altitude about 263 ft. Drilled by A. C. Locey. Casing, 6-in. to 100 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil and clay	52	52	Troutdale formation:		
			Gravel, cemented	16	68
			Gravel and sand	29	97
			Gravel, water-bearing	3	100

3/1-10B1

[Thomsen. About 1 mile northwest of Baker and 0.1 mile west of U.S. Highway 99 on road just south of County Road 64. Altitude about 295 ft. Drilled by A. C. Locey. Casing, 6-in. to 167 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	5	5	Sand	40	100
Soil, sandy	35	40	Gravel, loose	15	115
Sand (quicksand)	10	50	Gravel, cemented	10	125
Troutdale formation:			Sand (quicksand)	25	150
Clay	10	60	Gravel, cemented	16	166

3/1-10C2

[C. H. and Amelia Reese. About 4 miles north of Salmon Creek and 0.5 mile west of U.S. Highway 99. Altitude about 305 ft. Drilled by F. L. Warner. Casing, 8-in. to 168 ft; perforated from 143 to 163 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Clay	90	90	Gravel, cemented	47	137
			Gravel	31	168

3/1-10H1

[L. H. Wilson. About 0.5 mile north of intersection of U.S. Highway 99 and road from Baker to Sara. Altitude about 290 ft. Drilled by A. C. Locey. Casing, 6-in. to 132 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil, sandy	15	15	Troutdale formation—Con.		
Troutdale formation:			Clay, sandy	7	94
Gravel, cemented	31	46	Gravel, cemented	26	120
Clay, blue	41	87	Gravel, water-bearing	12	132

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1–10H2

[J. H. Dooley. About 1 mile north of Baker and 0.2 mile south of intersection of U.S. Highway 99 and County Road 64. Altitude about 300 ft. Drilled by A. C. Locey. Casing, 6-in. to 163 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	18	18	Clay	79	122
Sand	25	43	Gravel	14	136
			Gravel, cemented	26	162
			Sand, black	2	164

3/1–10J1

[George Prom. On U.S. Highway 99, about 0.6 mile north of intersection with County Road connecting Baker and Sara. Altitude about 300 ft. Drilled by A. C. Locey. Casing, 6-in. to 173 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	6	6	Sand and gravel, water-bearing	15	148
Troutdale formation:					
Clay, yellow	34	40	Gravel, cemented	18	166
Clay, sandy	93	133	Gravel, loose, water-bearing	7	173

3/1–10M1

[Schimmelpfenig. About 0.8 mile west of State Route 1 S, along first road north of road from Sara to Baker Altitude about 336 ft. Drilled by A. C. Locey. Casing, 6-in. to 178 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits(?):			Troutdale formation—Con.		
Soil	10	10	Sand, blue	11	98
Troutdale formation:			Gravel, sandy	22	120
Sand and clay	30	40	Gravel and clay	25	145
Clay and gravel	23	63	Gravel, water-bearing	33	178
Gravel, sandy	24	87			

3/1–10N2

[H. F. Boutwell. About 0.9 mile west of old U.S. Highway 99 and 0.2 mile north of road from Baker to Sara. Altitude about 325 ft. Drilled by G. Zent]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	3	3	Clay, sandy	55	80
Clay	22	25	Gravel, cemented	114	194

3/1–10P1

[D. L. Belknap. About 0.8 mile west of Baker along road from Baker to Sara. Altitude about 335 ft. Drilled by A. C. Locey. Casing, 6-in. to 192 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	5	5	Clay, sandy	5	79
Clay	16	21	Gravel, cemented	45	124
Clay, sandy	13	34	Gravel, loose	68	192
Clay	40	74			

3/1–10R1

[Baker School District. About 0.5 mile north of intersection of U.S. Highway 99 and road from Baker to Sara. Altitude about 300 ft. Drilled by A. C. Locey. Casing, 6-in. to 133 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	20	20	Gravel	20	108
Sand	68	88	Gravel, cemented	18	126
			Sand, black	8	134

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-11A1

[H. L. Stuart. About 1.5 miles northeast of Baker. Altitude about 270 ft. Drilled by Joe Hansen, 1954. Casing, 6-in. to 168 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	25	25	Sand, water-bearing	55	163
Sand, dry	70	95	Sand, water-bearing, and very little gravel	5	168
Troutdale formation:					
Gravel, cemented	13	108			

3/1-11D1

[F. R. Moudry. About 0.8 mile north of intersection of old U.S. Highway 99 and road from Baker to Sara. Altitude about 240 ft. Drilled by A. C. Locey. Casing, 6-in. to 141 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	2	2	Clay	5	35
Sand	8	10	Gravel, loose	7	42
Troutdale formation:			Sand (quicksand)	59	101
Gravel	20	30	Gravel	38	139
			Sand, black	2	141

3/1-11F1

[C. H. Rigsby. About 2 miles southeast of Lambert and 0.7 mile northeast of Baker. Altitude about 295 ft. Drilled by A. C. Locey. Casing, 6-in. to 138 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	10	10	Gravel, loose	10	100
Clay, yellow	60	70	Sand	13	113
Sand	20	90	Gravel	10	123
			Sand	10	133
			Gravel, pea	5	138

3/1-11M1

[W. Brewster. About 0.3 mile north of road from Baker to Sara, along old U.S. Highway 99. Altitude about 300 ft. Drilled by A. C. Locey. Casing, 6-in. to 135 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	20	20	Gravel, cemented	36	129
Sand	73	93	Sand, black	7	136

3/1-11N2

[J. H. Hubbard. Baker District, just north of intersection of old U.S. Highway 99 and road from Baker to Sara. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 125 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation: Sand and gravel	17	125
Soil and clay	24	24			
Sand	21	45			
Clay	3	48			
Sand	57	105			
Sand, water-bearing	3	108			

3/1-11Q1

[H. Carpenter. About 0.6 mile east of old U.S. Highway 99 along road from Baker to Manor. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 131 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	10	10	Gravel, cemented	20	117
Clay, yellow	35	45	Gravel and sand	16	133
Sand	52	97			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-11Q2

[John Sohn. About 0.8 mile east of old U.S. Highway 99, along road from Baker to Manor. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 117 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	8	8	Sand and gravel	6	95
Sand	16	24	Gravel, cemented	6.5	101.5
Clay	11	35	Gravel, loose	8.5	110
Clay, sandy	54	89	Sand, black	7	117

3/1-12R1

[O. P. Stark. About 1.8 miles east of Baker. Altitude about 260 ft. Drilled by H. J. Bittner, 1952 Casing, 8-in. to 215 ft; perforated from 197 to 206 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Clay	38	38	Upper member—Con.		
Sand, yellow, muddy	37	75	Rock, broken, blue	3	193
Troutdale formation:			Sand, yellow	2	195
Upper member:			Sand, coarse, brown, water-bearing	1	196
Gravel	41	116	Gravel, water-bearing	13	209
Sand, brown	5	121	Lower member:		
Gravel, water-bearing	2	123	Sand, yellow	3	212
Sand, gray	3	126	Clay, yellow	3	215
Gravel, cemented	31	157			
Clay	33	190			

3/1-14J1

[H. P. Calvin. About 1.1 miles southeast of Baker and 0.6 mile south of road from Baker to Manor, on County Road 61. Altitude about 250 ft. Drilled by A. C. Locey. Casing, 6-in. to 192 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Clay and sand	32	32	Gravel	40	118
Troutdale formation:			Lava and boulders	18	136
Gravel, loose	39	71	Clay	32	168
Boulders	7	78	Gravel, water-bearing	24	192

3/1-15H2

[A. S. Moulton. About 0.5 mile south of Baker. Altitude about 296 ft. Drilled by Steinman Bros., 1943 Casing, 8-in. to 219 ft; perforated from 155 to 219 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Clay	10	10	Gravel, cemented (water-bearing at 155 ft)	110	183
Sand, water-bearing	13	23	Gravel, loose, water-bearing	37	220
Troutdale formation:					
Clay, with soft and hard streaks; yellow	50	73			

3/1-16H1

[Chester Wrenn. About 1.1 miles southwest of Baker and 1.5 miles southeast of Sara. Altitude about 335 ft. Drilled by A. C. Locey. Casing, 6- and 4-in. to 219 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	10	10	Troutdale formation:—Con.		
Troutdale formation:			Sand	18	118
Sand and gravel	25	35	Boulders, shot	101	219
Gravel and clay	65	100			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-17F1

[D. P. Piechioni. About 0.5 mile southwest of Sara. Altitude about 175 ft. Drilled by A. C. Locey. Casing, 6-in. to 186 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and clay	18	18	Clay and gravel	7	143
Sand	30	48	Clay, water-bearing	7	150
Clay, sandy	11	59	Gravel	31	181
Sand	11	70	Gravel, water-bearing	5	186
"Powder polish"	40	110			
Clay	6	116			
Sand	10	126			
Clay	10	136			

3/1-18H2

[F. M. McWilliams. About 3.1 miles southwest of Baker. Altitude about 170 ft. Drilled by H. I. Bottner, 1952. Casing, 6- to 4-in. to 196 ft; perforated liner from 161 to 196 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Old well	164	164	Troutdale formation:		
			Gravel, cemented	27	191
			Gravel, water-bearing	5	196

3/1-18J1

[Valley Erwin. About 0.8 mile southwest of Sara. Altitude about 175 ft. Drilled by A. C. Locey. Casing, 6-in. to 187 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Clay, sandy	38	38	Gravel, cemented	38	180
Sand, gray	37	75	Sand, black	7	187
Sand, blue	15	90			
Clay, blue	30	120			
Sand, gray	15	135			
Clay, blue	7	142			

3/1-18J2

[C. W. Hartman. About 0.8 mile west of State Route 1T on road about 0.6 mile south of Sara School. Altitude about 160 ft. Drilled by A. C. Locey. Casing, 6-in. to 181 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil and sand	41	41	Gravel, cemented	25	145
Sand, water-bearing	31	72	Light material(?)	22	167
Clay, sandy	36	108	Gravel and sand	7	174
Clay	12	120	Gravel, water-bearing	7	181

3/1-18Q1

[C. E. Grelle. About 2 miles northwest of Felida. Altitude about 130 ft. Drilled by R. J. Strasser. Casing, 10- and 8-in. to 302 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Surface topsoil	2	2	Gravel, cemented	70	170
Clay	53	55	Gravel, water-bearing	15	185
Clay, sticky, blue, and silt	37	92	Gravel, cemented	51	236
Clay, blue	8	100	Clay, blue	19	255
			Gravel, water-bearing	47	302

3/1-19R1

[Z. Herzog. About 0.2 mile east of Northern Pacific track, 0.8 mile south of Salmon Creek. Altitude about 171 ft. Drilled by George Marshall. Casing, 6-in. to 165 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits; clay	104	104	Troutdale formation:		
			Gravel, cemented	58	162
			Gravel, water-bearing	3	165

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

3/1-20C1

[A. G. Maki and C. O. Mickey. About 2 miles north of Felida. Altitude about 170 ft. Drilled by R. A. Jobes, 1951. Casing, 6-in. to 183 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Sand and yellow clay	35	35	Gravel, cemented; water-bearing at 136 ft	40	145
Sand, blue, water-bearing; with streaks of blue clay	70	105	Sand and gravel, heaving	33	178
			Sand and gravel, water-bearing	5	183

3/1-20G1

[E. E. McIrvin. About 1.1 miles east of Northern Pacific track, 0.4 mile north of Salmon Creek, on State Route 1T. Altitude about 170 ft. Drilled by George Marshall. Casing, 6-in. to 166 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Silt	25	25	Gravel, cemented	35	135
Sand (quicksand)	65	90	Sand, fine (quicksand)	20	155
Clay, blue	10	100	Gravel and sand	8	163
			Gravel, course	3	166

3/1-20J1

[A. H. Sasse. About 1.5 miles north of Felida. Altitude about 80 ft. Drilled by A. M. Jannsen, 1949 Casing, 6-in. to 88 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil and clay	35	35	Gravel, sandy, water-bearing	11	86
Clay, sandy	30	65	Rock	2	88
Sand (quicksand)	10	75			

3/1-21R1

[George Kapitanovich. About 2.3 miles southwest of Baker. Altitude about 175 ft. Drilled in 1951. Casing, 8-in. to 165 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Clay	10	10	Gravel, cemented	65	155
Beaver dam	35	45	Gravel, loose, water-bearing	10	165
Sand, blue	5	50			
Clay, blue, and sand	40	90			

3/1-22P1

[J. D. Sullivan. About 2.1 miles south of Baker. Altitude about 187 ft. Dug by J. E. Hollenback, 1954. Casing, 36-in. to 35 ft; perforated from 25 to 35 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvail deposits—con.		
Topsoil	2	2	Sand	10	35
Clay	23	25			

3/1-23E1

[J. A. Heidecker. About 0.75 mile north of Salmon Creek School on U.S. Highway 99. Altitude about 205 ft. Drilled by J. E. Hansen, 1952. Casing, 6-in. to 175 ft; perforated from 114 to 117, from 142 to 147 ft, and from 159 to 169 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	5	5	Sand, heavy, mixed with light gravel	22	117
Clay, yellow	30	35	Gravel, cemented	21	138
Sand, water-bearing	30	65	Gravel, cemented, with loose gravel and sand	37	175
Clay, blue	30	95			

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

3/1-23J2

[Lee Hixon. About 0.8 mile northeast of Salmon Creek School and 0.5 mile east of old U.S. Highway 99. Altitude about 310 ft. Casing, 36-in. to 97 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Continued		
Upper member:			Lower member:	17	111
No record	85	85	Clay		
Gravel, coarse	5	90			
Gravel, fine, black	4	94			

3/1-23M2

[L. B. Hathaway. About 1.5 miles north of Salmon Creek and 0.5 mile west of U.S. Highway 99. Altitude about 205 ft. Drilled by H. Bottner, 1951. Casing, 8-in. to 171 ft; perforated from 156 to 168 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Clay	18	18	Clay and gravel	14	101
Sand	63	81	Gravel, cemented	55	156
Clay, blue	6	87	Gravel, water-bearing	15	171

3/1-23R1

[John Schreiber. About 0.25 mile east of old U.S. Highway 99 and 0.5 mile northeast of Salmon Creek School. Altitude about 290 ft. Drilled by A .C. Locey. Casing, 6-in. to 268 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	6	6	Troutdale formation—Con.		
Troutdale formation:			Lower member:		
Upper member:			Clay, blue	6	128
Clay	38	44	Clay, red	37	165
Gravel, cemented	78	122	Sand, dry	33	198
			Clay, blue	66	264
			Sand	4	268

