UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Portland, Oregon

GROUND-WATER RESOURCES OF BAKER VALLEY, BAKER COUNTY, OREGON

By

Frederick D. Trauger

Prepared in cooperation with the U. S. Bureau of Reclamation
and the Oregon State Engineer

January 1951

CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS

TABLES

GROUND-WATER RESOURCES OF BAKER VALLEY

BAKER COUNTY, OREGON

By F. D. Trauger

ABSTRACT

The Baker Valley is the southern part of a small oval-shaped intermontane structural basin located near the southeastern edge of the Blue Mountains of northeastern Oregon. The Powder River enters and leaves the valley through narrow rock gorges. The alluviated basin floor at an altitude of about 3,400 feet is bounded by high, Alpine-type mountains on the west and by lower hilly ridges on the north, east, and south. Creeks descend across alluvial fans from the higher western margin of the valley to the Powder River on the valley floor.

The valley floor and the contiguous alluvial slopes are formed of unconsolidated deposits of Quaternary age having a thickness of more than 700 feet in the central part of the valley. The surrounding higher lands are formed of consolidated rocks composed of volcanic flows, tuffs, and partly consolidated deposits of Tertiary age, and sedimentary, igneous, and metamorphic rocks of late Paleozoic age. The unconsolidated materials underlying the alluvial slopes are mostly fanglomerates — composed of partly consolidated angular rock fragments imbedded in assorted finer materials — and fine-grained sedimentary deposits having much interbedded gravel and sand along the valley floor.

Unpublished records
subject to revision

The unconsolidated deposits contain a body of ground water, the upper surface of which is called the water table. The water table slopes down gradient approximately parallel to the land surface. Variations in the general inclination of that water table indicate that drainage on different segments of the alluvial slope is influent and effluent to the ground-water body. Yields from wells in the fanglomerate along the west side of the valley are not large, but large yields are obtained from wells on the valley floor just north of Baker. Properly constructed test wells have not been drilled over much of the northern part of the valley floor.

The Tertiary rocks of both volcanic and sedimentary origin along the margin of the valley east of Baker contain some ground water under sufficient pressure to cause wells to flow at the surface, but generally those strata are not highly productive. Some water occurring along fault lines in these rocks has an abnormally high temperature.

The growing season in this area is short and the use of shallow water for irrigation may aid materially in securing the maximum returns of which the valley is capable.

Unpublished records
subject to revision

INTRODUCTION

Details of the Field Work and the Report

Location and Extent of the Area

The area considered in this report lies in northeastern Oregon, in the northwestern part of Baker County (see pl. 1). The name Baker Valley is commonly applied to the southern part of an alluviated fault basin which is an intermontane valley situated in the southeastern part of the highland area known as the Blue Mountain physiographic section./ The valley is a roughly rectangular area of approximately 120 square miles now devoted largely to stock raising. The main line of the Union Pacific Railway, as well as U. S. Highway 30, traverses the area.

/ Fenneman, N. M., Physiography of Western United States, p. 226, McGraw-Hill Book Co., Inc., 1931.

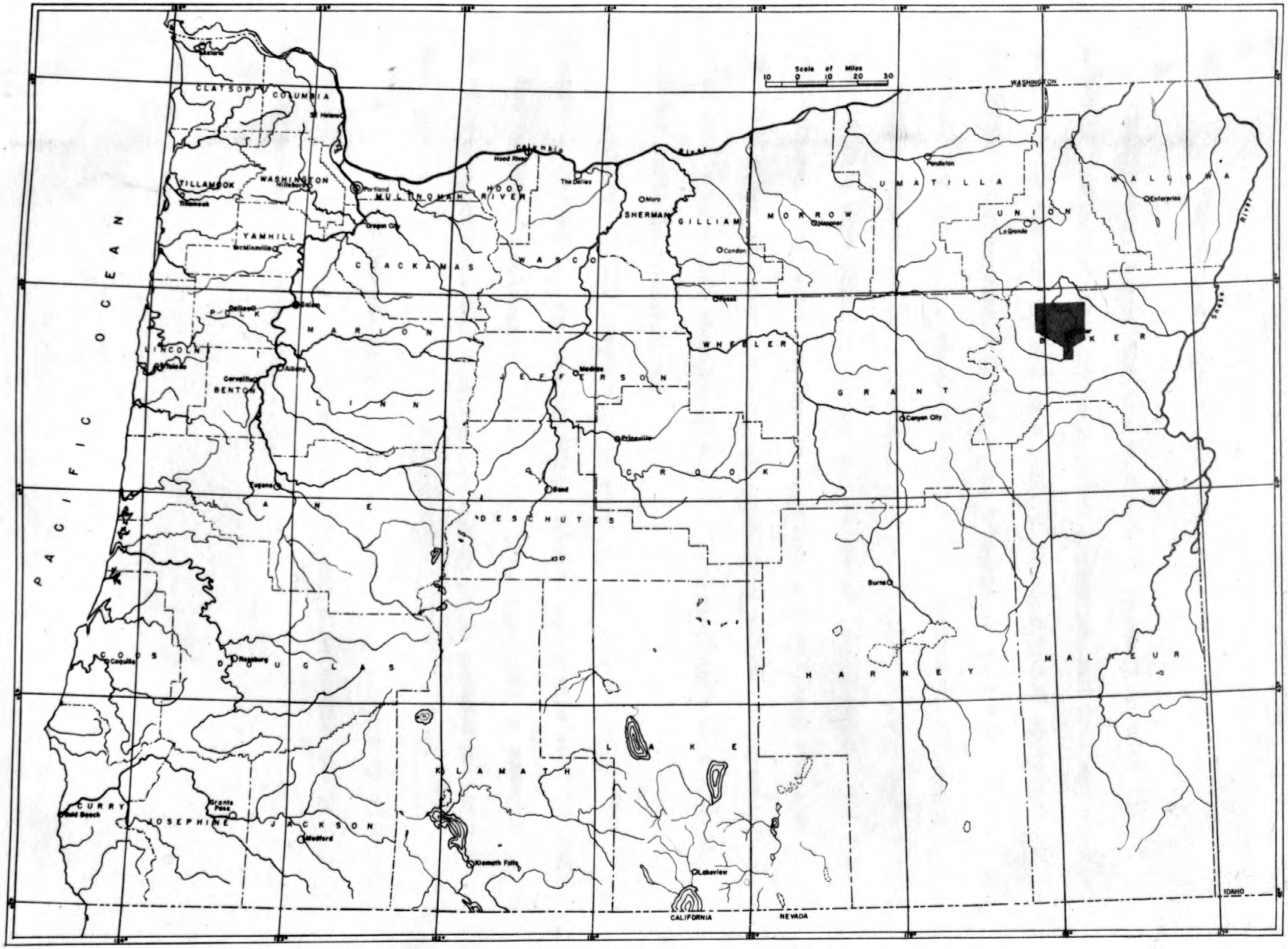


PLATE 1

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

Purpose and Scope of the Investigation

The investigation of the area was made in cooperation with the Bureau of Reclamation in conjunction with irrigation and drainage studies being made by the Bureau, and as a part of the continuing appraisal of the ground-water resources of Oregon in cooperation with the office of the State Engineer. The study involved a well canvass during which hydrologic informationwas collected and a brief geologic reconnaissance in which data were obtained on the occurrence of ground water. The few available well logs were obtained from owners and drillers, who also furnished other pertinent information concerning wells. Observations on water levels were made wherever possible and arrangements were made to continue periodic measurements.

Approximately 100 comprehensive chemical analyses of water from representative wells, springs, sloughs, creeks, and rivers were furnished by the Bureau of Reclamation. These data were augmented by numerous tests of water for hardness and chloride content by field methods during the well canvass.

Altimeter traverses were made to supplement the topography of the available maps and a small amount of additional planimetric and topographic mapping was accomplished from these traverses.

Well-Numbering System

In this report, each well or spring is designated by a symbol which indicates its location according to the official rectangular survey of public lands. For example, the symbol 8/39-22G1 refers to a well in sec. 22, T. 8 S., R. 39 E. The letter after the section number refers to a 40-acre subdivision of the section according to the following diagram,

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

and the number 1 to the first well visited in that particular 40-acre tract. The townships are south from the Willamette base line and the ranges are east of the prime meridian.

Acknowledgments

The people contacted during the collection of these data were helpful and their aid is gratefully acknowledged. Particular acknowledgment is due to Clyde Ward, rancher, Wallace Maxwell, watermaster, L. H. Williams, driller, and Earl Johnson, James Adams, and Lloyd Atherton for the donation of their time and services. Appreciation also is expressed for the cooperation of the Soil Conservation Service and the Bureau of Reclamation. Donald Anderson, field assistant, and Joseph Meyers, geologist, of the Geological Survey gave valuable help during the collection of the data and preparation of illustrations for this report.

Climate and Physiography

Climate

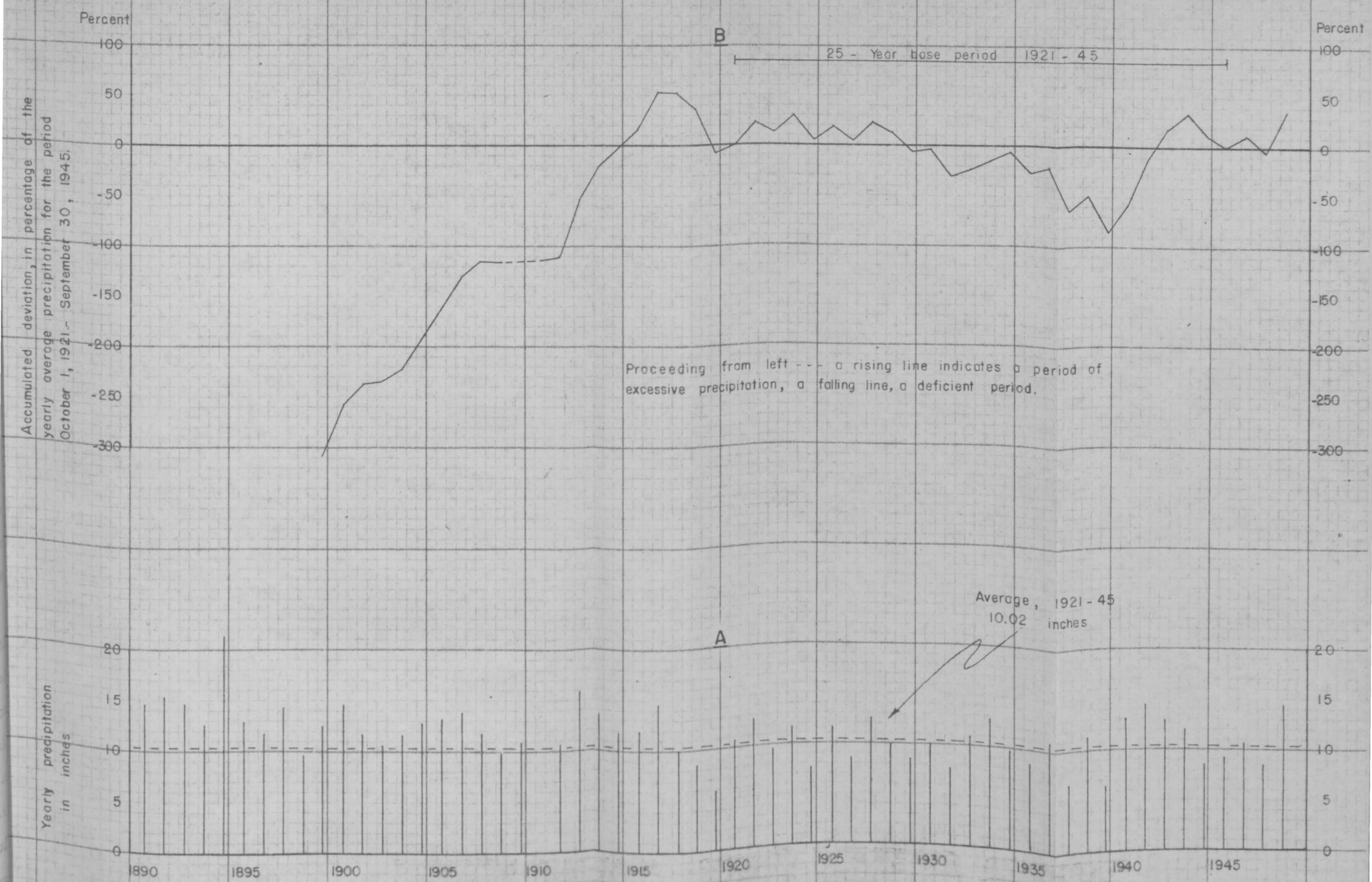
The climate of Baker Valley is in general semiarid with moderate extremes of temperature. The average annual precipitation at Baker City recorded over a 58-year period, is 11.24 inches_/ (see pl. 2). The winter temperature is sometimes as low as -25° F. with a summer maximum of 104° F.

_/ Climatic data compiled from records of the U. S. Weather Bureau.

Most of the precipitation occurs as snowfall during December, January, and February. The snow commonly melts between falls and does not accumulate on the valley floor to any appreciable depth. There is a secondary wet period in May and June (see pl. 3) which generally is attended by electrical storms after periods of warm weather. Such storms occur intermittently during the summer but usually do not result in as heavy precipitation as those of early spring, nor are they as dependable. It is common for less than 0.25 inch of precipitation to fall during each of the months July, August, and September.

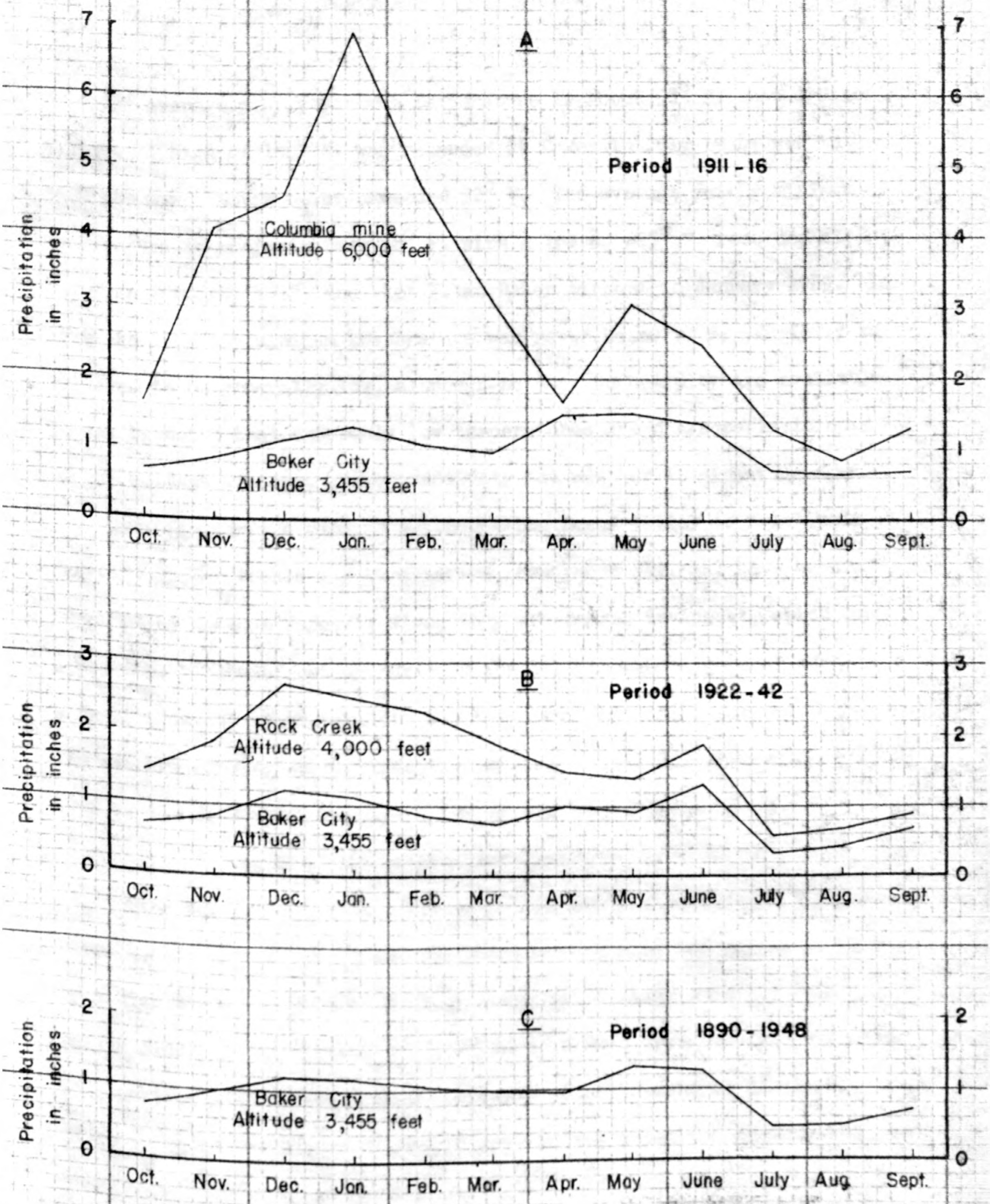
In general, the precipitation is directly proportional to the altitude in the Baker region. At Baker Airport, about 3 miles north of and 100 feet lower in altitude than the town, the 5-year record, 1944-48, indicates consistently less annual precipitation -- in one year nearly 2 inches less -- than that received at Baker. At Rock Creek, sec. 35, T. 7 S., R. 38 E., at an altitude of about 4,000 feet, the average annual precipitation was 19.31 inches for the period 1922-42, whereas at the Columbia Mine in the Blue Mountains northeast of Baker, altitude 6,000 feet, the yearly average for the period 1910-1916 was 35.90 inches.

PLATE 2



Graphs showing (A) precipitation at Baker City during climatic years ending on September 30 of each year 1890-1948, and (B) the accumulated deviation, in percentage of the yearly average precipitation for the 25-year period October 1, 1920- September 30, 1945.

PLATE 3



Graphs showing average monthly precipitation at (A) Columbia mine, (B) Rock Creek, and (C) Baker City, Baker County, Oregon.

Comparisons are made where records cover the same periods of observation.

The average yearly maximum temperature is about 98° F. in the Baker Valley. A high of 104° F. was recorded at Baker in July 1934; yet in 1922 the temperature never exceeded 92° F. The average yearly minimum temperature is approximately -8° F. with a low of -25° F. recorded at Baker in February 1933, and -26° F. at Baker Airport in January 1949. In 1934 and 1942 the minimum temperature was never below 9° F. Humidity is believed to be generally low, although no data on humidity are available. It may be noted that extremely low temperatures are characteristic only of the coldest winters, and oppressively hot weather is almost unknown.

Records show the growing season in the Baker Valley is relatively short. Killing frosts may be expected throughout May, and have been recorded as late as June 21; also, they are common in August, which has a recorded killing frost as early as the 5th, though in general such a frost does not occur earlier than the middle or latter part of that month. The average growing season free from killing frosts for the period 1920 to 1948 is 138 days, from average dates of May 14 to September 29.

Surface Features and Drainage

Baker Valley is a broad, flat-bottomed basin across which the Powder River meanders (see pls. 4 and 5). On the west side the valley is bounded by a highland spur known as Elkhorn Ridge which rises abruptly from the valley floor to an altitude of 9,097 feet at Rock Creek Butte. The ridge is a part of the composite Blue Mountains of north-central and northeastern Oregon. On the east, the valley adjoins a less prominent upland with more gently sculptured terrane. Summits rise to altitudes of 4,000 to 5,000 feet and there are few dominating peaks.

Panoramic view of Baker Valley showing main basin floor and its relation to the valley sides. The view covers approximately 230° and is centered on the northeast. It was taken from the county road in the SW$\frac{1}{4}$NE$\frac{1}{4}$ sec. 13, T. 9 S., R. 39 E.

Plate 4

East of Haines a group of low hills, outliers from the eastern upland, bounds the Baker Valley on the north and separates it from the North Powder Valley with which it is contiguous and genetically connected. The Powder River, in its exit from Baker Valley, follows westward around this group of outliers which are known locally as the Coyote Hills.

South of Baker Valley is another upland, the general surface of which appears to be that of a plane, inclined gently, and dissected by streams flowing northward. Summit altitudes range from about 4,000 feet on the north to 6,113 at Dooley Mountain 11 miles to the south. The Powder River crosses this upland in a narrow gorge carved in the resistant rocks, and, in what is apparently an area of less resistant material, has developed a 4-mile-long, 1-mile-wide basin known locally as Bowen Valley. From Bowen Valley the river passes northward through a short narrows into Baker Valley.

Baker Valley is roughly rectangular with a maximum east-west dimension of about 14 miles, and a maximum north-south dimension of 11 miles. From Baker, at an altitude of about 3,446 feet, near the point where the Powder River debouches into the valley, the floor of the valley slopes northward at the rate of about 15 feet per mile. The gradient is not regular, however, being steeper near the mouth of the canyon, and flattening to the north where, at Haines, it attains an altitude of about 3,329 feet. The surface of the valley is characteristic of that of a typical mountain valley alluviated after water-borne materials have filled the basin nearly to a stage where there is equilibrium between the load and the carrying power of the streams. In general, the surface of the valley floor has little relief; however, it is marked by scars of old courses of the Powder River. Baldock and Old Settlers Sloughs are distributaries through which some of the water from Powder River flows during periods of flood runoff. They are now utilized to distribute excess spring and early-summer runoff for irrigation. The northeast and north-central part of the valley floor has a low gradient. Here the channels of the Powder River and Baldock Slough twist and turn in an intricate maze across what appears to have been a lake bed. Aerial photographs reveal even a more complicated pattern of meanders, ox bows, and dead-end channels than are evident on the topographic map.

On the west side of the valley, the coalescent alluvial fans of the stronger streams that descend from the high Elkhorn Ridge-Blue Mountain upland have built an alluvial slope that extends to the eastern side of the valley where it intersects the rock slope or the lesser alluvial slope on that side. The Powder River takes its course along the toe of that alluvial slope. The largest fans of the coalesced assemblage are those formed by Pine and Goodrich Creeks (see pl. 6). Their compound fan slopes from an altitude of 4,100 feet to 3,400 feet in 4½ miles from its debouchment to the axis of the valley floor. Rock Creek, in the northwest corner of the area, has built a comparable fan outward into the valley to intersect the rock slopes of the Coyote Hills which form the northeastern limits of Baker Valley. This fan, together with the Coyote Hills, forms a lateral constriction of the valley floor through which the Powder River has maintained its course. The outward growth of the fan has been sufficiently great to shift the course of the river toward the foot of the Coyote Hills. Beyond the Baker Valley, about 2 miles north of Haines, the river turns to the east and leaves the Baker Valley-North Powder fault trough by way of canyoned gorges and structural lowlands to join the Snake River 40 miles east of Baker.

View looking west toward Elkhorn Ridge and the Pine Creek-Goodrich Creek alluvial fan from road turn at the northwest corner of sec. 19, T. 8 S., R. 40 E. The surface of the alluvial fan in the middle ground rises 700 feet in $4\frac{1}{2}$ miles from its toe to the mountains.

About the south, east, and north margins of Baker Valley are remnants of a rock terrace (see pl. 7) which in places is as much as 80 feet above the valley floor. The most extensive terraces are those lying on either side of the city of Baker, and in the gap between the Coyote Hills and the eastern upland. Piper[1] has reported a continuation of this terrace northward beyond the Coyote Hills, to the town of North Powder, and has referred to it as the North Powder terrace. On the east side of Baker the terrace forms a prominent flat-topped ridge some 80 feet above the general level of the valley floor, but on the west the corresponding terrace has been more or less dissected, resulting in a number of even-crested spurs which overlook the city. A flat area that probably represents a southward extension of the same rock-cut terrace may be seen along both the east and west sides of Bowen Valley, south of Baker.

