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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PRELIMINARY REPORT ON THE GROUND-WATER RESOURCES OF THE TUALATIN VALLEY, OREGON

by

D. H. Hart & R. C. Newcomb

Prepared in cooperation with the office of
the State Engineer of Oregon

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ABSTRACT

The Tualatin Valley proper consists of broad valley plains with altitudes of 100 to 300 feet, and the lower mountain slopes of the drainage basin of the Tualatin River, a downstream tributary of the Willamette River in northwestern Oregon. The valley is almost entirely farmed and its population is increasing rapidly, partly due to the expansion of metropolitan Portland.

Structurally, the bedrock of the basin consists of a saucer-shaped syncline that has a centrally located ridge. The bedrock basin has been partly filled progressively by alluvium, which underlies the present extensive plains.

Ground water occurs in the Columbia River basalt, a lava-rock stratum that forms the top several hundred feet of the bedrock, and also in the zones of fine sand in the upper part of the alluvial fill. It occurs in unconfined, confined, and perched situations. Curves depicting the observed water levels in wells show that the ground water is replenished each year by precipitation. The curves show that the amount and time of that recharge vary in different aquifers and for different modes of ground-water occurrence. The shallower alluvial aquifers are refilled each year to a point where further recharge is rejected and drains away as runoff. No instances are known of undue depletion of the ground water by pumping. These facts indicate there is a great quantity of additional water available for future development.

Unpublished records
subject to revision

The ground water is developed for use by some spring works and by thousands of wells, most of which are of small yield. Improvements in the design of the wells in basalt and the use of sand or gravel envelopes in wells penetrating the fine-sand aquifers are now being put into practice.

The ground water in the basalt and the valley fill is of general good quality, only slightly or moderately hard and of low salinity. Saline and mineralized water is present in the rocks of Tertiary age below the Columbia River basalt. Under certain structural and stratigraphic situations the water, of poor quality, has gained, and can in the future gain, access to the fresh-water aquifers.

Detailed hydrologic and geologic conditions are presented in 4 tables, 7 pictures, and 40 graphic plates in this report.

INTRODUCTION

Location and Extent of the Area

The Tualatin Valley is in the northwestern part of the Willamette Valley of Oregon. It consists of the low-lying plains and the lower slopes of the Tualatin River drainage basin, which extends across the boundary between two physiographic sections: the Puget Trough section and the Oregon Coast Range section (Fenneman, 1931).

The Tualatin River drainage basin ranges in altitude from about 60 feet at the mouth of the river to 3,000 feet along the divide of the Coast Range. The lower part, which lies in the Puget Trough section, is commonly and herein termed the "Tualatin Valley." As used in this report, the Tualatin Valley includes slopes and interstream divides that rise to an altitude of as much as 1,500 feet, as well as the main valley plains.

The Tualatin River drainage basin has a total area of about 712 square miles. Of that area, the main valley plain consists of nearly 350 square miles, being about 30 miles long in a northwest-southeast direction and about 10 miles wide. The area described in this report overlaps slightly into adjacent drainage basins. A prominent part of that overlap is the area southward from Tonkin station to the Willamette River at Wilsonville; it is included because hydrologically and topographically it is nearly continuous with the Tualatin Valley area.

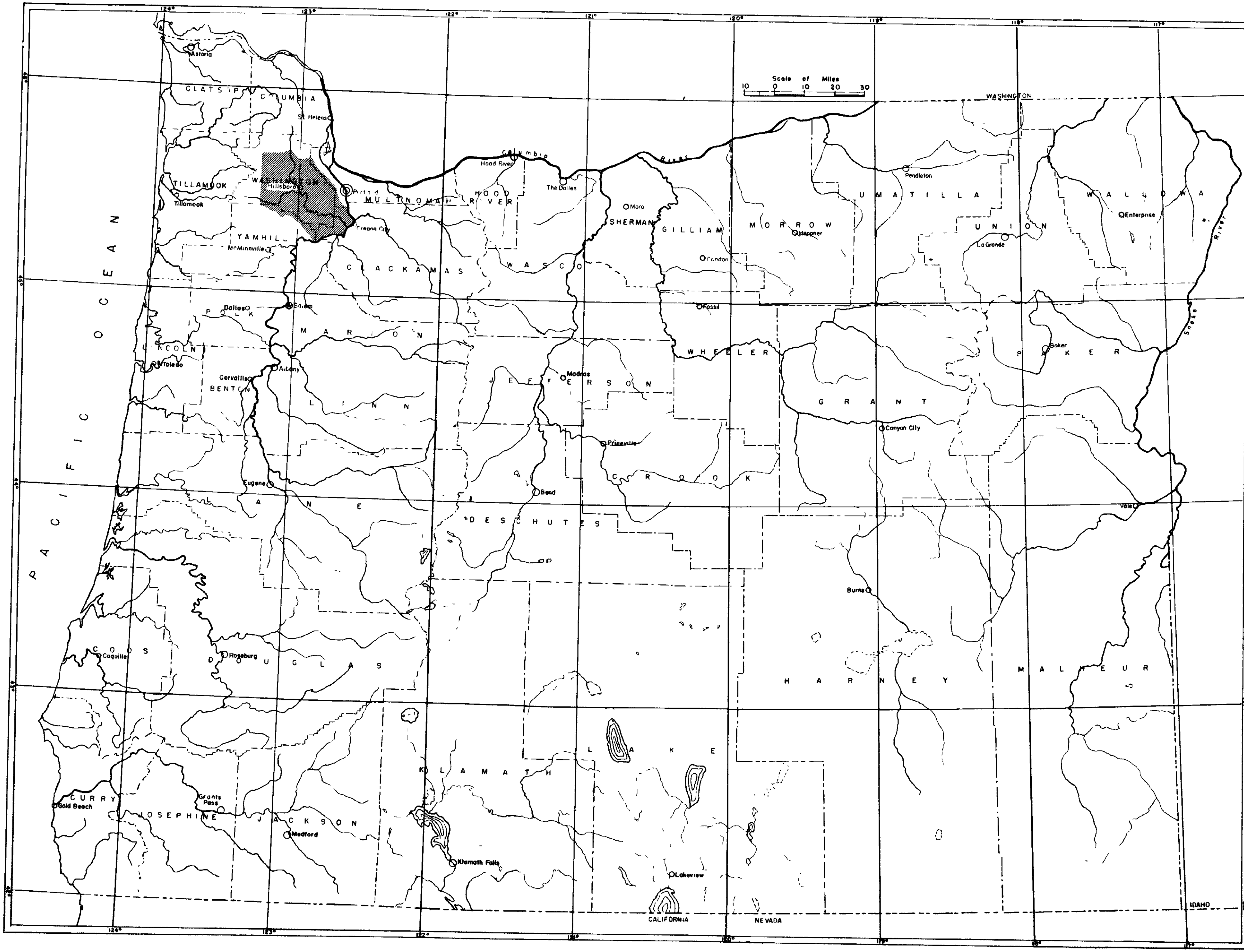
The general location and extent of the area are shown on plates 1 and 2; the topography, culture, wells, springs, and areal geology are shown on plates 3 and 4.

Purpose and Scope of the Investigation

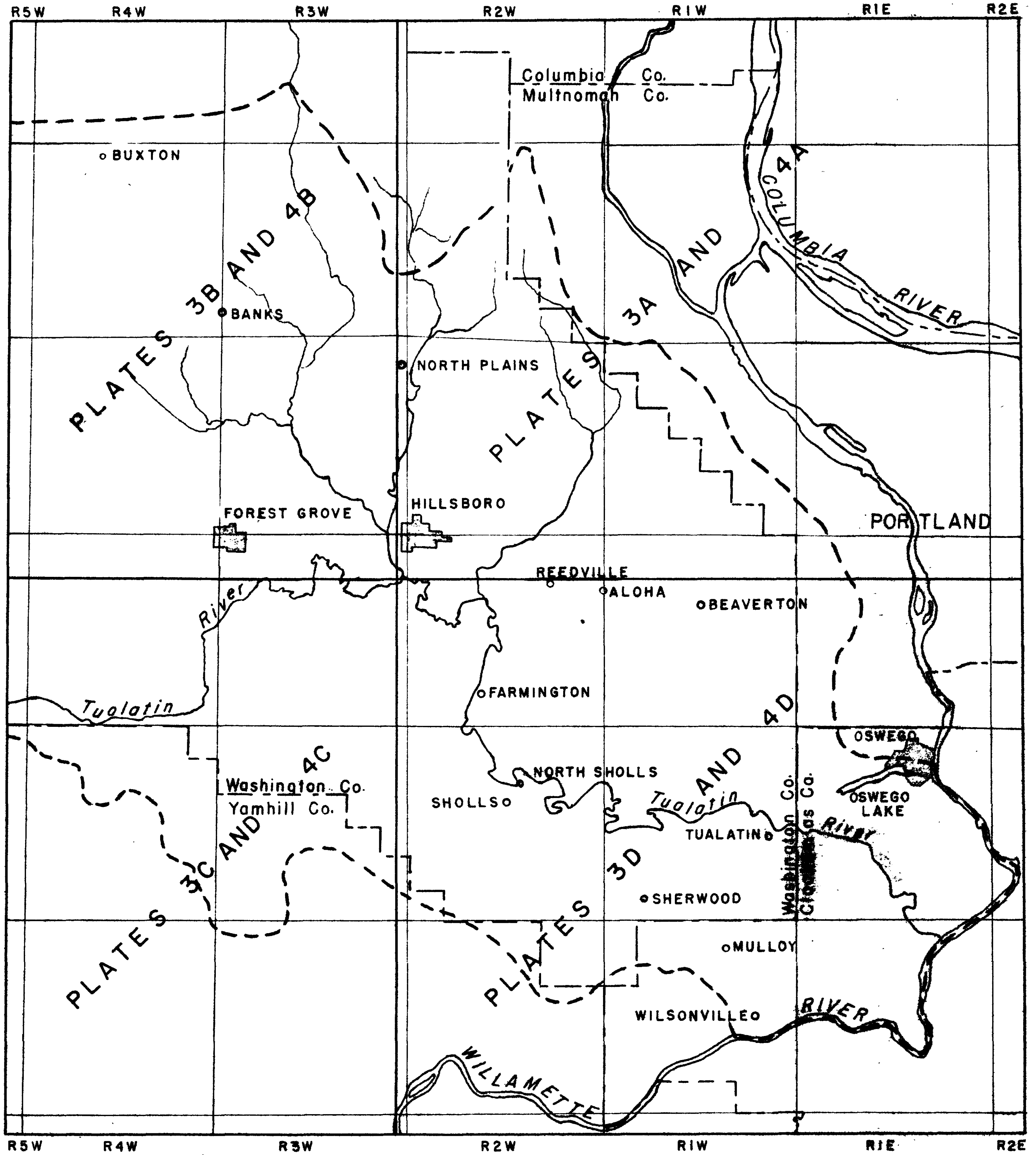
Since about 1940 there has been a great increase in population and development of the Tualatin Valley, much of which is rapidly becoming a part of metropolitan Portland. Along with this has come the need for more irrigation water, required to secure larger returns per acre. With the subdivision and settlement of the suburban areas, greater demand has arisen for more domestic and larger public water supplies. In addition, the manufacturing and processing plants that have located in the area require substantial supplies of water.

To provide the necessary information on the occurrence and quantity of ground water in this area of rapid development, an investigation of the geologic and hydrologic conditions was made by the U. S. Geological Survey in cooperation with the office of the State Engineer. This report is a compilation and interpretation of data obtained in the study.

PLATE 1



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



SKETCH MAP SHOWING THE AREA COVERED BY THIS INVESTIGATION (boundary indicated by line of heavy short dashes) AND THE EXTENT OF AREA COVERED BY PLATES 3A,B,C,D AND 4A,B,C,D.

PLATE 2

The investigation was started in 1951 and consisted of canvassing the area for water facts, collecting water data in possession of organizations and individuals, mapping and describing the geology, studying the hydrology, and preparing the report. In the canvassing, the entire area was studied in detail and wells and springs that afforded the most reliable ground-water data were selected for description in the tables and for further study. Additional data were collected from well drillers, public water-supply officials, state and county agencies, and managers of industrial plants.

The geologic work consisted of compiling the geologic map, principally from previous maps (Piper 1942, Trimble 1954, Treasher 1942, Warren 1945), and constructing cross sections and structural-contour maps from records of subsurface materials. Some additional data were obtained from a few electrical and gamma-ray logs of drill holes.

The hydrologic study consisted of distinguishing between the different types of occurrence of the ground water--unconfined (or water table), confined (or artesian), and perched--and in the accumulation of data regarding the characteristics and behavior of the ground water in each type of occurrence and in each type of aquifer. Records were compiled for each type of aquifer as to its capacity to yield water and to transmit water to a well. Observations of the water level in index wells were maintained to determine the general manner of recharge and discharge of the ground water (pls. 20 to 45). F. J. Frank assisted in the collection of the basic data and in the geologic interpretations.

The field work was done during 1951 and 1952, and the report was prepared during 1953. Plans call for continuation of the study by revision and enlargement of this report for ultimate publication as a water-supply paper.

Location Symbols

In this report, wells and springs are designated by symbols which indicate their locations according to the official rectangular survey of public lands. For example, in the symbol for well 2/3-22B2, the part written as a fraction before the hyphen indicates township and range south and east of the Willamette base line and meridian (T. 2 S., R. 3 E.); for those townships north of the base line and west of the meridian, the respective numbers are followed by the letters "N" and "W". The number after the hyphen indicates the section (sec. 22); the letter denotes the 40-acre subdivision of the section, according to the following diagram; and the final digit is the serial number of the well or spring in that particular 40-acre tract. Thus, 2/3-22B2 is in the NW$\frac{1}{4}$NE$\frac{1}{4}$ sec. 22, T. 2 S., R. 3 E., and it is the second well in that tract to be listed.

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

In table 1 these location symbols are not given in full for each well. Rather, the symbols are grouped by townships under appropriate subheads and only that part of the symbol is tabulated which indicates the section, 40-acre tract, and serial number. All wells and springs listed in the tables are located on plate 3, which is in four parts (A, B, C, D).

Natural Resources and Cultural Features

Since the original settlement, during the period 1834 to 1850, the fertile soils of the Tualatin Valley plain and the adjacent gentle hill slopes have been the outstanding natural resource of the area. Originally the plain was largely open prairie and the forests were mostly confined to the margins and to the surrounding slopes and mountains. Now the forests have been logged off until only the steeper of the surrounding hill slopes are forested. Lumbering and processing of forest products are now secondary industries, generally located adjacent to the timber stands in the Coast Range.

Until the coming of rapid transport, settlement of the valley was rural in type. Since 1940 the eastern part of the valley has been undergoing a progressively greater suburban-type settlement and is now a part of metropolitan Portland. Hillsboro, the largest city in the valley and the county seat of Washington County, had a population of 5,142 in 1950. Forest Grove with 4,343 and Beaverton with 2,512 were secondary in size, and North Plains, Banks, Helvetia, Verboort, Orenco, and Gaston, each with less than 1,000 are smaller towns. Much of the recent settlement in the eastern part of the valley lies outside incorporated communities. Cedar Mill, West Slope, Bonny Slope, Raleigh Hills, and other such centers of suburban settlement are rapidly growing communities.

Routes of transportation consist of: (1) highway--two main east-west highways from Portland to the Coast, a main highway (99W) south from Portland, and an ample network of secondary and local roads mostly paved with blacktop or oil; and (2) railroads--two branch lines, one that loops through Hillsboro and Beaverton from the Southern Pacific junctions near the towns of Tualatin and McMinnville, and one spur through Cornelius Pass to the northern edge of the valley and upper Gales Creek from the United Railways at Portland.

Previous Investigations

The Tualatin Valley is a small part of the area covered by Water-Supply Paper 890 of the U. S. Geological Survey, "Ground-water resources of the Willamette Valley, Oreg." (Piper, 1942). In that paper, the area was described briefly and data for a few wells were presented.

The unpublished "Preliminary report on ground-water occurrence near Beaverton, Washington County, Oreg." (Trauger, 1948), presented for a small district some detailed ground-water data as related to a possible interference of pumping from wells south of Beaverton.

The Tualatin Valley is included in the extensive geologic map, U. S. Geological Survey Oil and Gas Investigations Preliminary Map 42, "Geology of Northwestern Oreg." (Warren and others, 1945).

Concurrently with this investigation the Engineering Branch of the Survey mapped the adjacent metropolitan Portland area. An exchange of geologic data was maintained with Donald E. Trimble, geologist in charge of that mapping project.

Acknowledgments

The highly beneficial help of well owners and operators is gratefully acknowledged. Well drillers and pump companies were universally cooperative in giving access to their records of ground water and subsurface data and in granting their time and facilities to aid the investigation.

Municipal and public water-supply district officials and operating personnel contributed data on their areas.

The Portland General Electric Co. made available the ground-water records compiled during studies by Clyde Walker, Agricultural engineer specialist.

Drillers' logs of subsurface materials were furnished by the Oregon State Department of Geology and Mineral Industries.

Records of chemical analyses of ground water were freely furnished by Charlton Laboratories, Inc., of Portland.

GEOGRAPHY

Climate

Precipitation

The Tualatin Valley normally has an equable climate--a long, frost-free growing season and a mild winter. However, the seasons are characterized by marked differences in precipitation: the winters are wet and cloudy, and the summers usually dry and clear. The winter weather is dominantly oceanic, moving in from the west, but in occasional years subarctic air from the east or north brings freezing and even near-zero temperatures to the valley. The summer climate is of a more continental type, driest and hottest during periods of high barometric pressure. Occasionally dry air from the east brings low-humidity conditions for short periods.

The average annual rainfall for the Forest Grove station during the climatic years 1921-45 was 43.56 inches (pl. 6). The total annual rainfall varies somewhat from place to place in the valley and is much greater on the higher divides of the drainage basin, as shown by the records for the Timber station (pl. 7).

The precipitation records for Forest Grove are given in plate 6 and show that the annual total has ranged from as little as 28 to as much as 58 inches. The long-term curve (pl. 6) shows that total annual deviation from average precipitation (a graph that closely simulates the ground-water storage situation) went through a gradual decline to the year 1931, a troughlike condition to 1935, and a slightly greater-than-average accumulation from 1937 to the present time. Ground-water levels were not previously recorded; hence they cannot yet be compared with long-term records on precipitation.

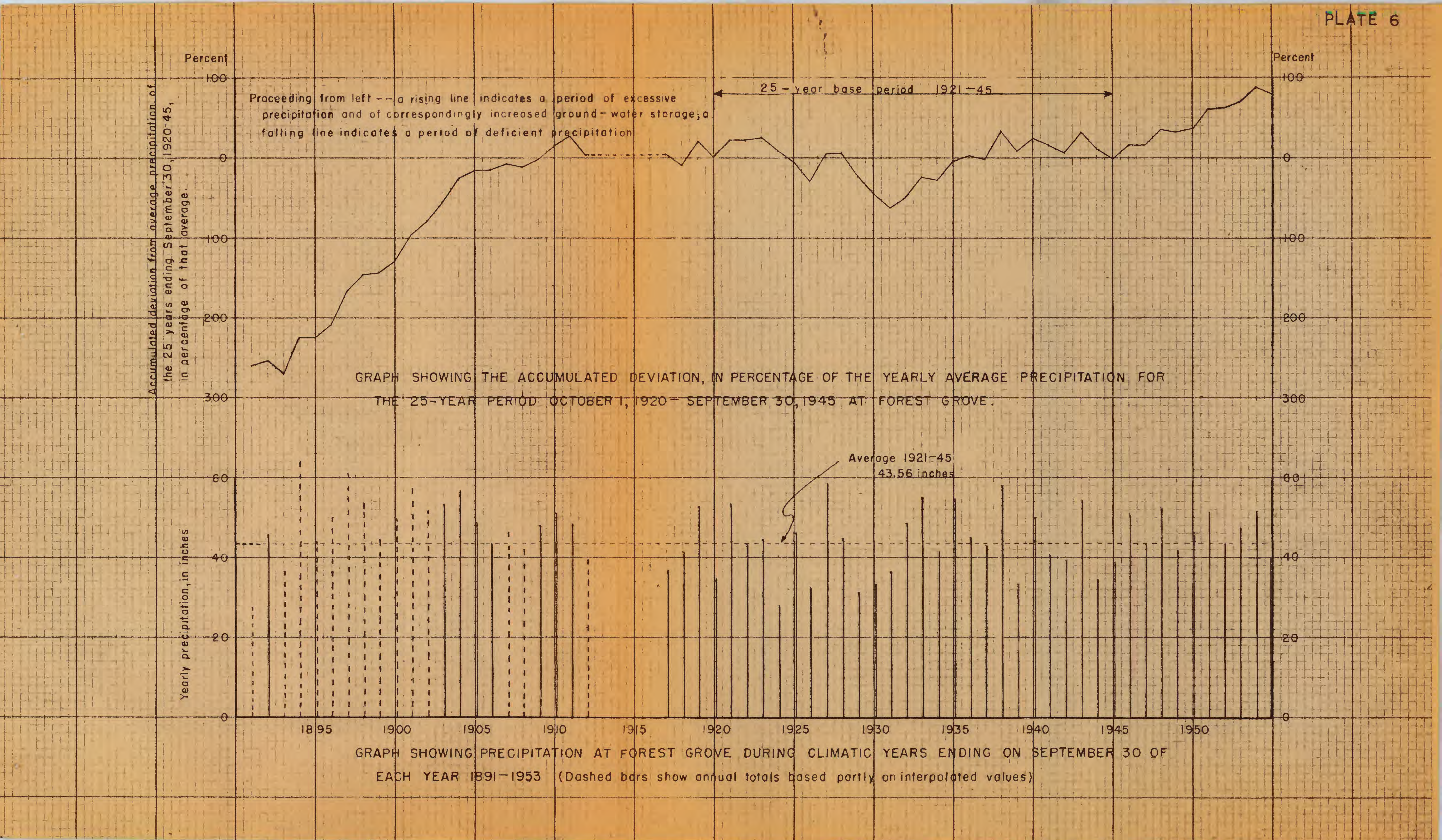
The precipitation occurs mainly in the winter months. Its distribution through the climatic year and through long-term periods is shown for the station at Forest Grove in plates 6 and 7.

December is the wettest month and July the driest in most years. About 80 percent of the annual precipitation falls during the 6 months October through March. That unequal distribution of precipitation, with the resultant dry growing season, is a dominant feature of the climate.

In the valley areas nearly all the precipitation occurs as rain, but some falls as snow on the higher parts of the watershed. The snow accumulation on the Coast Range seldom reaches great depth; in most years it does not exceed 2 or 3 feet and does not remain long after rains again predominate in the spring months. There are however, rare years when the valley floor receives considerable snowfall. The last such year was 1937, when Hillsboro had a total of 31.3 inches and Forest Grove had 34.4 inches measured as new fallen snow.

