UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PRELIMINARY REPORT ON THE GROUND-WATER RESOURCES OF THE KLAMATH RIVER BASIN, OREGON

By

R. C. Newcomb and D. H. Hart

Open-file report; subject to revision.

Prepared in cooperation with the Oregon State Engineer, the U. S. Bureau of Reclamation, and the California Division of Water Resources

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ABSTRACT

The Klamath River basin, including the adjacent Lost River basin, includes about 5,500 square miles of plateaus, mountain-slopes and valley plains in south-central Oregon. The valley plains range in altitude from about 4,100 feet in the south to more than 4,500 feet at the northern end; the mountain and plateau lands rise to an average altitude of 6,000 feet at the drainage divide, some peaks rising above 9,000 feet. The western quarter of the basin is on the eastern slope of the Cascade Range and the remainder consists of plateaus, mountains, and valleys of the basin-and-range type.

The rocks of the Klamath River basin range in age from Recent to Mesozoic. At the southwest side of the basin in Oregon, pre-Tertiary metamorphic, igneous, and sedimentary rocks, which form extensive areas farther west, are overlain by sedimentary rocks of Eocene age and volcanic rocks of Eocene and Oligocene age. These early Tertiary rocks dip east toward the central part of the Klamath River basin. The complex "volcanic rocks of high Cascades" include three units: The lowest unit consists of a sequence of basaltic lava flows about 800 feet thick; the medial unit is composed of volcanic-sedimentary and sedimentary rocks--the Yonna formation--200 to 2,000 feet thick; the uppermost unit is a sequence of basaltic lava flows commonly about 200 feet thick. These rocks dip east from the Cascade

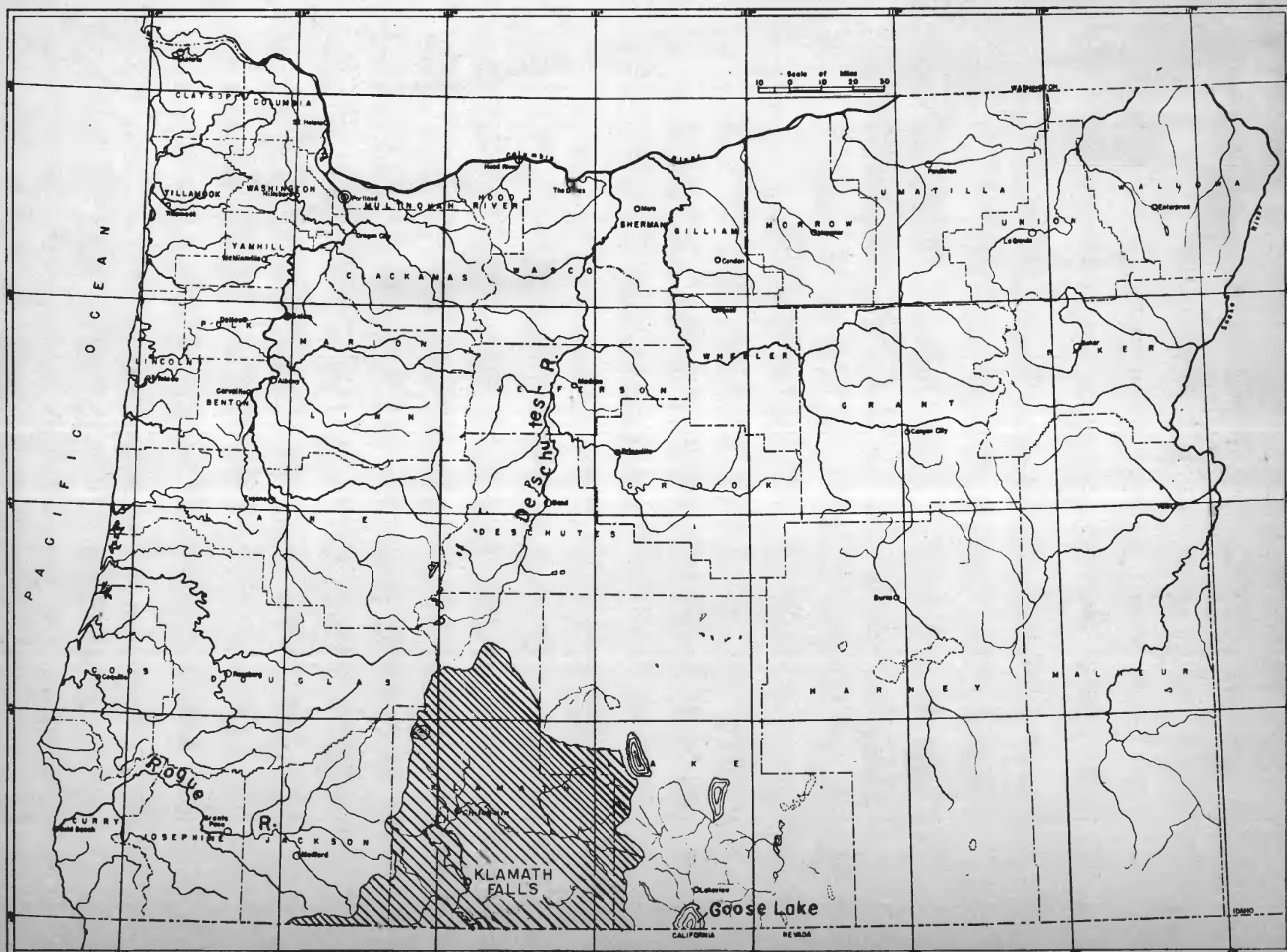
Range and are the main bedrock formations beneath most of the basin. Extensive pumice deposits, which emanated from ancestral Mount Mazama, cover large areas in the northwestern part of the basin.

The basin has an overall synclinal structure open to the south at the California boundary where it continues as the Klamath Lake basin in California. The older rocks dip into the basin in monoclinal fashion from the adjoining drainage basins. The rocks are broken along rudely rectangular nets of closely spaced normal faults, the most prominent set of which trends northwest. The network of fault displacements includes two main grabens, the Klamath and the Langell, which were downthrown approximately 500 and 1,000 feet, respectively.

The average annual precipitation varies with the altitude, the higher parts of the Cascade Range getting more than 60 inches, and the semiarid valley plains receive as little as 13 inches in some places. Most precipitation occurs in the winter.

The principal tributaries, Williamson and Sprague Rivers, rise near the higher parts of the eastern rim of the basin, flow through narrow valley plains to the western part, and discharge into Upper Klamath Lake. Wood River and associated creeks also empty into Upper Klamath Lake after draining southward along the eastern foot of the Cascade Range. The Klamath River receives the outflow from Upper Klamath Lake, via Link River and Lake Ewauna, and flows southwestward through Keno Gap and hence through a youthful canyon, to its lower valley in California.

The ground water occurs largely in an unconfined, or water-table, condition, though areas of local confinement are present. The regional



Map of the State of Oregon showing area covered by this investigation

water table is graded to a base level about equal to that of the major drainage. on the valley plains. The slope of the water table, or where water is confined, the piezometric surface is downstream at about the same grade as that of the surface drainage in each of the larger valleys, and ground-water divides occur between the upper parts of adjacent major valleys. The principal water-bearing units are the lower lava rocks and upper lava rocks of the "volcanic rocks of high Cascades," the pumice of Quaternary age, and the alluvium. In places layers of coarse fragmental material in the Yonna formation (Newcomb, 1958) also transmit water. The water-bearing units, especially the breccia layers of the lava rocks and the pumice, yield large amounts of water to wells and provide natural discharge outlets for the ground water.

The spring outflows to the Williamson and Wood Rivers-Crooked Creek drainage, measured in September and October 1955, were at a rate equivalent to about 700,000 acre-feet per year. The spring outflows into the Sprague River were at a rate equal to 245,000 acre-feet per year. Large springs occur along the edges of Upper Klamath Lake but their discharges could not be measured, and the known spring discharge from the lower lava rocks in the river canyon below Keno was not measured. The spring discharge into Lost River in the reach from Bonanza to Harpold Bridge was at a rate equivalent to 75,000 acre-feet per year.

Much of the water discharged from springs is used for irrigation during the growing season, but ground water has not been extensively developed by means of wells except in the Yonna Valley and other local areas. The total withdrawal of ground water from wells in 1954 was only about 30,000 acre-feet, of which 27,000 was used for irrigation.

The ground water is of excellent quality in general, but sodium sulfate water occurs in the belts of warm rock along some faults and alkali bicarbonate water is present in the main evapotranspiration basins.

INTRODUCTION

Purpose and Organization of the Investigation

The investigation was requested by the agencies and commissions charged with the administration and development of water resources in Oregon and California. Its main objectives were:

1. Recognition and inventory of the ground-water contributions to the surface water in the Klamath Basin and any significant diversions of surface water to the ground-water reservoirs, as well as significant diversions of water from or into the basin through percolation of ground water.
2. Recognition of the principal factors governing the ground-water regimen and the water resources available for development.
3. Collection of geologic and hydrologic information pertinent to the development and use of the ground-water resources.

The funds were supplied from the Geological Survey's cooperative program with the Oregon State Engineer, by transfer from the U. S. Bureau of Reclamation, and from the Geological Survey's cooperative program with the California Division of Water Resources.

The available data were collected on significant wells, including all irrigation and large public-supply or industrial wells. The larger springs were studied and their yields determined, chiefly by measurement of the effluent streams. The geologic fabric of the basin was determined by reconnaissance mapping and checking of existing geologic maps, such as those of Crater Lake Park and the Yonna-Swan Lake valleys. The field work was carried on during the last 6 months of 1954.

The base map used for plates 2 and 3 was compiled by piecing together parts from nine different maps. The horizontal control was founded on the map of the Klamath Protective District. Lack of time and finances precluded construction of a better finished base. Plans for later revision and publication of this report foresee the use of topographic quadrangle maps now in preparation or in planning stage.

Geography and General Physiography of the Basin

Size and Shape of the Basin

The drainage basin of the Klamath River in Oregon comprises about 5,500 square miles. The main part of the basin is roughly equidimensional, extending northward as much as 90 miles from latitude 42°, the Oregon-California boundary, and westward an average of about 80 miles from longitude 120°45'. The basin contains parts of two main physiographic divisions of the United States -- the northwest corner of the Basin and Range province and a part of the Sierra-Cascade province (Fenneman, 1931).

The headwaters of the Klamath River gather mainly from the east, north, and west. On the east, streams drain a complex terrain of plateau, butte, mountain, and canyon lands that slope up from the valley-floor levels of about 4,200 feet to reach altitudes of about 6,000 feet. Many buttes and mountains rise still higher; the highest of these, Gearhart Mountain and Yamsay Mountain, reach altitudes of 8,364 feet and 8,100 feet respectively. The northern part of the basin is similar to the eastern part but is lower. The plateaus and mountains, such as those making up the Walker Rim district, have a general altitude of 5,500 feet and a maximum of 7,078 feet on Walker Mountain. The western part of the basin is formed by the more abrupt slope of the Cascade Mountains, and in general, south of Mount McLoughlin, by the southeast- and south-sloping plateaus that comprise that part of the Central Cascade Mountains section (Fenneman) where the true crest of the Cascades is less definite. The drainage divide in the Cascade Mountains occurs at a common altitude of about 6,500 feet with many eminences rising above that level, Mount McLoughlin reaches 9,760 feet and Mount Thielsen, 9,173 feet.

The drainage divide separates the Klamath River watershed from that of the Rogue River on the west, the Deschutes River on the north, and Goose Lake, or the Pitt River, on the east.

Rocks Composing the Basin

The uplands are composed almost entirely of volcanic rocks, mostly basaltic and andesitic lava flows. The floors of the valley plains are formed across alluvial fill which covers downthrown or downwarped blocks of the bedrock. Several valleys, notably the Sprague River and Yonna Valleys, are partly erosional surfaces cut across the soft tuffs and diatomaceous strata of the Yonna formation.

Drainage

Surface Water

The valley plains are imperfectly connected by a rudely integrated drainage system which culminates downstream in the Klamath River proper. The Williamson River, the principal headwater stream, rises in a spring zone in the SE$\frac{1}{4}$ sec. 4, T. 33 S., R. 11 E. While flowing northward for 16 miles, it receives the inflow from several springs and from Deep and Jackson Creeks, which drain the west side of Yamsay Mountain, and from Jack Creek, which drains the northeastern part of the basin. It then turns westward and flows about 4 miles across a pumice plain to the northeastern end of the Klamath Marsh. In Klamath Marsh it receives the inflow of Big Spring Creek and other smaller creeks. Two of these, Scott and Sand Creeks, drain from the east side of Mount Mazama, the mountain in which Crater Lake is situated. From Klamath Marsh the Williamson River flows over a lava-rock rim near Kirk, descending about 300 feet in 5 miles, and continues south where it discharges into Upper Klamath Lake after receiving the Spring Creek and Sprague River inflows (see pl. 2).

The north and south forks of the Sprague River rise on the flanks of Gearhart Mountain at the eastern side of the basin and join about 4 miles northwest of Bly to form the main river. After flowing through the Beatty Gap, the Sprague River is joined by the Sycan River from the north. Several creeks and springs enter the river as it flows an airline distance of 25 miles westward, through the lowland known as the Sprague River valley, to its confluence with the Williamson River near Chiloquin. The Wood River and Sevenmile Creek separately drain southward into Agency Lake, which is a northern lobe of Upper Klamath Lake now nearly separated by the encroachment of the delta of the Williamson River.

Along the western side of Upper Klamath Lake, several creeks -- including Threemile, Cherry, Rock, Fourmile, and Rocky Creeks -- enter from the Cascade slope. The surface of Upper Klamath Lake stands near 4,140 ft in altitude but varies several feet and is controlled in part, for power generation and irrigation, by a dam in the outlet trench.

The outflow from Upper Klamath Lake is through Link River, a short, narrow, rockbound trench which descends about 40 ft to the small lake known as Lake Ewauna. Out of Lake Ewauna the main stem of the Klamath River flows along the northwest side of the extensive lowland known as Klamath Valley and the wide playa and marsh known as Lower Klamath Lake, to pass over lava-rock ridges near Keno at an altitude of about 4,050 feet. The river descends through a deep youthful canyon below Keno and crosses into the State of California at an altitude of about 2,950 feet. Below Keno, Spencer Creek drainage enters the river and Jenny Creek flows south to enter the river in California.

The Lost River basin is a separate river basin, but because use of its water for irrigation is so greatly integrated with that of the Klamath River, and, because in part it occupies the same structural basin, it is included in this paper as part of the Klamath Basin in Oregon. The headwaters of the Lost River gather in the mountains and plateaus forming the youthful topography athwart the Oregon-California line east of the Klamath Valley and Tule Lake basin. Barnes Creek rises on the plateaus at the eastern edge of the drainage basin, Miller

Creek flows from the escarpment of the Gerber Rim (where drainage is collected in the fault graben occupied by Gerber Reservoir), and Clear Creek forms on the plateaus east of Tule Lake basin in Calidornia. There are storage reservoirs on the tributaries, the outflow of which is used mainly for irrigation. Through Olene Gap the Lost River enters the Klamath Valley at an altitude of about 4,100 feet and flows south around the east side to discharge into Tule Lake, a lake-sump whose bed stands about 45 feet below the floor of Lower Klamath Lake, from which it is separated by narrow fault ridges.

Ground Water

Part of the precipitation that infiltrates to the regional ground-water body and to local perched bodies reaches the surface streams from a few large springs, from a great number of medium-sized springs, and rarely, from a great number of small seepage springs. The upland areas contain thousands of small springs which represent local infiltration that has become perched upon less permeable layers of rock and brought laterally to the slope on which it emerges. So common is the occurrence of such small springs that the uplands of even the drier sections of the basin are relatively well watered for stock. The discharge from this type of small spring commonly occurs above the regional water table and does not reach a stream before again infiltrating or being consumed by evapo-transpiration. Where the volume of saturated rock is larger and infiltration recharge more abundant, medium-sized springs emerge in places that are at the level of the perched or the regional water table. Such springs commonly discharge fifty to several hundred gallons a minute and contribute to the flow of many of the streams.

The main outlets for the ground water occur where valleys intersect both the regional water table and highly permeable rocks. Most such outlets commonly release large flows ranging from 10 to more than 300 cubic feet of water per second. Such large spring flows emerge in the lowland reaches of most of the larger streams and in the lakes. There the spring discharges form a large part of the base flow of the Klamath River. The magnitude and sources of several such springs are described in detail beyond.

Population and Settlement

The valley plains and the adjacent slopes of the valleys are farmed, grazed, or occupied by lakes and reservoirs. Extensive settlement of the region is limited to the low-lying valley plains. Minor settlements exist near recreational areas, lumbering operations, and livestock ranching units in the higher districts. Klamath Falls, with a population of 15,875, is the largest city, and is followed by Merrill (835), Malin (592), Keno, and smaller towns in the main Klamath and Tule Lake valleys; by Bonanza (259) and Dairy in Yonna Valley of the Lost River basin; by Chiloquin (668), Bly, Beatty, and Sprague River (town) in the Sprague and Williamson River valleys, and by Chemult at the northern limits of the basin.

Vegetation

Except for the valley plains, a few dry hillsides, and some mountain meadows and marshes, the whole basin is forested. Ponderosa pine, Douglas fir, lodgepole pine, sugar pine, hemlock, and cedar are the main types of trees. Different types are predominant in certain environments -- the Douglas fir, hemlock, and cedar are on the cool, damp slopes of the Cascade Range, the lodgepole pine on the pumiceous soils of the northwestern part of the basin, and the ponderosa pine and sugar pine in the districts of intermediate moisture and altitude, where the bedrock soils are at or near the surface.

The brushy types of vegetation also vary with the altitude, soil, and moisture conditions. Slick-leafed buck brushes, mountain laurel, mountain mahogany, bitterbrush, shadscale each predominates in certain environment. There are only minor amounts of sagebrush such as predominates in the Oregon plateaus to the east of the Klamath Basin.

The principal farm crops are irrigated, but some dryland grain is grown, largely on the higher parts of the valley plains. The main crops are hay (both alfalfa and grass), grains, potatoes, and forage grasses.

Climate

Precipitation

There are long-term cyclic variations in the amount of rainfall, though these are but partly shown in the 51-year record accumulated to date (see pl. 4). The annual rainfall cycle in the Klamath Basin is characterized by the variation common to most of the Pacific Northwest--a dry summer and fall with most of the moisture coming in the winter months. A secondary, or minor, rainy period commonly occurs in June. The amount of moisture falling at any place is in direct relation to the altitude, though that rule has some exceptions. In general, the higher parts of the Cascade slope receive the most precipitation (60.4 inches shown for Crater Lake on pl. 5), while other high points such as Gearhart Mountain, Yamsay Mountain, and Walker Rim may receive but slightly smaller amounts. Though records are inadequate for a conclusive statement, it appears that precipitation also may be progressively less to the east within the basin. The least precipitation is recorded on the lowest valley plains, where the following annual average amounts have been computed from the weather records for the climatic years shown: Klamath Falls, 1905-48, 12.92 inches; Yonna, 1908-48, 13.35 inches; Chiloquin, 1912-48, 16.51 inches (Meyers and Newcomb, 1952). Much of the winter precipitation comes as snow, and the proportion is progressively greater with increased altitude. The valley plains seldom receive an accumulation of more than a foot of snow, but depths of 5 to 10 feet are built up on the higher uplands by spring of most years. The lowland snow is commonly gone by April but the upland snow on the north slopes and shady locations may persist well into the summer, and on a few of the higher parts of the Cascade Mountains some snow accumulations melt away in only the warmest summers, like those of 1952 and 1953.

Temperature

The basin has warm, dry summers and cool, more humid winters. On the valley plains the warmest weather usually occurs in July, and the coldest in January. For the period 1924-48 at the Yonna station the highest monthly average temperature for July was 65.7° F and the lowest monthly average temperature for January was 27.3° F. The respective temperatures for the same period at the Chiloquin station were 61.1° F for July and 26.2° F for January. The average annual temperatures for these years were 46° F at Yonna and 43° F at Chiloquin (Meyers and Newcomb, 1952).

The average growing season, which is commonly taken as the period of no subfreezing temperatures, varies in length with local conditions such as altitude, air drainage, and exposure to sunshine. During the years 1924-48 the frost-free period at Yonna averaged 103 days (June 3 to September 13) but ranged from 175 days in 1940 to less than 30 days in 1930. Such a 103-day season may be about average for the valley plains of the Klamath Basin in Oregon, but it is common belief that the growing season of the lowlands lengthens progressively southward with the decrease in altitude in the basin.

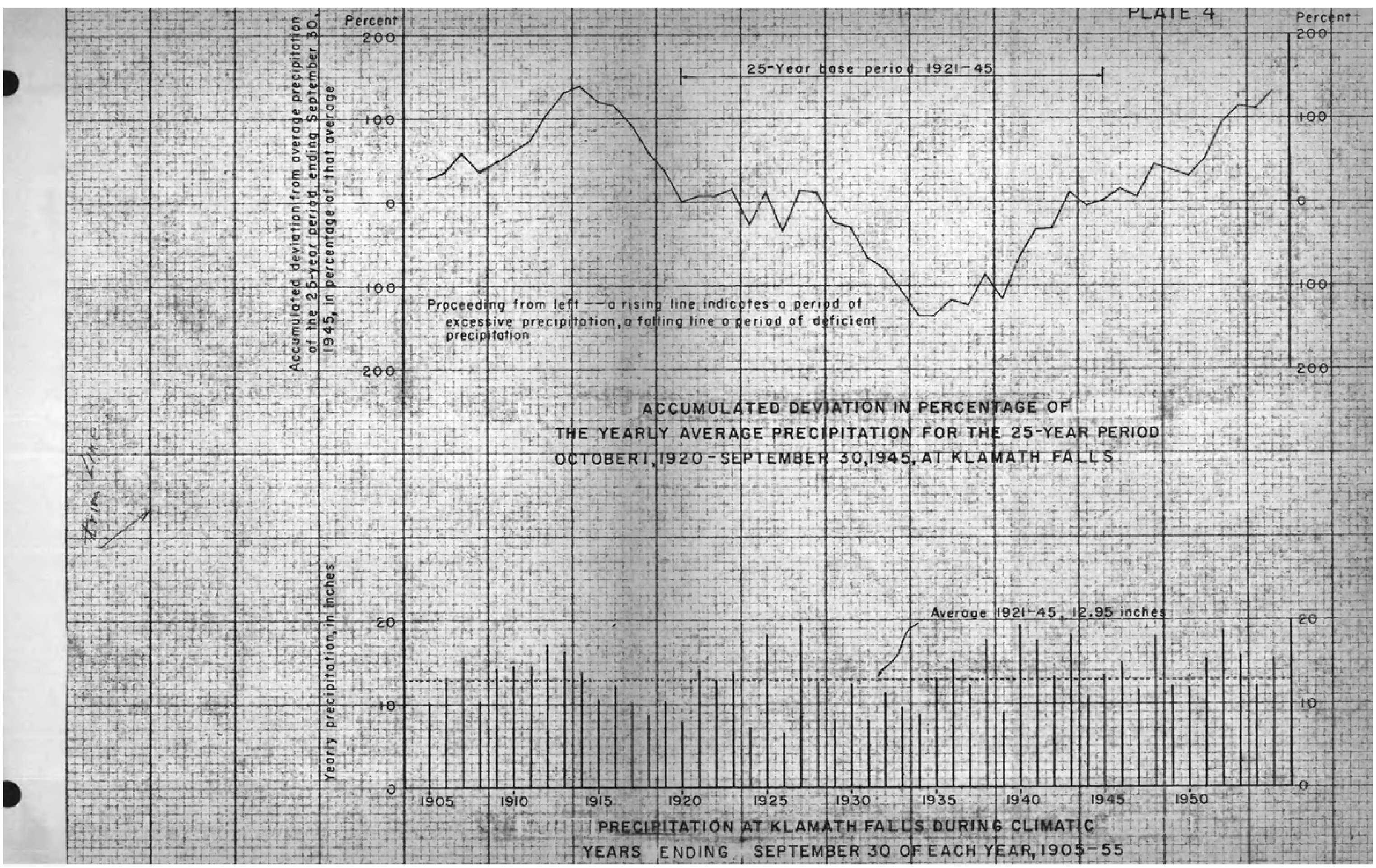
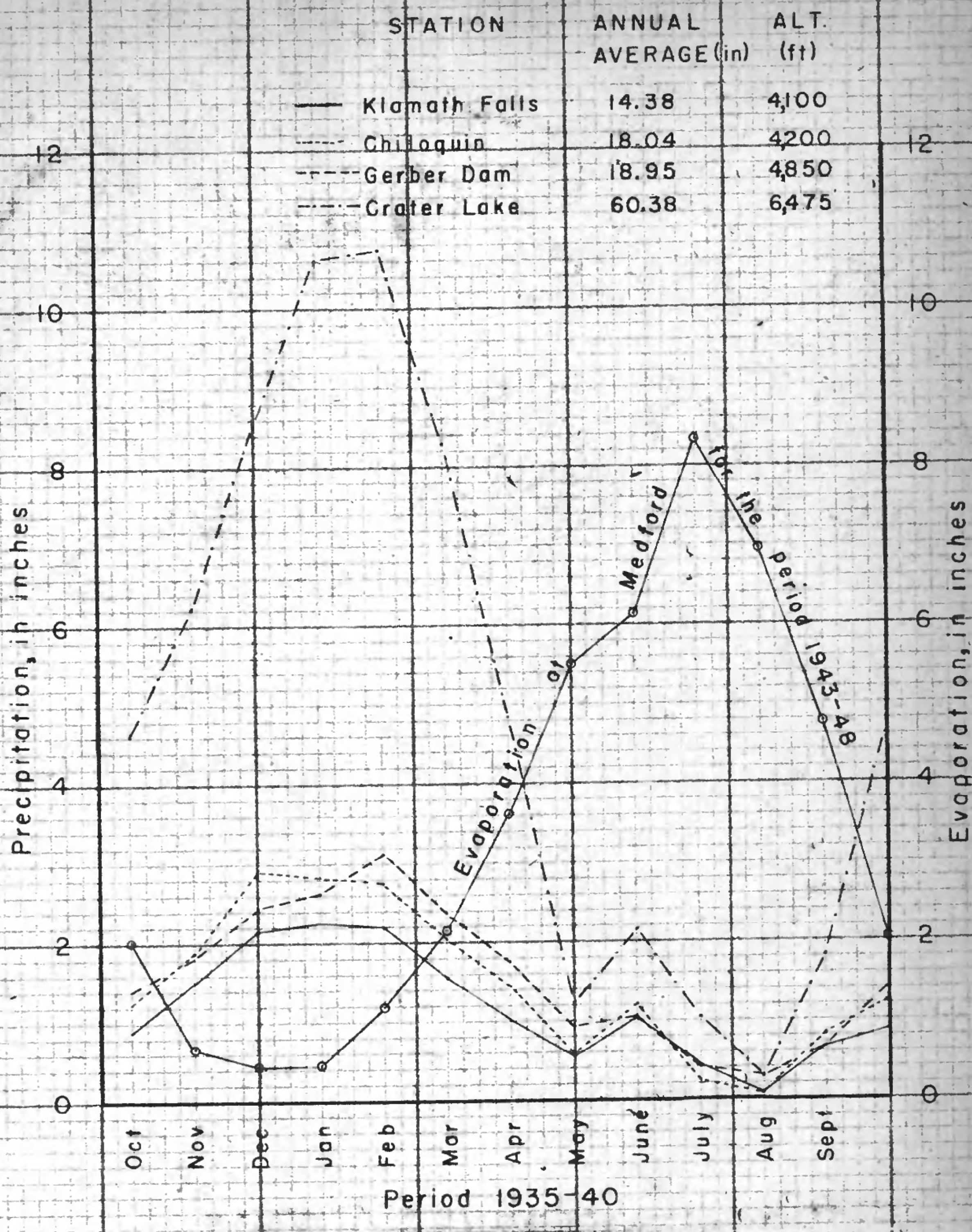


PLATE 4
Percent
25-Year base period 1921-45
Accumulated deviation from average precipitation of the 25-year period ending September 30, 1945, in percentage of that average
Proceeding from left — a rising line indicates a period of excessive precipitation, a falling line a period of deficient precipitation
ACCUMULATED DEVIATION IN PERCENTAGE OF THE YEARLY AVERAGE PRECIPITATION FOR THE 25-YEAR PERIOD OCTOBER 1, 1920 - SEPTEMBER 30, 1945, AT KLAMATH FALLS
Yearly precipitation, in inches
Average 1921-45, 12.95 inches
1905 1910 1915 1920 1925 1930 1935 1940 1945 1950
PRECIPITATION AT KLAMATH FALLS DURING CLIMATIC YEARS ENDING SEPTEMBER 30 OF EACH YEAR, 1905-55



AVERAGE MONTHLY RAINFALL

AT FOUR STATIONS IN THE KLAMATH RIVER BASIN, AND AVERAGE MONTHLY EVAPORATION AT MEDFORD.

Evaporation

The nearest station at which a record of evaporation has been kept is Medford, at 1,400 feet altitude in the Rogue River basin 55 miles west of Klamath Falls. Average annual evaporation from a class A Weather Bureau pan at Medford for the period 1943-48 was about 44 inches (pl. 5). This figure may be low for the Klamath River basin, but monthly distribution of evaporation at the two stations probably is comparable.

A series of lysimeter and evaporation experiments by the U. S. Bureau of Reclamation in 1909 is reported (Henshaw, 1912, p. 17-18) to have yielded records which show that transpiration from the tules and evaporation together, at an area on Lower Klamath Lake, consumed water equivalent to a depth of 4.78 feet of water over the area during the 5 months, May to September. Presumably the evaporation exceeds 48 inches per year in most parts of the Klamath River basin and in places may even reach or exceed 60 inches.

Well-Numbering System

In this report each well and spring is designated by a symbol which indicates its location according to the official rectangular survey of public lands. For example, the symbol "37/11½-2H1" refers to a well (or spring) in sec. 2, T. 37 S., R. 11½ E. The letter "H" after the section number refers to a 40-acre subdivision of the section according to the following diagram, and the number "1" to the first

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

well (or spring) visited in that particular 40-acre tract. The townships in which wells and springs are located are all south of the Willamette baseline and the ranges are all east of the Willamette prime meridian.

Acknowledgments

Help in the collection of well data was supplied by the following well drillers: John Van Meter, Storey Bros., Hartley Bros., W. L. Hartley & son, C. V. Enloe, and Vochatzer Bros. Mrs. Jack Wilson supplied data from the records of the late Jack Wilson.

The Klamath Protective District, through the State of Oregon Board of Forestry, supplied the map used as horizontal control for the preparation of plates 2 and 3. The Bureau of Indian Affairs furnished the topographic map of the Klamath Indian Reservation. The U. S. Forest Service furnished maps and aerial photos of the National Forest lands. Some data on ground water were made available by the Bureau of Reclamation. Well owners and others were wholeheartedly cooperative with efforts to collect the ground-water data.

OCCURRENCE OF THE GROUND WATER

Geologic Setting

General Occurrence of the Rock Units

Essententially all the consolidated rocks of the basin are volcanic and volcanic-sedimentary types except those in a relatively small area in the Jenny Creek region at the basin's southwest corner, where older metamorphic, igneous, and sedimentary rocks occur. The distribution of the main rock groups is shown on plate 3.

The series of old lava flows called "volcanic rocks of Western Cascades" (Callaghan and Buddington, 1938, pl. 1), shown by the symbol "Tvwc" on plate 3C, dips generally eastward along the west slope of the Cascade Mountains and passes beneath the overlying "volcanic rocks of high Cascades" (idem, pl. 1). The volcanic rocks of high Cascades continue eastward into the Klamath Basin, where they constitute the greater part of the bedrock at and near the earth's surface.

The volcanic rocks of high Cascades in the Klamath Basin consist of two types: (1) a basaltic lava rock and sedimentary series that occurs over most of the basin, and (2) an andesitic lava rock that apparently lacks the sedimentary units. The andesitic unit occurs in the Walker Rim and in the Cascade Mountains slope west of Chemult at the north end of the basin. The relations between the andesitic type and the basaltic type ("Tca" and "Tcu" respectively on pl. 3) were not determined; the dashed line separating the two and the arbitrary boundary beneath the Quaternary materials near Crater Lake on plate 3 are only approximations of their contact, which may, instead, be a wide transitional zone in which the two types of volcanic rock interfinger.

The basaltic rock is the principal bedrock and strongly influences the ground-water regimen in much of the basin. The rock unit is described in more detail below. The andesitic rock is believed to be far less permeable than the basalt and to transmit a great deal less ground water.

The classification "volcanic rocks of Quaternary age" include many youthful cinder cones and lava flows that are younger than the uppermost of the rocks distinguished as the volcanic rocks of high Cascades in the Klamath Basin. The youthful lava flows, cinder cones, and pyroclastic deposits are designated by the symbol "Qv" on plate 3, though undoubtedly a great many additional occurrences were not distinguished from the younger parts of the underlying volcanic rocks of high Cascades. The vast pumice fields, of airborne and flow pumice identified by the symbol "Qp" on plate 3, are shown largely as mapped by Howell Williams (1942). Mapping of the pumice as a unit separate from the other volcanic rocks of Quaternary age is desirable because of its special significance to the occurrence of some of the ground water.

The alluvial deposits that underlie some of the valley plains consist largely of fine-grained clastic material, peat, volcanic ash, and reworked pumice. Many of the smaller areas of alluvium in the upland meadows are not shown on plate 3.

Stratigraphy

Pre-Tertiary rocks.-- Metamorphic, igneous, and sedimentary rocks of Mesozoic and earlier age crop out in the southwest corner of the basin. These rocks are mapped and described in a previous work (Wells, 1939). They are essentially tight, non-water-bearing rocks and, except for the overlying soil zones, do not accept or store significant quantities of water.

Umpqua formation.-- Dipping eastward off the east side of the pre-Tertiary rocks is a sedimentary formation of Eocene age known as the Umpqua formation. It is exposed in only about 3 square miles of this basin but is much more extensively exposed farther north in the Rogue River basin and farther south in the Klamath River valley in California. The sandstone, shale, and conglomerate of this formation are tight and generally not water bearing; moreover, the ground water present contains a relatively large amount of dissolved solids and is of poor quality -- particularly below the first 100 feet in depth. Extensive data on the ground-water characteristics of the Umpqua formation and older rocks in the Rogue River basin have been collected in a study of that basin.

Volcanic rocks of Western Cascades.-- A broad belt of partly altered lava flows and interbedded tuffs extends in a north-south direction along the west slope of the Cascade Mountains in the Rogue River basin. The rocks crop out in the southwestern part of the Klamath River basin and continue more extensively in the Klamath River valley in California ("Tvcw" on pl. 3). The members of the unit are tight and generally are not water bearing. Apparently the flows and interbedded tuffs were unusually tight and nonporous when they originally solidified, and subsequent low-degree alterations along with tectonic deformation and some intricate shearing have left them relatively impermeable. Both the low permeability and the eastward dip beneath the overlying rocks that extend into the Klamath Basin are of importance to the ground-water situation in the Klamath Basin. The volcanic rocks of Western Cascades are exposed in the Rogue River basin for a thickness of 3,000 to 5,000 feet and dip 10° to 20° eastward (Wells, 1942). They continue the general eastward dip in the Klamath Basin and they crop out on the slopes at progressively lower altitudes eastward, being exposed in the lowest 200 or 300 feet of the Klamath River canyon in Oregon.

Volcanic rocks of High Cascades.-- This unit, whose name originated with Callaghan and Buddington (1938), includes two types of rock in the Klamath River basin -- the subordinate, andesitic type and the predominant, basaltic type. The latter includes a medial zone of tuff sedimentary rocks, the Yonna formation.