3/1-24H2

[J. Brougher. About 0.2 mile west of Salmon Creek School. Altitude about 155 ft. Drilled by A. C. Locey. Casing, 6-in. to 108 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium: Soil and sand	8	8	Troutdale formation—Con.		
Troutdale formation:			Lower member:		
Upper member:			Clay, yellow	9	72
Gravel and boulders	8	16	Clay, gray	4	76
Sand, water-bearing	2	18	Clay, green	19	95
Gravel	10	28	Sand, brown	9	104
No record; water-bearing	1	29	Sand, black, water-bearing	4	108
Gravel	15	44			
Gravel, cemented	8	52			
Gravel, loose	11	63			

3/1-24K1

[R. H. Todd. About 0.5 mile west of Pleasant Valley School at junction of Salmon Creek and Mill Creek. Altitude about 140 ft. Drilled by A. C. Locey. Casing, 6-in. to 85 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium: Sand	5	5	Troutdale formation—Continued		
Troutdale formation:			Lower member:		
Upper member: Gravel	20	25	Clay, blue	40	65
			Sand, black	19	84
			Sand, red	1	85

3/1-24K2

[R. J. Darling. About 2.4 miles southeast of Baker. Altitude about 125 ft. Drilled by George Zent, 1956. Casing, 12-in. to 58 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	2	2	Troutdale formation—Continued		
Troutdale formation:			Lower member:		
Upper member:			Clay, blue	48	69
Clay, sandy	3	5	Shale, hard, gray	6	75
Gravel, heavy, water-bearing	16	21	Shale, soft, gray	10	85
			Shale, hard, gray	5	90

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-24L1

[R. J. Darling. About 2.3 miles southeast of Baker. Altitude about 155 ft. Drilled by A. M. Jannsen 1953. Casing, 12-in. to 70 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Clay	17	17	Clay, vari-colored	485	570
Quicksand	3	20	Sand	178	748
Troutdale formation:					
Lower member:					
Clay	58	78			
Sand and gravel, water-bearing	7	85			

3/1-24R2

[E. R. Kadow. About 1.5 miles east of Salmon Creek School. Altitude about 225 ft. Drilled by Hansen, 1949. Casing, 8-in. to 179 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	5	5	Upper member:		
Clay and light-colored sand	20	25	Gravel, cemented	60	140
Sand, water-bearing	15	40	Rocks, big, water-bearing, with clay	10	150
Pleistocene alluvial deposits and Troutdale formation: Clay, black and yellow	40	80	Lower member: Sandstone rocks	28	179

3/1-25G1

[A. R. Smoole. About 2.9 miles southeast of Baker. Altitude about 217 ft. Drilled by J. E. Hansen, 1952. Casing, 6-in. to 92 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluval deposits—Con.		
Topsoil	5	5	Sand, water bearing	10	85
Sand and clay	13	18	Troutdale formation: Gravel, water-bearing	7	92
Quicksand	42	60			
Clay, blue	15	75			

3/1-25M1

[L. A. Tesch. About 0.8 mile east of Salmon Creek School and 500 ft east of Salmon Creek. Altitude about 105 ft. Drilled by R. A. Jobes. Casing, 6-in. to 64 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation—Continued		
Gravel and boulders	14	14	Sand	3	34
Sand	5	19	Clay and gravel	17	51
Troutdale formation:			Gravel	2	53
Gravel and sand	3	22	Sand	4	57
Gravel, sandy	7	29	Gravel	7	64
Gravel, cemented	2	31			

3/1-25Q1

[Jacob Schwann. About 0.5 mile west of County Road 59, on County Road 6, near Salmon Creek. Altitude about 200 ft. Drilled by A. C. Locey. Casing, 6-in. to 108 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil, sandy	30	30	Troutdale formation:		
			Sand and gravel	20	50
			Clay, blue	30	80
			Gravel, sandy	28	108

3/1-26C1

[F. L. Davies. About 6 miles north of Vancouver, just west of Salmon Creek School, on U.S. Highway 99. Altitude about 195 ft. Drilled by R. A. Jobes. Casing, 6-in. to 169 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil, sandy, clayey, and coarse sand	20	20	Gravel, cemented	45	140
Sand (quicksand), water-bearing	60	80	Sand and gravel, water-bearing	29	169
Clay, blue	15	95			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-32J2

[W. H. Yost. About 1 mile northwest of Lake Shore School and 0.3 mile east of Northern Pacific track. Altitude about 198 ft. Drilled by R. A. Jobes. Casing, 6-in. to 178 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Old hole, no record	23	23	Troutdale formation:		
Pleistocene alluvial deposits:			Gravel, cemented	65	138
Clay	20	43	Sand	10	148
Sand	30	73	Sand, with some gravel, gravel proportion increasing with depth	30	178

3/1-33D1

[G. Van Volkenberg. Near Felida, about 1 mile east of Northern Pacific track, on County Road 14. Altitude about 215 ft. Drilled by A. C. Locey. Casing, 6-in. to 186 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	35	35	Gravel	20	155
Sand	10	45	Sand (quicksand)	6	161
Clay	33	78	Gravel, cemented	24	185
Clay, sandy	7	85	Boulders	3	188
Sand	50	135	Clay	5	193
			Gravel	5	198

3/1-33M2

[R. A. Garner. About 5 miles northwest of Vancouver and 1 mile south of Felida. Altitude about 215 ft Drilled by Almer and Brockway, 1950. Casing, 48-in. to 40 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Loam, sandy	6	6	Sand, black	12	39
Clay and sand	21	27	Sand, fine, black, and clay	1	40

3/1-33R1

[W. E. Kennedy. About 1.25 miles southeast of Felida. Altitude about 225 ft. Drilled by A. M. Jannsen, 1949. Casing, 8-in. to 215 ft, 6-in. to 237 ft; perforated from 216 to 237 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil and clay	20	20	Gravel	75	210
Sand	50	70	Sand (quicksand)	2	212
Clay, red	15	85	Gravel, water-bearing	13	225
Sand	50	135	Gravel	20	245

3/1-34G1

[F. Kluttenhoff. About 4 miles north of Vancouver and 0.2 mile south of County Road 14, on old U.S. Highway 99. Altitude about 170 ft. Drilled by Pete Hanson]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Clay and sand, mixed	80	80	Sand and gravel	20	160
Troutdale formation:			Sand, with little gravel	20	180
Gravel, cemented hard	60	140	Gravel, cemented	32	212

3/1-34G2

[Paul Borchers. About 4 miles north of Vancouver, at intersection of old U.S. Highway 99 and County Road 14. Altitude about 160 ft. Drilled by A. C. Locey. Casing, 6-in. to 129 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Soil	4	4	Troutdale formation—Con.		
Pleistocene alluvial deposits and Troutdale formation: Soil, sand, and gravel	56	60	Sand (quicksand)	4	72
			Boulders	8	80
			Sand, cemented	18	98
Troutdale formation:			Boulders	14	112
Boulders, shot	8	68	Gravel, water-bearing	17	129

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/1-34R1

[Clark County Public Utility District. About 2.4 miles south of Baker. Altitude about 195 ft. Drilled well. Casing, 12-in. to 275 ft; perforated from 176 to 230 ft, from 244 to 252 ft, and from 255 to 270 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Topsoil	3	3
Clay, yellow	9	12
Sand, water-bearing	8	20
Clay, blue	40	60
Clay brown	35	95
Clay, sandy	15	110
Troutdale formation:		
Gravel, cemented	25	135
Gravel and sand; water-bearing	20	155
Troutdale formation—Con.		
Gravel and brown sand	14	169
Sand	7	176
Sand, coarse, and gravel	11	187
Sand and gravel, cemented	8	195
Sand and gravel, some clay	52	247
Clay, blue, with sand and gravel	11	258
Gravel, sandy	17	275

3/1-35D1

[Thomas Christiansen. About 0.7 mile west of U.S. Highway 99, on old U.S. Highway 99, just south of Salmon Creek. Altitude about 76 ft. Drilled by A. C. Locey. Casing, 6-in. to 59 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	6	6
Troutdale formation:		
Gravel	12	18
Rock	6	24
Gravel	12	36
Troutdale formation—Con.		
Boulders	7	43
Gravel, coarse	8	51
Sand	4	55
Sand, black	4	59

3/1-35P1

[Columbia Winery. About 0.75 mile south of Salmon Creek, on east side of U.S. Highway 99. Altitude about 180 ft. Drilled by A. C. Locey. Casing, 6-in. to 119 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Soil, sandy	32	32
Sand	10	42
Clay, blue	6	48
Clay, brown	2	50
Troutdale formation:		
Gravel, cemented	29	79
Sand	2	81
Gravel, cemented	9	90
Sand (quicksand)	10	100
Gravel	10	110
Sand, black	12	122

3/1-36A1

[Arnold Ueltschi. About 2.3 miles southeast of Baker. Altitude about 250 ft. Drilled by Floyd Wickersham, 1954. Casing, 8-in. to 200 ft; perforated from 150 to 170 ft, and from 182 to 195 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Topsoil	5	5
Silt and sand	60	65
Silt and sand, brown, water-bearing	30	95
Clay, blue	23	118
Troutdale formation:		
Clay, yellow	9	127
Troutdale formation—Con.		
Sand, brown, water-bearing	16	143
Gravel, cemented, water-bearing	30	173
Sand, fine, and boulders	6	179
Gravel, coarse, open (?) water-bearing	16	195
Gravel, cemented	5	200

3/1-36B1

[J. J. and D. H. Herman. About 6 miles northeast of Vancouver and 1 mile east of Salmon Creek. Altitude about 210 ft. Drilled by Floyd Wickersham, 1952. Casing, 6-in. to 97 ft, 10 ft of 100 slot screen]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Topsoil	4	4
Clay, blue	11	15
Sand, blue	28	43
Troutdale formation:		
Clay, yellow	11	54
Gravel, cemented	28	82
Gravel, loose	15	97

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-1Q2

[T. L. Roberts. About 1.5 miles southeast of Battle Ground. Altitude about 275 ft. Drilled by Floyd Wickersham, 1952. Casing, 6-in. to 59 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	3	3	Gravel, cemented	11	52
Clay, yellow	11	14	Gravel, loose, water-bearing	7	59
Sand, brown, water-bearing	21	35			
Clay, blue	6	41			

3/2-2D3

[D. Primley. In Battle Ground, just southeast of intersection of State Routes 1U and 1S. Altitude about 290 ft. Drilled by A. C. Locey. Casing, 6-in. to 34 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	8	8	Boulders	8	28
Troutdale formation:			Gravel	5	33
Gravel, sandy	12	20	Sand, black	2	35

3/2-2F1

[H. S. Gish. About 0.4 mile south of intersection of County Roads 78 and 80. South of Battle Ground. Altitude about 286 ft. Drilled by A. C. Locey. Casing, 6-in. to 73 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	2	2	Clay and boulders	20	32
Clay	10	12	Gravel	19	51
			Clay	8	59
			Gravel, water-bearing	15	74

3/2-3B1

[Town of Battle Ground well 1. Altitude about 284 ft. Drilled by H. I. Bottner, 1954. Casing, 8-in. to 144 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Sand, yellow, water-bearing	2	97
Silt, loam, topsoil	5	5	Gravel, water-bearing, and coarse sand	20	117
Troutdale formation:			Sand, water-bearing	2	119
Gravel, medium	6	11	Gravel, loose, medium, water-bearing	16	135
Gravel and large boulders	21	32	Gravel, loose, coarse. water-bearing	3	138
Sand, yellow, and clay	20	52	Sand, medium, black, water-bearing	4	142
Gravel, cemented	15	67	Clay, yellow	2	144
Gravel, water-bearing	3	70			
Gravel, cemented	22	92			
Gravel, medium, water-bearing	3	95			

3/2-3B3

[Town of Battle Ground. Altitude about 284 ft. Drilled by H. Bottner, 1954. Casing, 12-in. to 144 ft; perforated from 105 to 112 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Clay, loam, topsoil	2	2	Sand and clay, gravelly, water-bearing	3	70
Troutdale formation:			Gravel, sandy	35	105
Clay, brown, and gravel	13	15	Sand, coarse, and gravel; water-bearing	7	112
Boulders and clay	10	25	Sand, coarse, black, and gravel; water-bearing	30	142
Gravel, brown sand, and clay	20	45	Clay, blue	10	152
Clay, brown, sand, and some gravel	22	67			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-3C1

[Fred Vandermast. About 0.6 mile west of intersection of State Route 1 U and 1 S, Battle Ground. Altitude about 282 ft. Drilled by A. C. Locey. Casing, 6-in. to 82 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	4	4	Gravel	17	49
Clay	10	14	Clay	6	55
Troutdale formation:			Gravel, water-bearing	27	82
Clay and boulders	18	32			

3/2-3E1

[C. A. Remy. About 1 mile west of Battle Ground and 0.25 mile south of State Route 1 S. Altitude about 275 ft. Drilled by Floyd Wickersham, 1950. Casing, 8-in. to 177 ft; perforated from 65 to 120 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	6	6	Gravel, cemented, water-bearing	60	114
Troutdale formation:			Sand and gravel, water-bearing	25	139
Upper member:			Lower member:		
Clay, yellow	15	21	Clay, blue	30	169
Clay, blue, and gravel	12	33	(Not logged)	8	177
Clay, yellow, and boulders	21	54			

3/2-3R1

[E. Anderson. About 1.0 mile south of Battle Ground on State Route 1 U, at Scotton Corner. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 50 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Gravel	18	58
Clay, yellow	12	14	Sand, black	5	63
Clay, blue	26	40			

3/2-4H2

[Arthur Leggett. About 1.6 miles southwest of Battle Ground. Altitude about 275 ft. Drilled by Floyd Wickersham, 1953. Casing, 6-in. to 177 ft; perforated from 93 to 127 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Unknown	93	93	Troutdale formation—Con.		
Troutdale formation:			Lower member:		
Upper member:			Sand, brown	20	147
Gravel, cemented	18	111	Clay, brown	12	159
Gravel and sand	3	114	Clay, blue	18	177
Gravel, open(?)	13	127			

3/2-4J1

[F. W. Hollenbeck. About 1 mile southwest of Battle Ground and 0.5 mile south of intersection of County Road 56 and State Route 1S. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 94 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	4	4	Gravel, cemented	26	61
Clay, sandy	6	10	Clay	5	66
Sand (quicksand)	5	15	Gravel	10	76
Clay, blue	10	25	Gravel, loose, water-bearing	18	94
Troutdale formation:					
Clay, rocky	10	35			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-4J2