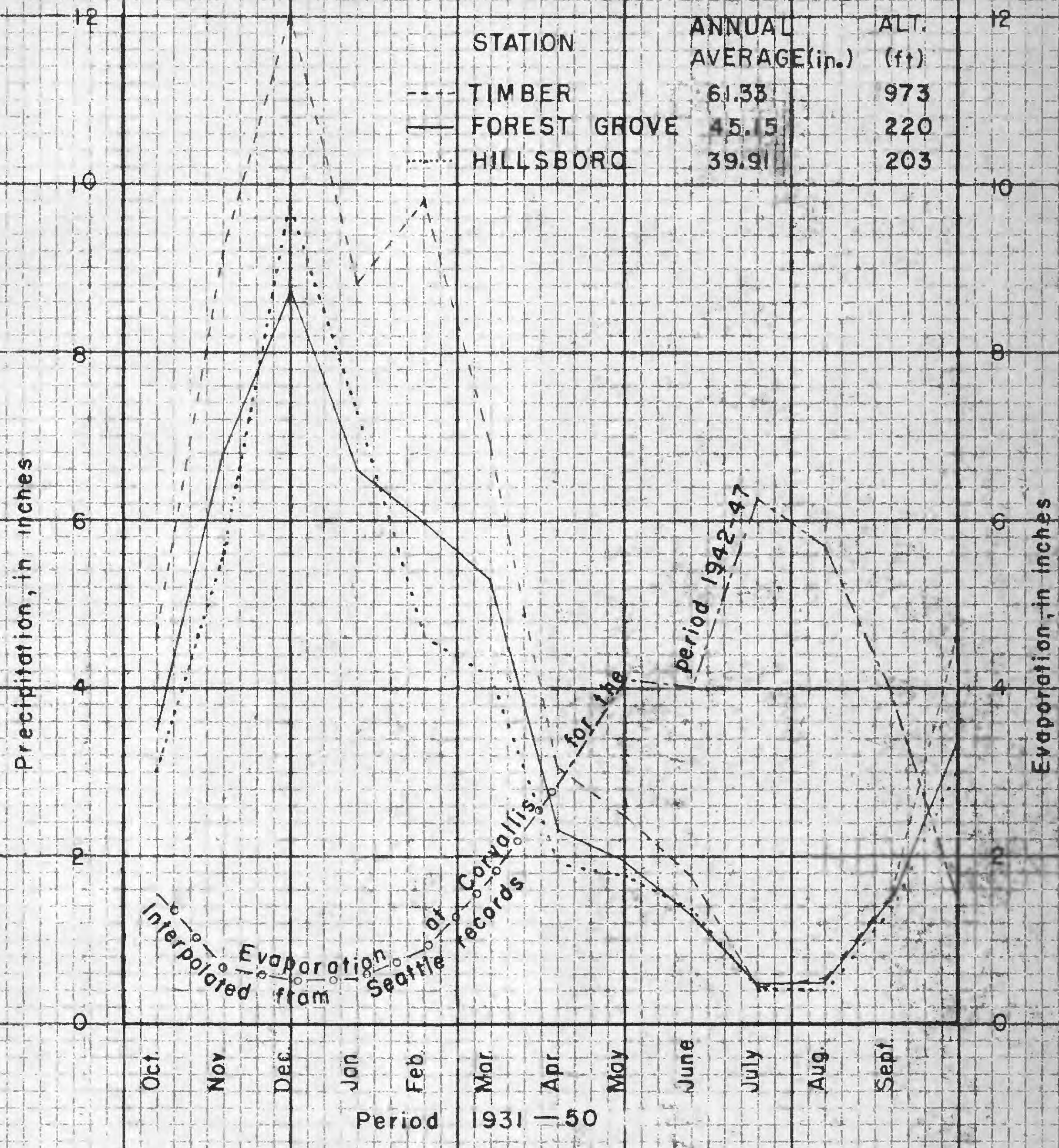
Evaporation

The monthly average evaporation at the State College station in Corvallis, a situation roughly comparable to that of the Tualatin Valley, gives the following figures, in inches, for the calendar years 1940-49: April 2.80, May 4.15, June 4,43, July 6.14, August 5.53, September 3.61. The total average evaporation during the 6-month growing season at Corvallis, and--by correlation--for the Tualatin Valley, is about 26.66 inches. When the additional evaporation for the winter months is approximated from records at stations like Seattle, with complete annual data, the total annual evaporation for the Tualatin Valley is found to be in the order of 30 to 32 inches (pl. 7).



GRAPH SHOWING THE ACCUMULATED DEVIATION, IN PERCENTAGE OF THE YEARLY AVERAGE PRECIPITATION FOR THE 25-YEAR PERIOD OCTOBER 1, 1920 - SEPTEMBER 30, 1945 AT FOREST GROVE.

GRAPH SHOWING PRECIPITATION AT FOREST GROVE DURING CLIMATIC YEARS ENDING ON SEPTEMBER 30 OF EACH YEAR 1891-1953 (Dashed bars show annual totals based partly on interpolated values)



GRAPH SHOWING AVERAGE MONTHLY RAINFALL AT THREE STATIONS IN THE TUALATIN VALLEY, OREGON, AND THE AVERAGE MONTHLY EVAPORATION AT CORVALLIS, OREGON, PARTLY INTERPOLATED FROM RECORDS OF THE SEATTLE, WASHINGTON, STATION.

Temperature

The average annual temperature for the 16-calendar-year period 1937-52, according to the U. S. Weather Bureau, was 52.6° F. at the Hillsboro station. The temperature is generally uniform and comfortable, the extreme cold and hot weather being brought in by uncommon movement of air masses from the north and east respectively. During the same 16-year period the extreme high and low temperatures observed were 104° F. and -10° F. The average annual highest temperature observed was 99.5° F. and the average annual lowest 13° F. January was the coldest and July the warmest month of the year.

Air Circulation

In general, the movement of air is not strong across the valley floor; extremely high or property-damaging winds are rare, and tornadoes are practically unknown. The prevailing air movement is from the southwest in winter and from the northwest in summer. Occasionally a high-pressure air mass centered to the east moves west through the Columbia River Gorge or across the Cascade Mountains in such strength as to cause the so-called east winds to flow across the Tualatin Valley. Those east winds are predominantly cold and dry in winter, and hot and dry in summer.

Cloudiness and Sunshine

During the 10-calendar-year period 1938-1947 an annual average of 118 clear, 79 partly cloudy, and 168 cloudy days were recorded. However, the variation of sunshine and cloudiness is very great from year to year. For example, the clear days during that period varied from 78 to 167 days per year. The cloudy days predominate in the winter and the sunny days in the summer.

Land Forms

The Tualatin Valley comprises a broad and extensive valley plain and the adjacent slopes and side valleys, as well as a few included minor hills.

The main body of the valley plain is about 22 miles long and 10 miles wide, extending around the Cooper Mountain-Bull Mountain hill land, which is a little southeast of the geographic center of the plain. The plain has an average altitude of about 200 feet, but ranges from 120 to 250 feet, and includes large expanses that do not differ greatly from the 200-foot level. It extends up the tributary valleys for several miles at a much steeper gradient than that which characterizes the main valley floor.

Aerial view of the northeast part of the Tualatin Valley looking northeast; Portland Hills in background and Sunset Highway in foreground; community of Cedar Mill in right foreground lies just north of highway. Willamette River and Portland Peninsula in distance.

Photo by Photo-Art Studio

The hill slopes that rise from the valley floor are mainly moderate ramplike surfaces, which are farmed where clear, and are steep only in some stream canyoms and areas of structural deformation. The marginal slopes rise gradually to reach mountainous heights on the drainage divides north, west, and southwest sides of the valley. On the east and southeast the valley is separated from the floor of the lower Willamette Valley by the more gentle hill-sized ridges such as Palatine Ridge (sometimes called the Portland Hills or West Portland Hills) and Petes Mountain.

Cooper and Bull Mountains, a series of gentle dome-shaped hills, rise 500 to 600 feet above the valley plain just southeast of the center of the valley.

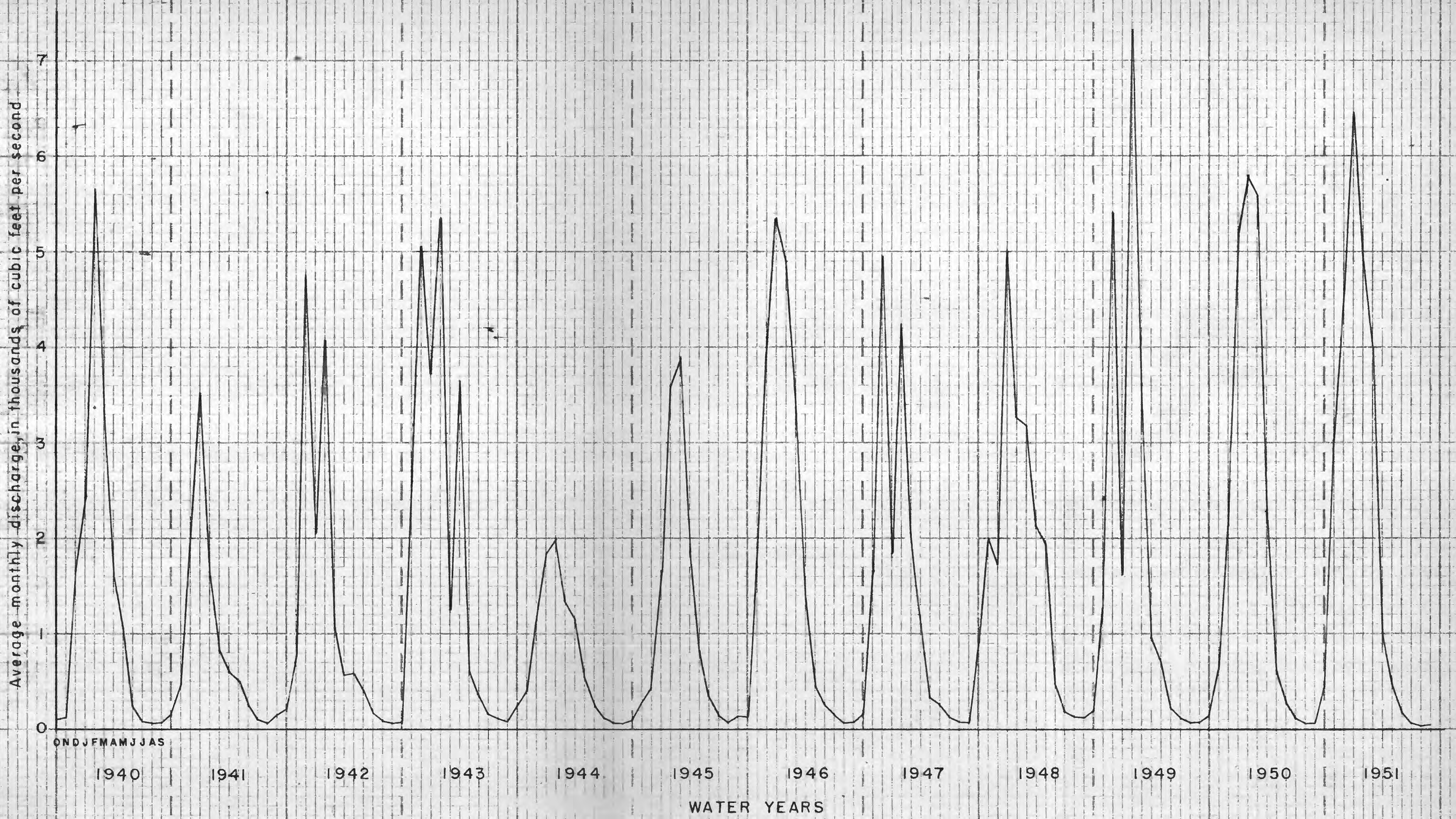
The valley plain, although broad and uniform in altitude over large areas, has a few wide terraces which slope gently toward the major drainage, the Tualatin River.

Drainage

Streams

Major streams.- The upper reach of the Tualatin River above Gaston drains a part of the east slope of the Coast Range. It flows eastward through a mountainous terrain for about 13 miles before reaching the extension of the Tualatin Valley at Gaston where it is joined by Wapato Creek. Flowing 4 miles northward it picks up, successively, Scoggins Creek and Gales Creek before flowing eastward onto the main Tualatin Valley plain, at an altitude of about 120 feet. While flowing 45 sinuous river miles across the valley plain, it descends only 20 feet in altitude before meeting the bedrock reef in the gap at the town of Willamette. Within that gap it flows 6 miles, emptying into the Willamette River at an altitude of about 60 feet.

During the 21-year period July 1928 to September 1949, the Tualatin River (including diversion to Lake Oswego) discharged an average volume of 1,376 cfs of water (Paulsen, C. G., and others 1951). In the 12-year period 1940-51, shown in plate 9, the flow at the town of Willamette ranged from an average winter-time maximum of about 7,330 cfs to almost no water during the late summer of most years.



GRAPH SHOWING FLUCTUATIONS IN FLOW OF THE TUALATIN RIVER NEAR WILLAMETTE, OREGON, INCLUDING THE OSWEGO CANAL DIVERSION

<u>Secondary streams.</u>- Wapato, Scoggins, Gales, Dairy, Rock, McFee, Chicken, and Fanno Creeks are the larger of the tributary streams. The first three drain part of the Coast Range; Dairy and Rock Creeks drain the mountainous spur of the Coast Range that extends north of the valley plain, as well as the valley floor itself; McFee, Chicken, and other creeks drain the northeast slopes of Chehalem Mountains, whereas Fanno Creek arises largely as drainage from the valley floor and the slope of the Portland Hills. The first five creeks named above have deeply dissected the slope of the Coast Range to a condition of mature topography--a situation of maximum relief and runoff. Their stream profiles show steep gradients in the higher catchment areas, moderate gradients through the intermediate, canyon zones, and relatively low gradients over their lower, aggraded courses that merge with the Tualatin Valley plain. Because of these characteristics, the secondary streams have a strong flood tendency along their lower reaches and are actively aggrading their side valleys and their separate parts of the Tualatin Valley plain.

The secondary streams draining the Chehalem Mountains, the Portland Hills, and the Cooper Mountain slopes are not so severely incised and appear to be less subject to large volumes of floodwater.

All the drainage basin of the Tualatin River, except the highest headwater areas at the west and north, is shown on plates 3 and 4.

Lakes and Marshes

Wapato Lake, near Gaston, an intermittent shallow lake which covered a considerable area during wet years, was the only large natural lake in the basin. Now, largely diked and drained, its floor furnishes more than a square mile of rich farmland.

The only large lake existing in the valley today is Oswego Lake. It lies on the drainage divide in such a position as to indicate that it was formerly a channel of the Tualatin, and possibly of the Willamette River. Enlarged and maintained by a manmade diversion from the Tualatin River, it is kept at controlled levels for scenic pleasure and hydroelectric power purposes.

Marshy areas are confined to the lowlands near the Tualatin River and its tributaries that flow across the valley floor. These areas are wettest in the winter and spring; probably the largest marshy area is near the east fork of Dairy Creek in the vicinity of Verboort.

In the parts of the valley where the slope of the valley floor is the least, such as (1) along Wapato Creek and the main stem of the Tualatin River north nearly to Forest Grove and (2) in the embayment of the valley plain northwest of Verboort, the land was marshy and waterlogged until drainage was provided. Some of that land is subject to overflow or backwater during times of excessive rainfall and is still characterized by the relatively shallow depth to the water table.

GEOLOGY

Occurrence and Relationships of the Stratigraphic Units

Volcanic and Sedimentary Rocks of Eocene Age

As shown on plate 4 (symbols "Tev" and "Tes"), the mountain slopes in the western part of the Tualatin drainage basin are underlain by igneous and sedimentary rocks that originated in the Eocene epoch of the Tertiary period of geologic time (see pl. 4).

The oldest rock unit is composed of lava rock with interbedded tuff. It comprises the highest part of the Tualatin River basin; the main areas occur south of Gales Creek and west of the general locality of the town of Cherry Grove. The volcanic rocks consist of a broad classification that apparently includes the continuation of the rock series mapped as the Siletz River volcanics 20 miles to the southwest of the area covered by this investigation (Baldwin and Roberts, 1952) but may include some strata that are being mapped in later work as separate units. The volcanic rocks are a thick unit, only the top part of which is exposed in the Tualatin Basin.

The lava-rock unit is overlain by a sequence of sedimentary rocks, also of Eocene age, consisting largely of shale, claystone, and siltstone. In places, the sedimentary series has a basal conglomerate composed of basaltic cobbles and gravel. These Eocene sedimentary rocks likewise may be the equivalent of several formations (such as the Burpee and Nestucca formations of Baldwin and Roberts, 1952) mapped separately in studies of neighboring areas. The sedimentary rocks are not thick, probably no more than 1,000 feet of strata is exposed in the band that underlies the lower mountain slopes of the western part of the Tualatin River headwater catchment area. That band of sedimentary rocks broadens out beneath the rolling hill lands and plains in the Yamhill River basin farther south.

Both the Eocene volcanic rocks and the overlying sedimentary rocks are inclined generally eastward about 6° to 7° and pass beneath the younger rocks. Where continuous to the east, they lie at great depth beneath the main part of the Tualatin Valley. Their continuation beneath the valley may be the strata penetrated below a depth of about 8,000 feet in the Texas-Cooper Mountain oil test (well 1/2W-25J1).

Sedimentary Rocks of Oligocene and Miocene(?) Age

Sedimentary rocks (shown by the symbol "Ts" on pl. 4) occur in the belt of hill land extending northward into the Wapato Creek Valley and continue along both slopes of the Tualatin River Valley from Gaston to Forest Grove. These sedimentary rocks make up the west slope of David Hill and form the broad expanse of mountainous slopes that comprise the headwaters area of the two forks of Dairy Creek, as well as a smaller windowlike area in the canyon of McKay Creek.

The sedimentary rocks of Oligocene and Miocene(?) age extend upward from the top of Eocene volcanic rocks to the base of the overlying Columbia River basalt. As grouped on Warren's (1945) map and on plate 4, this sequence may contain strata equivalent to those referred to in more detailed treatises, as the Keasey(?) of Schenk (1927), Pittsburg Bluff and Blakeley of Weaver (1912), Spencer and Illahe of Thayer (1933), and possible other formations.

The sedimentary beds are shaly and tuffaceous sandstones, sandy shales and tuffs, and some conglomeratic materials. The beds consist of marine sediments, with minor amounts of near-shore, brackish, and possibly fresh-water deposits. The beds that crop out in McKay Creek near the bridge in sec. 18, T. 2 N., R. 2 W., are massive, medium-hard blue-gray tuffaceous sandstones carrying many marine shells. The rock is composed largely of medium- and coarse-grained siliceous rounded sand grains with some interstitial filling of tuffaceous and pumiceous material.

The beds are observed to dip inward toward the center of the Tualatin Valley from the southwest, west, and north. They are also presumed to dip into the syncline, at depth, from the anticlinal ridges along the east side of the valley. An emergence to continental conditions and a period of subaerial erosion must have intervened between the deposition of these sedimentary rocks and the outflow of the lavas of the Columbia River basalt. However, where the stratifications of the Oligocene and Miocene(?) sedimentary rocks can be observed close below the basalt (in the Dairy Creek, McKay Creek, David Hill, and Chehalem Mountain exposures), the bedding of the sedimentary rocks is in general accordance with the base of the basalt and the layers within it, or at least the discordance, if present, is too small to be strikingly apparent in those exposures. The general stratigraphic nature of the contact between the sedimentary rocks of Oligocene and Miocene(?) age and the overlying Columbia River basalt indicates that the sedimentary rocks constituted a low-lying gentle plain (probably with a southward slope) when covered by the lavas of the Columbia River basalt in Miocene and Pliocene(?) time.

Columbia River basalt

Overlying the sedimentary rocks of Oligocene and Miocene(?) age is a series of old lava flows known collectively as the Columbia River basalt. This basalt series is an aggregation of lava flows that lie layer on layer without appreciable interflow sediments and with very small amounts of breccia or any other form of lava solidification except the blocky, jointed lava rock. The basalt is a brown, black, or dark-gray dense rock that contains a pronounced vesicular structure near the tops of most of the individual lava flows.

The rock of each flow has its own system of joints and cracks, resulting largely from the contraction during cooling. The most common joint systems are the columnar, cubical, and sheeting. The columnar jointing separates the flows into rudely hexagonal columns, which extend perpendicular to the cooling faces--generally to the top and bottom--of the flow. The cubical or "brickbat" system of jointing separates the mass of some flows into very crude "cubes," commonly ranging from 2 to 12 inches in diameter. Both the columnar and cubical systems of jointing exist in some flows, but in most flows one is more prominent than the other. Sheeting joints occur in some flows and are prominent near the top and bottom of the flow, to which surfaces they are roughly parallel.

The basalt ranges in thickness from a featheredge at the northern part to about 1,000 feet beneath the central and southern parts of the drainage basin. The main mass, in its vast occurrence east of the Cascade Mountains in central Washington, is regarded as belonging to the Miocene epoch, and probably also to the early Pliocene epoch, of the Tertiary period. West and north of the Tualatin Valley, its supposed extensions are interbedded with the upper part of the Astoria formation and are therefore considered to be of Miocene age in that locality. Such is probably the time position of at least the major part of the Columbia River basalt in the Tualatin River basin.

The base of the basalt is a rather regular and consistent plane in most of the basin, although it has some irregularities. The thickness of the basalt changes rather evenly and gradually in much of the Tualatin Basin. Presumably, before deformation and erosion took place, the top of this accumulation of highly fluid lava was a fairly level plain. Now in a mildly warped condition, that old top of the basaltic lava, deeply weathered (pls. 5 and 12) and moderately eroded, forms the surface of many of the upland slopes, such as the Chehalem Mountains, Cooper and Bull Mountains, Parrett and Petes Mountains, and the highest ridges of the Portland Hills.

A. Photo showing weathered Columbia River basalt exposed in road cut at the northeast corner of sec. 18, T. 2 N., R. 2 W. Such weathered material is common to a depth of 50 to 200 feet on all but the steepest erosional slopes of the basalt.

B. Closeup showing spheroidal structure of the decomposed Columbia River basalt in A above.

Eastward from the Chehalem Mountains' rim near Gaston and the rim of David Hill, the basalt forms the general bedrock, the uppermost consolidated rock of the whole basin area--except for (1) the places along the west slope of the Portland Hills where the later Boring lava lies above it, and (2) the areas of sedimentary rock in upper McKay and Dairy Creeks from which the basalt's thin extensions have been stripped by erosion. The basalt itself is visible in few places other than the steepest of the cliff and stream bluffs and the artificial exposures, such as the quarries and road cuts.