The andesitic type consists of both massive and platy lava flows, bluish gray in color, porphyritic, and of varying grain sizes. Most of the groundmass is microcrystalline, dense, and nonporous. The andesite contains few, if any, interbedded tuffs or sedimentary deposits. Several hundred feet of the andesitic flows are exposed in the north escarpments of Walker Rim, and about 800 feet in the walls of the Little Deschutes River canyon northwest of Chemult. Flow breccias and other highly permeable materials seem to be lacking, and the area of the andesitic rock is devoid of large springs. The rock seems to exclude most of the water; it serves as a perching layer, and small springs having flows up to about 50 gallons per minute (gpm) are common at the downslope end of bodies of overburden--pumice, soil, and alluvial or slope debris.

The basaltic unit occurs in the Cascade Mountains south of Crater Lake and extends eastward as the prevailing bedrock through the Klamath Basin into Lake County on the east and into California on the south. A representative section consists as follows (from the top down):

Upper lava rocks: About 50-200 feet thick, dark gray, brown, and black microcrystalline and aphanitic lava with as much as 30 or 40 percent of flow breccia. In most places this unit is essentially a caprock lava having remarkable continuity in view of its thinness. On plate 3, a large part of the material marked by the inclusive symbol "Tcu" is actually the upper lava rocks, but because the rocks were not mapped in detail and the scale of the map does not permit showing the lesser areas of the Yonna formation and lower lava rocks, the inclusive symbol was used. The upper lava rocks, where they lie below the water table or where they contain a body of perched water, yield large amounts of water to wells and springs.

Yonna formation: A volcanic-sedimentary and sedimentary unit that varies in thickness generally from 200 to 1,000 feet; though it feathers out completely in certain places where it is not present between the two lava-rock units, and in other places it increases to nearly 2,000 feet in thickness. The unit in the type area was described in detail by Meyers and Newcomb (1952), and it was named to Yonna formation by Newcomb (1958). It consists of a lower phase that is predominantly of sedimentary origin and an upper phase of largely volcanic fragmentary materials referred to as volcanic-sedimentary deposits in this report. In and around the type area in the Yonna Valley the sedimentary phase is largely diatomite, stratified sandstone, laminated siltstone, water-laid ash, and basaltic lapilli tuff, part of which was laid down in water. The upper, or volcanic-sedimentary phase, is largely brown basaltic lapilli tuff of great lithologic variation. The formation is cut by many basalt dikes and in places includes a few basaltic flows. The Yonna formation is considered to be of middle Pliocene age on the basis of a few fresh-water shells and a vertebrate fossil determination (Meyers and Newcomb, 1952, p. 39-40). The formation seems to have been deposited under lacustrine and volcanic-plain conditions throughout an area that extends from the flanks of the Cascade Mountains in Oregon eastward into Lake County and from the andesitic rocks of Walker Rim southward into California. On plate 3 the Yonna formation is shown wherever it was found in extensive outcrops. Small exposures are included with the upper (and lower) lava rocks under the inclusive symbol "Tcu." The Yonna formation in general is nonwater-bearing material, but some of the coarser agglomeratic tuff layers transmit water in a few places, notably in the upper part of the Sprague and Williamson River valleys.

Lower lava rocks: Basaltic lava flows compose the lowest unit. They crop out in the canyon of the Klamath River below Keno, where they overlie the volcanic rocks of Western Cascades, in the Cave Mountain constriction, or "Chiloquin Rapids" of the Sprague River near Chiloquin, in Lost River bank at Harpold Dam, and in several mountain slopes. In only a few places were the lower lava rocks mapped in sufficient detail to permit showing on plate 3; elsewhere the unit was included with the other units as "Tcu," volcanic rocks of high Cascades undifferentiated. The lava was extruded onto an erosion surface having considerable relief. The full thickness of the unit is not known; in the Klamath Canyon below Keno it is about 800 feet. The lower lava rocks constitute a moderate to good water-bearing material, though not quite so permeable as the average of the upper lava rocks. Wells extending 100 to 300 feet below the water table in the lower lava-rock unit obtain large supplies of water.

The relations of the basaltic part of the volcanic rocks of high Cascades, as used in this report, to those rocks as considered by earlier workers are shown on the chart below:

Callaghan 1938 pl. 1	Moore 1937 pl. 5	Meyers and Newcomb, 1952 pl. 2	This report 1958
Pliocene(?) Pleistocene, and Recent	Pliocene(?)	Pliocene	Pliocene and Pleistocene(?)
Volcanic rocks of high Cascades	Olivine basalt -Unconformity- Diatomite and associated sediments -Unconformity- Lower lava series	Upper lava rocks -Unconformity- Sedimentary rocks of Tertiary age -Unconformity- Lower lava rocks	Upper lava rocks -Unconformity- Yonna formation -Unconformity- Lower lava rocks

Intrusive rocks.-- The Pliocene rocks described above have been intruded by basaltic dikes and by plugs and stocks of igneous materials. The larger intrusive bodies occur in the areas of greatest upwarp, such as Gearhart Mountain and Yainax Butte. A few of these intrusive masses are shown on plate 3. The mapping did not include detailed delineation of other intrusives that are known to occur, especially in the district about Gearhart Mountain. The intrusive rocks are largely dense, massive, prophyritic to holocrystalline -- even coarsely crystalline. They are tight and largely nonwater bearing.

Volcanic lava rocks of Quaternary age.-- The volcanic rocks (flows, cinders, and fragmentaries)that followed the deformation of the basaltic and andesitic phases of the volcanic rocks of high Cascades are considered in this report to be largely, if not entirely, of Quaternary age. Such classification follows Williams (1942, p. 19) rather than Callaghan and Buddington (1938, pl. 1), who included rocks of Quaternary age in their volcanic rocks of high Cascades. The vast pumice extrusions from Mount Mazama, the ancestral mountain whose crater now is occupied by Crater Lake, are considered separately for hydrologic reasons.

The lava flows from Mount Mazama constitute the bulk of these rocks. They are andesitic and dacitic flows and associated fragmentary deposits that descended from Mount Mazama but did not reach the lowlands. Numerous cinder cones and smaller lava vents are shown on plate 3, mostly as given by Williams (1942, pl. 3).

A large, and apparently single, flow of basaltic rock extends south and west from Fuego Mountain and now forms the caprock of the mesa known as the "Knot Table Land" in the Sprague River valley. Two other areas of young lava farther east help mark the former route of an ancestral valley now lying north of the floor of Sprague River valley. Adjacent and higher lava mesas that circle the north side of the Black Hills were included in the Quaternary lavas by Moore (1937, pl. 5) but have been referred to the latter part of the Pliocene "upper lava rocks" in this report because they were somewhat deformed prior to the extrusion of the young lava of the Knot Table Land.

Pumice of Quaternary age.-- Ancestral Mount Mazama emitted great amounts of airborne pumice and later flow-avalanche pumice. The extent of these deposits as a mappable unit is shown on plate 3, largely after Williams (1942, pl. 3). The main body of the pumice extending south from Chemult to Kirk and west of the Klamath Marsh lies beneath a vast plain called the "Mazama pumice plain" in this report. The pumice blankets much of the slope of the Mount Mazama upland and forms nearly the whole slope and flat of this great "Mazama pumice plain." It appears to average about 75 feet thick along Highway 97 but it tapers to a thin edge along the east side of Klamath Marsh. Probably it buried a region of varied but small relief so its thickness differs some from place to place. The earlier airborne pumice mantles much of the upland eastward from Klamath Marsh past Yamsay Mountain and northward beyond Walker Rim. The age of the pumice was estimated by Williams (p, 114) to be only about 5,000 years, so it undoubtedly followed much of the alluvial deposition of Quaternary age. Later dating of the avalanche pumice by the radioactive carbon method is reported to have placed the age as 6,250, ±250 years (Harry C. Parker, U. S. Park Service, oral report, 1954).

The pumice is an excellent medium for the infiltration of precipitation and its lateral permeability is moderately high. The lower ends of the pockets of pumice on the upland provide numerous small springs of importance to stock watering. Together with the underlying lava rocks, the pumice transmits a large amount of ground water that percolates eastward and southward to the large spring outlets at Klamath Marsh, the lower Williamson River, and the Wood River. The pumice beneath the alluvium supplies water to wells in the Fort Klamath area at the north end of the Upper Klamath Lake, and low-lying bodies of pumice supply water to shallow wells in many of the creek valleys on the east side of Klamath Marsh.

Alluvium.-- Most of the valley plains of the upland meadows and lakes are underlain by silt, sand, clay, volcanic ash, peat, diatomaceous materials, and slope debris. In some of the larger valleys the thickness of the deposits may be several hundred feet, but in general the thickness is not so great nor the bedrock beneath the valley so deep as might be judged from the steepness and height of the upwardly displaced escarpments that form the valley walls.

Parts of the plains of the Sprague River valley, Yonna Valley, Poe Valley, and Langell Valley, and much of the northern part of Klamath Valley are cut across the soft rocks of the Yonna formation and do not have thick or extensive deposits of alluvium. In Sycan Marsh and Klamath Marsh the thickness of alluvium and pumice of Quaternary age may not exceed 300 feet. The Upper Klamath Lake basin, the Lower Klamath Lake basin, and the Tule Lake basin contain widespread bodies of alluvium which in places may extend to considerable depth. The log of the Tule Lake (city) well in California indicates that there may be as much as 800 feet of alluvium there. In the Merrill wells about 200 feet of alluvium overlies the bedrock. Probably there are few places, even in the larger and deeper basins, where the thickness of the alluvium exceeds 1,000 feet. Owing to the failure of many drilling records to distinguish between alluvial deposits and the softer parts of the "chalk rock" of the Yonna formation, the true thickness of the alluvium at many places is not known. The alluvium is largely fine grained and does not yield water readily to wells. In most places supplies large enough for household use are obtained from wells in sandy beds of the alluvium.

Tectonic Structure of the Rocks

General situation of the Klamath River basin area.-- The rocks of Tertiary age in the westernmost part of the Klamath basin and in the adjacent Rogue River basin are inclined eastward. In the Winter Ridge and the highlands west of Goose Lake, at the east side of the Klamath River basin, the rocks of Tertiary age dip westward. Likewise, the rocks of Walker Rim dip southward into the basin. Thus, the general bedrock structure of the Klamath River basin is synclinal, there being a plunge, or opening, to the south.

Within the area of the syncline, and upon an erosional surface carved at least partly across volcanic rocks of Eocene age 1,200 to about 3,000 feet of volcanic flows, volcanic-sedimentary rocks, and sedimentary rocks were laid down, largely in Pliocene time.

Block faulting.-- Sometime after the deposition and local erosion of the upper lava-rock unit, probably during middle and late Pleistocene time, the region underwent deformation of a type known as block faulting. Apparently, arching or bending was subordinate to the failure of the rocks along multiple fractures, which have a definite and consistent pattern. Many principal fault displacements are shown on plate 3. Most of the fault blocks outlined on the map are cut by multiple lesser faults which follow the general trends and patterns of the principal faults.

The planes of movement along the larger faults are visible in many places. Conspicuous among these are the well-known slickensides exposed by cuts and quarries on the east and west sides of Upper Klamath Lake in sec. 24, T. 37 S., R. 8 E., and in the NE$\frac{1}{4}$ sec. 6, T. 38 S., R. 8 E. Those faults are normal, with planes dipping about 60° toward the downthrown side. All the other faults observed in this block-fault pattern also are normal, indicating that they were formed by tensional stress.

The principal significance of the faults on the occurrence of ground water arises from their control of the vertical position of the main aquifers--the upper lava rocks and the lower lava rocks. Also the fault-fracture zones provide permeable avenues along which the ground water in many places gains vertical hydraulic continuity. The visible fault zones exhibit cracked and disjointed bands in which the most severely crushed and sheared parts represent the interfaces along which the greatest displacement of the rock took place. In the lava rocks these fault zones do not, in themselves, constitute barriers to the horizontal movement of ground water in most of the situations observed. Their marginal areas of broken and disjointed rock in places permit ready percolation of water, and many of the fault zones provide routes for the emergence of ground water from the lava rocks. The fault zones observed in the less competent materials of the Yonna formation consist of jumbled, disheveled materials adjacent to rather sharp and clean lines of fracture. These fault zones lack the permeability necessary for appreciable movement of ground water.

The block faulting is greatly intensified in the vicinity of the down-dropped trenchlike blocks that form the Klamath graben and the Langell graben. Major faults trending northerly along the west side of the Klamath graben and the major faults that trend northwesterly along the east side of the graben seem to intersect beneath the volcanic rocks of Quaternary age of ancestral Mount Mazama. To the northeast and the west the faulting is less extensive than in the vicinity of the Klamath and Langell grabens, but the prevailing basin-and-range block faulting and the northwesterly trends continue to the north and east into Lake County and, to a lesser extent, westward into the Rogue River basin.

Characteristics of the Aquifers

The principal water-bearing rocks in the basin, from oldest to youngest, are: lower lava rocks, upper lava rocks (both are units of the volcanics of high Cascades), alluvium of Quaternary age, and pumice of Quaternary age. In addition, a few coarsely bedded layers in the Yonna formation yield ground water to wells and springs in the upper Sprague and Williamson River valleys.

Lower lava rocks.-- These lava rocks contain scoriaceous and fractured interflow zones that readily transmit water. The porous interflow zones overlap and interfinger sufficiently to allow relatively free movement of water vertically across the layers. In the Yonna and Swan Lake Valleys about one-third of the lower lava rocks penetrated by wells have been logged as "porous, water bearing." That they lie beneath the Yonna formation over wide areas, undoubtedly lessens the opportunity for recharge to reach the lower lava rocks. However, in the slope of the Cascade Range and in the mountainous fault blocks, the lower lava rocks are open to recharge from the surface. In much of the basin the lower lava rocks serve as a relatively deep layer of transmission for the regional body of ground water. The main points of surface discharge of the ground water are believed to be the fault escarpments at the foot of the Cascade slope, Kamkaun Spring in the Sprague River, the Harpold Dam area on Lost River, and the canyon of the Klamath

River where the lower lava rocks of high Cascades overlie the less permeable volcanic rocks of Western Cascades (shown on pl. 3).

Upper lava rocks.-- These basaltic lavas, where they are more than one flow thick, contain a large proportion of flow breccia, porous, scoriaceous interflow zones, and other permeable rock. In the wells in Yonna and Swan Lake Valleys about two-thirds of this unit was logged as "porous, water-bearing rock." Besides the myriad small springs in the upland areas, this unit provides notable outflows of ground water in the Bly section of the Sprague River valley, in Whisky Creek below Beatty, in Bonanza Springs of the Lost River valley, in Spring Creek north of Chiloquin, and possibly in the Wood River and Crooked Creek Springs.

Alluvium of Quaternary age.-- The alluvial fill beneath the valley plains is relatively fine grained but nevertheless is able to accept the infiltration of much of the precipitation and some of the surface flow. In the Swan Lake Valley the alluvium contains a perched ground-water body from which water cascades underground to the regional water table at the south, west, and east sides of the valley floor (Meyers and Newcomb, 1952, p. 55). In other valleys the alluvium is a substantial reservoir from which ground water is passed to the surface drainage or to the more permeable aquifers. There are few places where the alluvium will provide large or even moderate yields to wells, but both beneath the slopes and the valley plains it does furnish a large aggregate storage for recharging the deeper aquifers in the lava rocks.

<u>Pumice of Quaternary age</u>.-- The large areas of pumice provide a great space for storage of ground water. The airborne pumice extends much more widely than the later flow pumice but is thinner. Although the flow pumice includes some semiconsolidated layers that are of low permeability, very little of it excludes downward percolation of water. Of the mountain streams that flow onto the pumice plain, only Scott and Sand Creeks succeed in reaching the Klamath Marsh with even a part of their flow. Contours that show the altitude of the water table in the pumice (and in the underlying alluvium and volcanic rocks) are shown on plate 2. Notable discharge outlets for the ground water from the pumice are Big Spring, Spring Creek, the Wood River, and Crooked Creek Springs.

Hydrologic Conditions

Shape and Extent of the Principal Ground-Water Bodies

Data on wells and springs indicate that the regional body of ground water has a water level near the local base level of the major streams. Although this ground-water body is a single hydrologic unit, interstream divides separate it into four main segments which are treated below as hydrologic subunits. The areas constituting these subunits are (1) the Klamath Marsh area, (2) the Sprague River valley, (3) the Cascade Mountain slope south of Annie Creek valley, and (4) the valleys of the Lost River drainage system in Oregon.

The inward dip of the rock strata at the west, north, and east sides of the basin, along with the low permeability of the older underlying rocks in the west side of the basin, creates a condition which largely prevents natural ground-water diversions out of the

Klamath Basin in Oregon. The known and interpolated slopes of the regional water table are inward, away from the drainage divides, and substantiate the hypothesis that there are no significant natural diversions of ground water from the Klamath Basin in Oregon.

Ground water of the Klamath Marsh area.-- Included in this subunit is the Fort Klamath plain north of Upper Klamath Lake, the Klamath Marsh proper, the Mazama pumice plain west and north of the marsh, and the upper Williamson River valley with the slope north and east therefrom to the basin drainage divide. A generalized regional water-table map of the area was drawn from water levels measured in 1954 in widely scattered wells and springs (see pls. 2A, 2B, and 2C). The contours show the general shape of the water table beneath the plain and its effluence from the large springs that discharge much of the ground water from this area.

Along the east and west flanks of the Mazama pumice plain northwest of Klamath Marsh, the ground water moves on a broad front toward the center of the plain. The average slope of the water table is 10 to 20 feet per mile. The ground-water trough beneath the central part of the plain slopes about 2 feet per mile toward the marsh. A channel deposit of highly permeable alluvial material, probably gravel for the most part, underlies the pumice. Probably this gravel was deposited along the drainage axis of the pre-pumice land surface by ancient streams flowing off the Cascade Range. Big Springs at the northwest edge of the marsh is the main orifice which discharges the upper part of this ground water. Southward beneath the Mazama pumice plain the ground-water gradient averages about 8 feet per mile, but steepens to about 25 feet per mile farther south near Spring

Hill and the Wood River valley. The Wood River Springs, the Fish Hatchery springs, and the Spring Creek springs are the main surface outlets of this large ground-water body.

In the vicinity of Chiloquin the water-table contours indicate that this ground-water body is joined by ground water percolating westward from the Sprague River valley. Southward from Chiloquin, the water-table contours show that the water table slopes about 10 feet per mile on a broad front toward Upper Klamath Lake.

Ground water of the Sprague River valley.--A generalized water-table contour map of this area, drawn from water levels measured in 1954, is shown on plates 2C and 2D. In the upper Sprague River valley above Beatty Gap (1 mile northeast of Beatty) well data were insufficient for the construction of water-table contours.

In general, the water table in the area between the communities of Sprague River (town) and Beatty has a troughlike shape. On the upland south of the valley, the altitude of the water in well 36/10-29M1 is reported to be about 4,395 feet, which is above the highest levels of the water surface in the wells of the valley floor, indicating that there is a ground-water divide between the Sprague River valley and Yonna Valley of the Lost River basin to the south. Well 36/10-29M1 is close to the topographic divide, and probably is also near the ground-water divide between the two valleys. The average ground-water gradient northward from this divide is about 30 feet per mile to the level of the Sprague River.

At well 34/11-34F1, on the north slope of the Sprague River valley, the reported water-table altitude is about 4,590 feet, which is higher than the altitude of Klamath Marsh. Therefore, a ground-water divide must exist between the Klamath Marsh area and the Sprague River valley; it probably lies along a line passing somewhere in the vicinity of the Fuego Mountain upland. The slope of the water table southward toward the Sprague River is rather gentle, about 12 feet per mile beneath the upland, but near the river it steepens to about 25 feet per mile as the water table beneath the tablelands descends to the level of the valley floor.

Downstream from the town of Sprague River the slope of the water table descends at a rate approximately equal to the gradient of the river, about 5 feet per mile. At Braymill the river enters a basalt canyon, the Chiloquin Narrows, and drops 40 feet in a little more than a mile. The shape of the water-table contours above and below the rapids suggests that the ground-water gradient also steepens at that locality. Farther downgradient the ground water merges to the west with the ground water from the Klamath Marsh area.

Ground water of the slope of the Cascade Range.--South of the Annie Creek valley the basaltic rocks of the volcanic rocks of high Cascades, some younger volcanic rocks, and possible small areas of the older rocks form the relatively rugged mountain terrain. There is moderately thick soil or slope debris, and some alluvial deposits occur in the larger creek valleys.

Some large springs issue near the foot of the escarpments and a great many moderate-sized and small springs discharge to the creeks and marshes. Sevenmile Creek flowed 87 cubic feet per second (cfs) on October 5, 1954, from sources that were largely ground water. Mares Egg Spring, Spring Creek, Threemile Creek, and Nannie Creek added an additional 18 cfs in October 1954.

Ground water of the Lost River drainage system.--- This hydrologic subunit includes five valleys -- namely Langell Valley, Yonna Valley, Swan Lake Valley, Poe Valley, and Klamath Valley. There is sufficient information for the construction of a water-table contour map only in Swan Lake and Yonna Valleys (pl. 2D). Water-level information for the other valleys is sufficient only to indicate that the water table in them, like that in Swan Lake and Yonna Valleys, slopes generally toward the Lost River. That river seemingly is the local base level for ground water moving beneath all five of these closely related valleys.

In the upper reaches of Swan Lake and Yonna Valleys the ground-water gradient, so far as is known, is decreasing at about 20 feet per mile. Beneath the floor of the central part of Swan Lake Valley the regional water table flattens, its slope decreasing to approximately 10 feet per mile. The water-table contours shown on plate 2D represent the piezometric surface of the regional ground-water body whose water percolates southward through the basalt aquifers underlying the valley at depth. A second set of contours (shown by dotted lines) represents the level of the perched water in the permeable layers of the valley fill. The perched water table is much flatter than the regional water table and slopes generally toward the sides of the valley, where part of the perched water descends within a rather short distance, through the talus and bedrock, to the regional water table.

The regional water tables beneath Swan Lake and Yonna Valleys merge in the vicinity of Pine Flat into one uniform slope, which continues southward to the Lost River. The water table between Pine Flat and Poe Valley slopes about 2 feet per mile.

Some Hydraulic Characteristics of Ground Water

Below the level of the regional water table the pores of all rock materials are saturated. Where the ground-water body is unconfined, the water surface is at atmospheric pressure only and the water percolates under the force of gravity, in the direction of the hydraulic gradient, from areas of recharge toward areas of discharge. In places where relatively impermeable material, such as clay or silt, forms a sloping, less permeable blanket over a part of the water-bearing material, a confined, or artesian condition may exist.[1] Such a confining layer occurs in the vicinity of Fort Klamath, where a layer of blue clay, probably deposited in Upper Klamath Lake, confines the ground water in the alluvium and underlying bedrock. The water rises in wells to an altitude considerably higher than the surrounding land surface. Pressure measurements in the artesian wells near Fort Klamath (wells 33/7½-16R1 and -22J1) indicate that the confining layer of blue clay terminates where the pumice disappears beneath the alluvium, about a mile north of Fort Klamath (see pl. 3C).

[1] In general, hydrologists use the word "artesian" to mean any confined water, whether or not wells tapping it will flow at the land surface. Most dictionaries still use the old definition of water that flows at the surface. Some popular usage is still more loose, meaning water from any deep well, or even any drilled well.

Confined ground water occurs also in places beneath the Klamath Marsh plain and in the Sprague River valley above Sprague River (town). In the Sprague River valley the confining layer is "chalk rock" (clay, volcanic ash, diatomite, and tuff) the less permeable part of the Yonna formation, and in the Klamath Marsh area the tighter layers of the flow pumice or interbedded valley alluvium may form the confining layers for the local artesian water.

Discharge of the Ground Water

Source.-- The upper and lower lava rocks and the pumice of Quaternary age are the materials from which most of the large springs emerge. The springs that flow from the basalt occur mainly where porous water-bearing sections of the basalt are exposed at the land surface by faults, erosion, or other geologic conditions. The Spring Creek Spring (33/7-32A1), located at the base of an escarpment, is a typical example of flow from a basalt aquifer exposed by uplift along a fault. Other large springs of this type are Wood River Spring, the Fish Hatchery Springs, and Agency Spring, all flowing from the basalt at the base of the escarpment on the east side of the Fort Klamath plain. Bonanza Spring (39/11-10Q1), although not at the base of an escarpment, is on the trace of a fault and discharges water from the upper lava rock at, and slightly above, the level of the Lost River.

The pumice beneath the plain north and west of the Klamath Marsh is also a major aquifer feeding water to several springs discharging from the surficial pumice deposits. Big Spring (30/8-16Q1), the largest of this type, occurs at the edge of the pumice plain, near the contact of the pumice and the alluvium of the marsh. This spring occurs approximately on the plain's central axis, beneath which, underlying the pumice, may be a concentration of coarser, more permeable material acting as a conduit for the water.

At the source of the Williamson River (in Tps. 32 and 33 S., R. 11 E.) several springs discharge from a layer of porous agglomerate in the Yonna formation underlying the upper lava rocks. Water percolating downward through the basalt beneath the slope of Yamsay Mountain apparently is accumulated in the upper part of these sedimentary beds and discharged at points where their porous members are exposed by erosion or faulting. The spring at the head of the Williamson River (33/11-4N1) and Wickiup Spring (32/11-17P1) are two of the largest springs emitting water from those beds. These and other springs in the area are the major source of the upper Williamson River above Klamath Marsh during the base-flow period from June to October.

Quantity.-- The water discharged by the various streams and springs in the basin was measured, where possible, during the months of September and October 1954, when practically all the flow could be classified as ground-water effluent. In order to evaluate the natural ground-water discharge in the basin, the streams and springs shown in table 5 have been grouped into their respective subbasins and listed in order as they enter the river, starting at the sources of the Williamson and Sprague Rivers.

About 3.8 cfs of the measured flow of Big Spring Creek is furnished by flow from wells 30/8-22D1 and -22G1, located in the creek channel. In the marsh, about 10 additional wells flow free throughout the year. They have an aggregate yield of about 6.7 cfs, or 4,800 acre-feet per year.

(An acre-foot is 43,560 cubic feet, the amount of water that will cover an acre of ground to a depth of 1 foot.) Most of these wells, which were constructed during the drought of the 1930's, reportedly started flowing for the first time in the spring of 1952. Almost the entire ground-water discharge from the Mazama pumice plain north of Kirk and Fort Klamath emerges from the large springs on the plain and from the springs at the base of Spring Hill. These springs are Big Springs and the springs on Spring Creek, Wood River, and the lower Williamson River springs between Kirk and Spring Creek. They discharged approximately 700,000 acre-feet of ground water in 1954. The discharge computation is based on the assumption that the measurements made in September and October 1954 are representative of the average flow from the springs for the entire year. Lack of information on seasonal variations in the flow of the springs prevents appraisal of the validity of that assumption.

The discharge of several large springs in the channel of Sprague River near Kamkaun Spring could be computed by measuring the flow of the river above and below the springs. The measurements of the north and south forks of the Sprague River and their tributaries (see table 5) on the slopes adjacent to the upper Sprague River valley show that the total discharge was 65 cfs less than that measured the same day farther downstream, at the Beatty Gap gaging station 1 mile northeast of Beatty. The increase in flow above Beatty Gap probably is effluent ground water from the younger alluvium which borders the river. Its source may be in part return irrigation water, and in part drainage water from the underlying basalt reaching the surface through the alluvium. The minimum flow of the Sprague River near Chiloquin, without diversions (see table 5), plus evaporation from more than a hundred miles of river surface should approximate the average yearly discharge of ground-water effluent into the river. This amounts to about 245,000 acre-feet per year.

Along the west side of Upper Klamath Lake one large spring-fed stream, Sevenmile Creek, and several smaller ones discharge an estimated 40,000 acre-feet of ground water into Upper Klamath Lake each year (see table 5). Other large springs occur in Pelican Bay and other points along the Upper Klamath Lake shores but cannot be measured accurately.

Considerable inflow is added to the Klamath River from numerous springs in a 9-mile stretch of the river canyon below the Highway 66 bridge which is in sec. 31, T. 39 S., R. 7 E. Local residents report that a few of the largest springs may be seen in the bottom of the canyon when the river is at low stage. Undoubtedly many more springs occur in the river bed, where permeable water-bearing zones of the lower lava rock have been cut through by the canyon. Below that reach the river cuts into older rocks that are practically impermeable; therefore, little or no ground water is believed to enter the river in Oregon downstream from sec. 3, T. 41 S., R. 6 E.

The inflow to Lost River from a 6-mile reach that includes Bonanza Spring amounts to about 100 cfs at periods of low flow in the river (see table 5). The part of Bonanza Spring that is visible and directly measurable supplies about 20 cfs of this flow. The rest of the flow must come from inconspicuous spring orifices in the bed of the river. About 10 river miles below Harpold Dam, in the vicinity of Olene, a few springs add an unknown quantity of water to the summer flow of the Lost River. The largest of these springs (39/11½-19M1) flows about 7 cfs, according to the report of the landowner.

Recharge to the Ground Water

The infiltration to the ground water which ultimately returns to the surface as spring discharge to the streams, occurs mainly on the upland areas at places where the more permeable are exposed, and on the vast pumice plains and slopes that lie to the north, east, and south of Crater Lake. On these areas direct infiltration of rainfall and snowmelt accounts for the greater part of the ground-water recharge. Additional water reaches the ground-water body from a few small streams that flow off the east slope of the Cascades and sink into the pumice plain along the western margin of the Klamath Marsh. Sand, Scott, and Miller Creeks are the largest of these streams. In some years part of the flow of Scott Creek and Sand Creek reaches the marsh or is used for irrigation on the lands along the west side of the marsh. Measurements of Miller Creek from October 1, 1913, to September 30, 1914, give the total runoff for this stream during the water year 1914 as 12,400 acre-feet (Grover, 1917). This is the only year for which complete discharge records are available on any of these streams that sink completely into the pumice. Measurements made during this investigation, September and October 1954, show the combined flow of these three streams to be about 40 cfs (Miller Creek measured at the present Highway 97 and Sand and Scott Creeks at the old Highway 97). This quantity of water would indicate that these creeks contribute a minimum yearly recharge of about 30,000 acre-feet to ground water in the pumice.

As previously stated, the average annual precipitation over the basin ranges from 14 inches at Klamath Falls to more than 60 inches at Crater Lake. At Chemult (altitude 4,760 feet) the average precipitation for the 16 water years 1938 through 1953 was slightly more than 27 inches. As the average altitude of the pumice plain and upland north of Kirk is a little higher than Chemult, the average annual precipitation on that 1,400-square-mile area is estimated to be about 30 inches, or roughly half that at Crater Lake. Because the pumice is highly permeable, probably not less than 10 to 12 inches of the precipitation reaches the water table as recharge. This much infiltration would equal 750,000 to 900,000 acre-feet a year in this area and probably is a conservative estimate. The measured 700,000 acre-feet of discharge from springs of this area in 1954 (see p. 39) sufficiently approximates the figure of 750,000 to 900,000 acre-feet, obtained above from recharge estimates, to substantiate the estimate of 10 to 12 inches as being of the correct order of magnitude for the average annual recharge to the ground water.

Recharge in the Sprague River basin occurs mostly on the uplands above the valley floor where the porous members of the rock units are exposed or sufficiently broken to allow the percolation of the water. The valley plains probably receive about the same amount of precipitation as Chiloquin, 18 inches, of which most may run off, be evaporated, or be transpired. On the upland recharge area, comprising about 1,000 square miles, the average annual precipitation is probably about 20 to 25 inches. Computations made from the base-flow measurements of the river at Chiloquin show that the Sprague River gains about 245,000 acre-feet per year from spring discharge. Such a figure would indicate an average discharge equal to 4½ inches of water infiltration over the 1,000-square-mile area.

The main area of recharge for the subvalleys in the Lost River drainage system consists of the uplands north and east of the Swan Lake and Yonna Valleys. The basalt on the upland east of Langell Valley is not thick enough to contain much ground water in storage and the infiltration largely drains off into the stream valleys that have cut through the basalt cap to the less permeable tuffs of the Yonna formation.

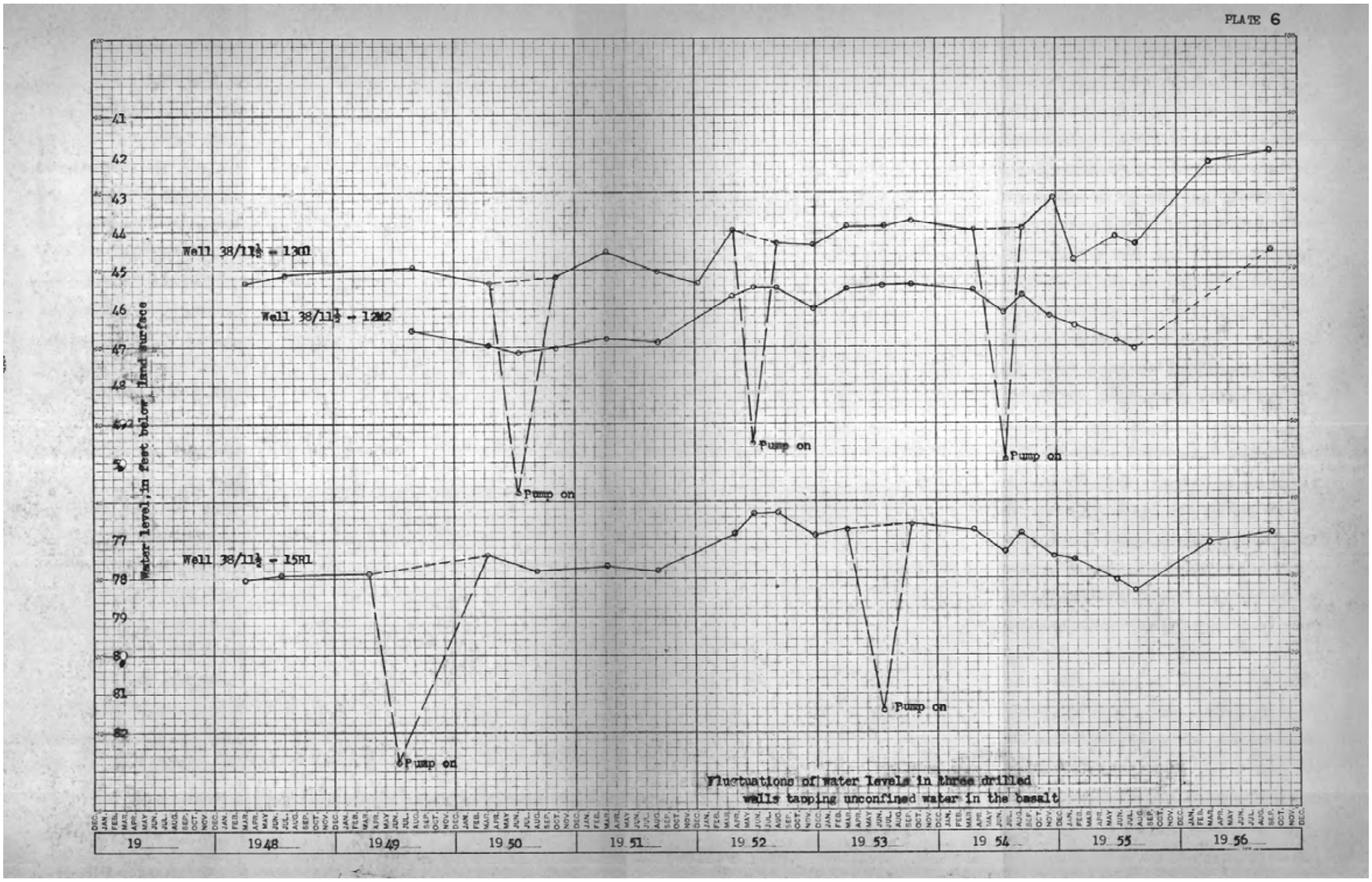
Recharge to the ground water of the Swan Lake-Yonna Valleys was estimated (Meyers and Newcomb, 1952) to be about 23,000 acre-feet annually. This amount was computed by assuming that about 2 inches of the annual precipitation reaches the water table as recharge. Water levels of three wells that tap the basalt in Yonna Valley (see pls. 6 and 7) show a general rise from 1948 to about June 1952. After this rise there appears to have been a steady level followed by a slight decline (during 1953 and 1954) which may reflect (1) a previous period of deficient recharge, or (2) a period during which withdrawal from wells exceeded the annual recharge. The downward trend has not extended long enough to indicate which situation exists. However, existence of a similar decline in the level of the perched water, from which water is pumped (see pl. 8), indicates that a lower rate of recharge may be the cause of the decline in the level of the regional water table during 1955 and 1954. About 7,500 acre-feet of water was pumped from wells for irrigation in those valleys in 1954.