1/ Piper, A. M., Ground water in Baker Valley, Oreg., U. S. Geol. Survey unpublished records, p. 3, 1928.

Basalt of Tertiary age exposed in a rock quarry near center of sec. 20, T. 9 S., R. 40 E. The flow contacts strike N. 48° W. and dip 9° southward. The skyline is the surface of the rock terrace that borders the valley. The bermlike ledge in the center is developed on a scoriaceous interbed.

GEOLOGY

General Distribution and Age of the Rocks

The rocks of the Baker Valley consist of three main types: (1) the well-consolidated, largely crystalline, igneous, sedimentary, and metamorphic rocks of Paleozoic and Mesozoic age; (2) the semiconsolidated sedimentary and consolidated igneous rocks of Tertiary age, and (3) the unconsolidated deposits of Quaternary age. The older consolidated and semiconsolidated rocks of the first two types form the highlands that surround, and the bedrock "basement" that underlies, the Baker Valley. They furnish the rock waste that forms the unconsolidated fill and much of the soil of the valley and they control in detail the stream pattern and slope of the basin watershed.

Description of the Rock Units

Pre-Tertiary Rocks

The pre-Tertiary rocks of the Baker Valley area are exposed in the uplands and hills that bound the basin. They consist of a variety of sedimentary, metamorphic, and igneous rocks, the thickness of which is unknown but considerable. The types of rock present include siliceous argillite, limestone, metagabbro, greenstone, gabbro, and a variety of granitoid rocks. These rocks are of late Paleozoic and early Mesozoic age.

Argillite, tuffaceous argillite, tuff, conglomerate, limestone, and chert that crop out on the Elkhorn Ridge are believed to be the oldest rocks found in the area. These rocks were named the Elkhorn Ridge argillite by Gilluly./ They generally are dark gray to black on the fresh surfaces, and lighter shades of gray where weathered.

/ Gilluly, James, Geology and mineral resources of the Baker Quadrangle, Oreg.: U. S. Geol. Survey Bull. 879, pp. 14-21, 1937.

Unpublished records
subject to revision

Much of the Elkhorn Ridge argillite shows no bedding or schistosity, is fine-grained, and displays resistance to weathering characteristic of such rocks. According to Gilluly, tuffaceous argillite is more common than nontuffaceous argillite, which it resembles closely. Chert also is common in the formation, and ranges in color from black through red to white. Limestone is present but not prevalent, and, where found, has generally been altered to marble. Fossil remains found in the limestone indicate Carboniferous (Pennsylvanian?) age.

The Clover Creek greenstone has been assigned by Gilluly / to the Permian system on the basis of a limited fossil collection. It crops out at both the northern and southern extremities of the Coyote Hills where it consists of metavolcanic rock, altered volcanic flows and pyroclastic rocks. East of the map area the formation includes some limestone, conglomerate, and chert. In the Coyote Hills the Clover Creek greenstone is largely fine-grained, dense, and in places distinctly schistose.

/ Op. cit., pp. 21-27.

Mesozoic intrusive rocks of the area have been mapped with the pre-Tertiary sequence. In the vicinity of Baker Valley the most common intrusive rock is a medium-grained, equigranular dark-gray biotite quartz-diorite of post-Jurassic (?) age. It crops out on the north flank of Elkhorn Ridge, immediately adjacent to the valley, to form Hunt Mountain. It is exposed also in the central part of the Coyote Hills, where it has been quarried as a building and monumental stone, and in a road cut along Oregon State Highway 86.

Smaller intrusive rocks of post-Carboniferous (?) age crop out in the Magpie Peak area east of the Coyote Hills and in the low hills about 4 miles northeast of Baker. They are possibly of Triassic age and may be in part Permian. These intrusive rocks include gabbro, metagabbro, and greenstone. The metagabbro and greenstone are mostly fine-grained, dense, light to dark green, and in places distinctly schistose. Serpentine in small amounts is associated in places with gabbro and metagabbro.

Tertiary Rocks

The Tertiary rocks overlie the pre-Tertiary rocks and form the surface features around the southeast, south, and southwest margins of Baker Valley. They consist of partly consolidated sedimentary rocks overlying and in part interbedded with rhyolitic, andesitic, and basaltic lavas. Some of the sedimentary materials are reported to be of lacustrine origin. In the area studied the sedimentary deposits are well exposed in the front of the terrace about 0.8 mile east of the center of Baker (SE¼SE¼ sec. 16, T. 9 S., R. 40 E.), where they consist of cross-bedded, poorly sorted, fine and coarse sand with some stringers of fine gravel and clay. The sand is light gray to buff, depending upon the amount of clay contained. The larger grains of sand and gravel were derived mostly from argillaceous rocks and only a small part of them was derived from granitoid rocks. Although nearly all the material in this exposure shows some rounding, there is enough angularity to suggest it has not been transported any great distance or subjected to any prolonged wave action.

The sedimentary materials at this place have all the characteristics of a stream deposit and none of the usual characteristics of a lake deposit. Characteristic lake-type sediments of Tertiary age were not observed, however, in the area studied. Wherever outcrops could be observed the deposits appeared to be typically fluviatile.

The lava rocks closely associated with the Tertiary sedimentary rocks in the Baker area have been referred to by Gilluly_/ as Columbia River basalt on

_/ Gilluly, James, op. cit., p. 62.

the basis of assemblages of fossil plants found in the associated sediments. This assemblage of plant remains has been determined as Miocene in age and is believed to be equivalent to the Latah and Mascall formations farther north and west. The lava rock crops out at the south end of the valley west of the town of Baker and along the east side of the valley. At a quarry (center, sec. 20, T. 9 S., R. 40 E.) in the city of Baker (see pl. 7) the lava rock is well exposed. The flows here appear to be normal olivine basalts, somewhat vesicular but in part dense. On one wall of the quarry there is exposed a highly scoriaceous contact between two flows with a pillowlike structure in the upper flow. On the east side of the river, directly opposite the quarry, faulting has raised a block of the basalt and exposed a section of more than 300 feet which forms a prominent scarp above the city. In this exposure dense, vesicular, and scoriaceous phases occur. In many places the basalts show blocky or brick-bat structure caused by close fracturing and jointing. The varied nature of the lava rock can be readily observed also along the road cuts in the narrows of the Powder River about a mile south of town (SW¼ sec. 29, T. 9 S., R. 40 E.). These rocks are not well exposed along the east side of the valley, being masked by soil on the less rugged terrain.

Quaternary Deposits

Pleistocene and Recent deposits in the Baker Valley area consist of gravel beneath older terraces around the valley, older sedimentary deposits of the alluvial fans, glacial deposits in the upper canyons of Elkhorn Ridge, and the younger sedimentary materials of the valley fill and the lower alluvial slopes. Pardee / and Hewett mapped the glacial deposits

/ Pardee, J. T., and Hewett, D. F., Geology and mineral resources of the Sumpter quadrangle, Oreg.: Oregon Bur. Mines, Mineral Resources of Oregon, vol. 1, no. 6, pp. 3-128, 1914

and Piper / distinguished between the older and younger alluvial deposits.

/ Piper, A. M., op. cit., pp. 6-7.

During this investigation the older and younger alluvial deposits were mapped. The deposits beneath the terraces and the sedimentary materials of the alluvial fans, considered here as units of the older alluvium, were mapped together as older alluvium. Well-log data indicate that the deposits of gravel and sand of Recent age commonly extend to a depth of about 20 feet but may attain a thickness of nearly 40 feet in some places. Below that level the older alluvial deposits apparently extend several hundred feet to the bedrock. Where the alluvial deposits are continuous, the division between older and younger alluvium is somewhat arbitrary in view of the lithologic similarity of the deposits and the supposition that deposition over the valley has been continuous during Quaternary time.

Pleistocene deposits.- The gravel deposits that mantle the rock terraces around the north, east, and south sides of the basin are inferred to be older than the bulk of the large alluvial fan deposits on the west side of the valley. Inasmuch as the gravel-mantled terraces do not appear on the west side of the valley, it is logical to assume that, if they once existed, they have been covered or destroyed by the later building of the large fans. In the area west of Washington Gulch (sec. 10, T. 9 S., R. 39 E.) the terrace is terminated where it would pass beneath the surface of the fan and the topographic expression is such as to suggest strongly that it has been buried.

The thin mantle of sedimentary deposits that covers the rock benches on the north, east, and south sides of the valley consists mostly of poorly sorted clay, sand, gravel and cobbles. The coarser material is largely well-rounded pebbles and cobbles of argillitic rock with subordinate amounts of the granitoid and extrusive rocks.

Locally the Pleistocene sand and gravel that underlies the terraces cut mostly in the Tertiary rocks are somewhat cemented, but in most places weakly so. In many places they are colored yellow or reddish orange by iron oxide. The thickness of the Pleistocene deposits underlying those terraces probably does not exceed a few tens of feet. Piper_/ reports an exposure 20 feet thick in the vicinity of North Powder, just north of the area concerned herein. In Bowen Valley, south of Baker, outcrops along the west side of the valley indicate a probable thickness of 20 to 30 feet. There the deposits seem to have constituted a valley fill which has since been partly reexcavated by the present streams. In the immediate vicinity of Baker, the unconsolidated material beneath the terrace is generally thin or entirely absent, as it is at the quarry shown in plate 7. In places where the gravel overlies the older Tertiary gravel (described above) it is difficult to distinguish between the two. Such a place is the area about the mouth of Washington Gulch (sec. 10, T. 9 S., R. 39 E.) where the terrace has not been obliterated by development of alluvial fans.

The terrace deposits are included with the older alluvium unit on the geologic map (pl. 5) and are assigned to the Pleistocene, although they may be older in part. Inasmuch as the major growth of the alluvial fans probably was during Pleistocene and Recent time, the deposits beneath the terraces probably were deposited in early Pleistocene or possibly late Pliocene time before being raised in the last crustal movement.

_/ Piper, A. M., op. cit., p. 6.

Unpublished records
subject to revision

The poorly sorted clay, sand, gravel, cobbles, and coarser material brought down by streams from the Elkhorn Ridge make up the extensive alluvial fans on the west side of Baker Valley. These deposits contain large cobbles and boulders on the upper parts of the fans, as on Pine Creek fan, along the east-west road through sec. 30, T. 8 S., R. 39 E., where granitic boulders are now scattered over the surface. The fresh surfaces of the boulders indicate recent transportation and deposition. It is evident that in places the fans are still growing, but in other places erosion has removed some of the older alluvial materials. In sec. 7, T. 7 S., R. 39 E., Willow Creek has been pushed southward by the expanding Rock Creek fan and is cutting laterally into older deposits. The material exposed in the 20- to 30-foot bluff is mostly fine-grained, consisting of silt, clay, and fine to medium sand, largely of granitic origin, derived apparently from the slopes of Hunt Mountain. Locally the beds are weakly cemented. At the mouth of Salmon Creek a section of the older fan material is well exposed (see pl. 8) in the abandoned workings of the historic Nelson gold placer. These workings were visited and described by Lindgren/

/ Lindgren, Waldemar, The gold belt of the Blue Mountains of Oregon: U. S. Geol. Survey 22d Ann. Rept., pt. 2, pp. 652-653, 1901.

at the time they were in operation. Placer mining reportedly exposed the deposits to a depth of approximately 200 feet without encountering bedrock. Two units, an upper blue gravel 10 to 20 feet thick and a lower brown gravel (depth unknown) were described by Lindgren, who thought that the upper probably was deposited during the period of glaciation of the upper canyons, and that the lower was deposited earlier. The following section, from top to bottom, was measured at the southeast wall of the placer pit.

A. View southeast across the historic Nelson placer, sec. 8, T. 7 S., R. 39 E., showing the fan deposits abutting against the fault escarpment of the adjacent hill. The zone of faulting is exposed in the placer wall.

B. Photograph showing alluvial fan deposits exposed in the southeast wall of the Nelson placer excavation. Below a rude line at knee height of the man the material is badly decomposed and consists largely of boulders and cobbles that disintegrate upon being dislodged; above that line, the material is much fresher. The extremely poor sorting of the material is characteristic of these fans; it accounts for the low permeability and the generally low yield of wells in these deposits.

	Thickness (feet)	Depth (feet)
Topsoil, brown, and sandy loam with thin streaks of fine to medium gravel	2	2
Clay loam, light-reddish, poorly stratified, sandy; little coarse material	4	6
Clay, light-tan, compact; contains sharply angular rock	3	9
Alluvial fan debris, yellow to reddish, poorly sorted; contains rounded to subangular boulders and cobbles or argillite and greenstone; has much fine material (clay and silt) forming a tight matrix; all badly decayed with cobbles breaking apart in the hand. Some basaltic and granitic material; local thin coarse sand stringers show stratification and in places include carbonaceous material . . .	30-50	59

The lower 20 feet of the placer-pit wall is covered with talus at this location but outcrops in nearby stream channels indicate that the fan debris continues downward. Lindgren_/ states that a shaft was sunk

_/ Lindgren, Waldemar, op. cit., p. 653.

in the fan material at the bottom of the placer to a depth of 90 feet without encountering bedrock. The shaft measured 115 feet in depth when visited in 1949, and material in the old pile of debris indicates that the last material removed from the shaft was the type commonly found in the gravel-clay fan deposit. The shaft is now full of water.

When the placer was visited by Grant and Cady / the upper unit was

/ Grant, U. S., and Cady, G. H., Preliminary report on the general and economic geology of the Baker district of eastern Oregon: Oregon Bur. Mines, Mineral Resources of Oregon, vol. 1, no. 6, pp. 129-161, 1914.

reported overlain by a gray to white deposit of volcanic ash of Recent age covered by topsoil and vegetation. Although ash covers much of the upper part of the fan in the vicinity of the placer, it is overlain at one place by 3 to 4 feet of coarse bouldery material which includes rounded to subangular masses of argillite and greenstone as much as 3 feet in diameter in a matrix of clay, silt, sand, and gravel. Some material of granitic origin also is included.

The older, lower unit exposed in the placer pit walls is characteristically more deeply stained by iron oxide and more decayed. A similar staining was noted in some of the gravel at pits opened at a lower level on the fans, but the rock material was less decomposed. The gravel in these pits probably is equivalent in age to the upper unit in the placer-pit wall.

The alluvial fan deposits become progressively finer and better sorted away from the mountain front. At a gravel pit (NW$\frac{1}{4}$SE$\frac{1}{4}$ sec. 17, T. 8 S., R. 39 E.) on the Pine Creek fan (see pl. 9) the following section is exposed from the top down:

Exposure of alluvial fan material in a borrow pit near the lower end of the alluvial fan, center of sec. 17, T. 8 S., R. 39 E. The deposits probably are equivalent in age to the upper gravel in the Nelson Placer (pl. 8 B). Here the material is better sorted and crudely stratified. It is probably of late Pleistocene age and may include some Recent material.

	Thickness (feet)	Depth (feet)
Gravel, gray, medium, rounded to subrounded, undecomposed, with coarse sand; mostly argillitic material; considerable silt and clay in the matrix	0.5	0.5
Loam, buff, sandy, clayey; contains small argillitic pebbles near the base	3.00	3.5
Gravel, blue-gray, coarse, containing rounded to subangular cobbles as much as 6 inches in diameter, consisting largely of argillite with some granitic rock and a very little basaltic material; rudely stratified; has little or no iron staining or decay of material; sand, silt, and clay matrix	5.0	8.5
Clay, reddish, silty, sandy, with few small pebbles scattered throughout and interfingering with cobble beds; slightly cemented	8.0	16.5

Other gravel pits (see pl. 5) contain similar deposits although the sequence of strata differs in each pit. A 12-foot section of crudely stratified sand and gravel exposed in a pit (NE¼SW¼ sec. 10, T. 9 S., R. 40 E.) near the northeast corner of Baker is covered by 1 to 2 feet of sandy soil. The gravel is round to subround, is unweathered, and includes cobbles as much as 6 inches in diameter, 1-to 3-inch pebbles being the most common. The cobbles and pebbles are composed of argillite, metavolcanic rocks, and rhyolitic and basaltic volcanic rocks. Few granitic rocks were noted. Sand comprises the matrix of the gravelly material. It is coarse and consists largely of sharply angular grains of argillite, metavolcanic rocks, and some quartz. There is less clay, silt, and sand in this deposit than in those examined higher on the alluvial fan where the gravels generally are "dirty." A similar deposit of gravel is being quarried in the northeast corner of sec. 21 T. 8 S., R. 40 E. where the soil cover is but a few inches thick. The scattered distribution of quarried deposits of gravel on the floor of the valley and the available well-log information indicate that coarser material was deposited over most of the valley prior to the deposition of the present thin cover of silt and clay. The coarse material, although mapped in most places with the older alluvium and assigned to the Pleistocene, may be, in part, of Recent age.

Unpublished records
subject to revision

Glacial deposits, mostly in the form of valley trains, occur in the upper canyons of Marble, Mill, Goodrich, and Pine Creeks. Similar deposits are found in Rock Creek Canyon but at a much lower altitude indicating larger, more active glaciation there than in the canyons south of the Rock Creek area. The glacial materials in all the canyons are unsorted masses of clay, sand, gravel, and boulders such as are normally left by the melting away of mountain valley glaciers. The material is undecomposed and is currently being reworked and spread over the surfaces of the alluvial fans by the streams. The maximum thickness of the glacial drift deposits in the canyons does not appear to be great -- probably not over 100 feet, except, perhaps, in Rock Creek Canyon. There the canyon floor is wide and has local hummocky areas underlain by glacial debris that may be considerably more than 100 feet thick. Coarse materials contained in the glacial drift in Rock Creek Canyon are largely granitic, whereas in Pine Creek Canyon they are mostly argillitic.

Recent deposits.- Recent deposits of the Baker Valley consist of the sediments distributed over the flood plain of the Powder River and the sheet-wash alluvium of the hill slopes. The postglacial (Recent) age of these deposits is indicated by the following: According to Mr. Grant Lindsay of the Soil Conservation Service, Baker, a sample identified by the writer as fine, well-sorted, clean, white volcanic ash was obtained from 6-inch to 12-inch layers at a depth of a few feet. These ash layers are known to occur beneath the surface adjacent to Baldock Slough, along the north end of the valley, and also in the Powder River overflow area through secs. 17 and 20, T. 8 S., R. 40 E. It is quite likely this material is related to the ash deposits covering the coarse fan material at the mouth of Salmon Creek. Gilluly / reported such an ash bed to be postglacial inasmuch as it is known to overlie glacial deposits in the high parts of Elkhorn Ridge. In the area of Baldock Slough the ash has been covered by the fine-grained flood-plain material like that still being deposited at the north end of Baker Valley during periods of overflow.

/ Gilluly, James, op. cit., p. 66.

The character of the Recent materials ranges greatly within short distances, but near the surface it follows a general plan and, when facts are known, may be found to have a general system at greater depths also. At the debouchment of the Powder River at Baker, the Recent sediments consist largely of pebbles, cobbles, and subangular fragments of argillite and granitic rocks in a matrix of medium to coarse quartzitic sand and fine gravel. Materials in the upper part are progressively finer-grained northward in the valley, although there is coarse gravel of probable Recent age exposed in a quarry nearly 7 miles north of Baker. The few available well records indicate that the near-surface material in the northern part of the valley is largely silt and clay.

Unpublished records
subject to revision

In the absence of drilling records or other data on the formations beneath the important agricultural lands of the valley floor, the information available must come from geological interpretations of the probable distribution of coarse and fine sediments of the valley fill. In a fault trough such as the Baker Valley, it is logical to expect that the drainage was interrupted and a lake existed until the valley was largely filled. It is also to be expected that, in the absence of data to the contrary, the stream-borne lake fill near the debouch of the Powder River just east and northeast of Baker would be coarse and gravelly. Inasmuch as later stream deposits there are also coarse, wells drilled in that vicinity should encounter much coarse material above bedrock. Similar materials such as coarse shore-line or talus deposits would be less abundant but might be found at depth along the perimeter of the valley.

North of the area of coarse deposits near Baker, the lower part of the alluvial fill may be largely fine lake-bed materials (clay and silt) and the upper part, which was laid down after the river became a through stream, may be composed of clay and silt containing isolated tongues or snakelike trains of gravel and sand marking old river tracts across the fill.

Thus, test wells in the largely unexplored central and northern parts of the valley north of Baker may encounter an upper zone in which layers of sand and gravel are interspersed and a deeper zone composed largely of fine, non-water-yielding materials.

The small streams that descend from the eastern upland have carried material down and deposited it along the margin of the valley. These marginal sediments are finer than those of the fans on the west side of the valley but are coarse enough to be distinguishable from the clay and silt of the river flood plain. Locally thereis coarse material along that eastern slope, as at the mouth of the canyons. In general, there is a greater thickness of fine soil materials covering the east side of the valley than is found over the alluvial fans of the west side. There is little evidence of an interruption of deposition between Pleistocene and Recent time and the distinction of the base of the Recent materials is largely arbitrary in the area of the valley floor. Interpretation of well-log data (see table 3) indicates that Recent deposits are not thick around the margin of the valley, generally less than 25 feet; however, they may be considerably thicker near the center.

Structure of the Rocks

General Structure

The present structure of the Baker Valley is dominated by major block faulting similar to that commonly known as the Basin and Range type. Intense folding and later mild warping (see pls. 5 and 10 A) is expressed in the topography of the area. Both the east and west sides of Baker Valley are bounded by faults which strike in a northwesterly direction. The down-dropped block between these faults has been partly filled by material eroded from the folded and upfaulted blocks on the east, west and south.

A. View northeastward showing part of the Farley Hills bordering the east side of Baker Valley. The hill is essentially the eastward-dipping limb of a syncline that is separated from Baker Valley by a major fault, the upthrown side of which forms the rock slope at the edge of the floor of Baker Valley.

B. View southwestward toward the hills immediately west of Baker. The ridge at the left is bounded on both sides by parallel faults. The easternmost fault is the one that is exposed in the Nelson placer (pl. 8 B). The alkali crust in the foreground shows the characteristic surface deposits from evaporating ground water (photo in July 1949).

Folding

The Paleozoic and Mesozoic rocks exposed in the Elkhorn Ridge have been subjected to strong compressional forces which have caused them to be intricately folded and sheared. The older rocks were undoubtedly folded and faulted prior to the Basin and Range faulting that outlines the Baker Valley. Pardee / reports finding in the glacial cirques of Pine and Goodrich Creeks tightly compressed folds and pseudo-conglomerates formed by shearing, and Gilluly / suggests that the intense compression was attended by overthrusting. Dips are generally steep and the general structure outlined on Elkhorn Ridge is that of an eastward-plunging anticline which dies out just south of Baker.

/ Pardee, J. T., and Hewett, D. F., op. cit., pp. 33-35.

/ Gilluly, James, op. cit., p. 69.

The upland area east of Baker Valley is a gently inclined block (see pl. 10) with dips to the east at an average inclination of about 7°. It forms the west limb of the lower Powder River syncline (east of area mapped) and is separated from Baker Valley by the afore-mentioned east-side fault.

The Lome Pine Mountain-Virtue Hills upland southeast of Baker is also an anticlinal structure which trends northwest. That structure is split by faulting parallel to the trend of the folding, and broken by transverse faulting at the northern limit of the fold where it ends against the Baker Valley.

Though Baker Valley is a structural depression bounded by faults, it is entirely possible the primary structure may be a downwarp, as suggested by Gilluly,_/ accentuated by faulting.

_/ Gilluly, James, op.cit., p. 74.

South of Baker a synclinal trough, also accentuated by faulting, is occupied by Sutton Creek. The trough parallels the Lone Pine Mountain-Virtue Hills anticline to the northeast, and its south limb rises with a gentle dip to become the north limb of the large Dooley Mountain anticline, a major east-west structure lying just south of the area mapped.