[H. C. Sholund. About 1.7 miles southwest of Battle Ground. Altitude about 270 ft. Drilled by Floyd Wickersham. Casing, 6-in. to 126 ft; perforated from 102 to 123 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	5	5	Gravel, open(?), and sand; water-bearing	18	79
Clay, brown, sandy	9	14	Sand, gray, water-bearing	3	82
Sand, brown	13	27	Sand and boulders, water-bearing	15	97
Clay, blue	4	31	Gravel, open(?), water-bearing	26	123
Troutdale formation:			Gravel, cemented	3	126
Clay and boulders	18	49			
Gravel, cemented, water-bearing	12	61			

3/2-5E1

[Leonard Walther. About 3 miles west of Battle Ground and 0.5 mile south of State Highway 1S. Altitude about 220 ft. Drilled by Floyd Wickersham, 1947. Casing, 6-in.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Boulders and yellow clay	4	23
Clay, brown	11	15	Sand, water-bearing	8	31
Clay, blue	4	19	Gravel and sand, water-bearing	39	70

3/2-5M1

[C. V. Hill. About 0.7 mile south of Dollar Corner and 3 miles west-southwest of Battle Ground on County Road 3. Altitude about 220 ft. Drilled by A. C. Locey. Casing, 6-in. to 80 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation: Gravel, loose, water-bearing	66	80
Clay, sandy	5	5			
Clay, blue, sandy	9	14			

3/2-5R1

[M. M. Morgan. About 1.3 miles southeast of Dollar Corner. Altitude about 365 ft. Drilled by A. C. Locey]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Soil	20	20	Sand (river sand), dry; took water	140	250
Clay, with boulders near bottom	50	70	Sand (quicksand), wet	140	390
Gravel, cemented	40	110	Shale, gravelly, blue, water-bearing	10	400
			Clay, blue	--------	400

3/2-6G1

[A. P. and Martha McDaniel. About 3.9 miles west of Battle Ground. Altitude about 200 ft. Drilled by Floyd Wickersham, 1954. Casing, 8-in. to 217 ft; perforated from 45 to 79 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	7	7	Lower member:		
Silt	11	18	Clay, brown	8	100
Troutdale formation:			Clay, blue	9	109
Upper member:			Clay, yellow	5	114
Boulders, sand, and gravel; water-bearing	12	30	Sand, coarse, water-bearing	45	159
Gravel, cemented	49	79	Clay, blue	49	208
Sand, brown, water-bearing	13	92	Sand, coarse, blue, water-bearing	4	212
			Clay, blue	5	217

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-6J2

[H. C. Dugger. About 3 miles west of Battle Ground and 0.75 mile south of State Route 1S. Altitude about 205 ft. Drilled by Floyd Wickersham. Casing, 6-in. to 74 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Gravel, coarse, water-bearing	15	41
Clay, yellow	13	17	Gravel, cemented, and sand; water-bearing	21	62
Sand, blue, water-bearing	9	26	Gravel, loose, and sand; water-bearing	12	74

3/2-7E1

[A. Thompson. In Goodhope district, about 1.5 miles south of State Route 1S, on County Road 59. Altitude about 250 ft. Drilled by A. C. Locey. Casing, 6-in. to 163 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Gravel, loose	8	118
Sand (quicksand)	70	73	Sand, coarse, black	14	132
Sand, black	37	110	Sand, black	13	145
			Sand, coarse	17	162
			No record, water-bearing	1	163

3/2-8A1

[R. B. Agard. About 3.1 miles southwest of Battle Ground. Altitude about 275 ft. Drilled by B. L. Price, 1953. Casing, 8-in. to 170 ft; perforated 130 to 154 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	5	5	Upper member:		
Silt, brown	35	40	Clay and gravel	10	85
Silt, blue	35	75	Clay, blue	5	90
			Sand and gravel	64	154
			Sand and fine gravel	3	157
			Lower member: Sand, fine	13	170

3/2-8D2

[R. C. Chapman. About 3.7 miles southwest of Battle Ground, 700 ft southeast of northwest corner. Altitude about 220 ft. Drilled by B. L. Price, 1953. Casing, 10-in. to 127 ft; perforated from 100 to 107 ft and from 115 to 125 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	3	3	Gravel	10	65
Silt, blue	22	25	Gravel and sand	15	80
Troutdale formation:			Gravel and dirt	25	105
Gravel and sand	20	45	Gravel, clean	22	127
Gravel, fine, and sand	10	55			

3/2-8M1

[J. R. Tappan. About 3.7 miles southwest of Battle Ground. Altitude about 231 ft. Drilled by F. Wickersham, 1955. Casing, 6-in. to 112 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Sand and gravel	6	65
Clay, yellow	12	15	Gravel, cemented	15	80
Clay, blue	12	27	Sand and gravel	21	101
Sand, gray	32	59	Gravel, open(?)	11	112

3/2-9A1

[Clarence Larsen. About 1.5 miles southwest of Battle Ground, near Meadow Glade. Altitude about 280 ft. Drilled by B. L. Price, 1952. Casing, 10-in. to 150 ft; perforated from 130 to 145 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Clay, blue, and gravel	20	65
Silt, brown	26	30	Clay, brown, and gravel	20	85
Silt, blue	6	36	Sand and gravel, muddy	65	150
Mud, heavy, blue	9	45			

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
3/2-9D1					
[L. A. Vallet. About 2.6 miles southwest of Battle Ground. Altitude about 285 ft. Drilled by Rupert A. Jobes, 1952. Casing, 6-in. to 130 ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	1	1	Sand and gravel	30	75
Clay	2	3	Gravel, cemented; water-bearing below 92 ft	52	127
Sand, yellow	9	12	Gravel	1	128
Sand, blue, water-bearing	32	44	Clay and gravel; no water	6	134
Clay, blue	1	45			
3/2-9H1					
[Columbia Academy. In Meadow Glade, about 0.2 mile north of intersection of County Roads 56 and 8. Altitude about 285 ft. Drilled by R. J. Strasser. Casing, 10-in. to 169 ft; perforated from 60 to 70 ft, from 110 to 123 ft, and from 124 to 142 ft]					
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil and clay	10	10	Upper member—Con.		
Sand, yellow	20	30	Sand and gravel	3	94
Silt, gray, and sand	25	55	Gravel, cemented	16	110
Troutdale formation:			Sand and gravel, water-bearing	31	141
Upper member:			Sand, with small amount of gravel	18	159
Sand and gravel, water-bearing	25	80	Lower member: Sand, yellow	36	195
Gravel, cemented	11	91			
3/2-10F1					
[E. Gassoway. About 1.5 miles south of Battle Ground, on State Route 1U near intersection with County Road 8. Altitude about 291 ft. Drilled by A. C. Locey. Casing, 6-in. to 90 ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	12	12	Boulders	5	55
Sand (quicksand)	28	40	Clay	30	85
Clay, blue	10	50	Gravel	10	95
3/2-10H1					
[Emil Wall. About 1.3 miles south of Battle Ground, 0.4 mile south of Scotton Corner, and 0.4 mile east of State Route 1U. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 79 ft]					
Pleistocene alluvial deposits: Soil	20	20	Troutdale formation—Con.		
Troutdale formation:			Gravel	10	70
Sand and gravel	20	40	Sand, water-bearing	9	79
Gravel, cemented	20	60			
3/2-10L2					
[M. S. Smart. About 0.3 mile east of Meadow Glade, on County Road 8. Altitude about 293 ft. Drilled by A. C. Locey. Casing, 6-in. to 137 ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Clay, rocky	13	64
Clay, sandy	8	10	Boulders and gravel	18	82
Sand (quicksand)	41	51	Gravel, loose, water-bearing	56	138
3/2-10M1					
[A. F. Gilham. Just east of Meadow Glade, on County Road 8. Altitude about 282 ft. Drilled by A. C. Locey. Casing, 6-in. to 117 ft]					
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	5	5	Clay, rocky	20	79
Sand (quicksand)	45	50	Gravel	34	113
Clay	9	59	Gravel, loose, water-bearing	4	117

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-10Q1

[G. J. Kavodias. About 0.7 mile southeast of Meadow Glade and 0.8 mile south of intersection of County Road 64 and State Route 1U. Altitude about 284 ft. Drilled by A. C. Locey. Casing, 6-in. to 99 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	10	10	Gravel and clay	15	90
Soil and clay	40	50	Gravel, water-bearing	9	99
Sand	25	75			

3/2-10Q2

[W. R. Wendt. About 2.1 miles southwest of Battle Ground and 700 ft north and 600 ft east of south quarter corner. Altitude about 285 ft. Drilled by B. L. Price, 1952. Casing, 10-in. to 150 ft; perforated from 130 to 145 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	5	5	Boulders	5	50
Silt	40	45	Mud and sand	50	100
			Sand and small gravel	50	150

3/2-11C1

[George Granlund. About 1 mile south of Battle Ground and 0.2 mile west of intersection of County Roads 64 and 80. Altitude about 285 ft. Drilled by A. C. Locey. Casing, 6-in. to 91 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Boulders and clay	10	26
Clay	14	16	Clay, rocky	22	48
			Gravel, cemented	30	78
			Gravel, loose, water-bearing	13	91

3/2-11D2

[C. Dietrich. About 1 mile south of Battle Ground and 0.1 mile east of Scotton Corner. Altitude about 285 ft. Drilled by A. C. Locey. Casing, 6-in. to 78 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	8	8	Gravel, coarse	24	78
Sand	13	21	Sand, black	5	83
Clay	24	45			
Sand (quicksand)	9	54			

3/2-11E1

[J. W. Hill. About 1.4 miles south of intersection of State Routes 1S and 1U. Altitude about 28[illegible] ft. Drilled by A. C. Locey. Casing, 6-in. to 58 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil, sandy loam	20	20	Clay and gravel	12	45
Sand (quicksand)	13	33	Boulders	2	47
			Gravel, cemented	8	55
			Gravel	5	60

3/2-11P1

[A. W. Peter. About 2 miles south of Battle Ground and 0.2 mile north of Salmon Creek on County Road 80. Altitude about 265 ft. Drilled by A. C. Locey. Casing, 6-in. to 85 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Boulders	2	40
Clay, sandy	10	13	Gravel and rock	7	47
Sand (quicksand)	10	23	Clay	7	54
Clay	15	38	Gravel and rock	8	62
			Gravel, loose, water-bearing	24	86

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-12R1

[Earl McLavy. About 2.7 miles southeast of Battle Ground and 1.75 miles south of County Road 78, on County Road 81. Altitude about 254 ft. Drilled by A. C. Locey. Casing, 6-in. to 43 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	12	12	Gravel	7	43
Sand	16	28	Sand, black	2	45
Clay, yellow	8	36			

3/2-13B1

[Ray Kielman. About 1.2 miles northwest of Hockinson and 1 mile north of Hockinson Road, on County Road 81. Altitude about 270 ft. Drilled by A. C. Locey. Casing, 6-in. to 89 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Sand, red	28	28	Boulders	2	50
Sand, blue	10	38	Gravel, loose	9	59
Clay, blue	10	48	Gravel, cemented	27	86
			Gravel, loose	3	89

3/2-13P1

[L. Dietrich. About 1.1 miles west of Hockinson, on Hockinson Road. Altitude about 288 ft. Drilled by A. C. Locey. Casing, 6-in. to 133 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	12	12	Sand (quicksand)	28	94
Sand	16	28	Gravel	14	108
Clay	21	49	Clay	13	121
Troutdale formation:			Gravel	9	130
Gravel	17	66	Sand, black	3	133

3/2-14A1

[R. J. Helms. About 1.7 miles northwest of Hockinson, 0.8 mile north of Hockinson Road on Mill Road Altitude about 280 ft. Drilled by A. C. Locey. Casing, 6-in. to 108 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	11	11	Gravel	14	38
Sand	13	24	Sand	37	75
			Clay, yellow	5	80
			Gravel	22	102
			Sand	3	105
			Sand, black	3	108

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-14P1

[Arthur Tikka. About 2 miles west of Hockinson, on Hockinson Road. Altitude about 302 ft. Drilled by Hamilton-Locey. Casing, 8-in. to 180 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Soil	4	4
Clay, water-bearing	14	18
Clay and sand, water-bearing	50	68
Troutdale formation:		
Upper member;		
Clay, sand, and gravel	17	85
Clay and gravel, water-bearing	1	86
Sand, gravel, and clay	15	101
Sand and gravel, with red water	2	103
Sand, clay, and gravel	5	108
Sand and gravel	2	110
Clay and gravel	4	114
Gravel and sand	2	116
Gravel and clay	5	121
Gravel	1	122
Gravel and clay	3	125
Clay and sand	1	126
Sand and gravel	1	127
Gravel, cemented	2	129
Sand and gravel	3	132
Gravel	7	139
Troutdale formation—Con.		
Upper member—Con.		
Gravel, water-bearing	1	140
Gravel, cemented	4	144
Sand and gravel	1	145
Gravel, cemented	4	149
Gravel and sand	1	150
Gravel, cemented	6	156
Sand and gravel	3	159
Gravel and clay	4	163
Sand and gravel, water-bearing	1	164
Gravel and clay	3	167
Gravel, loose, and sand, with gray water	3	170
Lower member;		
Clay, red	3	173
Clay, blue	12	185
Clay, brown	10	195
Clay, blue, and gravel; water-bearing	1	196
Shale, blue	11	207
Gravel	1	208
Shale, blue to black	7	215

3/2-16M2

[Clinton Higdon. About 1 mile southwest of Meadow Glade. Atlitude about 270 ft. Drilled by H. I. Bottner, 1952 Casing, 8-in. to 157 ft; perforated from 112 to 116 ft, from 128 to 135 ft, and from 140 to 152 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Topsoil	8	8
Sand	11	19
Sand, cemented, brown	9	28
Sand, dark-brown	3	31
Sand, blue	40	71
Troutdale formation:		
Gravel, cemented	13	84
Gravel, large	28	112
Gravel, water-bearing	6	118
Sand, yellow, and gravel	8	126
Gravel, cemented	1	127
Gravel, water-bearing	28	155
Sand, brown	2	157

3/2-17D1

[F. Thomas. About 2.2 miles south of Battle Ground Road and 1.6 miles northwest of Pleasant Valley School, on County Road 3. Altitude about 230 ft. Drilled by A. C. Locey. Casing, 6-in. to 64 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:		
Soil	4	4
Sand	41	45
Clay, sandy	15	60
Troutdale formation:		
Gravel	3	63
Sand, black	2	65