Obviously, the quantities of recharge presented above for sections of the Klamath Basin are rough estimates that are subject to revision as better data and methods of estimation come into use.

Relation of Ground Water to Basin Runoff

The surface discharge from the basin during the late summer and early fall comes largely from ground water. During this period there is practically no runoff from snowmelt; only a little, if any, of the summer precipitation reaches the streams, and the channel storage, reservoir storage, and irrigation-drainage additions in Oregon are negligible. As data are lacking on the variation of the discharge from the springs throughout the year, the base flow during September and October was tentatively taken as the average rate of discharge from the ground water throughout the year.

In general, even though some lag in time is involved, the quantity of ground water supplied to the streams is proportional to the amount of water in storage in the aquifers. Plate 9 shows the discharge of Spring Creek and Big Spring Creek as compared with the accumulated deviation from the average precipitation at Chiloquin. The discharge of these springs showed a steady decline from 1916 to 1930, when Big Spring Creek went dry. Spring Creek continued to flow through the thirties and forties but probably at a reduced rate (no measurements were made from 1934 to 1949). Big Spring Creek was still dry September 15, 1950, and the first measurement (28.3 cfs) after the discharge recommenced was made September 1, 1951. The flow of Spring Creek in July 1934 was 267 cfs (see pl. 9), which coincides with the lowest point on the accumulated deviation curve for precipitation. This is also considered to be the lowest point in any long-term curve showing the amount of precipitation available to recharge the ground water. Though the infiltration to ground-water storage should have leveled off in 1935 and possibly began increasing in 1936, the minimum



Fluctuations of water levels in three drilled wells tapping unconfined water in the basalt

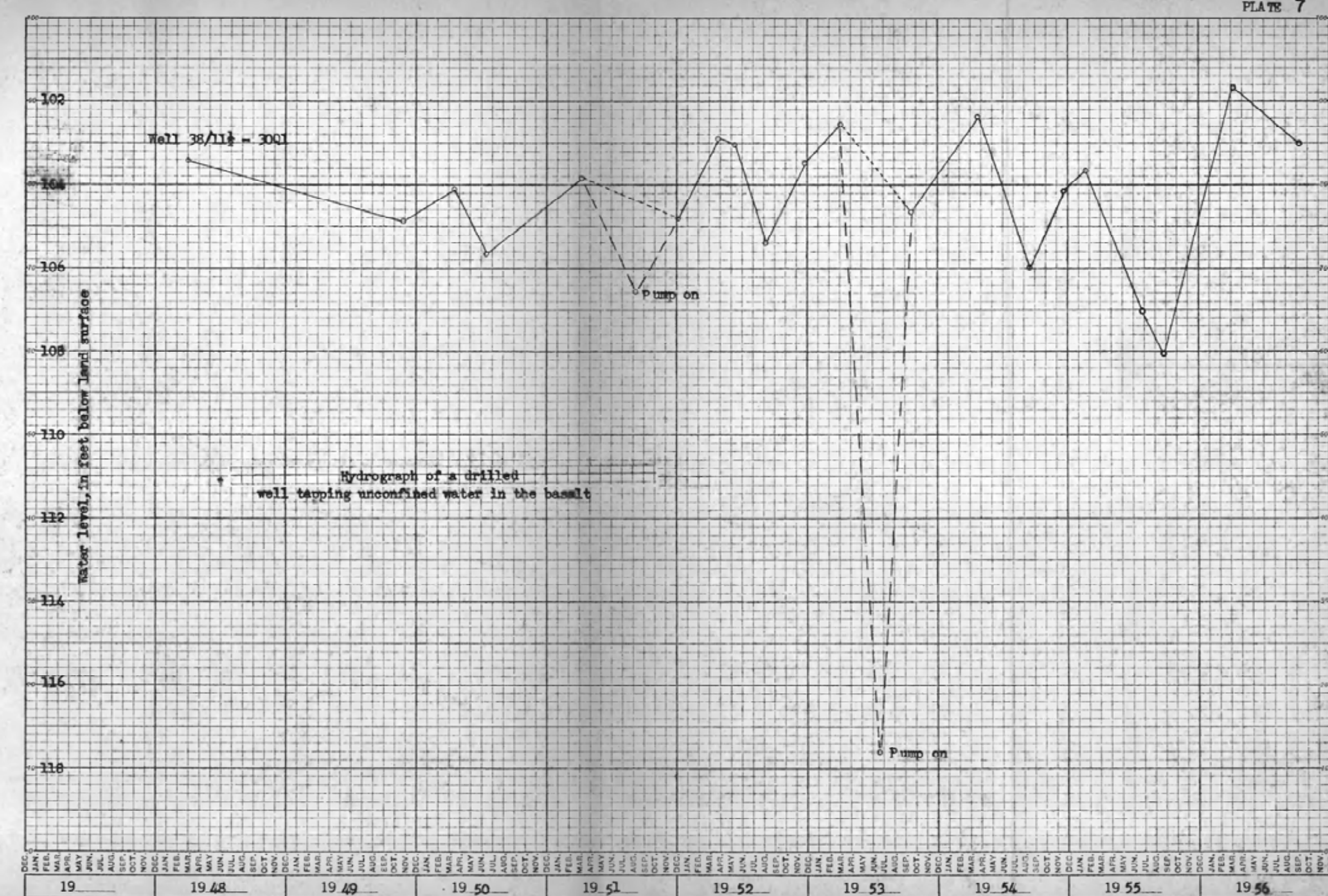
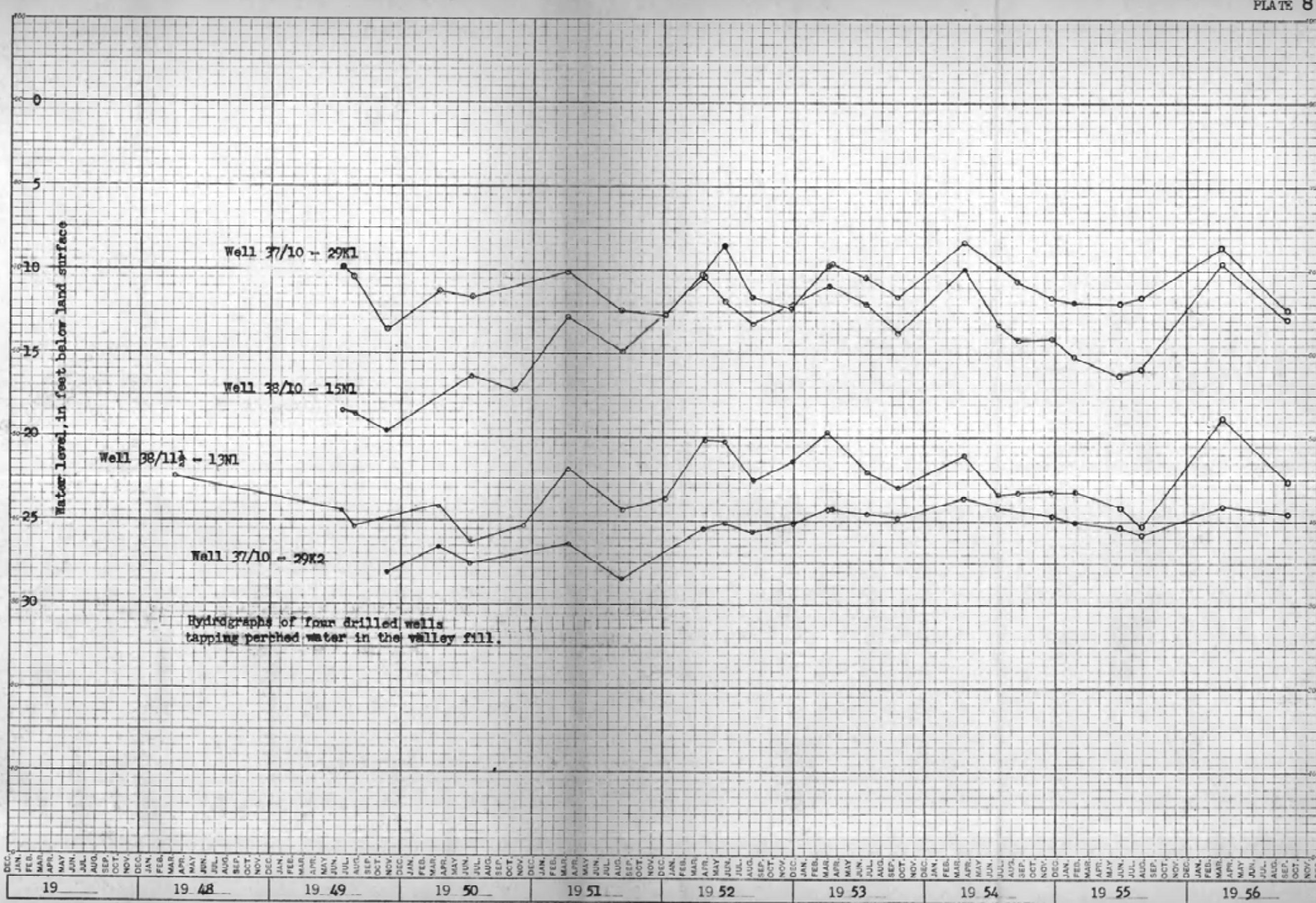

Well 38/11½ - 30Q1
Hydrograph of a drilled well tapping unconfined water in the basalt
Pump on
Pump on
Water level, in feet below land surface
102
104
106
108
110
112
114
116
118
19
1948
1949
1950
1951
1952
1953
1954
1955
1956

PLATE 8



Hydrographs of four drilled wells tapping perched water in the valley fill.

flows of the Spring Creek springs cannot be postulated for the period of no record, 1935-47, because the time lag between recharge and discharge is not evident from the records.

Big Spring apparently is an overflow point where the ground-water body discharges at the surface only when the level of the water table is above the average position. The record of flow and nonflow for Big Spring when compared with the accumulative deviation curve (pl. 9) graphically indicates this conclusion. After the precipitation curve (accumulative deviation from normal) crossed the zero-percent line (about 1923) and continued a steady decline, it took about 8 years for the spring to go dry. The accumulative precipitation curve continued to decline until 1935 and in 1936 started an upward swing. The curve again reached the zero-percent line on its upward trend in 1943, and Big Spring Creek started flowing again in 1951, 8 years later. Therefore, in summary, it appears that the flow of Big Spring will continue when the annual precipitation stays at normal or slightly above, will increase after a rise in the accumulative deviation, and will decrease after the accumulative precipitation curve crosses and goes below the line of zero deviation from normal.

Discharge measurements on Wood River, Fort Creek, and Crooked Creek are shown on plate 10. The discharge measurement records of Fort and Crooked Creeks contain so few data that comparison with other records is not justified. Measurements on Wood River include undetermined amounts of surface runoff from Annie and Sun Creeks. However, the record does show the similarity between the amounts of spring discharge and the accumulative deviation from normal precipitation.

USE OF THE GROUND WATER

Irrigation

As previously mentioned, on the Klamath Marsh there are about 10 free-flowing wells that discharge a total of about 6.7 cfs, or about 4,800 acre-feet of water per year. Most of these wells are used approximately 3 months of each year to irrigate native pasture on the marsh. This is the only irrigation use of ground water from wells on the Klamath Marsh and it amounts to about 1,200 acre-feet per year. The flow from 2 other wells goes directly to Big Springs Creek; the water is used occasionally for irrigation when a part of the creek is turned out onto the pastures.

In the Sprague River valley there are 10 wells, each flowing or being pumped at rates of 400 to 4,000 gpm. They are used an average of 3 months each year to irrigate pasture and grain. Most of the flowing wells are equipped with shutoff valves and flow only during the irrigation season. The aggregate withdrawal of ground water from these 10 wells is about 20,000 gpm for 90 days, or roughly 8,000 acre-feet per year. All the wells are in T. 36 S., Rs. 10 and 11 E., and are described in table 1.

In Swan Lake and Yonna Valleys 7 wells produced 6,000 acre-feet of ground water per year from 1950 to 1952, for the irrigation of about 3,800 acres. Several additional wells have been put into operation since that time and the total ground-water withdrawal is now estimated at about 7,500 acre-feet per year.

In the Poe Valley about 660 acre-feet of water is pumped for irrigation each year from 3 wells.

In the Langell Valley 4 wells furnish about 1,400 acre-feet of water during a 3-month irrigation season.

South of Poe Valley--near the California line, in the Merrill and Malin (Sand Hollow) areas--7 wells are used to irrigate some of the slopes outside the irrigation district which uses water from Lost River. These 7 wells discharge about 8,000 acre-feet of water during the 3-month irrigation season.

The total withdrawal from wells for irrigation in the Klamath River basin as of 1955 is estimated to be about 27,000 acre-feet per year. An additional 3,600 acre-feet flows from wells into the streams. This withdrawal by wells is independent of the water from springs, which is accounted for under surface-water rights.

Public Supply

Klamath Falls is supplied with municipal water from 8 wells located on the east side of the Link River (see table 1). On the basis of a normal per capita use of about 60 gallons per day, the average daily withdrawal for Klamath Falls is estimated to be about a million gallons, or 1,100 acre-feet per year.

Chiloquin, Merrill, add Malin, each having two wells, withdraw an average daily total of about 65,000 gallons, or 75 acre-feet per year. The combined withdrawal for public supply in the basin thus is about 1,200 acre-feet of ground water per year.

Domestic Supply

Of the three or four thousand wells drilled for domestic use in the Klamath River basin, more than 500 representative wells are described in table 1.

The population of the Klamath River basin outside of incorporated communities was 34,180 in 1950. The per capita rural use of water is normally about the same as that of small residential communities without industry--30 gpd. Therefore, the domestic use of ground water is roughly 700,000 gpd, or about 760 acre-feet per year.

Industrial Supply

Except for the sawmills and timber-processing plants, such as one large hardboard plant, industry in the Klamath basin in Oregon does not use much water. The hardboard plant, the only large industry outside Klamath Falls, uses about 100,000 gpd from 2 wells and 1 spring, or about 100 acre-feet per year.

The main use of ground water by industry within Klamath Falls is for heating. Hot-water wells and springs are used to heat many residences and for special heating tasks. Several commercial buildings in the city are heated entirely by hot water from wells. Other uses include the heating of inclined sections of road pavement and the thermal protection of the foundations of a commercial ice plant. The total amount of hot water used for these purposes is probably not more than 1,000 acre-feet per year.

Total Withdrawal of Ground Water

The amount of ground water withdrawn totals about 30,000 acre-feet per year under the following categories:

Use		Acre-feet per year	
Irrigation		27,000	
Public supply		1,200	
Domestic supply		760	
Industrial supply			
(cool water	110 acre-ft)		
(hot water	1,000 acre-ft)	1,110	
Rounded total,			30,000

Potential for Future Development

The presence of aquifers such as the basaltic lava rocks and the pumice in areas having transportation and raw-material resources suggests that the industrial needs for ground water may expand in the future.

Many more areas of adequate soils and satisfactory growing conditions may be found suitable for irrigation by ground water. Especially significant is the capacity of the aquifers to supply ground water for irrigation in some places above the levels of canals and in water-short districts where it can supplement the present irrigation supply from surface-water sources.

Data on the withdrawal of water from wells indicate that this water source is being utilized at present on a scale that is rather small in comparison to the potentialities.

QUALITY OF THE GROUND WATER

General Character of the Water

In the study of the chemical quality of the ground water, comprehensive analyses were made by the Geological Survey of water from 12 wells and 1 spring. Additional analyses of water from 4 wells and 1 spring were obtained from other sources. Field analyses were made for hardness or chloride of water from 135 wells and 42 springs. The results of the analyses are shown in table 4 and in columns 16 and 17 of table 1.

Except for that from a few sources, the ground water in the Klamath River basin is of excellent quality for irrigation and other uses. The water is soft or but moderately hard and is suitable for most uses. In a few small areas, however, some ground water may be of inferior quality.

The ground water discharging from the major springs, and tapped by wells above those outlets, is largely soft and of low salinity. Some wells, obtaining ground water in places where it is less actively moving from points of recharge to known points of discharge, yield water that is moderately hard to hard. The basalt yields water of varying degrees of hardness. Some wells that tap water in the alluvium, the Yonna formation, and basalt aquifers,(see table 1) yield hard water.

Water of Poor Quality

The ground water of inferior quality occurs in two situations. (1) The warm and hot water in the warm rocks coincident with certain fault zones and (2) the water of normal temperature in the alluvium adjacent to the evaporation basins of Lower Klamath Lake and Tule Lake. The warm and hot water occurs along fault zones, particularly at Olene

Gap, south of Lorella in Langell Valley, and east and above the hot-spring area in the eastern part of Klamath Falls. The high-temperature ground waters contain considerable amounts of sodium sulfate and lack the normal amounts of magnesium (see table 4).

In some of the alluvium near evaporation areas in the Tule Lake and Lower Klamath Lake basins the ground water contains objectionable concentrations of sodium bicarbonate. In a few places it contains concentrations that make the water undesirable for irrigation use.

Important Minor Characteristics of the Ground Water

Boron

Boron in small quantities is essential for all plant growth but in slightly larger quantities it may be harmful. The most sensitive crops may be injured by water having more than 0.33 ppm of boron. More tolerant crops may be irrigated without harmful effects with water having as much as 3.75 ppm of boron (Scofield, 1936).

All the water samples analyzed contained less than 1.0 ppm of boron (see table 4). The highest concentration, 0.96 ppm, represents a water sample from well 38/9-28N1, a hot-water well used for heating in Klamath Falls. In most water used for irrigation within the basin the concentration of boron ranges from 0 to 0.05 ppm.

Fluoride

Drinking water having a fluoride content ranging from 0.5 to 1.5 ppm is considered beneficial to children's teeth during the formative period, usually between the ages of 4 and 12 years (Dean, 1936). Water having a fluoride concentration greater than 1.5 ppm, when used for a long time during the calcification of the teeth, may cause a mottling of the enamel. Water analyzed for fluoride had concentrations below or within the commonly accepted limits for drinking water.

Iron

The permissible amount of iron in good domestic water is considered to be about 0.3 ppm. Concentrations greater than this will stain laundry, fixtures and utensils. The pumice and sand tapped by well 31/7-24D1 yields water that contains 0.48 ppm of iron. Of the waters tested, this supply is the only one that contained excess iron. Owners of several wells whose waters were not analyzed reported that the water from their wells stained plumbing fixtures. Most of these reportedly iron-bearing waters come from red cindery zones in the basalt.

Gaseous Constituents

A few wells obtaining water from the lava rocks are reported to give off a slight to moderately strong odor of hydrogen sulfide. A small amount of hydrogen sulfide is normal for waters in the basalt of the Pacific Northwest. At least part of the gas represents volcanic emanations trapped in the rocks or decomposition of sulfides of iron in the lava rock (Meyers and Newcomb, 1952).

Four wells, 400 to 1,300 feet deep, in alluvial deposits of the Klamath Valley are reported unusable because of an excessive amount of gas in the water. Undoubtedly many peaty beds are present in these valley-fill deposits and when penetrated by wells they may release a mixture of gases (probably mostly methane, carbon dioxide, hydrogen sulfide, and / nitrogen). The removal of these gases, which can be accomplished easily by aeration, makes the water usable for most purposes.

Temperature

The waters from wells and springs throughout the basin have considerable temperature differences. These differences cannot be explained wholly by the increase due to the earth's temperature gradient. Contact of the water with zones of warm or hot rock probably is the main cause of their abnormal heat. Good examples of heating by such contact are the waters in the wells and springs in the Hot Springs addition of Klamath Falls, where the water temperature ranges from 100° F to more than 220°F. All the hot wells and springs examined are in, or very near, known faults.

Other wells in the Sprague River valley and the valleys of the Lost River basin produce water that is considerably above the "normal" temperatures ("normal" is considered to be the mean annual atmospheric temperature plus the temperature rise with depth due to the earth-temperature gradient, which is roughly 1°F for each 50-to-100-foot increase in depth below the first 100 feet), but the water is not of sufficiently high temperature to be called "hot." Water from well 36/11-17B1 in the Sprague River Valley has a temperature of 70° F, which is approximately 20° above normal. Several other wells in this area, above the town of Sprague River, tap water whose temperature is 5° to 20° above normal. These wells tap water in the basalt and "sand" layers under the thick "chalk rock" layer. In the Poe Valley, water from well 40/11-2A1 has a temperature of 83°F, which is 28° above the normal. Water from well 41/12-12G1, in Sand Hollow, is 23° above normal. These are only two of the many wells that produce ground water 10° to 30° above the normal. These warm waters indicate that the earth-temperature gradient must be greater than normal, at least in part as a result of the heat effects of fault zones.

RECORDS FOR WELLS, SPRINGS, AND CHEMICAL QUALITY OF WATER

The remainder of the report contains 6 tables giving pertinent information on the representative wells and springs in the basin.

Table 1 is a listing of data for the wells shown on plate 2. The depths of the wells (col. 5), and the water levels below land surface (col. 12), reported to the nearest hundredth of a foot, were measured by the Geological Survey; those in whole feet were reported by driller or owner. The yield shown in column 14 is not necessarily the maximum of which the well is capable, but simply the yield of the pump (in most cases estimated from the size of the pump on the well). Most wells have potential yields greater than those shown in column 14.

Statements on occurrence of the ground water at each well (col. 11) have been interpreted from the record of that particular well and may seem to involve some inconsistencies--for example, for certain wells that tap the regional body of unconfined water, the occurrence may be listed as confined because local beds of nonwater-bearing material excluded water from the well until it extended some depth below the normal level of the water table in the vicinity.

Representative logs of nearly 100 wells shown in table 1 and on plate 2 are given in table 2. The stratigraphic headings were inserted by the authors. The drillers' terms are given for the materials penetrated and in some places the authors' interpretations of these terms follow in parentheses. The drillers' term "chalk rock" is commonly applied to the white, or light-colored, volcanic ash, diatomite tuff, or clay of the Yonna formation. The term "chalk" is applied to the less compact varieties of these materials. Some drillers' terms for the materials encountered in wells are given in quotation marks where it is believed that other classifications may be possible.

Table 3 contains basic data on the representative springs shown on plate 2.

The chemical analyses listed in table 4 were made of representative samples of the ground water by the Geological Survey and others as noted in the footnotes.

Measurements of spring and stream discharge are summarized in table 5.

Table 6 is a compilation of water levels in observation wells measured periodically during the investigation.

Table 1.- Representative Wells

[Location of wells

Topography where well is located: P, plain; S, slope; U, upland. Altitudes

Type of well construction: Bd, bored; Dg, dug; Dn, driven; Dr, drilled.
Ground-water occurrence: C, confined; P, perched; U, Unconfined.
Water-level information: Depths and water levels expressed in feet and feet were reported by owner or driller. F, flowing well, static level

Type of pump: C, centrifugal; J, jet; N, none; P, plunger; S, submersible
Use of water: D, domestic; H, heating (space); Ind, industrial; Irr, S, stock.
Chemical values given in columns 16 and 17 determined by field methods.

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing (feet)	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 27 S., R. 8 E.								
21M1	G. W. Damon	P 4,755	Dr	220	6	220	25 85	15 1	Pumice Rock
21N1	Ray Darnell	P 4,755	Dg	37.9	46	38	27	11	Pumice
	T. 28 S., R. 8 E.								
17K1	Southern Pacific Co.	P 4,654	Dr	161	8	161	156	5	Sand and gravel
20E1	Grady Gooch	P 4,639	Dr	120	6				Basalt
20E2	J. K. Pinkley	P 4,639	Dr		6				do.

in the Klamath River Basin

is shown on plate 2.7

determined by altimeter and map interpolation.

decimals were measured by the Geological Survey; those given in whole not known; plus measurement, static level above the surface.

turbine; T, turbine.
irrigation; N, none; O, observation; PS, public supply; RR, railroad;

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump (gpm) and its yield	Use	Chemical character of the water: Hardness as $CaCO_3$	Chemical character of the water: Chloride	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
P			N	N				Materials penetrated were pumice, 0 to 40 ft, rock 40 to 220 ft; no water encountered below 85 ft.
P	28.85	8/26/54	J, 20	D	14	4		Supplies motel.
C	28(?)	10/14/26	P, 25	RR				Diamond Lake station well; see table 2 for log.
U	80		J, 10	D				Supplies motel and service station.
U	91.49	8/26/54	S, 10	D	16	2		Supplies restaurant, service station and cabins.

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 28 S., R. 9 E.								
21E1	Brooks-Scanlon Co.	U 5,040	Dr	670	12	17	480	190	Basalt
	T. 29 S., R. 8 E.								
6N1	John Zbinben	P 4,620	Dr	115	6	80	100	15	Gravel
7R1	Southern Pacific Co.	P 4,640	Dr	128	8	64	96	32	Basalt
32L1	Weyerhaeuser Timber Co.	4,615	Dr		6				
34D1	J. O'Connor	P 4,620	Dr	52.5	6				Pumice
	T. 29 S., R. 10 E.								
19D1	Klamath Indian Reservation	P 4,600	Dr	185.5	8				
	T. 30 S., R. 7 E.								
6A1	Klamath Indian Reservation	P 4,790	Dr	205	6-4				
11G1	do.	P 4,625	Dr	122.8	6				
	T. 30 S., R. 8 E.								
6K1	Raymond Logging Co.	P 4,600	Dr	143	8	30			Sand, black

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	480	9/ 8/47	N	N				Originally supplied large logging camp; driller reports all basalt below 15 ft of pumice.
P)?)	40	1936	J, 10	D				Owner reports 100 ft of pumice overlies aquifer.
U	114 98.83	9/10/26 8/26/54	J, 20	RR				Yamsay Station well; see table 2 for log.
			P, 10	D, S				
P	28.28	8/19/54	N	O	20	3	46	See table 6 for record of water level.
U	23.80	8/31/54	N	O				Formerly supplied logging camp; see table 6 for record of water level.
U	184.95	9/27/54	N	O				Formerly used for large logging camp; see table 6 for record of water level.
U	56.74	8/27/54	P, 3	S, O				See table 6 for record of water level.
U	65	8/ /54	T, 20	Ind				Supplies steam crane used for loading logs.

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 30 S., R. 8 E. - Continued								
21H1	J. P. McAuliffe	P 4,535	Dr	34.7	2				Pumice
22D1	do.	P 4,540	Dr	90	6	50			Basalt
22G1	do.	P 4,525	Dr		6 (?)				
22K1	do.	P 4,530	Dr	65	6				
23A1	do.	P 4,545	Dr	59.1	6				
23E1	do.	P 4,525	Dr	190	6				
24R1	William Kittridge	P 4,530	Dr	100	6				
25M1	do.	P 4,525	Dr		6				

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	3.61	8/19/54	N	N				
C	F	7/28/54	N	N	25	2	45	Located in channel of Big Spring Creek; apparently drilled when stream was dry; well now flowing about 1,300 gpm; local residents report wells in marsh started flowing about 1951.
	F	8/24/54	N	N			43	Drilled in a branch of Big Spring Creek, probably when creek was dry; now flows about 400 gpm.
	10-20	9/ /52	P, 3	D				
	F	8/19/54	P, 10	S	20	2	43	Flow estimated at 100 gpm.
	F	8/24/54	N	S			43	Flows about 300 gpm, 1.5 ft above surface.
	F	10/ 2/52	N	S	22	2	43	Flows about 50 gpm; reportedly has been pumped at 800 gpm.
	F	8/19/54	N	D, S	32	5	42	Flow estimated at 100 gpm; a 3½-inch flowing stock well lies 50 ft northeast of this well.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 30 S., R. 8 E. - Continued								
30F1	Southern Pacific Co.	P 4,555	Dr	75	8		48	19	Sand
31C1	do.	P 4,554	Dr	70	12	63	21	43	Pumice and sand
	T. 30 S., R. 9 E.								
10P1	Hugh Knight	P 4,535	Dg		72				Pumice
17J1	do.	P 4,536	Dr	85.0	6	96			
25P1	Orrie Summers	P 4,540	Dr	200	6		12	130	"Conglomerate"
30H1	C. C. Pennio	P 4,530	Dr	234.0	8-6				
30K1	do.	P 4,525	Dr	365	6				
35B1	do.	P	Dr	104.0	6				
	T. 30 S., R. 10 E.								
10D1	William Kittridge	P 4,625	Dr	195.0	6				
18Q1	do.	S 4,580	Dr	76 (?)			30	46 (?)	Sand, black, and pumice

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	26 21	9/ 8/24 6/19/53	T, 200	RR				One of two Lenz Station wells; see table 2 for log.
U	21 21	10/11/26 9/19/53	T, 165	RR	15	2		
U	4.5	8/24/54	P, 3	N				
U	7.96	8/24/54	P, 3	D				
U	4		T, 15	D, S				Well penetrated pumice above aquifer and entered basalt at 142 ft; owner has similar well 200 ft west.
U	1.93	8/19/54	N	S				
C	F	8/19/54	N	S				Flows about 100 gpm; reportedly has been tested at 1,000 gpm.
U	13.53	8/24/54	J, 15	S				
U	25.03	8/24/54	P, 3	N				Known as Mayfield well.
U	42	1952	P, 5	D				Reportedly penetrated pumice to 10 ft, lava 10 to 30 ft, black sand and pumice 30 ft to bottom

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 31 S., R. 7 E.								
24C1	J. Ball	P 4,560	Dr	61	10	54	48	13	Pumice and sand
	T. 31 S., R. 8 E.								
5B1	L. Royce	P 4,510	Dr	110	2		100	10	Sand and gravel
7M1	W. M. Zumburn	P 4,510	Dr	62	10				Basalt(?)
19N1	Southern Pacific Co.	P 4,533	Dr	127	6		125	2	Gravel
	T. 31 S., R. 9 E.								
9G1	Klamath Indian Reservation	P 4,510	Dr	14.8	6				Pumice
15H1	Raymond Logging Co.	P 4,500	Dr D	85.5	6	90			do.
20A1	Klamath Indian Reservation	P 4,510	Dg		48				do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	25	7/23/53	J, 20	D				Supplies service station; see table 2 for log and table 4 for chemical analysis of water.
C	F	8/19/54	N	S		42		Penetrated pumice to 5 ft, and gravel and "quicksand" 5 to 110 ft; flow estimated at 55 gpm.
C	B	7/23/53	N	Irr				Started flowing in spring of 1952 for first time since drilled (1928); flow estimated at 700 gpm on July 23, 1953.
C	11.67	11/23/54	N	N				Well obstructed at 32.5 ft; materials encountered were pumice to 122 ft, sand rock 122 to 125 ft; gravel 125 to 127 ft, hard rock at 127 ft.
U	2.52	8/25/54	N	N				Formerly used for stock watering.
U	8.6	8/25/54	N	N				Well reportedly drilled in pumice and sand the entire depth; logging camp supplied from a shallow dug well.
U	5.0	8/25/54	P	N				Broken windmill over well.

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 31 S., R. 11 E.								
28D1	Mrs. Farnsworth	P 4,675	Dr	240	6		239	1	Sand, white
	T. 31 S., R. 15 E.								
32B1	Weyerhaeuser Timber Co.	U 5,724	Dr	1,040	8	80	766 1025		Lava, broken Sand, green
	T. 32 S., R. 6 E.								
36H1	C. F. Wilson	P 4,300	Dg	8	120	8	0	8	Gravel
	T. 32 S., R. 7 E.								
12K1	Southern Pacific Co.	P 4,524	Dr	62.5	8	62½	60	2½	Sandstone, soft
23A1	Mrs. Berrien	P 4,535	Dr	70	6				
24E1	do.	P 4,520	Dr	89.4	6	90			
36K1	Southern Pacific Co.	P 4,525	Dr	130	6				
	T. 32 S., R. 7½E.								
31N1	William Brewer	P 4,250	Dr	108	6	90	90	18	Sand
	T. 32 S., R. 8 E.								
9L1	Yamsay Cattle Co.	P 4,520	Dn		2				

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	100	1950	P, 10	D				Reported some water at a depth of 75 ft; dry from 75 to 239 ft.
U	741	1948	P, 20	Ind	14	22		See table 2 for log; a nearby well 361 ft deep did not reach water.
U			C, 10	D				Apparently receives infiltration from nearby Annie Creek.
U	18 7.71	10/11/26 11/23/54	P, 20	RR				Penetrated pumice, layered loose and solid to 55 ft, and sand 55 to 60 ft above aquifer.
U	9	1953	P, 3					Water has slight sulfur odor.
U	22.47	7/23/53	N	N				
			P, 100	RR				Has diesel-driven pump.
U	7	1934	J, 5	D				Materials were sand and blue clay above aquifer.
C	F	8/19/54	N	S				Flows about 10 gpm; well partially plugged.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 32 S., R. 8 E. - Continued								
29N1	Hunt	P 4,520	Dr	42.0	6				
30P1	do.	P 4,520	Dr	54.0	8				
	T. 32 S., R. 14 E.								
7A1	Chewaucan Land & Cattle Co.	P 4,990	Dr	300	6				
21E1	do.	P 4,998	Dg	12	24		10	2	Gravel
	T. 33 S., R. 6 E.								
13Q1	Seth Dixon	P 4,180	Dr	355	3				
36E1	do.	P 4,150	Dr	110	2				
	T. 33 S., R. 7½ E.								
4P1	Seth Dixon	P 4,210	Dr	164	3	160			
16R1	Bert Gray	P 4,182	Dr	220	2	200	196	24	Sand
17P1	Stewart Nicholson	P 4,190	Dr	410	3				

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	6.24	8/20/54	C, 10	S				
U	8.0	8/20/54	C, 10	S				Another driven, 2-inch domestic well 400 ft to the west.
			C	S				Reportedly drilled entirely in clay; no water below 70 ft.
U	7	1949	P	D	40	6		Yield insufficient for domestic use; nearby similar well used for stock.
C			C, 5	D				Flows part of the time.
C	F	11/19/54	N	N			42	Flows about 50 gpm.
C	1		J, 5	D				
C	+ 6.5	12/18/54	N	D			43	Penetrated layers of sand and clay to aquifer; wood encountered at 186 ft; flows about 20 gpm; see table 4 for chemical analysis of the water.
C	F	11/19/54	C, 5	D				

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 33 S., R. 7½ E.- Continued								
18Q1	E. Nicholson	P 4,190	Dr	280	3	280	279	1	Sand
22J1	Wood River Motel	P 4,170	Dr		2				do.
26E1	W. M. Zumburn	P 4,165	Dr	274	2	274	273	1	do.
32C1		P 4,155	Dr		2				
34G1	R. S. Loosley	P 4,150	Dr	260	2	160	259	1	Sand, black
35P1	Fred L. Pope	P 4,155	Dr	368	3	360	365	3	Gravel
	T. 33 S., R. 11 E.								
8J1	Yamsay Cattle Co.	U 4,800	Dr	150	6				"Rock"
9M1	do.	U 4,810	Dr		12				
	T. 34 S., R. 6 E.								
1A1	Bob Helms	P 4,150	Dr	190	3	180	180	10	Sand, coarse, black
1H1	Paul Wampler	P 4,145	Dr	90.5	6	85			Sand

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F	11/19/54	C, 15	D			43	Flows about 20 gpm.
C	+19.75	12/18/54	N	D			43	Supplies motel.
C	F	11/19/54	C, 15	D, S			42	Flows about 110 gpm.
C	F	12/18/54	N	N			44	Flow estimated at 10 gpm.
C	+16	1926	N	D			42	Penetrated a blue rubbery clay from 160 to 259 ft.
C	+18	1953	C, 5	D				Penetrated sand and mud to 355 ft and blue clay 355 to 365 ft.
C	4		N	N D				An adjacent similar well used for ranchhouse.
C	F	Mar. to July	C, 500	Irr				Water used on 400 acres of pasture.
C	F	11/19/54	N	D				
C	F	11/20/54	N	S			44	Flows about 100 gpm; a 2-inch well 50 ft to the north flows about 20 gpm.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 34 S., R. 6 E. - Continued								
11K1	Christian Church	P 4,145	Dr	145	6	88	142 7	3 84	Lava rock Gravel
	T. 34 S., R. 7 E.								
9J1	State of Oregon	S 4,190	Dr	221	6	42	9	212	"Rock"
22F1	Ruth Barfield	P 4,190	Dr	340 (?)	6	60			Sand, gray
22Q1	Forest Lumber Co.	P 4,190	Dr		6				
27H1	W. T. Oates	P 4,185	Bd	45	8	45	44	1	Sand with pebbles
30A1	R. P. Robinson	P 4,175	Dr	24.0	6		32	3	Gravel and sand.
33F1	Earl Hall	P 4,200	Dr	178	8	90			
33K1	Town of Chiloquin	P 4,188	Dr	425	10	10			Basalt
33K2	do.	P 4,188	Dg	36.7	36				
34J1	do.	S 4,196	Dr	1,350 (?)	10 (?)				