In most of its upland areas, the top 20 to 200 feet of the basalt is weathered to residual lateritic soil products. These deeply-weathered products form some of the distinctive "red land" soils, an important part of the basic agricultural economy of the valley. Also, there in places, it forms an important low-grade deposit of aluminum ore (Libbey and others, 1945). A similar thickness of weathered material at the top of the basalt extends beneath most of the valley-fill deposits.

Troutdale Formation

Overlying the downwarped parts of the Columbia River basalt is a deposit of semiconsolidated silt, clay, and sand, part of which has been correlated (Threasher, 1942) with the Troutdale formation, an old alluvial fan type of deposit that is extensive along the front of the Cascade Mountains 20 miles east of the Tualatin River basin.

The troutdale formation occurs in the linear downwarps (synclines) of the bedrock in the Portland Hills (pl. 4) and can be traced northward and westward therefrom, beneath the later Boring lava, to the edge of the Tualatin Valley plain. Emerging farther west from beneath the Boring lava, the Troutdale formation is covered by progressively greater thicknesses of the later valley fill, and its identity is not established west of the Metzger and Raleigh localities. Undoubtedly an extension of the Troutdale formation makes up much of the deep sedimentary fill beneath the main valley plain. Deposits similar to the Troutdale formation are included in the broad classification "Tertiary and Quaternary sediments, undifferentiated" (QTsu) that is used to designate (pl. 4) all the main body of older unconsolidated deposits that underlie the Tualatin Valley plain and extend in depth to the basalt bedrock. The detailed studies necessary to differentiate the sediments of true Troutdale age are beyond the scope, and outside the immediate needs, of this report.

The Troutdale formation in the Tualatin Valley consists of clays, silts, some sands, and a few gravels. On the whole, the materials are finer grained than in the type locality of the Troutdale formation in the eastern part of the East Portland terraces, but the deposits here show an otherwise similar lithology, stratigraphic position, structural relationship, and erosional history. Though deposits of the Troutdale now occur in a few places at altitudes as great as 600 feet and possibly even 700 feet, they probably did not overlay at any time the basalt that now forms the crest of the higher ridges of the Portland Hills. In a few places along these hills the thickness exceeds 500 feet, though the true maximum stratigraphic thickness is unknown. The deposition apparently was entirely in fresh water; at least no marine fossil evidence and no traces of saline connate water are known to the writers.

An old erosion surface across the Troutdale strata, which is preserved at the base of the Boring lava, had a general slope toward the Tualatin Valley plain. A cross section of a Boring lava flow that progressed downslope in a rill of that old erosion surface is shown on plate 11. Undoubtedly the erosional reworking of the materials of Troutdale age, in the uplifted belt along the Portland Hills, contributed much sediment to the later fill that covers the deposits of Troutdale age beneath the main Tualatin Valley plain.

Boring Lava

Lying upon the Troutdale formation and the Columbia River basalt in a roughly linear band along the west flank of the Portland Hills is the later volcanic extrusive rock named by Treasher (1942) the Boring lava. The known occurrences of this lava rock extend southward from the ridge crest east of Cedar Mill through Sylvan and Multnomah to Mount Sylvania. Farther south and east these lava rocks occur outside the Tualatin Valley in Mount Scott and the large rock plateaus of the Beaver Creek, Damascus, and Boring (city) areas. Apparently the lava was extruded from local fissures as well as from some central vents (such as Mount Sylvania and Mount Scott).

The Boring lava is a gray, basaltic rock with some small (near microscopic) phenocrysts of olivine and plagioclase feldspar in a rather stony, and in part microcrystalline groundmass. It has a rather distinctive bluish-gray color and in places a porous (aerated) appearance. In some places a massive columnar jointing system is developed and in others a closely spaced flagstone-like platy jointing. The rock is not known to have been deformed tectonically in the Tualatin Valley.

A. Boring lava, QTb, valley fill, QTsu, and the Troutdale formation, Tt, exposed in road cut on Boones Ferry Road in the NW$\frac{1}{4}$SE$\frac{1}{4}$ sec. 33, T. 1 S., R. 1 E. A marginal zone of breccia is part of, and underlies, the Boring lava. The road cut is a section across a narrow lava rock flow that moved downslope to the east (right) in a small arroyo.

B. Boring lava exposed in road cut on Tualatin Valley Highway just west of the center of sec. 12, T. 1 S., R. 1 W. The characteristic massive structure and jointing are visible. Photo taken from exposure near the steep western end of a large flow of lava rock.

In its original extrusion it was probably not much more extensive in the Tualatin Valley than its present distribution (pl. 4). Its outflow on the surface followed the details of the erosional surface--a proof that some time elapsed between the Pliocene deposition of the Troutdale formation and the extrusion of the Boring lava. Whether that time lapse was sufficient to place the Boring lava in the Quaternary period is not known--hence the nonspecific age of Quaternary or Tertiary assigned to the Boring lava. Logs of wells, such as 1N/1W-20H1, -35M1, and 1/1W-11L1 (table 2), depict the superimposed position of the Boring lava upon the deposits of Troutdale age. Apparently the lava rose and flowed from numerous small vents that occurred along linear structural lines. The strongest outlets, such as Mount Sylvania and several smaller ones, acquired and preserve the conical shape commonly associated with the vents of explosive extrusion. Only in one place (West Burnside Road, sec. 6, T. 1 S., R. 1 E.) did the lava accumulate high enough to flow eastward over the divide and be preserved downslope on the Willamette River side.

There has been but little erosion of the Boring lava. Consequently, the areas where it occurs still depict many of its original depositional details. Where the Boring lava abutted against the mountain slopes of the Columbia River basalt with its characteristic 50 to 200 feet of residual and alluvial soil cover, and where it abutted against a layer of Troutdale age that thinly covered parts of the basalt, stream entrenchment has removed the intervening softer material. Thus, narrow stream valleys now isolate many of the areas of Boring lava from the basalt slope against which it originally abutted. The higher parts of the areas of Boring lava are covered with 5 to 30 feet of residual soil and alluvial material so that the lava crops out in few places where it is not artificially exposed. Along the Portland Hills the base of the Boring lava occurs at an altitude of about 300 to 350 feet, and at its western extremity it extends to a minimum altitude of 150 to 160 feet--some 50 feet below the present general plain on the valley fill. The downslope edges of the Boring lava are now covered with as much as 30 to 50 feet of the undifferentiated valley fill, shown as "QTsu" on plate 4.

Tertiary and Quaternary Sedimentary Materials Undifferentiated

Beneath the main part of the valley plain, and lapping up along the margins, is a sufficient accumulation of unconsolidated sedimentary fill to cover the unevenness in the bedrock framework and to create a smooth valley plain. This fill varies in thickness from a featheredge at the margins to a common thickness of 300tto 600 feet beneath the lowest part of the valley plain. It also extends to a common depth of 900 feet, and a maximum known depth of 1,480 feet at Hillsboro, in the deeper trough that lies north of Cooper and Bull Mountains. Likewise, the valley fill includes deposits that range in age at least from the time of the earliest warping of the basalt (in pre-Troutdale or Troutdale time) to latest Recent time, as the alluvium is even now accumulating in places (pl. 4).

The undifferentiated sediments of the valley fill are arbitrarily separated from the Troutdale formation where the two abut in the Raleigh and Metzger districts. Elsewhere in the valley the age of any part of the undifferentiated valley fill is not known to be equivalent to the Troutdale formation, and it is possible that only along the flank of the Portland Hills uplift does the Troutdale formation occur at such a high level. Through the rest of the undifferentiated fill, the equivalents of the Troutdale formation, if present, must lie at considerable depth.

Because of the above-stated inability to separate these strata for this report, and because their hydrologic features and lithologic characteristics are similar, the deposits are grouped together as Tertiary and Quaternary sediments undifferentiated (QTsu on pl. 4).

The undifferentiated fill is largely clay and silt. Sand beds occur at well-separated vertical intervals. A few of those sand zones seem to have widespread though not universal extent. The sand is mostly a very fine-grained, well-sorted, lakebed type of material. Very few gravel beds have been found in the fill except beneath the area where Gales Creek passes onto the valley plain; there, some gravel trains occur, diminishing in thickness and extent eastward from Forest Grove.

The sand zones that occur in the valley fill beneath the Hillsboro district and, to a lesser extent, beneath the Beaverton district have been encountered sufficiently in wells to establish their general continuation.

The undifferentiated fill of the Tualatin Valley is probably entirely a fresh-water deposit. None of the many wells are known to have encountered saline water that could be considered connate and indicative of marine or brackish water deposition. Because youthful fine-grained materials tend to retain some vestiges of the water in which they were deposited, the absence of marine-type water indicates that fresh water was the most likely environment of this valley fill. Moreover, no marine-type fossils are known to have been taken from the valley fill. Samples from well 1N/3W-7A2 at 660 feet and well 1/1W-17A2 at 750-800 feet were examined by Dr. Weldon Rau of the U. S. Geological Survey and found devoid of micro-organic fossils. Furthermore, much uncarbonized wood was encountered in the first 300 feet of the deposits during the construction of many wells in the valley fill.

In the main valley, only the deposits underlying the flood plain and the channel-bed materials of the present streams are separately distinguished (pl. 4) from the main body of the valley fill. However, other parts of the valley fill may be as young as the older alluvium that is distinguished elsewhere in the valley.

Alluvium

The flood plains of the present streams and the slightly higher levels of former flood-time deposition, as well as a few pocketlike areas where water-borne debris has accumulated, are the principal sites underlain by alluvium in thicknesses sufficient to form a mappable unit. The older alluvium ("Qoal" on pl. 4) lies generally above the level of present accumulation. The younger alluvium is still being added to during periods of flood. In most parts of the basin the strips of alluvium are relatively thin. The alluvium in Gales Creek averages less than 20 feet in thickness, most of the younger alluvium along the channels of Dairy and McKay Creeks across the valley plain is less than 10 feet in thickness, and that along the flood plain of the main stem of the Tualatin River from Gaston and Forest Grove downstream may be considerably thicker, in places as thick as 30 feet. Along the Willamette River, at the south edge of the area covered in this report, the younger alluvium is 40 to 50 feet thick.

The alluvium of the flood plains in the Tualatin Basin is almost universally fine-grained material--silt, clay, fine sand, and peaty material. The younger alluvium of the smaller creeks (Dairy, McKay, Rock, Fanno, and others) is a shallow reworked deposit of the material in transit and an ephemeral channel-bed load. The large lowland north of Thatcher School, poorly drained by the West Fork of Dairy Creek, has characteristics of alluvium that is youthful and deeply deposited in an area of subsidence. An area in Wapato Creek valley just southeast of Gaston is maintained in a semilake condition by the alluviation of the Tualatin River where that river enters that broader valley. The younger alluvium along Gales Creek and the main stem of the Tualatin River is a backfill and floodtime deposit accumulated as the streams swept their channel beds across the valley plains. All the younger alluvium there underlies wet, poorly drained land and consists of fine-grained materials.

In general, the older alluvium is composed of similar fine-grained materials except along the Willamette River, where gravels and sands are present. The large areas of older alluvium along the Willamette River, which accumulated largely in the Pleistocene epoch, are part of the extensive deposits of the valley plain of the Willamette River. Where the alluvium abuts against the mountainous slopes, it is overlain by some slope-washed detritus. Overlying accumulations at the landward edge and erosion at the streamward edge have given a pronounced slope to most of the terrace surfaces on the older alluvium, in some places considerably accentuating the original slope. The areas of older alluvium along Chehalem, Wapato, and Gales Creeks are remnants of former valley plains that now form terraces along the sides of the present flood plains. This older alluvium is thin and rests on an eroded bedrock surface. Southward through Tonkin to Mulloy, a train of rock rubble extends from a former spillway across the bedrock divide. That rubble train is included with the older alluvium of the Wilsonville plain of the Willamette Valley proper.

Structure of the Rocks

Importance of Rock Structure

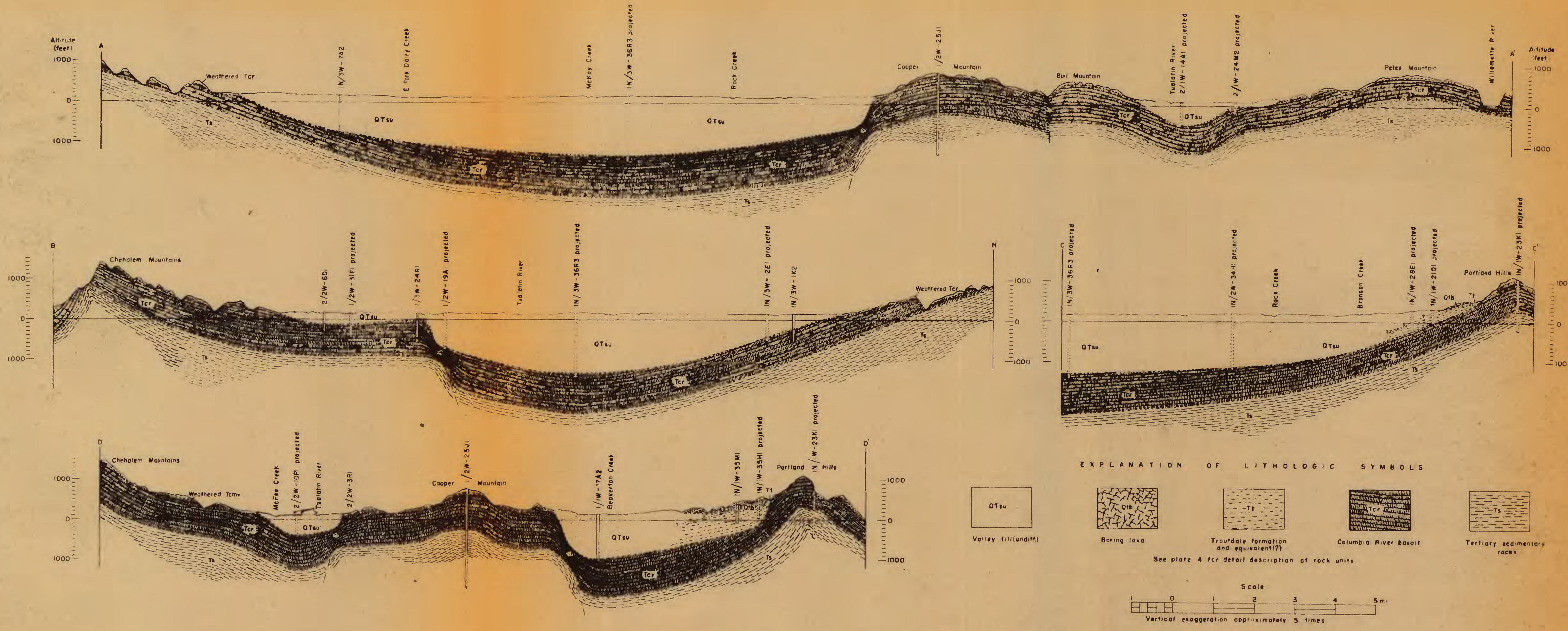
As most all the rocks in the Tualatin River basin were originally sedimentary deposits, volcanic lava flows, or sedimentary accumulations of volcanic fragmentary debris, the original bedding of each rock unit was nearly horizontal. The present position of those bedding stratifications is a measure of the earth's deformation since the rocks were formed. Knowledge of the condition and attitude of the rocks also affords a means by which their course and continuity can be followed from place to place, and their position in depth can be determined where desired. Thus, the exploitation of any resource present in a rock formation requires that the structure of that rock be known. Particularly is this true of the ground-water resources known to occur in, or to be absent from, some of the rock units. At places the availability of ground water can be determined by the extension of the rock structure.

Inclination of the Rocks

The Eocene and other Tertiary sedimentary and volcanic rocks that crop out in the mountain slopes of the western side of the Tualatin Basin have a general eastward inclination. Those same rocks, where exposed on the north side of the basin, dip generally southward. Many of the observed dips are shown on plate 4.

The Columbia River basalt inclines generally in accordance with the underlying Eocene and other Tertiary rocks. It dips northward off the Chehalem Mountains north of Newberg, eastward off the extension of the Chehalem Mountains and David Mountain, respectively, south and north of Forest Grove. It dips southward off the mountains near North Plains and Helvetia, westward off the Portland Hills, and outward away from the center of Cooper and Bull Mountains. The upper surface of the basalt is, in general, a subdued replica of its original constructional surface, which is now slightly modified by weathering and erosion and displaced by folding and faulting.

There are very few places where the structure can be observed in the beds of the Troutdale formation. The presence of the Troutdale, almost exclusively in the structural sags of the Columbia River basalt, indicates that its deposition followed the main part of the folding but may have been involved in later moderate displacements. Mr. Robert Murphy reported to the writers that he encountered steeply inclined beds of semiconsolidated clay and siltstone below the 12-foot depth in digging a well some years ago near his house in the NE$\frac{1}{4}$NW$\frac{1}{4}$ sec. 27, T. 1 S., R. 1 W. That location is near a known displacement in the underlying Columbia River basalt and the inclined beds may have represented deformed beds of Troutdale age along that structural lineament. The actual deformation may be greater than can be inferred from the few exposures.



EXPLANATION OF LITHOLOGIC SYMBOLS

Valley fill (undiff.)

Boring lava

Troutdale formation and equivalent(?)

Columbia River basalt

Tertiary sedimentary rocks

See plate 4 for detail description of rock units

Scale

Vertical exaggeration approximately 5 times

GEOLOGIC SECTIONS OF THE TUALATIN VALLEY, OREGON

(See plate 4 for location of sections)

Unpublished records subject to revision

The Boring lava and the later alluvial deposits, so far as known, are tectonically undeformed.

Master Shape of the Tectonic Structures

The main structure of the Tualatin Basin is a shallow bowl-shaped syncline with an interior, centrally located anticlinal ridge (Cooper Mountain-Bull Mountain ridge). The essential form of that structure, at least as it affects the water resources, is shown on the geologic map (pl. 4) and the structural contour map of the Columbia River basalt (pl. 5). North and south of the Cooper Mountain-Bull Mountain ridge the bedrock lies in rather closely folded separate synclinal troughs.

Over broad areas of the basin the exposed tectonic structure is a gently sloping part of the over-all synclinal fold, but abrupt changes to steeply dipping folds and fault displacements are evident locally. The major known fault displacements include the one separating Parrett Mountain from the east end of the Chehalem Mountains and the one followed by Gales Creek (pl. 4).

Secondary Tectonic Elements

The major deformations, which produced the complex bowl-shaped structure in the bedrock of the Tualatin Valley, had many subordinate results that are of importance to the occurrence and development of ground water.

Structurally, the Portland Hills are mainly an assemblage of separate linear secondary folds extending from Oregon City to where they merge with the uplands north of Portland. As shown on plate 4, the deposits of Troutdale age and the Boring lava have filled some of the linear synclines and have topographically joined the higher parts of some of these en echelon anticlinal ridges.

The Bull Mountain-Cooper Mountain upland is ringed in part by linear topographic sags that apparently represent lines of steeper folding or steplike fault displacement. A similar linear depression separates Bull Mountain and Cooper Mountain. Other such displacements of the bedrock are visible on the topography (pl. 3).

The Chehalem Mountains consist mainly of an asymmetrical anticline. The surface of the basalt ramps up to the south and, outside the Tualatin Basin, dips more sharply downward beneath the adjoining Newberg area. Farther northwest the mountain is more of a tilted block whose western limb, if any ever existed, has been upfaulted and subsequently deeply eroded in the Gaston area.

The course of Fanno Creek roughly parallels the axis of a complex and, in places, rather steep syncline between the Portland Hills and the Cooper Mountain-Bull Mountain anticline. A "high" in the Columbia River basalt extends westward through Progress but is sharply downdropped at least 300 feet in a fault(?) of undetermined trend that passes close to well 1N/1W-27C1. The steeply dipping beds of probably Troutdale age, found in the Murphy well as mentioned above, lie along this displacement.

The low bedrock ridge which connects the northern ends of Parrett Mountain and Petes Mountain is apparently an anticline between the sharp syncline beneath the main stem of the Tualatin River and the southeastward-plunging synclinal basin in which Wilsonville is located.

Although the major structures of the bedrock are more evident, the many minor structures are particularly significant to the development of the resources of those rocks. As many of those minor structures are not exposed but are deep beneath the surface, it is imperative that the collection of data concerning them be continued.

Types of Displacements

Most of the broad major bedrock structures of tectonic origin seem to be due to displacement by folding, though some, such as Parrett Mountain and the highlands south of Gales Creek, owe their position largely to displacement along fault fractures.

Of the minor structures, both folds and faults are known to be present. The earth stresses that produced the major structures undoubtedly produced many minor displacements, only a small part of which can be delineated with present information.

Some steplike displacements are present in the bedrock below the valley fill and the known ones are shown on the bedrock contour map (pl. 5). Particularly significant among these are the one that trends east-west just north of Farmington and seems to form the northern limit of an area of flowing wells, and the one that trends generally northward through well 1/1W-27C1 just west of Progress. Such a bedrock displacement apparently occurs between wells 1/1W-33P1 and -P2 located in the depression that separates Bull Mountain from Cooper Mountain. Many of those sharp changes in the level of the bedrock surface may be due to close folding but some are known to be fault fractures such as the zone penetrated by well 1/1W-27C1.

Effects of Tectonic Structures on the Ground-Water Resources

The sand aquifers of the upper part of the valley-fill deposits and those of the alluvial materials lie essentially horizontal and are not directly affected by tectonic structures. However, tectonic structures do largely control the availability of ground water in the Columbia River basalt, which is the main bedrock aquifer in the Tualatin Valley. Whether the basalt is within economic reach beneath the valley plains or whether it stands so high above the water table in the uplands that all but meagre pockets of perched water are drained out is determined by its position in the tectonic structures. This deformation has caused many of the enigmatic features found by those seeking development of ground water from the Columbia River basalt.

The accessibility of the porous zones in the basalt to be recharged by fresh water may be largely controlled by the tectonic structures. The best situation for recharge to these porous zones may occur beneath the gravelly beds of streams flowing across the beveled edges of the basalt layers, while the worst situation is probably in the flat-lying basalt deeply covered by impervious beds of valley fill. Some areas of good recharge may be on the margins of the Tualatin Valley plain; while some of the worst may be in the synclines buried deep beneath the central part of the valley plains.

As a result of the layered arrangement and the irregular continuity of the porous zones in the basalt, progressive decline in the volume of water transmission can be expected away from the points of recharge of fresh water. However, well sites down the dip from, and relatively near, the points of recharge may be advantageous for sustained large yields of water from the basalt.