Faulting

The major faults that bound the valley are nearly parallel to the trend of the folds. The fault that separates the valley from the upland to the east (see pl. 10) is not easily visible on the surface and must be inferred along much of the margin of the valley. The rectilinear pattern of the low fault escarpment, however, is distinctive (see pl. 5). Aerial photographs indicate its trend reasonable well and in secs. 1, 2, 3, and 12, T. 8 S., R. 40 E., a complex system of sliver blocks and cross faults is shown clearly. The south end of the valley also is bounded by faults that are expressed more positively in the topography than those along the east side of the valley. The thermal spring and warm-water wells east of the town of Baker occur along these fault zones.

In some cases the fault displacement occurs along several parallel or overlapping lines of failure. Immediately west of Baker a double fault bounds a thin, elongate splinterlike block -- the low hill along the lower slope of the Elkhorn Ridge (see pl. 5). The hill spurs are faceted and there is a line of springs along the eastern fault for a distance of a mile or more. The western fault continues to the north and is exposed in the Nelson placer at the mouth of Salmon Creek. The fault has a visible throw of not less than 100 feet on a single plane, and an inferred throw of at least 215 feet, as indicated by reports on old mines. The fault dips eastward at an angle of about 30° -- a normal fault witnessing the tensional forces that prevailed when the Baker Valley was downdropped. A brecciated zone (see pl. 11) having a width of several hundred feet was examined at the face of the placer pit. There veins of aplite and quartz are included in highly brecciated material -- indicating at least two periods of opening and movement along this western boundary fault. No displacement of the alluvial fan material was discerned. The steepness of the mountain front and faceted hill spurs indicates that the fault is relatively young. The trace of this western boundary fault is obscured farther north but it is reasonably certain that the western margin of the valley is bounded by fault lines that now largely are buried beneath alluvial debris.

Photograph taken along the strike of the fault zone exposed in the Nelson placer at the mouth of Salmon Creek. The metamorphic rock and aplitic dikes here shown are shattered and broken.

Recent displacement in the valley area is indicated by the dislocation of segments of the North Powder terrace as described by Piper._/ Indication of faulting of Recent deposits was observed in secs. 10 and 11, T. 9 S., R. 39 E., near the mouth of Washington Gulch where a relatively abrupt terrace front crosses old alluvial deposits.

_/ Piper, A. M., Ground water in Baker Valley, Oreg.: U. S. Geol. Survey unpublished records, p. 8, 1928.

Inasmuch as the consolidated rocks about Baker Valley were considerably deformed by structural movements older than those that depressed the valley block, it is assumed that the bedrock beneath the valley fill is at least mildly folded and faulted. The rock base is probably irregular, owing to hasty burial; hence, the depth to bedrock could be expected to differ from place to place.

Structural features in consolidated rock, such as inclination of beds and faults, are known to have an appreciable control over the ground-water movement. Similarly, the thickness of alluvium beneath the floor of the valley is determined in part by the configuration of the underlying bedrock; hence, the determination of that configuration may be desirable in planning the most advantageous development of ground water from the valley itself.

HYDROLOGY

General Occurrence of Ground Water

In the Baker Valley unconfined ground water is found at shallow depths in the unconsolidated valley fill and alluvial deposits. Confined water is encountered in limited amounts in the deeper zones of the valley fill and in the consolidated bedrock.

Ground Water in the Consolidated Bedrock

The known occurrence of ground water in the consolidated bedrock is limited and only small quantities of water are recovered from these beds at present. However, the bedrock may prove to be an important source of ground water because of its structure and lithology. The Tertiary volcanic rocks where observed around the Baker Valley contain porous zones which should be highly productive where saturated with water. Even the denser basaltic phases of the volcanic rocks may be considered as potential sources of water because of their productivity elsewhere in the region. The volcanic rocks exposed in the quarry (pl. 7) at the south side of Baker and in the canyon walls of the Powder River (sec. 29, T. 9 S., R. 40 E.) appear to be sufficiently permeable to yield water readily.

Two wells (9/40-15G1 and -G2) east of Baker were drilled to a depth of 740 feet. No logs of the wells are available but according to Mr. L. H. Williams, who cleaned out and deepened the wells, they are producing from basalt which is presumed to be of Tertiary age. Both wells encountered water under pressure and the combined pumping yield of the two wells is reported to be approximately 3,700 gallons per minute. Another well (9/40-28D1), having a depth of 578 feet, yields approximately 1,050 gallons per minute. The log of this well (see table 3) indicates that the Tertiary volcanic rocks were encountered at a depth of 36 feet. A 4-inch well (10/40-17D1) drilled for a school supply at the south end of Bowen Valley was reported by the driller to have encountered basalt at a depth of 26 feet. This well was drilled 426 feet deep and flows at the surface at an estimated rate of 2 gallons per minute. Another flowing well (9/39-12N2) east of Baker, was drilled on a hillside on the upthrown side of a fault. This well is reported to be 285 feet deep and, although no log is available, it is presumed to be drilled in the Tertiary volcanic rocks that constitute the upfaulted hill mass.

Tertiary rocks are not known to have been encountered in wells in the main alluviated part of the Baker Valley, although several deep wells have been drilled close to the margin of the valley. At one place a 400-foot well (9/39-11H1) drilled within 300 feet of the hillside did not encounter bedrock. Well 8/40-20R1, located in the central part of the valley, was reportedly drilled to a depth of 750 feet entirely in unconsolidated material.

Because of the difference in temperature of water from wells 9/40-15G1 and -G2 (78° F.) and well 9/40-28D1 (58° F.), it has been suggested that the wells are producing from separate aquifers; however, the nearness of the wells to zones of recent faulting may be responsible for their higher water temperature. A more complete study would be necessary to determine whether or not the wells obtain water from different water-bearing formations.

At the northern margin of the valley, on the slopes from the highlands, several wells (7/39-25A1, 7/40-20C1, and 8/39-1H1) probably penetrate altered volcanic rocks of pre-Tertiary age. The yield of these wells is unknown but believed to be adequate only for domestic and stock use. Two other wells (7/39-28G2 and -28G4) penetrate the pre-Tertiary diorite constituting the Coyote Hills.

Ground Water in the Unconsolidated Deposits

The major part of the ground water now utilized in Baker Valley is withdrawn from the unconsolidated sediments of Pleistocene and Recent age. These sediments are in part porous and in most places they are saturated with water to within a few feet of the ground surface. This water is unconfined, occurring under water-table conditions.

The upper surface of this ground water (the water table) by its continuity and uniformity of slope shows that beneath the valley floor, and possibly also the alluvial side slopes, all the water in the unconsolidated material belongs to one ground-water body. This water table follows, in a general and smoother manner, the surface topography.

The deposits that mantle the older terraces on the margins of the valley have not been developed extensively for water at any place in the valley. Those deposits are generally thin and are on higher ground; hence, ground water would be expected to drain out and not to accumulate there in large quantities. In secs. 1 and 2, T. 9 S., R. 40 E., some dug wells in the gravel furnish adequate water for domestic uses but none has been developed for irrigation. One well (9/40-2G2, pl. 12), in a district where the deposits are thicker, is drilled to a depth of 148 feet and with a drawdown of 17 feet yields 120 gallons per minute from a fine sand reported by the owner to occur at a depth of 133 to 148 feet. The well probably is producing from the older alluvium.

In the older alluvium of the slopes along the west side of the valley the coarser material is mixed with clay and silt (see pls. 8 and 9) and the porosity is relatively low. Although water may be obtained in wells at shallow depths nearly any place on the alluvial fans, the yield of most of these wells is small. Owners report that the water level in wells on the fans remains fairly constant and that most wells yield adequate supplies for domestic and stock use. Many shallow wells dug 40 to 50 years ago are still in use and reportedly have never failed. All dry wells found could be attributed to constructional failure which permitted filling of the well by sand and earth to above the normal ground-water table.

Beds of relatively clean sand and gravel are the principal water-producing zones in the better wells on the alluvial fans. The irregular stratification of these water-bearing beds and the general discontinuity of bedding structure of alluvial fans / are such as to make difficult the delineation of the widespread water-bearing zones. The ultimate location of favorable water-bearing strata in the alluvial cones will be facilitated by the faithful recording of the materials penetrated in future well construction and other types of subsurface exploration in that area.

/ See Tolman, C. F., Ground Water, pp. 364-379, McGraw-Hill Book Co., Inc., 1937, for a detailed description of the general structure and water-bearing properties of alluvial cones.

Measurements of water levels in wells on the Pine Creek-Goodrich Creek alluvial fan indicate that some areas of the fan have a water table at roughly uniform depths below the land surface. In the wells on the higher part of the fan, in the east half of sec. 23 and the west half of sec. 24, T. 8 S., R. 38 E., the static water levels range from 10 to 25 feet below ground surface. On the intermediate levels of the fan, in a belt extending from sec. 24, T. 8 S., R. 38 E., to sec. 4, T. 9 S., R. 39 E., the depth to water in wells is from 1 to 10 feet, and on the lower slopes, from sec. 7, T. 8 S., R. 39 E., to sec. 33, T. 8 S., R. 39 E., the depth ranges between 15 and 45 feet.

The occurrence of water on the lower slopes at greater depths than on the intermediate slopes is the reverse of what is normally found in alluvial fans. Ground water generally may be expected to rise toward the surface on the lower slopes of fans where in many cases it discharges as springs. Two possible explanations for this belt of unusually low static ground-water level are: (1) more permeable sediments along the lower slopes of the fan than along the intermediate slopes, permitting more rapid movement of water on the lower slopes, hence a draining away and lowering of the water table; (2) a fault or other ground-water barrier traversing the fan might cut off percolation from the upper part of the slope and result in lowered water levels on the toe of the fan.

The sharp change in water-table gradient may coincide with fault zones that trend in that direction from the hill just west of Baker. The fault barrier, in part, may extend up into the unconsolidated materials and be primarily responsible for the difference in the depth of ground water observed between adjacent areas on the Pine Creek-Goodrich Creek fan. Movement on these faultshas been comparatively recent, and if those faults do continue across the fan, the older fan deposits must have been faulted.

The unconsolidated deposits of the valley plain are the principal source of ground water in the valley. The most productive strata are mainly those near the surface which, in this study, are considered to be Recent. As the sediments range from fine silt and clay to coarse sand and gravel, the yield of wells differs also from area to area, the better wells being those located in areas underlain by greater thicknesses of coarse sand and gravel. The beds of sand and gravel underlying the valley plain are better classified and contain less fine material than those constituting the alluvial-fan deposits on the west side. They therefore have a greater permeability and yield greater volumes of water. Dug and drilled wells developed for irrigation in the younger alluvium have obtained comparatively large yields of water at relatively shallow depths.

Although coarse gravels lie close to the surface throughout much of the valley, only near the apex of the Powder River alluvial fan north of Baker has the productivity of wells in the gravels been found to be great. In the central and northern parts of the valley the ground water in the younger alluvium has been developed only for domestic and stock purposes. The alluvium there is sufficiently permeable near the surface that most drive-point wells penetrating to a depth of 20-25 feet provide 500 to 1,000 gallons of water per day. According to most owners, beds of sand and gravel are encountered at that depth.

Only one deep well (8/40-20R1) has been drilled in the central and northern parts of the valley. Reports on the drilling and testing of that well are not adequate. Properly constructed and finished exploratory wells are needed to evaluate the ground-water possibilities of that section.

The water table in the central and northern parts of the valley plain is close to the surface throughout the year, and during late spring much land is waterlogged by high ground-water levels and by stream flooding. Observation of water levels in wells 8/40-19D1 and 8/40-23A1 in the central and east-central parts of the valley indicates that the water table seldom drops to a depth of 6 feet from the surface during the drier part of the year (August and September). The water table on the west-central side of the valley near the toe of the Pine Creek alluvial fan generally is somewhat deeper; however, the water level in well 8/39-22F1 near the toe of the fan did not decline below a depth of 10 feet during the period 1939-1949. The water-level fluctuations in the valley alluvium show a normal variation in response to seasonal precipitation and stream runoff.

There is much water available in the Recent sediments for irrigation, but careful drilling and special well-finishing techniques will be necessary to develop wells of high yield in some areas where finer material is more prevalent, such as in the central and northern parts of the valley floor. The best producing wells generally can be obtained only by adequate test drilling, expert well finishing, and proper development on the basis of accurate well logs.

Unpublished records
subject to revision

Use of the Ground Water

Present Development

Until recent years the development of ground water in Baker Valley was restricted to domestic and stock use, with the exception of a few deep irrigation wells drilled many years ago. Most domestic wells are shallow, dug or driven wells having small yields. The small-diameter driven wells generally yield enough water to irrigate only lawns and gardens. Drilled domestic wells are more common on the west side of the valley on the lower alluvial slopes where the water table is deeper and in general the wells are more adequate, dependable, and sanitary than either the dug or driven wells. Stock wells in the valley are used generally for emergency periods during late summer when supplies of surface water fail.

Irrigation

The drilling of wells for irrigation evidently was begun about 1908 when two deep wells were put down for the Balfour, Guthrie & Co., Limited on what is known as the Sunnyslope tract. These wells (9/40-15G1 and -15G2) are within 200 feet of each other. They are reported to have been enlarged and deepened about 1948, and both are said to be 740 feet deep. Well 9/40-15G1 is reported to yield 2,200 gallons per minute with 16 feet of drawdown; well -15G2 is reported to yield 1,500 gallons per minute. In the early days the wells were pumped with centrifugal pumps powered by steam or gasoline engines, and the cost of operation is said to have exceeded the benefit derived. The wells are now in process of being put to use in the redevelopment of that tract. In recent years several shallow dug and drilled irrigation wells have been constructed in sec. 7, T. 9 S., R. 40 E. (see table 1) by Mr. Clyde Ward, who now operates seven wells during the pumping season (July and August) when surface water is not available. The total capacity of the seven wells is estimated to be 4,200 gallons per minute and the pumps run continuously for the 2-month period. Mr. Ward estimates that he pumps about 1,150 acre-feet of water to irrigate approximately 1,200 acres during this 2-month period, and that an equal amount of surface water is applied during the late spring and early summer, prior to the pumping period. This would indicate a total water usage of 2,350 acre-feet on 1,200 acres, or about 2 acre-feet per acre, probably a minimum for good crops in a normal year. A former attempt to farm on the Sunnyslope tract, using about 1½ acre-feet per acre of water for irrigation, was not successful, according to Mr. Ward.

Other deep wells have been drilled for irrigation, with varying degrees of success, but only one (9/40-16G1) has been used for irrigation. This well was drilled in 1929 to a depth of 530 feet and, according to Lewis, / it flowed at a rate of 80 gallons per minute at a height of 1.5 feet above land surface; its static water level was 5.5 feet above land surface. The well was test pumped at a rate of about 900 gallons per minute with a drawdown to 45 feet. The flow is reported to have continued through the winter of 1929-1930 and the water was used to irrigate some 40 acres of land in the summer of 1930. The heavy pumping of that well is reported to have affected the flow of Sam-O Spring and the water levels in the adjacent wells. The well has not been pumped heavily for several years and is now used only intermittently for irrigation. The water has a temperature of 76° F., which indicates that the well may tap an aquifer having the same source of heat as do wells 9/40-15G1 and -15G2, a mile to the east.

/ Lewis, M. R., Progress report: Irrigation and drainage study, Baker Valley, Baker County, Oreg.: Dept. of Soils, Oregon Agr. Exper. Sta., and U. S. Dept. Agr., Div. Agr. Eng., typescript report, March 1929.

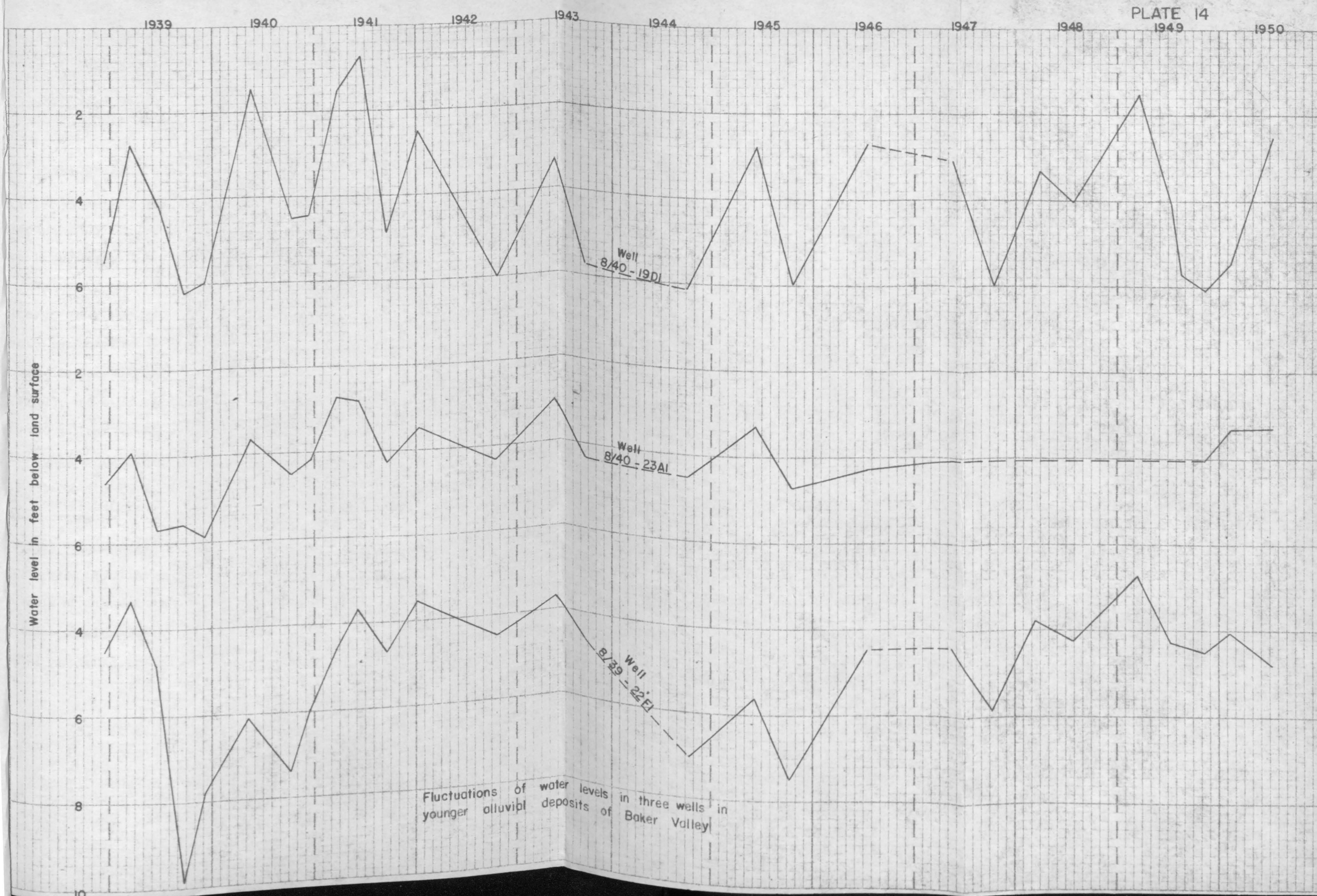
Unpublished records
subject to revision

Irrigation on a small scale from dug wells on several other ranches in the valley generally is found to be practical. Well 8/39-25E1, dug to a depth of about 15 feet, has a water level only 8.22 feet below the surface when being pumped continuously at a rate of 400 gallons per minute. According to the owners, the water-bearing stratum is gravel and sand. The water level declines somewhat in the late summer. This well is typical of the dug wells that are used for irrigation, although possibly the average depth is nearer 22 feet and the static water level nearer 15 feet below land surface. A late-summer decline in water levels was measured in several wells (see pls. 13 and 14) and was reported by a majority of the owners using wells for irrigation. These late-summer declines of water level in shallow dug and drilled wells are to be expected in an area such as the southern part of Baker Valley where the coarseness of the materials making up the aquifers and the steepness of the land-surface slope are conducive to free movement of ground water. Such annual fluctuations do not necessarily represent overdraft from the ground-water supply, nor do they indicate that ground-water supplies are inadequate to support extensive additional development for irrigation.

Industrial Supply

The only large development of ground water for industrial supply in the Baker Valley is that of the California Pacific Power Co. The company drilled a 15-inch 578-foot well (9/40-28D1) and obtained a yield reported as 1,050 gallons per minute with a drawdown of about 107 feet. The water has a temperature of 58° F. and is used for cooling at the company's steam-generating plant.


1949
1950
May
June
July
August
September
October
November
December
January
February
March
April
May
June
July
August
September
Water level in feet below land surface
Well 8/39-22G1
Well 9/39-2N1
Graphs showing monthly water-level fluctuations from May 1949 through September 1950 in two wells in valley fill and the effect of nearby surface-water irrigation on water level of well 9/39-2N1 in mid-June 1949.


1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
Water level in feet below land surface
2
4
6
2
4
6
4
6
8
10
Well 8/40-19D1
Well 8/40-23A1
Well 8/39-22E1
Fluctuations of water levels in three wells in younger alluvial deposits of Baker Valley

Quantities of Ground Water Used

Of the 340 wells visited during the investigation, 88 are used solely for household purposes, 49 for both domestic and stock, and 70 for stock alone; 44 wells furnish water primarily for irrigation, 4 for public supply, and 7 for miscellaneous purposes; 78 are not in use.

The use of water by the small rural population is not great and the volume of water withdrawn from wells for domestic and stock use may be roughly estimated as follows: If domestic wells pump 400 gallons per day, stock wells pump 100 gallons per day (average well supplies about 5 head of stock), and wells supplying water for both stock and domestic use pump 600 gallons per day, then annual withdrawal of ground water by these wells would be about 80 acre-feet.

Data obtained from the owners of 35 of the 44 irrigation wells visited during the investigation indicate that approximately 3,400 acre-feet of ground water is pumped during a normal year. The power-company well is estimated to withdraw about 830 acre-feet annually on the basis of an average daily operating period of 12 hours. These estimates added to that given above for domestic and stock use indicate a total pumpage of ground water in Baker Valley of about 4,310 acre-feet.

Unpublished records
subject to revision

Possibilities of and Probable Effect of Increased Development of Ground Water

The information gathered on the present wells and on the character of the valley fill indicates that the ground water beneath Baker Valley can be developed to a greater extent than at present. The area of the valley is approximately 76,000 acres, much of which is underlain at shallow depth by permeable gravel and sand. In such a situation, where the water table is but a few feet below the surface, the upper 40± feet, to the base of the principal water-producing zone, even if the specific yield is only 10 percent, will contain about 230,000± acre-feet of water and part of that water can be recovered with properly constructed wells.

The possibility of obtaining good wells in the valley fill should not be discouraged on the basis of the few haphazard attempts to obtain good wells. In addition to the alluvium, the bedrock in some places may contain ground water. Only a few wells (40/19-16G1, -H1, etc.) along the southeast edge of the valley have been drilled through the valley fill and into the bedrock. The success of those wells suggests that if permeable Tertiary volcanic bedrock were penetrated under the valley fill, confined water could be obtained in quantities sufficient for irrigation. Thus, in places where the bedrock is not too deep, it may provide an additional source of ground water. In most places the near-surface deposits of sand and gravel will probably provide the most easily developed ground-water supplies.

Because much of the area of Baker Valley is subject to flooding and is waterlogged through part of each year, drainage may be one of the primary considerations in the development of the agriculture of the area. Increased pumping of ground water can aid the problem of drainage by lowering the water table.

In the past, development of the important ground-water resource has been hindered by the improper drilling and finishing of wells and by the incomplete recording of well data. This report is intended as a start toward the proper recording of ground-water facts and seeks to point out that modern drilling practices require complete records of ground-water and geologic data obtained from each well.