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F	11/22/54	N	N			44	Flows about 2 gpm; flow in casing apparently from lava rock at 142 to 145 ft; flow around casing from gravel at 7 to 84 ft; see table 2 for log.
U	18.9	2/16/55	J, 15	D, PS				Supplies Collier State Park.
			J, 2	D	30	6	50	Penetrated into rock at 12 ft.
C	F	7/31/54	N	N	15	4	63	Flows about 10 gpm.
			J, 5	D	25	4		Casing perforated near bottom.
U	4.56	11/20/54	C, 5	S				Penetrated 6 ft of soil, 4 ft loose boulders and sand, and 22 ft basalt boulders above aquifer.
U	27		T, 20	D				Supplies motel and cafe.
U	9	1940	T, 500	PS	30	2	50	Village well no. 2.
U	8.1	7/31/54		N				
U	11.09	7/31/54	T, 500	PS	20	4		Village well no. 1.

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 34 S., R. 7 E. - Continued								
34G1	C. L. Lorenz	P 4,186	Dr	465	6	100			"Sandy" zone in basalt
34Q1	Mrs. A. DeBortoli	P 4,185	Dg	10	48	10			Alluvium
	T. 34 S., R. 7½ E.								
2H1	W. M. Zumburn	P 4,155	Dr	250 (?)	2				Sand
4H1	Hawkins Cattle Co.	P 4,150	Dr	185	2				do.
	T. 34 S., R. 8 E.								
19L1	W. M. Bray	P 4,280	Dr	165	6				"Gravel"
24J1	Lee Hatcher	S 4,350	Dr	290	6				
28C1	R. H. Mettle	P 4,280	Dr	82	6		40		
33H2	M. D. Rafter	S 4,300	Dg	40	60				
36Q1	Edna Stanton	P 4,182	Dr	101.6	6				

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	1.02	8/ 2/54	N	O			66	Reportedly flowed when drilled in 1928; a productive second aquifer from 300 to 325 ft had water level below surface; see table 6 for record of water level.
U	7.5	7/31/54	J, 5	D	100	10		
C	F	11/19/54	N	S			43	Water contains some iron.
C	+11.25	2/19/54	N	D				Reportedly 11 similar wells used for stock on this 5,000-acre ranch.
C	4-5	3/ /54						Two similar wells on sawmill property--one south of river is 165 ft deep; one at buildings to north is 265 ft deep.
C	12.48	8/ 5/54	P, 2	S	40	2	53	Reported to be easily pumped dry.
C	4.96	8/ 2/54	C, 5	D	60	3		
			J, 10	D	40	2		Supplies summer camp.
U	7.44	8/ 9/54	P, 3	D	42	4	50	See table 6 for record of water level.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 34 S., R. 9 E.								
15[illegible]1	Yamsay Cattle Co.	S 4,500	Dr	600 (?)	6				
30[illegible]1	F. F. McCready	P 4,270	Dr	208	8	50			Sedimentary rock
3[illegible]1	Henry Wolf	P 4.260	Dr	92	6				Chalk rock
	T. 34 S., R. 11 E.								
34F1	Raymond Logging Co.	U 4,930	Dr	500	8				Basalt
	T. 35 S., R. 7 E.								
4F1	Amy Jackson	P 4,180	Dr	550	6				do.
4K1	do.	P 4,175	Dr		8				do.
5F1	Cora Crystal	S 4,195	Dr	723	12	10	500	223	do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	167+	8/ 5/54	P	S				
U	21.9	8/ 3/54	J, 10	D				Reportedly penetrated 2 thin layers of basalt; obtained water below basalt.
U	9.01	8/ 6/55	J, 3	D				Reportedly penetrated chalk rock (diatomaceous earth and volcanic ash deposits) for entire depth.
U	340	9/15/54	T, 30	D				Originally 270-ft dry hole drilled for Klamath Indian Reservation; penetrated through surficial basalt and long section of chalk rock to aquifer.
C	.27	8/ 3/54	N	N	45	3		
C	F	8/ 3/54	J, 20	D	20	5	61	Flows about 10 gpm.
C	26.40	11/20/54	J, 5	S				Tested at 600 gpm with 104 ft of drawdown after 4 hrs' pumping; see table 2 for log and table 6 for record of water level.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 35 S., R. 7 E. - Continued								
7D1	W. E. Davis	S 4,160	Dg	18	8	12	11	4	Gravel, coarse
7F1	Plantz Bros.	S 4,165	Dr	68	6		62	4	do.
17F1	Henry Wolf	U 4,298	Dr	138	6		40	98	Sand and gravel
17F2	do.	U 4,310	Dr	152	6				do.
22N1	K. W. Collins	P 4,180	Dr	80	6				Sand, fine
32J1	Ivan Doak	P 4,170	Dr	350	6	20	350		Sand
34N1	Mrs. Elsie Burton	P 4,160	Dr	510	12	156	175	3	Pea gravel
	T. 35 S., R. 8 E.								
12D1	A. Summers	S 4,300	Dr	240	6	60			
	T. 35 S., R. 9 E.								
6C1	Henry Wolf	P 4,280	Dr	200					Chalk rock

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	12	11/ /54	J, 5	D				Penetrated silt and sand to 11 ft, coarse gravel 11 to 15 ft, fine black sand 15 to 18 ft.
C			T, 40	Irr				Water irrigates 5 acres; see table 2 for log.
P	64.05	11/22/54	P, 30	S				Penetrated pea gravel 3 to 5 ft and clay 6 to 40 ft above aquifer.
P	117.08	11/22/54	N	S				About 300 ft north of well -17F1.
U	16.46	8/ 3/54	J, 10	D	45	4		Supplies house and service station.
C			J, 10					Penetrated a second water-bearing sand at 200 ft.
U	12	9/ /50	T, 640	Irr				See table 2 for log; test-pumped 1,500 gpm with 73 ft of drawdown.
C	63.47	8/ 9/54	P, 15	D, S				
C			P, 3	S	50	3		

Table I.– Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Water-bearing zone or zones: Thickness (feet)	Water-bearing zone or zones: Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 35 S., R. 9 E. - Continued								
10H1	Evelyn Cheraldo	P 4,280	Dr	80 (?)	6				
13N1	Calvin Barney	P 4,280	Dg	13	60	13			Alluvium
36E1	David G. Sheen	P 4,280	Dg	18.5	18	19			do.
	T. 35 S., R. 10 E.								
19B1	Ted Crume	P 4,350	Dr	360	6	70			Sand
21D1	do.	P 4,350	Dr	280	6				do.
31D1	Alfrater Bodner	P 4,285	Dr	62.2	6				
	T. 35 S., R. 11 E.								
22E1	L. G. Griffith	S 4,600	Dr		8				
24K1	J. R. Morgan	U 4,575	Dr	612	8	45			Chalk rock
30K1	L. G. Griffith	S 4,400	Dr	987	6				

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	9.96	8/ 2/54	P, 10	D				Former CCC well.
U	6.12	8/ 9/54	J, 5	D, S				
U	6.12	8/ 9/54	J, 5	D				
U	11.3	8/ 9/54	J, 10	D	60	5		See table 6 for record of water level; water level in dug well 50 ft east was 10.42 ft Aug. 2, 1954.
U	30.89	8/ 6/54	J, 20	S				
C	8.82	8/ 9/54	J, 10	D				
U	57.9	9/15/54	P, 15	S.				
C	80	1952	P, 18	D. S.				Penetrated mostly chalk rock for entire depth below surface basalt.
C	18	1953	N					Very little water; mostly chalk rock for entire depth.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 35 S., R. 12 E.								
26M1	J. Foster Estate	U 4,370	Dr	300 (?)	6				
27G1	Sam Godowa	P 4,380	Dr	500 (?)	6				
27Q1	Henry Noneo	P 4,365	Dr	500 (?)	6				
32G1		U 4,500	Dr	900 (?)	6				
34C1	Joseph Godowa	P 4,560	Dr		6				
35D1	Andy Foster	P 4,400	Dg	8.4	24				
	T. 35 S., R. 14 E.								
29D1	Mrs. F. Obenchain	S 4,500	Dr	100	6				
31J1	Harry Obenchain	S 4,390	Dr	109	6				
32N1	O. H. Osborn	P 4,380	Dr	270	8	93			
	T. 36 S., R. 6 E.								
3L1	Robert Sloan	S 4,243	Dr	80.2	6				Basaltic "cinders"
3P1	do.	P 4,155	Dr	116	6	116			"Quicksand"

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F	11/10/52 8/ 7/54	N	Irr			57	Flows about 75 gpm.
C	F	8/ 7/54	N	D, S			54	Flows about 15 gpm.
C	9.04 10.17	8/ 7/54 10/27/54	P, 3	D				
C	8.92	9/15/54	N	N				
C	F	8/ 7/54	N	N			56	Flows about 10 gpm.
U	.44	8/ 7/54	N	D				
			J, 5	D	120	18		
C	24.04	8/12/54	S, 10	D, S				
C	16	1954	J, 50	D				
P	46.28	12/ 1/54	N	N				
U	7.67	12/ 1/54	C, 3	D				"Quicksand" penetrated also at 40 ft.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 36 S., R. 6 E. - Continued								
10K1	Fish & Carlstrom	P 4,150	Dg		8				Alluvium
	T. 36 S., R. 7 E.								
4E1	E. Lang	P 4,150	Dr	130	6				
9B1	J. Miller	P 4,150	Dr	485	6	100			
9Q1	G. E. Johnson	P 4,150	Dr	280	6				Sand, fine
15K1	Tony Zadina	P 4,160	Dr	250	8	240	240 90	10 150	Basalt Alluvium
15K2	Lamm Lumber Co.	P 4,170	Dr	160	6				
15P1	J. L. Hoback	P 4,145	Dr	200	6	200	170	30	Gravel
15Q1	Wm. Helm	P 4,145	Dr	249	6	249	200	49	Sand, fine
	T. 36 S., R. 10 E.								
2P1	Irwin Crume	P 4,345	Dr	625	6				
3E1	Roy Ganger	P 4,335	Dr	340	6	40	230	110	Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	5.37	12/ 1/54	J, 5	D				
			J, 10	D				
U	20	1932	J, 5	D				Reportedly sand and silt most of the depth.
U	3.52	11/20/54	J, 10	D				
U	22.92	11/22/54	J, 20	D, Ind				Casing perforated from 90 to 240 ft.
				Ind			71	Formerly supplied nearby houses.
U	.5	9/ /54	J, 10					Penetrated sand, silt, and some gravel above aquifer.
U	2	9/ /54	J, 20					Has perforated liner 169 to 249 ft and pack of ¼-inch gravel.
U	14.12	8/ 2/54	J, 10	S	30	3	55	
U	3.99	8/ 9/54	J, 20	D, S	68	5		

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 36 S., R. 10 E. - Continued								
3Q1	Irwin Crume	P 4,340	Dr	400	6	44½			Sand and chalk
4B1		P 4,335	Dr		6				
6R1	Joe LaHoda	P 4,340	Dr	420	10-6	64½			Sand and pumice
9R1	H. T. Robbins	P 4,350	Dr	400 (?)	4				
9R2	do.	P 4,350	Dr	70	6	11	37	18	Sand, blue
11P1	Great Northern RR	P 4,310	Dr	600			570	30	Basalt
13F1	Ivy C. Clark	P 4,320	Dr	400	12	42	320	80	Sand, black
13G1	H. T. Robbins	P 4,325	Dr		12				
14D1	M. Carnini	P 4,345	Dr	260	8	36	225	35	Sand, black
14D3	C. R. Williams	P 4,345	Dr	122	6				

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	3-4	12/ /52	J, 20	D	30	4		Flowed during springs of 1952, '53, '54.
U	13.1	8/ 6/54		D				
U	22.4	8/ 2/54	N	N				Planned for irrigation; see table 2 for log.
U			P, 5	S	60	4	52	
U	12.02	8/ 9/54	N	N				See table 2 for log.
C	F	8/ 9/54	T, 300	RR	24	5	65	Penetrated chalk rock to 570 ft.
C	F	8/ 5/54	N	Irr	30	4	65	Reportedly flows 400 gpm and is used to irrigate 25 to 30 acres; penetrated chalk rock to 380 ft.
C	F	11/10/53 8/ 6/54	N	Irr	42	1	66	Water irrigates about 100 acres of pasture; see table 4 for chemical analysis of water.
U	17	7/ 4/49	J, 5	D	40	5		Supplies restaurant; see table 2 for log.
U	18.3	8/ 2/54	N	N				Not used for 3 years.

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 36 S., R. 10 E. - Continued								
14K1	Ivy C. Clark	P 4,345	Dr	500	12	84	400	100	Sand, black
14K2	do.	P 4,345	Dr	500	12	84	400	100	do.
29M1	Klamath Indian Reservation	U 4,710	Dr	440	6	234	405	35	Basalt
	T. 36 S., R. 11 E.								
8P1	Frank Gaularte	P 4,305	Dr	523	12	470	503	19	do.
12N1	Edwin Walker	P 4,320	Dr	260	6	61	221	39	do.
15L1	Frank Gaularte	P 4,325	Dr	260	16	180	180	80	do.
16Q1	do.	P 4,350	Dr		14				Basalt(?)

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	14	1938	T, 800	PS	80	3		Supplies 16 families; conglomerate penetrated to 14 ft, and chalk rock 386 to 400 ft.
U	25.9	8/ 5/54	N	N				Located 25 ft east of well -14K1; see table 6 for record of water level.
U	316	6/12/35	N	N				See table 2 for log.
C	+32.75	2/16/55						Reportedly flows about 1,200 gpm; penetrated chalk and sand to 504 ft.
C	1	5/ /51	P, 5	D	12	8	50	Penetrated chalk rock to 221 ft.
C	17	11/ /52	T, 3,000	Irr				Water level draws down 57 ft when 3,000 gpm is being pumped; chalk rock penetrated from surface to aquifer.
C	F	11/ /52 12/ /54	N	Irr	40	2	57	

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 36 S., R. 11 E. - Continued								
17B1	Frank Gaularte	P 4,325	Dr	386	20	105	368	18	Porous zones in basalt
17Q1	Oscar Capellen	P 4,345	Dr	468	12	64	400	68	do.
17R1	do.	P 4,328	Dr	330	12	97	280	50	Basalt
18C1	D. M. Hess	P 4,325	Dr	200	6				
18H1	do.	P 4,335	Dr	625	12	100	568	57	Basalt
18N1	H. T. Robbins	P 4,360	Dr	90	10				
25R1	W. M. Williams	P 4,380	Dr	223	16	96	122	100	Basalt

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F +28±	7/ /53 12/ /54	N	Irr			70	Flows about 4,000 gpm, water broke out in field ½ mile away when well was shut off in 1953; well used about 20 days per year; penetrated chalk rock to 260 ft, basalt 260 to 386 ft.
C	2.96	4/14/53	T, 1,500	Irr				Water level draws down 8 ft pumped at 1,500 gpm; penetrated chalk rock to aquifer.
C	F	7/22/53	N	D, Irr			70	Flows about 1,350 gpm; penetrated 280 ft of chalk rock above aquifer.
C	F	11/ /52	P, 35	D	30	2	64	
C	F	8/ 6/54	N	Irr	20	2	72	Reported 568 ft of chalk and clay above aquifer; flows about 400 gpm.
U	21.25	8/ 6/54	N	N				Drilled for stock well.
U	9.88	10/27/54	T, 2,200	Irr	60	3	54	Water irrigates 320 acres; water level draws down 46 ft when well is pumped 2,200 gpm; see table 6 for record of water levels; see table 2 for log.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 36 S., R. 11 E - Continued								
25R2	W. M. Williams	P 4,380	Dr	100	6				
	T. 36 S., R. 12 E.								
3J1	Beatty Hood Ranch	P 4,330	Dr	59.2	6				
4Q1	Mrs. Miller	P 4,345	Dr	630	8	220	600	630	Sand, black
7A1	D. Crume	P 4,325	Dr		6				
8A1	Steve Driscoll	P 4,325	Dr	280	6				
8B1	do.	P 4,325	Dr	300	12				
8J1	O. Smith	P 4,325	Dr		6				
9C1	L. L. Crawford	P 4,330	Dr	730	8	80	280 728	20 2	Sand do.
10H1	LeRoy Godowa	P 4,330	Dr	110	6				
12Q1	Weyerhaeuser Lumber Co.	V 4,340	Dr	130	8	40			Sand
13L1	Oregon, California & Eastern Ry.	P 4,335	Dg	14.5	42				

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	8.64	8/ 6/54	J, 10	D				
U	4.53	8/ 7/54	P, 3	N				
C	+69	12/19/54	N	D, Irr			53	Flows about 600 gpm.
C	F	8/ /54	N	D			52	Flows about 25 gpm.
C	F	8/ /54	N	D, S	44	6	52	
C	F	8/ /54	N	S	51	2	51	Flows about 10 gpm.
C	F	8/ /54	N	D, S			49	Flows about 5 gpm.
C	F	1956	N	Irr				Flow reported as 1,350 gpm when drilled; see table 2 for log.
C	F	8/ /54	N	D			53	Flows about 20 gpm.
C	15-18	5/ /54	J, 10	D				
U	12.22	8/11/54	P, 10	D				

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 36 S., R. 12 E. - Continued								
14M1	Beatty Recreation Hall	P 4,345	Dr	47.9	6				
23L1	Walter Scott	P 4,350	Dr	299	6				
	T. 36 S., R. 13 E.								
19C1	Quincy Baker	P 4,340	Dr		6				
22H1	Floyd Martin	P 4,335	Dr	165	6		150	15	Basalt breccia
	T. 36 S., R. 14 E.								
5D1	O. H. Osborn	P 4,360	Dg	28.1	30		6	24	Alluvium
10B1	F. W. Hyde	S 4,370	Dr	490	6		485	5	Basalt cinders
14B1	F. W. Obenchain	U 4,370	Dr	128	8				
17B1	F. W. Hyde	S 4,370	Dr	173.5	6				
20P1	John Roberts	P 4,320	Dg	16	36	16	4	12	Alluvium
22G1	F. W. Hyde	S 4,345	Dr	90	6				
25E1	Walter Campbell	S 4,360	Dr	140	6				Basalt(?)

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	3.21	8/10/54						See table 6 for record of water level.
C	3.15	8/10/54	P, 5	D, S				
U	16.98	8/10/54	T, 30	D				
U								Penetrated soft material to 100 ft; basalt 100 to 150 ft.
U	7.25	8/12/54	J, 5	D				
U			P, 35					Basalt encountered at surface.
U			P, 10	D	72	2		
U	51.55	8/12/54	J, 15	D				See table 6 for record of water level.
U	9.32	8/11/54	C, 5	D				Flows above basement floor in winter.
U	30±	1954		D				
U			P, 10	S				Owner has similar 160-ft well $\frac{1}{4}$ mile west.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 36 S., R. 14 E. - Continued								
27P1	Henry Gerber	P 4,340	Dr	438	18	80	285	153	Lava rock
29J1	William Tucker	S 4,345	Dr	100	6				
34F1	Spangler Lumber Co.	P 4,350	Dr	300	12	88	104	196	Basalt
34P1	Bly Water Co.	P 4,350	Dr	204	10	50	200	4	Basalt, creviced
35P1	Basil Hall	P 4,340	Dr	600	6				
	T. 37 S., R. 8 E.								
25B1	Algoma Lumber Co.	S 4,150	Dr	120	5				"Sand"
	T. 37 S., R. 9 E.								
4B1	R. D. Dehlinger	U 4,150	Dr	353	6		316	34	Broken lava
31F1	L. H. Redhead	P 4,150	Dr	80	[illegible]				Sand
31K1	A. R. Porter	S 4,160	Dr	64	6	55			Boulders (talus rubble)

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	8	9/21/56		Irr				Test pumped 2,020 gpm for 3½ hrs with 47 ft of drawdown; see table 2 for log.
U	13.48	8/11/54	J, 5	D, S	29	2		
C	9	6/ /50	T, 500	Ind	88	3		Penetrated soft material to aquifer; water used to fill millpond.
C	27	1928	T, 125	PS	88	6	60	Flowed when first drilled; penetrated basalt to 200 ft; supplies 130 customers; water level draws down 5 ft after well is pumped 125 gpm for 4 hrs.
			J, 10	D				
U	8	5/ /36	N	N				
U	331	10/ /49		S				See table 2 for log.
U	12	1954	J, 5	D				Penetrated hardpan and rock rubble to aquifer.
U	18	1954	J, 5	D				

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 37 S., R. 9 E. - Continued								
36H1	Marshall Bros.	P 4,220	Dr	250	8	21	246	4	Broken lava
	T. 37 S., R. 10 E.								
7R1		S 4,270	Dr						
8E1	A. R. Devincenzi	S 4,320	Dr	159.7	10				
14N1	do.	S 4,220	Dr	123.0	10				Broken lava
18H1	Fred Coleman	P 4,220	Dr	120	10		115	5	"Gravel" (tuff)
19H1	H. D. Whiteline	P 4,206	Dr	155	6	30	145	10	Black "gravel"
25E1	L. M. Hawkins	P 4,180	Dr	365	16	272			Brown "sand"
29K1	A. R. Devincenzi	P 4,187	Dr	100.1	10				
29K2	do.	P 4,186	Dr	800	18		800	(?)	Yonna formation
							135	20	"Gravel"

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	45±	8/ /49		S				Reportedly bailed at 50 gpm with drawdown of 15 ft; see table 2 for log.
	79.60	7/28/54	T, 1,500	Irr				
U	130.10	11/17/49		N	60	3		To be test-pumped for irrigation when electric power is available.
C	54.95	11/17/49	P	S				
C	60±	7/ /48	P	D, S				Test-pumped at 180 gpm; owner reports sands and gravels above aquifer.
C	33.20	11/17/49	P	D, S	60	3		Yields 12 gpm with 2 ft of drawdown; see table 2 for log.
C	16.26	7/20/49		S	65	5		Driller states well drilled to 615 ft and it filled with sand to 365 ft; once test-pumped at 1,400 gpm with 93 ft of drawdown.
P	9.98	7/20/49	P	S	65	5		See plate 8 for record of water level.
P	28.01	11/19/49	P	S	70	3		Penetrated into Yonna formation at 800 ft but did not obtain a good yield; see plate 8 for record of water level.
P								

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 37 S., R. 10 E. - Continued								
30B1	Fred Coleman	P 4,205	Dr	98.6	16	55	32	66	Black "cinders and gravel" (tuff strat
31E1	Marshall Bros.	P 4,200	Dr	1,800	16-12	600			Sedimentary rocks
36H1	L. M. Hankins	S 4,190	Dr	125	6				"Gravel"
	T. 37 S., R. 11½ E.								
16R1	J. C. Crawford	U 4,250	Dr	222	6	40			"Sand"
24H1	S. K. Hartzler	U 4,324	Dr	487	6	42	440	10	Porous lava rock
35H1	James Nail	U 4,230	Dr	235	6				
	T. 38 S., R. 9 E.								
7F1	Harry Loeber	P 4,150	Dr	43	6		42	1	Basalt
7G1	J. R. Casson	P 4,160	Dr	84	6				

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	23.11	8/22/49	T.	Irr	50	3		Water level draws down 17 ft when well is pumped at 2,000 gpm; see table 2 for log and table 4 for chemical analysis.
U	51	9/ /53	N					Penetrated Yonna formation; obtained unsatisfactory yield.
P	30.34	11/18/49	P	S				
C	120+	11/ /49	P	D, S				Owner reports well drilled in sedimentary materials entire depth and stopped in caving sands.
C	100.43	4/ 3/48	P	D, S				Unsuccessful test well for irrigation; see table 2 for log.
	97±	11/ /49	T	D, S	60	4		Water level draws down 41 ft when well is pumped at 50 gpm.
U	6	1954	J, 5					Penetrated gray cindery rubble to 18 ft, boulder rubble 18 to 40 ft, and basalt to 42 ft.
U	17.77	12/ 1/54	J, 5	D	78	6		

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 9 E.- Continued								
7Q2	J. L. Pinion	P 4,145	Dr D	21	10		21	1	"Cinders" basaltic
7M1	M. VanderHoff	P 4,150	Dr	192	8				"Gravel"
19A1	C. A. Tobins	S 4,330	Dr	190	8	52	115	5	Tuff, cindery
19A2	Gino Carnini	S 4,400	Dr	330	8	60			Basalt
20L1	Wright and Bebout	S 4,350	Dr	235	8	100			Sand, black
20M1	H. M. Rush	S 4,340	Dr	310	8				
20N2	do.	S 4,315	Dr	290	6	60			
28D1	E. M. Igl	S 4,225	Dr	346	8	344	344	2	Basalt
28D4	John R. Howard	S 4,290	Dr	515	8	401	425 460	20 48	do.
28F1	U. S. Veterans Administration	S 4,435	Dr	409+	12				do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	2.5	1954	J, 15	D				Penetrated soil to 10 ft and basaltic rock to aquifer.
U	12	1946	T, 25	D	48	6		Supplies motel, restaurant, and service station.
P	68.43	12/11/54	T, 30	D	50	4		Supplies motel; see table 2 for log.
			J, 20	D				Supplies motel.
			S, 15	D				Water is warm and soft.
P	74.65	12/11/54	P, 3	D				Pumped with windmill; used during power failures.
P	57.94	12/11/54	S, 15	D	66	6		Located 200 ft west of well -20M1; penetrated bouldery rubble to 90 ft.
P	40	1950	N	H			206	One of many similar wells in this locality for domestic heating by the thermosyphon method.
U	181	2/ /54	N	H			198	See table 2 for log.
U	295	12/21/54	N	N			205	Drilled for planned hospital.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 9 E. - Continued								
28L1	F. H. Marks	S 4,230	Dr	358	8	195	310	1	Basalt
28M2	John Rose	S 4,125	Dr	398	8	184	192	206	do.
28N1	Medo-Land Creamery	P 4,110	Dr	765	8 6	358 489	529	24	"Shale"
28N6	Klamath Senior High School	P 4,110	Dr	240	14	120½	223	5	Basalt, soft
28N7	do.	P 4,116	Dr	212	10	72½			do.
28N8	F. C. Clark	P 4,110	Dr	228	10-8	90	208	20	Basalt
28N9	Oregon State Highway Dept.	P 4,110	Dr	419	12	307	307	112	do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	134	7/ /40	N	H			223	See table 2 for log.
U	15.8	9/ /40	J, 15	H			165	Water is pumped through house radiators for heating.
C	F	12/22/54	J, 50	Ind			180	Water used for pasteurizing milk and for hot water in plant; see table 4 for chemical analysis of water and table 2 for log.
C	F	12/ /54	T, 350	H			186	Used to heat part of school; reportedly flows 200 gpm.
C	+10±	12/ /54	T, 350	H			186	Return heating water from well -28N6 discharged into this well; reportedly flows 200 gpm; natural flow used to fill swimming pool; located 150 ft southeast of well -28N6.
C	F	12/ /54	C, 10	H			173	Flows about 7 gpm; pump used to increase circulation in well; penetrated "chalk" to 90 ft and "rock" 90 to 208 ft.
C	F	1948		H			150-190	Water heats pavement of underpass.

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 9 E. - Continued								
28P2	J. E. Friesen	P 4,110	Dr	564	8	260½	275	178	Basalt
29J2	Balsiger Motors	P 4,155	Dr	272	10	31	215	57	do.
32A1	Cascade Hotel	P 4,106	Dr	650	10	150			
32E1	Oregon Water Corp.	P 4,088	Dr	90	12	74			
32E2	do.	P 4,088	Dr	90	12	76			
32E3	do.	P 4,088	Dr	190	12-8	140			
32E4	do.	P 4,088	Dr	93	10-8	90	86	7	Basalt breccia
32E5	do.	P 4,088	Dr	75	12	52	52	23	do.

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	+11	8/20/44	C, 25	Ind, H			204	Flows about 40 gpm; used for self-service laundry and heating of commercial building; see table 2 for log, and table 4 for chemical analysis.
				H			181	Drilled for standby in case hot spring (-29J1) goes dry; see table 2 for log.
C	F	12/ /54	N	N	18	22	102	Drilled for heating proposed motel; not used; believe water not hot enough; test-pumped at 400 gpm.
	F		C	PS			69	City well no. 1.
	F		C	PS			69	City well no. 2.
	F		C	PS				City well no. 3; wells 1, 2, and 3 connected to same suction pump; combined yield of 1,530 gpm with 20 ft of drawdown.
C	F		C	PS				City well no. 4; see table 2 for log.
C	F		C, 500	PS			69	City well no. 5; total of 1,830 gpm pumped from wells 1, 2, 3, 4, and 5 with 18 ft of drawdown.

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 9 E. - Continued								
32E6	Oregon Water Crop.	P 4,088	Dr	147	13	57	40	107	Tuff agglomerate
32E7	do.	P 4,088	Dr	370	13	73	30	250	do.
32E8	do.	P 4,087	Dr	845	16	168	587	12	Basalt
32G1	Consumers Heating Co.	P 4,095	Dr	258	12				
32H1	Ellington Lumber Co.	P 4,093	Dr	342	6	290	304	3	Basalt and sandy "shale"
32H2	Ed Dunham	P 4,093	Dr	325	4		320	5	Sand
32H3	A. W. Newton	P 4,092	Dr	240	6	150			

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F		C, 1,000	PS			69	City well no. 6- see table 2 for log.
C	F		C	PS			69	City well no. 7.
C	+9	1930	C	PS				City well no. 8; flows about 1,200 gpm; total of 6,020 gpm pumped from wells 6, 7, and 8 with 16 ft of draw-down; see table 2 for log.
U	30	10/ /53	T, 150	Ind				Supplies water for boiler feed; pumped 3 million gallons in 1953; reportedly pumped 150 gpm for 12 hrs with a draw-down of 40 ft.
C	F	4/ /42	T, 50	Irr	46	6		Driller reports well flowed 12 gpm when drilled; now used to irrigate lawn; owner reports sprinklers become plugged with sand.
C	F	12/ /54	N	D			72	Flows about 10 gpm; enough natural pressure for domestic use.
C	+40	8/ /54	N	Irr			72	Used to irrigate lawn.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 9 E. - Continued								
32H4	Oregon Water Corp.	P 4,092	Dr	845	20	240	355	415	Basalt
33C1	M. K. Lucas	P 4,100	Dr	362	6				
33C3	Warren Poole	P 4,100	Dr	545	10	300	480	65	do.
33D1	Lois Merruys	P 4,100	Dr	528	10	100			do.
33E1	Klamath Ice Co.	P 4,100	Dr	1,100	6	40	800	2	Sand
33G1	N. A. Welman	P 4,110	Dr	525	6	472	472	53	Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F	7/ /54	N	N			75	City well no. 9; water level reported to draw down 90 ft when well was bailed at 50 gpm at 770 ft; little water reported below 770 ft; see table 2 for log.
C	F	12/ /54	N	H	66	57	195	Flows about 20 gpm; well water wasted after passing through house radiators.
C	+8	1954	N	H			202	Flows about 10 gpm; well water wasted after passing through house radiators.
C			C, 10	H			160	Water used to heat concrete floor of garage by thermo-syphon; pumped to keep water hot; see table 4 for chemical analysis.
C	+6	1954	C, 15	H			125	Water used to prevent frost damage to foundations of ice plant and to heat part of building by thermosyphon; see table 4 for partial chemican analysis; well penetrated chalk rock for entire depth above and below aquifer.
C	F	12/ /54	N	H			180	Thermosyphon system used to heat domestic water and to heat floor and driveway; water wasted to sewer.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 10 E.								
9N2	George R. Stacy	P 4,190	Dr	284	12	60			Alluvium; lava rock
13D1	L. M Hankins	P 4,192	Dr	220.9	16	40	216	5	Red cinders
15N1	Klamath County	P 4,198	Dr	73.9	5	50			
20D1	Dave Liskey Estate	P 4,400	Dr	1,140	12				
25A1	G. C. Mitchell	P 4,190	Dr	524	14	329	520	4	Lava boulder and cinders
26C1	Dave Liskey Estate	P 4,221	Dr	582	16	15	560	21	Porous lava rock
	T. 38 S., R. 11 E.								
5P1	Leonard Ritter	U 4,252	Dr	200	16	12	181	19	Broken lava rock
6B1	Freida Woelk	P 4,240	Dr	245	8	20	135		Sand
6N1	J. P. Colahan	P 4,198	Dr	325	16	18	315	10	Cinders

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
P	63.45 96.44	7/20/49 1/ 4/52	T, 1,500	Irr	70	7		Deepened into basalt bedrock in 1951 and 2,000-gpm capacity obtained.
U	77.29 79.70	7/21/49 11/19/40		S, Irr	90	12		After 3 hrs' pumping at 1,600 gpm water level draws down 19 ft; see table 2 for log.
P	18.38	7/18/49		O	65	4		Located in county right-of-way; see plate 8 for record of water level.
		7/ /49		N				Dry hole.
U	83	9/ /49		Irr				Test-pumped at 2,048 gpm with drawdown of 7 ft after 5 hrs; gravel-packed from adjacent pilot hole; see table 2 for log.
U	125.55	7/19/49		Irr				Test-pumped at 700 and 2,165 gpm when at 282 and 560 ft respectively; drawdown was 2.5 ft at the latter rate.
U	129.38	4/ 2/48	T, 1,600	Irr				Well yields 1,600 gpm with drawdown of 2 ft after 5 min; see table 2 for log.
P	82.80	11/15/49	J	D	85	3		Reportedly drilled in sedimentary materials for entire depth
U	82	5/ /49	T, 1,600	Irr				Test-pumped at 1,000 gpm with drawdown of 15 ft after 2 hrs;

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 11 E. - Continued								
7B1	S. Hartzler	S	Dr	194	20				Basalt
7C1	Christine Williams	P 4,200	Dr	586	16	42	567	19	Broken lava rock
7M1	Louis Tofel	P 4,205	Dr	260	12		242	18	Red and gray cinders
9K1	Cox Bros.	S 4,370	Dr	320	8		310	10	Lava rock
17A1	do.	S 4,320	Dr	220	16				do.
18D1	Ernie Ritter	P 4,182	Dr		12	100			
31B1	Haskins & Co.	S 4,183	Dr	178	16	20	55	120	Broken lava rock
31R1	Fred Rueck	P 4,156	Dr	226.8	10		85	77	Sandstone seams in yellow shale
31R2	do.	P 4,160	Dr	211	6	178	210	1	Broken lava rock

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	105.55	7/30/54	T, 3,200	Irr				
U	84.92	7/20/49	T	Irr				Test-pumped 1,400 gpm with drawdown of 19 ft; static water level of 94 ft at depth of 367 ft during drilling in April 1949.
U	88.64	7/20/49	T	Irr				Yields 1,000 gpm; see table 2 for log.
U	297	1952	P, 5	S				Penetrated loose overburden to 61 ft and lava rock to bottom.
U	175	1953	T	Irr				
U	66.24	7/20/49	T	Irr	48	2		Yields 2,000 gpm.
U	68.68	7/20/49	T	S, Irr	50	3		Yields 1,200 gpm with drawdown of 2.8 ft; driller reports "sandstone" over aquifer.
P	33.89	11/16/49	P	N	150	13		Abandoned; owner states cattle won't use water because of its gassy nature.
U	45±	6/ /49	J	D, S				Yields 300 gpm; cased through "bad water" at 87 to 164 ft.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 11½ E.								
2P1	J. Angel	P 4,172	Dr	404	6	40	388	16	Lava rock
2Q1	do.	P	Dr	583	18	31	556	27	do.
3J1	J. N. Drew	P 4,190	Dr	194	16	20	110	84	Broken porous lava
6E1	L. M. Hankins	S 4,190	Dr	224	16		174	40	do.
7Q1	do.	S 4,200	Dr	200	16				do.
10F1	J. N. Drew	P 4,178	Dr	285	6	40	272	13	Broken lava rock
11H1	Bradley Estate	P 4,160	Dr	224	16	20	214	10	Broken, porous lava rock
12E1	Joe Vierra	P 4,180	Dr	280	16	8	272	8	Broken lava rock
12M1	Frank Challis	P 4,156	Dr	425	12	18	401	24	Porous lava rock

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	44.15	11/15/49	J	D	80	3		Diatomaceous earth and associated sedimentary materials overlie aquifer.
U	71.57	7/27/54	T, 1,400	Irr	180	4		
U	70.91	7/19/49	T	Irr				Yields 2,500 gpm; driller reports mostly "chalk" overlies aquifer.
U	89.65	4/23/52	T	Irr				Located on foot of escarpment talus.
U	98.15	4/23/52	T	Irr				
[illegible]	33.62	7/19/49		S	85	3		Driller states all "chalk" down to aquifer.
U	45.36	4/ 1/48	T, 1,700	Irr	65	3		Water level drew down 10 ft after well was pumped at 1,650 gpm for 3 min; see table 2 for log.
U	64.84	4/ 3/48	T, 1,100	Irr				Drawdown 6 in. after 3 hrs' pumping at 1,500 gpm; see table 2 for log.
U	41.44	4/ 1/48	T, 1,200	D, S	55	12		Drawdown 10.5 ft when well was pumped at 300 gpm; water reported in motion when pump was idle; see table 2 for log and table 4 for chemical analysis.