In other investigations it has been found that lines of severe flexure--both of tight folding and of faulting--may be barriers to the lateral transmission of ground water in the basalt (Newcomb, 1951). In some situations such barriers may be responsible for the high levels of the ground water found on the up-dip side (example, well 1/2W-31C1) and the nearby lower levels on the down-dip side of a fault (example, well 1/2W-19A1). Locally, parts of some fault zones in the basalt may fail to create barriers; their broken zones may be open networks of fractured rock rather than comminuted gouge. Under this condition the fault zone may in part be a vertical passage for the ground water in the basalt. Such porous parts of the fault zones may serve as vertical discharge routes from the basalt to the overlying alluvial materials or to the surface. Likewise, porous parts of fault zones may allow water of poor quality to rise from the older rocks that underlie the basalt. Such may have been the situation in the porous zone, carrying saline water, penetrated by well 1/1W-27C1.

Gamma-Ray Logs as Stratigraphic and Structural Indicators

Some gamma radiation is emitted during the decomposition of certain minerals that are present in minute quantities within all earth materials. The amount of gamma radiation varies slightly with each bed and layer but generally is greatest in the sedimentary materials and least in the basaltic lava rocks.

Gamma-ray logs of four wells in the Tualatin Valley are included in this report (pls. 13, 14, and 15). A significant stratigraphic feature, shown by these logs, is the contact between the valley-fill deposits and the weathered zone of the Columbia River basalt. This contact is difficult for the well driller to detect because the weathered basalt reacts to the drill like a clayey silt. The point indicated on the logs as the "top of fresh Columbia River basalt" is taken from the drillers' records. It can be seen that little or no difference in gamma radiation exists at the transition between the weathered and the fresh Columbia River basalt.

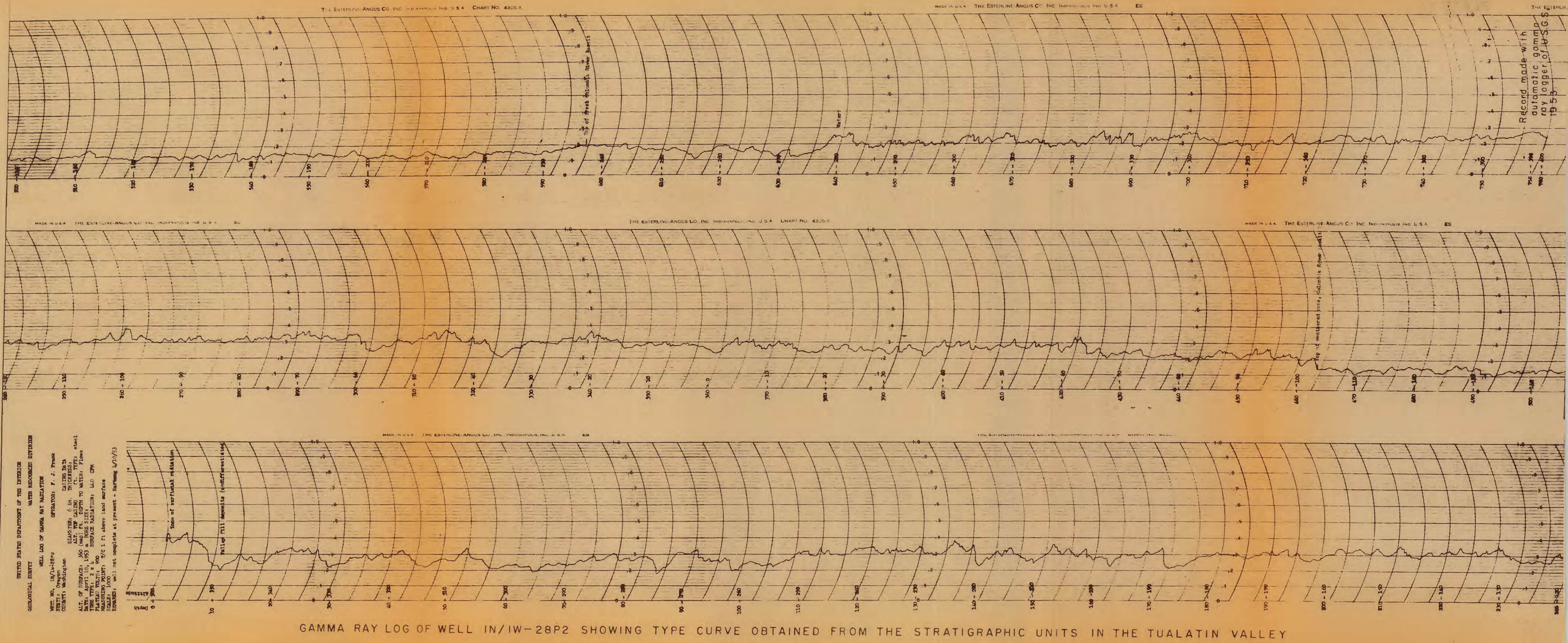
The gamma-ray log of well 1N/1W-21L1 (pl. 14) indicates that there is little or no weathering of the Boring lava at that location.

The curves typical of the gamma radiation are shown with the separate rock zones designated on the curves. There is a striking similarity between the curves for the bottom part of the Tertiary and Quaternary valley fill, undifferentiated (QTsu) in wells 1N/1W-28P2 and 1/1W-24D3, which are 5 miles apart.

The use of gamma-ray logs to assist in the lateral correlation of strata and in the proper design and engineering of wells is just beginning. As more data are obtained, this process may become a very useful tool in the proper design and construction of water wells in the Tualatin Valley.

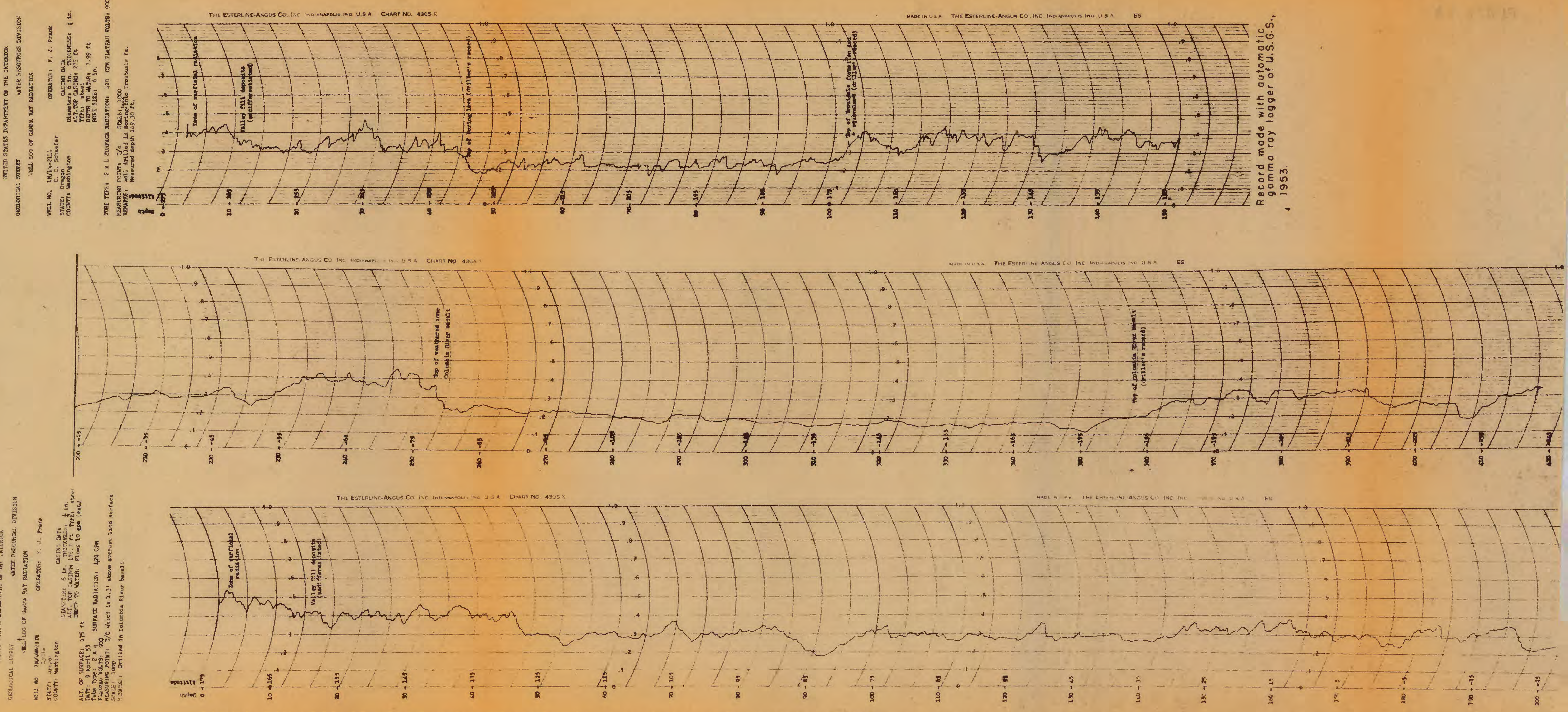
Another instrument which may have extensive application in mapping the bedrock surface, is the sonic depth indicator. This instrument, now in its development stage, may, in the future, make possible the economic and accurate mapping of the Columbia River basalt in depth beneath the valley floor and slopes.

PLATE 13



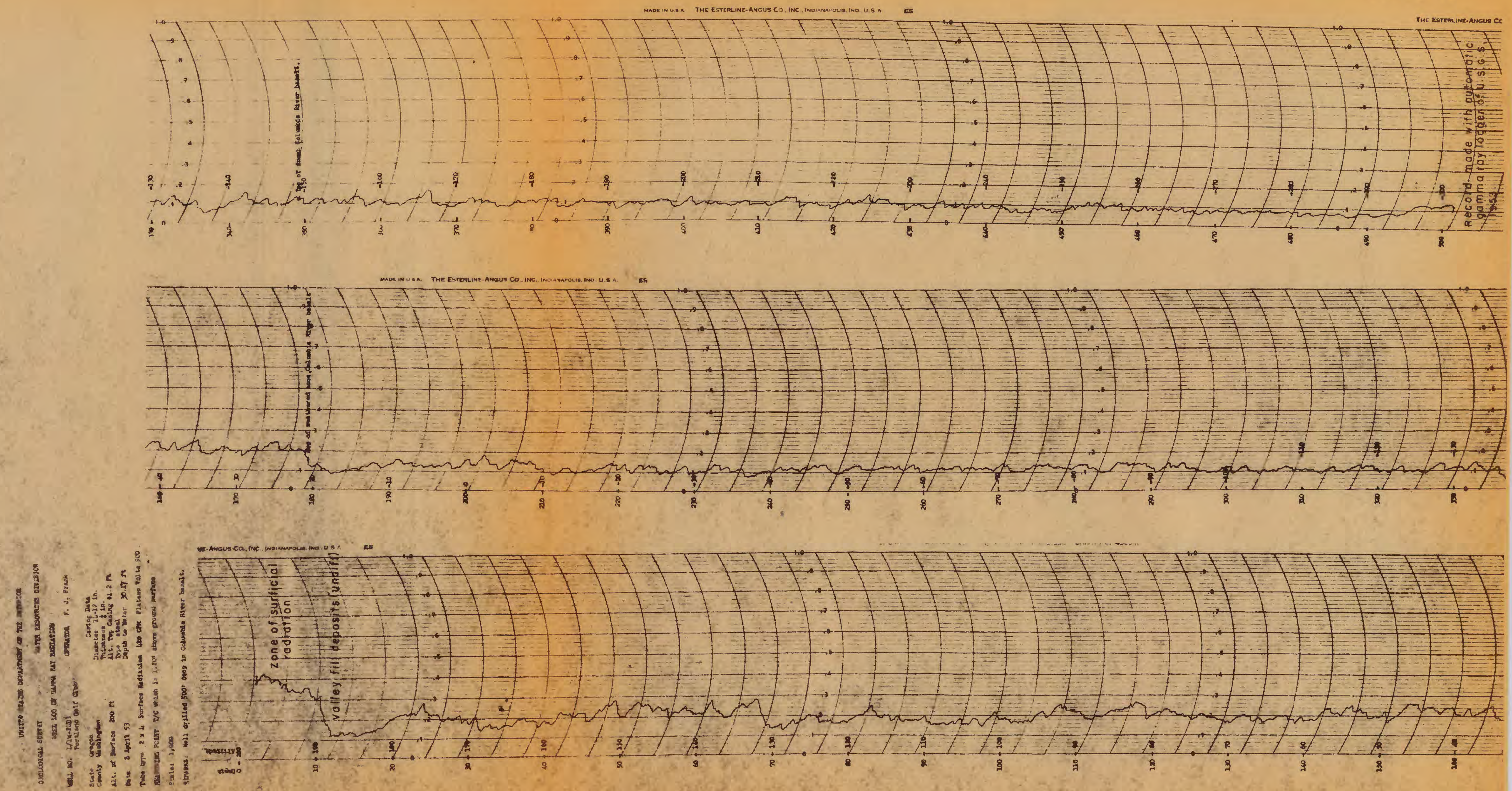
GAMMA RAY LOG OF WELL 1N/1W-28P2 SHOWING TYPE CURVE OBTAINED FROM THE STRATIGRAPHIC UNITS IN THE TUALATIN VALLEY

PLATE 14



GAMMA RAY LOGS OF WELLS 1N/4W-11D1 AND 1N/1W-21L1 SHOWING TYPE OF CURVE OBTAINED FROM THE STRATIGRAPHIC UNITS IN THE TUALATIN VALLEY

PLATE 15



GAMMA RAY LOG OF WELL 1/1W-24D3 SHOWING TYPE OF CURVE OBTAINED FROM THE STRATIGRAPHIC UNITS IN THE TUALATIN VALLEY

GROUND WATER

General Hydrologic Features

Beneath a given level, not far below the surface of the valley floor, all the materials of the outer part of the earth's crust are saturated with water. The upper surface of this water-saturated zone of the earth is called the water table except where that surface is formed by an impermeable body. The water in the rocks below that water table is said to occur under water-table conditions and is called unconfined ground water. Despite the uniform saturation below the water table, only certain parts of some rock units have sufficiently large pores and interconnections to be of economic importance as aquifers. Ground water in the Tualatin Valley chiefly occurs under water-table conditions. In some places, extensive layers of rock in the zone of saturation consist of tight, nontransmissive materials whose lateral extent is sufficient to deny ready passage upward of the ground water below. This ground water is under a hydrostatic pressure generally about equivalent to the altitude of the water table a short distance away. Where that confining stratum is perforated and the aquifer below is tapped by a well, the ground water rises to an altitude equal to the hydrostatic pressure in the aquifer. Such ground water is said to be confined, or artesian. Some confined water exists in the Tualatin Valley as described in the sections below. /The reader may note that hydrologists in general, as well as those of the Geological Survey, use the word "artesian" to mean any confined ground water. Some dictionaries use the older definition of "artesian" water as ground water that flows at the land surface./

In other localities, layers or zones of non-water-bearing material cause the infiltrated water to be held up above the regional water table. Such water is in fact a small area of local saturation and is called "perched" ground water. At many places in the higher parts of the Tualatin Valley, perched ground water occurs as described in the sections below.

The main factors that determine the availability of ground water and the uses that can be made of this resource are: (1) the type of occurrence--unconfined, confined, or perched, (2) the rock materials in which the ground water exists, (3) the manner and place of recharge, (4) the characteristics of movement or transmission through the rock materials, (5) the place of discharge--either natural (springs and seeps) or artificial (wells), and (6) the chemical and physical changes brought about by the passage underground.

Unconfined Ground Water

Throughout the greater part of the principal valley plain, the ground water, in both the valley fill and the underlying older rocks, rises in wells to a uniform level, the water table. The water table lies rather close beneath the main valley plain and slopes generally toward the Tualatin River and its tributaries at a rate about in conformity with the land surface. Beneath the hill and mountain slopes around the margins of the valley and beneath the Cooper Mountain-Bull Mountain hill land, the level of the water table is continuous with the level of the water table beneath the valley floor. It is a level of saturation that cuts across boundaries and geologic units of different lithology.

The unconfined ground water is tapped by several thousand wells, of which many representative examples are listed in the tables and for which some observed water-level records are shown graphically on plates 20 to 45.

The water table fluctuates in conformity with the annual rainfall cycle. The charts (such as pls. 25 and 37) show that the shallower wells of the valley fill tap water whose level fluctuates through a range of as much as 15 or 20 feet. Apparently the recharge during the months of heavy rainfall is so great that it fills all the available pore space of the valley fill deposits nearly to the land surface. The water tapped by deeper wells in the valley fill is partly confined and its levels do not show so great an annual fluctuation, their total range being from 5 to 10 feet per year (see graphs on pls. 26 and 29).

Confined Ground Water

Some of the deeper strata of the valley fill and the Columbia River basalt at depth beneath the valley fill contain ground water that rises in wells above the level of the water table in their respective localities. In general, the wells tapping the confined water with the greatest pressure head above the water table are around the sides of the valley floor. Several of these wells flow in districts such as Cedar Mill, North Plains, Helvetia, Kansas City, Farmington, and Mulloy (on the Willamette slope south and outside the Tualatin Valley proper). The well with the greatest confined water pressure is probably the Hartung well (1N/1W-28L1) or the Gent well (1N/4W-15C1). Those wells have a pressure head of about 50 feet above land surface.

Perched Ground Water

Beneath the slopes and uplands around the margins of the valley, ground water in relatively small quantities occurs above the regional water table. Ground water percolating downward toward the water table in places encounters impermeable layers, or "traps", which impede its travel and produce relatively small saturated zones above the regional water table. Such perched water lies upon impermeable layers in the soil zones and upon high-lying masses of the valley-fill deposits, as well as upon impermeable layers of the Columbia River basalt and the Boring lava.

Economically, these pockets of perched water are especially important for sustaining household supplies in areas where the water table lies at great depth beneath the surface or lies in impermeable materials from which water of good quality cannot be extracted. Places like Petes Mountain, Portland Hills, Chehalem Mountains, and the north slope of the valley (north of Helvetia and North Plains) are characterized by many perched-water bodies. Many small seeps and springs in the Chehalem Mountains that provide household water are outlets for perched water bodies. Ground water in the base of the Boring lava (such as that tapped by well 1/1-31C1) and in the isolated porous streaks of the Columbia River basalt (such as that tapped by well 2/1-31P1) is perched ground water developed for household supply.

In some circumstances, perched ground water can occur in a semiconfined or confined condition. Where the perched water has filled a porous zone below a local inclined confining layer, the conditions of confined water are met in the lower end of that water body even though the whole of the ground-water body is perched above the regional water table. Such is probably the situation in wells like 1N/2W-3K1.

The Principal Aquifers

In addition to being described according to the hydraulic conditions under which it occurs, ground water may be described according to the geologic units in which it is found.

Valley Fill

As described previously under Geology, the unconsolidated materials that fill the Tualatin Valley structural syncline and lie below the present land surface are largely fine grained and compact, consisting mainly of clay, silt, and fine sand. Thin beds of fine and very fine, well-sorted sand occur in the upper 300 to 400 feet of the valley fill throughout much of the valley area.

Beneath the western part of the valley floor, there are areas where the sand beds, and even a few beds having granular gravel, form an uncommonly large part of the valley-fill material. Beneath the surface in an area of several square miles centered around Hillsboro, sand beds are present at depths of about 40, 100, 200, and 300 feet. Not all are present beneath any one spot, but each is encountered in enough wells to indicate its presence beneath a fairly widespread area. Those sand beds supply most of the water now derived by wells in this area. From the number of producing wells in the 40-foot sand, that sand zone is inferred to be relatively widespread and continuous throughout the Hillsboro area. Some of the other sand beds may subsequently be established as continuous sheetlike occurrences but at the present time this can only be inferred.

A sand and granular gravel bed occurs in limited extent at about 95 feet in depth beneath the north and east edges of Beaverton but is not penetrated by wells in the St. Marys district, a mile to the west. Wells 1/1W-16A1 and -22F1 tapped water in that stratum, which contains some black volcanic lapilli, BB-sized volcanic ejecta.

In the extension of ancestral Gales Creek through the Forest Grove district, a number of gravel layers occur. Some of those gravel layers may be followed in successive wells through Forest Grove and east nearly to Hillsboro, where they seem to aline with sand zones. Those gravel beds lie at depths of about 50 feet in Gales Creek valley (well 1/4W-2H1) and at greater depths to the east, being about 100 feet deep at Forest Grove. They undoubtedly represent gravel trains deposited in the valley fill by ancestral Gales Creek.

Aside from the gravels beneath Forest Grove, and possibly the more extensive sand zones beneath the Hillsboro area, the beds of fine sand that serve as water-bearing strata to wells in the valley fill cannot now be related to sources or to definite stratigraphic positions in the valley fill. The fine sand beds seem to represent deposition by the shifting and vagrant currents of a lake, and they occur at irregular and unrelated places and positions within the great mass of valley fill, most of which is clay and silt.

The bulk of the valley fill lies below the level of the water table and most of the ground water therein is unconfined. However, confined ground water occurs at a few places in the valley fill. Many of the fine-sand strata buried under clay and silt layers in the valley fill carry water that is under a small confining pressure. When these strata are penetrated by wells, the water rises slightly above the local water table and in the low areas may even flow at the surface.

The part of the valley fill that lies relatively high along the west side of the Portland Hills, and is shown on the geologic map as the Troutdale formation, contains ground water in a few gravelly or sandy members and in a position that definitely is perched above the regional ground-water level (see wells 1N/1W-23N1 and -26E1).

Columbia River Basalt

The Columbia River basalt is a series of individual lava flows which, as a stratigraphic unit, lies at depth beneath the valley plain and crops out on the adjacent slopes and hills. Between some of the successive flows is a zone of breccia, "cinders" or broken rock generally porous enough to permit the accumulation and movement of water. It is in these interflow zones that the main percolation of ground water takes place in the Columbia River basalt. Cracks and fissures in the dense part of the flow may contain some ground water and also, in a few places, may act as passages for water moving vertically between interflow zones; but usually those cracks and joints within the centers of individual lava flows fail to supply much water to wells. Any particular interflow zone, even one that is highly permeable, may contain isolated sections or pockets of impermeable material. For this reason, even wells drilled close together in many instances may obtain water from different interflow zones and may have slightly different static water levels.

Water-table conditions (water in well does not rise above level where encountered) in the Columbia River basalt are limited to areas such as Cooper Mountain, Bull Mountain, and some of the higher elevations along the margins of the valley. Well 1/1W-30L1 illustrates these conditions. It was drilled almost on the summit of Cooper Mountain and first encountered water at the regional water table, about 200 feet in altitude. Many similar wells in this area and the Bull Mountain area were also reported to have static water levels at about that altitude (table 1).

Confined ground water in the Columbia River basalt occurs mostly under a pressure head equal to the altitude of the regional water table. Therefore, wells tapping the Columbia River basalt below the valley fill in most areas have a static water level that stands at about the level of the valley floor. Wells of this type are found throughout most sections of the valley. Examples of a few such wells are the north well of the city of Beaverton, (1/1W-11L1), city wells (1N/3W-1K1 and -K2) of North Plains, the Al Peters well (1N/3W-8E1), and the S. R. Rotchstrom well (2/2W-6D1).