Recharge of the Water-Bearing Strata

The Confined Water Zone

Some wells in Baker Valley draw water from the Tertiary volcanic and sedimentary rocks or from the deeper part of the Quaternary valley fill. The two deep irrigation wells in sec. 15, T. 9 S., R. 40 E., tap confined water in the Tertiary volcanic and sedimentary rocks on the northward-dipping limb of the anticline. The aquifer, therefore, is recharged largely from a small area of outcrop of Tertiary volcanic rocks, about 10 square miles, exposed about the northern flanks of Lone Pine Mountain east and southeast of the city of Baker. Presuming that water passes through these strata only along stratification planes downward from the area of outcrop, the average annual recharge (assuming an average downward escape of 15 percent from the 14-inch* annual precipitation) could not exceed a total of approximately 1,000 acre-feet of water. The two wells are now reported to pump about 800 acre-feet per year. This heavy pumpage is close to or in excess of the safe yield for the aquifer. The water levels were reported to have been lowered below ground-surface level for several months by a few weeks of / continuous pumping. The water level in well 9/40-15G2

/ Lewis, M. R., op. cit., 1929.

was 10.79 feet below land surface when measured in March 1949, after the water level had had all winter in which to recover from pumping. Thus, the measured and reported water levels indicate that these wells (and possibly others that tap the aquifer) are withdrawing water annually at about the rate of estimated annual replenishment. Such withdrawal of stored ground water can be entirely beneficial in reducing waste water runoff from the recharge area. The Tertiary rocks crop out over much of the area east and south of the valley and outside the Baker Valley (such as the southwest side of the lower Powder Valley). The same formation should prove at least equally productive in other areas where its exposures and structure permit accumulation of ground water.

The deep Quaternary valley fill has been penetrated by several unsatisfactory drilled wells, which tapped small amounts of confined water that flowed at the surface. From oral reports it is concluded that the water-bearing strata lie below clays of the valley fill. The recharge of these aquifers, therefore, must be from downward percolation of water in the upper parts of the alluvial fans. Although much of the alluvial fan contains coarse materials, the lack of sorting reduces the effective porosity and delays the transmission of water to the deeper sediments of the valley fill.

Movement along some faults that outline Baker Valley has in places raised Tertiary and older rocks against valley alluvium. The effect of the fault planes as barriers to the movement of ground water is not known, but it is believed that they prevent free movement to some extent. Well 9/40-12N2 is a flowing well and its location on a hill slope on the upthrown side of a fault strongly suggests a ground-water dam created by the fault, as does also the line of springs along the trace of this same fault.

The observations and deductions given above indicate that recharge of the confined-water strata of both the deeper valley fill and the Tertiary rocks is slow and reaches them in some cases by devious routes.

The Unconfined-Water Zone

The zones of unconfined water are those in which water is free to move vertically as well as laterally and, when first encountered by a well, the water does not rise appreciably above the point of entrance into the well. The upper strata of the valley fill and alluvial fans are the zones wherein unconfined water is found in important quantities. The water stored in the unconsolidated strata in the upper part of the valley fill is derived from precipitation and from streams. The average annual precipitation over the valley floor is approximately 12 inches and because of the coarseness of much of the surface material, the low relief, poor drainage, and the spacing of the periods of precipitation, it is estimated that a high percentage (possibly 20 or 25 percent) of this precipitation percolates directly downward to the water table. If recharge from precipitation is assumed to be 25 percent on the valley floor and alluvial fans, then the amount of water added to the ground-water reservoir annually by precipitation would amount to approximately 19,000 acre-feet. In addition to this estimated recharge from precipitation, the runoff of streams from the surrounding mountains would contribute water to the permeable materials of the valley by infiltration. The alluvial fans of the various streams emptying into the valley serve as infiltration zones as illustrated by the ground-water levels at the apex of the Pine Creek fan. The alluvial fan materials are saturated nearly to the surface most of the year, as indicated by the year-round high water table and by the number of small creeks and springs that originate on the intermediate and lower slopes of the fans. The water enters the porous upper strata of the alluvial fans and possibly the deeper strata as well. From the upper parts of the alluvial slopes, ground water percolates down gradient toward the alluvium of the valley floor.

In addition to the recharge by streams, the valley alluvium is artificially recharged in places by infiltration of surface water spread for irrigation. The lack of stream measurements and of records of the amount of surface water used for irrigation makes it difficult to estimate the amount of water added to the ground-water reservoir by the streams and by the spreading of water for irrigation. There are only a few low-water measurements published for the streams that flow eastward into the Baker Valley. Wallace Maxwell, watermaster in the Baker Valley, has estimated that 75 cubic feet per second is the average high-water discharge of all creeks descending from the Elkhorn Range between Baker and Rock Creek settlement (sec. 34, T. 7 S., R. 38 E.) during the period of maximum runoff, and that Rock Creek discharges an additional 75 second-feet. The spring runoff usually begins about March 15, is high by April 1, starts decreasing about June 1, and declines to 1 or 2 second-feet by June 15. This would indicate a period of high runoff of about 3 months during which the total runoff is estimated to be about 13,000 acre-feet of which part is added to the ground-water reservoir by infiltration. The runoff of Rock Creek lies outside the Baker Valley proper.

The Powder River in its course across the valley contributes to the recharge of the valley alluvium (see contours on pl. 12 B). During the spring and early-summer runoff the river level is higher than the water table in the adjacent area (the water table slopes away from the stream), hence the stream loses water through the underlying permeable materials. In the central and northern parts of its course across the valley, the river may also be effluent throughout the year, but the basis for such surmise is less positive. Through secs. 17 and 20, T. 8 S., R. 40 E., the river has built a low natural levee and during late spring high water commonly floods the surrounding flat lands.

Stream Flow and Drainage

Stream flow and drainage in Baker Valley have a significant effect upon ground water. In all parts of the valley streams and irrigation diversions flow for a large part of each year across areas of permeable materials and furnish a nearly continuous supply of water for recharge. The streams and sloughs across the flat valley floor are in balance generally with ground water and feed large quantities of water underground (see pl. 12, B). The alluvial fans of Pine Creek and Rock Creek, by their position athwart the drainage, exert control over the ground water in Baker Valley. The extension of the Pine Creek and Rock Creek fans toward the Coyote Hills, and the saturation of the fan materials has created a ground-water dam across the northern part of the valley. The ground-water levels remain close to the land surface of the fans throughout the year; hence, a ground-water dam is constantly in effect. As a result, ground-water drainage from the valley is impeded and storage in the fill increased. It escapes by rising to the surface and draining into the surface streams and sloughs. The effluence of ground water is especially evident in late spring and early summer when water tables rise over all the valley, pastures at the northern end are flooded by rising ground water and roadside drain ditches, cut below water-table depth, are filled and discharge into the sloughs and river channels at the north end of the valley.

In normal years, the heavy stream runoff ceases by mid-June, and by mid-summer the ground-water levels begin to decline. Water loss by drainage to streams, by evaporation and plant transpiration, and by pump withdrawal reaches a maximum during the summer.

Chemical Character of the Ground Water

General Character

The ground water in the Baker Valley area in general does not contain excessive amounts of dissolved material. On the average it is slightly to moderately hard, some of it being very hard, and most of it low in chloride and free of odor and color.

The chemical studies and observations were based on 108 relatively complete chemical analyses furnished by the Bureau of Reclamation (see table 4). In addition, samples of ground water from approximately 307 wells and springs were analyzed by field methods for hardness and chloride content (see tables 1 and 2).

Temperature

The average ground-water temperature in the upper 100 feet of the earth in Baker Valley is approximately 50° F. Water encountered at greater depth commonly is a little warmer, temperature increases about 1.8° F. per 100 feet of depth. Ground-water temperatures too high to be accounted for by normal earth-temperature gradients are found in wells 9/40-16G1 and -16H1, which have temperatures of 76° and 79° F., respectively. These wells are located at the eastern outskirts of Baker, and the temperatures are comparable to that of the water in nearby wells 9/40-15G1 and -15G2, which are reportedly drilled in the volcanic rocks of Tertiary age. The high temperature of the ground water may be due to the location of the wells near a fault zone. At the northern end of Baker Valley, just north of Haines, a number of hot springs, developed as a resort area, occur near a fault zone in the granodiorite of the Coyote Hills.

Hardness

The usual cause of hardness in water is the presence of dissolved compounds of calcium and magnesium. When dissolved in the form of bicarbonate, the calcium and magnesium commonly are termed carbonate ("temporary") hardness and when in the form of sulfates and chlorides are termed noncarbonate ("permanent") hardness. Water having less than 55 parts per million of hardness ordinarily is considered to be soft, 56 to 100 parts slightly hard, 101 to 200, moderately hard, 201 to 300, hard, and more than 300, very hard. Of the 307 wells tested, only 25 had hardness over 200 and of these, 15 had ratings over 300, 22 had ratings of 55 or lower, and 251 had ratings between 56 and 200. The hardest water tested had a hardness of 485 parts per million, and the softest had but 10 parts.

The data show that of the 22 wells yielding soft water, 11 are drilled wells more than 60 feet deep, 2 are drilled 33 and 41 feet deep, respectively, 5 are dug wells less than 12 feet deep, 3 are driven wells less than 26 feet, and 1 is a bored well 8 feet deep. Of the 25 wells producing hard water, 14 are dug wells less than 40 feet deep, 2 are driven wells less than 18 feet deep, one is bored 23 feet deep, and 8 are drilled wells, the shallowest of which is 60 feet. It thus appears that in general the ground water is slightly softer in the deeper strata -- a rather common situation.

The wells with soft water are rather evenly distributed. It may be observed, however, that no water in the hard or very hard group was found in the general area of the Pine Creek-Goodrich Creek alluvial fan, and of the 25 wells in the "hard to very hard" group, 13 were located in a belt along the southeast side of the valley, from sec. 25, T. 8 S., R 40 E., to sec. 20, T. 9 S., R. 40 E. Of the 13, 6 are drilled wells more than 60 feet deep and 7 are dug wells. In the same belt, however, are several drilled and dug wells, and also some springs with soft water. Lack of accurate information on depth of casing in drilled wells, and on depth and nature of the water-producing zones in both dug and drilled wells prohibits positive conclusions as to the relation of hardness to the depth of wells or to the type of rock material from which the water is derived.

Chloride

Chlorides are present to some extent in nearly all natural waters, sodium chloride -- common salt -- being the most common, and, like the alkali salts, they are derived originally from the rock material with which the water has come in contact. Occasionally sodium chloride and other dissolved materials are concentrated in inland lakes and deposited in the sediments of the lake bottom when they dry up. Wells penetrating such old lake deposits sometimes encounter these salt-rich sediments and obtain water that has a high concentration of chloride. In addition, animal contamination may cause an unusually high concentration of sodium chloride in well water, particularly if the well is improperly located or constructed.

The U. S. Public Health Service_/ recommends, as drinking water

_/ U. S. Public Health Service drinking water standards: Public Health Repts., vol. 61, no. 11, pp. 371-384, March 15, 1946.

standards for common carriers, concentrations of chloride up to 250 parts per million. These standards are for interstate carriers but also are widely used in evaluating the suitability of a water for private or public supply. Somewhat higher concentrations are not detrimental for some uses, and concentrations up to 355 parts per million have been considered acceptable for irrigation water, according to Scofield._/

_/ Scofield, D. D., South Coastal Basin investigation, quality of irrigation water: California Dept. Public Works, Water Resources Div. Bull. 40, 1933.

In general, the chloride content of the well water in the Baker Valley area is low. Two wells showed chloride concentration of 122 and 151 parts per million. One was a shallow dug well adjacent to a corral and the other an open dug well in a pasture; hence, the high salinity may be discounted as not representative of the natural chloride content of the water.

Alkalinity

The term "alkalinity" as used in this report refers to the presence in the water of soluble basic-reacting salts of the alkali metals sodium and potassium. The most common salts causing alkalinity are the bicarbonates.

In general, the ground waters of the Baker Valley are of good quality with respect to alkalinity. None of the analyzed samples from the alluvial fan areas showed high concentrations of alkali and only four samples from the central part of the valley were strongly alkaline. These four were all shallow dug or bored wells. The only other analyzed ground-water samples to show high concentration of alkali were from two artesian wells at the southeast corner of the valley, and from Sam-O Spring.

It may be noted that the absence of high concentrations in the ground water of Baker Valley seems in contradiction to the observed occurrence of alkali encrustation over much of the valley floor. The alkali crust (see pl. 10 B) over much of the ground is only a thin surface layer. It accumulates there because of the upward movement of ground water by capillary action, and the subsequent evaporation of the water. This material is usually dissolved again with the advent of the seasonal rains and carried downward or away by the surface drainage. Although the movement of the ground water in the central part of the Baker Valley appears to be slow, and the drainage impaired, still they are adequate to prevent excessive concentrations of dissolved materials in the ground water.

Other factors affecting quality of ground water for irrigation

Water that is of acceptable quality for some uses may not be satisfactory for irrigation; hence, careful consideration should be given to the chemical composition of water that is to be used extensively on crops. The sodium content is usually given primary consideration. The "percent sodium" or "sodium percentage" is the proportion of sodium to the other basic constituents (computed on the basis of equivalents). Seasonal variations in the alkali content of water can render it less satisfactory at certain times of the year. The waters of Baker Valley, both ground and surface, are in general within the acceptable limits as proposed by Scofield_/ whose

_/ Scofield, D. D., op. cit. Also, The salinity of irrigation water Smithsonian Inst. Ann. Rept., pp. 275-287, 1935.

recommendations were followed by Wilcox._/ Using the specific conductance

_/ Wilcox, L. V., The quality of water for irrigation use, U. S. Dept. Agr. Tech. Bull. 962, pp. 6-14, 1948.

and percent sodium as reported in the analyses (see table 4) it is possible to evaluate with respect to alkalinity the suitability of water for irrigation. The following table shows permissible limits for electrical conductivity and percent sodium of several classes of irrigation water: /

/ Wilcox, L. V., op. cit., p. 27.

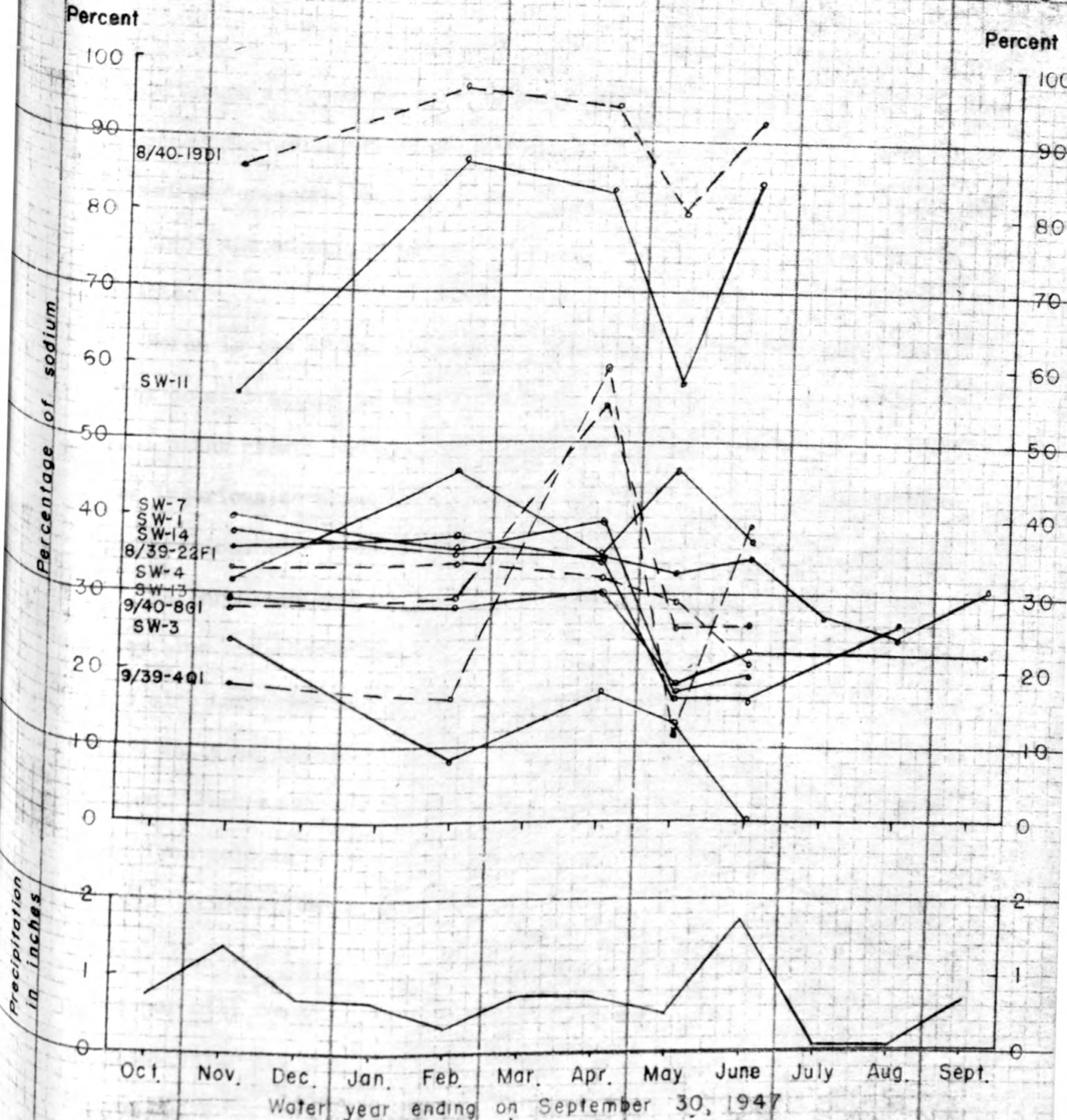
Rating	Classes of water	Electrical conductivity ($EC \times 10^6$ at 25° C.)	Percent sodium a/
1	Excellent	Less than 250	Less than 20
2	Good	250-750	20-40
3	Permissible	750-2000	40-60
4	Doubtful	2000-3000	60-80
5	Unsuitable	More than 3000	More than 80

a/ Percent sodium to total of active bases.

Not all waters analyzed will fit perfectly into this scale; for example, the water from well 9/40-8G1 in May 1947 contained 26 sodium, but the specific conductance was only 210; hence, on this basis, the water could still be considered of good quality for irrigation. The limitations of the "excellent" and "good" classes (given in the table above) are such that the waters are suitable for most types of crops on any type of soil under average irrigation conditions. The suitability of waters within the "permissible" and "doubtful" classes are largely dependent upon the type of crop grown and the type and condition of the soil and the soil drainage.

In addition to the above factors that affect the quality of ground water for irrigation, the total concentration of dissolved solids, whether specifically injurious or not, is important. A measure of the total solids concentration is commonly obtained by determining the specific electrical conductance of the water. If the specific conductance is high, the water has a high concentration of dissolved solids; if low, then the water contains a low concentration of dissolved solids. That type of rapid determination is used by the U. S. Department of Agriculture to aid in the classification of the waters for irrigation.

The seasonal variations in the chemical content of ground and surface water is particularly marked with respect to sodium percentage. The percent sodium in some waters varies as much as 49 percent in one month (see pl. 15). An increase in sodium concentration generally occurs in the sloughs and wells in areas of ground-water stagnation during the fall and winter months as the annual dry period slows the movement of both surface and ground water in these areas. Such rivers as the Powder River and Pine Creek show the first decline in sodium concentration as the freshening effect of fall and winter precipitation occurs. In the spring, the sloughs and wells whose water analyses attested to a winter increase in sodium show a corresponding decline in sodium percentage as the spring runoff progresses and they receive more fresh water. A spring rise following a winter decline in sodium percentage of the water in the wells, creeks, and rivers -- noted in some cases -- is probably due to the addition of water flushed from the areas of winter stagnation. By April the initial wave of runoff has passed, fresh water has arrived at nearly all points, and a decline in sodium concentration is general in all wells, creeks, rivers, and sloughs. An exception was noted in the water from one location on Baldock Slough at the north end of the valley. The water was reported to be stagnant when sampled and the analysis report should not be considered/ representative. As the runoff of surface streams declines in the latter part of spring each year, nearly all waters, both ground and surface, again show an increase in sodium concentration.



Chemical data taken from table 4

Graph showing seasonal variations in sodium percentage of some surface and shallow well waters in Baker Valley with graph showing monthly precipitation for the same period.

Although analyses were not made for consecutive summer and fall months for any of the wells, it seems reasonable to surmise that near the surface the sodium concentration continues to increase through the late summer and fall until the advent of the seasonal recharge when the annual cycle is completed.

Boron is one of the important chemical constituents commonly found in low concentrations in natural waters. It is an essential element for normal plant growth but in excess of the desirable concentrations is likely to be injurious to plant life. Crops sensitive to boron cannot tolerate concentrations much greater than one part per million.

The boron content is low in most ground and surface water in the valley area and the waters that do have high concentrations are those which also have high sodium percentages. The maximum boron concentration of any analyzed samples of ground water in Baker Valley is 1.88 parts per million. That concentration was shown by an artesian well that obtains its water from volcanic rocks of Tertiary age at the southeast edge of the valley. Baldock Slough, at the bridge crossing in the southeast corner of sec. 15, T. 9 S., R. 40 E., showed a concentration between 2.14 and 3.28 parts per million through April, May, and June (see table 4) but this is stagnant water and represents exceptional conditions. Water from Sam-O Spring has a concentration of 1.84 parts per million. It is probable that the flow of Sam-O Spring and possibly other unknown ground-water increments enriched by evaporation is largely responsible for the concentration of boron in the slough at that place. Those high boron waters would be of doubtful quality for the irrigation of such crops as potatoes, wheat, barley, and lima beans, since these crops are only semitolerant to boron and will not stand concentrations of much more than two parts per million. These waters would probably be suitable for sugar beets, common garden vegetables, and alfalfa, as those plants are more tolerant of boron.

Well, Spring, and Water-Quality Records

As shown in table 1, the depths of many wells are based on reports by owners or drillers because the wells could not be measured. Those depths shown to the nearest tenth of a foot were measured by the Geological Survey.

Water levels are expressed in feet below a land-surface datum, a plane of precise reference at each well which coincides with the general level of the land immediately adjacent. Those levels given to the nearest whole foot are reported and are considered dependable within a few feet. Those followed by plus-or-minus signs are approximate or estimated.

The character of the water-bearing materials (table 1, column 10) is largely that reported by the owner, except in those wells for which drillers' logs are given in table 3. The frequent change in ownership of properties and the lack of adequate logs generally have precluded the determination of the water-bearing formations and their depth and thickness (table 1, columns 8 and 9).

Statements on occurrence of the ground water at each well (table 1, column 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 clay or silt excluded water from the well until it extended some depth below the normal water-table level of the vicinity.

The data on capacity of pump (table 1, column 14) are necessarily approximate. They do not show the ultimate yields of the wells, of which some have potential capacities much greater than the current rate of use. Estimates of yields were not made of domestic or stock wells because in early all cases such wells are equipped with small-capacity piston or jet pumps with the output limited to 4 to 10 gallons per minute.

About 298 wells and 9 springs were examined and are described in tables 1 and 2. The wells range in depth from 4.3 to 750 feet, but most are less than 40 feet deep. Only 35 wells are 100 feet or more deep, and of these only 7 are more than 500 feet deep. The diameters of the wells range from 1 inch in the shallow driven wells to 12 feet in one of the dug wells used for irrigation. The casing is commonly 6 inches in diameter in the drilled domestic wells of the alluvial-fan areas, and from 3 to 6 feet in diameter in the dug wells. Drilled irrigation wells range from 12 to 18 inches in diameter and in most cases have steel drive-pipe casings perforated below the water table.