3/2-17J1

[W. M. Higdon. About 4 miles southwest of Battle Ground and 0.5 mile north of County Road 72, on Binner Road. Altitude about 261 ft. Drilled by A. C. Locey. Casing, 6-in. to 116 ft]

Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	15	15
Troutdale formation:		
Gravel and sand	60	75
Troutdale formation—Con.		
Gravel, cemented	15	90
Gravel water-bearing	26	116

695-385 O - 64 - 16

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

3/2-17Q1

[J. M. Morgan. About 1.9 miles west of Brush Prairie. Altitude about 250 ft. Drilled by H.I. Bottner 1952. Casing, 8-in. to 235 ft, 6-in. from 230 to 304 ft; perforated 113 to 119 ft and from 285 to 301 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	8	8	Lower member—Con.		
Sand, dirty	48	56	Sand, brown	42	187
Clay, blue	12	68	Clay and gravel	1	188
Troutdale formation:			Gravel, water-bearing	2	190
Upper member:			Sand, brown	37	227
Gravel, cemented	45	113	Clay	53	280
Gravel, water-bearing	7	120	Sandstone	19	299
Lower member:			Gravel, water-bearing	2	301
Clay, blue, and sand	25	145	Sandstone	3	304

3/2-18C1

[B. Sellinger. About 2 miles east of Baker, at intersection of Mill Creek and County Road 8. Altitude about 200 ft. Drilled by A. C. Locey. Casing, 6-in. to 52 ft.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	8	8	Gravel	11	36
Clay	17	25	Sand	10	46
			Sand, black	6	52

3/2-18C2

[B. Sellinger. About 2 miles east of Baker and 0.2 mile southeast of intersection of Mill Creek and County Road 8. Altitude about 200 ft. Drilled by A. C. Locey. Casing, 6-in. to 97 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	12	12	Gravel	20	59
Sand	16	28	Clay	18	77
Troutdale formation:			Rock	11	88
Boulders	11	39	Sand, black	9	97

3/2-18D1

[J. T. Pagel. About 5 miles southwest of Battle Ground and 500 ft south and 125 ft east of northwest corner. Altitude about 205 ft. Drilled by B. L. Price. Casing, 8-in. to 190 ft; perforated from 42 to 47 ft and from 90 to 94 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Unknown	43	43	Troutdale formation—Con.		
Troutdale formation:			Upper member—Con.		
Upper member:			Gravel and sand, water-bearing	8	98
Gravel, water-bearing	4	47	Lower member: Clay, blue	112	220
Sand with thin layers of gravel	43	90			

3/2-19A1

[Ernest Dunlap. About 2.3 miles west of Brush Prairie. Altitude about 200 ft. Drilled by Floyd Wickersham]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Gravel, cemented, water-bearing	28	69
Clay; yellow	14	18	Gravel fine, and sand; water-bearing	14	83
Sand, blue, water-bearing	5	23			
Clay, blue	18	41			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-19B1

[L. L. Demming. About 0.8 mile northeast of Pleasant Valley School, at intersection of Studer Road and County Road 65. Altitude about 210 ft. Drilled by A. C. Locey. Casing, 6-in. to 66 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Gravel, cemented	24	58
Clay, sandy	22	24	Gravel, loose, water-bearing	8	66
Clay	10	34			

3/2-19G1

[H. L. McDowell. About 0.6 mile east of Pleasant Valley School on Studer Road. Altitude about 170 ft. Drilled by A. C. Locey. Casing, 6-in. to 20 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium: Soil	6	6			
Troutdale formation:			Troutdale formation—Con.		
Gravel	12	18	Gravel	2	30
Rock	10	28	Sand, black	1	31

3/2-20C1

[C. W. Parker. About 0.4 mile east of County Road 3, on County Road 72. About 0.5 mile north of Salmon Creek. Altitude about 235 ft. Drilled by R. A. Jobes. Casing, 6-in. to 69 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:					
Clay	49	49			
Clay, blue	10	59	Troutdale formation: Gravel, probably with some blue sand and silt(?)	10	69

3/2-21A1

[J. Shefek. About 0.5 mile west of Brush Prairie. Altitude about 290 ft. Drilled by owner]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Sand, water-bearing	at	34	Gravel, cemented	at	100
Troutdale formation:			Gravel, sand, and boulders; water-bearing. Sand comes in	43	143
Hardpan (gravel, cemented?)	5	39			
Sand, blue, water-bearing	at	45			
			Gravel, water-bearing	at	143

3/2-21A2

[W. Lane. About 0.7 mile northwest of Brush Prairie on County Road 72. Altitude about 265 ft. Drilled by A. C. Locey. Casing, 6-in. to 71 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	10	10	Gravel	13	57
Sand	12	22	Sand (quicksand)	2	59
Clay	22	44	Gravel	12	71

3/2-21A3

[M. T. Radke. About 0.8 mile northwest of Brush Prairie. Altitude about 265 ft. Drilled by B. L. Price. Casing, 6-in. to 139 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Sand and some gravel	20	120
Clay and sand	28	32	Gravel and sand, water-bearing	19	139
Clay, blue	6	38			
Silt and sand	62	100			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-21A4

[S. E. Wellman. About 0.8 mile northwest of Brush Prairie. Altitude about 265 ft. Drilled by Floyd Wickersham, 1954. Casing, 8-in. to 148 ft; perforated from 132 to 145 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Gravel, cemented	43	126
Clay, yellow	6	9	Sand, blue	2	128
Sand, brown	29	38	Gravel, cemented, and sand; water-bearing	20	148
Sand, brown, water-bearing	25	63			
Sand, blue	15	78			
Clay, blue	5	83			

3/2-21K1

[Fred Moore. About 0.9 mile west of Brush Prairie. Altitude about 290 ft. Drilled by B. L. Price, 1953. Casing, 12-in. to 290 ft; perforated from 150 to 180 ft and from 270 to 290 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Topsoil	3	3	Lower member:		
Clay	15	18	Clay, blue	20	205
Silt and sand	85	103	Sand, brown	35	240
Troutdale formation:			Gravel	7	247
Upper member:			Clay	6	253
Sand and gravel	37	140	Gravel	37	290
Gravel	25	165			
Gravel, muddy	20	185			

3/2-22F1

[Andrew Erkkila. In Brush Prairie, at intersection of State Route 1U and T. H. Adams Road. Altitude about 297 ft. Drilled by A. C. Locey. Casing, 6-in. to 120 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	4	4	Gravel	4	102
Clay, sandy	6	10	Sand (quicksand)	5	107
Sand (quicksand)	42	52	Gravel, water-bearing	13	120
Clay	18	70			
Sand	28	98			

3/2-22J1

[Jacob Henkel. About 0.5 mile southeast of Brush Prairie. Altitude about 293 ft. Drilled by Floyd Wickersham, 1955. Casing, 8-in. to 175 ft; perforated from 145 to 160 ft and from 165 to 172 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Gravel, cemented, and sand	50	144
Sand, brown	4	8	Gravel, large	3	147
Clay, yellow	24	32	Gravel, cemented	11	158
Sand, clay binder	22	54	Gravel, large	3	161
Sand, gray	40	94	Sand, gray	3	164
			Gravel, cemented	8	172
			Sand, brown	3	175

3/2-23D2

[W. F. Messner, Jr. About 0.8 mile northeast of Brush Prairie. Altitude about 295 ft. Drilled by B. L. Price, 1952. Casing, 8-in. to 178 ft; perforated from 152 to 172 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	5	5	Gravel, mud	5	90
Mud, brown	30	35	Mud, brown	12	102
Silt, blue	50	85	Mud, brown, and gravel	43	145
			Sand, gravel, and mud	33	178

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-23H1

[Axel Pelto. About 1.5 miles east of Brush Prairie. Altitude about 295 ft. Drilled by F. Wickersham, 1954. Casing, 8-in. to 193 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Gravel, cemented	51	152
Sand, brown, and silt	14	18	Sand, fine, water-bearing	30	182
Clay, blue	28	46	Gravel, cemented	4	186
Sand, brown	19	65	Sand, coarse, and gravel; water-bearing	8	194
Clay, blue	10	75			
Clay, yellow	10	85			
Sand, blue, water-bearing	16	101			

3/2-23J1

[E. Kreinbring. About 1.5 miles east-southeast of Brush Prairie, at intersection of County Roads 92 and 93. Altitude about 285 ft. Drilled by A. C. Locey. Casing, 6-in. to 139 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation(?)—Con.		
Soil	4	4	Sand, black	20	105
Clay	41	45	Troutdale formation:		
Sand	15	60	Gravel	25	130
Troutdale formation(?):			Gravel, cemented	5	135
Clay, yellow	15	75	Sand, black	4	139
Clay, blue	10	85			

3/2-23J2

[E. V. Kreinbring. About 1.5 miles east of Brush Prairie. Altitude about 295 ft. Drilled by G. T. Lane, 1954. Casing, 10-in. to 195 ft; perforated from 135 to 140 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	2	2	Gravel, water-bearing, with sand	4	109
Sand, brown, and loam	1	3	Gravel, cemented	26	135
Clay, yellow	7	10	Gravel, water-bearing	5	140
Sand, red	8	18	Gravel, cemented	8	148
Clay, blue	10	28	Gravel, water-bearing	4	152
Clay, yellow	17	45	Gravel, cemented	6	158
Sand, gray	29	74	Gravel, water-bearing	4	162
Clay, yellow	3	77	Gravel, cemented	9	171
Clay, blue	26	103	Sand, coarse, brown, and gravel; water-bearing	24	195
Sand, brown	2	105			

3/2-24N1

[W. F. Bennett. About 1.9 miles southeast of Brush Prairie. Altitude about 280 ft. Drilled by B. L. Price, 1953. Casing, 10-in. to 158 ft; perforated at 120 ft, and from 138 to 152 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	3	3	Mud and sand	20	60
Silt, brown	7	10	Clay, blue	20	80
Mud, blue	25	35	Troutdale formation: Sand and gravel	78	158
Mud	5	40			

3/2-25H1

[Jack Bechill. About 0.75 mile north of County Road 5, on A. J. Berg Road. Altitude about 261 ft. Drilled by A. C. Locey. Casing, 6-in. to 111 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	7	7	Boulders	23	65
Sand (quicksand)	4	11	Gravel, coarse	46	111
Clay, blue	31	42			

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-25L1

[H. R. and Hilda E. Hoseney. About 2 miles southeast of Brush Prairie. Altitude about 275 ft. Drilled by Floyd Wickersham, 1953. Casing, 8-in. to 295 ft, perforated; gravel plug from 283 to 305 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Upper member: Gravel and boulders, cemented, water-bearing	42	148
Clay, red	3	6	Lower member:		
Gravel, loose, and boulders	12	18	Clay, yellow	3	151
Clay, yellow	19	37	Sand, fine, with mica; water-bearing	143	294
Shale, blue	5	42	Sand, coarse, water-bearing	11	305
Clay, yellow	34	76			
Sand	13	89			
Clay, blue	17	106			

3/2-27F1

[W. D. Andrews. About 1.2 miles south of Brush Prairie and 0.1 mile north of intersection of Glenwood Heights Road and State Route 1U. Altitude about 285 ft. Drilled by G. H. Locey. Casing, 6-in. to 253 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	14	14	Lower member:		
Sand	7	21	Clay, sandy	34	187
Clay, sandy	42	63	Gravel, sandy	2	189
Troutdale formation:			Clay	16	205
Upper member:			Gravel, sandy, water-bearing	1	206
Clay, sandy, and gravel	12	75	Clay, sandy	8	214
Gravel, cemented	7	82	Sand, water-bearing	5	219
Gravel, sandy, water-bearing	13	95	Rock, white, floating (pumice?)	24	243
Clay, sandy, and gravel	27	122	Clay	8	251
Gravel, cemented	12	134	Gravel, "volcanic"	2	253
Gravel, sandy	2	136			
Clay, sandy, and gravel	12	148			
Gravel, loose	2	150			
Gravel, cemented	3	153			

3/2-27F2

[W. D. Andrews. About 1.2 miles south of Brush Prairie. Altitude about 285 ft. Drilled by R. J. Strasser, 1953. Casing, 12-in. to 279 ft; perforated from 116 to 120 ft, from 128 to 141 ft, from 143 to 151 ft, from 213 to 229 ft, and from 250 to 275 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil	6	6	Clay, blue	22	214
Clay, sandy	16	22	Sand and gravel, water-bearing	28	242
Sand	12	34	Clay, brown	7	249
Clay, blue	19	53	Gravel with clay binder	9	258
Sand and silt	43	96	Gravel and sand, water-bearing	21	279
Troutdale formation:			Gravel with clay binder	8	287
Sand and gravel, water-bearing	55	151	Clay, yellow	8	295
Gravel with clay binder	11	162			
Clay, yellow	30	192			

3/2-28A1

[R. V. Somerell. About 0.5 mile northwest of intersection of Glenwood Heights Road and State Route 1U. Altitude about 286 ft. Drilled by A. C. Locey. Casing, 6-in. to 163 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	18	18	Gravel, sandy	31	121
Subsoil	26	44	Sand, dry	4	125
Sand	11	55	Gravel, sandy	20	145
Clay, sandy	35	90	Clay	5	150
			Gravel	14	164

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-28C2

[A. A. Groth. About 1 mile southwest of Brush Prairie. Altitude about 285 ft. Drilled by B. L. Price, 1951. Casing, 8-in. to 247 ft; perforated from 163 to 240 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	5	5	Upper member:		
Silt	25	30	Mud and gravel	67	190
Silt and sand	45	75	Mud, blue	22	212
Sand, heavy	10	85	Lower member:		
Sand, blue (quicksand)	10	95	Sand and gravel	33	245
Clay, blue	28	123	Clay, blue	2	247

3/2-28G2

[H. L. Grantham. About 0.1 mile south of Glenwood Heights Road and 0.5 mile west of State Route 1U. Altitude about 285 ft. Drilled by A. C. Locey. Casing, 6-in. to 160 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Clay, sandy	60	60	Clay, sandy	40	130
Clay, blue	20	80	Sand (quicksand)	10	140
Sand (quicksand), water-bearing	10	90	Gravel, loose	2	142
			Gravel, cemented	13	155
			Gravel, loose, water-bearing	5	160

3/2-28P1

[J. Hebert. About 1.0 mile northeast of Homan, 0.8 mile west of State Route 1U on County Road 6. Altitude about 257 ft. Drilled by A. C. Locey. Casing, 6-in. to 170 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	3	3	Boulders	13	104
Clay, sandy	12	15	Gravel, cemented	65	169
Sand	48	63	Gravel, water-bearing	1	170
Sand (quicksand)	5	68			
Clay, sandy	23	91			