Only a few wells have been drilled into the Columbia River basalt where it occurs 1,000 feet or more below the valley floor. Two of these, the Birdseye Cannery well (1N/3W-36R3) and the Oregon Nursery Co. well (1N/2W-34H1), were abandoned after penetrating less than 200 feet of basalt. The authors believe this penetration was not enough for a good test of the water-bearing properties of the Columbia River basalt. The latest deep well (1/1W-17A1) for St. Mary's Catholic school, near Beaverton, encountered the basalt after penetrating 1,170 feet of valley fill. That well produced 115 gpm with a drawdown of 200 feet. The water-producing section of the basalt in this well lies 1,274 to 1,507 feet below the surface.

Along the margins of the valley are small areas wherein perched artesian water occurs in wells penetrating the Columbia River basalt. The water in these wells stands a considerable height above the regional water table. Such wells occur in the Portland Hills, the Helvetia area, and in the vicinity of Kansas City. Partial stratigraphic traps, wherein some of the interflow zones within the basalt have become thin or pinched out, is the most probable cause for these occurrences of perched artesian water. Structural displacement (through faulting or sharp folding) of the basalt, in such manner as to cause some of the permeable interflow zones to lie opposite impermeable zones, is another possible cause of this condition and may be present in some places. Examples of such wells are the Lindow Bros. well (1N/1W-28E1) north of Cedar Mill, the Nussbaumer well (1N/2W-3K1) in Helvetia, and the Goff well (1N/4W-23R1) south of Kansas City.

At present, most of the wells obtaining water from the Columbia River basalt penetrate about 200 feet of the rock strata. Exceptions to this are found mainly in the Farmington and Cooper Mountain areas, where a few wells, such as the one drilled by Mr. Asbahr (1/2W-31C1), had to be drilled through about 450 feet of the basalt before obtaining an ample supply of water. The large-capacity wells in the Farmington area obtain most of their water by penetrating about 300 to 400 feet of rock. The Schallberger well (1/2W-29P1), known as the "old Dalby well" penetrated approximately 300 feet of rock before obtaining a flow of about 120 gpm. Mr. Schallberger reported that a centrifugal pump of 600-gpm capacity did not break suction. On the south side of Cooper Mountain, the Bierly Bros. well (2/2W-1J1) penetrated about 550 feet of Columbia River basalt before reaching an aquifer that will produce about 600 gpm.

An aquifer test on this well (2/2W-1J1) gave a coefficient of transmissibility of 23,000 gpd/ft for the Columbia River basalt in that vicinity. The coefficient of transmissibility is defined as the number of gallons of water per day that will pass through a vertical section of the aquifer 1 foot wide with a hydraulic gradient of 100 percent at the prevailing water temperature (Theis, C. V., 1935).

Boring Lava

As shown on the geologic map (pl. 4), the Boring lava covers large portions of the eastern slopes and uplands of the Tualatin Valley. The Boring lava is similar in many respects to the Columbia River basalt although the Boring lava lacks the larger interflow zones present in the older rock. Because most of the Boring lava lies on slopes and uplands above 200 feet in altitude, the greater part lies above the regional water table. This elevated position and the fact that only small interflow zones, if any, exist in the Boring lava give it only limited importance as an aquifer. In places the Boring lava contains small amounts of perched (both confined and unconfined) ground water. Wells tapping perched water are 1/1-29N1, 1/1-30J1, and -31G1, all near Mount Sylvania. Perched and confined ground water within the Boring lava north of Cedar Mill is tapped by a few wells, such as well 1N/1W-34D2, that produce enough water to supply a household. One well, 1N/1W-21J1, tapping the Boring lava is at an altitude low enough to allow the water to flow at the surface. These confined and perched bodies of water in the Boring lava, as in the Columbia River basalt, are probably caused by stratigraphic traps. However, these water-filled layers have less continuity, as indicated by the existing wells, than the water-bearing zones in the older basalt. Because of this limited continuity, it is difficult to predict, with any degree of accuracy, at what level ground water will stand if encountered in the younger lava.

A. View looking northeast from sec. 24, T. 2 S., R. 2 W., on the north slope of the Chehalem Mountains, showing the flood plain of the Tualatin River and, in the background, Cooper Mountain and Bull Mountain, with the Portland Hills in the distance.

B. View looking northeast toward Cooper Mountain from the Bierly Brothers farm in sec. 1, T. 2 S., R. 2 W., showing sprinkler irrigation of pasture with water from well 2/2W-1J1.
(Photo by Clyde Walker.)

Underlying the Boring lava in most places is the Troutdale formation--a series of interstratified gravel, sand, and clay beds (see section on Geology). At the contact between these two formations, some ground water is encountered at a few places. Wells, such as 1N/1W-26E1, tapping these perched aquifers produce, on the average, enough water for one domicile.

Two large springs north of Beaverton, known as Johnson Spring (1/1W-3E1) and Wessinger Spring (1/1W-10H1), flow either directly from the Boring lava or from its contact with the Troutdale formation. These two springs, the largest from the Boring lava, each had a discharge of about 340 gpm on April 4, 1951.

Recharge and Discharge of the Ground Water

Recharge

The records of the water levels in wells show that the ground-water levels rise as the precipitation becomes greater during November and December, continue at a high level during the rainy winter months, and decline in conformance with the diminishing rainfall and increased evaporation and transpiration during the spring and summer months (see pls. 20 to 45). The ground-water levels in most wells reach their annual low range in the summer and their lowest point in September or October of each year. The levels of the unconfined ground water beneath the valley floor are especially remarkable in their synchronous agreement with the annual rainfall cycle. There is little lag between the time of the increase and decrease in rainfall and the corresponding response in the levels of the unconfined ground water. Such correlation strongly indicates that the source of the unconfined ground water in most parts of the Tualatin Valley is from the precipitation that has percolated downward in the immediate vicinity.

The confined water in the Columbia River basalt, and possibly that in the deeper parts of the unconsolidated deposits, percolates laterally in the direction of the hydraulic gradient from recharge areas along the margins of the valley. The levels of this confined water, in the wells observed, is shown to fluctuate in conformity with the precipitation (see pls. 22, 31, 42, and others). The recharge to this confined water may accrue directly to a water table at some distance from the observed wells and cause the water level to rise in the observed wells by pressure distribution. Probably a main source of recharge to the deeper sand aquifers is from water in the unconfined zone leaking through the clay and silt aquicludes between the aquifers.

Well 1N/3W-13F3 probably taps water of this type, although part of the annual fluctuation (see pl. 26) may be caused by the loading and unloading of the aquiclude with water in the unconfined zone.

The water levels observed in wells tapping perched water (see pls. 29 and 42) show the same general type of rise and fall in agreement with the annual cycle of precipitation.

As previously described under Geology, the slopes and uplands at the north and west sides of the basin are composed of rocks that are largely impermeable. Such a condition precludes the transfer of significant amounts of ground water to the valley from those directions and also renders improbable the interbasin transfer of ground water into or out of the Tualatin Valley.

The soils, the valley-fill deposits, the Boring lava, the Columbia River basalt and parts of the Troutdale formation are the main rock units that are sufficiently permeable to permit recharge to the ground water. Direct recharge to the valley fill apparently comes from precipitation and also from runoff across the valley floor. The lava rocks and Troutdale formation are recharged by precipitation where those rocks are near the surface in the slopes around the edges of the valley. A large part of the precipitation runs off the slopes and uplands and the recharge to the lava rocks and the Troutdale formation is apparently only a small part of the precipitation.

Much of the precipitation that falls on the valley floor infiltrates to the water table. After the first rains restore the summer-depleted moisture content of the soils, subsequent rain percolates beneath the valley floor until the water table has risen to a point high enough that its hydraulic gradient toward the nearest surface drainage produces a rate of lateral percolation equal to the rate of recharge, or high enough that the water table reaches or approximates the land surface and runoff ensues. By comparison of the rainfall records at Forest Grove (U. S. Weather Bureau) with the water level given by plate 25, it is apparent that 22.37 inches of rain during October, November, and December of 1951 coincided with a rise of about 25 feet in well 1N/3W-8P1 and about 17 feet in well 1N/2W-35E1. Also the levels show that the water table did not rise further during the ensuing 3 months, when an additional 16.79 inches of rain fell, but declined thereafter during the spring and summer months to the level of the previous summer. Because the average evaporation from open water bodies (pl. 7) is a total of only 2.8 inches for the months October, November, and December, the transpiration could hardly have exceeded the evaporation, and well 1N/3W-8P1 in particular lies in a flat area where little or no runoff occurs during the fall months, it may be assumed that a minimum of 16 inches of rainfall produced the 25-foot rise in the water level cited above. Such a rise with that amount of water would indicate an effective porosity of 5.3 percent in this zone of water-level rise. The average annual fluctuation during 1951 and 1952 measured in 12 valley-floor wells tapping unconfined water in the valley fill (included on pls. 25 to 41) was 17.7 feet. With 5.3 percent effective porosity the average fluctuation indicates that an average of about 11 inches of water was recharged to the unconfined ground water in the valley fill during the 3-month period October-December, 1951. The water-level records also show that the water table approximately reached the surface at some of the wells and indicate that the opportunity for precipitation to percolate into ground-water storage was denied to part of the precipitation that fell on the valley plain in the 3-month period January to March of that winter.

The means by which recharge reaches the unconfined water in thr basalt beneath the Cooper Mountain-Bull Mountain upland is uncertain. The water table is roughly continuous with that beneath the valley floor on both sides of the upland and the water is of good quality though saline water is present at places in the upper part of the basalt in the synclinal troughs to the north and south of the upland. Thus, the quality of the water beneath the upland indicates that either some recharge must percolate vertically through the basalt beneath the upland or the water of good quality was present before the saline water entered the basalt in the synclinal areas north and south of Cooper and Bull Mountains.

Discharge

Some of the precipitation that percolates into the soil on the upland slopes is discharged to the surface in small seeps and springs that abound at the base of the soil in ravines and other irregularities of the upland surfaces. Small and moderate-sized (up to 100 gpm) springs occur where ravines and escarpments cut across perched or unconfined water in the porous zones of the lava rocks and the Troutdale formation. The prominent line of springs (one of which is spring 2/3W-4K1) at the base of the Columbia River basalt in the escarpment of the Chehalem Mountains east of Gaston is of this type. Many of the small upland creeks, such as Tryon (north of Oswego) and Chicken Creeks, are fed during the summer months by this type of ground-water discharge.

The ground water in the Boring lava is largely perched above the level of the water table, but substantial springs (see springs 1/1W-3E1, and 10H1 in table 3) flow from the lower ends of the most westerly extensions of the Boring lava. Apparently the lava has extended down former valleys in at least these two points below the altitude of the water table. The long points of lava apparently serve as drains for the ground water in the Boring lava as well as the unconfined water in the adjacent unconsolidated deposits. Small springs flow from the perched water in the Boring lava in the ravines and small creeks along the west slope of the Portland Hills.

The ground water which percolates through the aquifers of the Columbia River basalt toward the central part of the basin presumably has outlets to the surface; as its piezometric surface, in most places, is close to the level of the water table. Possibly the ground water passes from the basalt to the more porous zones of the overlying unconsolidated deposits or to the surface streams or to both through vertical fractures like that encountered by well 1/1W-27C1.

Along the east side of the valley the piezometric surface of the ground water in the Columbia River basalt stands at about 200 feet altitude in the wells near Lake Grove, 185 feet just west of Sylvan, and 215 feet just east of Bethany. Just east of the Portland Hills the water level in the basalt stands at about 40 feet altitude in the eastern wells of Oswego, and at 19 feet and 1 foot altitude in the wells of the Equitable Building in downtown Portland and the Pensylvania Salt Company at St. Johns, respectively, outside the Tualatin Basin. This drop of 160± feet in the altitude of the water in the basalt coincides with the anticlinal axis of the ridge. Though the sub-basalt shale must be raised up high enough to form a dam above 200 feet in altitude beneath the higher parts of this anticline, the low sags undoubtedly contain routes for passage of the ground water across this structural divide and out of the Tualatin Basin. A similar opportunity for the escape of some ground water through the basalt may exist in the low ridge along the south side of the Tualatin Basin between Parrett Mountain and Petes Mountain.

The water recharged during the winter months of each year to the unconsolidated deposits underlying the valley plains is discharged principally by lateral percolation to the streams. Discharge by evaporation from the land surface (as capillary draft) and by the transpiration of plants is a minor, though possibly significant, amount of water. A large part of the valley plain is tilled or planted to crops that do not draw large amounts of water from the zone of saturation. The summertime base water level observed in most wells is practically equivalent to the altitude of the nearby local stream drainage. Usually in July the base level is reached, and the average 11 inches of fall and early winter recharge, as well as the lesser but unknown amounts of winter and spring recharge, by then must have been discharged to the local streams.

USE OF WATER

Use of Ground Water

The principal uses of ground water in the valley are divided into four main divisions, namely (1) irrigation, (2) public, (3) domestic, and (4) industrial supply. These divisions, listed in order of their magnitude, show the relative volumes of the ground-water resources that are placed at the direct service of the valley residents.

Irrigation

Most of the water is used to irrigate dairy pasture and other field crops, but the irrigation of vegetables and berries for fresh market produce and the frozen-food-processing plants is coming into major importance. This latter use undoubtedly will increase as more successful irrigation wells are constructed in the valley-fill materials. This water is applied exclusively by means of sprinkler systems. Of those farms on which irrigation with ground water is practiced, the number of acres irrigated by wells ranges from about 1 acre to about 50 acres per farm. Of 75 farms irrigating 3 acres or more in 1953, the average irrigated area was about 15 acres. About 100 acres of a large golf course is irrigated from 2 wells.

In 1953 an estimated 1,125 acres were irrigated with ground water in the Tualatin Valley. That figure includes all the farms on which an acre or more was irrigated. Irrigation experts agree that the average amount of irrigation water required for most crops in this area is about 18 inches per growing season. That amount of irrigation approximately doubles the yield of field and row crops and gives much greater increase in pasture.

From the acreage and the water duty per year, the total withdrawal of ground water for irrigation during 1953 is estimated to be nearly 1,700 acre-feet, or about 46 percent of all the ground water used in the valley.

Below is a tabulation of the wells that supplied water to irrigate 5 acres or more during 1953:

Well no.	Acres irrigated	Well no.	Acres irrigated
1N/1W-28E1	35	1/2W-11F1	10
29P2	10	18P1	8
1N/2W-1G2	15	19A1	20
2N1	15	23Q2	40
3R1	30	26A1	8
5R2	50	31C1	30
21P1	11	1/3W-5F1	5
26P.	6	22E1	16
30G1	7	24R1	35
1N/3W-7E1	10	1/4W-1N1	10
25A1	14	6C1	15
29M1	5	8E1	5
31G1	7	31M1	10
32P1	12	2/1W-4B1	40
32P2	5	17B1	30
1N/4W-23R1	7	18J1	20
2N/3W-25M1	8	2/2W-1J1	50
1/1W-1B1	10	6D1	10
2J1	20	2/3W-1R1	15
2L1	20	2/3W-14C1 and -F1	50
2L2	10	3/1W-2Q1	20
2P1	35	10K1	15
6F1	5	14K1	10
24D1 and -D3	100	23A1	6
		3/1-7E1	25
24F1	30	7H1	15
25M1	6	18G1	15
1/2W-8K1	10		
8L1	7		
8C1	20		

Unpublished records
subject to revision

The larger irrigation wells, such as 1N/1W-28E1 and 2/2W-1J1, obtain water from the Columbia River basalt. Most of these basalt wells are located near the outer margins of the valley plain or near Cooper and Bull Mountains. At those places, the basalt is near enough to the surface so that drilling is economically feasible, the water level is high enough so that pumping costs are low, and the distance to points of recharge is short enough so that the water is of generally good quality. However, some wells centrally located in the valley plain do draw water for irrigation from the Columbia River basalt, especially in the Farmington area, where the basalt is at moderate depth below the surface (see pl. 5 for isodepth lines on the top of the Columbia River basalt).

In many places smaller irrigation wells that produce 25 to 50 gpm draw water from the valley fill. Very few of these wells are over 300 feet deep and the majority are under 150 feet. The extent of the known sand zones in the valley fill is discussed above under geology of the valley fill.

Public Supply

Seven small cities and towns and one private water district are supplied principally by ground water from 17 wells and 2 springs. The total quantity of ground water used in 1952 by these communities, which have a population of approximately 17,000, is estimated to be about 1,200 acre-feet. This is about 33 percent of the total quantity of ground water used in the valley. All 17 wells draw water from the Columbia River basalt. Their depths range from 188 to 980 feet, and their yields from as little as 35 gpm to more than 500 gpm.

The cities of Beaverton and Oswego have water mains connecting with the Bull Run supply of the city of Portland. These interconnections are maintained primarily as a source of emergency supply. The Bull Run supply is used exclusively by a large part of the suburban area in the eastern part of the valley, where the West Slope and Metzger Water Districts serve most of the area. The Wolf Creek Water District uses Bull Run water to supplement its supply from Johnson spring.

Below is a tabulation of the incorporated cities and towns that use ground water as their main source of supply. It shows the estimated amount of ground water used by each town in 1952, and the amount used by industry.

Use of ground water by Cities, Towns, and Water Districts in 1952

City, town, or water district	Total amount used (in millions of gallons)	Source of supply	Estimated population served	Industrial use (in millions of gallons)	
Banks	6.30	2 springs	700		
Beaverton	85.12	2 wells	4,500		
North Plains	4.33	2 wells	400		
Oswego	130.06	4 wells	4,000		
				(Cannery	13.84
Sherwood	45.93	2 wells	1,060	(Tannery	8.92
Tigard	40.00	2 wells	2,240	Industrial	1.34
Tualatin	7.65	2 wells	460	(Cannery	2.70
				(Dairy	.23
Lake Oswego Water Dist.	93.44	3 wells	5,000		
Total	412.83		18,300		27.03

From these figures, the average daily consumption per capita in 1952 was about 60 gallons.

Unpublished records
subject to revision

Domestic Supply

The rural population of Tualatin Valley, dependent on private wells for its water supply, is estimated as 23,400 in 1952 (based in part on the 1950 U. S. Census).

Assuming an average per capita consumption of 30 gallons per day, the amount of water used for domestic purposes in 1952 is estimated as about 630 acre-feet, or 211 million gallons. This is about 17 percent of the total estimated ground-water withdrawal from the valley. This domestic water is being pumped from an estimated 5,000 to 6,000 wells, most of which tap the shallow sand strata of the valley fill. Along the margins of the valley where the sand strata are not encountered the domestic wells draw water from the Columbia River basalt. There the wells are generally deeper than those in the valley fill. Most of the rock wells obtain enough household water by penetrating 50 to 100 feet of basalt.

Industrial Supply

Outside the incorporated cities and towns, the use of ground water for industry is relatively small. Sawyers Inc., a camera manufacturing and film-processing plant at Progress, reports for 1953 a consumption of 27 million gallons from a well tapping the Columbia River basalt. This is probably the largest industrial water user in the valley, dependent entirely on ground water.

The other industrial users include Portland Gas & Coke Co., which uses 2 million gallons per year for cooling purposes at two gas pumping stations; two slaughterhouses near Hillsboro; two sawmills; a pickle canning works northwest of Oswego; a horseradish-processing plant at Beaverton; and numerous greenhouses and refrigerator-storage rooms. The total use by industry, not supplied from public systems, is estimated to be about 50 million gallons per year or about 4 percent of the total ground water used in the valley.

Use of Surface Water

For comparison with the amount of ground water used in the valley, the quantity of surface water used by municipalities and water districts and for irrigation was computed for 1952.

Irrigation

According to records of a local power company, there were 8,640 acres under irrigation by surface water in 1952. Most of this land was sprinkler irrigated. Assuming an application of about 12 inches per year (lower than full irrigation requirements because of the shortage of water for some irrigators) the total surface water used for irrigation was about 8,600 acre-feet. This is about 5 times the volume furnished by ground water.

At the present time all the available surface water is being used, and hence no further expansion can take place in that practice unless additional storage is provided or inter-stream diversions are made.

A plan to construct storage dams, particularly one above Gaston, is now under discussion as a means of providing water to irrigate about 44,800 acres, nearly 4½ times the total land under irrigation at present. Such a project would still leave some 60,000 to 70,000 acres dependent on irrigation water from the ground or from other sources.

Public Supply

The largest two towns in the valley, Hillsboro and Forest Grove, are supplied entirely by surface water. At present, the supplies are said to be taxed to the limit and other sources may be needed in the near future.

The amount of surface water used by each town or water district in 1952 is shown below. The average daily use per capita was about 75 gallons.

Use of surface Water by Cities, Towns, and Water Districts in 1952

City, town, or water district	Total amount used (in millions of gallons)	Source of supply	Estimated population served	Industrial use (in millions of gallons)
Hillsboro	420.92	Seine Creek	11,000	(Cannery 260 (MillingCo. 103.8 (Railroad 8.85
Forest Grove	235.06	Clear Creek and Gales Creek	6,000	Cannery 187.25
Gaston	28.00	Hillsboro system	500	
Aloha-Huber	80.66	do.	3,000	
West Slope Water Dist.	166.29	Bull Run-Portland	6,400	
Wolf Creek Water Dist.	140.47	do.	7,925	
Metzger Water Dist.	69.45	do.	4,775	
Total	1,140.85		39,600	559.90

Unpublished records subject to revision

Dependability of the Ground-Water Supply

Past Records

Only within one small area have the water levels been affected seriously by withdrawals of ground water from other nearby wells. In the Sexton Mountain district south of Beaverton, the pumping of Beaverton's municiapl well 2 lowers the water level in some nearby wells that also tap water in the Columbia River basalt. Plate 32 shows the effect on the water level in one such nearby shallow basalt well. The water-level decline in this well (1/1W-21R1) has been about 20 feet in the 3 years 1948-51.

The only other known decline from the normal water level is less serious in effect. It occurs in the Farmington Artesian area. There the water level in well 2/2W-6D1 (pl. 42) has lowered about 2 feet in 3 years. This decline may be temporary, reflecting a lower-than-average rainfall in some past year, or may be due to other causes. Records of the water levels in wells of this area, covering a longer period, should permit better evaluation of the long-range effect of precipitation on the ground-water levels.

Even though long-term records are not available for the wells drawing water from the valley fill, it is safe to assume there has been no appreciable decline in the ground-water level, as present records show that the water-bearing material fills each year nearly to the surface.

Prospects for the Future

The records of the wells indicate that considerable ground water is available for further development without over depletion of the resource. Both the Columbia River basalt and the unconsolidated valley fill contains additional ground water now unused.