The chemical analyses of ground and surface waters listed in table 4 were furnished by the Bureau of Reclamation. Analyses of water from the Powder River in the Sumpter Valley are included for comparison. Where the amount of total dissolved solids (table 4, column 6) has not been computed, it may be closely approximated by multiplying the value for specific conductance (table 4, column 5) by 0.7 (7/10).

Table 1.- Records of representative wells in Baker Valley, Baker County, Oreg.

Well number	Owner or occupant of property	Topography 1/ and approximate altitudes (feet above sea level)	Type 2/	Depth (feet)	Diameter (inches)	Depth of casing (feet)	Water-bearing zone or zones: Depth to top (feet)	Water-bearing zone or zones: Thickness (feet)	Water-bearing zone or zones: Character of material	Water-bearing zone or zones: Ground-water occurrence	Water level: Feet below land-surface datum 3/	Water level: Date	Type of pump 4/ and yield (gallons per minute)	Use 5/	Total hardness of water as $CaCO_3$ (parts per million)	Chloride content of water as Cl (parts per million)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 7 S., R. 39 E.																
25A1	H. K. Coffey	Ts-3395	Dr	250	6				Greenstone (?)	Unconfined	46.45	Mar. 30, 1949	P	S			
27Q1	N. W. Granite Co.	S-3316	Dr	40.4					Fine sand	do.	16.57	Apr. 16, 1949	P	D	60	15	Pumps fine sand with hand pump.
28F1	T. R. O'Dell	Ap-3312	Dr	132	4 2	90 132			Sand and gravel	do.	4.0 3.5	Nov. 2, 1928	P	PS			Temperature of water reported to be 50° F.
28G2	do.	Ap-3311	Dr	90	4	90			Diorite	Confined	Flowing	do.		PS			Not located in 1949; believed to be included in enlarged hot spring pool; temperature of water reported to be 135½° F. in 1928.
28G3	do.	Ap-3311	Dg	40	60					Unconfined		July 2, 1949	C, 400	PS			Used to dilute hot water for swimming pool.
28G4	do.	Ap-3312	Dr	200	6					do.		do.	P	D	35	5	
31N1	E. H. Anderson	Ap-3441	Dr	54	6					do.	12	May 11, 1949	J	D, S	70	3	
33H1	William Dougherty	Ap-3346	Dr	118	6					do.	8	Apr. 16, 1949	J	D, S	85	5	
33K1	G. H. Davis	Ap-3326	Dr	86	6					do.	9.20	May 10, 1949	P	N	55	3	Water level standing at about 5 feet below surface in basement of house.
	T. 7 S., R. 40 E.																
29C1	U. S. Soil Conservation Service	S-3630	Dr	214.4	6				Volcanic rock(?)	do.	105.85	Mar. 30, 1949		N	90	3	
31E1	Lee Savley	Ts-3486	Bd	22.5	18					do.	11.20	do.	P	D, S	310	46	

See final page of table for footnotes.

Unpublished records subject to revision

Table 1.- Records of representative wells in Baker Valley, Baker County, Oreg.

Well number	Owner or occupant of property	Topography 1/ and approximate altitudes (feet above sea level)	Type 2/	Depth (feet)	Diameter (inches)	Depth of casing (feet)	Water-bearing zone or zones: Depth to top (feet)	Water-bearing zone or zones: Thickness (feet)	Water-bearing zone or zones: Character of material	Water-bearing zone or zones: Ground-water occurrence	Water level: Feet below land-surface datum 3/	Water level: Date	Type of pump 4/ and yield (gallons per minute)	Use 5/	Total hardness of water as $CaCO_3$ (parts per million)	Chloride content of water as Cl (parts per million)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 7 S., R. 39 E.																
25A1	H. K. Coffey	Ts-3395	Dr	250	6				Greenstone (?)	Unconfined	46.45	Mar. 30, 1949	P	S			
27Q1	N. W. Granite Co.	S-3316	Dr	40.4					Fine sand	do.	16.57	Apr. 16, 1949	P	D	60	15	Pumps fine sand with hand pump.
28F1	T. R. O'Dell	Ap-3312	Dr	132	4 2	90 132			Sand and gravel	do.	4.0 3.5	Nov. 2, 1928	P	PS			Temperature of water reported to be 50° F.
28G2	do.	Ap-3311	Dr	90	4	90			Diorite	Confined	Flowing	do.		PS			Not located in 1949; believed to be included in enlarged hot spring pool; temperature of water reported to be 135½° F. in 1928.
28G3	do.	Ap-3311	Dg	40	60					Unconfined		July 2, 1949	C, 400	PS			Used to dilute hot water for swimming pool.
28G4	do.	Ap-3312	Dr	200	6					do.		do.	P	D	35	5	
31N1	E. H. Anderson	Ap-3441	Dr	54	6					do.	12	May 11, 1949	J	D, S	70	3	
33H1	William Dougherty	Ap-3346	Dr	118	6					do.	8	Apr. 16, 1949	J	D, S	85	5	
33K1	G. H. Davis	Ap-3326	Dr	86	6					do.	9.20	May 10. 1949	P	N	55	3	Water level standing at about 5 feet below surface in basement of house.
	T. 7 S., R. 40 E.																
29C1	U. S. Soil Conservation Service	S-3630	Dr	214.4	6				Volcanic rock(?)	do.	105.85	Mar. 30, 1949		N	90	3	
31E1	Lee Savley	Ts-3486	Bd	22.5	18					do.	11.20	do.	P	D, S	310	46	

See final page of table for footnotes.

Unpublished records subject to revision

Table 1.- Records of representative wells -- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 38 E.- Continued																
25Q1	Leland Wilcox	Af-3853	Dn	15.8	1½					Unconfined	10.94	Apr. 22, 1949	P	D	95	3	
36C1	Jim Minion	Af-3927	Dn	12.5	1¼					do.	5.76	do.	P	D, S	100	3	
	T. 8 S., R. 39 E.																
1H1	Coffey Ranch	S-3390	Dr	350	6				Greenstone (?)	do.	40	Mar. 30, 1949	J	D, S	335	15	75 feet of pump column; will break suction after approximately half an hour of pumping
3N1	Nell Kipland	Ap-3335	Dr	60	6					do.	3.99	May 9, 1949	P	S			Obstruction in casing at 9.3 feet.
4G1	Cecil Cox	Ap-3332	Dr	?	8					do.	2.66	May 10, 1949			190	17	Obstruction in casing at 7.6 feet.
4J1	Chas. Barker	Ap-3331	Dr	41.4	6					do.	3.36	do.	P	S	35	5	
4M1	Kenneth Fisher	Ap-3349	Dg	6.6	36					do.	3.40	do.	J	D	125	7	
5E1	Lille Ward	Ap-3403	Dr	50.3	6					do.	4.13	May 11, 1949	P	D	75	4	
6A1	Tom Stinson	Ap-3407	Dr	58.8	6					do.	5.99	do.	P	D	85	3	
6D1	G. C. Davidson	Ap-3446	Dr	54.2	6	55			Gravel	do.	10.11	do.	P	D	60	3	Owner reports water legel very constant; was at 10 feet when drilled about 1925.
6D2	do.	Ap-3448	Dg	15.2	10		6	9	Gravel and sand	do.	3.88	do.	P	S	60	3	
6E1	C. C. Davidson	Ap-3452	Dr	406	4-3	406					18.76	do.	J	D	80	3	Quicksand reported cased off at 40-50 feet.
6E2	do.	Ap-3451	Dr Dg	36.9 14.0	5 30					do.	4.84 3.32	do.	 T	N S	65 75	4 5	Drilled inside dug well to reported depth of 60 feet; now sanded up.
6M1	do.	Ap-3443	Dr	63.9	6					do.	5.41	do.	P	D	90	4	Reportedly will break suction after 50-60 gallons with hand pump.
6P1	Fluvia Nicol	Ap-3416	Dn	14.5	1¼					do.	2.40	do.		N	95	3	

Table 1.- Records of representative wells -- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
T. 8 S., R. 39 E.- Continued																	
7J1	Mabel Colvin	Ap-3430	Dr	100+	6					Unconfined		May 11, 1949	C	D, S	95	4	Well buried; inaccessible.
7P1	A. W. Greger	Af-3496	Dr	61.0	6					do.	33.70	do.	P	N	80	3	Has not been pumped for many years.
8D1	N. E. Dodd	Ap-3406	Dg	121	48					do.	6.77	May 10, 1949	P	D	90	3	See table 4 for chemical analysis.
8R1	L. A. Sieg	Ap-3414	Dg	40	18				Fine sand	do.	25	May 9, 1949	P	D	110	7	Sometimes pumps fine sand in summer time; see table 4 for chemical analysis.
9A1	Dick Cole	Ap-3345	Dn	10.8	1½					do.	1.88	do.	P	D	315	21	
9C1	Robert Proebstel	Ap-3356	Dr	62.9	4					do.	4.01	do.	P	S	85	3	
9G1	N. E. Dodd	Ap-3355	Dg	142	12					do.	3.50	do.	P	N			
10L1	do.	Ap-3348	Dr	41.1	6					do.	5.90	do.	P	S	60	4	
10M1	Glenn Duncan	Ap-3368	Dr	55.3	12					do.	4.95	do.		N	120	5	Drilled for irrigation but yield insufficient.
11Q1	John Payton	Fp-3332	Dg	14.0	36					do.	2.71	Apr. 16, 1949	P C	D S	240	7	
13P1	E. L. Kipling	Fp-3340	Dn	20	1½					do.	6.5	Mar. 31, 1949	P	S	70	5	
13Q1	do.	Fp-3340	Dn	23	1¼				Fine gravel	do.	1.5	do.	P	D	75	6	See table 3 for log, and table 4 for chemical analysis.
14G1	John Payton	Fp-3337	Dn	121	1½					do.	2.68	Apr. 16, 1949		N	60	6	
14Q1	Lula Kipling	Fp-3335	Dn	21.2	1½					do.	1.34	do.	P	N			
15R1	Ed Young	Ap-3343	Dn	22	1½					do.		May 9, 1949	P	Irr	115	3	

Unpublished records subject to revision

Table 1.- Records of representative wells — Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 39 E.- Continued.																
15B2	Ed Young	Ap-3343	Dn	14.2	1¼					Unconfined	4.32	May 9, 1949		N			
15G1	James A. Kelly	Ap-3360	Dg	10.3	2½					do.	4.26	do.		N	115	4	
15K1	John W. Wells	Ap-3366	Dg	12.1	72					do.	4.19	May 8, 1949	P	S	110	3	
15L1	Len Sieg	Ap-3366	Dn	10.7	1-3/4					do.	4.76	do.	P	D	120	3	Owner reports water level drops to about 7 feet in August.
16M1	Nelson Sieg	Af-3442	Dg	30.0	60				Gravel, fine, packed and cemented.	do.	21.78	do.	P	D	80	2	Owner reports well used to go dry nearly every summer.
18A1	do.	Af-3471	Dr	42.9	6				-	do.	36.40	May 11, 1949		N	140	6	
18L1	C. Bieber	Af-3556	Dr	46.7	6					do.	16.41	do.	P	N	70	7	
20A1	Franklyn W. Polley	Ap-3465	Dg	12.8	60					do.	6.79	May 8, 1949	C	S	100	5	
20F1	do.	Af-3525	Dr	56.3	6					do.	46.94	May 7, 1949		N	65	2	
21Q1	Blanche Paytom	Ap-3433	Dg	12			3	9	Coarse to fine gravel.	do.	4	May 8, 1949	P	D	140	4	
22B1	C. H. Bostwick	Ap-3377	Dg	19.8	1-3/4					do.	4.19	do.	P	S	90	3	
22F1	U.S. Geological Survey	Ap-3387	Dg	4.5	18	11.5	3 4	1 12	Gravel and sand Coarse gravel and sand.	do.	4.00	do.		O	245	7	See table 3 for log, table 4 for chemical analysis, and plate 14 for water-level measurements.
22G1	Florence Rohner	Ap-3383	Dg	12	12					do.	8.85	May 6, 1949	P	N	135	5	See plate 13 for water-level measurements.
22G2	do.	Ap-3383	Dr	40.7	6					do.	3.46	May 8, 1949	C	D	125	2	

Unpublished records subject to revision

Table 1.- Records of representative wells-- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 39 E.- Continued.																
22L1	Emil Rehner	Ap-3389										May 8, 1949		D			See table 4 for chemical analysis.
22L2	do.	Ap 3359	Dg	7.8	24					Unconfined	4.69	do.	P	S	115	3	
23E1	Orel McQuowen	Ap 3359	Dg	9.7	60		9		Fine gravel	do.	3.78	May 9, 1949		S	185	7	See table 3 for log.
23G1	Glenn Payton	Ap-3345	Dn	12.9	1½					do.	2.87	do.	P	D	175	8	
23H1	Herbert Chandler	Fp-3339	Dr	42.6	6					do.	4.02	Apr. 16, 1949	C	D, S	65	3	
23M1	Orel McQuowen	Ap-3361	Dn	9.7	1¼				Sand and gravel	do.	4	May 9, 1949	C	D	140	4	
24K1	Herbert Chandler	Fp-3346	Bd	7.5	8					do.	1.46	Mar. 31, 1949	P	S	45	15	See table 4 for chemical analysis.
25E1	Zelma Funk	Ap-3353	Dg-Dn	15.1	72-144				Gravel and sand	do.	10.22	May 7, 1949	C-400	D, S	110	4	Water level recorded at time pump had been in operation 2½ hours pumping estimated 400 gallons per minute; house well driven to 22 feet in southwest corner of shaft. See table 4 for chemical analysis.
25F1	A. W. Davenport	Ap-3350	Dn	18	1½		6	12	Sand and fine gravel.	do.	2	Apr. 16, 1949	P	D, S	115	6	
25H1	W. A. Funk	Ap-3362	Dg	5.1	36					do.	0.56	do.	P	S	110	14	
26D1	L. A. Sieg	Fp-3362	Dr	50.0	6					do.	3.55	Apr. 23, 1949		N	100	4	
26F1	do.	Ap-3367	Dr	84.7	4					do.	3.47	do.	C	D, S	75	5	
26G1	Delbert Gildersleeve	Ap-3360	Dr	60	6					do.	6	May 7, 1949	J	D	70	2	
26G2	do.	Ap-3361	Dg	21.6	8					do.	3.43	do.	P	S	110	3	

Unpublished records
subject to revision

Table 1.- Records of representative wells-- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 39 E. Continued																
26J1	Delbert Gildersleeve	Ap-3355	Dg	7.1					Medium gravel	Unconfined	1.08	May 7, 1949	P	S	135	3	
26F1	E. Deśudonnie	Ap-3367	Dr	62	6	62				do.		Apr. 23, 1949	C	D, S	70	4	
27C1	Charles Wright	Ap-3393	Dn	11.1	1½					do.	3.68	May 8, 1949	P	D	130	2	
27E1	Vester Gover*	Fp-3415	Dg	11.1						do.	4.68	Apr. 23, 1949	C	D	115	6	
27[illegible]1	F. B. Clark	Fp-3400	Dr	35.3	6					do.	3.93	do.	C	D	95	4	See table 4 for chemical analysis.
27F2	Wingville School	Ap-3397	Dr	32.9	6					do.	4.98	May 8, 1949	P	N	45	3	School no longer in use.
27P1	Glen Morin	Fp-3409	Dr	42						do.	3.73	Apr. 23, 1949	T	D	100	6	
28D1	Williams Ditch Co.	Af-3491	Dr	50.8	6					do.	19.15	May 7, 1949	P	D, S	70	2	
28G1	Wallace Simrell	Af-3456	Dr	43.4	6					do.	2.34	Apr. 23, 1949	C	D, S	95	5	Owner reports water level stays at about 3 feet all the year.
28L1	Cecil Cross	Af-3478	Dr	30						do.		do.	J	D	90	4	
28L2	do.	Af-3475	Dg	12.5	24					do.	4.10	do.	C	S	95	4	
29A1	Ed Young	Af-3509	Dr	33.8	6					do.	31.15	May 7, 1949	P	N			
29D1	Hirum Wicks	Af-3586	Dg		36						20(?)	do.	P	N			Caved; muddy at about 19 feet inside pump column.
29J1	F. J. Schultz	Af-3527	Dr	85	4	85				do.	33.27	Apr. 23, 1949	P	D, S	90	3	Owner reports water level almost always drops to about 25 feet in winter and early spring; lower this year.

Unpublished records
subject to revision

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	<u>T. 8 S., R. 39 E.</u>- Continued.																
29M1	Dennis Bennett	Af- 3625	Dg	18.4						Unconfined	4.45	May 7, 1949		D	75	2	Owner reports water level has dropped as low as 14 feet in dry years.
29N1	Holland Land Co.	Af- 3630	Dr	18.3	4					do.	4.20	Apr. 23, 1949	P	N	70	3	
29R1	Mary Derrick	Af- 3536	Dg	28.5	6					do.	15.94	do.	P	D, S	105	5	Backfilled around steel casing.
30E1	Ray Keifling	Af- 3777	Dg	18	60					do.	1	do.					
30F1	do.	Af- 3705	Dg	25.8	24	24				do.	2.45	do.	P	D	85	3	
31B1	Harold Sherred	Af- 3692	Dg	20±					Gravel and boulders	do.		do.	C	D, S	110	7	Owner reports water table rises to within 4 feet of surface in May and June.
31C1	M. H. Spriet	Af- 3747	Dg	14	-				Gravel	do.	4	do.	P	D, S	120	4	Backfilled around steel casing; see table 3 for log.
31D1	Hudson L. Miller	Af- 3754	Dg	13.0	60					do.	5.27	do.	P	Irr	100	5	
31G1	Harold Sherred	Af- 3718	Dg	23.3	60				Coarse gravel, cobbles, and small boulders.	do.	4.76	do.		S	90	3	Owner reports well galleried at bottom, 12 feet to north and 12 feet to south.
32D1	S. H. Mitchell	Af- 3641	Dg	22.7	6					do.	8.85	do.	J	D, S	120	5	
32H1	Bufford Kennison	Af- 3540	Dn	28	1½					do.	7	Apr. 23, 1949	P	D	105	4	See table 4 for chemical analysis.
32H2	do.	Af- 3542	Dr	300	6	300					8.12	do.	P	S	105	4	Owner reports hole was "dry" below 66 feet.
32M1	Hugh Doherty	Af- 3655	Dg	42	72		6 38	9 4	Boulders and cobbles Sand and clay	do.	4.64	Apr. 22, 1949	P	S	85	3	See table 3 for log; owner reports creek adjacent to well has no effect on water level in well.

Unpublished records
subject to revision

Table 1.- Records of representative wells -- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 39 E.- Continued.																
32N1	Hugh Doherty	Af-3657	Dr	59.5	6					Unconfined	8.32	Apr. 22, 1949	P	N	50	3	Was 8-inch hole drilled to 85 feet; water contained much iron; well was deepened but no other water found; 6-inch casing run inside 8-inch to 60 feet and 8-inch pulled; hole plugged at 60 feet.
33C1	Ed DeVos	Af-3492	Dn	16.7	1-3/4					do.	4.10	do.	P	D	60	3	
33M1	Goldie Cable	Af-3535	Dr	118.0	6						11.14	Apr. 23, 1949	P	D, S	25	3	
34B1	Merrit Waltz	Ap-3408	Dr	125	6						6	do.	T	D	105	3	
34C1	George Erickson	Ap-3411	Dr	47	6					do.	4	do.	J	D, S	95	4	
34L1	E.P. Hill	Ap-3411	Dr	86	6	86				do.	3	do.	C	D	95	4	Well buried, inaccessible; see table 4 for chemical analysis.
34Q1	U. Stevens	Ap-3412	Dr	150	6							Mar. 26, 1949	P	D	80	3	
36A1	T. F. Gudurian	Ap-3363	Dr	185	8							Apr. 15, 1949	T	D	65	4	
36A2	do.	Ap-3363	Dg	75						do.	1.67	do.	P	S	135	3	
36J1	Cecil C. Curl	Ap-3366	Dn	11.2	1¼					do.	1.71	May 7, 1949	P	N	65	10	
	T. 8 S., R. 40 E.																
5R1	Charles H. Colton	Fp-3334	Dg	12.0	16					do.	3.07	Mar. 28, 1949	C	S	125	8	Backfilled around 16-inch casing.
5R2	do.	Fp-3334	Dr	50	8	50		Coarse gravel		do.	4	Mar. 31, 1949	P	D	80	6	Well buried; inaccessible.
5R3	do.	Fp-3334	Dn	40	2			Sand and gravel		do.	4	do.	C	D	70	6	
9E1	Carl Parker	Fp-3336	Dn	22	2					do.		Mar. 28, 1949	P	D	140	18	See table 4 for chemical analysis.