3/2-28Q1

[A. Adams. About 1 mile northeast of Homan and 0.6 mile west of State Route 1U, on County Road 6. Altitude about 272 ft. Drilled by A. C. Locey. Casing, 6-in. to 126 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Soil	8	8	Rock	7	75
Sand	18	26	Gravel	21	96
Gravel	13	39	Clay	20	116
Clay	17	56	Gravel	8	124
Troutdale formation:			Sand, black	7	131
Gravel	12	68			

3/2-29B1

[Fred W. Fleming. About 2.1 mile southwest of Brush Prairie. Altitude about 190 ft. Dug by N. C. Fleming, 1954. Casing, 30-in. to 15 ft, 12-in. from 15 to 26 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Muck, black	3	3	Quicksand	23	26

3/2-29H1

[L. D. Flindt. About 2.1 miles southwest of Brush Prairie. Altitude about 195 ft. Dug by C. M. Nye, 1953. Casing, 36-in. to 23 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	3	3	Sand	6	19
Silt soil	10	13	Sand, coarse, water-bearing	4	23

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-29M1

[A. Naegeli. About 0.3 mile north of intersection of County Highways 3 and 6. Altitude about 224 ft. Drilled by A. C. Locey. Casing, 6-in. to 115 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	14	14	Clay and gravel	8	89
Sand, coarse	26	40	Gravel	22	111
Sand, water-bearing	41	81	Gravel, water-bearing	4	115

3/2-30C1

[C. M. Coffey. Between Pleasant Valley and Glenwood and 0.6 mile west of intersection of County Roads 3 and 70. Altitude about 242 ft. Drilled by A. C. Locey. Casing, 6-in. to 109 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	10	10	Sand (quicksand) and clay	33	95
Sand (quicksand)	30	40	Sand and clay	10	105
Clay, blue	20	60	Troutdale formation: Gravel	5	110
Sand (quicksand)	2	62			

3/2-30K1

[Evelyn Berger. About 2 miles east of Salmon Creek. Altitude about 240 ft. Drilled by Courtney Bach, 1951. Casing, 6-in. to 107 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation: Gravel	7	107
Soil, sandy	20	20			
Sand (quicksand)	80	100			

3/2-31M1

[J. L. Lee. About 4.2 miles southwest of Brush Prairie. Altitude about 255 ft. Drilled by Joe Hansen. Casing, 6-in. to 35 ft; perforated 15 to 35 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Topsoil	6	6	"Quicksand," with mixed clay	3	35
Clay, light, and sand	9	15			
Sand, water-bearing	17	32			

3/2-33K1

[Homer Mosier. About 0.8 mile east of Homan, 1 mile southwest of intersection of County Road 6 and State Route 1U, at end of Miller Road. Altitude about 222 ft. Drilled by A. C. Locey. Casing, 6-in. to 107 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	5	5	Clay and gravel	21	91
Soil, sandy	13	18	Gravel	2	93
Sand, water-bearing	27	45	Clay and gravel	7	100
Sand (quicksand)	25	70	Boulders	3	103
			Sand, black	4	107

3/2-33P2

[J. Ingstrom. About 0.8 mile southeast of Homan and 0.7 mile west of State Route 1U, on J. Bassil Road. Altitude about 220 ft. Drilled by A. C. Locey. Casing, 6-in. to 77 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	12	12	Sand	6	68
Sand	20	32	Troutdale formation:		
Gravel	13	45	Clay, yellow	7	75
Boulders	17	62	Gravel	2	77

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/2-34L1

[R. O. Woster. About 0.9 mile southwest of Union School and 0.6 mile south of County Road 6, on State Route 1U. Altitude about 260 ft. Drilled by A. C. Locey. Casings, 6-in. to 134 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	7	7	Clay, red	30	81
Sand	16	23	Sand	18	99
Sand (quicksand)	3	26	Gravel	27	126
Boulders	2	28	Sand, black	9	135
Clay, sandy	23	51			

3/2-34N1

[Frank Campbell. About 1.3 miles southwest of Union School, at intersection of State Route 1U and Towle Road. Altitude about 260 ft. Drilled by A. C. Locey. Casing, 6-in. to 128 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	1	1	Clay	9	116
Gravel	9	10	Gravel	12	128
Sand	97	107			

3/2-34P1

[R. T. Gould. About 1.2 miles southwest of Union School, 0.25 mile east of State Route 1U on Towle Road. Altitude about 252 ft. Drilled by A. C. Locey. Casing, 6-in. to 126 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Gravel	35	35	Gravel	20	80
Sand	25	60	Clay	24	104
			Sand (quicksand)	11	115
			Sand and gravel	9	124
			Boulders and gravel	22	146

3/2-34P2

[Henry Thomas. About 1.2 miles southwest of Union School and 0.2 mile north of intersection of State Highway 1U and Towle Road. Altitude about 270 ft. Drilled by A. C. Locey. Casing, 6-in. to 133 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	7	7	Gravel	40	130
Sand	28	35	Sand, black	5	135
Sand (quicksand)	17	52			
Boulders	10	62			
Clay, sandy	28	90			

3/3-8Q1

[W. E. Weisenborn. About 2.5 miles northeast of Hockinson and 0.3 mile south of County Road 86 on County Road 88. Altitude about 540 ft. Drilled by A. C. Locey. Casing, 6-in. to 138 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	4	4	Gravel, loose	11	101
Clay, red, sandy	26	30	Clay, yellow, very soft	27	128
Clay, rocky	50	80	Sand, fine, black	2	130
Sand (quicksand)	5	85	Gravel, loose	5	135
Gravel, cemented	5	90	Sand, black, water-bearing	3	138

3/3-17N1

[William Ahola. About 0.7 mile northeast of Hockinson and 0.6 mile east of County Road 89 on County Road 88. Altitude about 530 ft. Drilled by A. C. Locey. Casing, 6-in. to 102 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	2	2	Sand and gravel	57	93
Clay	34	36	Sand, water-bearing	9	102

TABLE 17.—*Materials penetrated by representative wells*—Continued

3/3-18R1

[S. K. Bain. About 0.45 mile east of Hockinson Center. Altitude about 498 ft. Drilled by A. C. Locey. Casing, 6-in. to 103 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	5	5	Sand (quicksand)	6	94
Sand	28	33	Gravel	6	100
Gravel	55	88	Sand, black	8	108

3/3-19A1

[Fred Laws. About 0.5 mile east of Hockinson. Altitude about 480 ft. Drilled by Bill Price, 1952. Casing, 10-in. to 145 ft: perforated from 107 to 118 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Clay, silt, and some gravel	18	18	Gravel, fine	4	130
Gravel	2	20	Sand, gray	4	134
Silt	33	53	Gravel, fine	2	136
Gravel	12	65	Sand	3	139
Clay	2	67	Gravel	6	145
Gravel, water-bearing	20	87	Rock, black	10	155
Gravel with some clay	10	97	Gravel, water bearing	3	158
Gravel, clean, water-bearing	23	120	Gravel, hard	9	167
Sand, red, and gravel	6	126			

3/3-19D1

[A. Schimpf. About 0.3 mile west of Hockinson Center. Altitude about 270 ft. Drilled by Floyd Wickersham. Casing, 6-in. to 68 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	4	4	Clay, blue, and boulders; cemented	9	60
Clay, gray	5	9	Gravel, loose	8	68
Clay, yellow	11	20			
Clay, yellow, and sand	15	35			
Sand, yellow	15	50			
Clay, blue-green	1	51			

3/3-21M1

[John Huhtala. About 1.7 miles west of Mountain View School, 0.5 mile north of Griffil Road. Altitude about 527 ft. Drilled by Pete Hansen. Casing, 6-in. to 94 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Clay, yellow, sticky	20	20	Gravel, cemented	9	94
Sand (quicksand), yellow, with some mica	65	85			

3/3-32N1

[C. R. Ellenwood, and I. M. Brown. About 2.7 miles south-southeast of Hockinson, at intersection of Del Groso Road and Fifth Plain Creek. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 66 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Soil	4	4	Sand (quicksand)	12	57
Sand	23	27	Gravel	5	62
Gravel	18	45	Sand, black	4	66

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/1W-13Q1

[Northern Pacific Railroad. In Ridgefield, about 200 ft north of station. Altitude about 40 ft. Casing, 12- to 10-in. to 109 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Cinders	2	2	Troutdale formation—Con.		
Troutdale formation:			Sand, coarse, and fine gravel	14	63
Sand, yellow, clayey, and cemented gravel	20	22	Gravel, coarse, and sand	3	66
			Gravel, with gray clayey sand	12	78
Gravel, cemented	16	38	Gravel, cemented	26	104
Sand, coarse, with some clay; water-bearing	11	49	Clay, blue, soft	1	105
			Gravel, coarse, and sand	4	109

4/1-5E1

[L. R. Hussa. About 2.5 miles west of La Center, on Pekin Ferry Road, 0.7 mile south of Lewis River measured along road. Altitude about 235 ft. Drilled by A. M. Jannsen. Casing, 8-in. to 299 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Clay, brown	35	35	Sand	50	190
Gravel, cemented	20	55	Sand, dry	25	215
Gravel	10	65	Sand	25	240
Gravel, cemented	64	129	Sand (quicksand)	56	296
Sand and rock	11	140	Gravel and sand	4	300

4/1-7H1

[E. Johnson. About 2 miles north-northeast of Ridgefield, at junction of Allen Canyon Road and County Road 24. Altitude about 252 ft. Drilled by A. C. Locey. Casing, 6- to 4-in. to 359 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member(?):		
Soil	2	2	Gravel and sand	71	238
Sand and gravel	58	60	Sand	100	338
Gravel	30	90	Gravel, water-bearing	21	359
Gravel and "shot" boulders	30	120			
Boulders	12	132			
Boulders and gravel	35	167			

4/1-7Q1

[Arthur Whitler. About 1.5 miles northeast of Ridgefield, 0.6 mile east of intersection of County Roads 21 and 22. Altitude about 200 ft. Drilled by A. C. Locey. Casing, 6-in. to 459 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
No record	400	400	Troutdale formation—Con.		
Troutdale formation:			No record	94	500
Gravel, water-bearing	6	406	Tertiary volcanics: Rock	50	550

4/1-7R1

[J. O. Downing. About 1.8 miles northeast of Ridgefield and 0.2 mile west of intersection of County Roads 21 and 24. Altitude about 255 ft. Drilled by R. A. Jobes. Casing, 6-in. to 203 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Clay	65	65	Sand, dry	23	188
Gravel, cemented	100	165	Sand, water-bearing	15	203
			Sand and blue clay; water-bearing	--------	203

4/1-8M1

[C. L. Bisher. About 2 miles northeast of Ridgefield and 0.2 mile northeast of intersection of County Roads 21 and 24. Altitude about 255 ft. Drilled by R. A. Jobes. Casing, 6-in. to 406 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Sand	90	90	Upper member: Gravel, cemented	50	140
			Lower member: Sand	266	406

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/1-8N1

[W. Darr. About 2 miles northeast of Ridgefield, near intersection of County Roads 21 and 24. Altitude about 243 ft. Drilled by R. A. Jobes]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Sand	60	60	Lower member:		
Troutdale formation:			Sand	107	257
Upper member: Gravel, cemented	90	150	Sand and clay	--------	257

4/1-11B1

[O. P. Lewellen. About 1.6 miles southeast of La Center. Altitude about 120 ft. Drilled by George Zent. 1954. Casing, 6-in.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Topsoil	2	2	Clay, sandy	46	93
Clay, sandy	20	22	Sand and silt, water-bearing	9	102
Gravel, cemented	25	47	Clay, blue	23	125
			Clay, gray	10	135

4/1-11B2

[O. P. Lewellen. About 1.5 miles southeast of La Center. Altitude about 40 ft. Drilled by George Zent. Casing, 6-in.]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation—Con.		
Clay, rocky	12	12	Lower member—Con.	3	98
Clay, sandy	7	19	Clay, gray	25	123
Sand, water-bearing	2	21	Clay, blue	4	127
Troutdale formation:			Clay, yellow	14	141
Lower member:			Clay, blue		
Clay, blue	74	95			

4/1-11G1

[O. P. Lewellen. About 1.6 miles southeast of La Center. Altitude about 16 ft. Drilled by George Zent. Casing, 6-in. perforated 10 ft in middle]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation:		
Gravel	8	8	Upper member(?): Clay, yellow rocky	3	25
Clay, sandy	12	20	Lower member: Clay, blue	20	45
Sand and silt, water-bearing	2	22			

4/1-16C1

[A. W. Sundvick. West Pioneer. At intersection of U.S. Highway 99 and County Road 28. Altitude about 272 ft. Drilled by R. J. Strasser. Casing, 6-in. to 274 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil and clay	5	5	Upper member—Con.	7	154
Clay, yellow	48	53	Gravel, loose, caving	16	170
Clay, yellow, with some sand	40	93	Gravel, cemented		
Troutdale formation:			Lower member:	88	258
Upper member:			Sand, dry	14	272
Gravel, cemented	54	147	Sand, water-bearing		
			Sand, packed hard (sandstone?)	2	274

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/1-16D1

[H. Weston. West Pioneer. At intersection of U.S. Highway 99 and County Road 28. Altitude about 265 ft. Drilled by R. J. Strasser. Casing, 6-in. to 277 ft; perforated and gravel-packed from 256 to 270 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Clay, yellow, and topsoil	85	85	Upper member—Con.		
Troutdale formation:			Gravel, loose, dry	35	215
Upper member:			Lower member:		
Gravel, cemented	53	138	Sand, dry	41	256
Sand	3	141	Sand, water-bearing	14	270
Gravel, cemented	39	180	Sand, dry, hard	7	277

4/1-17H1

[C. B. Moffett. About 2 miles northeast of Ridgefield and 0.1 mile west of intersection of County Roads 21 and 25. Altitude about 225 ft. Drilled by R. A. Jobes. Casing, 6-in. to 450 ft, 5-in. to 660 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Clay	30	30	Sand, coarse, yellow	80	210
Gravel, cemented	100	130	Sand (quicksand), fine	450	660

4/1-17H2

[C. B. Moffett. About 2 miles northeast of Ridgefield and 0.1 mile west of intersection of County Roads 21 and 25. Altitude about 225 ft. Drilled by R. J. Strasser. Casing, 6-in. to 209 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Topsoil	2	2	Clay, blue and yellow	83	190
Clay, yellow	26	28	Sand, water-bearing	19	209
Conglomerate	79	107			