Along the north and south sides of the valley the basalt lies at relatively shallow depths and will afford yields of several hundred gallons of water per minute to properly constructed wells penetrating it a few hundred feet. Typical wells now tapping this resource include 1N/3W-1K2 of the town of North Plains, 1N/3W-5Q1 at Roy, 1/2W-29Q1 of the Farmington artesian area and 2/1W-23N1 near the town of Tualatin. Plate 5 is a contour map showing the approximate altitude at which the top of the basalt occurs. Plate 3 gives the land surface contours from which the altitude of any proposed drilling site may be determined approximately.

The sedimentary deposits underlying the main valley plains are of lake-deposition types, as previously described. With the exception of some beds beneath the Forest Grove-Hillsboro district, the most permeable materials are uniformly sized fine sand, and very fine sand. Nevertheless, a great quantity of water can be extracted from these deposits if wells are properly constructed for that purpose. This source of water is now tapped only for domestic use by wells of small capacity. The newer method for the construction of fine gravel and sand-packed wells in these deposits is described below in the section on Construction of Wells. If the ground water can be developed and drawn from the fine sand aquifers of the valley fill deposits economically, a vast quantity of water will be available for use. As shown under the section on Recharge, the average amount of water available for recharging the ground water from precipitation on the valley floor is approximated at some amount between about 11 and 20 inches in the fall, winter, and spring months of the average year. The drawing down of the water table by pumpage might have additional beneficial results from the conversion of late winter and spring runoff to ground water storage and from the easing of land drainage problems. The importance of the possible salvage-for-use of 11 to 20 inches of water over the whole valley plain is sufficient to warrant extensive research for the perfection of properly constructed wells to tap this resource.

CONSTRUCTION OF WELLS

Wells in Valley Fill

The common domestic well drilled into one of the sand units of the valley fill is 6 inches in diameter, cased with standard welded or coupled steel pipe. The casing is either perforated or left unperforated in the water-bearing zone. In either situation the development of the aquifer consists of removing sand in the vicinity of the well until a sand-free opening or pocket has been formed in the water-bearing material. Many wells finished in this manner have suffered a collapse of the sand walls and of any unsupported silt or clay stratum immediately above the aquifer. Many such collapsed sand wells and sand-pumping wells were encountered during examination of wells in the valley fill.

In the last 2 years, as the demand has increased for more irrigation water, some drillers have been installing wells equipped with a gravel pack. In general, these wells are drilled 18 or 20 inches in diameter and packed with one-eighth to one-fourth inch gravel around 6-, 8-, or 10-inch perforated casing. One of these wells, 1/2W-8C3, 200 feet deep, reportedly produced 200 gpm of sand-free water on test after completion. The average productivity of the first few wells is about 100 gpm. These gravel-packed wells are developed by gentle surging or pumping until the fine-gravel envelope has subsided compactly in support of the fine sand walls of the aquifer in the well and until the well will take no more packing material. The gravel envelope around the perforated casing partially holds the fine sand of the aquifer in place during development and during the use of the well. As most of these wells have been in production for only a short period, this method of constructing wells in these fine-grained sand aquifers still is in the experimental stage in this area. Many construction factors, such as the hydraulic conditions that might cause the fine sand to penetrate the gravel pack and to clog its interstices, are just now being determined.

Several drilling companies are experimenting with sand-packed wells that utilize a well screen instead of a perforated casing. A coarse sand or fine gravel can be used for the pack, the correct grain size being selected to hold the aquifer material in place and to prevent the penetration of the pack by large quantities of fine sand. The support of the aquifer sand in its original position is also desired to assure the retention of the horizontal permeability of the water-bearing formation. It is the belief of the authors that, when this method of well construction is perfected, permanent wells yielding 100 gpm or more will commonly be obtained from sand aquifers of the valley fill.

Wells in Columbia River Basalt

Drillers construct wells in the basalt by driving casing through the residual soils and the unconsolidated sediments and as far as possible into the basalt. An open hole is then drilled into the basalt, which generally does not have to be cased, until the desired quantity of water is obtained or the planned depth is reached.

Most domestic wells are 6 inches in diameter, though 8-inch casing is becoming popular. Irrigation wells are generally 12 inches in diameter. In addition to the larger pump space, it is believed that the heavier string of 12-inch tools helps to fracture the rock in the vicinity of the well, thus increasing its effective diameter and its specific yield.

CHEMICAL CHARACTER OF THE GROUND WATER

Overall Quality of the Ground Water

Complete chemcial analyses were obtained of water samples from 13 wells and 2 springs in the Tualatin Valley. Several partial analyses also were compiled from various sources (table 4). The hardness and chloride content of water from practically all the inventoried wells were determined by field methods (table 1). Plate 17 is a graphical representation of the analyses for 13 representative wells in the valley.

As a whole, the quality of the ground water is good. The formations younger than the sedimentary rocks of Oligocene and Miocene(?) age contain fresh water of good chemical quality, good color, and nongaseous nature. Where saline water has been encountered, the geologic and ground-water conditions suggest that rocks older than the Columbia River basalt contain water of connate origin. The occurrence of saline groundwater, and its intrusion in places into the younger rocks, must be avoided by the proper location and construction of the wells.

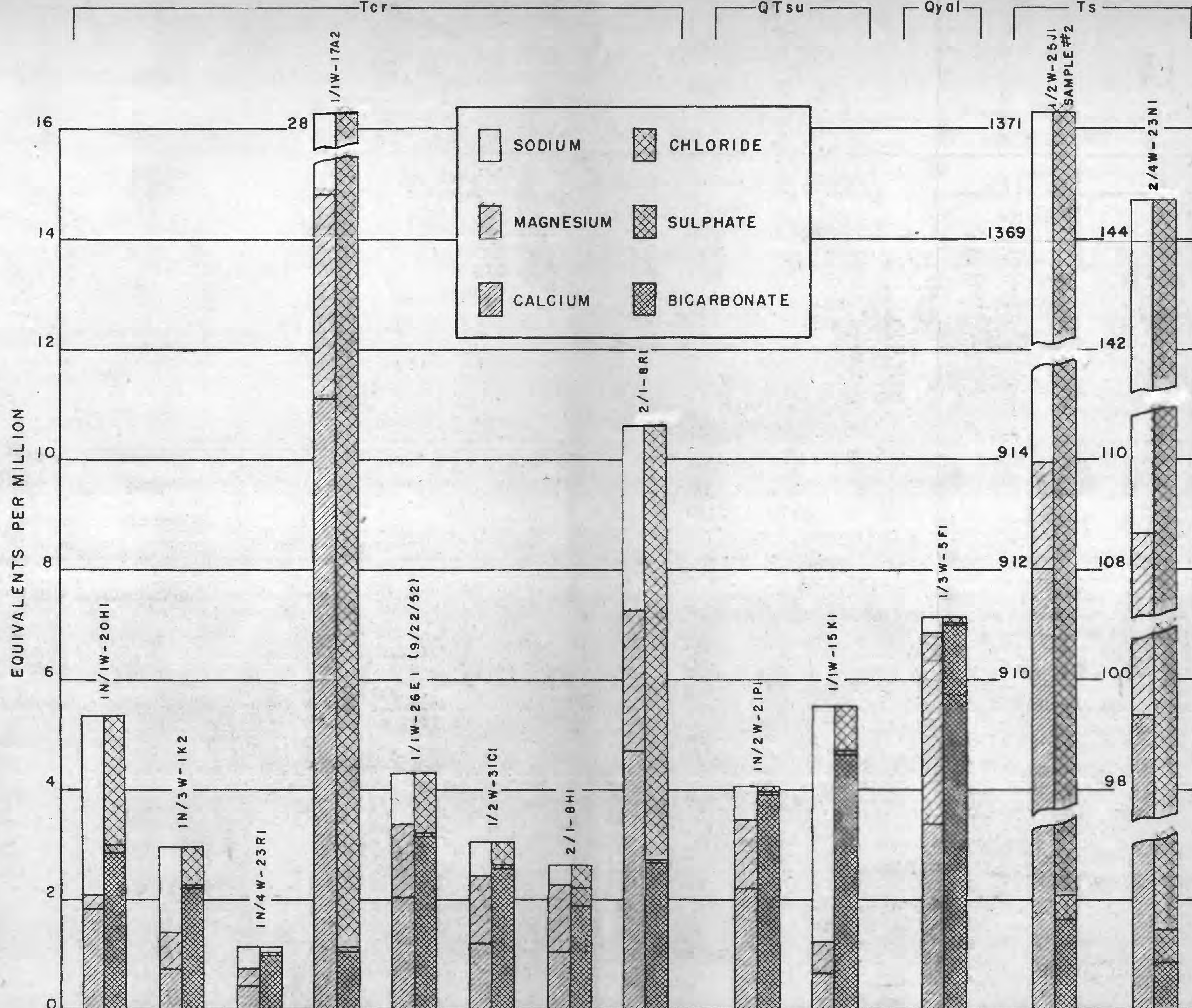
Hardness

Calcium, magnesium, and other soap-consuming elements in water, cause hardness which is commonly expressed as parts per million of calcium carbonate and is an indication of the soap-consuming nature of the water. A commonly used scale for expressing the relative hardness of water is given below (U. S. Geological Survey, 1953):

Hardness as $CaCO_3$ (parts per million)	Classification
0 - 60	Soft
61 - 120	Moderately hard
121 - 200	Hard
201 -	Very hard

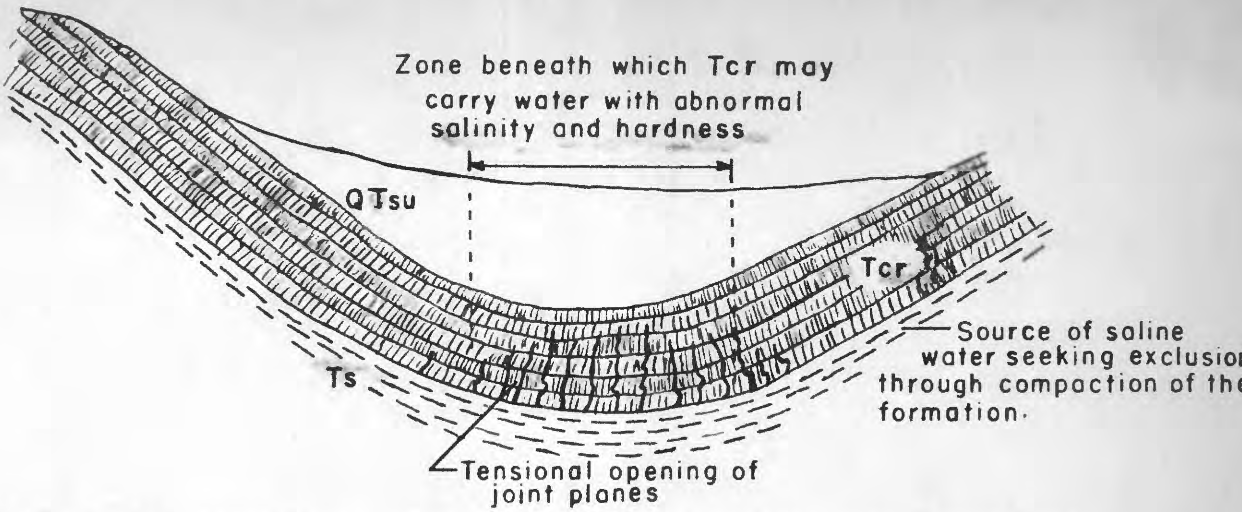
For 500 wells in the valley tapping all the known fresh water aquifers, the average hardness is about 115 ppm. From the above scale, this would be equivalent to a moderately hard water.

Water from the Columbia River basalt has an average hardness of about 100 ppm (from 342 wells) and ranges from 800 (well 1N/1W-28E1) to less than 10 ppm. No single area contains all hard or all soft water, but the most mineralized ground water in the basalt occurs in areas having unusual geologic relations (pl. 18). The normally hard-water wells in the basalt, as well as the soft-water wells, are scattered throughout the valley. Thus, in extreme cases, a well containing hard water may be very close to one having soft water. For example, well 2/3W-11C1 is 183 feet deep and has a water hardness of 352 ppm whereas well 2/3W-11K1, about half a mile away, is 150 feet deep and has a water hardness of only 46 ppm.

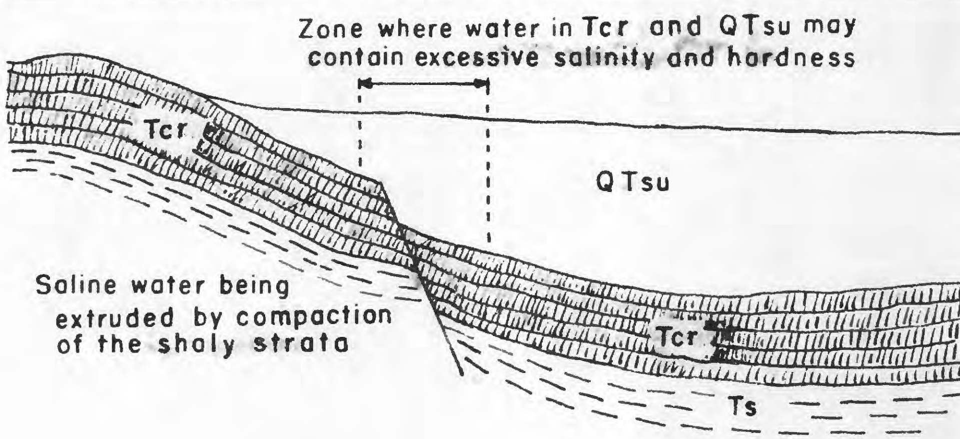


GRAPH SHOWING COMPARISON OF CHEMICAL CONSTITUENTS IN GROUND WATER OF THE TUALATIN VALLEY, OREGON. SOURCE OF WATER: Qyal, YOUNGER ALLUVIUM; QTsu, VALLEY FILL (UNDIFF.); Tcr, COLUMBIA RIVER BASALT; Ts, MARINE SEDIMENTS OF TERTIARY AGE.

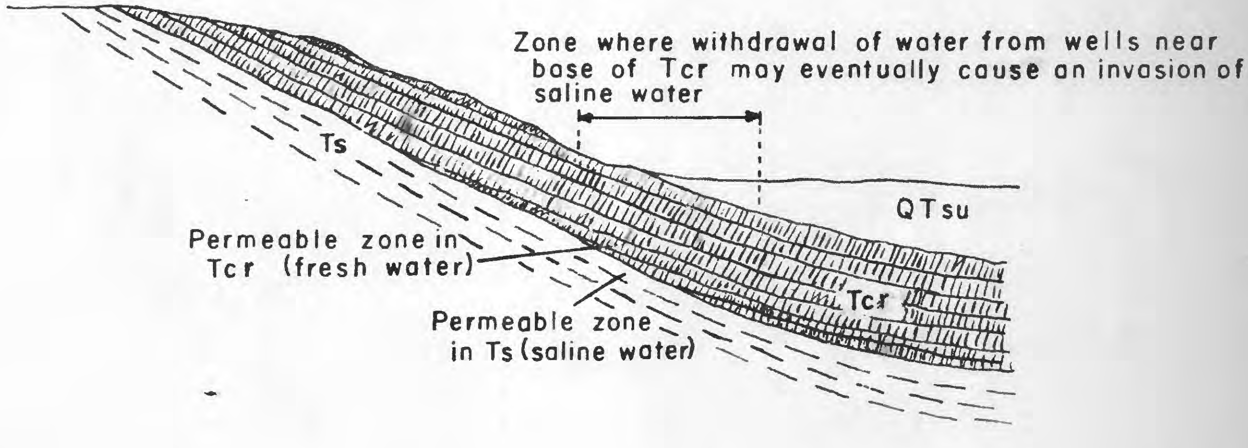
PLATE 18



(A) Upward egress from shale in tension cracks along axis of syncline



(B) Upward migration path through basalt along broken rock of fault zone



(C) Stratigraphic connection of basalt to saline aquifers

SKETCHES SHOWING SCHEMATICALLY, THE GEOLOGIC STRUCTURE, (A and B) AND THE STRATIGRAPHIC (C) CONDITIONS THAT PERMIT SALINE GROUND WATERS TO MIGRATE INTO THE COLUMBIA RIVER BASALT AND YOUNGER DEPOSITS (See plate 4 for explanation of geologic symbols)

Field analyses of water from 259 wells tapping the first 100 feet of the valley fill show an average hardness of 97 ppm. This is classed as a moderately hard water, but the hardness for individual wells ranges from 364 ppm (well 1/1W-34A1) to only a few parts per million.

Deeper wells in the valley fill, up to a depth of 400 feet, have an average hardness (57 wells) of 124 ppm which is hard according to the above scale. The harder waters in the valley fill are not in any one particular area but are scattered throughout the valley.

The similarity between the average hardness of the water from the basalt and that from the valley fill may be due to the lithologic similarity--the water-bearing sands in the valley fill are largely of basaltic and other volcanic material.

Salinity

In general, the chloride content of waters in the basalt does not exceed 20 ppm. There are instances, however, under certain geologic conditions, where saline water from rocks underlying the basalt (see pl. 18 and the section above on Geology) moves into parts of the aquifer. An example of this is the Murphy well (1/1W-27C1) that apparently was drilled into a fault zone and encountered water with a chloride content of 1,839 ppm. Another example is the well drilled at the St. Mary's of the Valley Academy. This well (1/1W-17A2), which is 1,500 feet deep, encountered water with a chloride content of 960 ppm. The water has probably worked upward along tension cracks in the sharp fold along the axis of the syncline north of Cooper Mountain.

So far, all the saline waters encountered in the basalt are predominantly a calcium chloride water, as are the waters from the underlying sedimentary rocks. Water from well 1/1W-17A2 (pl. 17) illustrates a calcium chloride type.

The 14 analyses of water from the basalt show negligible amounts of sulfate and nitrate, except for water from well 1/1W-21P1 which has 25 ppm sulfate--considerably higher than most basalt water but still not a detrimental concentration.

Water from the valley fill is generally low in salinity. The range of chloride averages from 5 to 50 ppm, with a few wells having 100 ppm and one (1N/1W-30P1) having 307 ppm chloride (table 1). Analyses of water from 4 wells (table 4) tapping the valley fill at varying depths, show the sulfate and nitrate content to be negligible.

Minor Constituents

Fluoride

In concentrations from about 0.5 to 1.5 ppm fluoride in drinking water is known to prevent or lessen the incidence of dental caries in children's teeth. In amounts greater than this, fluoride may cause a dental defect known as mottled enamel. The analysis of water from well 2/1-8R1, tapping the basalt, shows a fluoride content of 0.9 ppm. All the other analyses show a range in fluoride from 0.1 to 0.3 ppm (see table 4).

Iron

A concentration of about 0.3 ppm iron is considered the allowable limit in water of good quality for domestic use. Concentrations greater than this may stain laundry and plumbing fixtures. Almost any concentration is permissible for irrigation water. Iron occurs in ground water usually as a bicarbonate, although the sulfate and chloride may be present. Owners of several wells located in different parts of the valley report undesirable amounts of iron in their well water. Improvised or simple commercial iron-removal equipment, when built and operated properly, should be sufficient to remove the concentrations of iron present in ground waters of the valley.

Suitability of Water for Irrigation

The characteristics of a water that show its chemical suitability as an irrigation water, according to the Department of Agriculture (Richards, 1954), are: (1) the total concentration of soluble salts, (2) the relative proportion of sodium to other cations, and (3) the concentration of boron.

Electrical conductivity, because of its accuracy and ease of determination, is the simplest means to determine the approximate concentration of soluble salts in water. It is generally called the specific conductance and is expressed in micromhos per centimeter at 25° C. It is a measure of the salinity hazard present in an irrigation water.

The sodium (alkali) hazard of an irrigation water is the proportion of sodium to that of the other principal cations, calcium and magnesium. Before the sodium-adsorption ratio was developed, the relative proportion of sodium to other cations in an irrigation water was expressed in terms of the soluble-sodium percentage (percent sodium). The sodium-adsorption ratio of a soil solution is simply related to the adsorption of sodium by the soil; consequently this ratio has certain advantages for use as an index of the sodium or alkali hazard of the water. This ratio may be determined by the following formula where all cations are expressed in equivalents per million:

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

If the proportion of sodium to calcium and magnesium is high, the alkali hazard is high.

A graphical relation of the sodium-adsorption ratio to the electrical conductivity is shown on plate 19. This diagram classifies irrigation waters from low salinity (C1) and low sodium (S1) to very high salinity (C4) and very high sodium (S4). A water classified as C1-S1 is an excellent irrigation water and can be used on practically all soils and crops with little danger of damage. A water classified as C4-S4, however, is in general, unsuitable for irrigation except under special conditions. The irrigation suitability of waters which fall into one of the other 14 classifications depends on the permeability of the soil, the drainage conditions, the type of crops to be grown, and other factors.