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 11½ E. - Continued								
12M2	Frank Challis	P 4,162	Dr	150	12	5	148	2	Red porous lava rock
13G1	R. M. Robertson	P 4,159	Dr	183	16		161	22	Broken lava rock and cinders
13N1	William Konig	P 4,155	Dr	600	20	16			Diatomaceous ash
13P1	do.	P 4,151	Dr	475	16	16	468	17	Broken lava rock and cinders
15C2	Orrin Hankins	S 4,200	Dr	60	6	22	19	41	Broken lava rock
15R1	L. M. Hankins	P 4,198	Dr	495	12		362	133	Lava rock and cinders
23F1	Cliff Sewald	P 4,170	Dr	286	12	14	225	61	Porous lava rock

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	46.58	8/22/49		N	145	5		Test-pumped at 500 gpm with 73-ft drawdown; may be deepened; see table 2 for log and plate 6 for record of water level.
U	45.35	4/ 1/48	T, 1,600	Irr				Yields 1,600 gpm with drawdown of 6.5 ft immediately after pumping begins; see plate 6 for record of water level.
P	22.52	4/ 2/48		N	95	5		"Dry"; has shallow seepage water only; "chalk" extends to bottom; see plate 8 for record of water level.
U	36.67	4/ 2/48 7/21/49	T, 1,600	Irr	60 50	11 3		Reported to draw down 5 ft when pumped.
U	2.20	11/13/49		D, S	50	4		Test-pumped at 300 gpm with 10 ft of drawdown after 3 hrs; 19 ft of blue clay over aquifer.
U	78.05 77.91	4/ 2/48 7/19/49	T	Irr	 145	 3		Test-pumped 1,200 gpm with drawdown of 5 ft; see table 2 for log and plate 6 for water-level record.
U	51±	8/ /48	T, 1,600	Irr	55	3		Yields 1,600 gpm; drawdown is 17 ft after 1 min of pumping; water sample for field analysis taken July 19, 1949; see table 2 for log.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 11½ E. - Continued								
24E1	Virgil Schmoe	P 4,166	Dr	996	20		880	119	Lava rock and cinders
24P1	Haskins & Co.	P 4,150	Dr	984	18	40	984	11	Broken burnt lava rock
25E1	Richard Hoeffler	P 4,149	Dr	276			194	82	Lava rock
26H1	Cliff Seward	P 4,162	Dr	191	20	20	183	8	Broken lava
29B1	L. M. Hankins	S 4,206	Dr						Lava rock
29J1	Guy Barton	S 4,207	Dr	136	16	60	100	36	Porous lava rock
30M1	L. M. Hankins	S 4,215	Dr	281	16		223	22	Lava rock
30Q1	W. L. Whytall	P 4,217	Dr	175	14	120	157	18	Broken lava rock and cinders
30R1	do	P 4,190	Dr	145	12		123	22	Cinders
32G1	L. L. Porterfield	P 4,185	Dr	197	16	64	130	67	do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	53.20 52.83	7/19/49 8/22/49	T	Irr	325	75		Test-pumped at 2,000 gpm with 26 ft of drawdown after 4 hrs; chemical analysis of water from dipped sample; see table 2 for log.
U	37.67	7/19/49	T	Irr	75	7		Test-pumped 2,100 gpm with 42 ft of drawdown.
U	33.80	7/19/49	T, 1,600	Irr				Driller reports 194 ft of "chalk" over aquifer.
U	47.02	7/18/49	T	Irr	50	4		Yields 3,000 gpm with 7 ft of drawdown;
	108	4/23/52	T	Irr				
U	94	9/ /49	T	Irr	75	10		Test-pumped 1,450 gpm with 4 ft of drawdown.
U	93.42	4/23/52	T	Irr				
U	103.43	4/ 2/48	T, 1,100	Irr	60	10		Yields 950 gpm; see table 2 for log; see table 4 for chemical analysis and plate 7 for record of water level.
U	85±	1933	T, 1,000	Irr				Yields 875 gpm.
C	72.20	4/ 2/48	T, 2,000	S, Irr				Yields 1,500 gpm with 8 ft of drawdown; see table 2 for log.

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 38 S., R. 11½E. - Continued								
33F1	Bud Lee	S 4,210	Dr	96	6				Basalt
33L1	Guy Barton	S 4,230	Dr	200	16				do.
34D1	V. E. Grise	S 4,135	Dr	57	10				do.
34F1	L. J. Horton	S 4,121	Dr	55.1	16		18	39	Broken lava rock and cinders
36D1	R. Hoeffler	P 4,158	Dr	470	18				
36R1	F. Rogers	P 4,132	Dr	252	6	80	224	28	Lava rock
	T. 38 S., R. 15 E.								
32N1		U	Dr	39.5	8				Basalt(?)
	T. 39 S., R. 7 E.								
22E1		S 4,700	Dr	300	10?				
36R1	G. L. Moore	S 4,120	Dr	108	6				Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
	66+	1946	J	D, S, Irr	55	4		Yields 100 gpm; water sprinkled on small field.
	117.80	11/19/49		Irr	60	4		Test-pumped 1,400 gpm with drawdown of 1 ft.
	22.22	11/19/49	J	D, S	75	4		Supplies irrigation water for sprinkling small field.
U	8.55	7/18/49	T	Irr	50	4		Test-pumped at 3,000 gpm.
C	45.66	8/22/49		Irr	225	9		Drilled for oil prospect; 30-inch hole to 1,580 ft; now cleaned out to 470 ft; reported yield 1,500 gpm; chemical analysis made of a dipped sample.
C	22+	1949	J	D, S	105	14		Driller reports sedimentary materials over aquifer; iron in water stains fixtures.
U	5.15	9/ 1/54		D				
	297±	10/ 6/54	P	N				Former sawmill well.
U	56	1954	J, 15	D				

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 7 E. - Continued								
36R2	E. Z. Howard	S 4,110	Dr	204	6	25			Basalt
	T. 39 S., R. 8 E.								
1P1	Charles M. Ohles	P 4,175	Dr	148	12				"Gravel"
6F1	L. W. Soukup	U 4,250	Dr	170	20	98	161	9	Basalt
11M1	Lee Holliday	S 4,250	Dr	148.5	8				
12R1	H. W. Leitzke	S 4,185	Dr	270	6				
13A1	do.	S 4,160	Dr	110	8	110	98	5	Sand, black
13J1	Weyerhaeuser Timber Co.	S 4,120	Dr	817	12	194	229	51	Basalt
14Q1	L. A. Smith	S 4,130	Dr	150	6	50			Gravel
22L1	D. E. Colwell	S 4,240	Dr	283.5	8	36			Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	25	1939	J, 5	D	226	24		
U	50	1948	T, 350	Irr				Irrigates 80 acres by sprinklers.
U								Driller reports well test-pumped at 3,500 gpm; now used to drain Round Lake underground; see table 2 for log.
U	125.16	12/ 6/54	N	N				Well of former rock-crushing plant.
			P, 20	PS				Leitzke Water Service well no. 1; small yield; supplies only 5 houses.
U	90	1950	T, 100	PS				Leitzke Water Service well no. 2; casing perforated 90 to 110 ft; supplied 25 houses with 2½ million gals. of water in 1953; see table 2 for log.
U	28	10/ /54	T, 100	Ind			60	Company's well no. 2; water used in sawmill and fiber-board plant; see table 2 for log.
U	18	1949	J, 20	D				
U	111.9	12/ 6/54	N	N				Tested at 60 gpm; drilled for irrigation; yield insufficient.

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 8 E. - Continued								
22Q1	D. E. Colwell	S 4,135	Dg	50.9	48				Alluvium
	T. 39 S., R. 9 E.								
7H1	W. T. Mann	S 4,225	Dr	250	4	250?			Basalt
7K1	Suburban Water Co.	S 4,250	Dr	400	10				Basalt(?)
7K2	do	S 4,250	Dr	400	10				do.
7M1	F. M. Summers	S 4,200	Dr	180	6				do.
7M2	Robert Andrews	S 4,250	Dr	131	6	40			do.
7N1	Fred A. Raddis	S 4,250	Dr	281	10				Sand(?)
7Q1	Bratton Packing Co.	S 4,225	Dr	365	8				
8F1	G. B. Schaenzer	S 4,140	Dr	128	6	8	110	18	Basalt
9R1	Great Northern Ry.	P 4,093	Dr	336	10	208	263	73	do.

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	42.54	12/ 6/54	P, 10	N				Has supplied water at rate of 4,000 gpd.
U	60	7/ /50	S, 20	D				Supplies motel; owner has similar well 120 ft to the south.
			T, 150	PS				Owner's well no. 1; system supplies approximately 225 customers.
			T, 50	PS				Owner's well no. 2; located 75 ft west of well -7K1.
	64	7/ /54	J, 35	D				Supplies 3 houses.
			J, 20					Supplies 7 houses and cafe.
C	80	1954	J, 30	D				Owner reports mostly "chalk rock" above aquifer.
			J		100	26	66	Old 80-ft well located 200 ft to the north.
U	50	2/ /40	J, 15	D	160	8		Supplies 2 houses and service station; penetrated basalt entire depth.
U	8 8	6/16/31 12/17/32	N	N			102	Well destroyed; water reported too hot; see table 2 for log.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 9 E. - Continued								
9R2	Great Northern Ry.	P 4,093	Dr	475	12	200			Basalt
12B1	G. F. Hillyard	P 4,175	Dr	140	6		120	20	Sand, black
14M1	C. R. Jacobson	P 4,100	Dr	84	6	40			Basalt
16E1	T. P. Packing Co.	P 4,095	Dr	618	8	39	35 611	150 7	"Clay" Basalt
16J1	E. B. Milani	P 4,080	Dr	500	6				
17M1	C. L. Hunt	P 4,085	Dr	332	8	41	315	17	Shale(?)
18B1	O. C. George	S 4,110	Dr	150	8				Basalt
18E1	Holliday Water System	S 4,230	Dr	280	8				
18M1	Weyerhaeuser Timber Co.	S 4,175	Dr	177	10	177	89 154	44 23	"Gravel" Basalt
18M2	do.	P 4,180	Dr	545	12	276	415	130	Lava rock

in the Klamath River Basin - Continued

Ground-water occurrence	Water level		Type of pump and its yield (gpm)	Use	Chemical character of water		Temperature (°F)	Remarks
	Feet below land-surface datum	Date			Hardness as $CaCO_3$ (ppm)	Chloride (ppm)		
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	6.31	12/ 3/54	T, 100	RR	20	38	95	Located 75 ft southeast of site of well -9R1.
U	7±		J, 10	D				
U	15	1947	J, 10	D			90	
U	8	10/10/54		Ind				Water level draws down 32 ft when well is bailed at 30 gpm; see table 2 for log.
U	.69	12/ 3/54	N	N				Test-pumped at 25 gpm; water contains considerable gas.
U	15	10/ /49	J, 5	D				
U			J, 10	D				Penetrated basalt for entire depth.
			J, 50	PS			66	Supplies 30 houses and 2 apartment buildings.
U	89.9	10/26/54	T, 170	Ind	33	5	70	Owner's no. 3 well; water level draws down 5½ ft after well is pumped at 170 gpm for 18 hrs; an average of 90,000 gpd is pumped; owner's analysis shows no iron in water; see table 2 for log.
U	94	10/26/56		Ind			69	Owner's no. 4 well; test-pumped at 1,225 gpm for 3-2/3 hrs with 13-3/4 ft of drawdown; see table 2 for log.

Unpublished records subject to revision

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 9 E. - Continued								
19D1	Weyerhaeuser Timber	P 4,086	Dr	795	12 10	100 573			Sand and silt
21A1	Joe Wright, Sr.	P 4,088	Dr	648	6	60			Sand
21B1	Joe Wright, Jr.	P 4,088	Dr	300	6	110			"Clay, blue"
21D1	V. E. Warren	P 4,090	Dr	300	6		120	3	Sand, black
21F1	Bill Grey	P 4,089	Dr	422	6				Gravel
22M1	A. E. Gross	P 4,086	Dr	400	10-8	17			"Clay," blue
23A1	J. E. Williams	P 4,097	Dr	172	6	40			Sand
23A2	do.	P 4,097	Dr	550	6				"Clay and tules"

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
			N	N				Abandoned; sanded up in 1946; yielded 300 gpm when 586 ft deep and 200 gpm when 795 ft deep, with 10-inch liner perforated 153 to 455 ft; see table 2 for log and table 4 for partial analysis of the water.
U	12	1935	J, 10	D				Owner reports 500 to 600 ft of "chalk rock" above aquifer.
U	12	1932?	P, 10	B, S			53	Penetrated "blue clay" entire depth.
U	12	1954	N	D				Being drilled; water at 120 ft contains iron and sulfur; mostly blue clay and silt above and below first aquifer.
U	20	1953	J, 25	D				Penetrated blue clay to 300 ft.
U	6.17	12/ 3/54	N	N				Reportedly water contains gas and has unpleasant taste.
U	60?	11/ /54	J, 10	D				
			N	N				Owner reports water contained gas and had foul taste; located 100 ft east of 172-ft domestic well.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones		
							Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 9 E. - Continued								
24R1	Henley School	P 4,105	Dr	250	6				Sand
28H1	Floyd Stoute	P 4,085	Dr	468	6	45	465	2	Basalt
29C1	Ralph Waggoner	P 4,086	Dr	1,300	6				Alluvium
31M1	Charles P. Gray	P 4,105	Dr	177	8	41	165	12 (?)	Basalt
32P1	Fred Peters	P 4,100	Dr	145	8	40	85	60	do.
32Q1	Joe Milani	P 4,090	Dr	110	6				Basalt(?)
33R1	Don E. Johnson	P 4,100	Dr	84	6				do.
34E1	U. S. Air Force	S 4,300	Dr	500	8	416			do.
34P1	Earl W. Mack	P 4,115	Dr	756	10	405	745	8	do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
			T, 75	PS				Supplies 2 schools and 4 houses; located about 300 yds west of schools; reported 6 wells drilled at school; all obtained water with bad taste.
U				D				Some sand pumped; water level draws down to 15 ft when 30 gpm is pumped; see table 2 for log.
U	6	1953	N	N				Large amount of gas in water reported; owner using 29-ft dug well 50 ft to the east; see table 4 for partial chemical analysis of water.
U	12	5/ /54	C, 20	D				Water level draws down 18 ft when water is bailed at 40 gpm; see table 2 for log.
U	29	8/14/54		D				Reported water level has little drawdown when water is bailed at 60 gpm; see table 2 for log.
U	17.53	9/16/54	T, 40	D, S				
U	10	9/16/54	J, 15	D, S				
	236	10/ /56	N	N			88	Test pumped 240 gpm with 1.17 ft of drawdown after 24 hrs; see table 2 for log and table 4 for chemical analysis of water.
U	26.52	4/19/57	N	N			80	Tested at 700 gpm with water at 89 ft; Yonna formation to 660 ft and lower lava rock below.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 10 E.								
7C1	Don Kenyon	S	Dr	312	8	296	275	37	Lava cinders
7H1	Ester Newell	S 4,195	Dr	230	6	42	180	50	Sand
8G1	Andrew Collier	S 4,225	Dr	1,200	10	180			
8J1	Mt. Calvary Cemetery	S 4,200	Dr	380	8				
8R1	do.	S 4,190	Dr	500	8				
9H1	C. E. Dunn	S 4,220	Dr	1,340	12	20	1,000	1	Sand
12H1	John Marshall	S 4,130	Dr	80	6				
13J1	J. R. Chapman	P 4,080	Dg	40	48	40			Chalk rock
13Q1	Rex E. High	S 4,140	Dr	120	8				Basalt
14K1	do.	S 4,150	Dr	720			400		do.
15M1	Henry Grimes	S 4,175	Dr	1,276	6	10			Chalk rock

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	55	1948	J, 20	D				Passed through Yonna formation above aquifer.
U	16.13	12/ 8/54	N	D				Materials above aquifer were 6 ft of soil and 184 ft of "chalk rock."
								Being drilled; penetrated sandstone to 10 ft, "chalk rock" 10 to 1,134 ft, basalt 1,134 to 1,200+ ft.
			T, 75	Irr				Used for irrigating lawn.
U	56.87	12/ 8/54	T, 40	Irr				Located 500 ft south of well -8J1.
U	100		T, 70	D, S				"Chalk rock" above and below aquifer.
U	30		J, 15	D, S				Water level draws down to 50 ft when pumped at 50 gpm.
U	15	8/27/52	J, 10	D, S				
U	17		J, 20	D, S	82	7	62	
U	46		J, 15	D, S	68	52	100	Penetrated 300 ft of "chalk rock" and "some sandstone" above aquifer.
			J, 3					Pump breaks suction when pumping only 6 gpm.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 10 E. - Continued								
15N1	Henry Grimes	S 4,160	Dr	300	6	20			Sand, black
15Q1	E. A. Eggers	S 4,136	Dr	400	6				Basalt
16G1	Robert M. Lewis	S 4,190	Dr	511	6	60	509	1	Sand, white
16J1	Henry Grimes	S 4,180	Dr	800	6	60			Sand, black
18D1	W. F. Hilyard	S 4,200	Dr	204	6				"Quicksand"
18E1	I. J. Dixon	S 4,210	Dr	80	6	5	60	20	Sand, black
19R1	E. Tilton	P 4,105	Dr	115	2				Sand
21P1	N. W. Banta	P 4,110	Dr	276	5	63	274	2	Gravel
21Q1	Denny Babson	P 4,109	Dr	197.5	4				
28C1	Mrs. C. A. West	P 4,100	Dr	740	6	20			Sand, black

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	15	12/ /53	S, 25	D, S				Penetrated mostly "chalk rock" to aquifer near bottom.
U	8.58	12/ 8/54	J, 20	D				Supplies 4 houses.
U	31.97	12/ 8/54	J, 7	D	142	2		"Chalk rock" above and below aquifer; a 21-ft dug well 15 ft to the north is used for garden.
U	45.58	12/ 8/54	N	N				Mostly "chalk rock" above aquifer.
U	50±		P, 5	D				
U	58.38	12/ 9/54	N	N				Penetrated sand rock down to aquifer.
U	10±		C, 10	D, S				
U	10±		J, 1	D				Penetrated 40 ft of soil, 180 ft of "chalk rock," 2 ft of black "cinders" and 52 ft of "chalk rock" above aquifer.
U	10.03	12/10/54	J, 15	D, S				
C	[illegible]	12/ 9/54	[illegible], 10	D, S	28	3		

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 10 E. - Continued								
28Q1	Glen Dehlinger	P 4,119	Dr	350	6		348	2	Basalt
29D1	C. R. Millard	P 4,103	Dr	200	6				Sand
31A1	W. Woodard	P 4,085	Dr	118	6	94	112	6	do.
32D1	do.	S 4,110	Dr	312	6				do.
	T. 39 S., R. 11 E.								
3N1	J. Haseltine	S 4,165	Dr	400	6	100	360	40	Lava rock
5N1	W. Haley	P 4,145	Dr	316	6	68	288	28	Broken lava rock and red cinders
6D1	R. House	P 4,130	Dr	96	6	71	92	4	Red cinders
8J1	W. H. Casebeer	S 4,138	Dr	460	8		450	10	Lava rock
9R1	J. Davidson	P 4,117	Dr	283	6	40	276	7	Brown lava rock

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F	12/10/54	C, 25	D, S			80	Penetrated 348 ft of "chalk rock" and 2 ft of basalt above aquifer; flows about 30 gpm.
C	10	1954	C, 10					Flows about 5 gpm.
U	30	3/ /47	J, 5	D				Penetrated 112 ft of clay to aquifer.
U	32	1952	P, 5					Driller reported sand and clay for entire depth.
U	55	1949	T	D, S	60	15		Yields 20 gpm with drawdown of 15 ft; driller reports "chalk rock" to aquifer.
U	36	1943	J	D	85	4		See table 2 for log.
U	20	1943	J	D, S	150	10		Iron in water stains fixtures; see table 2 for log.
U	30.10	11/22/49		S	65	13		Iron in water stains fixtures; driller reports "chalk" down to aquifer.
U	9	1943	J	D				Driller encountered sedimentary rocks for entire depth to aquifer.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 11 E. - Continued								
10L1	R. Wagner	P 4,133	Dr	211	6	40	208	3	Broken lava rock
10N1	Bob Hartley	P 4,110	Dr	166	6	40	163	3	Brown lava rock
12G1	D. E. Driscoll	S 4,250	Dr	180	6		80	100	Basalt
13H1	Charles Walker	S 4,125	Dr	243	6		240	3	do.
16J1	Mary Schmitt	S 4,135	Dr	48	6				
19N1	Klamath County	S 4,170	Dr	312	10-8	25			Basalt
20G1	Homer Holt	S 4,170	Dr	585	16	20			do.
24H1	L. R. Davis	P 4,250	Dr	576	12				
30J1	Art Gibson	S 4,230	Dr		16-12				
30P1	L. E. Holzhauser	S 4,145	Dr	96	6				Basalt
36R1	Lester Levitt	S 4,225	Dr	476	6				do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level		Type of pump and its yield (gpm)	Use	Chemical character of water		Temperature (°F)	Remarks
	Feet below land-surface datum	Date			Hardness as $CaCO_3$ (ppm)	Chloride (ppm)		
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	4.68	11/23/49	J	D	55	3		Driller reports 208 ft of chalk over aquifer.
U	2	11/ /49	J	D	60	2		Yields 300 gpm with 1.5 ft of drawdown; see table for log.
U	80	1954	J, 5	D				Encountered basalt at a depth of 65 ft.
U	30	1954	J, 10	D, S	200	6		
			J, 15	D, S	100	4	60	Driller stppped on basalt.
U	60±	1954		Ind				Used for rock crusher.
U	63	1949	T, 1,500	Irr				Penetrated soil to 5 ft, broken basalt 5 to 585 ft; reported drawdown about 70 ft when well was pumped 1,050 gpm for 3 hrs.
C	27	1954	N	N				Drilled for irrigation well; produced only 100 gpm.
			T, 250	D, S, Irr				Operates 20 sprinklers.
U	20	1954	J, 10	D, S				
U	17	1954	J, 10	D, S				

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 11½ E.								
5D1	L. L. Porterfield	P 4,205	Dr	260	16	21	150	110	Basalt
6B1	E. Metler	P 4,190	Dr	455	16	170	380	75	Lava rock and cinder
10B2	L. J. Horton	S 4,155	Dr	50.9	16	30	14	47	Broken lava rock and cinders
12H1	A. E. Burgdorf	P 4,128	Dr	217	6	42	177	40	Broken blue lava rock
14H1	Virgil Schmoe	P 4,107	Dr	2,510	12				Basalt(?)
19E1	Taylor High	S 4,090	Dr	40	8				Sand, white
20K1	Frank Sullivan	S 4,100	Dr	250	6				
22J1	P. T. Hatchett	S	Dr	900	12	40			Lava rock

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	93.67	11/19/49	T	Irr				Yielded 1,800 gpm with draw-down of 25 ft after 4 hrs; see table 2 for log.
U	78.88	11/19/49		Irr				Test-pumped at 1,480 gpm with drawdown of 26 ft; drill tailings show diatomaceous ash overlies aquifer.
U	F	11/22/49	T	Irr	55	6		Flow on surface estimated at 400 gpm when first drilled; gradually dropped off to about 50 gpm; ceases flow during summer; yields 2,500 gpm with 5 ft of drawdown; see table 2 for log and table 4 for chemical analysis.
C	20±	1940	J	D, S	50	4		See table 2 for log.
C	F	7/ /48		N				Originally drilled as oil test well; reported to flow 50 gpm; log not available but driller reports basalt at 915 ft; well may have been drilled in fault zone.
U	2	1954	J, 15	D, S				
U	20	8/ /54	J, 5	D, S				
C	85	11/20/49	T, 1,000	D, S, Irr				See table 2 for log.

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 11½ E. - Continued								
26F1	Mrs. Liskey	P 4,150	Dr	142	12 (?)				
26H1	do.	S 4,200	Dr	253	6		241	12	Basalt
28R1	W. Tuback	P 4,105	Dr	460	6	60			Chalk rock
29A1	P. Breithaupt	P 4,104	Dr	240	6				
29G1	do.	P 4,130	Dr	344	6		322	20	Basalt
29L1	Wilber Reiling	S 4,140	Dr	220	6		200	20	do.
30C1	Taylor High	S 4,340	Dr	62	7	52	58	7	do.
31L1	Virgil Holmes	S 4,750	Dr	300	6	40	210	2	Sand layers
33B1	I. F. Rodgers	P 4,105	Dg	54	36				Alluvium
	T. 39 S., R. 12 E.								
5N1	Jerry McCartie	S 4,260	Dr	125	6		95	30	Basalt
6R1	do.	S 4,200	Dr	125					do.

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	60.63	8/27/54	T, 25	D, S	46	4	58	
U			P, 10	N				
U	10.06	8/27/54	J, 15	D, S				See table 6 for record of water level.
U	3	1954	J, 15	D, S				Supplies 3 houses.
U	25	1954	J, 30	D, S				
U	50	1954	T, 25	D, S				Supplies dairy.
P	15.06	8/27/54	J, 20	D, S				See table 2 for log.
P	23	7/ /35		S				Do.
U	24	1954	J, 5	D				
U	95	1954	P, 5	S				Encountered basalt at 80 ft.
U	55	1954	J, 10	D, S				Encountered basalt at 40 ft.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 12 E. - Continued								
7E1	Haley	S 4,240	Dr	259	16				Basalt
7H1	W. Sparks	S 4,155	Dr	60	6				
7L1	Haley	S 4,200	Dr	215	6				Basalt
20J1	Santford Jones	S 4,300	Dr	135					do.
21R1	W. A. Yountny	S 4,185	Dr	170					do.
26C1	Barkley	S 4,300	Dr	118	8				do.
28A1	T. Albert	S 4,180	Dr	160	6				
28R1	Marion Brown	P 4,140	Dg	60					Alluvium
29H1	S. Ramtvedt & Sons	S 4,130	Dr	45	6				Basalt and cinders
29K1	Jack Weimer	S 4,140	Dr	88	6		88		Basalt
30J1	Santford Jones	P 4,165	Dr	290	6		171	119	do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	80	1954		Irr				Water level draws down 103 ft when pumped at 1,050 gpm for 6 hrs.
P	2±	1954	J, 15	D, S				
U	70	1954	T, 50	D, S				Another well 80 ft deep about 300 yds west produces warm water.
P	15	1954	J, 5	D, S				
			J, 10	D, S				Penetrated some sandstone.
P	40	1954	J, 15	D, S				
			J, 5	D, S				
U	2	1954	J, 5	S				
U	20	1954	J, 10	D, S				
U	17.69	8/11/54	J, 10	D	164	4		See table 6 for record of water level.
U	20	1954		S				Penetrated 171 ft of soft materials above basalt.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 12 E. - Continued								
31D1	Santford Jones	P 4,148	Dr	228	6				Basalt
32D1	Rowcliff	P 4,150	Dr	160	6		53	60	Alluvium
33A1	Harris	P 4,135	Dr	68	6		30	38	Basalt
34F1	L. Horton	S 4,190	Dr	480	6				Chalk rock
34R1	Bruce Beiler	P 4,185	Dr	403	6	73	393	2	Basalt
35P1	Randle	S 4,180	Dr	200	6				
36L1	Lloyd Crawford	P 4,150	Dr	360	6				Basalt
	T. 39 S., R. 13 E.								
12F1	U. S. Bureau of Reclamation	S 4,870	Dr	260	6				
30Q1	M. D. Settle	S 4,300	Dr	280	16	164			Basalt
31G1	Horseley	S 4,250	Dr	110	6	20	30	40	do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
	10	1954		D, S				
U	12	1954	J, 5	D, S				Penetrated mostly "blue clay."
U	4.3	8/11/54	J, 10	D	188	6		Penetrated 30 ft of " chalk" above aquifer.
			J, 5,	N	288	40		Water reported too roily to use.
C	5	7/18/42		D				See table 2 for log.
C	13.35	8/ 6/54	J, 10	D, S			62	
C	35.24	8/ 7/54	J, 10	D, S				See table 6 for record of water level; see table 4 for chemical analysis of water.
	230±	1954	P, 5	D				Supplies caretaker's house at Gerber Reservoir.
C	F	8/ 5/54	T, 230	Irr				Irrigates 40 acres; penetrated basalt, a section of sedimentary rock, then aquifer.
P	19	1954	J, 10	D, S	144	4		

Unpublished records subject to revision

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 39 S., R. 13 E. - Continued								
31N1	W. D. Campbell	S 4,175	Dr	124	6				Basalt
	T. 40 S., R. 4 E.								
6R1	R. M. McVeigh	U 3,900	Dr	219	5				do.
7A1	R. A. Cooper	U 3,900	Dr	181	6				do.
	T. 40 S., R. 7 E.								
11N1	U. S. Air Force	U 4,900	Dr	1,310	12-8	1,200	1,192	118	do.
	T. 40 S., R. 8 E.								
6C1	Oregon Highway Dept.	S 4,120	Dr	292					do.
34C1	Hereford	S 4,120	Dr	90	6				
34F1	Henzel Bros.	P 4,100	Dr	127	10	72	101	26	do.
	T. 40 S., R. 9 E.								
2J1	A. J. Manning	P 4,100	Dr	1,965	10 (?)				
3Q1	Robert Stewart	P 4,095	Dr	60	6	39	55	5	Sand
5D1	W. H. McMillan	P 4,090	Dg	210	48				
9M1	William Gray	S 4,140	Dr	500	6	170	488	2	Sand and gravel

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	12	1954	J, 10	D				
P	42.02	8/13/54	N	N				
P	1,192		J, 10	D				
U	1,192	5/16/58	T, 50	PS				Well penetrated rubble to 120 ft, upper lava rocks 120 to 322, Yonna formation 322 to 545, and lower lava rocks from 545 to bottom.
U								Drilled at maintenance garage.
U	42.1	7/30/54	P, 3	D				A deeper well located 300 ft north.
U	28	7/25/41		D				Supplied old logging camp.
								Drilled as an oil test; known as Seimen's well; basalt reportedly encountered at 600 ft.
U	22	12/ /48	J, 10	D, S				See table 2 for log.
U	10.66	9/16/54	J, 10	D				Inadequate supply.
U	56.78	9/16/54	T, 20	D, S				See table 2 for log.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 40 S., R. 9 E. - Continued								
10C1	W. Harnsberger	P 4,090	Dr	48	6				Sand
13M1	Jack O'Connor	P 4,097	Dr	300	6	87	275	2	Agglomerate
27L1	L. Motschenbacher	S 4,110	Dr	155	6	102	148	2	do.
36K1	Oscar Baker	S 4,550	Dr	327	6	40	313	14	Sand, black
	T. 40 S., R. 10 E.								
6Q1	Ralph Hill	P 4,086	Dr	384	6-4	125	376	8	Sand and gravel
7J1	Tom Jackson	P 4,085	Dr	135	6	50	125	10	Sand, black
8B1	V. H. Berry	S 4,090	Dr	120	6				
17F1	Elliot	P 4,080	Dr	410	8				
18M1	Charles Matney	P 4,086	Dr	466	6		465	1	Gravel, coarse
25M1	Ervin Johnson	S 4,150	Dr	100	6				
27A1	V. E. Rexford	S 4,200	Dr	620	6				

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	8.83	9/15/54	J, 5	D, S				
U	30	11/ /52	J, 30	D, S				See table 2 for log.
U	55	8/ /53		D, S				Do.
P	27	2/ /50		D, S				Water level draws down 13 ft when well is pumped at 22 gpm; see table 2 for log.
U	2.5	12/23/41	C, 20	D, S	50	6		See table 2 for log.
U	.1	11/10/53		D				Do.
U	10	1954	J, 10	D, S			72	
C	F	9/13/54	N	S	40	10		
U	3	1/ /50	J, 10	D, S	190	3		Water reportedly contains sulfurous gas.
U	40	1954	J, 10	D, S	170	10	62	
C	30	1954	J, 10	D, S				

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 40 S., R. 10 E. - Continued								
28R1	C. W. Lewis	P 4,078	Dr	432	6	90	428	4	Sand, black
33L1	Ray Hobson	P 4,084	Dr	920	6				
34K1	E. C. Lemler	P 4,077	Dr	240	6	132	238	2	"Gravel"
36N1	Lawson Kandra	P 4,078	Dr	825			824	1 (?)	Cinders
36R1	John H. Degnan	P 4,075	Dr	130	6				Sand
	T. 40 S., R. 11 E.								
2E1	E. G. Gienger	P 4,104	Dr	85	6				
3A1	Melvin Fiegi	P 4,103	Dr	722	8	62	95 152 702	2 1 20	Sandstone do. "Shale"
3D1	Emil Wells	P 4,110	Dr	125	8				
4J1	L. F. Moore	S 4,135	Dr	520	6				
10A1	A. W. Shaupp	S 4,160	Dr	625	12				

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	41	8/ /52		D				Water level draws down 20 ft when well bailed at 40 gpm; see table 2 for log.
U	53.5	9/13/54	T, 20	D, S				Supplies dairy.
U	7	3/ /49	J, 10	D	300	60	53	Mostly "chalk rock" and sand above aquifer; see table 2 for log.
U	25	1954	J, 10	D				
U	2	1954	J, 10					
U	14.51	8/23/54	J, 5	D	104	14	54	
C	F	8/13/54	J, 25		8	6	83	See table 2 for log.
U	40	1954	J, 10	D				Owner has 190-ft well ¼ mile to the west in which water has temperature of 68° F.
C	24	1954	J, 10	D, S	44	6		
U	30?	1954	J, 15					

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 40 S., R. 11 E. - Continued								
11D1	A. W. Shaupp	S 4,150	Dr	1,000	13		700	300	Basalt
12D1	Irving Ross	S 4,145	Dr	465	6	33	445	15	"Rock (agglomerate)
12G1	W. Rajnus	S 4,155	Dr	193	6	6	187	6	Sand, black
13F1	Jerry Rajnus	S 4,220	Dr	300	12				Basalt
13M1	do.	S 4,200	Dr	400					
36P1	Carl Ciyah	S 4,150	Dr	155	8	5	128 153	25 2	Sandstone Sane
36R1	Rudolph Paygr	S 4,098	Dr	132	6		112	20	Conglomerate
	T. 40 S., R. 12 E.								
3Q1	John McFall	U 5,050	Dg	14					Alluvium
6B1	F. O. Freuer	S 4,180	Dr	84	5				Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	10.77	8/21/54	P, 3	S	104	5		Penetrated 700 ft of "chalk rock" above aquifer; see table 6 for record of water level; drawdown is 80 ft when pumped at 70 gpm.
U	90	2/ /48	P, 5	D, S				See table 2 for log.
U			J, 10	D, S				Water level lowered to 193 ft when well was bailed at 20 gpm; penetrated mostly "chalk rock" and sandstone down to aquifer.
C	18	5/ /52	T	Irr				Domestic well 200 ft north is 200 ft deep; see table 2 for log.
				Irr				Well not in use; caving.
U	110	5/ /49	4	D				See table 2 for log.
U	64	6/ /48	J, 10	D				Water level draws down 11 ft when well is bailed at 34 gpm; see table 2 for log.
P	9	1954	J, 10	D				
P	12	1954	J, 10	D, S				

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 40 S., R. 12 E. - Continued								
6G1	F. O. Freuer	S 4,225	Dr	240	14	20	150 215	10 23	Basalt
10B1	John McFall	U 5,050	Dr	448	10				Chalk rock(?)
18D1	Wm. Rajnus	S 4,157	Dr	550	16	30			Basalt
31J1	Hugh Rick	S 4,180	Dr	175	10				Sand, black
31Q1	Richard Craven	S 4,210	Dr	153	8	21	127	26	Sand, brown and black
33P1	T. E. Weatherby	S 4,177	Dr	110	6				
34P1	C. G. Gross	S 4,155	Dr	625	16				Basalt
	T. 40 S., R. 13 E.								
1B1	R. A. Smith	P 4,148	Dr	180	6				Alluvium
1J1	Robert R. Davis	P 4,135	Dr	67					do.