4/1-17H3

[C. B. Moffett. About 2 miles northeast of Ridgefield and 0.3 mile west of intersection of County Roads 21 and 25. Altitude about 200 ft. Drilled by R. J. Strasser. Casing, 12-in. to 200 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Upper member—Con.		
Topsoil	2	2	Conglomerate	75	87
Clay, yellow	10	12	Lower member:		
			Clay, blue and yellow	86	173
			Sand, water bearing	27	200

4/1-19E3

[Town of Ridgefield. Altitude about 35 ft. Drilled by R. J. Strasser, 1955. Casing, 10-in. to 65 ft; perforated]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation—Con.		
Surface topsoil	6	6	Gravel, cemented	8	50
Boulders	4	10	Sand, and gravel, water-bearing	6	56
Troutdale formation:			Gravel, cemented	9	65
Gravel, cemented	26	36			
Gravel, water-bearing	6	42			

4/1-19R1

[A. F. Frewing. About 1.1 miles southeast of Ridgefield. Altitude about 240 ft. Drilled by Hansen Drilling Co., 1955. Casing, 6-in. to 150 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	3	3	Gravel, cemented	65	145
Clay and sand	14	17	Gravel and sand, water-bearing	5	150
Clay, blue	8	25			
Clay, yellow	55	80			

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/1-20C1

[Pearl Talbert. About 1.5 miles east of Ridgefield. Altitude about 260 ft. Drilled by Joe Hansen, 1949. Casing, 6-in. to 343 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Topsoil and yellow clay	10	10	Lower member—Con.		
Troutdale formation:			Sand (quicksand), water-bearing	75	275
Upper member: Clay, yellow, with small gravel	170	180	Clay, blue	35	310
Lower member:			Sand, water-bearing	25	335
Sand, dry	20	200	Gravel, cemented, and sand	8	343

4/1-20G1

[John Ryf. About 1.7 miles east of Ridgefield and 1.3 miles west of U.S. Highway 99, on State Route 1 T. Altitude about 260 ft. Drilled by R. A. Jobes. Casing to 227 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Clay, with layers of sand	90	90	Troutdale formation: Gravel, cemented	137	227

4/1-22N2

[J. Timms. About 0.8 mile west of Pioneer. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 174 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Clay, red, sandy	20	20	Gravel	56	157
Clay, yellow	30	50	Boulders	3	160
Sand	30	80	Gravel	9	169
Troutdale formation(?): Clay, sandy	21	101	Sand, black, and loose gravel; water-bearing	5	174

4/1-23A1

[William McKee. About 4.9 miles east of Ridgefield. Altitude about 300 ft. Drilled by Floyd Wickersham, 1953. Casing, 8-in. to 340 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Topsoil	5	5	Upper member: Gravel, cemented	102	207
Clay, yellow	12	17	Lower member: Sand, fine, brown	105	312
Clay, brown	6	23	Sand, coarse, water-bearing	11	323
Clay, yellow	57	80	Clay, blue	17	340
Clay, sandy, yellow	25	105			

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/1-26M1

[C. A. Robinson. About 1 mile south of Pioneer on State Route 1 S. Altitude about 265 ft. Drilled by H. J. Ferron. Casing, 8-in. to 672 ft; perforated from 120 to 285 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Topsoil	3	3	Lower member—Continued		
Clay, hard, water-bearing	32	35	Sand, fine	18	252
Clay, yellow	10	45	Gravel	3	255
Clay, sandy, yellow	37	82	Sand, fine, yellow	18	273
Troutdale formation:			Sand and coarse gravel	2	275
Upper member:			Sand	5	280
Gravel, coarse, water-bearing	15	97	Clay, reddish	30	310
Sand and gravel	3	100	Sand, gray	2	312
Gravel	2	102	Clay, brown	3	315
Gravel, coarse, and sand	4	106	Sand, fine, gray	20	335
Sand, fine	14	120	Sand, with a little gravel	5	340
Sand and gravel	13	133	Sand, 3 in. of clay at 553 ft. Small stringers of clay penetrated, but not measurable. (Well started blowing at 650 ft)	332	672
Sand, fine, yellow	6	139	Clay, hard, brown	1	673
Sand and gravel	8	147	Clay, sticky, blue	2	675
Sand, fine, yellow	10	157	NOTE: 40 ft of gravel placed in casing to hold back fine sand.		
Sand and gravel	5	162			
Lower member:					
Clay	13	175			
Sand, fine	35	210			
Clay, blue	12	222			
Sand, fine	11	233			
Gravel	1	234			

4/1-27P1

[Frank Bowles. About 1.3 miles southwest of Pioneer, at intersection of U.S. Highway 99 and County Road 18. Altitude about 257 ft. Drilled by A. C. Locey. Casing, 6-in. to 106 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation: Gravel and sand	24	106
Sand	40	40			
Clay	20	60			
Sand	22	82			

4/1-27R1

[J. H. Tucker. About 1 mile south of Pioneer, at intersection of County Road 18 and State Route 1 S (old U.S. Highway 99). Altitude about 270 ft. Casing, 6-in. to 131 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	56	56	Sand and gravel	13	116
Clay	30	86	Gravel loose	9	125
Sand	17	103	Sand, black	6	131

4/1-28R1

[J. H. Bloom. About 1 mile north of Lambert, at intersections of Gee Creek and County Road 18. Altitude about 225 ft. Drilled by A. C. Locey. Casing, 6-in. to 134 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Pleistocene alluvial deposits—Con.		
Soil	12	12	Sand	5	85
Clay, yellow	10	22	Sand and clay	21	106
Sand, soft	22	44	Troutdale formation:		
Clay	12	56	Boulders	2	108
Sand, soft	19	75	Gravel and sand	16	124
Clay	5	80	Gravel, water-bearing	10	134

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

4/1-29F1

[J. E. Royle. About 2 miles southeast of Ridgefield and 0.1 mile northeast of Gee Creek. Altitude about 180 ft. Drilled by A. C. Locey. Casing, 6-in. to 131 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Gravel, water-bearing	37	106
Sand	8	10	Clay	4	110
Clay	54	64	Gravel, water-bearing	21	131
Sand	5	69			

4/1-29G1

[Fred Zink. About 2.1 miles southeast of Ridgefield and 0.2 mile west of County Road 25, on Persinger Road. Altitude about 258 ft. Drilled by A. C. Locey. Casing, 6-in. to 142 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	2	2	Gravel	30	125
Sand and clay	93	95	Gravel, loose, water-bearing	17	142

4/1-29M1

[D. F. Wells. About 1.8 miles southeast of Ridgefield. Altitude about 285 ft. Drilled by H. I. Bottner 1953. Casing, 8-in. to 210 ft, 6-in. from 205 to 228 ft; perforated from 180 to 185 ft. 6-in. liner perforated from 205 to 228 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:—Con.		
Clay, yellow	93	93	Upper member—Con.		
Troutdale formation:			Sand	5	198
Upper member:			Sand and gravel; bailed 25		
Gravel, cemented	96	189	gpm at 216 ft	11	209
Gravel, water-bearing, and			Gravel, with some sand; 2 ft		
very little sand; bailed test			water-bearing gravel	19	228
7 gpm	4	193	Lower member: Clay, blue	80	308

4/1-32J1

[Lytle. About 1.2 miles northwest of Lambert and 0.2 mile south of junction of Williams Road and State Route 1T. Altitude about 270 ft. Drilled by A. C. Locey. Casing, 6-in. to 157 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation: Gravel	67	157
Clay, yellow	90	90			

4/1-32R2

[A. Sandmann. About 1.2 miles west-northwest of Lambert and 0.3 mile south of Williams Street on State Route 1T. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 157 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	35	35	Gravel, cemented	20	155
Sand	10	45	Sand, black	5	160
Clay	33	78			
Sand	57	135			

4/1-33J2

[A. W. Bottemiller. About 0.5 mile north of Lambert, on County Road 19. Altitude about 262 ft. Drilled by A. C. Locey. Casing, 6-in. to 133 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	4	4	Sand and gravel	16	130
Sand and clay	106	110	Gravel, water-bearing	3	133
Sand, water-bearing	4	114			

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/1-34M1

[E. Leopold. In Lambert District, 1 mile north of intersection of County Roads 15 and 19. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 126 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	22	22	Sand and gravel	36	110
Clay	20	42	Sand and gravel, water-bearing	1	111
Clay, sandy	32	74	Clay and gravel	5	116
			Gravel and sand, water-bearing	11	127

4/1-35N1

[Albert Ost. About 0.2 mile north of Battle Ground Road, on old U.S. Highway 99. Altitude about 275 ft. Drilled by A. C. Locey. Casing, 6-in. to 129 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	14	14	Sand and gravel	26	126
Sand	4	18	No record; water-bearing	3	129
Sand and clay	38	56			
Sand	44	100			

4/1-36B1

[Mrs. Johnson. About 4.5 miles northwest of Battle Ground and 1.25 miles west of King Corner. Altitude about 230 ft. Drilled by F. L. Warner, 1952. Casing, 8-in. to 115 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Clay	20	20	Sand and gravel	11	80
Sand, brown	8	28	Gravel	9	89
Troutdale formation:			Sand and gravel	3	92
Sand, black	13	41	Sand	11	103
Clay, blue, and gravel; water-bearing at 58 ft	19	60	Gravel, cemented	11	114
Sand, blue (quicksand)	9	69	Gravel, water-bearing; small amount of blue sand	13	127

4/1-36M1

[T. Engleking. About 0.3 mile north of Battle Ground Road, on County Road 61. About 1.5 miles northwest of Goodhope. Altitude about 285 ft. Drilled by A. C. Locey. Casing, 6-in. to 133 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	20	20	Gravel, cemented	16	105
Clay	39	59	Gravel	25	130
Sand	30	89	Sand, black	5	135

4/1-36N1

[V. Bales. About 1.5 miles northwest of Goodhope and 0.1 mile north of intersection of Battle Ground Road and County Road 61. Altitude about 292 ft. Drilled by A. C. Locey. Casing, 6-in. to 143 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	22	22	Gravel, cemented	10	105
Clay	43	65	Gravel	35	140
Sand	30	95	Sand, black	5	145

4/2-8K1

[H. Jaster. About 1 mile southwest of McFadden, along McFadden Road. Altitude about 330 ft. Drilled by A. C. Locey. Casing, 6-in. to 104 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Soil	5	5	Clay	22	80
Clay, yellow	15	20	Clay, sandy	27	107
Rock(?)	4	24	Clay (blue?)	7	114
Rock and boulders	5	29	Sand (quicksand)	15	129
Gravel and boulders	5	34			
Gravel and clay?	24	58			

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/2-9E1

[John Anderson. About 1.8 miles north of Charter Oak, midway between two intersection of County Roads 3 and 48. Altitude about 430 ft. Drilled by A. C. Locey]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift: Soil and boulders	3	3	Troutdale formation—Con.		
Troutdale formation:			Lower member:		
Upper member:			Clay	19	132
Clay and sand	22	25	Clay, gray	11	143
Clay and gravel	60	85	Clay, blue	44	187
Gravel	1	86	Sand, red	107	294
Clay, blue	8	94	Clay, blue	7	301
Shale	1	95	Sand (quicksand)	194	495
Gravel	18	113			

4/2-11F1

[R. Pender. About 2.3 miles northeast of Charter Oak, 0.3 mile west of Rock Creek, on county road. Altitude about 404 ft. Drilled by A. C. Locey. Casing, 6-in. to 28) ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Troutdale formation—Con.		
Soil	2	2	Upper member—Con.		
Boulders	16	18	Gravel, loose	10	45
Troutdale formation:			Lower member:		
Upper member:			Clay	39	84
Clay, rocky	11	29	Sand	83	167
Clay	6	35	Clay, water-bearing	161	328

4/2-16D1

[Fred Prew. About 1.4 miles northwest of Charter Oak. Altitude about 290 ft. Drilled by A. C. Locey. Casing, 6-in. to 125 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	2	2	Lower member:	13	93
Clay, sandy	34	36	Clay	11	104
Troutdale formation:			Clay, sandy	12	116
Upper member:			Clay, blue	9	125
Gravel, loose	16	52	Sand, water-bearing		
Gravel and clay	28	80			

4/2-16P1

[M. Besich. About 0.5 mile west of Charter Oak and 0.7 mile west of Harrison Road, on County Road 50. Altitude about 293 ft. Drilled by A. C. Locey. Casing, 6-in. to 111 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Open hole, no record	44	44	Troutdale formation:—Con.		
Troutdale formation:			Gravel, cemented	27	104
Clay, rocky	33	77	Gravel, loose	8	112

4/2-18D1

[H. J. Maxwell. About 3 miles northeast of Pioneer and 0.2 mile east of intersection of County Road 48 and Lewis River Bottom Road. Altitude about 230 ft. Drilled by R. A. Jobes]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member: Gravel and clay	80	80	Lower member:		
			Sand, dry	83	163
			Sand, water-bearing	20	183
			Clay, blue	at	183

4/2-20A1

[Lloyd Webb. About 1.1 mile west-southwest of Charter Oak and 0.5 mile north of East Fork of Lewis River. Altitude about 245 ft. Drilled by A. C. Locey. Casing, 6-in. to 71 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	4	4	Gravel, loose	23	51
Clay, sandy	24	28	Gravel, cemented	5	56
			Gravel, loose	15	71

TABLE 17.—*Materials penetrated by representative wells*—Continued

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)

4/2-21B1

[L. Green. In Charter Oak, about 0.3 mile west of road intersection. Altitude about 260 ft. Drilled by A. C. Locey. Casing, 6-in. to 73 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Continued		
Soil	22	22	Sand	19	58
Troutdale formation:			Gravel, pea	9	67
Gravel	17	39	Sand, black	6	73

4/2-21C1

[L. Wooldridge. About 0.7 mile west-southwest of road intersection in Charter Oak. Altitude about 250 ft. Drilled by A. C. Locey. Casing, 6-in. to 55 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	21	21	Sand and gravel	15	51
Sand	12	33	Gravel, water-bearing	4	55
Sand, water-bearing	3	36			

4/2-22E1

[H. M. Nelson. About 0.4 mile southeast of Charter Oak, at intersection of County Road 50 and Charles Johnson Road. Altitude about 260 ft. Drilled by A. C. Locey. Casing, 6-in. to 172 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation:		
Soil	8	8	Clay	147	156
Boulder, shot	1	9	Sand, blue	13	169
			No record; water-bearing	3	172