Unpublished records
subject to revision

Table 1.- Records of representative wells -- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 40 E.- Continued																
9E2	Carl Parker	Fp-3336	Dg	7						Unconfined	1.24	Mar. 28, 1949	P	S	80	11	See table 4 for chemical analysis.
9F1	Walter W. Colton	Fp-3337	Dr	25						do.	2	do.	P	D, S	120	15	
9L1	Brent Perkins	Fp-3337	Dg	12.1	36					do.	2.00	do.	T	S	160	11	
9F1	E. J. Warner	Fp-3339	Dm	18	2					do.		do.	P	D	445	29	
13R1	L. E. Williams	S-3356	Dg	29.5	24					do.	25.82	Mar. 25, 1949	P	D, S	70	7	
13Q1	U.S Soil Conservation Service	S-3423	Dg	20.5	36					do.	18.01	do.	P	S	100	19	
14P1	Joe Geddes	Fp-3349	Dr	6						do.	3.20	Mar. 26, 1949	P	N	170	51	Do.
15C1	T. L. Hughes	Fp-3342	Dr	60	5					do.		Mar. 30, 1949	P	S	70	5	Temperature of water, 50° F.
15C2	do.	Fp-3342	Dm		2½					do.		do.	P	S			
15H1	Arlenne McClurg	Ap-3348	Dg		36					do.	3.19	Mar. 26, 1949	P	S	125	13	
15R1	Weaver Bond	Ap-3350	Dr	20	2				Coarse sand	do.	4-5	do.	P	D	90	6	See table 3 for log.
15R2	do.	Ap-3350	Dg	10.2	60-36					do.	6.73	do.	P	S	115	7	
16B1	Fred Warner	Ap-3341	Dm	19	1½					do.	2.5	Mar. 28, 1949	P	D	85	8	
16J1	Lee Savely	Ap-3344	Dg	9.2	36					do.	4.08	Mar. 30, 1949	P	S	110	15	See table 4 for chemical analysis.
16N1	Brent Perkins	Ap-3345	Dm	112.5	1½					do.	2.10	Apr. 12, 1949	P	D	80	5	
17F1	Harvey Harrison	Ap-3342	Dg	70						do.	1.74	do.	P	D	110	5	

Unpublished records subject to revision

Table 1. Records of representative wells -- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 6 S., R. 40 E.- Continued.																
17Q1	H. L. Wellman	Fp-3344	Dr	60	6	22				Unconfined	2	Apr. 12, 1949		D, S	310	90	
18N1	Herbert Chandler	Ap-3342	Dn	16.8	1½					do.	3.86	Mar. 31, 1949	P	D	125	7	
18Q1	Elizabeth Diendonne	Ap-3342	Dn	13.6	1½					do.	.95	do.	P	D			
18R1	W. S. Truscott	Ap-3342	Dn	18.6	1½					do.	3.10	do.		N	80	9	
18R2	do.	Ap-3342	Dn		1½					do.		do.	P	N			See table 4 for chemical analysis.
19D1	Baker County	Ap-3342	Dg-Bd	8.2	18	13	2	10	Sand and gravel	do.	2.69 2.24	June 11, 1936 Mar. 31, 1949		O	10	3	See table 3 for log, table 4 for chemical analysis, and plate 14 for water-level measurements.
19D2	do.	Ap-3342	Bd.							do.							Hole bored by Bureau of Reclamation to obtain water sample; see table 4 for chemical analysis.
20A1	E. Brent Perkins	Fp-3341	Dn	22	2					do.	2	Apr. 12, 1949	C	D	65	4	
20A2	do.	Fp-3346	Dg	5.2	48					do.	2.26	do.	P	S	395	122	
20R1	Herbert Chandler	Fp-3356	Dr	750	8-4	750				do.		Apr. 16, 1949		N			Driller reports much coarse material; some sand at 400 feet.
21G1	Lee Wright	Ap-3350	Dr	40	6					do.	2	Mar. 28, 1949	C	D	130	9	
21G2	do.	Ap-3350	Dn	14.2	2					do.	2.22	do.	P	S	90	7	
21P1	Ferd Prochnow	Fp-3356	Dn	18	1½					do.		do.	C	D, S	100	6	See table 4 for chemical analysis.
21P2	do.	Fp-3356	Dn	20.3	1½					do.		do.		N			

Unpublished records subject to revision

Table 1.- Records of representative wells - Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 40 E.- Continued.																
21Q1	John Rash	Ap-3357	Dn		1½					Unconfined	2.92	Mar. 27, 1949	G	S	130	26	
22D1	Earl Tanning	Ap-3349	Dg		36					do.	3.22	Mar. 26, 1949	P	S			
22H1	Wm. Burke	Ap-3356	Dr	90	6					do.		Mar. 29, 1949		N			Well buried; inaccessible.
22P1	do.	Ap-3356	Dg	10.4	84-60					do.	3.34	Mar. 28, 1949	P	S	95	8	
22Q1	W. J. & Lewis Smith	Ap-3356	Dn	12.6	1½					do.	2.80	do.		N			
22Q2	do.	Ap-3356	Dn	10.5	2					do.	3.45	do.			30	7	
22R1	Clyde Ward	Fp-3357	Dn	10	1½					do.	5-6	Mar. 25, 1949	P	D	115	7	
23A1	Baker County	Ap-3349	Dg-Bd	9	18	14	6	9	Fine sand and fine gravel	do.	4.54	June 11, 1936		O			See table 3 for log and plate 14 for water-level measurements.
23C1	Beecher Jess	Fp-3349	Dg	10.1	48					do.	4.18	Mar. 26, 1949	P	Irr	120	14	
23H1	Gertrude Lee	Ap-3356	Dg	7.3						do.	4.94	Mar. 25, 1949	G, P	S	125	24	
25G1	J. E. Prowell	S-3368	Dg Dr	30.5 165.0	48 6					do. do.	29.36 23.37	Mar. 24, 1949	P	S N	75 215	24 27	Dug well is reported to have one 50-foot gallery and one 70-foot gallery at bottom; 6-inch drilled well located in southeast corner of shaft.
26H1	Gertrude Lee	Ap-3362	Dg	8.0						do.	6.41	do.		N	145	57	
27Q1	W. J. &Lewis Smith	Ap-3357	Dn	20	1½					do.	2	Mar. 28, 1949	P	D	95	8	
27Q2	do.	Ap-3357	Dg-Dn							do.	3.19	do.	P	S	100	9	

Unpublished records
subject to revision

Table 1.- Records of representative wells - Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 40 E.- Continued.																
27J2	Margaret Geddes	Fp-3,362	Dn	12	1½					Unconfined		Mar. 25, 1949	P	D, S	110	10	
27R1	Charles Ward	Fp-3,367	Dg		36					do.	4.20	do.	P	S	95	9	
28G1	Missouri Flat School	Ap-3,361	Dr	77.5	6					do.	6.41	Mar. 27, 1949	P	N	90	4	See table 4 for chemical analysis.
28G2	L. D. Shurtloff	Ap-3,360	Dn	35						do.		do.	P	D	90	6	
28G3	Mrs. Don Meldrum	Ap-3,360	Dn		1½					do.		do.	P	D	95	7	
28G4	Don Meldrum	Ap-3,361	Dg	8.8	18					do.	4.78	do.	C	S	180	28	Backfilled around 18-inch casing.
28Q1	Floyd Swick	Ap-3,365	Dg	8	36					do.	5.79	do.	P	N	95	4	
28Q2	City of Baker	Ap-3,362	Dr	180						do.		do.		N			Casing reported perforated from 80 to 180 feet; well buried under road; inaccessible.
28R1	do.	Ap-3,366	Dr	363	6				Tight gravel			May 11, 1949	T	D			
29E1	Otha Perkins	Ap-3,358	Dn	21.0	1½					Unconfined	2.75	Apr. 15, 1949	P	D	100	3	Furnishes water for Baker airport; see table 4 for chemical analysis.
29E2	do.	Ap-3,358	Dg	4.6	15					do.	2.47	do.		N	135	7	Backfilled around concrete pipe.
30H1	Johanna Osborn	Ap-3,357	Dg	9.9	36					do.	4.15	do.	P	S	85	5	
30P1	Arthur Prowell	Ap-3,361	Dn		1½					do.	3.34	do.		S,	110	8	
30Q1	John Osborne	Ap-3,360	Dg	21	1½				Gravel	do.		do.	C	D, S	130	6	See table 4 for chemical analyses.
30Q2	do.	Ap-3,360	Dg	5.5						do.	1.63	do.		N	285	16	

Unpublished records
subject to revision

Table 1.- [illegible] - Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 8 S., R. 40 E.- Continued.																
31G1	Oregon Trail Dairy	Ap-3368	Dg	7.9	72					Unconfined	3.02	Apr. 15, 1949	P	S	130	11	See table 4 for chemical analysis.
31H1	Mary Jo Landreth	Ap-3368	Dg	9.7	60-48					do.	1.95	do.	P	S	125	33	
32M1	Chas. Lee	Ap-3376	Dg	4.3	36					do.	2.24	do.	[illegible]	S	190	18	
32N1	do.	Ap-3377	Dg							do.		do.	P	S			
33B1	Oscar Heater & Son	Ap-3368	Dm	16	1½					do.	2	Mar. 29, 1949	C	D, S	85	7	
33G1	E. E. Powers	Ap-3372	Dm	21	1½					do.	2.1	do.	C	D, S	95	6	
33Q1	Wendt Bros.	Ap-3383	Dg	19.3	72					do.	4.26	do.	C	Irr	95	6	Do.
33Q2	do.	Ap-3383	Dm	16	2					do.		do.	C	D	90	6	
33Q3	do.	Ap-3383	Dg	10.5						do.	5.37	do.	P	S	85	6	
34R1	C. T. Truscott	Fp-3377	Dm	10	1½					do.	2	Mar. 25, 1949	C	D	110	9	
35G1	Wm. R. Peyron	Ap-3370	Dg	9.1	48					do.	3.39	Mar. 26, 1949	P	S	180	49	
35J1	S. George Spencer	Ap-3370	Dm	10.4	2					do.	4 44	do.	P	S	45	19	Heavy alkali crust on ground around well.
36K1	Henry Peyron	S-3379	Dr	60	6			Fine sand		do.		Mar. 24, 1949	P	D	460	65	Temperature of water, 47° F.
36K2	do.	S-3380	Dg	30	48					do.	18.20	do.	P	S	185	26	
	T. 8 S., R. 41 E.																
31K1	Henry Peyron	S-3466	Dr	149	6	40		Sand		do.	119	Mar. 24, 1949	P	S	75	3	Temperature of water, 55° F.

Unpublished records subject to revision

Table 1.--Records of [illegible] wells--Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 39 E.- Continued.																
1G1	Dr. Biswell	Fp-3372	Dn		2					Unconfined		Apr. 20, 1949	C	D, S	140	6	
1Q1	Oscar Burnside	Ap-3364	Dr	200						do.		do.	P	D, S	100	4	
2D1	Chris Lee	Ap-3387	Dr	77.4	6					do.	1.50	do.	P	D, S	100	2	See table 4 for chemical analysis.
2M1	do.	Ap-3396	Dr	447	4					Confined	Flowing	do.	T	S	45	3	Flow estimated at 1/2 gallon per minute 1/2 foot above ground surface. Temperature of water, 58° F. See table 4 for chemical analysis.
2N1	do.	Ap-3417	Dr	321	12					Unconfined	6.47	do.		N	95	3	Casing reported perforated from top to bottom; drilled for irrigation but yield insufficient; see table 4 for chemical analysis and plate 13 for hydrograph.
2Q1	Earl McKnight	Ap-3390	Dg	26	20					do.	13±	do.	C	D, S	120	3	
3C1	G. P. Lilley	Ap-3416	Dr							do.		Mar. 26, 1949	J	D	70	2	
3D1	H. A. Kelly	Ap-3422								do.		do.	P	D	90	3	
3L1	Durward L. Best	Ap-3430	Bd	8.5	1½					do.	1.76	Apr. 20, 1949	P	N			
3M1	Jo Best	Ap-3471	Dg	21.7						do.	2.70	do.	J	D	115	4	
3Q1	B. H. Benson	Ap-3439	Dg	13.7						do.	1.67	do.	C	Irr	115	2	Owner reports well will pump dry in late summer using 1/2-horsepower centrifugal pump; recovers quickly.
4E1	O. A. Dean	Ap-3488	Dg	20.0						do.	2.67	Apr. 21, 1949	P	D	105	4	

Unpublished records
subject to revision

Table 1.- [illegible] -Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 39 E.- Continued.																
4G1	Bert Melvin	Ap-3488	Dg	15.0	12	15				Unconfined	6.61	Apr. 21, 1949	C	D, S	110	2	Water level in well affected by flow in nearby creek.
4L1	W. A. Buchanan	Af-3517	Dg	12.9	14				Clayey gr[illegible]	do.	2.11	do.		S	105	2	Backfilled around 14-inch casing; owner reports water level highest during April, May, and June.
4L2	do.	Af-3532	Tr	520	6				Gravel	do.	1.76	do.		N	120	2	Casing reported perforated from 23-100 feet.
4Q1	Glenn Wolfe	Af-3518	Dg	23			17	6	do.	Confined	3.24	Apr. 20, 1949		N	125	3	Water reported struck under hardpan at 17 feet, rose to 8 feet at times see table 4 for chemical analysis.
4R1	G. W. Kelly	Af-3499	Dg	13.0	18					Unconfined	5.91	do.		S	115	3	Backfilled around concrete casing.
5A1	Charles Simpson	Af-3560	Dg	13.8						do.	5.04	Apr. 23, 1949	C	D, S	65	2	See table 4 for chemical analysis.
5H1	W. A. Buchanan	Af-3565	Dn	18	1½					do.	10	Apr. 21, 1949	P	D	125	3	
8A1	T. W. Adams	S-3629	Dr	35	1½					do.	10.78	Apr. 20, 1949		N	85	3	Obstruction in casing at about 20 feet; backfilled around 1½-inch pipe.
9B1	Joe Handby	S-3566	Dg	17.9					Bouldery cl[illegible]	do.	8.94	do.	P	N	130	2	
9L1	J. W. Adams	S-3693	Dg	14.8	36					do.	4.39	do.	P	N	190	8	
10C1	Hugh Doherty	Ap-3465	Dr	112						do.		do.	P	PS	80	2	See table 4 for chemical analysis.
10F1	Tillman Olsen	Ts-3498	Dg	17.9	96					do.	3.25	do.		D, S	125	2	
10F2	do.	Ts-3489	Dr	260	4					Confined(?)		do.	P	D			Top of casing is about 3 feet below surface; owner reports at time of drilling water ran over top of casing.

Unpublished records subject to revision

Table 1.-- Records of representative wells - Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 39 E.																
10G1	J. E. Masters	Ts-	Dg	40						Unconfined	10?	Apr. 20, 1949	G	D	210	27	Pump sometimes breaks suction when irrigating garden in summertime.
11H1	E. D. Estermille	Ts-3403	Dr	400	8					Confined	Flowing	May 13, 1949		S	75	12	Flow measured at 1/8 gallon per minute at 2 feet above surface; temperature 55° F.; much iron staining in wooden trough.
12J1	Milton Moore	Ap-3398	Dg	15	36					Unconfined	9.73	Apr. 16, 1949	P	S	85	3	
12M1	Merl Miller	Ts-3430	Dg	22.4	60					do.	20.41	do.	C	Irr	90	8	Reported by owner to be connected by tunnel to a second well 20 feet to the north.
12M2	do.	S-3483	Dr	285					Basalt (?)	Confined	Flowing	do.		D	180	8	
13B1	do.	Ts-3477	Dg	10.1						Unconfined	.9	do.		S	35	3	Is reported to go dry in July or August.
13B2	do.	Ts-3479	Dg	9.2	36				Sand	Confined	Flowing	do.		N	35	2	Flow is reported to cease in summer.
13L1	Connie Talher	S-[illegible]	Dg	960	6					Unconfined	do.	do.		D	95	2	Dug originally as mine adit; owner reports flow declines in fall.
	T. 9 S., R. 40 E.																
1E1	Henry Peyron	Ts-3409	Dg	36	48					do.	30	Mar. 24, 1949	J	D	450	61	
1N1	Gus Gekus	Ts-3450	Dr	91.5	5					do.	38.88	do.		N	50	9	
2D1	G. H. Nye	Ap-3389	Dg	22.5	48					do.	19.05	do.	P	N	60	3	
2D2	Jack Stillman	Ap-3399	Dr	148	6	60	133	15	Fine sand	do.	28.27	do.	T, 120	D, S, Irr	290	37	Water level after 15 minutes' pumping was 45.4 feet; after 5 minutes recovery was 29.97; after 30 minutes recovery, 28.27 feet. See table 4 for chemical analysis. Temperature of water, 52° F.

Unpublished records
subject to revision

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 9 S., R. 40 E.- Continued.								
203	G. H. Nye	Ap-3390	Dg Dr	27.6 123.5	4				
2K1	Conrad Allen	Ts-3409	Dr						
2N1	Gus Gekus	Ts-3401	Dr	300					
2N2	do.	Ts-3399	Dg	16.9	84				
2P1	do.	Ts-3419	Dr	156	10				Fine sand
2Q1	R. C. Loyd	Ts-3431	Dr		8				
3B1	K. B. McCord	Fp-3384	Dm	18	2	18			
3B2	Geo. Spencer	Fp-3382	Dm	11	2				
3B3	do.	Fp-3382	Dm	15	1½				
3D1	S. L. Turing	Ap-3385	Dm		1½				
3D2	do.	Ap-3385	Dg	7.1	48				
3F1	Lloyd M. Judy	Fp-3387	Dm	14	1½		13		
3F2	do.	Fp-3387	Dm	10.2	1½				do.
3H1	J. E. Hudson	Ap-3395	Dm	25	1½				

(1)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
203	Unconfined	22.29 24.62	Mar. 24, 1949	P	N D	125 95	24 23	Drilled inside old dug well.
2K1	do.		do.	C	D	80	11	
2N1	do.	18	Mar. 25, 1949	P	D	430	6	
2N2	do.	8.02	do.	C, 400	S, Irr	410	44	Owner reports no lowering of water level in fall; temperature of water, 48° F.
2P1	do.	39.11	May 12, 1949	T, 300	Irr	440	43	Pumps fine sand. Casing perforated from top down.
2Q1	do.	31.7	Mar. 24, 1949	C	D			
3B1	do.	5	Mar. 25, 1949	P	D	90	8	
3B2	do.	6-7	do.	P	D, S	60	6	See table 4 for chemical analysis.
3B3	do.	6	Mar. 26, 1949	P	S			
3D1	do.		Mar. 29, 1949	P	D	120	14	
3D2	do.	2.53	do.		N	135	116	
3F1	do.	2	do.	C	D	80	6	Owner reports well penetrated 2-3 feet of "hardpan" stratum at about 10-12 feet - characteristic of area, with good water always found below "hardpan"
3F2	do.	2.74	do.	P	S	85	7	Pumps some fine to medium-fine sand
3H1	do.	8	do.	C	D	80	6	Owner reports water level rises late in spring.

Table 1. Records of representative wells— Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 40 E.– Continued.																
3P1	G. C. Taylor	Ap-3391	Dn	17	1½	17				Unconfined	4	Mar. 25, 1949	C	D	80	7	
3P2	Charles Ellas	Ap-3392	Dg	11.1	48					do.	8.30	Mar. 29, 1949	C	Irr	70	7	
3Q1	Walter Wellman	Ap-3387	Dn	21	2					do.	19	Mar. 25, 1949	C	D, S	110	9	See table 4 for chemical analysis.
4B1	James McEnroe	Ap-3387	Dg	13.2	48					do.	7.38	Mar. 29, 1949	C	S	80	5	
4K1	Jack Rouse	Ap-3395	Dr	40	6	40				do.	12	do.	J, 20	S	85	7	Maximum yield about [illegible]0 gallons per minute. Temperature of water, 50°.
4K2	do.	Ap-3395	Dg	18.0	48					do.	10.46	do.		S	85	5	Water level reported to decline in fall.
4K3	do.	Ap-3395	Dn	22	1¼					do.	10	do.	C	D	80	7	See table 4 for chemical analysis.
4Q1	Harold Peters	Ap-3399	Dg, Dn	26.4	2½					do.	13.41	Mar. 9, 1949	P	S, Irr	55	6	
5D1	Charles Lee	Ap-3382	Dn	12.3	1½					do.	5.86	Apr. 15, 1949	P	S			
5E1	Elmer Brown	Ap-3388	Dn	13.2	2					do.	10.02	do.	C	D, S	90	5	
5N1	Lula Eppinger	Ap-3402	Dn	65						do.		do.	P	D, S	115	18	Dug 30 feet, driven to 65 feet; owner reports water level rises to within 5 feet of surface in June.
6A1	Jess Williams	Ap-3383	Dr	105	6					do.		do.	C	D	90	7	
6A2	do.	Ap-3383	Dr	30.2	7				Coarse sand	do.	6.95	do.	[illegible]	N	95	6	
6A3	do.	Ap-3383	Dg	8.5	48					do.	5.44	do.	P	S	95	7	

Unpublished records subject to revision

Table 1.- Records of representative wells- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
T. 9 S., R. 40 E.- Continued.																	
6B1	Jim Warscall	Ap-3378	Dn							Unconfined		May 7, 1949	P	D	120	11	
6C1	do.	Ap-3377	Dg	11.7	1⅓					do.	2.68	do.	N	N	120	11	
6J1	Clyde Ward	Ap-3396	Dg	20.3	18-60					do.	13.69	Apr. 15, 1949	[illegible]	N	95	13	
7A1	do.	Ap-3399	Dr	47.3	14	53	42	33	Gravel	do.	17.12	Mar. 10, 1949	T, 500	Irr			See table 4 for chemical analysis.
7G1	do.	Ap-3398	Dr	67	12	67½	75	65	do.	do.	15	do.	T, 700	Irr	70	6	Owner reports output holds up in fall; casing "shot" every 5 feet below water level with ½ stick of dynamite. Temperature of water, 49° F. See table 4 for chemical analysis.
7G2	do.	Ap-3405	Dr	46	14	46	46	39	do.	do.	17.66	do.	T, 800	Irr			Output declines slightly in fall; see table 4 for chemical analysis.
7H1	do.	Ap-3405	Dg	32.9	72	33			do.	do.	19.75	do.	T, 600	Irr	115	25	Starting to cave; owner reports pump will sometimes break suction at 600 gallons per minute in late August.
7H2	do.	Ap-3403	Dr	82.4	18		40 82	20 35	Gravel and cobbles	do.	19.72	do.	T, 900	Irr	105	20	Owner reports 40 feet of drawdown after continuous pumping for many days; declines greatly in late fall. See table 3 for log.
7H3	do.	Ap-3403	Dr	51.5	16	52			Fine gravel	do.	17.94	do.	T, 250	Irr	100	10	Owner reports drawdown of about 30 feet after several hours of pumping.
7J1	Arthur S. Boyd	Ap-3406	Dg, Dr	47.1	18	50	50	23	Sand, gravel, and boulders	do.	20.04	Apr. 18, 1949	T	Irr			See table 3 for log.
7M1	Archie Entermille	Ap-3398		150	8					do.	20	do.	J	D, S, Irr	90	4	
7R1	Arthur S. Boyd	Ap-3415	Dg, Dr	50	18	50	50	20	do.	do.	21.08	do.	T, 1000	Irr			Owner reports well will yield at capacity for about a week, then drops off; see table 3 for log.

Unpublished records
subject to revision

Table 1.- Records of representative wells- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 40 E.- Continued.																
7R2	M. P. Pedersen	Ap-3410	Dg, Dr	365	8					Unconfined	16.84	May 12, 1949	T, 700	Irr	110	15	Owner reports yield drops to about 300 gallons per minute in October. Casing perforated from 18 feet to bottom.
7R3	James Wright	Ap-3411	Dg	24.4	36					do.	15.86	do.	C	Irr	140	10	Owner reports water level lowest from September to February.
8D1	John Kirkland	Ap-3400	Dg	22	48		10	12	Gravel	do.		Apr. 15, 1949	C	D, S	90	6	See table 4 for chemical analysis.
8G1	Elmer Satterberg	Ap-3409	Dg	17	96		12	13	do.	do.	17.12	Mar. 10, 1949	C	Irr	65	5	Owner reports water level declines in fall necessitating reducing pump yield. See table 4 for chemical analysis.
8H1	do.	Ap-3410	Dg	24.4	96				do.	do.	19.53	do.	C	Irr	70	5	Owner reports water level declines in fall.
8H2	do.	Ap-3410	Dr	50	6					do.		do.		N			Owner reports a low yield from this well.
8N1	Baker County	Ap-3410	Dg, Bd	10.2	18	10	2	13	Coarse sand and gravel	do.	8.02 dry	June 13, 1936 Sept. 10, 1936		O			All later measurements showed well dry; subsequently destroyed; 0-2 feet, fine silty loam topsoil; 2-15 feet, assorted coarse gravel and sand.
8P1	Omar Bowers	Ap-3416	Dg	23.7	48		4	22	Gravel and sand	do.	22.11	Apr. 18, 1949	C	Irr	140	22	See table 4 for chemical analysis.
8P2	Conrad Koehler	Ap-3414	Dg	23.2	20					do.	17.20	May 12, 1949	P	Irr	115	7	
8P3	do.	Ap-3413	Dr	680	12-10					do.	19.64	do.		N	40	4	See table 3 for partial log.
9B1	Walter Wellman	Ap-3401	Dn	22	2	22	4	18	Gravel	do.	6	Apr. 12, 1949	C	D, S	75	7	Owner reports "hardpan" stratum at about 16-17 feet. See table 3 for log.
9B2	Eugene Reynolds	Ap-3403	Dn	20.2	1½					do.	15	do.	P	D	85	7	
9B3	do.	Ap-3403	Dg	19.5	72					do.	15.33	do.	J	S			

Unpublished records
subject to revision

Table 1.- Records of representative wells- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 40 E.- Continued.																
9E1	D. L. Hughes	Ap-3410	Dg	22.9	84					Unconfined	18.13	Apr. 14, 1949	C	Irr	75	6	
9G1	James Kelly	Ap-3404	Dr	100	4	100				do.	24.71	Apr. 13, 1949	J	D	85	7	Water zone reported at 40 feet not developed.
9G2	do.	Ap-3403	Dn	25.4	2					do.	14.01	do.	P	S	95	10	
9G3	do.	Ap-3404	Dg	18.0	60					do.	14.40	do.		Irr	85	8	Yield reported not large.
9H1	Roy Scarbrough	Ap-3403	Dn	23.1	1½	23.15				do.	11.85	do.	P	S			
9K1	Kermit Myres	Ap-3412	Dg	21.5	60				Coarse gravel and cobbles	do.	15.75	do.	C	Irr	75	9	Owner reports water level declines to low stage by late August.
9M1	Clifford Farmer	Ap-3412	Dg	22.5	60		5	20	Gravel and sand	do.	16.95	Apr. 14, 1949	C	Irr	85	5	Owner reports water level varies about 20 feet annually; furnishes adequate water to irrigate 15 acres.
9N1	Clyde Ward	Ap-3417	Dr	60	12	60	8 45	37 15	Gravel Cemented gravel	do.	18.24	Mar. 10, 1949	T, 400	Irr	100	14	Owner reports water level declines about July and pump will break suction after pumping several hours.
9Q1	LeRoy Wright	Ap-3417	Dg	21.3	48					do.	19.01	Apr. 13, 1949	C	Irr	95	12	
9Q2	Edward T. Murphy	Ap-3420	Dg	24.0	48-72					do.	15.93	Apr. 14, 1949	C	Irr	115	26	Owner reports well galleried 12 feet to the north and 10 feet to the south at height of 3 feet above bottom of well. Water level generally rises to about 10 feet of surface in July, starts decline in August.
10A1	W. J. Robinson	Ap-3397	Dg	12	48					do.	6.09	Mar. 25, 1949	C	Irr	75	8	
10H1	Clarence Hatfield	Ts-3422	Dg	23.8	84-96	20.3	16		Coarse gravel	do.	19.7	Apr. 14, 1949	T	Irr	95	34	Owner reports water level about 6 feet higher in August.