Unpublished records
subject to revision

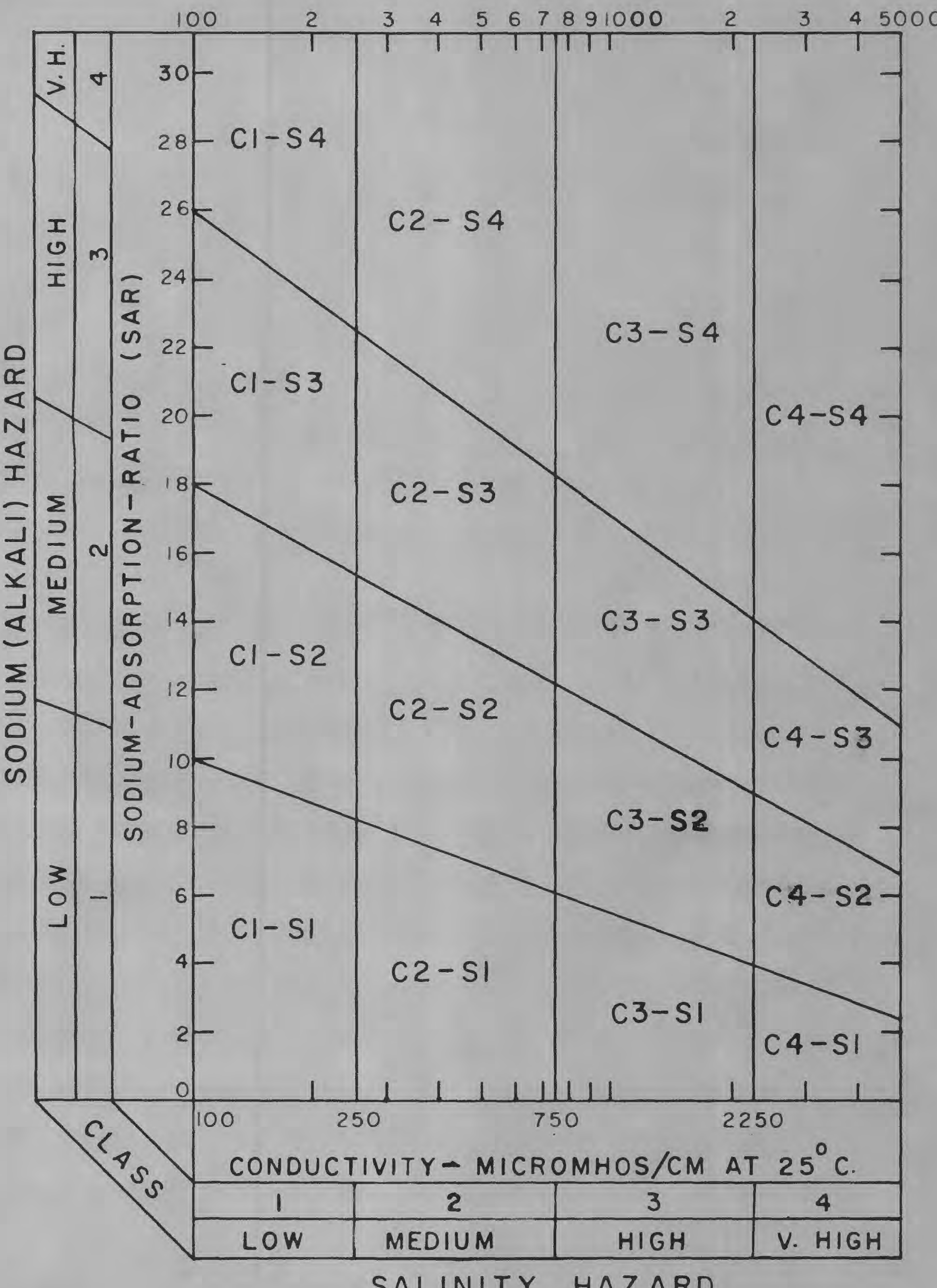


DIAGRAM FOR THE CLASSIFICATION OF IRRIGATION WATERS
(Taken from U.S. Dept. of Agri. Handbook no. 60, issued Feb. 1954)

Of the analyses made of the irrigation waters in the Tualatin Valley, four were complete enough to be classified according to the sodium adsorption ratio. Three of these waters, two (1N/2W-21P1 and 1/3W-5F1) from the valley fill and one (1/2W-31C1) from the basalt, were classified as C2-S1. Waters having this classification can be used on plants having moderate salt tolerance if a moderate amount of leaching occurs. The other water was from the basalt (1N/4W-23R1) and was classified as C1-S1. This type of water can be used on most soils and crops with little danger.

All the other waters for which the analyses were complete enough were classified as either C1-S1 or C2-S1, except the waters from wells 1/1W-17A2 and 2/4W-23N1. Water from these wells was classified as C4-S2 and C4-S1, respectively. The water from well 2/4W-23N1 comes directly from the sedimentary rocks of Oligocene and Miocene(?) age and the water from well 1/1W-17A2 is from the Columbia River basalt, but apparently is contaminated by water from the underlying sedimentary rocks. These two waters are generally unsuitable for irrigation but may be used occasionally if drainage is adequate, if very salt-tolerant crops are used, and if the soils have a high permeability.

Boron is necessary, in small amounts, for the growth of all plants, but is injurious when present in only slightly greater amounts. The permissible boron concentrations vary with each type of plant. The plants most sensitive to bohon may be damaged by a concentration of a little greater than 0.33 ppm whereas the most tolerant will be undamaged by a concentration as high as 3.75 ppm (Scofield 1936).

Of the 5 analyses showing boron (table 4) only 1 has a boron content of over 0.33 ppm. Water from this well (2/4W-23N1), tapping the sedimentary rocks of Oligocene and Miocene(?) age, contains a boron content of 2.1 ppm.

Temperature

The temperature of ground water is fairly constant throughout the valley and differs only slightly from the mean annual temperature (52° F.) plus the amount due to the earth-temperature gradient which is about 1.8° F. for each 100 feet below the first 100 feet of depth.

Water from four wells that tap basalt and range in depth from 314 to 585 feet ranges in temperature from 55° to 58° F. The deepest water from the well tapping the basalt in the valley (1/1W-17A2) has a temperature of 73° F. which is about 2° F. lower than that calculated from the earth's normal temperature gradient.

The water from well (1N/1W-14Q1) 132 feet deep, drilled into the valley fill, has a temperature of 58° F., which is about 5° F. warmer than that calculated from the normal earth-temperature gradient.

WELL, SPRING, AND QUALITY-OF-WATER RECORDS

The many detailed characteristics of the occurrence of ground water in the Tualatin Valley are given in 4 tables containing pertinent data on the representative wells and springs. Table 1 gives the data on representative wells and table 2 the stratigraphic information obtained by drillers' logs. Table 3 lists the data on springs and table 4 the chemical analyses of the ground water.

The listed depth of most wells (see table 1) is based on reports by owners or drillers, because few of the wells could be entered for measurement. Those depths shown to the nearest tenth of a foot were measured by the U. S. Geological Survey.

Water levels are expressed in feet below a land-surface datum, a plane of reference at each well which coincides with the general level of the land immediately adjacent. Those levels given to the nearest tenth of a foot were measured by the U. S. Geological Survey; those given to the nearest foot were reported and are considered dependable within a few feet.

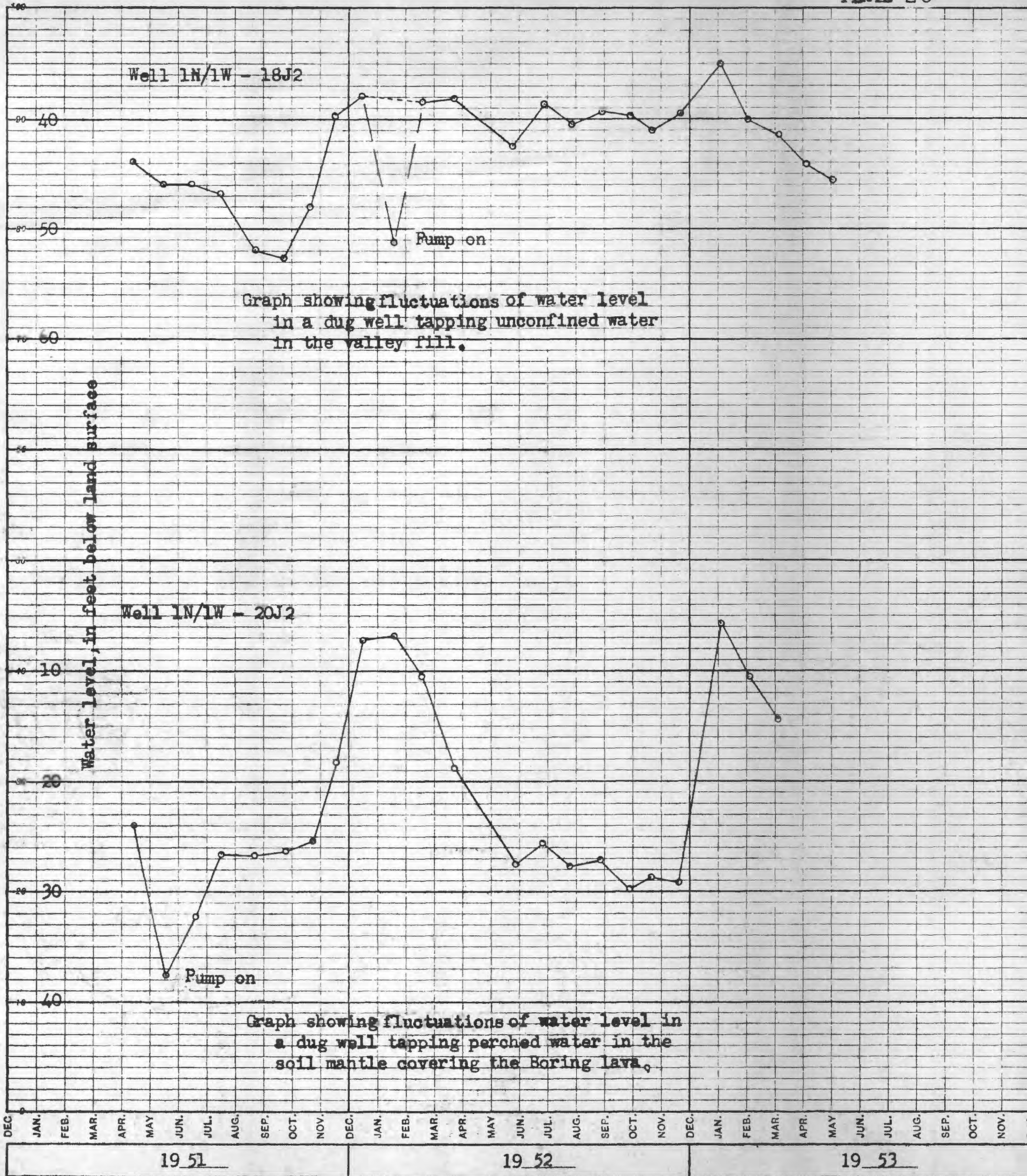
Except in those wells for which drillers' logs were available, the character of the water-bearing material (table 1, column 10) is largely that reported by the owner.

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 the pump (table 1, column 14) are necessarily approximate. They do not, in all cases, show the ultimate yields of the wells, of which some have potential capacities much greater than the current rate of use.

The chemical analyses of ground water listed in table 4 were made by the U. S. Geological Survey and by others, as shown in the footnotes.

PLATE 20



Well 1N/1W - 18J2
Pump on
Graph showing fluctuations of water level in a dug well tapping unconfined water in the valley fill.
Well 1N/1W - 20J2
Pump on
Graph showing fluctuations of water level in a dug well tapping perched water in the soil mantle covering the Boring lava.
Water level, in feet below land surface
40
50
60
10
20
30
40
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PLATE 20

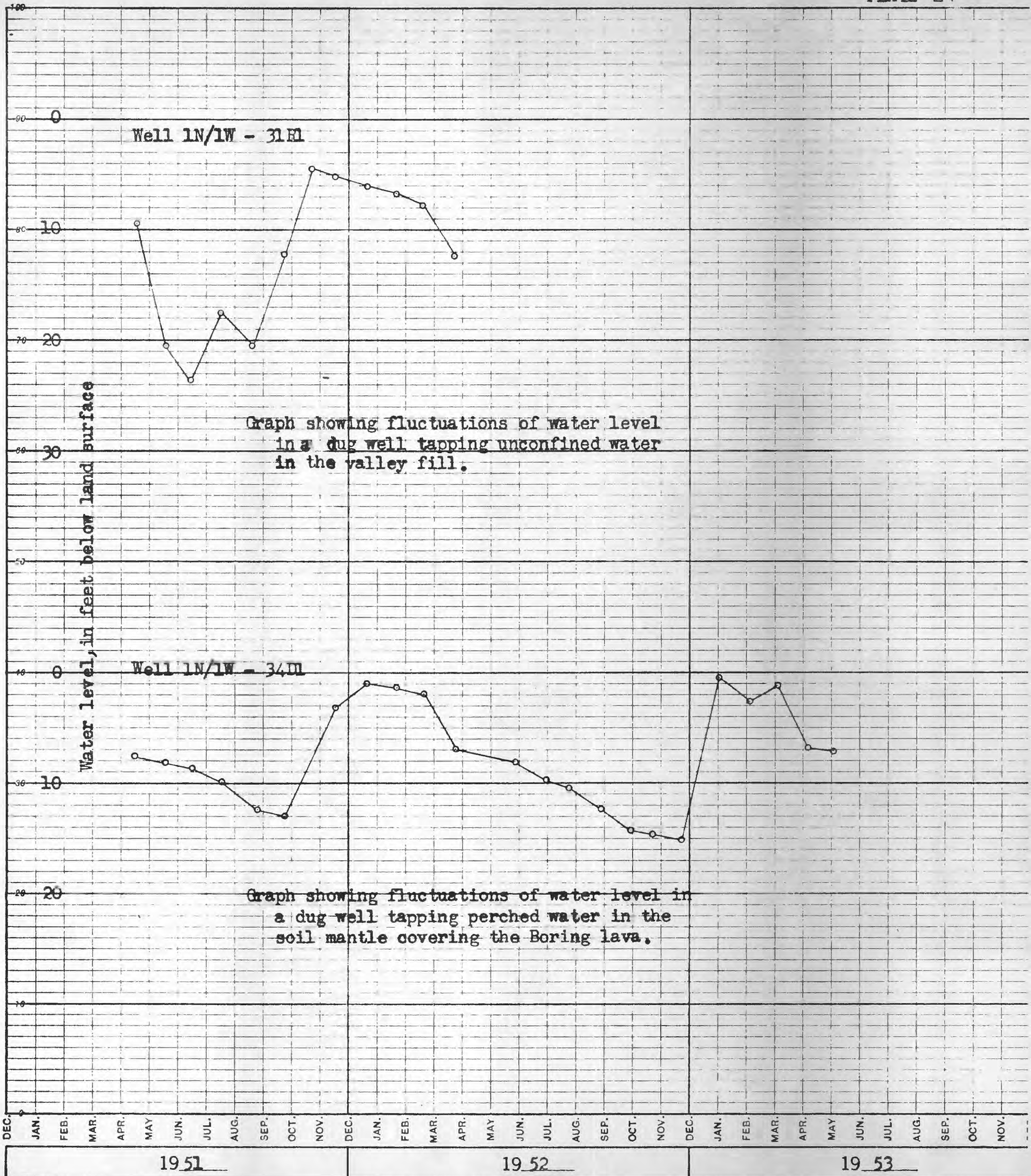
Well 1N/1W - 31E1
Graph showing fluctuations of water level in a dug well tapping unconfined water in the valley fill.
Well 1N/1W - 34D1
Graph showing fluctuations of water level in a dug well tapping perched water in the soil mantle covering the Boring lava.
Water level, in feet below land surface
0
10
20
30
0
10
20
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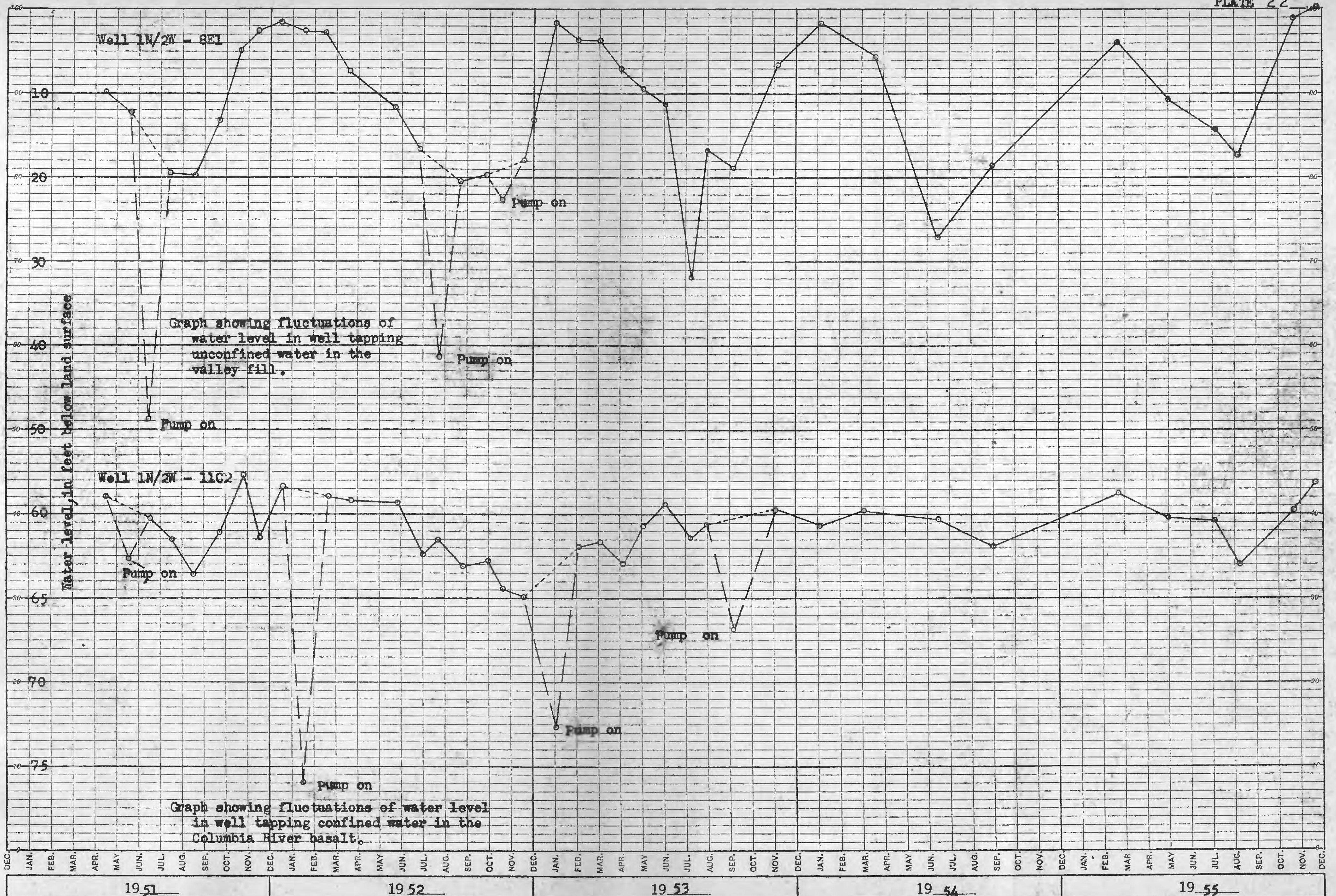
PLATE 21


Well 1N/2W - 8E1
Graph showing fluctuations of water level in well tapping unconfined water in the valley fill.
Pump on
Pump on
Pump on
Well 1N/2W - 11C2
Pump on
Pump on
Pump on
Pump on
Graph showing fluctuations of water level in well tapping confined water in the Columbia River basalt.
Water level, in feet below land surface
10
20
30
40
50
60
65
70
75
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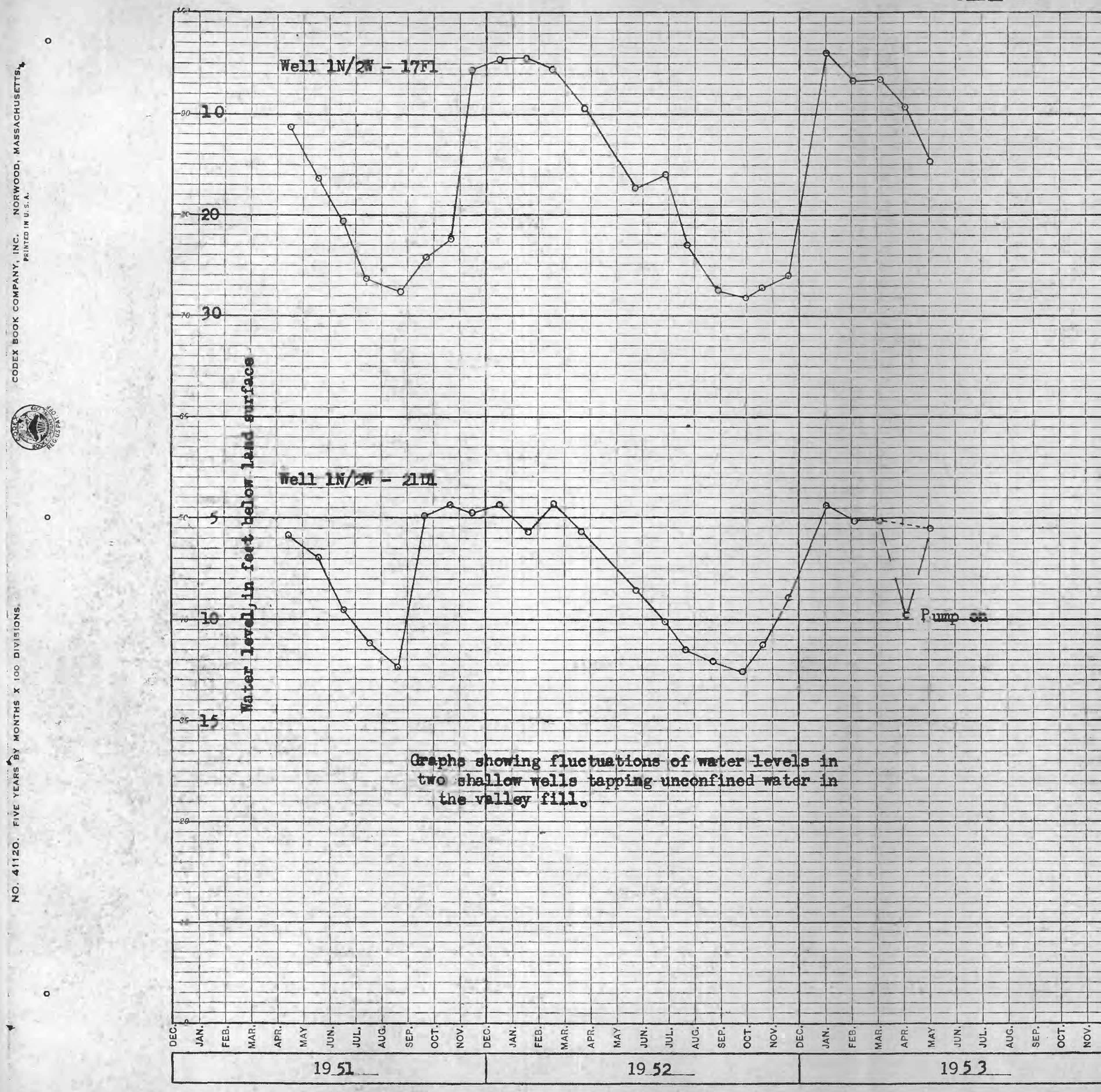
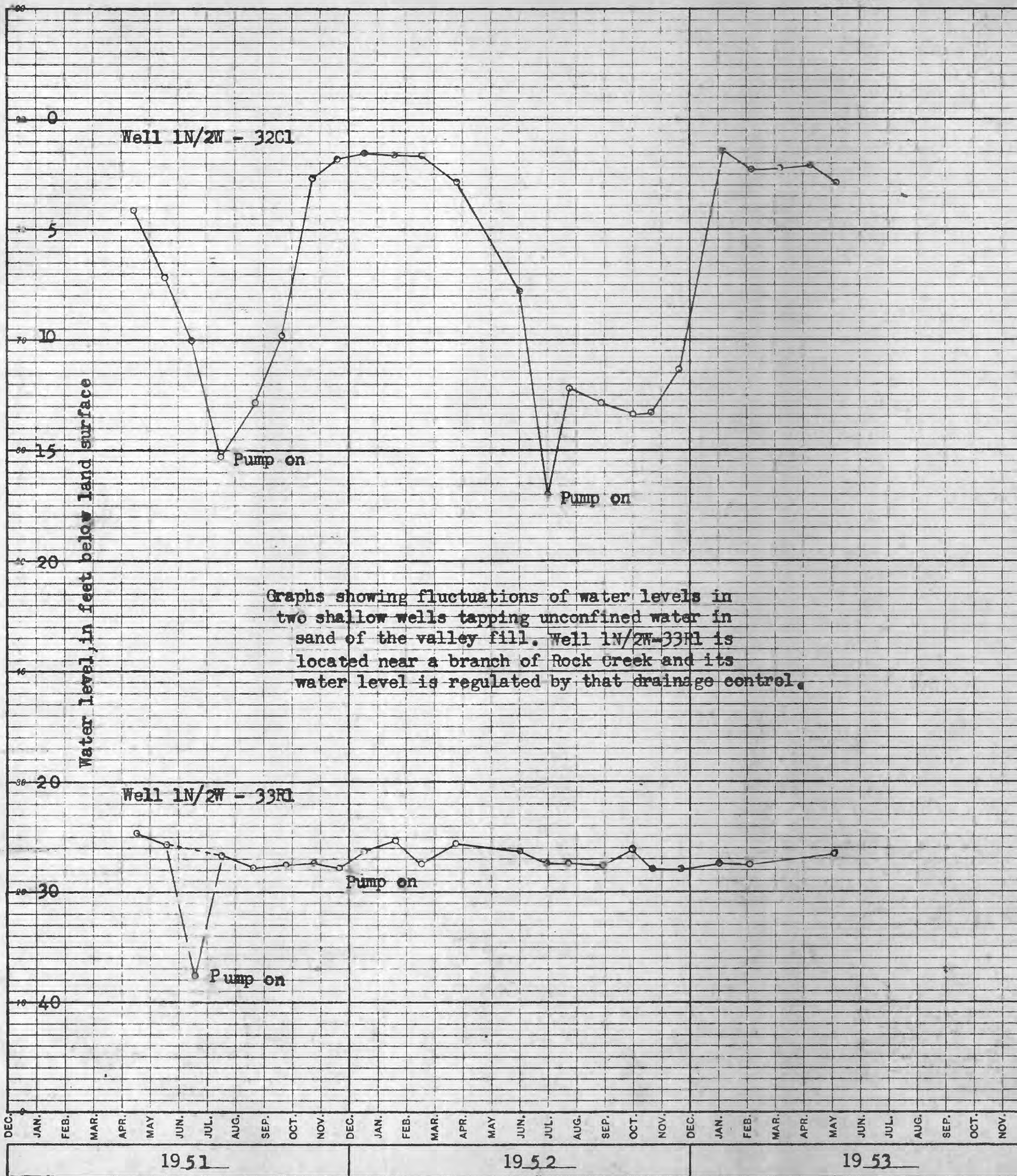