4/2-22H1

[Lewisville Park. About 1 mile east-southeast of Charter Oak and 0.3 mile northwest of East Fork of Lewis River. Altitude about 165 ft. Drilled by R. J. Strasser. Casing, 10-in. to 43 ft, 14-in. from 43 to 48 ft; perforated from 28 to 38 ft; gravel-packed]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation—Continued		
Sand	2	2	Lower member:		
Gravel, coarse	4	6	Sandstone, soft	69	106
Gravel and boulders	16	22	Shale	6	112
Troutdale formation:			Sandstone	41	153
Upper member:			Shale	38	191
Sand, light in color, water-bearing	13	35	Sand, with clay binder	5	196
Boulders	2	37	Shale	44	240

4/2-24Q1

[H. Jaske. About 0.6 mile northwest of Battle Ground Lake. Altitude about 600 ft. Drilled by A. C. Locey. Casing, 6-in. to 24 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Boring lava:			Boring lava—Continued		
Boulders	24	24	Rock, "solid"	63	87

4/2-24R1

[Andy Hansen. About 2.6 miles northeast of Battle Ground. Altitude about 540 ft. Drilled by William Price, 1953. Casing, 8-in. to 159 ft; perforated from 147 to 157 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Topsoil	5	5	Boring lava—Continued		
Boring lava:			Rock, shale, and cinders	20	169
Clay and loose rock	40	45	Rock	6	175
Volcanic rock	100	145	Troutdale formation: Gravel	5	180
Rock	4	149			

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/2-25K1

[R. W. Linn. About 0.5 mile southwest of Battle Ground Lake, off State Route 1U. Altitude about 420 ft. Drilled by A. C. Locey. Casing, 6-in. to 59 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	3	3	Gravel	12	51
Sand	8	11	Rock	8	59
Troutdale formation: Gravel	12	23	Sand, black	2	61
Boring lava: Rock, lava	16	39			

4/2-26F1

[E. Meyer. About 1.5 miles north of Battle Ground and 0.1 mile west of intersection of Boutelle and McCafferty Roads. Altitude about 376 ft. Drilled by R. A. Jobes]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Boring lava:			Troutdale formation: Clay, sand, and gravel. (Drilling stopped by boulders)	31	106
Rock, lava	30	30			
Rock, hard, blue	45	75			

4/2-26L1

[W. A. Nelson. About 1.5 miles north of Battle Ground, at intersection of Oxford and McCafferty Roads. Altitude about 384 ft. Drilled by Bert Abrams. Casing, 5-in. to 112 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	18	18	Gravel and boulders, packed	47	112
Boring lava: Rock, lava	47	65	Gravel and boulders, slightly looser, water-bearing	2	114

4/2-26Q1

[Lester Burkey. About 1.2 miles north-northwest of Tukes Mountain peak, Battle Ground, at end of Oxford Road. Altitude about 360 ft. Drilled by Bert Abrams]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Boring lava:					
Soil and boulders	7	7	Troutdale formation: Gravel and clay	10	56
Rock, lava, blue-gray, hard (*not* basalt)	39	46	NOTE: Water at base of rock.		

4/2-26Q2

[N. B. Edwards. About 2.6 miles northeast of Battle Ground. Altitude about 360 ft. Drilled by Floyd Wickersham, 1953. Casing, 6-in. to 131 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:		
Topsoil	5	5	Gravel, cemented	4	119
Boring lava: Lava rock	110	115	Gravel, fine, water-bearing	4	123
			Clay, blue	8	131

4/2-28Q2

[C. Spicer. About 0.5 mile east of Cherry Grove and 1.6 miles east of intersection of County Roads 3 and 55. Altitude about 270 ft. Drilled by A. C. Locey. Casing, 6-in. to 89 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil and clay	24	24	Sand (quicksand)	5	55
Troutdale formation:			Gravel	35	90
Gravel	26	50			

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/2-28R1

[Robert Cresap. About 1.3 miles northwest of Battle Ground and 0.2 mile northwest of intersection of County Roads 55 and 56. Altitude about 247 ft. Drilled by R. A. Jobes. Casing, 6-in. to 58 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Soil	8	8	Troutdale formation—Con.		
Troutdale formation:			Gravel, cemented	10	58
Gravel	29	37	Rock	4	62
Boulders	9	46	Sand, black	4	66
Gravel, coarse	2	48			

4/2-31A1

[O. F. Brookshire. About 0.9 mile north of Dollar Corner. Altitude about 229 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation(?):			Troutdale formation(?)—Con.		
Clay	20	20	Sand, yellow, and gravel	24	114
Sand	70	90			

4/2-33D2

[M. E. Rengo. About 2 miles northeast of Battle Ground and 0.1 mile southeast of intersection of County Roads 55 and 57. Altitude about 275 ft. Drilled by R. A. Jobes. Casing, 6-in. to 63 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits: Soil	10	10	Troutdale formation—Con.		
Troutdale formation:			Gravel, water-bearing	12	60
Sand and gravel	23	33	No record; water-bearing	3	63
Gravel and clay	15	48			

4/2-33E1

[K. R. Deffenbaugh. About 2 miles west of Battle Ground and 0.6 mile north of State Route 1S, on County Road 57. Altitude about 267 ft. Drilled by A. C. Locey. Casing, 6-in. to 83 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial deposits:			Troutdale formation—Con.		
Clay, yellow	16	16	Gravel and sand	10	62
Troutdale formation:			Sand (quicksand)	11	73
Gravel	7	23	Gravel and sand	5	78
Clay and gravel	29	52	Sand, black	6	84

4/2-33G1

[Floyd Wickersham. About 1.5 miles northwest of Battle Ground. Altitude about 276 ft. Drilled by A. C. Locey. Casing, 6-in. to 122 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	30	30	Gravel	40	85
Troutdale formation:			Boulders	28	113
Sand and gravel	15	45	Sand, black	9	122

4/2-33N1

[J. Eves. About 1 mile south of Cherry Grove and 0.2 mile north-northeast of intersection of State Route 1S and County Road 57. Altitude about 258 ft. Drilled by R. A. Jobes. Casing, 6-in. to 91 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Clay and gravel	50	50	Gravel, cemented	44	94

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/2-34D2

[L. Sonntag. About 1.5 miles northwest of Battle Ground and 1 mile north of State Route 1S on County Road 56 (Sonntag Road). Altitude about 290 ft. Drilled by A. C. Locey. Casing, 6-in. to 90 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	3	3	Gravel	14	72
Troutdale formation:			Sand (quicksand)	11	83
Gravel	20	23	Gravel	5	88
Gravel, cemented	12	35	Sand, black	2	90
Boulders	23	58			

4/2-34M2

[F. Haines. About 1 mile northwest of Battle Ground and 0.3 mile north of State Route 1S on County Road 56. Altitude about 277 ft. Drilled by A. C. Locey. Casing, 6-in. to 50 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil and clay	5	5	Gravel	2	22
Clay	5	10	Boulders	5	27
Troutdale formation:			Gravel and clay	37	64
Gravel	1	11	Gravel	7	71
Boulders	9	20			

4/2-34R1

[Battle Ground School. At Battle Ground. Altitude about 295 ft. Drilled by A. M. Jannsen. Casing, 12-in. to 180 ft; perforated from 100 to 120 ft and from 140 to 180 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Gravel, cemented, and large boulders	6	6	Clay, blue	11	176
Gravel, cemented	9	15	Clay, with a little gravel	36	212
Gravel and boulders, water-bearing below 100 ft	98	113	Clay, brown	53	265
Gravel	27	140	Clay, hard, and soapstone	36	301
Gravel, water-bearing	25	165			

4/2-35E2

[H. E. Reese. About 0.6 mile north of Battle Ground and 0.5 mile north of intersection of State Route 1S and County Road 5. Altitude about 308 ft. Drilled by A. C. Locey. Casing, 6-in. to 96 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:—Con.		
Soil	8	8	Gravel	13	58
Sand	12	20	Clay, yellow	22	80
Troutdale formation:			Gravel	4	84
Gravel	11	31	Sand	8	92
Sand	14	45	Sand, black	8	100

4/2-35F1

[R. Porter. Near Battle Ground, 0.2 mile southwest of sharp turn in State Route 1S, northwest of Tukes Mountain. Altitude about 312 ft. Drilled by A. C. Locey. Casing, 6-in. to 57 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	8	8	Clay	12	50
Sand	14	22	Gravel	3	53
Troutdale formation:			Sand, black	4	57
Gravel	16	38			

4/2-35G1

[Daisy Bush. Near Battle Ground, at sharp turn in State Route 1S, northwest of Tukes Mountain. Altitude about 312 ft. Drilled by A. C. Locey]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Gravel	55	55	Sand, black, water-bearing	2	57

Table 17.—*Materials penetrated by representative wells*—Continued

4/2-35G2

[Chadwick. Near Battle Ground, 0.5 mile northwest of Tukes Mountain, on State Route 1S. Altitude about 312 ft. Drilled by A. C. Locey. Casing, 6-in. to 50 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation:		
Soil	6	6	Gravel, coarse	21	39
Sand	12	18	Sand	8	47
			Rock	5	52
			Sand, black	4	56

4/2-35G3

[Robert Cresap. Near Battle Ground, 0.3 mile north of Tukes Mountain, on State Route 1S. Altitude about 312 ft. Drilled by A. C. Locey. Casing, 6-in. to 50 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene aluvial fan deposits:			Troutdale formation—Con.		
Soil	5	5	Sand	20	33
Troutdale formation:			Gravel and sand	16	49
Gravel	8	13	Sand, black	7	56

4/2-35H1

[J. Scranton. Near Battle Ground, 0.3 mile north of Tukes Mountain, on State Route 1S. Altitude about 315 ft. Drilled by A. C. Locey. Casing, 6-in. to 56 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Boring lava(?): Slate(?)	10	51
Soil	16	16	Troutdale formation:		
Clay, blue	17	33	Gravel	5	56
Troutdale formation: Gravel	8	41	Sand, black	2	58

4/2-35G2

[O. Foeh. Near Battle Ground, 0.3 mile morth of Tukes Mountain, on State Route 1S. Altitude about 315 ft. Drilled by A. C. Locey. Casing, 6-in. to 62 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Boring lava(?):		
Soil	17	17	Slate(?), red	10	70
Clay, blue	4	21	Slate(?)	20	90
Troutdale formation:			Rock	4	94
Gravel	29	50	Troutdale formation: Gravel and sand	5	99
Clay, blue	10	60			

4/2-35P1

[H. R. Morris. In Battle Ground, 0.3 mile north of intersection of State Route 1S and County Road 80, west of Tukes Mountain. Altitude about 295 ft. Drilled by A. C. Locey. Casing, 6-in. to 55 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Troutdale formation—Con.		
Soil	5	5	Sand	20	33
Troutdale formation:			Gravel	16	49
Gravel	8	13	Sand, black	7	56

4/2-35R1

[A. Kalse. Near Battle Ground. 0.8 mile east of intersection of State Routes 1S and 1U, on southwest flank of Tukes Mountain. Altitude about 360 ft. Drilled by A. C. Locey. Casing, 6-in. to 92 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
Upper member:			Lower member:		
Old hole; no record	27	27	Clay	46	91
Clay, blue	5	32	Rock	27	118
Gravel and sand	3	35			
Boulders	10	45			

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/3-8Q1

[C. Reynolds. About 3 miles southwest of Yacolt, along Battle Ground Road, about 1.7 miles east of State Route 1S. Altitude about 400 ft. Drilled by A. C. Locey. Casing, 5-in. to 57 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Glacial drift—Con.		
Soil	4	4	Clay	6	45
Gravel	8	12	Boulders	12	57
Boulders	27	39	Sand, black	1	58

4/3-18N3

[H. W. Heisson. About 1.1 miles east of Heisson and 0.6 mile south of Battle Ground Road, on State Route 1S. Altitude about 418 ft. Drilled by A. C. Locey. Casing, 6-in. to 161 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift: Soil	10	10	Troutdale formation—Con.		
Troutdale formation:			Gravel and boulders	27	97
Gravel and sand	20	30	Clay and boulders	11	108
Gravel	40	70	Boulders	53	161

4/3-20P1

[Walter Ek. About 3.7 miles northeast of Battle Ground. Altitude about 550 ft. Drilled by Price, 1954. Casing, 6-in. to 41 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift: Clay and soil, with rocks	40	40	Older consolidated rock: Rock, solid, with seams	188	228

4/3-28E1

[G. S. Carson. About 2 miles east of Battle Ground Lake and 0.2 mile south of County Road 75, on Spring Road. Altitude about 520 ft. Drilled by G. Zent. Casing, 6-in. to 27 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Boring lava(?): Cinders	10	27
Soil	3	3	Tertiary volcanic rocks: Rock	26	53
Clay	14	17			

4/3-29B1

[E. M. Koski. About 4 miles northeast of Battle Ground, 1 mile east of State Route 1S. Altitude about 510 ft. Casing, 8-in. to 53 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Boring lava: Rock, solid	87	140
Topsoil	5	5	Troutdale formation: Gravel	at	140
Clay, with some broken rock	48	53			

4/3-30J1

[A. Thom estate. About 0.7 mile east of Battle Ground Lake, on Burt Road. Altitude about 510 ft. Drilled by R. A. Jobes. Casing, 6-in. to 170 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Con.		
			Lower member:		
Upper member: Clay and gravel; water-bearing from 45 to 50 ft	50	50	Clay, blue	115	165
			Sand, water-bearing	5	170
			Clay and shale	30	200

TABLE 17.—*Materials penetrated by representative wells*—Continued

4/3-30Q1

[F. Duvall. About 0.6 mile southeast of Battle Ground Lake. Altitude about 463 ft. Drilled by G. Zent]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits:			Boring lava—Continued		
Soil	3	3	Cinders, gray	9	24
Troutdale formation(?): Boulders and clay	3	6	Rock	29	53
Boring lava:			Cinders, red	9	62
Rock, black	9	15	Rock	60	122
			Rock, broken, and clay	28	150
			Troutdale formation:		
			Gravel	20	170
			Clay	3	173

5/1-9H1

[F. M. Grieger. About 4 miles northeast of Woodland and 1.2 miles west-northwest of intersection of County Roads 20 and 40. Altitude about 45 ft. Drilled by A. C. Locey. Casing, 6-in. to 149 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Recent alluvium:			Troutdale formation—Continued		
Soil	2	2	Volcanic rocks(?)	8	60
Sand	38	40	Mud	80	140
Troutdale formation:			Gravel	8	148
Sand, volcanic	9	49	No record; water-bearing	1	149
No record; water-bearing	3	52			