Unpublished records subject to revision.

Table 1.- Records of representative wells- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T.9 S., R. 40 E.- Continued.																
10H2	Clarence Hatfield	Ts-3423	Dn	23.8	5					Unconfined	12.76	Apr. 14, 1949	P	D, S	90	32	
10H3	do.	Ts-3425	Dg	11.9	16-24		8	2	Coarse gravel	do.	9.69	do.		S	35	9	
10J1	Sunny Slope Co.	Ts-3425	Dr	43.0	6				Fine sand	do.	17.57	do	P	N	135	106	Pumps some fine sand.
11B1	do.	Ts-3432	Dr	54.6	6					do.	31.26	May 12, 1949	P	N			
11D1	Gus Gekus	Ts-3401	Dr	350	6					do.	11-12	Mar. 25, 1949	C	D, S	405	48	
15G1	Sunny Slope Co.	Ts-3473	Dr	740	14		700	40	Basalt	Confined	18	Mar. 24, 1949	T, 2200	Irr			Drilled 16-inch, and gravel-packed around 14-inch casing; drawdown of 16 feet reported. See table 4 for chemical analysis.
15G2	do.	Ts-3466	Dr	740	18	60	700	40	do.	do.	10.79	do.	T, 1500	S,	57	6	Drawdown of 16 feet reported; water has slight odor of hydrogen sulfide; temperature reported to be 78° F.
16A1	John Everson	Ap-3422	Dg	11.5	72		4	7.5	Coarse gravel and sand	Unconfined	7.46	Apr. 14, 1949	C	Irr	115	31	Owner reports well will pump dry in 15-20 minutes with 2-3/4-horse power centrifugal pump.
16B1	W. A. Bobisud	Ap-3423	Dg	14.2	48				Gravel	do.	10.77	do.		N	235	29	
16G1	William Wendt	Ap-3428	Dr	530	20-4				Sand	Confined	6.54	do.	T	Irr	50	11	Water has slight taste of hydrogen sulfide; temperature of 76° F. Reportedly flowed at 80 gallons per minute when drilled.
16G2	Stewart Sullivan	Ap-3428	Dr	462.0	6					do.	6.00	May 12, 1949	T	Irr	75	12	
16H1	Baker Packing Co.	Ap-3421	Dr	600	8					do.	Flowing	Apr. 13, 1949		S	40	11	Flow estimated at 2 gallons per minute; water has slight odor of hydrogen sulfide gas; temperature of 79° F. See table 4 for chemical analysis.

Unpublished records subject to revision

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 40 E.- Continued																
16E2		Ap-3422	Dg	23.71	81					Unconfined	3.30	Apr. 14, 1949		N	210	151	
16L1	Bert Smith	Ap-3447	Dg	6.9	36				Coarse gravel and sand	do.	4.29	do.		Irr	190	47	
17N1	Joe Schultz	Ap-3435	Dm	12.3	1¼					do.	9.13	Apr. 19, 1949	P	D, S	120	8	
18E1	George W. Logan	Ts-3452	Dg, Dr	56	6					do.	45.4	Apr. 18. 1949	J	Irr			
18F1	Milt Moore	Ts-3425	Dg	21.9	36					do.	21.9	do.	P	N	90	4	
18G1	do.	Ts-3420	Dr	165.0	6					do.	15.69	do.		N	70	5	Reported drilled to depth of 400 feet; did not yield sufficient water for irrigation.
18H1	Leo Brown	Ap-3420	Dg	17.8	72					do.	16.3	do.	P	N	115	5	
18H2	do.	Ap-3418	Dg	27.6	84				Coarse gravel	do.	18.59	do.	T	Irr	115	6	Owner reports sufficient water to irrigate 50 acres of alfalfa.
18K1	Oliver Boyer	Ts-3424	Dg	17.9	48					do.	16.82	do.					
18R1	Frank Hanna	Ts-3439	Dm	11.5	1½					do.	7.20	Apr. 19, 1949	P	S	90	3	
20D1	Sarah Seards	Ts-3498	Dg	11.4						do.	9.7	do.	P	N			
20D2	Ray Twombly	Ts-3493	Dg	14.1	42					do.	11.69	do.	C	Irr	190	8	
20G1	R. M. Hallgarth	Ap-3461	Dg	15.8	48					do.	12.6	do.		N	125	9	
20K1	R. F. Young	Ap-3483	Dg	4.5	60					do.	3.37	do.	P	N	230	47	
20Q1	Mrs. Phil DeRoest	Ap-3490	Dg	14.2						do.	8.85	do.	P	D, S	235	27	Backfilled around casing.

Unpublished records subject to revision

Table 1.- Records of representative wells- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 9 S., R. 40 E.- Continued.																
21E1	R. E. Bell	Ts 3490	Dg	12.5			12	1/2	Sand	Unconfined	12.7	Apr. 19, 1949		N	155	17	
28D1	California Pacific Utility Co.	Tr 3479	Dr	578	15	100±			Basalt	Confined	39.3	Mar. 15, 1949	T, 1050	Ind	90	9	See table 3 for log. Temperature of water 58° F.
29A1	T. A. Burlew	Tr 3481	Dg	16.2	72	6			Gravel	Unconfined	11.94	Apr. 19, 1949	C	Irr	175	5	Owner reports well can be pumped dry in early spring and late fall with 3-horsepower centrifugal pump.
32B1	Leonard Valentine	Ap 3615	Dr	120	6	110			Basalt (?)	do.	2.87	May 10, 1949	J	D	80	4	Owner reports water level drops to about 11 feet during late summer.
32B2	do.	Ap 3605	Dg	12.6	48					do.	.80	do.		N	80	6	Owner reports well goes nearly dry in August.
	T. 10 S., R. 40 E.																
5C1	Unknown	Tr 3514	Dg	17.9	36				Gravel and sand	do.	14.29	do.	P	D			Wall of well shows assorted sand, gravel, and cobbles.
6J1	Bob Vaughn	Tr 3537	Dr	171.0	6						13.0	do.	P	D, S	95	3	
7H1	Lee Stewart	Ap 3587	Dr									do.	T	D, S	130	7	
17D1	Stewart School	Ap 3580	Dr	319.5	4	26			Basalt	Confined	Flowing	do.		N	50	4	Basalt struck at 26 feet; drilled to 426 feet. Flow estimated at 2 gallons per minute at ½ foot above surface; temperature of water, 63° F.
17E1	Harry Dyke	Ap 3585	Dg	6.2	36	6				Unconfined	1.13	do.		N	55	2	
17H1	W. A. Gard	Tr 3595	Dn	17	1¼					do.	12	do.	P	D	85	3	
18G1	Mrs. Amos Gard	S 3589	Dn	18	2					do.	15	do.	C	D, S	75	4	

Unpublished records
subject to revision

Table 1.- Continued.

Table 1.- Records of representative wells- Continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	T. 10 S., R. 40 E.- Continued.																
1802	Mrs. Amos Gard	S-3593	Dg	18.9						Unconfined	10.77	May 10. 1949	P	N	245	42	

1/ Ap, alluvial plain; Af, alluvial fan; Fp, flood plain of stream; Tr, river terrace; Ts, structural terrace; S, hillside or slope to major valley.

2/ Bd, bored; Dg, dug; Dn, driven; Dr, drilled; J, jetted.

3/ Depths and water levels expressed in feet and decimals were measured by the Geological Survey; those in whole feet are reported by owner or driller; those with plus and minus signs are estimated. Flowing well, static level not known, "Flowing"; known static level above surface shown by "+" measurement.

4/ C, centrifugal; J, jet; P, plunger; R, rotary; T, turbine.

5/ D, domestic; Ind, industrial; Irr, irrigation; N, none; O, observation; PS, public supply; S, stock.

Unpublished records subject to revision

Table 2.- Records of representative springs in Baker Valley, Baker County, Oreg.

Location	Owner or occupant of property	Name	Topography 1/ and altitude (feet above sea level)	Water-bearing material	Occurrence	Yield		Use 2/	Temperature (F.)	Total hardness of water as $CaCO_3$ 3/ 4/	Chloride content of water as Cl 4/	Remarks
						Gallons per minute	Date					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
7/39-20C1	Chris Lee	Radium Hot Springs	Ap-3311	Diorite	May be on trace of regional block fault		Oct. 1, 1928 July 2, 1949	Bath	135	5	12	Has slight odor of hydrogen sulfide gas; used to supply public swimming pool.
8/38-12F1	Gus D. Saehos	None	T-3558	Terrace deposits	Along contact between pervious sand and impervious clay stratum.	2	May 11, 1949	D, S	47	105	4	Little fluctuation reported.
9/39-6K1	E. L. Bowman	None	S-3800	Alluvial fan deposits	Steep alluvial fan	1	Apr. 22, 1949	D, S	46	90	2	Water table spring; very little fluctuation.
9/39-11E1	C. W. Gardner	None	T-3464	Terrace deposits	Contact between valley alluvium and terrace sediments	7	Apr. 20, 1949	D, S	45	140	1	Located close to fault trace.
9/39-11J1	Frank Toney	None	S-3466	Volcanic rock	At foot of fault scarp	-	Apr. 18, 1949	D, S	54	85	5	Reported to have very constant flow.
9/40-1E2	Wm. Peyron	None	Ap-3400	Valley deposits	Apparently situated on trace of major fault	½	May 12, 1949	S	66	30	10	One of five spring seeps in immediate vicinity.
9/40-16J1	City of Baker	Sam O Springs	Ap-3463	do.	May be on trace of major fault	300	Apr. 13, 1949	N	80	55	11	Water flows into meadow pasture; formerly supplied water to natatorium.
9/40-20E1	R. D. Putnam	None	S-3555	Terrace deposits	May be on trace of fault	5	Apr. 19, 1949	S, Irr	50	195	17	Flow greatest from June to December; developed by augering horizontally into spring seep in edge of terrace.
9/40-32R1	Unknown	None	S-3496	do.	Contact of gravel on basalt at edge of terrace; possibly near fault trace.	10	May 10, 1949	D, S	62	50	3	

1/ Ap, alluvial plain; S, hillside or slope to major valley; T, terrace. 2/ D, domestic; Irr, irrigation, N, none; S, stock. 3/ Determined in field by soap method. 4/Parts per million.

Unpublished records subject to revision

Table 3.- Materials penetrated by representative wells in Baker Valley, Baker County, Oreg.

8/38-25J1. Alex Holland. Located in the NE$\frac{1}{4}$SE$\frac{1}{4}$ sec. 25, T., 8 S., R. 38 E. Altitude about 3,888 feet. Dug by owner

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Topsoil	2	2
Gravel, coarse, with cobbles	16	18
Sand, medium fine, loose	2	20
Older alluvium (?):		
Gravel, cemented	?	20+

Casing, 2-inch, set to 20 feet, excavations backfilled.

8/39-13Q1. E. L. Kipling. Altitude about 3,340 feet. Driven by owner

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Topsoil and "alkali" clay	4$\frac{1}{2}$	4$\frac{1}{2}$
Gravel, medium	4	8$\frac{1}{2}$
Older alluvium (?):		
Clay, yellow	2	10$\frac{1}{2}$
Gravel, medium	3$\frac{1}{2}$	14
Clay and sand stringers	3	17
Gravel, medium	3	20
Clay	1	21
Gravel, medium	2	23

Casing, 1$\frac{1}{4}$-inch, driven to 23 feet.

8/39-22F1. Baker County. Altitude about 3,387 feet. Dug by U. S. Geological Survey, June 1936

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Soil, sandy silt loam	3	3
Gravel, assorted, and sand	1	4
Sand, coarse, and gravel	5	9
Gravel, coarse, and sand	3	12

Casing, 18-inch (wooden) set to 11$\frac{1}{2}$ feet.

8/39-23E1. Orel McQuowen. Altitude about 3,359 feet. Dug by owner

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Topsoil (sandy loam)	3	3
Clay, green, and gravel	3	6
Sand, fine, and gravel, fine	2	8
Clay, green, sticky	1	9
Gravel, fine	1	10

Casing, 60-inch (wooden), set to 10 feet.

Unpublished records subject to revision

Table 3.- Materials penetrated by representative wells - Continued

8/39-31C1. M. H. Spriet. Altitude about 3,747 feet. Dug by owner

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Topsoil	3	3
Gravel, coarse, with cobbles	2	5
Older alluvium (?):		
Clay and gravel mixed; "hardpan"	4	9
Gravel, coarse, loose cobbles to 5 inches	5	14

8/39-32M1. Hugh Doherty. Altitude about 3,655 feet. Dug by owner, 1924

Younger alluvium:		
Topsoil	6	6
Boulders and clay	9	15
Older alluvium (?):		
Gravel, cemented	23	38
Sand and clay	4	42

8/40-15R1. Weaver Bond. Altitude about 3,350 feet

Younger alluvium:		
Topsoil	5	5
Older alluvium (?):		
"Hardpan"	5	10
Sand, fine	2	12

Casing, 2-inch, set to 20 feet.

8/40-19D1. Baker County. Altitude about 3,342 feet. Dug by U. S. Geological Survey, June 1936

Younger alluvium:		
Soil, fine sandy loam	2	2
Sand, coarse, and fine gravel	6	8
Quicksand	6	14

Casing, 18-inch (wooden), set to 9½ feet.

Unpublished records
subject to revision

Table 3.- Materials penetrated by representative wells - Continued

8/40-23A1. Baker County. Altitude about 3,349 feet. Dug by U. S. Geological Survey, June 1936

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Soil, fine silt loam	2	2
Sand, coarse, and clay	4	6
Sand, fine, and fine, assorted gravel	9	15

Casing, 18-inch (wooden), set to 10 feet, 12-inch perforated steel casing set 10 to 14 feet.

9/40-7J1. A. S. Boyd. Altitude about 3,406 feet. Drilled by A. A. Durand and Son, January 1948

Younger alluvium:		
Topsoil	6	6
Gravel and sand	21	27
Older alluvium (?):		
Gravel and boulders	18	45
Sand, gravel, and boulders	5	50

Casing, 13-inch, set to 50 feet.

9/40-7R1. A. S. Boyd. Altitude about 3,415 feet. Drilled by A. A. Durand and Son, December 1947

Younger alluvium:		
Topsoil	6	6
Gravel, with some sand	24	30
Gravel	4	34
Older alluvium (?):		
Gravel and boulders	8	42
Gravel and sand	8	50

Casing, 18-inch, set to 50 feet.

9/40-8P3. Conrad Koehler. Altitude about 3,413 feet. Drilled by L. H. Williams, 1931

Not logged	150	150
Tertiary sedimentary rocks (?):		
Sand, yellow, and boulders (30%)	110	260
Clay, blue, and gravel (80%)	126	386
Clay, blue, and gravel (30%)	104	490
Sand and gravel	10	500
Clay, tough, blue, with gravel and boulders	125	625
Clay, yellow, and "goose egg" gravel	60	685

Casing, 12-inch, set to 386 feet, 10-inch, set to 625 feet.

Unpublished records subject to revision

Table 3.- Materials penetrated by representative wells - Continued

9/40-9B1. Walter Wellman. Altitude about 3,401 feet. Driven by owner about 1943

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Topsoil	4	4
Gravel	10	14
Older alluvium:		
"Hardpan"	7	21
Gravel (water-bearing)	1	22

Casing, 2-inch, set to 22 feet.

9/40-16G1. Wm. Wendt. Altitude about 3,428 feet. Drilled by A. M. Knutson, 1929

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Topsoil	3	3
Sand	5	8
Gravel	7	15
Older alluvium (?):		
Clay	7	22
Gravel	11	33
Clay	4	37
Sand	11	48
Clay	26	74
Tertiary sedimentary rocks (?):		
Shale	11	85
Sand	19	104
Gravel and sand	6	110
Sand	7	117
Shale	8	125
Shale, sandy	16	141
Clay	29	170
Gravel	3	173
Clay, sandy	97	270
Peat, with some sand and gravel at top	21	291
Clay, sandy	54	345
Sand	4	349
Clay, sandy	181	530

Casing, 18-inch, set 0-40 feet; 10-inch, set 40-145 feet; perforated, 0-145 feet; 4-inch, set 0-530 feet, but may have been pulled out in part or entirely.

Unpublished records subject to revision

Table 3.— Materials penetrated by representative wells - Continued

9/40-28D1. California Pacific Utilities Co. Altitude about 3,479 feet. Drilled by A. A. Durand and Son, July-August, 1936

Materials	Thickness (feet)	Depth (feet)
Younger alluvium:		
Soil	8	8
Gravel	28	36
Tertiary volcanic and intercalated sedimentary rocks:		
Basalt	86	122
Mud	4	126
Rock	114	240
Rock and clay	75	315
Rock, soft, medium, and hard	253	568
Basalt, hard	10	578

Casing, 15-inch, set to 100± feet.

9/40-7H2. Clyde Ward. Altitude about 3,403 feet. Deepened by A. A. Durand, 1948

Younger alluvium:		
Topsoil	6	6
Gravel and sand (water-bearing)	14	20
Gravel and cobbles	20	40
Older alluvium:		
Gravel and clay, cemented	7	47
Gravel	35	82

Casing, 18-inch, steel.

Unpublished records subject to revision

Table 4.— Analyses of waters from wells, springs and streams in Baker Valley, Baker County, Oregon

Number (1)	Sample number Bureau of Reclamation (2)	Source (3)	Date of collection (4)	Specific conductance (micromhos at 25° C.) (5)	Dissolved solids (6)	Calcium (Ca) (7)	Magnesium (Mg) (8)	Sodium (Na) (9)	Potassium (K) (10)	Carbonate (CO_3) (11)	Bicarbonate (HCO_3) (12)	Sulfate (SO_4) (13)	Chloride (Cl) (14)	Boron (B) (15)	pH c/ (16)	Percent sodium (17)
					Parts per million and milligram equivalents b/											
		From wells and springs														
8/39-8D1	FF-6	Dug well about 2½ miles southwest of Haines, owned by N. E. Dodd, for domestic use.	July 1947	230	-	30.2 1.51	14.03 1.15	15.41 0.67	3.13 0.08	0.00	170.19 2.79	14.40 0.30	3.91 0.11	Tr d/	7.3	20
8/39-8R1	DD-6	Dug well about 2½ miles southwest of Haines, owned by L. A. Sieg, for domestic use.	do.	170	-	27.20 1.36	6.95 0.57	11.96 0.52	0.78 0.02	0.00	108.58 1.78	14.40 0.30	1.42 0.04	0.00	6.9	21
8/39-13Q1	GG-7	Driven well about 6½ miles northwest of Baker, owned by E. L. Kipling, for domestic use.	do.	340	-	23.80 1.19	9.39 0.77	76.82 3.34	2.74 0.07	0.00	276.94 4.54	36.96 0.77	6.75 0.19	0.00	7.3	62
8/39-22F1	I (1)	Dug well about 7½ miles northwest of Baker, owned by U. S. G. S., for observation purposes.	November 1946	543	356	56.60 2.83	13.54 1.11	43.70 1.90	0.78 0.02	0.00	345.87 5.67	3.36 0.07	14.20 0.40		7.2	33
	(2)	do.	February 1947	400	256	39.20 1.96	14.15 1.16	1.60		0.00	257.42 4.22	6.72 0.14	5.33 0.15		7.0	34
	(3)	do.	April 1947	330	261	35.00 1.75	8.91 0.73	28.06 1.22	4.30 0.11	0.00	228.75 3.75	1.44 0.03	5.68 0.16	0.00	6.9	32
	(4)	do.	May 1947	330		38.40 1.92	9.88 0.81	27.14 1.18	5.08 0.13					0.00	7.4	29
	(5)	do.	June 1947	330		41.80 2.09	11.96 0.98	18.63 0.81	2.35 0.06	0.00	231.80 3.80	2.36 0.07	0.00	Tr.	6.8	21
8/39-22L1	CC-6	Driven (?) well about 7 miles northwest of Baker, owned by Emil Rehner, for domestic use.	July 1947	230		42.40 2.12	9.52 0.78	11.04 0.48	2.74 0.07	0.00	162.87 2.57	17.76 0.37	1.78 0.05	0.00	7.0	14

a/ Data from analyses by Bureau of Reclamation. b/ In columns below, the upper of double figure gives parts per million by weight and the lower gives milligram equivalents.

c/ A figure of 7 would indicate a neutral reaction; over 7, alkaline; under 7, acid. d/ Tr., trace.

e/ Analysis is not in chemical balance; included only for comparison with other analytical data in this report and with possible future analyses.

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
8/39-24K1	GC-7 a/	Bored well about 6 miles northwest of Baker, owned by Herbert Chandler, for stock use.	August 1947	770		84.60 4.23	35.01 2.87	294.40 12.80	6.26 0.16	0.00	801.54 13.14	249.12 5.19	90.53 2.55	Tr	7.8	64
8/39-25E1	NN-7	Driven well about 5½ miles northwest of Baker, owned by Zelma Funk for domestic, stock, and irrigation purposes.	do.	220		33.00 1.65	14.15 1.16	15.18 0.66	3.13 0.08	0.00	198.86 3.26	7.68 0.16	2.49 0.07	Tr	7.1	19
8/39-27F1	BB-6	Drilled well about 6½ miles northwest of Baker, owned by F. B. Clark, for domestic use.	July 1947	170		29.40 1.47	11.35 0.93	13.57 0.59	1.17 0.03	0.00	107.97 1.77	12.00 0.25	1.42 0.04	0.00	7.5	19
8/39-32H1	LL-7	Driven well about 7 miles northwest of Baker, owned by Bufford Kennison, for domestic use.	August 1947	150		28.60 1.43	8.17 0.67	1.61 0.07	1.17 0.03	0.00	110.41 1.81	9.12 0.19	0.71 0.02	Tr	7.1	3
8/39-34L1	MM-7	Drilled well about 6 miles northwest of Baker, owned by E. P. Hill, for domestic use.	do.	200		33.80 1.69	11.35 0.93	10.12 0.44	2.35 0.06	0.00	173.24 2.84	11.04 0.23	0.36 0.01	0.00	6.8	14
8/40-9E1	HA-8	Driven well about 8 miles north of Baker, owned by Carl Parker, for domestic use.	September 1947	510		24.60 1.23	13.05 1.07	53.59 2.33	5.08 0.13	0.00	212.89 3.49	48.46 1.02	9.23 0.26	0.20 .018	7.6	49
8/40-9E2	HB	Dug well about 8 miles north of Baker, owned by Carl Parker, for stock use.	do.	510		46.60 2.33	15.98 1.31	49.22 2.14	4.30 0.11	0.00	281.21 4.61	38.40 0.80	7.46 0.21	0.08 .007	6.9	37
8/40-14P1	TT-8	Drilled well about 7 miles northeast of Baker, owned by Joe Geddes, but not in use.	do.	510		43.40 2.17	18.91 1.55	36.11 1.57	3.91 0.10	0.00	239.12 3.92	33.60 0.70	17.40 0.49	0.08 .007	7.5	25
8/40-16J1	M (1)	Dug well about 7 miles northeast of Baker, owned by Lee Savily, for stock use.	November 1946	389	272	36.80 1.84	12.81 1.05	34.27 1.49	0.00	0.00	229.97 3.77	13.92 0.29	10.65 0.30		7.2	34
	M (2)	do..	February 1947	310	189	28.80 1.44	12.32 1.01	 1.21		0.00	181.78 2.98	13.92 0.29	6.04 0.17		7.0	33
	M (5) a/	do.	June 1947	310		37.80 1.89	15.25 1.25	41.86 1.82	1.96 0.05	0.00	231.80 3.80	16.32 0.34	3.55 0.10	0.04 .004	7.5	36
8/40-18R2	Y-5	Driven well about 6½ miles north of Baker, owned by W. R. Truscott, but not in use.	do.	410		58.60 2.93	21.59 1.77	30.36 1.32	3.91 0.10	0.00	305.00 5.00	33.12 0.69	10.65 0.30	0.04 .004	7.2	22
8/40-19D1	G (1) a/	Bored well about 7½ miles northwest of Baker, owned by U.S.G.S., for observation purposes.	November 1946	1352	872	14.80 0.74	19.64 1.61	327.98 14.26	2.35 0.06	53.10 1.77	791.79 12.98	10.56 0.22	17.75 0.50		8.0	86

a/ See footnote on first page of table.