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	F	8/21/54	N	N			61	Owner reports flow about 250 gpm; water level draws down to 80 ft when pumped at 1,000 gpm for 5 hrs; water to be used for irrigation; see table 2 for log and table 4 for chemical analysis of water.
P	100	1954	N	N				
U	11	1/ /50	T, 1,300	Irr	88	4	58	Owner reports drawdown about 60 ft when pumped at 1,300 gpm; see table 2 for log.
U	63.5	9/13/54	S, 10	D, S	186	5	56	
U	99	9/ /50		D, S				See table 2 for log.
P	4	1954	J, 5	D, S				
U	142 ±	1954	T, 1,000	Irr			56	Water cascades into well from perched water body at 87 ft.
C	2	1954	J, 15	D, S				
C	F	8/ 5/54	J, 10	D, S	100	3		

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 40 S., R. 13 E. - Continued								
2B1	Mrs. B. Cambell	P 4,145	Dr	120	8				Basalt
2F1	Robert Dehlinger	S 4,165	Dr	160	12				do.
3D1	Fitzhugh	P 4,140	Dr	85	6	59	80	5	Sand, fine
3H1	I. L. Harris and Son	S 4,160	Dg	62	48				
4F1	Clay Walker	P 4,132	Dr	30	6				Basalt
4G1	H. Roberts	P 4,127	Dr	64	6				do.
4K1	P. R. Monrow	P 4,132	Dr	68	12		61	7	do.
6G1	C. C. Johnson	S 4,300	Dg	45			20	25	Alluvium
9G1	M. W. Dearborn	S 4,220	Dr	150	8				
9K1	Walter Smirh, Sr.	S 4,300	Dr	89	6				Chalk rock?
10K1	Brewtt	P 4,140	Dr	190	6				

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	3.03	8/ 6/54		D	100	7		
			J, 20	D, S				
U	17	1948	J, 20	D, S				See table 2 for log.
P	16	1954	J, 15	D, S			52	Encountered basalt near bottom.
U	12	1954	J, 5	D, S				
U	10	1954	J, 5	D				
C	F	8/10/54	J, 10	D	128	5		
P	20	1954	J, 3	D	176	2	56	Encountered basalt at 45 ft.
P	20	1954	J, 10	D				Reportedly penetrated much "chalk rock."
P	3	1954	J, 5	D				
U	15	1954	J, 10	D, S				

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Water-bearing zone or zones: Thickness (feet)	Water-bearing zone or zones: Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 40 S., R. 13 E. - Continued								
12R1	Caldwell Bros.	P 4,150	Dr	90	6				
13J1	Eugene Wall	P 4,135	Dr	100	5				
14K1	S. W. Brown	P 4,135	Dr	335	6				Chalk rock?
23J1	Anton Suty	P 4,137	Dr	107	6				do.
24M1	do.	P 4,134	Dr	75	7				do.
	T. 40 S., R. 14 E.								
6K1	U. S. Soil Conservation Service	S 4,220	Dr	400	12				Basalt
6L1	M. L. Lindsay	P 4,145	Dr	80	6				
7G1	W. E. Flescher	S 4,170	Dg	32					
18C1	Welsh	S 4,156	Dr	84	6		66	18	Basalt
18L1	Lloyd Gift	P 4,138	Dr	86	6				
18R1	do.	P 4,153	Dr	198	6	60	60	138	Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
C	11.23	8/ 5/54	J, 10	D, S				
C	+2	1954	J, 20	D, S			62	Flows about 10 gpm.
C	F	8/ 9/54	J, 10	D				Owner reports well penetrated 35 ft of yellow clay and 300 ft of "chalk rock."
U	5	1954	J, 10	D				
U	3	1954	P, 3	D				
			J, 5	D				Well at old CCC camp.
U	5.6	8/ 5/54	J, 15	D, S				
U	29	1954		D				Encountered rock at 32 ft.
U								Water level 21 ft while bailing 22 gpm.
U	12	1954	J, 5	D, S				
U	12	1954	J, 10	D, S				Penetrated "hardpan" alluvium to basalt.

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 40 S., R. 14 E. - Continued								
19B1	John L. Sullivan	P 4,140	Dr	100	6				
32B1	Eric Furlund	S 4,161	Dr	50	6		48	2	"Sandy zone"
32K1	Fred Furlund	S 4,180	Dr	255	12		130	124	Basalt
	T. 41 S., R. 8 E.								
16A1	Perry Langer	P 4,090	Dr	162	18		4	153	Basalt
	T. 41 S., R. 9 E.								
1E1	O'Connor	S 4,180	Dr	400	6				
	T. 41 S., R. 10 E.								
2R1	Town of Merrill	P 4,066	Dr	1,088	12 8	119 1024	1047	41	Basalt
4J1	M. J. Barnes	S 4,225	Dr	540	12-10	21	494	46	Agglomerate (?)
6J1	do.	S 4,200	Dr	330	12				Gravel, coars

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	6-8	1954	J, 5	D				
U	22.1	8/ 5/54		D, S				Owner reports 48 ft of basalt above aquifer.
C	7.6	8/ 5/54		D, S				Owner reports 130 ft of silt, sand, and "chalk rock" above aquifer and a sandy and silty zone below aquifer; drilled for irrigation but inadequately cased; caving resulted.
U	3.5	12/22/54		Irr				Not used much.
U	100	1954	J, 5	D, S				
U	47	11/ /39	T, 350	PS			69	See table 2 for log and table 4 for chemical analysis of water.
U	82	5/ /54	N	Irr				Water level draws down 38 ft when pumped at 1,000 gpm; see table 2 for log.
U	118	1954	T, 1,000	Irr				Water level draws down about 40 ft when pumped at 1,000 gpm.

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 41 S., R. 10 E. - Continued								
8R1	E. M. Mitchell	U 4,250	Dr	106	6				
9L1	Wendel Moore	S 4,120	Dr	781	12	21	600	181	Sand
10L1	Fatherington Bros.	S 4,130	Dr	678	12	17	641	27	"rock" (agglomerate?)
11H1	Leo McKoen	P 4,068	Dr	180	6	60	145	27	Sand and chalk rock
14M1	O. N. Hodges	P 4,100	Dr	265	6	43	260	1	Sand
17D1	E. M. Mitchell	P 4,093	Dr	160	6				
	T. 41 S., R. 11 E.								
1Q1	H. Clark	P 4,063	Dr	83			82	1	Sand
4K1	Randle Pope	U 4,200	Dr	157	6	18	140	17	Basalt
5A1	Bernice Wilson	S 4,135	Dr	300	10				do.
6R1	Walgren	P 4,072	Dr	107	6				Alluvium

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
P	35	1954		S				Reported to yield 40 gpm.
U	48	3/ /49	T, 2,200	Irr				Water level draws down about 70 ft when pumped at 2,200 gpm; see table 2 for log.
U	40	3/ /50		Irr			76	Water level draws down 80 ft when pumped at 2,400 gpm; see table 2 for log.
U	9	2/ /52	J, 15	D, S	132	22	62	Driller reports 29 ft of draw-down when pumped at 25 gpm; see table 2 for log.
U	30	5/ /50	J, 15	N	182	530		Owner reports water kills grass; see table 2 for log.
U	35	1954	J, 15	D, S	108	190	67	
U				D, S				Penetrated 34 ft of peat and soil and 48 ft of blue clay above aquifer.
U	143.0	9/ 9/54	S, 10	D, S			68	See table 2 for log.
U			J, 15	D, S			74	
U	12	1954	J, 15	D				

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 41 S., R. 11 E. - Continued								
7D1	John O'Neil	P 4,066	Dr	770	8	51	730	40	Sand layers
9B1	Leland Pope	P 4,066	Dr	178	6	50	177	1	Sand
10L1	Jack Ratliff, Jr.	P 4,059	Dr	465	6				Alluvium
11C1	Adolph Sacka	P 4,060	Dr	130	6		40	90	Basalt
12H1	Wilford Dixon	P 4,052	Dr	745	10	255	255		Sand layers
12H2	do.	P 4,052	Dr	820	6	84	90	295	do.
14L1	J. R. Ratliff	P 4,044	Dr	200	6				Alluvium
15L1	L. A. Drager	P 4,047	Dr	110	6				do.
16J1	L. R. Neel	P 4,046	Dr	200	6				do.
18M1	G. C. Haskins	P 4,067	Dr	170	6				
	T. 41 S., R. 12 E.								
1Q1	J. V. Rajnus	S	Dr	300	12				Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	5	1/ /43	J, 10	D, S			54	Driller reports drawdown 55 ft when bailing 12 gpm; see table 2 for log.
U	29.98	9/ 9/54	J, 15	D, S	132	22	54	See table 6 for record of water level.
U			J, 10	D, S	166	12	58	
U	40	1954	P, 5	D, S				
U	24	3/ /44						Log very similar that of well -12H2.
U	15	5/ /44						Plugged at 440 ft with concrete; see table 2 for log.
U	8	1954	J, 10	D, S				
U	12	1954	J, 10	D			54	
U	11	1954	C, 10	D, S			54	
U	30	1954	T, 20	D, S	236	68		
U	184.3	10/29/54	T, 1,200	Irr				

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 41 S., R. 12 E. - Continued								
2E1	A. G. Scott	S 4,150	Dr	173	6	41	82	1	Chalk rock
3E1	Albert Stastny	P 4,110	Dr	76	4				Alluvium
4E1	George Smally	P 4,105	Dr	209	6	17	200	9	Basalt
5C1	G. M. Freitag	P	Dr	167	8	13	160	6	do.
6F1	Cartwright	S 4,110	Dr	70	6				
10H1	E. Kenyon	P 4,097	Dr	325	8				
11C1	John McAuliffe	P 4,125	Dr	194	6	58			Sand
11L1	F. F. King	P 4.097	Dr						
12B1	L. B. Schriner	S	Dr	200	6		198	2	Basalt
12G1	Frye & Barney	S	Dr	126	8				
12H1	do.	S 4,220	Dr	300	16-14	20	165	135	do.

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
P	23	5/ /49	J, 10	D, S				Driller reports sand to 37 ft and "chalk rock" below.
U	.79	8/31/54	N	N				See table 6 for record of water level.
U			J, 5	D, S			59	Basalt encountered at a depth of 140 ft.
U	90.03	9/ 1/54	S, 15	D				Driller reports well bailed at 30 gpm with no apparent drawdown; see table 2 for log.
U	42.2	9/ 1/54	J, 15	D, S				
U	12	1954	J, 15	D, S				
U	51.39	10/29/54	J, 10	D				Driller reports "sand" entire depth.
U	13.39	8/31/54	J, 5	D, S				
U	150±	1954	S, 5	S				Located at sheep camp; water cascades into well from upper aquifer.
P	97±	1954	J, 20	D, S			56	
U	167.9	10/28/54	T, 600	Irr			73	Used for irrigating 200 acres of pasture; drawdown 13.8 ft after pumping about 600 gpm for 9 min; see table 2 for log and table 6 for water-level record.

Unpublished records subject to revision

Table I.- Representative Well

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 41 S., R. 12 E. - Continued								
13A1	Leslie Unruh	S 4,135	Dr	30	8				
15F1	Town of Malin	P 4,066	Dr	324	8				Sand and gravel (?)
15F2	do.	P 4,066	Dr	327	10-8				do.
19G1	D. P. Reid	P 4,045	Dg	30					Alluvium
24M1	W. C. Dalton	P 4,058	Dr	751	8	180	611	32	Sand laminae
	T. 41 S., R. 13 E.								
2H1	Frank Grohs	U 4,400	Dr						
13J1	McRenolds	P 4,140	Dr	35	6	22			Alluvium
18P1	Loveness Lumber Co.	S 4,170	Dr	55	6	49			Chalk rock
19D1	do.	P 4,085	Dr	140	6	44	138	2	Sand, coarse

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
P	8	1954	C, 5	D, S				
U	21	1943	T, 500	PS				City well no. 1; superintendent reports material above aquifer mostly clay and silt.
U	21	1943	T, 600	PS				City well no. 2; located 300 ft west of well no. 1; drawdown 10 ft when pumped at 532 gpm for 1 hr.
U	8.37	8/31/54	J, 5	D, S				See table 6 for record of water level.
U	21	8/ /42	J, 10	D, S				About 150 ft south of Oregon boundary, in Calif.; see table 2 for log.
P	5.38	8/ 9/54	J, 10	D, S				Reported to be a deep well.
U	11.19	8/ 9/54	P, 3	D	92	8		
U	26	1954	J, 20	D				Penetrated sandstone, pumice, and clay above aquifer.
U			J, 20	Ind	196	10		Penetrated mostly chalk and clay above aquifer.

Table I.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (feet above sea level)	Type	Depth (feet)	Diameter (inches)	Depth of casing	Water-bearing zone or zones: Depth to top (feet)	Thickness (feet)	Character of materials
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 41 S., R. 13 E. - Continued								
19E1	P. Blohm	P 4,085	Dr	136	6				
19F1	Loveness Lumber Co.	S 4,120	Dr	319	10	92	96 278	13 5	Basalt
	T. 41 S., R. 14 E.								
5G1	Charles Kilgore	S 4,145	Dr	150	6				do.
7R1	do.	S 4,150	Dr	210	16-12	8	70 170	2 8	Basalt breccia do.
18G1	Stanley Johnson	S 4,155	Dr	108	6	6	104	4	Basalt

Unpublished records subject to revision

in the Klamath River Basin - Continued

Ground-water occurrence	Water level: Feet below land-surface datum	Water level: Date	Type of pump and its yield (gpm)	Use	Chemical character of water: Hardness as $CaCO_3$ (ppm)	Chemical character of water: Chloride (ppm)	Temperature (°F)	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
U	30	1954	J, 20	D, S	82	3	61	
U	85±	8/ /48	T, 160	Ind				Supplies sawmill; owner reports drawdown 100 ft after pumping 160 gpm for 2 months; see table 2 for log.
U	8.53	8/ 4/54	C, 30	D				Penetrated soil to 5 ft and broken rock 5 to 150 ft.
U	17.06	8/ 4/54	T, 1,400	Irr				Drawdown about 60 ft when well is pumped at 1,200 to 1,400 gpm; water irrigates about 40 acres; hard basalt above and below aquifer; see table 6 for water-level record.
U	11.00	8/ 4/54	C, 15	S				Penetrated 4 ft of soil and 100 ft of rock above aquifer.

Unpublished records subject to revision

Table 2.- Materials Penetrated by Representative Wells

[Tentative stratigraphic designations by R. C. Newcomb]

28/8-17K1. Southern Pacific Co. Diamond Lake Station well. Drilled by A. M. Jannsen, 1926

Materials	Thickness (feet)	Depth (feet)
Pumice of Mount Mazama:		
Pumice	65	65
Old pyroclastic and alluvial deposits:		
Sand and gravel	15	80
Sand, gravel, and clay	42	122
Sand and gravel	28	150
Sand	4	154
Sand and boulders	2	156
Sand and gravel	5	161

29/8-7R1. Southern Pacific Co. Yamsay Station well. Drilled by E. V. Enloe, 1926

Pumice of Mount Mazama with interbedded pyroclastics and alluvium:		
Pumice	35	35
Sand, black, dry	8	43
Pumice, white	10	53
Clay, brown	9	62
Volcanic rocks, undifferentiated:		
Basalt, bluish	24	86
Sandstone	20	106
Basalt, honeycombed and water-bearing in lower 14 ft	22	128

30/8-30G1. Southern Pacific Co. Lenz Station well. Drilled by E. V. Enloe, 1924

Pumice of Mount Mazama and interbedded alluvium:		
Pumice	14	14
Sand	4	18
Pumice	1	19
Sand, black, caving	27	46
Pumice, semiconsolidated	2	48
Sand	19	67
Gravel, cemented	8	75

Table 2.- Materials Penetrated by Representative Wells - Continued

31/7-24C1. J. Ball. Sand Creek Service Station well. Drilled by L. Wilson, 1949

Materials	Thickness (feet)	Depth (feet)
Pumice of Mount Mazama:		
Soil and pumice	12	12
Pumice, light-pink, firm	6	18
Pumice, dark pink, firm	16	34
Pumice, lumps	14	48
Pumice and coarse sand, some water	6	54
Pumice and sand, water-bearing	7	61

31/15-32B1. Weyerhaeuser Timber Co. Pole Butte Camp well. Drilled by W. L. Hartley, 1948

Volcanic and sedimentary(?) rocks, undifferentiated:		
Basalt	62	62
"Sandstone" (tuff?)	78	140
Cinders (Pumiceous fragments)	4	144
Basalt	15	159
Clay	4	163
Basalt	196	359
Cinders	11	370
Basalt	12	382
Cinders, loose	14	396
Basalt, lowest 3 ft broken	31	427
Basalt	31	458
Cinders	9	467
Basalt	92	559
Cinders	3	562
Basalt, broken, water-bearing at bottom	204	766
Basalt	87	853
Sandstone	20	873
Basalt and green sand, water-bearing streaks	152	1,025
Basalt	15	1,040

Table 2.- Materials Penetrated by Representative Wells - Continued

34/6-11K1. Christian Church. Sevenmile Creek Camp. Drilled by C. Hartley, 1954

Materials	Thickness (feet)	Depth (feet)
Alluvial deposits:		
Clay, red	18	18
Gravel, fine	7	25
Gravel, coarse	59	84
Clay	44	128
Shale (or compact clay)	14	142
Lava rocks, undifferentiated:		
Lava, hard, blue, water-bearing	3	145

35/7-5F1. Mrs. Cora Crystal. Drilled by J. Wilson, 1951

Soil	4	4
Yonna formation:		
Sandstone, brown	6	10
Rock, blue, very hard (agglomerate?)	8	18
Rock, gray (tuff?)	12	30
Gravel	25	55
Gravel, fine and coarse (tuff?)	190	245
Shale, green and blue	245	490
Rock, gray	100	590
Sand, water-bearing (sandy tuff?)	10	600
Clay and coarse sand	20	620
Rock, gray (tuff)	25	645
Clay, blue (fine-grained tuff?)	50	695
Lower lava rocks(?):		
Rock, black	28	723

35/7-7F1. Plantz Bros.

Alluvium:		
Soil	11	11
Gravel	4	15
Sand	3	18
Alluvium or Yonna formation(?):		
Clay, blue	44	62
Gravel	4	66
Sand	2	68

Table 2.- Materials Penetrated by Representative Wells - Continued

35/7-34N1. Mrs. Elsie Burton. Drilled by J. Wilson, 1950

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil, hardpan, and gumbo	10	10
Clay, yellow, sandy	34	44
Sand, fine, with clay	4	48
Gravel, coarse	4	52
Clay, yellow top 4 ft, blue and brown	38	90
Sand, brown, very fine	14	104
Clay, yellow, sticky	54	158
Clay, blue, sandy	37	195
Sand, fine, with dark silt	65	260
Silt and sand, muddy, interbedded	52	312
Clay, yellow, sandy	64	376
Clay, gray and green	94	470
Gravel and sand, fine	20	490
Clay, gray	20	510

36/10-6R1. Joe LaHoda. Drilled by J. VanMeter, 1949

Alluvium:		
Soil, clay, and hardpan	8	8
Yonna formation:		
Chalk rock, yellow (diatomite or volcanic ash)	7	15
Chalk rock, green	125	140
Sand (tuff?), black, water-bearing	3	143
Sand (tuff?) and chalk rock	15	158
Pumice (pumiceous tuff?), water-bearing	3	161
Chalk rock, green	84	245
Sand and gravel (agglomerate?), black	36	281
Sand, cinders, pumice, and gravel (volcanic tuff breccia?)	50	331
Chalk rock	4	335
Sand, packed, and gravel (agglomerate?)	13	348
Chalk rock	72	420

Table 2.- Materials Penetrated by Representative Wells - Continued

36/10-9R2. H. T. Robbins. Drilled by J. VanMeter, 1949

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil and hardpan	4	4
Yonna formation:		
Chalk rock	14	18
Sand (tuff?)	5	23
Chalk rock	14	37
Sand, black (tuff?), water-bearing	18	55
Chalk rock	15	70

36/10-14D1. Mario Carnini. Drilled by J. VanMeter, 1949

Alluvium:		
Gravel, bound with clay	5	5
Yonna formation:		
Chalk rock	20	25
Sand and gravel (agglomerate?)	6	31
Chalk rock	78	109
Sand, black (basaltic tuff?)	3	112
Chalk rock and sand (tuff?)	37	149
Chalk rock	76	225
Sand, black (tuff?)	35	260

Table 2.- Materials Penetrated by Representative Wells - Continued

36/10-29M1. Klamath Indian Reservation. Squaw Flat well. Drilled by C. VanMeter, 1935

Materials	Thickness (feet)	Depth (feet)
Soil and boulders	4	4
Lava rocks undifferentiated:		
Basalt	30	34
Basalt, hard, red	14	48
Basalt, creviced	21	69
Volcanic sandstone (interbedded tuff?)	16	85
Basalt, creviced	17	102
Basalt and volcanic ash	13	115
Basalt, creviced	15	130
Basalt and volcanic ash, loose	10	140
Basalt, creviced	7	147
Sandstone, volcanic (tuff interbed)	9	156
Cinders, loose (tuff breccia)	36	192
Basalt, creviced	6	198
Diorite (porphyritic lava rock?)	10	208
Basalt, creviced 321-333	143	351
Basalt, broken	19	370
Diorite, creviced (porphyritic lava rock?)	17	387
Basalt, red, loose fragments	18	405
Basalt, creviced	14	419
Basalt, creviced, water-bearing	21	440

36/11-25R1. W. M. Williamson. Drilled by J. Wilson, 1948

Soil and hardpan	9	9
Yonna formation:		
Chalk rock	11	20
Sand, black, water-bearing	15	35
Sand, black	35	70
Sandrock, black	10	80
Clay, yellow, sandy, water-bearing	4	84
Sand, fine (tuff?)	21	105
Gravel, coarse, and pumice, brown (agglomerate?)	25	130
Rock, gray, hard, and gravel (agglomerate?), water-bearing	45	175
Cinders, gray, hard	37	212
Rock, hard, gray (tuff?)	8	220
Cinders, hard, broken, water-bearing	3	223

Table 2.- Materials Penetrated by Representative Wells - Continued

36/12-9C1. L. L. Crawford. Drilled by W. L. Hartley & Son, 1956

Materials	Thickness (feet)	Depth (feet)
Gravel, cemented	3	3
Yonna formation:		
Chalk rock	57	60
Sandstone	30	90
Chalk rock	190	280
Sand, black, and sandstone, water-bearing	20	300
Chalk rock	428	728
Sand, black, water-bearing	2	730

36/14-27P1. Henry Gerber. Drilled by W. L. Hartley & Son, 1956

Alluvium:		
Soil	8	8
Gravel, cemented	32	40
Clay	39	79
Upper lava rocks:		
Lava rock	84	163
Yonna formation:		
Clay	30	193
Lava rock	11	204
Clay	81	285
Lower lava rocks:		
Basalt	63	348
Lava, burnt	20	368
Pumice	2	370
Lava rock, blue, hard	30	400
Rock, red	38	438

Table 2.- Materials Penetrated by Representative Wells - Continued

37/9-4B1. R. D. Dehlinger. Drilled by W. Hartley, 1949

Materials	Thickness (feet)	Depth (feet)
Yonna formation:		
Chalk (diatomite or volcanic ash)	158	158
Sandstone and boulders	54	212
Lower lava rocks:		
Cenders, red	39	251
Rock, gray, and cinders	65	316
Lava, porous, broken; water-bearing	34	350
Basalt, hard	3	353

37/9-36H1. Marshall Bros. Drilled by K. Hartley, 1949

Alluvium, undifferentiated:		
Soil	4	4
Clay, yellow	19	23
Clay, yellow, and small boulders	2	25
Clay, yellow	10	35
Yonna formation:		
Sand, black	Trace	35
Shale, blue	23	58
Sandstone	6	64
Clay, blue, with sandstone streaks	48	112
Sandstone, yellow	4	116
Shale, blue	74	190
Clay, sandy, brown	5	195
Sand and shale layers, blue	22	217
Shale, blue	5	222
Sandstone, blue	24	246
Lower lava rocks:		
Lava, porous, water-bearing	4	250

Table 2.- Materials Penetrated by Representative Wells - Continued

37/10-19H1. H. D. Whiteline. Drilled by C. Coleman, 1946

Materials	Thickness (feet)	Depth (feet)
Yonna formation:		
Chalk (diatomite or volcanic ash)	24	24
Sand, black, layered with "gravels" (some water)	91	115
Clay, white	30	145
Sandstone, black, and "gravel"; water-bearing	10	155

37/10-30B1. Fred Coleman. Drilled by K. Hartley, 1949

Soil, sandy, brown	5	5
Yonna formation:		
Sandstone and "gravel"	27	32
Cinders, black, and "gravel" water-bearing	66	98
Lower lava rocks or interflow(?):		
Basalt, hard	2	100

37/11½-24H1. S. K. Hartzler. Drilled by C. M. Vochatzer, 1949

Yonna formation with basalt interflow or intrusive(?):		
Sandstone, yellow	45	45
Shale, blue	70	115
Basalt, hard, black	25	140
Shale, blue	194	334
Lower lava rocks:		
Basalt, hard, black	8	342
Clay, soft, blue	11	353
Basalt, hard, black	87	440
Lava, porous, water-bearing	10	450
Basalt, hard	37	487

Table 2.- Materials Penetrated by Representative Wells - Continued

38/9-19A1. C. A. Tobins. Drilled by J. Wilson.

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Boulders	8	8
Yonna formation:		
Chalk rock, yellow (diatomite or volcanic ash)	50	58
Chalk rock, brown and blue	32	90
Chalk rock, small amount of water	2	92
Chalk rock, brown	23	115
Cinders and lava (agglomerate), water-bearing	5	120
Shale, gray	20	140
Chalk rock, green and black	35	175
Cinders, black and red	10	185
Clay, red	10	195

38/9-28D4. J. R. Howard. Drilled by Wilson Drilling Co., 1954

Fill	6	6
Alluvium:		
Boulders	4	10
Clay, brown	25	35
Yonna formation:		
Chalk rock, white, with thin layers of white clay	135	170
Shale, red and brown	27	197
Conglomerate, blue	53	250
Shale, blue	15	265
Rock (tuff?) with layers of shale	25	290
Rock (basaltic sandstone?), blue	17	307
Shale, brown, with thin hard layers	33	340
Shale, blue	15	355
Lower lava rocks(?):		
Rock, blue and black, water-bearing from 425 to 445 ft and from 460 to 500 ft	160	515

Table 2.- Materials Penetrated by Representative Wells - Continued

38/9-28L1. F. H. Marks. Drilled by C. Van Meter, 1940

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil and clay	11	11
Yonna formation:		
Shale and clay (soft shale) in layers	117	128
Shale, water-bearing	3	131
Shale and clay in layers	34	165
Shale, water-bearing	1	166
Shale and clay in layers	29	195
Lower lava rocks:		
Basalt, with clay-filled seams	115	310
Basalt, creviced, water-bearing	1½	311½
Conglomerate, hard (lava breccia)	1½	313
Shale	2	315
Diorite, creviced (porphyritic basalt?)	13	328
Basalt, calcite-filled seams	30	358

38/9-28N1. Medo-Land Creamery. Drilled by J. Wilson, 1945

Soil and clay	7	7
Yonna formation(?):		
Shale, hard	68	75
Clay, yellow	17	92
Undesignated (faulted blocks or indiscriminately logged)?		
Basalt, mixed with clay	190	282
"Diorite"	18	300
Basalt with clay seams	20	320
"Diorite"	5	325
Basalt with clay seams	172	497
Shale and clay	8	505
Basalt with clay seams	10	515
Basalt	14	529
"Shale" uppermost 24 ft water bearing	53	582
Basalt with clay seams	18	600
Shale and clay lowest 11 ft hard shale	73	673
"Diorite"	42	715
Basalt with clay seams	35	750
Shale and clay, pink	15	765

Note: Log of nearby well at the Coca-Cola Bottling Works shows Yonna formation to 488 ft and lower lava rocks to bottom at 875 ft.