5/1-12K1

[G. Pellham. About 2.5 miles northeast of Pine Grove and 0.5 mile west of Dobler Hill Road, on Lynch Road. Altitude about 360 ft. Drilled by A. C. Locey. Casing, 6-in. to 88 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Tertiary volcanics:		
Soil	6	6	Rock, lava	43	138
Clay and boulders	14	20	Lava and clay	10	148
Clay and gravel	70	90	Rock, water-bearing	18	166
Boulders	5	95			

5/1-23A1

[Wesley Gettman. About 0.6 mile west of Highland, on northwestern edge of plateau. Altitude about 720 ft. Drilled by A. C. Locey. Casing, 6-in. to 107 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Continued		
Upper member:			Lower member: Clay	87	180
Soil	2	2			
Clay, sandy	43	45			
Clay, red	48	93			

5/1-24B1

[D. C. Hudson. About 0.2 mile northeast of Highland, on County Road 41. Altitude about 780 ft. Drilled by A. C. Locey. Casing, 6-in. to 66 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Continued		
Soil	3	3	Clay, sandy	17	62
Clay, red	27	30	Sand and pebbles	4	66
Clay, yellow	15	45			

5/1-34G2

[Town of La Center. About 1 mile north of La Center. Altitude about 390 ft. Casing, 8-in. to 229 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Troutdale formation:			Troutdale formation—Continued		
Lower member(?):			Sand (quicksand)	8	212
Clay	68	68	Sand, heavy	8	220
Clay and sand	29	97	Sand and some gravel; water-bearing	7	227
Sand (quicksand), water-bearing	11	108	Sand, coarse, water-bearing	4	231
Sand (quicksand)	89	197			
Sand (quicksand) and some gravel	7	204			

TABLE 17.—*Materials penetrated by representative wells*—Continued

5/1-35P1

[R. E. Dalin. About 0.9 mile northeast of La Center. Altitude about 275 ft. Drilled by McGhee, 1953. Casing, 5-in.; perforated from 160 to 170 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Pleistocene alluvial fan deposits(?):			Troutdale formation—Continued		
Clay	30	30	Sand	30	190
Troutdale formation:			Clay, blue	22	212
Gravel and clay	130	160			

5/2-26B1

[Fargher Lake Grange. At Fargher Lake. Altitude about 690 ft. Drilled by A. C. Locey. Casing, 6-in. to 80 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Troutdale formation—Continued		
Gravel	22	22	Gravel, shaly	9	46
Gravel, cemented	3	25	Sand, fine (quicksand)	14	60
Boulders	3	28	Clay	4	64
Troutdale formation:			Gravel and sand	10	74
Sand and gravel	9	37	Gravel	6	80

5/2-28D1

[F. M. Bremmer. About 2.5 miles west of Fargher Lake, on County Road 42, 0.2 mile southwest of intersection with County Road 43. Altitude about 805 ft. Drilled by A. C. Locey. Casing, 6-in. to 113 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Troutdale formation:		
Clay	15	15	Clay	7	60
Clay and gravel	15	30	Clay and gravel	30	90
Boulders	5	35	Sand, black	23	113
Clay and gravel	5	40			
Clay, gray	10	50			
Boulders, "shot"	3	53			

5/4-7M1

[Harbor Plywood Corp. About 0.5 mile northeast of Chelatchie. Altitude about 520 ft. Drilled by A. M. Jannsen, 1949. Casing, 12-in. to 189 ft, 10-in. to 217 ft, 8-in. to 475 ft, 6-in. to 553 ft; perforated from 80 to 90 ft, 142 to 150 ft, 175 to 185 ft, 190 to 204 ft, 208 to 217 ft, and 514 to 552 ft]

Materials	Thickness (feet)	Depth (feet)	Materials	Thickness (feet)	Depth (feet)
Glacial drift:			Tertiary rocks—Continued		
Topsoil	9	9	Shale, blue, burnt appearing	52	292
Gravel and boulders	50	59	Shale, red, burnt appearing	15	307
Gravel, muddy	14	73	Sandstone, hard, gray	20	327
Gravel, water-bearing	17	90	Rock, red, broken	8	335
Sand and gravel	10	100	Rock, hard, gray	15	350
Sand (quicksand)	39	139	Rock, soft, gray, white shells	5	355
Clay	3	142	Rock, blue	57	412
Gravel, water-bearing	8	150	Shale, soft, gray	62	474
Clay, sandy, small gravel	21	171	Rock, hard, blue (water-bearing from 514 to 516 ft)	44	518
Sand, muddy, water-bearing	4	175	Shale, soft, red, burnt appearing (water-bearing from 518 to 540 ft)	22	540
Gravel, water-bearing	23	198	Shale, blue	13	553
Gravel, cemented	7	205	Rock, extremely hard, black (water-bearing at 577 and 594 ft)	45	598
Sand and gravel, water-bearing	12	217			
Tertiary rocks:					
Rock, sticky, black	2	219			
Basalt	21	240			

TABLE 18.—*Comprehensive chemical analyses of water from wells and a spring in Clark County, Wash.*

[Analyst: CL, Charlton Laboratories, Portland, Oreg.; AL, Aluminum Co. of America; GS, U.S. Geological Survey; W, Wallerstein Laboratories, New York City]

Well	Depth (feet)	Date of collection	Analyst	Parts per million																	Sodium-adsorption ratio	Specific conductance (micromhos at 25°C.)	pH
				Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluroide (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$			
1/3-8B2	390	5-17-49	GS	44	......	.04	.00	13	9.0	6.6	2.8	88	....	4.9	6.9	0.1	8.4	0.01	144	[1] 69.	0.35	181	7.7
2/1-11C1	198	10- 7-50	CL	....	......	.06	......	....	......	......	......	150	....	18	9.2	.6	......	......	192	96	......	[1] 305	7.6
2/1-19B1	111 to 136	5-16-41	AL	45	.00	1.4	.69	35	17	[1] 11		212	....	4.6	1.9	.4	......	......	238	[1] 157	.37	[1] 380	....
19B2																							
19B3	111 to 136	10-13-43	AL	44	7.1	.35	1.1	37	8.4	[1] 13		202	....	9.3	7.6	......	......	......	215	[1] 127	.49	345±	8.0
2/1-27L1	108	3- 2-49	W	37	......	.1	......	26	5.0	......	......	53	....	9.7	1.5	......	......	......	138	[1] 86	......	[1] 220±	7.3
2/1-27L2	98	3- 2-49	W	22	......	.1	......	31	7.6	......	......	53	....	12	6.8	......	......	......	128	[1] 109	......	[1] 205±	7.4
City of Vancouver [2]	......	4-18-49	CL	44	.9	.3	.0	14	4.8	4.4		37	....	5.7	3.2	.0	......	......	129	[1] 55	.26	[1] 205	6.9
2/2-20A2	221	5-17-49	GS	36	......	......	.50	10	5.7	3.5	4.4	56	....	7.4	.4	.0	.3	.02	104	[1] 48	.22	140	8.0
2/3-6K1	97	5-17-49	GS	58	......	[3] .01	.00	14	7.5	5.7	4.0	78	....	.8	3.0	.2	5.4	.00	137	[1] 66	.31	151	7.0
3/1-33Q1	48	5-23-49	GS	64	......	.01	.00	37	17	8.1	4.0	96	....	41	16	.4	44	.01	279	[1] 162	.28	376	6.3
3/2-2D1	140	5-17-49	GS	44	......	.02	.00	22	8.4	9.3	3.6	126	....	2.7	4.0	.0	1.0	.01	157	[1] 89	.43	206	7.7
2/2-33L1s	Spring	5-17-49	GS	50	......	.02	.00	15	5.2	4.2	5.6	64	....	11	2.9	.2	7.2	.00	133	[1] 59	.24	140	7.6

[1] Calculated. [2] Composite sample only. [3] In solution, clear when collected.

TABLE 19.—*Field partial analyses of water from representative wells*

Well	Depth (feet)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	Well	Depth (feet)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)
1/2-1G2	243	4	60	2/2-32F1	193	6	70
1L1	33	2	70	33H1	125	6	75
1Q1	142	3	80	34C2	135	6	85
3G1	75	7	85	34E1	122	4	75
4D1	82	6	45	34G2	175	4	85
1/3-3D1	255	5	90	35A1	193	6	75
3M1	798	----	15	35C2	185	8	90
1/4-2M1	31	2	65	35M1	185	4	75
3B1	24	2	30	36C1	190	4	85
4F1	150	1	55	36P1	238	6	65
14A1	80	3	45	2/3-4K1	250	----	50
24F1	17	4	65	8E1	88	6	95
2/1-1J1	26	4	70	8M1	111	2	35
2A1	26	15	150	8Q1	130	3	55
2K1	48	4	70	16B1	28	4	60
4G1	180	6	115	21J1	100	2	35
10K1	27	6	95	23Q1	43	3	25
11D1	272	3	80	24M1	40	3	50
11H1	53	5	80	24Q1	22	2	70
14C1	200	2	100	31D1	165	6	70
16B1	142	3	105	32Q1	143	2	85
21C2	151	10	105	2/4-19E1	14	3	75
23K1	225	6	80	24G1	18	2	30
26G2	220	8	75	30F1	24	6	30
28G3	80	14	95	33A1	170	2	45
2/2-1G1	24	3	55	33C1	24	2	50
2C1	120	3	50	35G1	80	4	35
2J1	21	2	45	3/1W-1J1	102	4	115
2Q2	71	3	50	3/1-3A1	28	4	115
3D1	69	3	60	3H1	16	5	60
3J1	73	3	55	3N1	117	3	85
4G1	21	3	65	5L1	21	4	90
4M1	30	6	115	8M1	28	2	55
4N1	93	4	70	8N1	25	3	65
5G1	13	4	60	9A1	182	3	115
6C1	23	4	95	9H1	21	6	125
6G1	135	3	65	10A1	30	5	65
6K1	156	3	60	10G1	156	3	115
7D1	174	2	80	10H1	132	3	135
9D1	117	5	85	10P1	192	4	120
9G1	32	5	70	11F1	138	3	70
9M1	141	4	65	14D1	150	3	150
9N1	29	7	100	14J1	----	3	100
9P1	102	7	90	15H1	170	3	105
9Q1	78	5	70	15H2	220	4	100
10D1	94	3	80	15P1	147	3	105
10H2	65	6	75	16C1	23	3	75
10L2	64	3	60	19R1	165	4	120
10M2	66	4	70	20F1	150	4	135
11D2	80	5	75	20P1	20	4	90
12G1	75	4	65	21E1	22	6	145
13D2	96	2	45	24R1	50	5	85
13K2	90	6	55	25A1	20	4	70
15D1	14	4	75	25M1	64	3	85
15P1	73	3	70	27E1	45	6	75
17F1	20	5	65	33A1	58	5	90
17H1	30	4	70	35L1	106	3	120
18A1	30	9	110	36H1	60	5	55
18L3	35	7	105	36R1	42	4	75
18N1	5	6	65	3/2-1C1	16	4	35
18Q1	24	4	75	1J1	101	3	65
18Q3	25	7	80	1N1	25	4	115
19D1	160	6	70	3H1	82	4	80
19F2	90	5	60	4C1	125	4	90
19G2	20	9	105	4N1	106	4	70
19M1	18	6	55	4Q1	25	7	105
20P2	35	22	50	6B1	68	3	65
22E1	15	6	50	6Q1	12	7	105
22M2	25	6	45	7E1	163	4	65
22Q1	115	6	75	7Q1	14	8	105
23E1	99	4	75	8D1	17	2	90
24H1	93	4	80	9K1	17	3	65
24P1	80	3	70	9Q1	18	6	85
26D1	101	6	110	10P1	18	4	85
27N1	170	4	70	11P1	86	2	80
27N2	186	3	70	12H1	34	2	75
28H1	120	3	75	13B1	89	3	80
28P1	178	3	65	13J1	18	5	60
29H1	186	2	65	14H1	20	9	65
31J1	93	6	75	16M1	21	12	125

TABLE 19.—*Field partial analyses of water from representative wells*—Continued

Well	Depth (feet)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	Well	Depth (feet)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)
3/2-17J1	116	2	90	4/1-23H1	18	6	45
17P1	19	8	120	25H1	63	3	65
18H1	18	4	75	26C1	18	3	40
19G1	31	4	80	27P1	106	3	95
19J1	36	2	40	27R1	131	2	90
20A1	23	16	170	29G1	131	3	55
21A1	143	3	90	31B1	5	6	130
21L1	145	2	100	32B1	154	6	130
22G1	22	3	45	33M1	125	3	110
22Q1	17	4	45	34D1	22	8	115
23D1	93	3	75	35J1	129	4	80
23F1	13	5	65	35R1	131	3	95
23J1	139	2	90	36J1	18	5	95
24L1	16	29	150	4/2-13G1	29	4	25
24R1	17	3	65	16P1	112	7	125
25M1	12	2	65	16R1	75	2	50
26D1	12	2	35	19J1	11	4	60
27E1	37	3	65	20C1	101	3	70
27Q1	19	2	45	22E1	172	3	55
28N1	70	3	60	23D1	24	4	50
28P1	170	2	80	25K1	61	17	95
29D1	17	9	115	25M1	40	3	90
29G2	17	2	65	26A1	121	6	75
30A1	12	3	50	28M1	83	5	70
30R1	25	3	65	28Q1	89	3	65
32G1	20	12	105	31J1	32	4	55
32N1	14	12	95	33D1	18	37	135
33K1	107	3	60	34A1	43	4	35
34E1	122	3	65	34M1	78	5	90
34P2	135	2	55	36R1	37	3	50
35C1	77	4	55	4/3-7D1	14	4	30
36D1	42	10	90	10H1	19	4	25
36R1	11	4	60	11A1	23	4	25
3/3-3Q1	35	4	25	11H1	9	4	30
4M1	19	5	35	18N1	32	5	60
6G1	28	8	20	18N2	580	224	105
17N1	102	3	25	33D1	5	5	50
28D1	160	3	70	4/4-32Q1	14	5	35
31D1	13	2	100	5/2-19R1	40	4	25
4/1-5E1	300	8	80	5/3-11G1	48	6	45
16C1	274	6	85	12K1	32	4	25
16H1	630	24	85	15H1	14	5	40
17H3	200	6	70	16F1	23	3	30
19E1	35	6	60	20A1	76	5	50
19K1	117	3	95	21Q1	18	5	25
20E1	32	6	75	27H1	17	4	20
21L1	202	3	110	34B1	22	12	50
22H1	571	3	50	5/4-7B1	30	4	30
23B1	31	3	90	6/4-31N1	35	----------	40

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