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO3)	Bicarbonate (HCO3)	Sulfate (SO4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
8/40-19D1	G (2)	Bored well about 7½ miles northwest of Baker, owned by U.S.G.S., for observation purposes.	[illegible] 1947	340	249	0.40 0.02	0.98 0.08	3.82		17.70 0.59	143.35 2.35	4.32 0.09	3.55 0.10		9.4	97
	(3)	do.	April 1947	1070	851	3.40 0.17	2.93 0.24	289.11 12.57	12.90 0.33	18.60 0.62	634.40 10.40	81.12 1.69	18.11 0.51	0.47 .043	8.2	94
	(4)	do.	May 1947	1200		12.20 0.61	8.30 0.68	158.24 6.88	13.29 0.34					0.60 .055	8.9	81
8/40-19D2	GX-5 e/	Auger hole about 7½ miles northwest of Baker, owned by Baker County.	June 1947	1100		9.00 0.45	4.03 0.33	335.80 14.60	19.55 0.50	39.00 1.30	603.90 9.9	98.40 2.05	24.85 0.70	0.88 .084	9.2	92
8/40-21P2	DS (5)	Driven well about 5½ miles north of Baker, owned by Fred Prechnow.	June 1947			29.40 1.47	11.59 0.95	23.92 1.04	0.78 0.02			6.24 0.13		0.04 .004		29
8/40-28G1	N-1	Drilled well about 4-3/4 miles north of Baker owned by Missouri Flat School but not in use.	May 1947	200		23.20 1.16	8.66 0.71	16.79 0.73	2.35 0.06					0.04 .004	7.2	27
8/40-29E1	XA-6	Driven well about 5 miles north of Baker, owned by Otha Perkins for domestic use.	July 1947	270		44.40 2.22	17.57 1.03	17.02 0.74	4.69 0.12	0.00	212.28 3.48	23.04 0.48	1.76 0.05	0.00	7.0	18
8/40-30Q1	X-3 e/	Dug well about 5 miles northwest of Baker, owned by John Osborne for domestic and stock use.	April 1947	940	873	10.80 0.54	6.83 0.56	290.26 12.62	14.86 0.38	16.80 0.56	608.17 9.97	76.32 1.59	15.27 0.43	0.48 .044	8.3	89
	X-5	do.	June 1947	440		38.40 1.92	13.05 1.07	31.28 1.36	3.52 0.09	0.00	201.30 3.30	32.16 0.67	7.10 0.20	0.12 .011	7.0	31
8/40-31G1	W-5	Dug well about 4 miles north of Baker, owned by Oregon Trail Dairy for stock use.	do.	250		26.40 1.32	10.00 0.82	21.85 0.95	2.35 0.06	0.00	140.30 2.30	19.68 0.41	7.10 0.20	0.04 .004	7.4	30
8/40-33Q1	ZZ-8	Dug well about 3½ miles north of Baker, owned by Wendt Brothers for irrigation.	Sept. 1947	300		26.00 1.30	7.93 0.65	17.71 0.77	3.13 0.08	0.00	152.50 2.50	16.32 0.34	2.49 0.07	0.08 .007	6.9	27
9/39-2D1	UX-8	Drilled well about 4½ miles northwest of Baker, owned by Chris Lee for domestic and stock use.	do.	430		29.00 1.45	10.86 0.89	2.76 0.12	1.17 0.03	0.00	146.40 2.40	2.40 0.05	Tr.	Tr.	7.3	5
9/39-2M1	UY-8	Drilled well about 4½ miles northwest of Baker, owned by Chris Lee for stock use.	do.	220		16.00 0.80	0.61 0.05	29.44 1.28	0.78 0.02	0.00	125.66 2.06	14.88 0.31	0.00	Tr.	7.7	59
9/39-2N1	U-5 e/	Drilled well about 4½ miles northwest of Baker, owned by Chris Lee but not in use.	June 1947	350		54.40 1.72	15.01 1.23	21.16 0.92	1.56 0.04	0.00	250.10 4.10	12.96 0.27	0.00	Tr.	7.6	23

e/ See footnote on first page of table.

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
9/39-4Q1	K (1)	Dug well about 6 miles northwest of Baker, owned by Glenn Wolfe, but not in use.	November 1946	306	204	41.60 2.08	10.13 0.83	14.26 0.62	0.00	0.00	175.07 2.87	4.80 0.10	10.65 0.30		7.2	18
	(2)	do.	February 1947	270	179	35.60 1.78	10.86 0.89	0.52		0.00	149.45 2.45	7.20 0.15	3.55 0.10		7.2	16
	K (3)[c]	do.	April 1947	230	155	28.80 1.44	8.17 0.67	71.99 3.13	0.78 0.02	0.00	143.45 2.35	7.68 0.16	3.20 0.09	0.10 .009	7.3	59
	(4)	do.	May 1947	230		37.40 1.87	10.25 0.84	8.51 0.37	2.35 0.06					0.00	8.1	12
	(5)	do.	June 1947	250		27.80 1.39	7.93 0.65	29.21 1.27	0.00	0.00	164.70 2.70	18.72 0.39	0.00	Tr.	7.7	38
9/39-5A1	KK	Dug well about 6-3/4 miles northwest of Baker, owned by Charles Simpson, for domestic and stock use.	August 1947	100		14.40 0.72	4.27 0.35	2.99 0.13	0.00	0.00	73.20 1.20	2.88 0.06	0.71 0.02	Tr.	6.9	11
9/39-10C1	P-5[c]	Drilled well about 5 miles northwest of Baker, owned by Hugh Doherty, but not in use.	June 1947	230		26.00 1.30	9.39 0.77	37.26 1.62	0.78 0.02	0.00	158.60 2.60	16.80 0.35	0.00	Tr.	8.1	44
9/40-2G2	QQ-7	Drilled well about 4 miles northeast of Baker, owned by Jack Stillman, used for stock, domestic purposes, and irrigation.	August 1947	500		79.20 3.96	28.55 2.34	71.76 3.12	8.99 0.73	0.00	321.47 5.27	122.88 2.56	61.06 1.72	0.30 .029	7.5	32
9/40-3B2	SS-8	Driven well about 4 miles northeast of Baker, owned by George Spencer, used for domestic purposes and stock.	September 1947	370		26.80 1.34	8.17 0.67	44.16 1.92	2.35 0.06	0.00	198.86 3.26	19.68 0.41	7.10 0.20	0.12 .011	7.0	48
9/40-3Q1	RR-8	Driven well about 4 miles northeast of Baker, owned by W. Wellman, for domestic and stock uses.	do.	500		26.00 1.30	7.69 0.63	40.70 1.77	2.74 0.07	0.00	191.54 3.14	14.40 0.30	3.55 0.10	0.30 .029	7.5	32
9/40-4K3	Z-5	Driven well about 3 miles northeast of Baker, owned by Jack Rouse, for domestic use.	June 1947	240		27.20 1.36	8.91 0.73	13.34 0.58	1.96 0.05	0.00	134.20 2.20	18.72 0.39	10.55 0.10	0.12 .011	7.1	21
9/40-7A1	WY-6[c]	Drilled well about 2½ miles northwest of Baker, owned by Clyde Ward, for irrigation.	July 1947	320		36.60 1.83	11.47 0.94	45.31 1.97	4.30 0.11	0.00	172.02 2.82	37.44 0.78	22.01 0.62	Tr.	7.1	41
9/40-7G1	HH-7	Drilled well about 2 miles northwest of Baker, owned by Clyde Ward, for irrigation.	August 1947	200		24.80 1.24	9.64 0.79	12.65 0.55	4.30 0.11	0.00	133.59 2.19	16.32 0.34	3.55 0.10	Tr.	6.7	20

a/ See footnotes on first page of table.

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
9/40-7G2	WX-6	Drilled well about 2 miles northwest of Baker, owned by Clyde Ward, for irrigation.	July 1947	220		30.20 1.51	9.27 0.76	13.11 0.57	4.69 0.12	0.00	143.35 2.35	16.32 0.34	3.55 0.10	Tr.	7.0	19
9/40-8D1	V-5	Dug well about 2½ miles north of Baker, owned by John Kirkland, for domestic and stock use.	June 1947	380		38.40 1.92	11.71 0.96	40.71 1.77	1.17 0.03	0.00	170.80 2.80	44.16 0.92	17.75 0.50	0.04 .004	7.2	38
9/40-8G1	L (1)	Dug well about 2 miles north of Baker owned by Elmer Satterberg, for irrigation.	November 1946	331	220	35.40 1.77	11.59 0.95	23.92 1.04	0.00	0.00	164.09 2.69	15.36 0.32	12.78 0.36		6.8	28
	(2)	do.	February 1947	340	229	34.20 1.71	12.81 1.05	1.12		0.00	143.35 2.35	26.40 0.55	15.98 0.45		7.2	29
	(3)[a]	do.	April 1947	290	232	30.60 1.53	8.42 0.69	65.32 2.84	5.08 0.13	0.00	142.13 2.33	21.12 0.44	12.43 0.35	0.12 .011	7.2	55
	(4)	do.	May 1947	210		23.20 1.16	8.66 0.71	15.41 0.67	2.35 0.06					0.00	8.1	26
	(5)[a]	do.	June 1947	250		30.80 1.54	10.61 0.87	19.32 0.84	0.39 0.01	0.00	158.60 2.60	13.44 0.28	0.00	Tr.	7.2	26
9/40-8P1	T-5	Dug well in Baker at intersection of H Street and U. S. Highway 30, owned by Omar Bowers, for irrigation purposes.	do.	470		45.60 2.28	15.25 1.25	52.67 2.29	1.96 0.05	0.00	195.20 3.2	62.88 1.31	31.95 0.9	0.12 .011	7.4	39
9/40-15G1	R-5	Drilled well about 2 miles northeast of Baker, owned by Sunny Slope Co., for irrigation.	do.	600		12.00 0.60	7.56 0.62	174.57 7.59	9.78 0.25	0.00	475.80 7.8	12.00 0.25	14.20 0.40	1.88 .177	8.1	84
9/40-16H1	S-5	Drilled well about 1 mile east of Baker, owned by the Baker Packing Co., for stock use.	do.	650		14.20 0.71	7.32 0.60	172.27 7.49	9.78 0.25	0.00	542.90 8.90	0.96 0.02	17.75 0.50	1.64 .153	7.9	83
9/40-16J1	Q-5	Sam-O Spring about 1 mile east of Baker, owned by the city of Baker but not in use.	do.	650		13.00 0.65	14.83 1.22	184.92 8.04	10.17 0.26	0.00	573.40 9.4	1.44 0.03	17.75 0.50	1.84 .170	8.0	79

a/ See footnotes on first page of table.

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
		From rivers, sloughs and drain ditches														
SW-1	A (1)	Powder River by roadway bridge 1 mile east of Haines, sec. 34, T. 7 S., R. 39 E.	November 1946	344	220	35.40 1.77	8.05 0.66	33.58 1.46	0.39 0.01	0.00	184.22 3.02	16.80 0.35	7.10 0.20		7.5	38
	(2)	do.	February 1947	250	223	22.60 1.18	5.61 0.46	0.89		0.00	143.35 2.35	14.88 0.31	7.10 0.20		7.3	35
	(3)	do.	April 1947	200	273	22.20 1.11	4.88 0.40	18.63 0.81	1.17 0.03	0.00	126.27 2.08	13.92 0.29	4.26 0.12		7.5	35
	(4)	do.	May 1947	230		28.20 1.41	10.25 0.84	25.07 1.09	0.78 0.02	0.00				0.08 .007	7.2	32
	(5)	do.	June 1947	290		34.40 1.72	13.18 1.08	33.81 1.47	0.39 0 01	0.00	225.70 3.7	12.00 0.25	3.55 0.1	0.04 .004	7.9	34
	(6)	do.	July 1947	220		32.40 1.62	9.15 0.75	20.93 0.91	4.30 0.11	0.00	113.46 1.86	10.08 0.21	1.78 0.05	Tr.	7.7	27.[illegible]
	(7)	do.	August 1947	200		30.20 1.51	9.52 0.78	17.71 0.77	3.52 0.09	0.00	156.77 2.57	17.28 0.36	2.49 0.07	Tr.	7.5	25
	(8)	do.	September 1947	260		31.80 1.59	8.05 0.68	23.46 1.02	2.35 0.06	0.00	151.89 2.49	13.44 0.28	1.07 0.03	Tr.	7.5	31
SW-2	LP-7	Baldock Slough near Powder River at Tilley pumping plant about 8½ miles northwest of Baker, sec. 11, T. 8 S., R. 39 E.	August 1947	400		47.40 2.37	18.67 1.53	74.75 3.25	5.08 0.13	0.00	364.78 5.98	20.16 0.42	27.34 0.77	0.60 .055	7.8	45
SW-3	J (1)	Pine Creek at road intersection about 7½ miles northwest of Baker, sec. 28, T. 8 S., R. 39 E.	November 1946	145	112	23.80 1.19	2.32 0.19	10.12 0.44	0.00	0.00	75.03 1.23	11.04 0.23	7.10 0.20		7.4	24
	(2)	do.	February 1947	140	93	21.20 1.06	3.05 0.25	0.12		0.00	65.88 1.08	10.56 0.22	2.13 0.06		7.9	8
	(3)	do.	April 1947	120	88	18.40 0.92	1.83 0.15	5.06 0.22	0.00	0.00	65.88 1.08	15.36 0.32	2.13 0.06	0.10 .009	7.7	17
	(4)	do.	May 1947	100		17.40 0.87	2.07 0.17	3.68 0.16	1.17 0.03					0.00	7.7	13
	(5)	do.	June 1947	130		21.60 1.08	7.56 0.21	0.00	0.00	0.00	73.20 1.20	7.20 0.15	0.00	Tr.	7.6	0

See footnote on first page of table.

Unpublished records subject to revision

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
SW-4	B (1)	Baldock Slough about 8½ miles north of Baker; stagnant, sec. 5, T. 8 S., R. 40 E.	November 1946	279	164	21.80 1.09	6.47 0.53	17.71 0.77	0.00 0.00	12.00 0.40	104.92 1.72	19.20 0.40	14.20 0.40		8.0	32
	(2)	do.	February 1947	380	248	28.20 1.41	13.91 1.14	2.18		0.00	220.82 3.62	21.60 0.45	11.36 0.32		7.7	46
	(3)	do.	April 1947	260	284	25.00 1.25	10.25 0.84	26.22 1.14	1.17 0.03	0.00	155.55 2.55	24.00 0.50	5.63 0.16	0.24 .022	7.6	35
	(4)	do.	May 1947	350		33.40 1.67	13.91 1.14	57.04 2.48	1.17 0.03	0.00				0.24 .022	7.4	47
	(5)a/	do.	June 1947	250		24.40 1.22	11.10 0.91	27.60 1.20	0.78 0.02	24.00 0.8	183.00 3.0	20.64 0.43	3.55 0.1	0.16 .015	9.7	36
SW-5	B (6)	Baldock Slough about 8½ miles north of Baker on west side of road, sec. 5, T. 8 S., R. 40 E.	July 1947	260		21.00 1.05	8.91 0.73	55.66 2.42	4.69 0.12	12.30 0.41	209.23 3.43	16.80 0.35	4.97 0.14	0.00	9.1	56
	(7)	do.	August 1947	400		50.40 2.52	22.81 1.87	103.73 4.51	8.99 0.23	0.00	516.06 8.46	11.52 0.24	18.82 0.53	0.4 .039	7.6	49
SW-6	BX-6a/	Baldock Slough along roadway about 7½ miles north of Baker; running water, sec. 9, T. 8 S., R. 40 E.	September 1947	360		34.80 1.74	10.98 0.90	37.95 1.65	4.30 0.11	0.00	194.59 3.19	26.40 0.55	5.33 0.15	0.00	7.6	38
SW-7	H (1)	Powder River by roadway bridge about 6 miles north of Baker, sec 20, T. 8 S., R. 40 E.	November 1946	250	148	23.60 1.19	7.08 0.58	27.60 1.20	1.96 0.05	0.00	123.83 2.03	12.00 0.25	10.65 0.30		7.3	40
	(2)	do.	February 1947	190	196	17.20 0.86	7.56 0.62	0.85		0.00	98.21 1.61	12.96 0.27	3.55 0.10		7.2	35
	(3)	do.	April 1947	120	100	12.20 0.61	3.17 0.26	14.26 0.62	0.00	0.00	71.37 1.17	11.04 0.23	3.20 0.09	0.04 .003	7.7	39
	(4)	do.	May 1947	110		8.60 0.43	7.44 0.61	5.06 0.22	1.56 0.04					0.00	7.5	17
	(5)	do.	June 1947	170		16.20 0.81	7.08 0.58	7.59 0.33	0.00	0.00	91.50 1.50	9.12 0.19	0.00	Tr.	7.4	19
SW-8	PX-7a/	Standing water in airport drainage ditch at SE corner of airport about 4½ miles northeast of Baker, sec. 27, T. 8 S., R. 40 E.	August 1947	230		38.60 1.93	8.30 0.68	33.58 1.46	0.78 0.02	0.00	175.07 2.87	26.40 0.55	6.39 0.18	Tr.	7.0	36

a/ See footnote on first page of table.

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
SW-9	PY-8 a/	Airport drainage ditch at NW. corner of airport about 5½ miles northeast of Baker, sec. 28, T. 8 S., R. 40 E.	September 1947	290		28.80 1.44	8.78 0.72	27.83 1.21	1.56 0.04	0.00	154.33 2.53	20.16 0.42	4.26 0.12	Tr.	7.7	[illegible]
SW-10	N-5	Drainage ditch in front of Missouri Flat School about 4 3/4 miles northeast of Baker, sec. 28, T. 8 S., R. 40 E.	June 1947	200		21.40 1.07	9.52 0.78	15.87 0.69	0.78 0.02	0.00	128.10 2.10	7.68 0.16	3.55 0.10	Tr.	7.1	27
SW-11	D (1)	Baldock Slough about 1½ miles northeast of Baker where it crosses roadway, sec. 15, T. 9 S., R. 40 E.	November 1946	1258	580			146.74 6.38	4.30 0.11	0.00	627.08 10.28	6.24 0.13	37.63 1.06		7.3	
	(2)	do.	February 1947	1320	919	20.20 1.01	11.83 0.97	13.59		0.00	872.91 14.31	9.60 0.20	45.09 1.27		7.9	87
	(3) a/	do.	April 1947	1050	856	19.60 0.98	9.88 0.81	228.16 9.92	10.95 0.28	11.40 0.38	758.23 12.43	5.76 0.12	40.47 1.14	2.14 .198	8.5	83
	(4)	do.	May 1947	1000		21.40 1.07	19.64 1.61	194.81 8.47	9.38 0.24					3.28 .304	8.7	58
	(5)	do.	June 1947	850		15.00 0.75	13.79 1.13	253.46 11.02	11.34 0.29	51.00 1.70	530.70 8.7	5.76 0.12	28.40 0.80	2.72 .252	9.3	84
SW-12	E-6	Powder River at side-road bridge along highway about 2½ miles south of Baker, sec. 32, T. 9 S., R. 40 E.	July 1947	150		19.60 0.98	7.56 0.62	11.73 0.51	2.35 0.06	0.00	101.87 1.67	11.52 0.24	0.36 0.01		7.6	24
	E-8	do.	September 1947	200		20.80 1.04	8.17 0.67	11.27 0.49	1.17 0.03	0.00	111.02 1.82	12.48 0.26	0.00	Tr.	7.7	22
SW-13	F (1)	Powder River above dredge in Sumpter Valley, sec. 4, T. 10 S., R. 37 E.	November 1946	153	108	17.00 0.85	2.44 0.20	9.89 0.43	0.78 0.02	0.00	58.56 0.96	25.44 0.53	3.55 0.10		7.1	29
	(2)	do.	February 1947	130	66	14.00 0.70	4.64 0.38	8.74 0.38	1.95 0.05	0.00	33.68 00.88	21.60 0.45	2.49 0.07		7.5	28
	(3)	do.	April 1947	100	70	8.20 0.41	2.56 0.21	6.21 0.27	0.00 0.00	0.00	42.70 0.70	12.96 0.27	3.20 0.09	0.28 .026	7.6	30
	(4)	do.	May 1947	100		6.80 0.34	1.95 0.16	2.53 0.11	Tr					0.00	7.8	18
	(5) a/	do.	June 1947	100		9.20 0.46	3.05 0.25	4.60 0.20	0.00	0.00	30.50 0.50	9.60 0.20	0.00	Tr.	7.7	22

a/ See footnote on first page of table.

Number	Sample number BR	Source	Date	Specific conductance	Dissolved solids	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Boron (B)	pH	Percent sodium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
SW-14	E (1)	Powder River about 9 miles south of Baker, sec. 32, T. 10 S., R. 40 E.	November 1946	221	132	22.40 1.12	6.59 0.54	21.62 0.94	0.00	0.00	120.78 1.98	12.00 0.25	3.55 0.10		7.5	36
	(2)[e]	do.	February 1947	190	185	18.00 0.90	5.86 0.48	0.82		0.00	95.77 1.57	12.96 0.27	2.84 0.08		7.6	37
	(3)	do.	April 1947	120	85	11.20 0.56	2.56 0.21	9.20 0.40	0.39 0.0	0.00	65.88 1.08	9.12 0.19	3.20 0.09	0.04 .004	7.8	34
	(4)	do.	May 1947	100		7.60 0.38	4.51 0.37	3.45 0.15	0.39 0.01					0.00	8.0	17
	(5)	do.	June 1947	140		13.80 0.69	9.88 0.69	6.67 0.29	0.00	0.00	79.30 1.30	8.64 0.18	0.00	Tr.	7.8	16
	(6)	do.	August 1947	160		17.60 0.88	10.61 0.88	13.11 0.57	0.78 0.02	0.00	115.90 1.90	16.32 0.34	1.78 0.05	Tr.	7.9	26

e/ See footnote on first page of table.

Unpublished records subject to revision