Table 2.- Materials Penetrated by Representative Wells - Continued

38/9-28P2. J. E. Friesen. Drilled by C. VanMeter, 1944

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil and clay	43	43
Yonna formation:		
Shale, sandy; sandy layers have flowing artesian water	10	53
"Slate" (thinly laminated hard shale)	14	67
Conglomerate, hard	7	74
Shale with clay beds	54	128
Basalt, hard (interflow or bed of hard agglomerate)	18	146
Shale and clay, lowest 149-154 ft hard	27	173
Basalt (agglomerate?)	3	176
Clay	29	205
Lower lava rocks:		
Basalt	13	218
Shale (tuff?)	20	238
Basalt, with clay-filled seams	4	242
"Diorite" (porphyritic basalt)	33	275
Basalt creviced top 4 ft	26	301
Basalt, clay-filled seams, lowest 36 ft red	59	360
"Diorite" (porphyritic basalt)	25	385
Basalt, clay-filled seams	49	434
"Boulders in shale" (basalt blocks in tuff?)	2	436
Basalt, bentonitic clay in seams	17	453
Undesignated (possibly downfaulted Yonna formation):		
Shale, hard	49	502
Clay	58	560
Sandstone, hard	4	564

Table 2.- Materials Penetrated by Representative Wells - Continued

38/9-29J2. Balsiger Motors. Drilled by J. Wilson, 1948

Materials	Thickness (feet)	Depth (feet)
Soil, clay, boulders	30	30
Upper lava rocks:		
Boulders, loose	5	35
Basalt, gray	45	80
Yonna formation:		
Shale, brown, layers of hard strata in lowest 15 ft	135	215
Lower lava rocks:		
Basalt	57	272

38/9-32E4. Oregon Water Corp. Klamath city well no. 4

Alluvium:		
Black soil and gravel	5	5
Yonna formation:		
Clay with little boulders (tuff breccia?)	19	24
Sandstone	8	32
Lava rocks (undifferentiated):		
Boulders (lava breccia)	5	37
Cinders (lava breccia)	8	45
Rock, blue, hard	10	55
Boulders, hard, 6- to 10-inch diameter, in fine sand (tuffaceous basalt breccia?)	10	65
Rock, brittle, in fine sand (tuffaceous basalt breccia?)	7	72
Boulders, hard, in fine sand (tuffaceous basalt breccia?)	6	78
Rock, blue, hard	4	82
Clay, white, brittle	-1/6	82-1/6
Rock, blue, hard	3-5/6	86
Sand and gravel with small boulders (agglomerate), water-bearing	4	90
No record	3	93

Table 2.- Materials Penetrated by Representative Wells - Continued

39/8-32E8. Oregon Water Corp. Klamath city well no. 8. Drilled in 1930

Materials	Thickness (feet)	Depth (feet)
Gravel and boulders	73	73
Yonna formation or upper lava rocks(?):		
Shale, yellow, and rock	1	74
Rock, seamy	8	82
Rock and chalk rock	20	102
Rock, loose, some sand	56	158
Lava rock, soft, and clay (tuff?)	8	166
Yonna formation:		
Gravel, chalk rock and sandstone	20	186
Shale, brown, with some sand	13	199
Sandstone, with streaks of clay	96	295
Sandstone, gray	36	331
Sandstone with clay and basalt fragments	72	403
Sandstone, little gravel	20	423
Sandstone and varicolored shale	96	519
"Shell rock" (laminated soft and hard shale?)	14	533
Sandstone, hard	35	568
Gravel, hard (conglomerate or agglomerate?)	9	577
Rock, black, hard (lava flow or agglomerate?)	10	587
Rock, porous, artesian water (lava flow or agglomerate?)	12	599
Rock, black, hard, solid (lava flow or agglomerate?)	26	625
Conglomerate	44	669
Shale	11	680
Conglomerate	9	689
Chalk rock	6	695
Rock, dark, hard (agglomerate?)	50	745
Conglomerate	38	783
Shale, soft, blue	40	823
Sand, gray, with a little gravel	27	850

Table 2.- Materials Penetrated by Representative Wells - continued

38/9-32H4. Oregon Water Corp. Fifth and Elm Streets. Drilled by E. E. Storey, 1953

Materials	Thickness (feet)	Depth (feet)
Soil and hardpan	15	15
Yonna formation:		
Chalk rock and shale, caving	15	30
Sandstone	7	37
Chalk rock, white	18	55
Clay, bluish-green	80	135
Boulder(?)	3	138
Clay, green	53	191
Basalt, gray (basaltic agglomerate or sill?)	11	202
Shale	34	236
Basalt, gray (basaltic agglomerate or sill?)	16	252
Clay, green	63	315
Gravel; small amount of water	1	316
Shale	39	355
Basalt, gray (boulder?)	1½	356½
Shale	2½	359
Lower lava rocks:		
Basalt, black	7	366
Basalt, gray, water-bearing at 400 to 510 ft	214	580
Basalt, red, water-bearing	3	583
Basalt, reddish-brown	62	645
Basalt, gray	10	655
Basalt, grayish-black	35	690
Basalt, red; small amount of water	43	733
Shale, blue, sticky (interbed)	37	770
Shale, brown, sticky (interbed)	11	781
Basalt, hard, black	19	800
Shale, brownish-black, sandy (tuff? interbed)	25	825
Shale, bluish-black	20	845

38/10-13D1. L. M. Hankins. Drilled by K. Hartley, 1949

Materials	Thickness (feet)	Depth (feet)
Younger alluvial deposits:		
Soil	3	3
Clay, yellow	28	31
Upper lava rocks:		
Lava rock, black, porous	45	76
Ash, black	11	87
Lava rock, porous	53	140
Basalt, hard, blue	40	180
Lava rock, porous	36	216
Cinders, red	5	221

Table 2.- Materials Penetrated by Representative Wells - Continued

38/10-25A1. G. C. Mitchell. Drilled by Wilson Drilling Co., 1949

Materials	Thickness (feet)	Depth (feet)
Soil, sandy, brown	5	5
Alluvium and Yonna formation, undifferentiated:		
Sand and clay, brown	19	24
Sand, coarse, brown (some perched water)	4	28
Clay, blue	27	55
Clay with sand, brown	15	70
Sandstone and "shale," brown	12	82
Gravel and "cinders," 1/8- to 1/2-inch diameter (some water)	3	85
Sandstone, blue	2	87
Clay, blue and yellow, and sand	6	93
Gravel, colored; contains obsidian pebbles (some water)	3	96
Clay, tan	2	98
Gravel, colored, 1/8- to 1-inch diameter (some water)	3	101
Sand, coarse, colored	2	103
Clay, yellow	5	108
Chalk, gray (diatomite or volcanic ash)	22	130
Shale, blue, semihard	37	167
Clay, brown, very sticky	4	171
Chalk, blue	27	198
Clay, rusty color	4	202
Chalk, blue	6	208
Shale, sandy, black	4	212
Clay, rusty color, semihard	38	250
Clay, lowest 4 ft gray and brown	64	314
Shale, gray	2	316
Gravel varicolored	1	317
Sandstone, hard, varicolored	6	323
Clay, brown	4	327
Sandstone, hard, varicolored	2	329
Lava rocks, undifferentiated:		
Lava, broken, and boulders	5	334
Chalk, white (volcanic ash?)	4	338
Lava rock, hard, black	8	346
Chalk, gray (volcanic ash?)	8	354
Lava rock	6	360
Chalk, green (volcanic ash?)	29	389
Lava rock	14	403
Chalk, gray (volcanic ash?)	10	413
Shale, black (volcanic ash?)	5	418
Chalk, green, and "rock shells"	11	429
Lava rock, hard, black	56	485
Basalt	3	488
Rock and cinders, red; water-bearing	12	500
Lava rock, water-bearing	20	520
Lava boulders and cinders; water-bearing	4	524

Table 2.- Materials Penetrated by Representative Wells - Continued

38/11-5P1. Leonard Ritter. Drilled by F. Hilton, 1948

Materials	Thickness (feet)	Depth (feet)
Younger alluvial deposits:		
Soil, sandy	4	4
Clay	26	30
Yonna formation(?):		
Shale, blue	35	65
Sandstone	2	67
Shale, blue (some water at 128 ft)	111	178
Sandstone, black	4	182
Lower lava rocks:		
Lava rock, rust-coated, "gravel in cracks in rock" (water-bearing)	18	200

38/11-6N1. J. P. Colahan. Drilled by H. Hilton, 1947

Soil, sandy	8	8
Yonna formation:		
Chalk (diatomite and/or volcanic ash)	87	95
Sand, fine, black; some water	1	96
Chalk (diatomite or volcanic ash)	45	141
Sandstone, brown	12	153
Chalk (diatomite or volcanic ash)	57	210
Lower lava rocks(?):		
Rock, lava, hard, red	75	285
Shale, brown	20	305
Sand, brown; some water	5	310
Rock and cinders, water-bearing	15	325

38/11-7M1. Louis Tofel, Jr. Drilled by owner, 1948

Sand	1	1
Alluvium:		
Sandstone	28	29
Chalk, yellow (diatomite or volcanic ash)	66	95
Gravel; some water	2	97
Upper lava rocks:		
Rock (lava rock?)	40	137
Lava rock, broken, red; some water	92	229
Rock (lava rock?)	8	237
Clay, gray	5	242
Cinders, red, gray; water-bearing	18	260

Table 2.- Materials Penetrated by Representative Wells - Continued

38/11½-11H1. Bradley Estate. Drilled by F. Hilton, 1948

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil, sandy	7	7
Clay, brown, "hardpan"	½	7½
Yonna formation:		
Shale, blue	42½	50
Sandstone, brown	2	52
Shale, blue	142	194
Sandstone, black	20	214
Lower lava rocks:		
Lava rock, porous, broken, black, water-bearing	10	224

38/11½-12M1. Frank Challis. Drilled by G. Hartley, 1942

Alluvium:		
Soil, sandy	10	10
Yonna formation:		
Chalk, blue (volcanic ash?)	60	70
Gravel, and fine sand (some water)	3	73
Chalk, blue (volcanic ash?)	227	300
Gravel, coarse	8	308
Chalk, blue (volcanic ash?)	72	380
Sandstone, yellow	1	381
Chalk (diatomite or volcanic ash)	19	400
Upper lava rock(?):		
Lava rock, hard	1	401
Lava rock, porous, blocky, water-bearing	24	425

38-11½-12M2. Frank Challis. Drilled by Stuart, 1942

Alluvium and Yonna formation:		
Chalk (diatomite or volcanic ash or clay)	140	140
Upper lava rocks:		
Cinders	8	148
Lava rock, porous, red, water-bearing	2	150

Table 2.- Materials Penetrated by Representative Wells - Continued

38/11½-15R1. L. M. Hankins. Drilled by C. Vochatzer, 1948

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Yonna formation:		
Sand	4	6
Clay	32	38
Rock (sedimentary)	12	50
Shale (a little water)	2	52
Sand	2	54
Shale	191	245
Rock, black (sandstone of basaltic materials?)	6	251
Shale	21	272
Rock	16	288
Shale	10	298
Rock	20	318
Shale	10	328
Rock	5	333
Shale	5	338
Rock	5	343
Shale	19	362
Lower lava rock:		
Lava rock, water-bearing	70	432
Cinders, red, water-bearing	15	447
Cinders and brown clay	7	454
Lava rock and cinders, water-bearing	41	495

38/11½-23F1. Cliff Sewald. Drilled by F. Hilton, 1946

Topsoil	1	1
Yonna formation:		
Sandstone and clay seams	13	14
Chalk (diatomite or volcanic ash)	31	45
Sand, black; some water	1	46
Chalk (diatomite or volcanic ash)	154	200
Sand and chalk (a little water)	25	225
Lower lava rocks(?):		
Lava rock, porous, black, water-bearing	30	255
Sand, black, fine; some water	1	256
Lava rock, porous, black, water-bearing	14	270
Sand, black, fine; some water	2	272
Lava rock, porous, black, water-bearing	13	285
Sand, black, fine	1	286

Table 2.--Materials Penetrated by Representative Wells - Continued

38/11½-24E1. Virgil Schmoe. Drilled by F. Hilton, 1949

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil, sandy	2	2
Gravel, cemented	2	4
Clay, brown	31	35
Yonna formation:		
Shale, green	20	55
Sand	1	56
Shale, blue	157	213
Sand, black	3	216
Shale, green	478	694
Sandstone, green	2	696
Shale, green	3	699
Sandstone, green	2	701
Shale, green	64	765
Sandstone, black	18	783
Shale, green	14	797
Sand	3	800
Shale, sandy	57	857
Lower lava rocks:		
Lava rock, black	20	877
Cinders, red	3	880
Lava rocks, black	104	984
Lava rocks, broken, and yellow cinders	12	996

38/11½-26H1. Cliff Sewald. Drilled by F. Hilton and K. Hartley, 1948

Topsoil	1	1
Yonna formation:		
Sandstone, buff	5	6
Shale, blue	34	40
Sand	1	41
Shale, blue	30	71
Sand	1	72
Shale, blue	32	104
Sand	2	106
Shale, blue	65	171
Lower lava rocks:		
Lava, dense, black	12	183
Lava, broken, and yellow cinders	8	191

Table 2.- Materials Penetrated by Representative Wells - Continued

38/11½-30Q1. W. L. Whytall. Drilled by F. Hilton, 1947

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil, sandy	15	15
Upper lava rocks:		
Boulders, hard, with loose cinders	125	140
Lava rock, hard	17	157
Boulders, hard, with cinders	8	165
Cinders	10	175

38/11½-32G1. L. L. Porterfield. Drilled by P. McGinley, 1948

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil, sandy	10	10
Shale, blue	120	130
Upper lava rocks:		
Rock, gray, and cinders	65	195
Cinders, red, water-bearing	2	197

39/8-6F1. L. W. Soukup. Round Lake well. Drilled by E. E. Storey, 1953

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Clay	20	20
Upper lava rocks:		
Boulders	90	110
Clay, red	5	115
Basalt, red	15	130
Shale, brown	5	135
Basalt	26	161
Basalt, water-bearing	9	170

Table 2.- Materials Penetrated by Representative Wells - Continued

39/8-13A1. H. W. Leitzke. Drilled by J. Wilson, 1947

Materials	Thickness (feet)	Depth (feet)
Soil and hardpan	14	14
Yonna formation:		
Chalkrock, gray	13	27
Clay and sand	9	36
Gravel and clay, brown	16	52
Cinders, red (tuff?)	8	60
Clay, dark brown	7	67
Cinders, red	18	85
Clay, black, hard	13	98
Sand, black, water-bearing	5	103
Lower lava rocks(?):		
Rock, hard	7	110

39/8-13J1. Weyerhaeuser Timber Co. Well no. 2. Drilled by W. Hartley, 1929

Yonna formation:		
Chalk rock, white	35	35
Clay, dark	10	45
Shale and rock	30	75
Shale, black	65	140
Lower lava rocks:		
Rock, hard	45	185
Rock, black	44	229
Rock and a little "shale"	11	240
Rock	18	258
Rock, hard, brittle	22	280
Rock, black	537	817

39/9-9R1. Great Northern Railway

Yonna formation:		
Clay, blue, and chalk rock, white	207	207
Rock, hard	38	245
Sandstone, black	5	250
Clay, white	13	263
Lower lava rocks:		
Basalt, porous, water-bearing	73	336

Table 2.- Materials Penetrated by Representative Wells - Continued

39/9-16E1. T. P. Packing Co. Drilled by E. E. Storey, 1954

Materials	Thickness (feet)	Depth (feet)
Soil	6	6
Alluvium or Yonna formation(?):		
Chalk, white	29	35
Clay, green, little water	45	80
Clay, green, more water	105	185
Yonna formation:		
Clay, green	140	325
Shale, green	165	490
Clay, blue	35	525
Clay, blue, and sand	25	550
Shale, blue, hard	60	610
Rock (boulder or ledge)	1	611
Clay, black; some water	4	615
Lower lava rocks:		
Basalt, black	3	618

39/9-18M1. Weyerhaeuser Timber Co. Well no. 3 Drilled, 1946

Soil	12	12
Yonna formation:		
"Mud" and sandstone	6	18
"Mud" and sand	22	40
Sandstone and gravel	70	110
Lower lava rocks:		
Rock (basalt)	67	177

39/9-18M2. Weywrhaeuser Timber Co. Well no 4. Drilled by W. L. Hartley & Son, 1956

Yonna formation:		
Sandstone	8	8
Sandstone and boulders	30	38
Shale and boulders	17	55
Sandstone and boulders	10	65
Lava rock	13	78
Sandstone and boulders	14	92
Lower lava rocks:		
Lava rock (water)	36	128
Sandstone and boulders	17	145
Lava rock	100	245
Volcanic breccia, like sandstone	27	272
Lava rock, water-bearing from 415 to 420, at 464, and from 512 to 524	273	545

Unpublished records subject to revision

Table 2.- Materials Penetrated by Representative Wells - Continued

39/9-19D1. Weyerhaeuser Timber Co. Well no. 1. Drilled, 1928

Materials	Thickness (feet)	Depth (feet)
No record	586	586
Lower lava rocks:		
Rock, black	12	598
Basalt	2	600
Rock, black and hard	117	717
Shale and rock, black	78	795

39/9-28H1. Floyd Stoute. Drilled by E. E. Storey, 1953

No record; old well	115	115
Yonna formation:		
Clay, blue	135	250
Shale, greenish	78	328
Lower lava rocks:		
Basalt, black	137	465
Basalt, water-bearing	2	467
Basalt	1	468

39/9-31M1. C. L. Gray. Drilled by E. E. Storey, 1954

Soil and hardpan	10	10
Yonna formation:		
Chalk rock, white, with sand	10	20
Clay, bluish-green	142	162
Lower lava rocks:		
Basalt, black	3	165
Clay, blue	11	176
Basalt, black	1	177

39/9-32P1. Fred Peters. Drilled by E. E. Storey, 1954

Soil	5	5
Yonna formation:		
Chalk rock, white	30	35
Clay, blue	50	85
Lower lava rocks:		
Basalt, black	60	145

Table 2.- Materials Penetrated by Representative Wells - Continued

39/9-34E1. U. S. Air Force. Drilled by K. Hartley, 1956

Materials	Thickness (feet)	Depth (feet)
Soil and shale, yellow	52	52
Upper lava rocks:		
Lava, burned	42	94
Lava, black, dense	7	101
Lava, red	17	118
"Boulders," basaltic	6	124
Lava, burned	22	146
Yonna formation:		
Sand	100	246
Shale	45	291
Lava, black	12	303
Shale, gray, hard	29	332
Shale, blue	8	340
Clay and shale	46	386
Shale, gray, hard	24	410
Lower lava rocks:		
Lava, black, dense	37	447
Basalt, blue, very dense	26	473
Lava, porous, black (water)	15	488
Lava, red, cinders	12	500

39/11-5Q1. W. Oberheide. Drilled by W. Hartley, 1946

Alluvium:		
Soil	6	6
Quicksand	8	14
Clay, yellow	103	117
Upper lava rocks:		
Lava rock, water-bearing	38	155
Cinders, red, water-bearing	2	157

39/11-6D1. R. House. Drilled by W. Hartley, 1943

Soil	8	8
Upper lava rocks:		
Lava rock, broken, and "chalk" seams	84	92
Cinders, dark-red, water-bearing	4	96

Table 2.- Materials Penetrated by Representative Wells - Continued

39/11-10N1. Bob Hartley. Drilled by R. Hartley, 1946

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil	8	8
Quicksand	7	15
Chalk, yellow (diatomite or volcanic ash)	23	38
Chalk, green (volcanic ash?)	122	160
Sandstone, brown	3	163
Upper lava rocks:		
Lava rock, brown	3	166

39/11½-5D1. L. L. Porterfield. In south end of Pine Flat. Drilled by P. McGinley, 1946

Alluvium:		
"Dirt," black	19	19
Boulders	2	21
"Dirt" (a little water at 50 ft)	31	52
Upper lava rocks:		
Basalt rock	89	141
Sand (a little water)	9	150
Basalt rock, water-bearing	110	260

39/11½-10B2. L. J. Horton. At southwest edge of Yonna Valley. Drilled by F. Hilton, 1949

Alluvium:		
Soil, black	3	3
Hardpan, yellow (clay)	11	14
Upper lava rocks:		
Lava rock, broken, and yellow cinders	47	61

39/11½-12H1. A. E. Burgdorf. Drilled by W. Hartley, 1930

Alluvium:		
Chalk, yellow (diatomite or volcanic ash)	31	31
Chalk, blue (volcanic ash?)	146	177
Upper lava rocks:		
Lava rock, broken, blue	40	217

Unpublished records subject to revision

Table 2.- Materials Penetrated by Representative Wells - Continued

39/11½-22J1. P. T. Hatchet. In north part of Poe Valley. Drilled by R. and W. Hartley, 1949

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil, sandy	12	12
Yonna formation:		
Shale, bluish-green	382	394
Basalt, hard (sill or interflow)	18	412
Shale, bluish-green	90	502
Lower lava rock:		
Lava rock, broken (some water)	36	538
Basalt	362	900

39/11½-30C1. Taylor High. Drilled by C. VanMeter, 1943

Soil	3	3
Fault-jumbled or disturbed material:		
Chalk, sticky	24	27
Sandstone, water-bearing	6	33
Basalt	3	36
Hardpan	3	39
Boulders and clay (sloughs off)	6	45
Upper(?) lava rocks:		
Basalt, solid	13	58
Basalt, creviced	7	65

39/11½-31L1. Virgil Holmes. Drilled by C. VanMeter, 1935

Soil	2	2
Yonna formation:		
Chalk rock	118	120
Sandstone, water-bearing	5	125
Chalk rock	85	210
Sand streaks, water-bearing	2	212
Chalk rock	88	300

Table 2.- Materials Penetrated by Representative Wells - Continued

39/12-34R1. Bruce Beiler. Drilled by C. VanMeter, 1942

Materials	Thickness (feet)	Depth (feet)
Soil and hardpan	8	8
Upper lava rocks:		
Lava	52	60
Hardpan (interflow tuff)	12	72
Lava	7	79
Yonna formation:		
Conglomerate, small boulders and clay	12	91
Cinders, packed; small amount of water	4	95
"Lava," porous (agglomerate)	28	123
Chalk rock	42	165
Chalk rock, gravelly; some water	5	170
Shale, "slick"	26	196
Boulders and clay	14	210
Boulders, large (coarse agglomerate?)	15	225
Chalk rock, sandy	49	274
Conglomerate	7	281
Chalk rock, sandy	6	287
Lower lava rocks:		
Basalt	23	310
"Diorite"	25	335
Basalt, red (top of flow)	4	339
Basalt	44	383
Basalt, red (top of flow)	3	386
Basalt	7	393
Basalt, water-bearing	2	395
Basalt	8	403

40/9-3Q1. Robert Stewart. Drilled by Storey Bros., 1948

Soil	4½	4½
Yonna formation:		
Sandrock	13½	18
Chalk rock, blue	37	55
Sand, black, and chalk rock	5	60

Table 2.- Materials Penetrated by Representative Wells - Continued

40/9-9M1. William Gray. Drilled by E. E. Storey, 1953

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Boulders and clay	20	20
Yomna formation:		
Clay, brown	35	55
Rock (sandstone or agglomerate?)	25	80
Clay, black, sandy (tuff?)	245	325
Rock (sandstone or agglomerate?)	25	350
Shale, black	138	488
Sand and gravel (agglomerate?), water-bearing	2	490
Shale, tan	10	500

40/9-13M1. Jack O'Conner, Drilled by J. Wilson, 1952

Soil and hardpan	18	18
Yonna formation:		
Chalk rock, white	7	25
"Hardpan"	10	35
Shale, blue (hard water)	20	55
Shale, black	220	275
Gravel (agglomerate?), water-bearing	2	277
Shale, green	23	300

40/9-27L1. L. Motschenbacher. Drilled by E. E. Storey, 1953

Alluvium (some fault-disturbed materials):		
Soil, boulders and clay	63	63
Yonna formation:		
Boulders and sand (agglomerate?):	42	105
Sandstone	27	132
Rock, gray (tuff or agglomerate?)	16	148
Rock, water-bearing (tuff or agglomerate?)	2	150
Sandstone, blue	5	155

Table 2.- Materials Penetrated by Representative Wells - Continued

40/9-36K1. Oscar Baker. Drilled by J. VanMeter, 1950

Materials	Thickness (feet)	Depth (feet)
Soil and hardpan	2½	2½
Yonna formation:		
Chalk rock, white	18½	21
Chalk rock, green	236	257
Sand, black, "seepage water"	1	258
Chalk rock, green	25	283
Chalk rock and sand	22	305
Chalk rock, green	8	313
Sand, black, water-bearing	14	327

40/10-6Q1. Ralph Hill. Drilled by C. VanMeter, 1941

Alluvium:		
Soil	10	10
Sand, coarse, and gravel; water-bearing	26	36
Sand, muddy	60	96
Yonna formation:		
Chalk rock	224	320
Clay, sandy	56	376
Sand, coarse, and gravel with streaks of clay, water-bearing	8	384

40/10-7J1. Tom Jackson. Drilled by E. E. Storey, 1953

Alluvium:		
Soil	3	3
"Sandstone"	4	7
Clay, sandy	15	22
Sand, running	3	25
Yonna formation:		
Chalk rock, blue, sandy (tuff?)	35	60
Chalk rock, black, sandy (tuff?)	65	125
Sand, black, water-bearing	10	135

Table 2.- Materials Penetrated by Representative Wells - Continued

40/10-28R1. C. W. Lewis. Drilled by J. Wilson, 1952

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Sand	23	23
Mud, blue	5	28
Gravel	3	31
Sand	37	68
Sand and clay	15	83
Yonna formation:		
Chalk rock (tuff, diatomite, etc.?)	310	393
Sandstone	35	428
Sand, black	4	432

40/10-34K1. E. C. Lemler. Drilled by J. Wilson, 1949

Alluvium:		
Soil	5	5
Chalk, white	23	28
Yonna formation:		
Sand rock	20	48
"Quicksand"	82	130
Chalk rock	108	238
Gravel	2	240

40/11-3A1. Melvin Fiegi. Drilled by C. VanMeter, 1942

Alluvium:		
Soil	2	2
Chalk; seep of water at 75 ft	93	95
Yonna formation:		
Sandstone, water-bearing	2	97
Chalk rock	55	152
Sandstone, water-bearing	1	153
Chalk rock	200	353
"Limestone," hard, blue, water-bearing	16	369
Chalk rock, sticky	171	540
Shale and chalk rock, in layers	62	602
"Slate," hard	5	607
Chalk rock and "slate," in layers	53	660
"Limestons," hard	22	682
"Slate," hard	20	702
Shale, hard, water-bearing	20	722

Table 2.- Materials Penetrated by Representative Wells - Continued

40/11-12D1. Irving Ross. Drilled by J. Wilson, 1948

Materials	Thickness (feet)	Depth (feet)
Alluvium and Yonna formation(?)*		
Chalk rock, small amount of water	70	70
Yonna formation:		
Chalk rock	365	435
Lower lava rocks(?):		
Rock, gray	6	441
Rock, black	4	445
Rock, water-bearing	15	460
Conglomerate	5	465

40/11-13F1. Wm. Rajnus. Drilled by C. Hartley, 1952

Soil and decomposed brown sandstone	20	20
Yonna formation:		
Shale, yellow, hard	40	60
Shale, blue, hard	30	90
Clay	90	180
Gravel	1	181
Clay	24	205
Lower lava rocks:		
Basalt, boulders and clay	14	219
Basalt and red clay	26	245
Boulders and clay	16	261
Basalt	39	300

40/11-36P1. Carl Ciyah. Drilled by J. VanMeter, 1949

Gravelly soil	1½	1½
Upper lava rocks:		
Boulders and gravel	10½	12
Boulders	5	17
Basalt, blue	10	27
Crevice filled with clay	2	29
Basalt, red	15	44
Yonna formation:		
Sandstone, brown	84	128
Sandstone, black, water-bearing	25	153
Sand, water-bearing	2	155

Table 2.- Materials Penetrated by Representative Wells - Continued

40/11-36R1. Rudolph Paygr. Drilled by J. VanMeter, 1948

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil	5	5
Sand and boulders	7	12
Chalk	18	30
Upper lava rocks:		
Boulders	8	38
Rock, solid, gray	7	45
Rock, solid, brown	9	54
"Quartzite"	3	57
Basalt "conglomerate" and "quartzite"	10	67
Basalt, black	25	92
Basalt and red clay; small seep of water from crevice	3	95
Basalt, black	17	112
Yonna formation:		
Conglomerate, coarse sandstone, shale, red clay, chalk, gray clay, etc.; water-bearing	20	132

40/12-6G1. F. O. Freuer. Drilled by E. E. Storey, 1953

Alluvium:		
Soil	4	4
Gravel and clay	11	15
Upper lava rocks:		
Rock, creviced	135	150
Basalt, water-bearing	10	160
Basalt, blue	55	215
Basalt, black, water-bearing	23	238
Basalt, black	2	240

Table 2.- Materials Penetrated by Representative Wells - Continued

40/12-18D1. Wm. Rajnus. Drilled by J. Wilson, 1947 and 1950

Materials	Thickness (feet)	Depth (feet)
Soil and sandy clay	6	6
Upper lava rocks(?):		
Rock, gray	14	20
Rock, blue	10	30
Rock, green	4	34
Rock, black	26	60
Yonna formation:		
Shale, brown	5	65
Sand and gravel, black (tuff?)	10	75
Sandrock, brown	8	83
Rock and gravel (agglomerate?)	41	124
Cinders, red; some water	9	133
Basalt (basaltic agglomerate?)	31	164
"Diorite" (basaltic agglomerate?)	18	182
Cinders (tuff breccia?)	17	199
Rock, gray, with seams (tuff?)	11	210
Conglomerate, brown	5	215
Gravel, brown, with hard laminae	41	256
Rock, gray, hard (tuff?)	4	260
Rock, gray, hard (tuff?) (most of cuttings lost)	5	265
Sandrock, black, lowest 3 ft gray	8	273
Sand, fine	7	280
Rock, black (agglomerate)	15	295
Shale, brown	27	322
"Crevices"	15	337
Shale.	158	495
"Crevices"	10	505
Conglomerate, broken, and shale	45	550
Lower lava rocks:		
Basalt	at	550

Table 2.- Materials Penetrated by Representative Wells - Continued

40/12-31Q1, Richard Craven. Drilled by J. VanMeter, 1950

Materials	Thickness (feet)	Depth (feet)
Soil and small boulders	18	18
Upper lava rocks:		
Boulders, large	3	21
Basalt, gray	22	43
Sand and chalk conglomerate (interbed?)	11	54
Basalt, gray	4	58
Crevice in basalt	2	60
Basalt, gray	5	65
Sand and clay (seam or interbed)	6	71
Basalt, gray	7	78
Crevice	3	81
Basalt, gray	6	87
Crevice	1	88
Yonna formation:		
Chalk and sand	3	91
"Crevice"	8	99
Sandstone	3	102
Chalk rock and sand, black	11	113
Sand, water-bearing	13	126
Sandstone	1	127
Sand, brown, water-bearing	16	143
Sand, black, water-bearing	10	153

40/13-3D1. Fitzhugh. Drilled by J. Wilson, 1948

Soil and boulders	7	7
Yonna formation:		
Clay, brown	24	31
Sand, black, water-bearing	2	33
Clay, pink	37	70
Clay, blue	10	80
Sand, fine, water-bearing	5	85

Table 2.- Materials Penetrated by Representative Wells - Continued

41/9-2R1. City of Merrill. Drilled by C. VanMeter, 1939

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil and hardpan	10	10
Clay, gravelly, with layers of water-bearing sand	30	40
Clay, sandy, lowest 28 ft sticky	78	118
Sandstone	4	122
Clay	91	213
Clay, with some fine sand layers	12	225
Yonna formation(?):		
Sandstone, coarse-grained, soft, water-bearing	5	230
Sand, fine, water-bearing	18	248
Clay	64	312
Chalk rock with thin layers of water-bearing sand	4	316
Chalk rock	114	430
Chalk rock, thin water-bearing laminae	1	431
Yonna formation:		
Chalk rock	99	530
Sandstone	1	531
Chalk rock	175	706
Sandstone	1	707
Chalk rock, hard, with vertical seams	93	800
Chalk rock	186½	986½
Lower lava rocks:		
Basalt	60½	1,047
Basalt, creviced, water-bearing	39	1,086
Cinders, red and brown	2	1,088

Table 2.- Materials Penetrated by Representative Wells - Continued

41/10-4J1. M. J. Barnes. Drilled by O. Storey, 1954

Materials	Thickness (feet)	Depth (feet)
Soil and gravel	15	15
Yonna formation:		
Chalk rock, white	65	80
Clay, blue	43	123
Gravel, cemented (tuff?)	175	298
Basalt, gray (agglomerate?)	4	302
Gravel, cemented	8	310
Basalt, gray (agglomerate?)	13	323
Gravel, cemented, gray	18	341
Clay, blue	53	394
Basalt, gray (agglomerate?)	11	405
Gravel, cemented	10	415
Shale, blue and gray	10	425
Shale, blue	8	433
Lower lava rocks(?):		
Basalt	9	442
"Shale" with hard laminae	16	458
Rock	5	463
"Shale" with hard laminae	9	472
Rock	10	482
"Shale" with hard laminae	12	494
Rock, water-bearing	11	505
"Shale," blue	13	518
Rock, water-bearing	4	522
Rocky "shale," water-bearing	18	540

41/10-9L1. Wendell Moore. Drilled by J. Wilson, 1949

Soil, clay and gravel	20	20
Yonna formation:		
Chalk rock, yellow	15	35
Sandrock, black, water-bearing	15	50
Chalk rock, yellow	15	65
Chalk rock, blackish	110	175
Cinders, black with hard laminae	35	210
Sandrock, black	6	216
Chalk rock, brown	384	600
Sand, black, water-bearing	100	700
Rock, some gravel and sand	15	715
Sand	66	781

Table 2.- Materials Penetrated by Representative Wells - Continued

41/10-10L1. Fatherington Bros. Drilled by Storey Bros., 1950

Materials	Thickness (feet)	Depth (feet)
Soil and hardpan	11	11
Yonna formation:		
Chalk rock, lowest 125 ft white and blue	159	170
"Rock"	2	172
Shale, blue, lowest 17 ft rocklike	24	196
"Rock"	6	202
Clay, lowest 22 ft black	24	226
"Rock"	2	228
Clay, hard, black, sticky	82	310
Chalk rock, blue, gritty	149	459
"Rock"	2	461
Chalk rock	1½	462½
"Rock"	½	463
Chalk rock, gravelly	2	465
"Rock"	1	466
Chalk rock, gravelly	2	468
Yonna formation(?):		
"Rock"	19	487
Clay	3	490
"Rock"	8	498
Clay	7	505
"Rock"	110	615
Clay, red and blue	14	629
"Rock"	1	630
Clay, soft	11	641
"Rock," water-bearing (agglomerate?); no cuttings returned	25	666
Clay	1	667
Gravel, water-bearing	1	668
Chalk rock, gravelly	10	678

41/10-11H1. Leo McKoen. Drilled by J. VanMeter, 1952

Alluvium:		
Soil and hardpan	5	5
Chalk, yellow (top 20 ft) and blue, sandy	55	60
Chalk, blue	53	113
Chalk and sand	6	119
Chalk green, with streaks of coarse sand in lowest 20 ft	46	165
Chalk, yellow	6	171
Sand	1	172
Chalk, yellow	8	180

Table 2.- Materials Penetrated by Representative Wells - Continued

41/11-4K1. Randle Pope. Drilled by J. Wilson, 1946

Materials	Thickness (feet)	Depth (feet)
Soil	4	4
Upper lava rocks (probably faulted):		
Boulders	46	50
Cinders	20	70
Boulders; lost water in crevice	17	87
Boulders	21	108
Cinders	17	125
Basalt, creviced	13	138
Sandrock, water-bearing	2	140
Basalt, creviced, water-bearing	17	157

41/11-7D1. John O'Neil. Drilled by C. VanMeter, 1943

Alluvium:		
Soil and clay	12	12
Quicksand	4	16
Shale, water-bearing	5	21
Chalk, little water at bottom	159	180
Yonna formation(?):		
Chalk	119	299
Yonna formation:		
Sandstone, water-bearing	1	300
Chalk rock	430	730
Chalk rock, with layers of water-bearing sand	40	770

Table 2.- Materials Penetrated by Representative Wells - Continued

41/11-12H2. Wilford Dixon. Drilled by J. Wilson, 1944

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil	6	6
Quicksand, water-bearing	6	12
Sand, packed, water-bearing	36	48
Pumice, coarse, water-bearing	2	50
Sand, packed, and clay; some water	25	75
Clay	15	90
Sand, water-bearing	3	93
Clay	19	112
Yonna formation:		
Sand and clay, interlayered, water-bearing	23	135
Chalk rock with some water-bearing sand layers	250	385
Chalk rock	335	720
Sand	2	722
Chalk rock	8	730
Clay, bentonite, swells	5	735
Shale, sandy	10	745
Lower lava rocks:		
Basalt, creviced, clay seams, water-bearing, some gas in water	75	820

41/12-5C1. G. M. Freitag. Drilled by E. E. Storey, 1954

Soil and loose boulders	10	10
Upper lava rocks:		
Rock, tan	45	55
Boulders	15	70
Basalt, red	25	95
Basalt, gray	45	140
Shale (tuffaceous interbed?)	20	160
Basalt, black, water-bearing	6	166
Basalt, red	1	167

Table 2.- Materials Penetrated by Representative Wells - Continued

41/12-12H1. Frye & Barney. Drilled by J. VanMeter, 1953

Materials	Thickness (feet)	Depth (feet)
Alluvium:		
Soil, hardpan, sand, clay, small rocks	11	11
Boulders and clay	21	32
Yonna formation(?) (may be faulted material toward the top):		
Clay, gravel and sand	65	97
Clay, blue	6	103
Clay, yellow	5½	108½
Sandstone, soft	3½	112
Sandstone, medium-hard	2	114
Clay and sand	8	122
Sandstone	11	133
Clay and gravel	9	142
Sand, packed, and gravel	1	143
Lower lava rocks:		
Basalt, blue, creviced	7	150
Boulders, sand and gravel	18	168
Basalt, shattered, and clay	15	183
Boulders, sand and gravel	9	192
Basalt, vesicular	17	209
Boulders and gravel	3	212
Basalt, brown	1	213
Boulders and sand	2	215
"Quartzite"	3	218
Basalt, broken	1	219
"Sandstone," red	6	225
Basalt, broken	9	234
Boulders, gravel and sand	5	239
"Sandstone"	1	240
Boulders, gravel and sand	6	246
Boulders, sandstone and gravel	12	258
Basalt, broken	1½	259½
Boulders, gravel and clay	7½	267
Basalt, red, cinders and "gravel"	11	278
"Sandstone" (tuff interbed?)	7	285
Conglomerate (breccia?)	15	300

Table 2.- Materials Penetrated by Representative Wells - Continued

41/12-24M1. W. C. Dalton. Drilled by C. VanMeter, 1942

Materials	Thickness (feet)	Depth (feet)
Soil	4	4
Alluvium and Yonna formation(?):		
Chalk rock	181	185
Chalk rock, streaks of pumice, sand and gravel	14	199
Chalk rock, sticky	101	300
Yonna formation:		
Shale, some water	2	302
Chalk rock	18	320
Sandstone (with fossil bones and shells)	12	332
Chalk rock	275	607
Bentonite	4	611
Chalk rock, thin beds of water-bearing sand	32	643
Sandrock, hard	101	744
Chalk rock	7	751

Table 2.- Materials Penetrated by Representative Wells - Continued

41/13-19F1. Loveness Lumber Co. Drilled by J. VanMeter, 1948

Materials	Thickness (feet)	Depth (feet)
Sand and boulders	3	3
Yonna formation(?):		
Sand, packed (chalk 18-21 ft)	24	27
Sand, black, water-bearing	5	32
Chalk rock, gray and green	21	53
Sand; little water	10	63
Sand, packed	3	66
Sand, black, coarse	2	68
Sand, brown	4	72
Gravel, fine, and coarse sand	1	73
Basalt, broken, and boulders	6	79
"Conglomerate," clay binder	12	91
Basalt, black	5	96
Basalt, creviced, water-bearing (water level dropped)	13	109
Basalt, red	7	116
Basalt, broken in top 3 ft	25	141
Basalt, red	8	149
Clay, and gravel, soft (tuff interbed?)	15	164
Basalt	4	168
"Conglomerate," hard	6	174
"Conglomerate," basalt slag, cinders and red rock (agglomerate interbed?)	2	176
Basalt, creviced in lowest 2 ft	5	181
"Diorite," blue	8	189
"Conglomerate," hard	20	209
"Diorite"	4	213
Basalt, clay-bound cubical jointing	4	217
"Diorite," blue	10	227
"Conglomerate" (agglomerate interbed?)	28	255
Basalt, creviced in top 3 ft	23	278
Basalt, broken; some water in top 5 ft	17	295
"Granite," black	18	313
Conglomerate	6	319

[illegible]

Table 3.- Representative Springs

Topography: S, slope to valley; P, plain; U, upland.
Yield: (e) estimated; (m) measured; (r) reported

Spring no.	Owner	Spring name	Topography and altitude (feet above sea level)		Water-bearing material
(1)	(2)	(3)	(4)		(5)
28/8-23A1	U. S. Forest Service	Rook Spring	U	4,725	Pumice
30/8-16Q1	J. P. McAuliffe	Big Spring	P	4,530±	do.
30/8-22D2	do.	Lenz(?) Spring	P	4,525±	do.
31/6-19E1	National Park Service	Annie Spring	S	6,006	Pumice and lava rock
32/8-24K1	Klamath Indian Reservation	Dice Crane Spring	P	4,600±	Pumice
32/10-27N1	do.		S	4,775±	Pumice and lava rock
32/11-17P1	Yamsay Cattle Co.	Wickiup Spring	S	4,600±	do.
33/7-32A1	Klamath Indian Reservation	Spring Creek	P	4,250±	Basalt

in the Klamath River Basin

Use: D, domestic; H, heating; Ind, industrial; Irr, irrigation; N, none; S, stock.

Occurrence	Yield		Use	Hardness as $CaCO_3$ (parts per million)	Chloride (Cl) (parts per million)	Temperature (°F)	Remarks
	Gallons per minute	Date					
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Contact between basalt and overlying pumice mantle	20(e)	8/28/54	S	38	3	41	Flow about 5 gpm Oct. 1954.
Outflow from regional ground-water body onto pumice plain	2,500(e)	7/28/54	N	20	2		One of several such springs that form source of Big Spring Creek; see plate 9 for discharge record of Big Spring Creek.
do.	2,000(e)	7/28/54	N			43	Do.
Percolation from lava rock conduits through surficial pumice	1,220 2,160	9/20/08 8/ 8/13	D	15	2	35	Water supply for camp ground, source of Annie Creek.
	50(e)	8/20/54				45	Enclosed with 4- by 6-ft concrete box; discharges through 2-inch pipe.
Outflow seepage at base of pumice mantle	50(e)	8/31/54	S				
Outflow from an agglomerate bed of the Yonna formation	7,000(e)	9/16/54	N				Part of source of upper Williamson River; see text, p.38 for description of sources of Williamson River.
Outflow from regional ground-water body	138,150 (m)	9/22/54	S	24	4	44	A main branch of Williamson River; see plate 9 for discharge record of Spring Creek.

Unpublished records subject to revision

Table 3.- Representative Springs in

Spring no.	Owner	Spring name	Topography and altitude (ft above see level)		Water-bearing material
(1)	(2)	(3)	(4)		(5)
33/7½-3H1		Wood River Springs	P	4,210±	Basalt
33/11-4N1	Klamath Indian Reservation	Williamson River Springs	S	4,600±	Agglomerate layers of the Yonna formation
33/11-9M2	Yamsay Cattle Co.	Yamsay(?)	S	4,600±	Pumice
34/6-2C1	U. S. Forest Service	Mares Egg Spring	P	4,160	Basalt
34/7-18P1	Klamath Indian Reservation	Agency Springs	S	4,175	do.
34/7½-1F1	Oregon State Fisheries Dept.		S	4,145	do.

the Klamath River Basin - Continued

Occurrence	Gallons per minute	Date	Use	Hardness as $CaCO_3$ (parts per million)	Chloride (Cl) (parts per million)	Temperature (°F)	Remarks
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Outflow from regional ground-water body	101,800	9/17/50	N				Main source of Wood River; see plate 10 for discharge records of river 2½ mi downstream.
do.	2,500 (e)	8/30/54	Irr, S	34	2	43	Source of Williamson River; this and other nearby springs used by the Yamsay Cattle Co. to irrigate about 7 sq mi of pastures.
Seepage at base of pumice mantle	300 (e)	8/31/54	S				Flow reported to fluctuate with seasons and with pumpage of nearby wells.
Outflow from regional ground-water body	5,720 (m)	10/ 5/54	S			45	Yield includes small creek flowing about 1,000 to 1,500 gpm.
do.	9,180 (m)	9/27/54	D				Supplies Klamath Indian Agency; 50-ft concrete dam forms reservoir at spring site; tributary to Crooked Creek.
do.	19,548 (m)	10/ 4/54	Ind				Water used for trout propagation at fish hatchery; 1 of 4 similar springs used by hatchery; yield given as that of Crooked Creek below hatchery.

Table 3.- Representative Springs in

Spring no.	Owner	Spring name	Topography and altitude (ft above sea level)		Water-bearing materials
(1)	(2)	(3)	(4)		(5)
34/8-22D1	Hagelstein Bros.	Crawford Springs	P	4,290	Basalt
34/8-25J1	Rowland Lelo and Frank Summers	Kamkaun Springs	P	4,375±	do.
34/8-26C1	Ida Corbell		P	4,275±	do.
34/8-26E1	do.		P	4,275±	do.
34/8-33H1	M. D. Rafter		S	4,300±	Pumice
34/12-13E1	Klamath Indian Reservation	Godowa Spring	S	5,550±	Basalt
35/12-28N1	do.		P	4,300±	Pumice
36/6-3K1	Olive Johnson	Harriman Spring	P	4,140	Basalt, breccia
36/7½-19D1	U. S. Forest Service	Bud Spring	P	4,142	do.

the Klamath River Basin - Continued

Occurrence	Gallons per minute	Date	Use	Hardness as $CaCO_3$ (parts per million)	Chloride (Cl) (parts per million)	Temperature (°F)	Remarks
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Outflow from regional ground-water body	1,500 (e)	8/ 3/54	D, S	20	3	60	
do.	29,628 (m)	9/29/54	D	20	2	52	Former Indian wintering grounds.
do.			S	15	2	58	Flows out at river level.
do.	20 (e)	8/ 3/54	D	15	3	53	Concrete box, 6 ft square over spring.
Outflow at base of pumice mantle and above Yonna formation	20 (e)	8/ 2/54	Irr, S	55	2	47	Used for irrigating lawn and garden; reported variation of flow is very small.
Perched water emitting from base of lava flow	2 (e)	11/19/54	S				Piped underground for 50 ft; typical of many stock springs of the uplands.
Outflow from base of pumice (perched water?)	500 (e)	9/15/54	S			55	
Outflow from regional ground-water body	1,000 (e)	12/ 1/54	D	36	1	44	Water rises vertically from openings in basalt channel of Harriman Creek.
do.	2,000 (e)	11/22/54	N			44	Flows from openings between large blocks of basalt; several smaller springs of similar origin.

Table 3.- Representative Springs in

Spring no.	Owner	Spring name	Topography and altitude (ft above sea level)		Water-bearing materials
(1)	(2)	(3)	(4)		(5)
36/12-18C1	L. L. Jackson		S	4,310	Basalt(?)
36/12-19L1	Dell Smith		S	4,310	do.
36/12-24E1	D. G. Givan		S	4,355	do.
36/12-30G1	J. B. Casey		S	4,315	Basalt
36/12-31E1	D. O. Schonchin	Whisky Spring	S	4,315	do.
36/16-20M1	Weyerhaeuser Timber Co.	Salt Spring			do.
37/9-6E1	Klamath County	Barclay Springs	S	4,145	Basalt talus

the Klamath River Basin - Continued

Occurrence	Gallons per minute	Date	Use	Hardness as $CaCO_3$ (parts per million)	Chloride (Cl) (parts per million)	Temperature (°F)	Remarks
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Outflow from region ground-water body	75 (e)	8/ 7/54	D			55	Flows up through sand at end of a low ridge at level of valley plain; flows into Whisky Creek.
do.	200 (e)	8/ 7/54	D			57	Part of the sources of Whisky Creek.
do	300 (e)	8/ 7/54	D, S, Irr			64	Used for irrigating 80 acres of native grass; 5 smaller springs on valley plain below -24E1.
do.	200 (e)	8/ 7/54	Irr			58	Used for irrigating a few acres of pasture; part of Whisky Creek.
do.	400 (e)	8/ 6/54	D, Irr			54	Used for irrigating 40 to 60 acres; source of Whisky Creek; rises where basalt bedrock terminates.
Contact of upper lava rocks with underlying Yonna formation	10-20 (e)	10/14/54	D, S				Water is fresh and non-mineralized; name refers to stock-salting location; supplies camp ground.
At foot of fault scarp	500 (e) 763 (r)	11/24/49 8/ 8/10	S	50	4	54	Concrete catchment tank at west edge of US Highway 97.

Table 3.- Representative Springs in

Spring no.	Owner	Spring name	Topography and altitude (ft above see lewel)		Water-bearing materials
(1)	(2)	(3)	(4)		(5)
37/9-7F1	G. C. Horn		S	4,160	Basalt talus
37/9-7K1	Tom Brown	Hummingbird Springs	S	4,160	do.
37/9-11K1	C. L. Janssen	Janssen Springs	S	4,820	Basalt
37/9-22E1	J. Whiteline	Whitelihe Springs	S	4,500	Agglomerate layer in Yonna formation
37/10-6L1	A. R. Devincenzi	Edgewood Springs	S	4,500	Basalt
38/9-29J1	Balsiger Motor Co.	Balsiger Hot Springs	S	4,110	do.
38/11½-15C1	Orrin Hankins		S	4,200	do.
38/15-18F1		Robinson Spring	S	5,150±	do.

the Klamath River Basin - Continued

Occurrence	Yield		Use	Hardness as $CaCO_3$ (parts per million)	Chloride (Cl) (parts per million)	Temperature (°F)	Remarks
	Gallons per minute	Date					
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
At foot of fault scarp	200 (e)	11/24/49	D, S, Irr	50	3	49	A 100-ft rocked-up tunnel into talus; water ditched to irrigate approximately 1 acre of land.
do.	100 (e)	11/24/49	D, S	50	3	49	Covered and piped to storage tank.
Between basalt flows	500 (e)	11/17/49	S	40	3	50	Yield reported to vary with precipitation.
Outcrop of aquifer	500 (r)	11/17/49	D, S	45	4	50	Reported to fluctuate with a lag of about a year behind precipitation.
Between basalt flows	2,500 (e)	11/18/49	D, S	40	3	52	Flow reported to fluctuate slightly and to increase in the spring of the year.
Outflow from regional ground-water body after passing across hot fault zone	100 (e)	12/20/54	H			179	Used for heating large automobile shop.
May be on trace of fault		11/13/49	D	50	4	51	Basalt overlain by impervious clay.
Contact between basalt flows	150 (e)	9/ 1/54	S				Impounded by small earth dam.

Unpublished records subject to revision

Table 3.- Representative Springs in

Spring no.	Owner	Spring name	Topography and altitude (ft above sea level)		Water-bearing materials
(1)	(2)	(3)	(4)		(5)
39/8-13L1	Lee Holliday		P	4,105	Alluvium
39/8-27G1	D. E. Colwell		P	4,110	Basalt
39/9-18P1	Weyerhaeuser Timber Co.	Hardboard Spring	P	4,095	
39/10-14M1	Leo Donovan	Olene Hot Springs	S	4,150	Yonna formation
39/10-14M2	Dr. A. O. Roeniche	Olene Hot Spring (part of group)	S	4,160	do.
39/10-22K1	Dr. Paul Sharp	Crystal Spring	S	4,160	Basalt
39/11-10Q1	Cecil Hunt and others	Bonanza Springs	P	4,107	do.

the Klamath River Basin - Continued

Occurrence	Yield		Use	Hardness as $CaCO_3$ (parts per million)	Chloride (Cl) (parts per million)	Temperature (°F)	Remarks
	Gallons per minute	Date					
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Probably outflow from regional ground-water body in basalt, moving into alluvium and then discharging	50 (e)	12/ 6/54	D			70	Well drilled in spring obtained no increase in water; well penetrated peat soil to 10 ft, blue clay 10 to 50 ft, basalt 50 to 90 ft.
Contact between basalt flows	450 (r)	12/ 6/54	D	86	6	60	Located on edge of valley floor at base of slope from upland.
	135 (r)	12/ /40	Ind	158	5	70	Used by the hardboard plant; see table 4 for partial analysis of water.
On trace of major fault		11/24/49	D	115	38	125	Several orifices on banks of Lost River; all orifices located on same fault trace.
do.		12/ 9/54	H	106	67	158	Used for heating residence and small shop by gravity flow through radiators.
Outflow at the base of the upper lava rocks	900 (r)	12/10/54	S			78	Fish pond formed by small dam at spring.
On trace of intersecting fault zones in bedrock	8,980 to 9,870 (r)	1949	D,			59	Includes several orifices on banks of Lost River; discharge of all orifices included in 8,980- to 9,870-flow reported by owners--essentially the entire flow of Lost River during summer and fall; see

Table 3.- Representative Springs in

Spring no.	Owner	Spring name	Topography and altitude (ft above sea level)		Water-bearing materials
(1)	(2)	(3)	(4)		(5)
39/11½-10B1	L. J. Horton	Shook Springs	S	4,110	Vesicular basalt
39/11½-19M1	High Bros.		S	4,100	Basalt
39/14-3M1	Gerber Ranch(?)	Casebeer Spring	S	5,050±	do.
40/12-6C1	F. O. Freuer				do.
40/13-10E1	Walter Smith, Jr.	Big Hot Spring	P	4,150	Basalt through alluvium
43/13-15D1	Harry Martin		S	4,240	Basalt

the Klamath River Basin - Continued

Occurrence	Yield: Gallons per minute	Yield: Date	Use	Hardness as $CaCo_3$ (parts per million)	Chloride (Cl) (Parts per million)	Temperature (°F)	Remarks
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Outflow from regional ground-water body at low place along fault displacements	1,122 (r)	11/20/49	S	50	3	55	Springs consist of more than 100 orifices, which feed into reservoir.
Flows at regional ground-water level from lava rocks	3,150 (r)	8/27/54	Irr	72	4	66	
Base of the upper lava rocks	400 (e)	10/ 9/54	Irr				One of several similar springs along Gerber Rim; water irrigates meadow below spring and also flows to Gerber Reservoir.
Issues from contact between basalt flows	10 (e)	8/21/54	S				Several small springs of this type along side of hill.
On trace of major fault zone	40 (e)	7/30/54	N	60	66	142	Once used for hot mineral baths; largest of several hot springs along foot of west escarpment Langell graben.
Flows from talus material along trace of major fault	200 (r)	8/ 9/54	D	64	2	62	Similar spring half a mile to the south.

Table 3.- Representative Springs in

Spring no.	Owner	Spring name	Topography and altitude (ft above sea level)		Water-bearing materials
(1)	(2)	(3)		(4)	(5)
40/14-6G1	Joe Patucek		S	4,210	Basalt
40/14-9A1	Mrs. Kilgore		S	4,350	do.
41/15-16N1	U. S. Government		S	4,950	do.

the Klamath River Basin - Continued

Occurrence	Yield		Use	Hardness as $CaCO_3$ (parts per million)	Chloride (Cl) (parts per million)	Temperature (°F)	Remarks
	Gallons per minute	Date					
(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Flows from base of upper lava rocks	25 (r)	8/ 5/54	D, S, Ind	52	5	72	Concrete swimming pool at spring site for public use; has 2 orifices.
Flows from base of upper lava rocks(?) along major fault escarpment	40 (r)	8/ 6/54	D, S, Irr	92	2		One of 7 similar springs along side of hill; total flow of springs reported as 120 gpm.
Flows from contact between basalt flows	400 (e)	10/ 9/54	D, S				Campsite; source of a branch of Rock Creek.

Table 4.- Chemical Analyses of Ground
(Chemical constituents
Analyses by U. S. Geological

Well or spring no. / Date of collection	31/7-24C1 2-19-55	33/7½-16R1 2-19-55	36/10-13G1[a] 11-10-52	37/10-30B1 11-19-49
Temperature (°F)		43	66	45
Silica (SiO2)	39	40		51
Iron (Fe)				
(Total)	.49	.17		.03
(In solution)	.48	.01		.02
Calcium (Ca)	3.8	4.0	13	15
Magnesium (Mg)	3.0	1.2	3	11
Sodium (Na)	16	5.8	22	
Potassium (K)	1.8	1.7		13
Bicarbonate (HCO3)	70	38	105	128
Carbonate (CO3)				
Sulfate (SO4)	.3	1.2	5.3	1.4
Chloride (Cl)	.8	.8		1.4
Fluoride (F)	.2	.2		.2
Nitrate (NO3)	.0	.0		1.9
Boron (B)	.04	.1		.0
Dissolved solids (Total)	83	82	147	158
Hardness as CaCO3 (Calcium, magnesium)	22	15	45	83
Noncarbonate	0	0	0	0
Sodium-Adsorption ratio (SAR)	1.5	.7	1.4	.6
Percent sodium	59	42	52	25
Specific conductance (micromhos at 25° C)	112	62.9	170	200
pH	7.5	7.1	8.5	7.7

a Analysis by U. S. Bureau of Reclamation
b Analysis by Charlton Laboratories, Inc., Portland.
c Analysis by Bennetts, Tacoma.
*Contains equivalent of 4 ppm CO_3.
(S) spring.

Water in the Klamath River Basin
in parts per million.
Survey unless otherwise indicated.)

38/9-28N1 1-24-55	38/9-28P2 2-19-55	38/9-33D1 12-22-54	38/9-33E1[b] 4-2-36	38/11½-12M1 4-1-48	38/11½-30Q1 11-20-49	39/9-18P1[c] 11-12-54 S
178	164	160	125	51	61	70
81	87	83	70	32	47	
.04	.0	.0	.0	.04	.04	.05
.0	.0	.0			.03	
23	25	22		38	14	
.0	.0	.0		21	8.8	
213	221	207		21	20	
4.2	4.4	3.8				
32	32	*47		229	124	145
8	8					
403	431	393	380	16	2.9	
54	56	50	53	6.2	6.6	5.0
1.2	1.6	1.4		.2	.2	
.0	.0	.2		17	.4	
.96	.91	.74		.01	.01	
833	881	812	784	264	161	158
58	62	55	44	182	71	30
19	23	16	0			.0
12	12	12		6.9	1.0	
88	88	88		20	38	
1,160	1,230	1,100		409	200	
8.8	8.7	8.5	9.0	7.5	7.7	7.7

Unpublished records subject to revision

Table 4.- Chemical Analyses of Ground Water

Well or spring no. / Date of collection	39/9-19D1[d] 2-11-29	39/9-29C1[b] 4-2-53	39/9-34E1 12-18-56	39/11-10Q1 10-23-49 S
Temperature (°F)				59
Silica (SiO_2)				38
Iron (Fe)				
(Total)		.16	.36	.22
(In solution)			.01	.03
Calcium (Ca)			5.4	13
Magnesium (Mg)	19		.6	7.2
Sodium (Na)				14
Potassium (K)				
Bicarbonate (HCO_3)		796	133	106
Carbonate (CO_3)				
Sulfate (SO_4)		.0		2.5
Chloride (Cl)	9.1	12	7	1.7
Fluoride (F)			.3	.2
Nitrate (NO_3)			.0	.6
Boron (B)				.01
Dissolved solids (Total)	180	723	186	129
Hardness as $CaCO_3$				
(Calcium, magnesium)		314		62
Noncarbonate		0		0
Sodium-Adsorption ratio (SAR)				.8
Percent sodium				33
Specific conductance (micromhos at 25° C)			240	165
pH			8.5	7.9

b Analyses by Charlton Laboratories, Inc., Portland.
d Analyses by Northwest Testing Laboratory, Seattle.
S spring.

in the Klamath River Basin - Continued

	39/11½-10B2 11-22-49	39/12-36L1 2-18-55	40/12-6G1 2-18-55	40/10-2R1 2-18-55
	55		61	69
	48	46	27	38
	.02	.0	.01	.12
		.0	.0	.01
	11	14	20	11
	9.4	10	11	4.3
	14	10	21	44
		2.6	3.4	3.8
	108	118	166	114
	2.1	1.6	5.1	21
	2.4	1.8	1.8	27
	.3	.1	.1	.1
	.9	5.8	3.4	.0
	.0	.02	.05	.01
	141	139	168	214
	66	76	95	45
	0	0	0	0
	.8	.5	.9	1.4
	31	22	31	66
	175	204	269	316
	7.8	7.7	8.1	8.3

Table 5.- Discharge and Temperature of Streams and Springs in the Klamath River Basin

Date of measurement		Stream or spring	Location of measuring site	Discharge (cfs)	Temperature of water (°F)
1954		Williamson River and tributaries above the Klamath Marsh			
Sept.	16	Williamson River	NW¼ sec. 1, T. 33 S., R. 7 E. below Wickiup Spring	75.40	52
	17	Deep creek	SW¼ sec. 22, T. 31 S., R. 11 E. at mouth	1.03	
	17	Aspen Creek	NW¼ sec. 21, T. 31 S., R. 11 E.	2.90	44
	17	Irving Creek	SE¼ sec. 19, T. 30 S., R. 11 E.	1.51	46
	17	Jackson Creek	SW¼ sec. 7, T. 30 S., R. 11 E.	4.66	45
	29	Williamson Rover	SW¼ sec. 17, T. 30 S., R. 10 E., near Kittredge Ranch	70.67	52
	29	Three Creeks	SW¼ sec. 28, T. 29 S., R. 9 E., at mouth	.35	
	29	Big Spring Creek and diversion	SE¼ sec. 22, T. 30 S., R. 8 E.	89.20	44
		Williamson River and tributaries below Klamath Marsh			
Sept.	16	Williamson River*	SW¼ sec. 1, T. 33 S., R. 7 E., near Kirk	89.7	
	16	do.	Sec. 2, T. 34 S., R. 7 E., at former gaging station above Spring Creek	123.0	
	22	Spring Creek at mouth	NE¼ sec. 9, T. 34 S., R. 7 S.	307	
	16	Williamson River*	Sec. 3, T. 35 S., R. 7 E., near Chiloquin	754	

*Established USGS Gaging station.
Unpublished records subject to revision

Table 5.- Discharge and Temperature of Streams and Springs - Continued

Date of measurement	Stream or spring	Location of measuring site	Discharge (cfs)	Temperature of water (°F)
1954	Sprague River and its tributaries			
Sept. 28	Sprague River South Fork	SE¼ Sec. 8, T. 37 S., R. 15 E., 4 miles east of Bly	13.63	50
25	Sprague River (North Fork below diversion)	NW¼ sec. 5, T. 36 S., R. 14 E.	26.11	58
28	Sprague River (North Fork diversion)	NE¼ sec. 10, T. 36 S., R. 14 E.	13.50	48
25	Meryl Creek	SE¼ sec. 30, T. 35 S., R. 14 E.	14.33	56
28	Five Mile Creek and diversion	NE¼ sec. 34, T. 35 S., R. 13 E.	20.20	55
28	Sprague River*	SE¼ sec. 13, T. 36 S., R. 12 E., 1½ miles east of Beatty	155	
23	Sycan River	SE¼ sec. 21, T. 32 S., R. 14 E., at ZX Ranch	7.81	
23	Long Creek	NW¼ sec. 4, T. 32 S., R. 13 E.	15.50	51
24	Sycan River	SW¼ sec. 10, T. 33 S., R. 13 E., at Sycan Guard Station	9.19	
25	Sycan River	SE¼ sec. 34, T. 35 S., R. 12 E., 3 miles north of Beatty	33.0	54
29	Kamkaun Spring	SE¼ sec. 25, T. 34 S., R. 8 E., at mouth	65.84	52
29	Sprague River*	NE¼ sec. 35, T. 34 S., R. 7 E., near Chiloquin	330	

*Established USGS Gaging station.

Unpublished records subject to revision

Table 5.- Discharge and Temperature of Streams and Springs - Continued

Date of measurement		Stream or spring	Location of measuring site	Discharge (cfs)	Temperature of water (°F)
1954		Drainage into Upper Klamath Lake other than Williamson River			
Oct.	4	Annie Creek	SE¼ sec. 25, T. 33 S., R. 6 E.	63.57	42
	4	Fort Creek and diversion	NW¼ sec. 26, T. 33 S., R. 7½ E.	96.92	49
	4	Crooked Creek	SW¼ sec. 1, T. 34 S., R. 7½ E., 100 ft above hwy. bridge	43.44	47
Sept.	29	Agency Spring	SW¼ sec. 18, T. 34 S., R. 7 E., at Klamath Indian Agency	20.40	
	17	Wood River*	NW¼ sec. 22, T. 33 S., R. 7½ E., at Fort Klamath	445	
Oct.	5	Sevenmile Creek	SW¼ sec. 36, T. 33 S., R. 6 E.	86.83	43
	5	Mares Egg Spring	NE¼ sec. 2, T. 34 S., R. 6 E.	11.57	45
	5	Threemile Creek	SE¼ sec. 2, T. 34 S., R. 6 E.	.91	43
	5	Nannie Creek	SW¼ sec. 10, T. 34 S., R. 6 E.	5.51	44
		Lost River and Spencer Creek			
Oct	6	Spencer Creek	SW¼ sec. 20, T. 39 S., R. 7 E.	25.58	44
1953					
Oct.	22	Lost River*	Sec. 18, T. 39 S., R. 12 E., 3 miles SE of Bonanza	38.5	
	22	Lost River*	SE¼ sec. 19, T. 39 S., R. 11 E., 3 miles SW of Bonanza	143	
1954					
Nov.	6	Lost River*	do.	115	47

*Established USGS gaging station.
Unpublished records subject to revision

Table 6.- Measurements of Depth to Water in Observation Wells, 1954-56

[Altitude: (barometric) determined by means of aneroid barometer; (map) estimated from topographic map.] (Water levels are in feet below land-surface datum.)

29/8-34D1. Jack O'Connor. Altitude of land surface, 4,620 ft (barometric)

Date	Water level	Date	Water level
Aug. 19, 1954	28.28	Dec. 18, 1954	32.58
Oct. 26	30.03	June 27, 1955	36.57
Nov. 18	31.19	Aug. 25	36.65
Nov. 23	31.40		

29/10-19D1. Klamath Indian Reservation. Altitude of land surface, 4,535 ft (barometric)

Aug. 31, 1954	23.73	Jan. 1, 1955	r 23.76
Oct. 6	23.62	Feb. 1	r 23.58
26	23.87	Mar. 4	r 24.35
Nov. 18	23.91	Apr. 5	r 24.46
23	23.96	June 30	24.53
Dec. 1	r 23.85	Aug. 26	24.96
18	24.15	Oct. 11, 1956	20.98

r From automatic recorder chart.

30/7-6A1. Klamath Indian Reservation. Altitude of land surface, 4,812 ft (barometric)

Aug. 27, 1954	184.95	June 27, 1955	185.16
Oct. 26	184.84	Aug. 26	185.50
Nov. 23	184.79		

30/7-11G1. Klamath Indian Reservation. Altitude of land surface, 4,625 ft (barometric)

Aug. 27, 1954	56.74	Dec. 18, 1954	56.41
Sept. 29	57.39	June 27, 1955	57.40
Oct. 15	57.45	Aug. 26	58.08
26	56.29	Oct. 11, 1956	57.60
Nov. 23	56.31	Dec. 22	57.56

Table 6.- Measurements of Depth to Water in Observation Wells - Continued

34/7-34L1. Claudia L. Lorenz. Altitude of land surface, 4,186 ft (barometric)

Date	Water level	Date	Water level
Aug. 2, 1954	1.02	June 29, 1955	1.14
Oct. 27	.85	Aug. 26	1.51
Dec. 19	.85	Oct. 11, 1956	.31
Feb. 16, 1955	1.67	Dec. 22	.05

34/8-36Q1. Edna Stanton. Altitude of land surface, 4,182 ft (barometric)

Aug. 9. 1954	7.44	Aug. 26, 1955	10.82
Oct. 27	9.88	Apr. 8, 1956	1.45
Dec. 19	10.33	Oct. 11	8.80
June 29, 1955	9.95	Dec. 22	9.39

35/7-5F1. Cora Crystal. Altitude of land surface, 4,194 ft (barometric)

Nov. 29, 1954	26.40	Aug. 25, 1955	27.16
Dec. 18	26.53	Apr. 8, 1956	25.56
June 30	26.91		

35/10-19B1. Ted Crume. Altitude of land surface, 4,350± ft (barometric)

Aug. 2, 1954	10.8	June 29, 1955	21.13
Oct. 27	16.37	Aug. 26	18.37
Dec. 19	23.34*	Apr. 8, 1956	6.98
Feb. 16, 1955	18.04	Oct. 11	11.69

*Pump on.

35/12-27Q1. Henry Noneo. Altitude of land surface, 4,365± ft (barometric)

Aug. 7, 1954	9.04	Oct. 11, 1956	10.83
Oct. 27	9.17	Dec. 21	8.04
Apr. 8, 1956	8.89		

Table 6.- Measurements of Depth to Water - Continued

36/10-14K2. Ivy Clark. Altitude of land surface, 4,345 ft (map)

Date	Water level	Date	Water level
Aug. 5, 1954	25.90	June 29, 1955	23.84
Oct. 27	24.09	Aug. 26	26.91
Dec. 19	24.01	Apr. 8, 1956	25.51
Feb. 16, 1955	22.86	Oct. 11	24.81

36/11-25R1. W. M. Williams. Altitude of land surface, 4,380 ft (map)

Oct. 27, 1954	9.88	Aug. 26, 1955	9.63
Dec. 19	10.02	Apr. 6, 1956	8.35
Feb. 16, 1955	9.69	Oct. 11	9.26
June 29	37.00*	Dec. 21	9.83

*Pump on (measured with electric tape).

36/12-14M1. Beatty Recreation Hall. Altitude of land surface, 4,345 ft (map)

Aug. 10, 1954	6.21	Aug. 26, 1955	3.64
Oct. 27	6.52	Apr. 6, 1956	.90
Dec. 19	6.51	Oct. 11	2.80
June 29, 1955	6.35	Dec. 21	2.89

36/14-17B1. E. W. Hyde. Altitude of land surface, 4,370 ft (map)

Aug. 12, 1954	51.55	Aug. 26, 1955	52.62
Oct. 27	51.75	Apr. 6, 1956	51.19
Dec. 19	52.03	Oct. 11	50.78
June 27, 1955	52.36	Dec. 21	51.02

39/11½-28R1. W. Tubach. Altitude of land surface, 4,105 ft (map)

Aug. 27, 1954	10.06	June 28, 1955	8.95
Oct. 28	9.80	Aug. 25	6.50
Dec. 17	9.46	Apr. 7, 1956	8.43
Feb. 18, 1955	9.05	Det. 11	11.88
		Dec. 20	8.64

Table 6.- Measurements of Depth to Water - Continued

39/12-29K1. Jack Weimer. Altitude of land surface, 4,140 ft (map)

Date	Water level	Date	Water level
Aug. 11, 1954	17.69	Aug. 25, 1955	16.34
Oct. 28	22.62	Apr. 7, 1956	21.33
Dec. 17	24.25	Oct. 10	16.71
Feb. 18, 1955	25.46	Dec. 21	22.07
June 28	18.20		

39/12-36L1. Lloyd Crawford. Altitude of land surface, 4,150 ft (map)

Date	Water level	Date	Water level
Aug. 7, 1954	35.24	Aug. 25, 1955	36.09
Oct. 28	37.40	Apr. 7, 1956	38.13
Dec. 17	39.27	Oct. 10	34.55
Feb. 18, 1955	41.42	Dec. 21	40.94
June 28	37.82		

40/11-11D1. A. W. Schaupp. Altitude of land surface, 4,150 ft (map)

Date	Water level	Date	Water level
Aug. 21, 1954	10.77	Aug. 25, 1955	11.86
Oct. 28	10.57	Apr. 7, 1956	8.38
Dec. 17	10.32	Oct. 10	10.60
Feb. 18, 1955	11.34	Dec. 20	10.41
June 28	11.53		

41/11-9B1. Leland Pope. Altitude of land surface, 4,066 ft (map)

Date	Water level	Date	Water level
Sept. 9, 1954	29.98	Feb. 18, 1955	34.04
Oct. 29	29.58	June 28	32.56
Dec. 17	34.65	Aug. 25	31.29

41/12-3E1. Albert Stastny. Altitude of land surface, 4,110 ft (map)

Date	Water level	Date	Water level
Aug. 31, 1954	0.79	Aug. 25, 1955	1.37
Oct. 28	1.00	Apr. 7, 1956	.82
Dec. 17	1.10	Oct. 10	2.72
Feb. 18, 1955	.75	Dec. 20	3.11
June 28	1.00		

Unpublished records subject to revision

Table 6.- Measurements of Depth to Water - Continued

41/12-12H1. Frye & Barney. Altitude of land surface, 4,220 ft (map)

Date	Water level	Date	Water level
Oct. 28, 1954	167.82	Aug. 25, 1955	183.42*
Dec. 17	167.63	Apr. 7, 1956	166.14
Feb. 18, 1955	167.65	Oct. 10	164.82
June 28	187.05*	Dec. 20	164.16

*Pump on.

41/12-19G1. D. P. Reid. Altitude of land surface, 4,045 ft (map)

Aug. 31, 1954	11.37	Aug. 25, 1955	6.00
Oct. 29	7.45	Apr. 7, 1956	3.86
Dec. 17	6.77	Oct. 10	4.94
Feb. 18, 1955	6.83	Dec. 20	4.83
June 28	9.25		

41/14-7R1. Charles Kilgore. Altitude of land surface, 4,150 ft (barometric)

Aug. 4, 1954	17.05	Aug. 25, 1955	17.41
Oct. 28	17.77	Apr. 7, 1956	16.42
Dec. 17	17.99	Oct. 10	17.08
Feb. 18, 1955	17.66	Dec. 21	17.02
June 28	17.55		

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