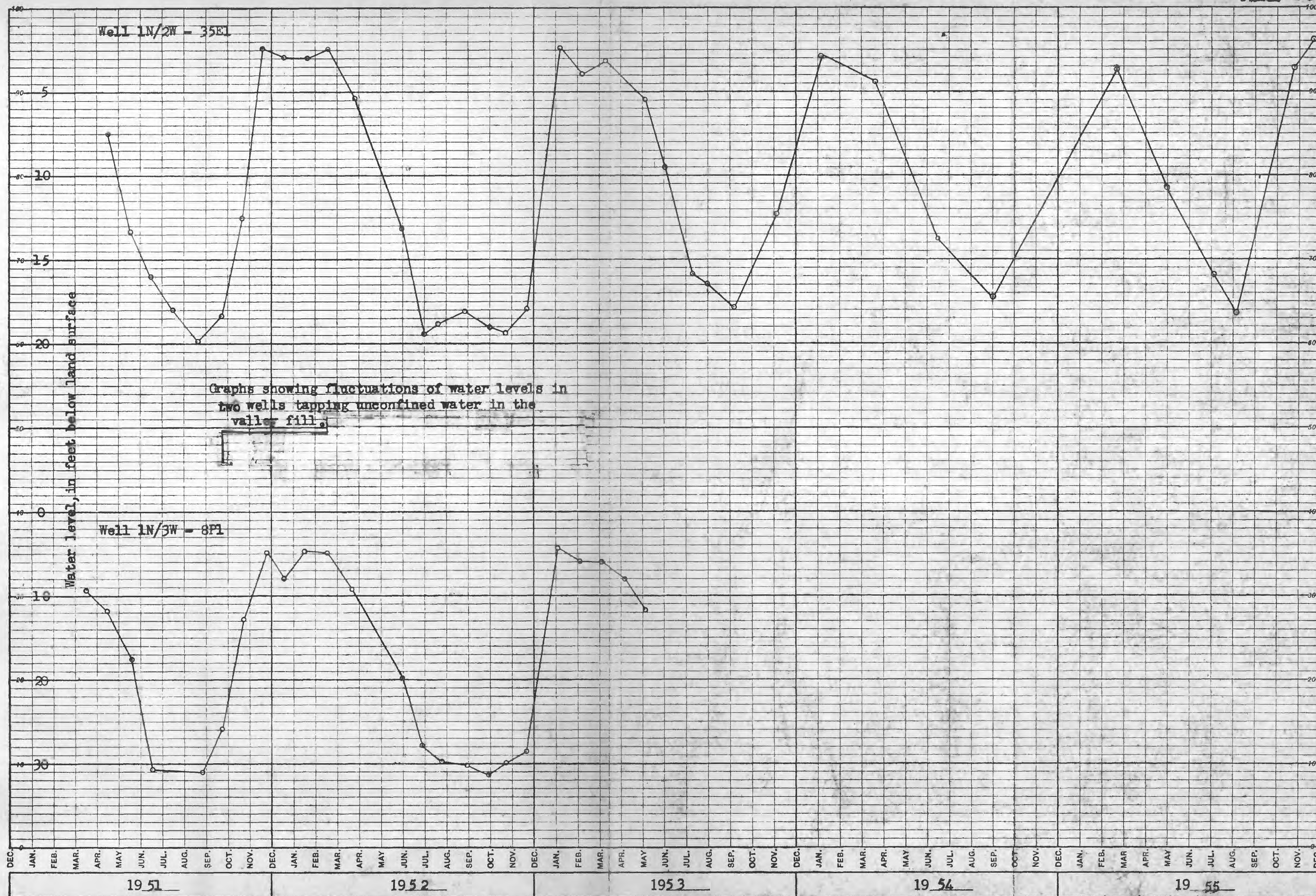
Graphs showing fluctuations of water levels in two shallow wells tapping unconfined water in the valley fill.

PLATE 23

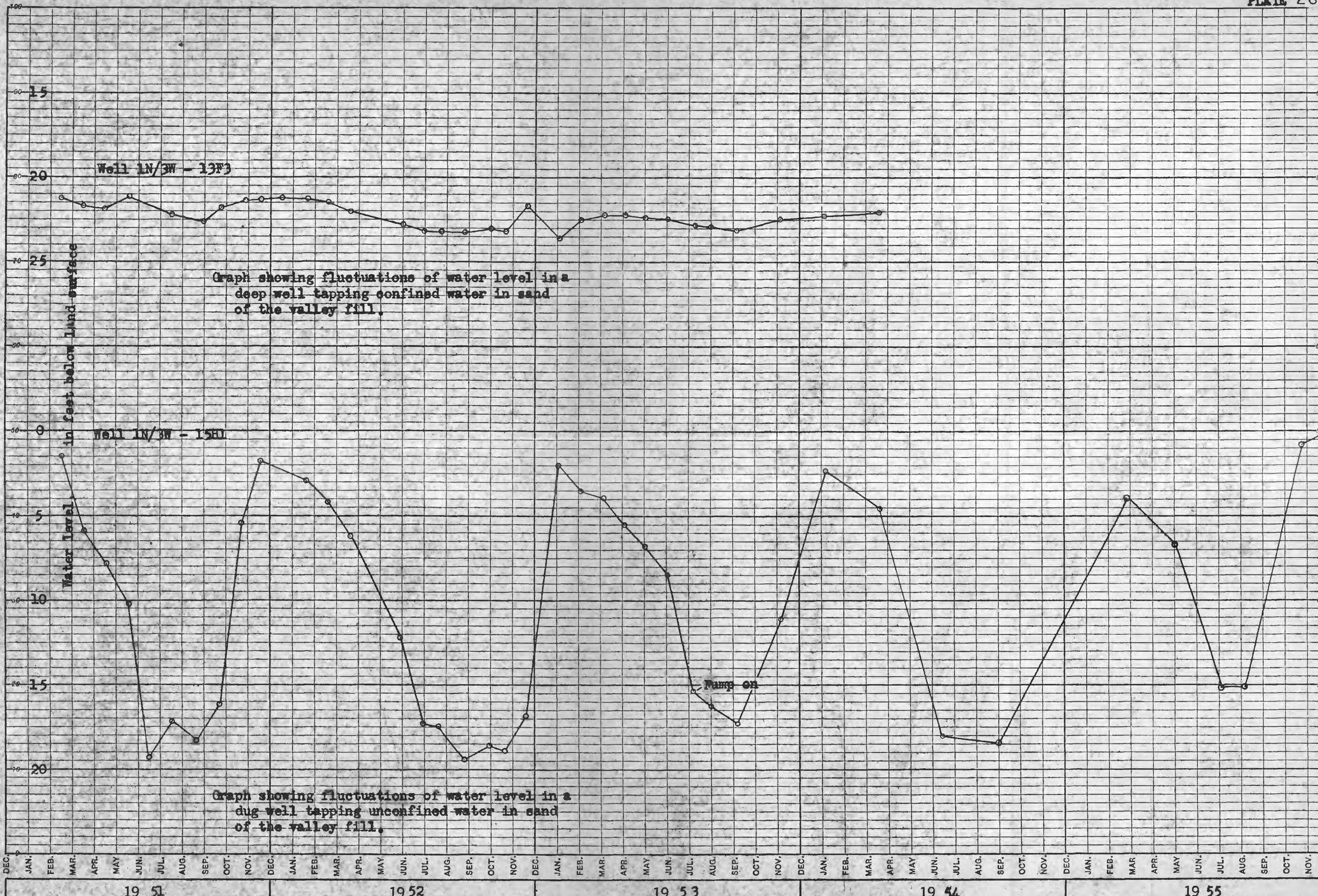


Graphs showing fluctuations of water levels in two shallow wells tapping unconfined water in sand of the valley fill. Well 1N/2W-33R1 is located near a branch of Rock Creek and its water level is regulated by that drainage control.

PLATE 24



Graphs showing fluctuations of water levels in two wells tapping unconfined water in the valley fill.


Well 1N/3W - 13F3
Graph showing fluctuations of water level in a deep well tapping confined water in sand of the valley fill.
Water level in feet below land surface
Well 1N/3W - 15H1
Pump on
Graph showing fluctuations of water level in a dug well tapping unconfined water in sand of the valley fill.
15
20
25
0
5
10
15
20
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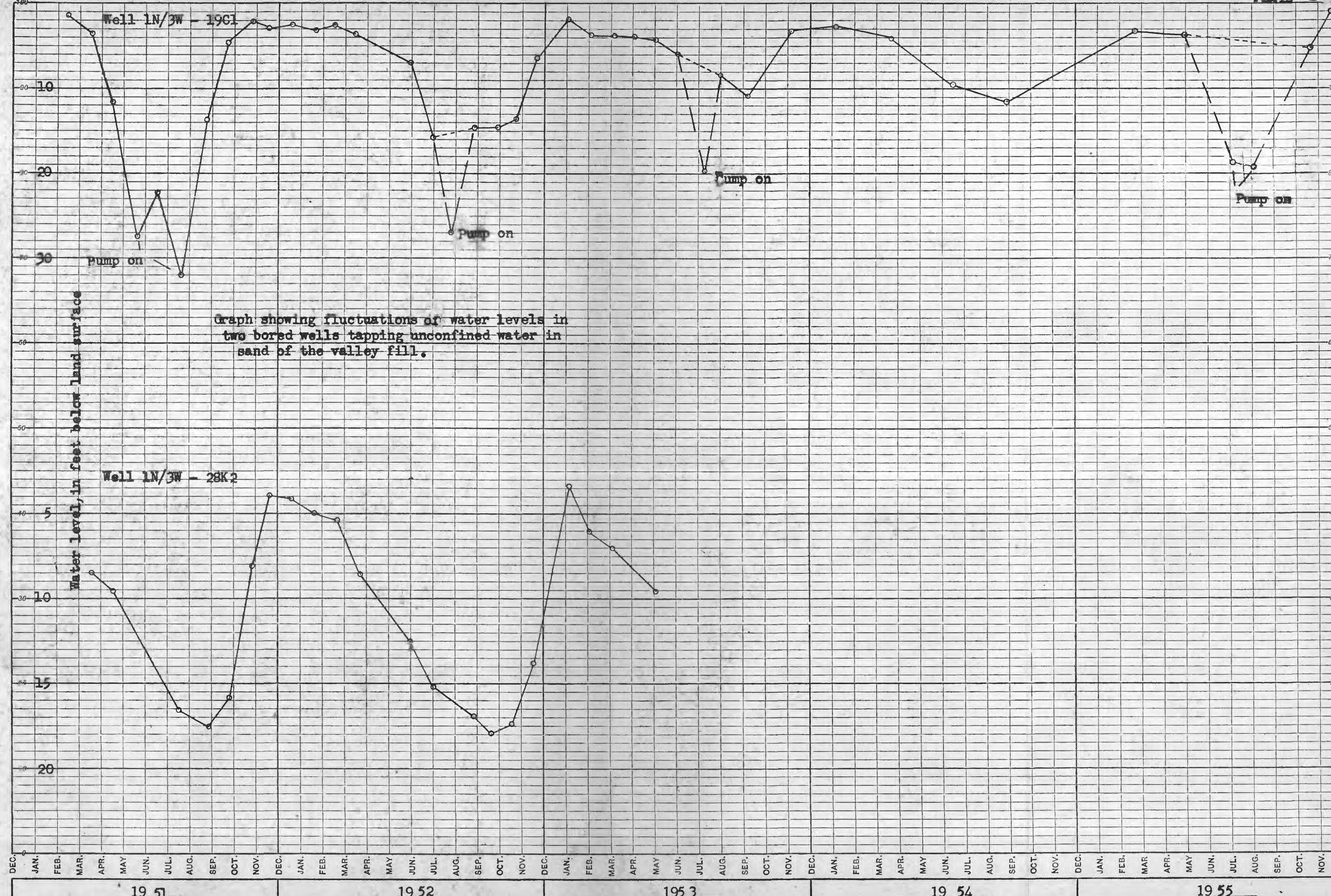
Well 1N/3W - 19C1
Well 1N/3W - 28K2
Pump on
Pump on
Pump on
Pump on
Graph showing fluctuations of water levels in two bored wells tapping unconfined water in sand of the valley fill.
Water level, in feet below land surface
10
20
30
5
10
15
20
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV.
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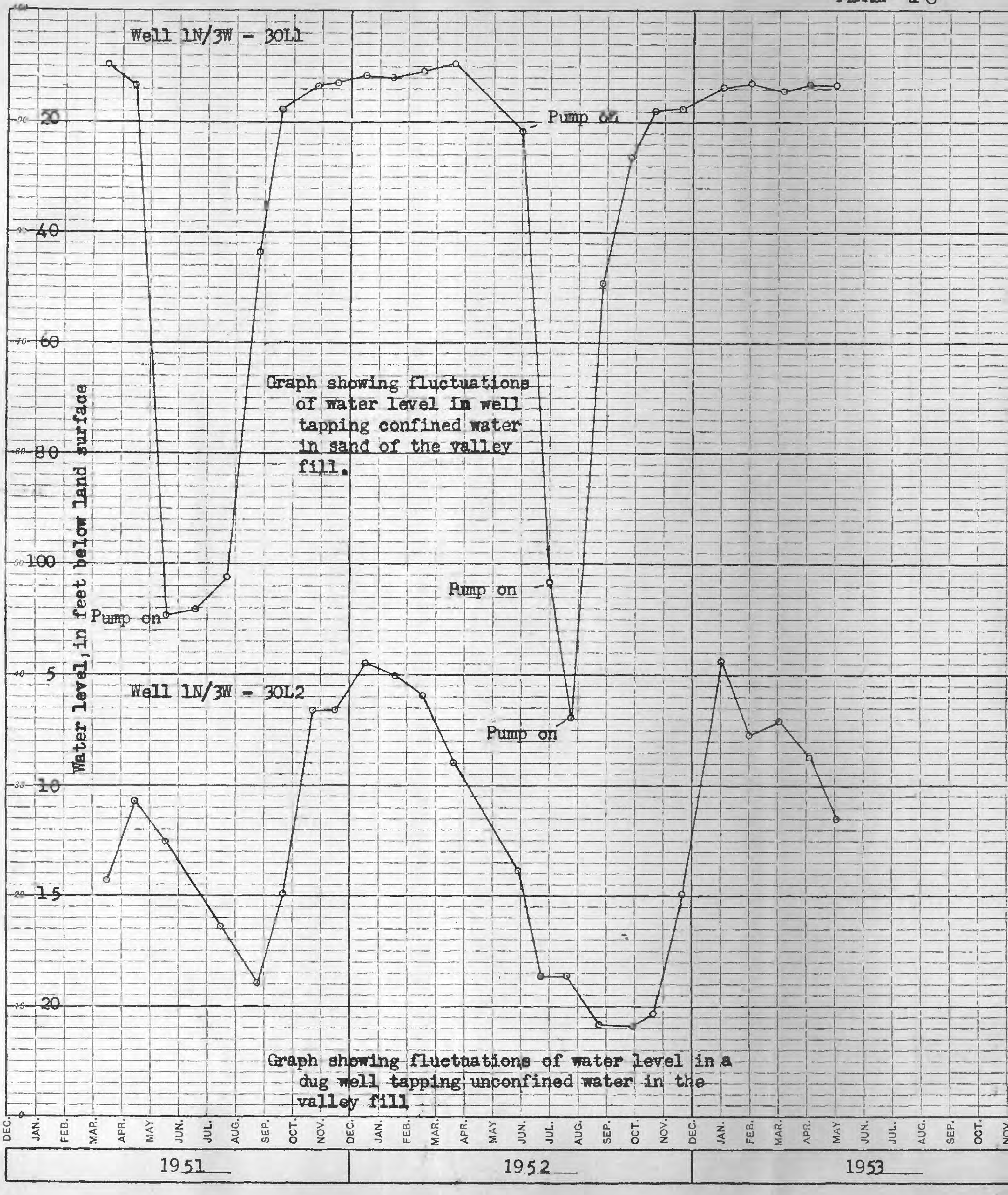
Well 1N/3W - 30L1
Pump off
Pump on
Pump on
Pump on
Graph showing fluctuations of water level in well tapping confined water in sand of the valley fill.
Water level, in feet below land surface
20
40
60
80
100
5
10
15
20
Well 1N/3W - 30L2
Graph showing fluctuations of water level in a dug well tapping unconfined water in the valley fill
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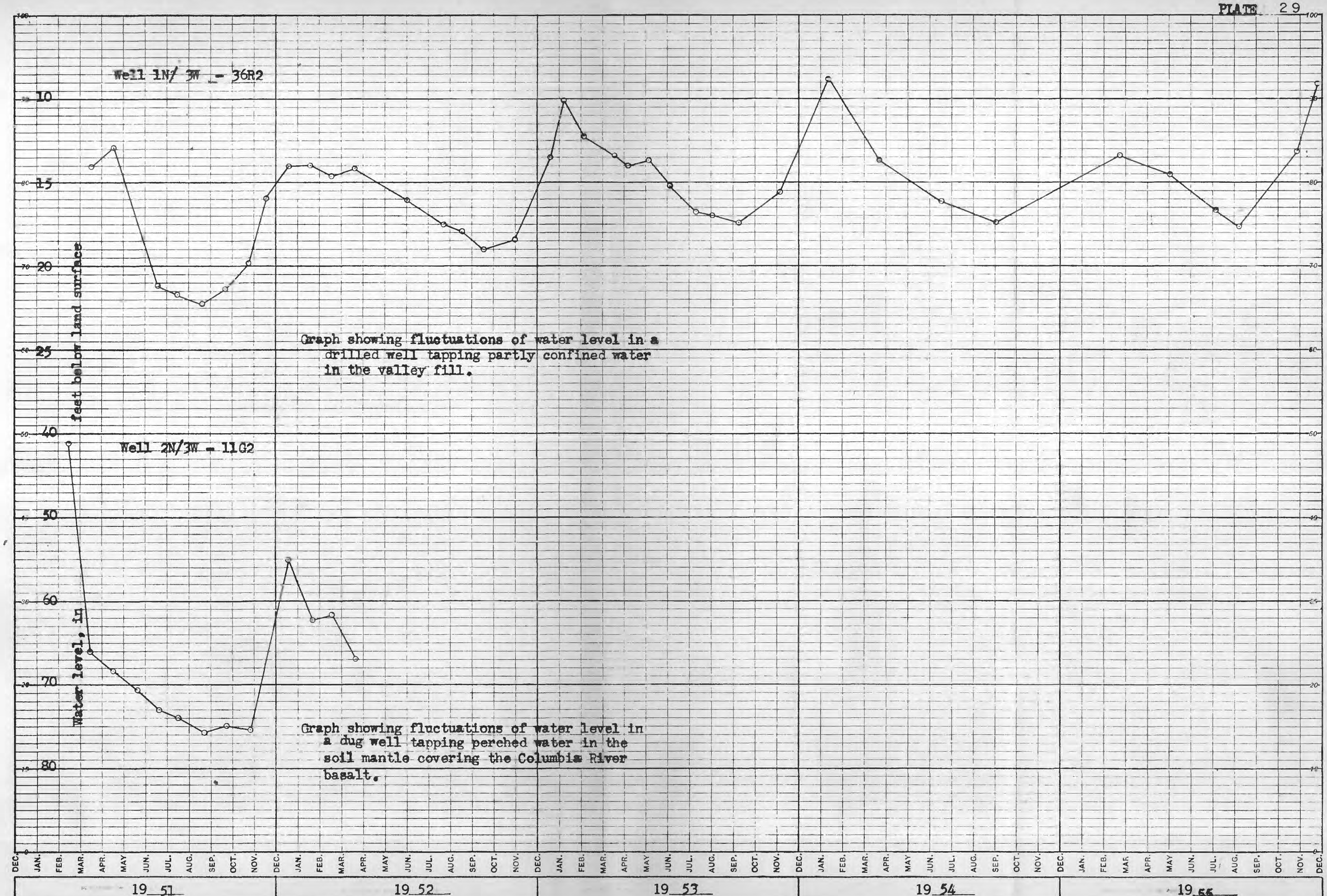
PLATE 28


Well 1N/ 3W - 36R2
Well 2N/3W - 11G2
Water level, in feet below land surface
10
15
20
25
40
50
60
70
80
Graph showing fluctuations of water level in a drilled well tapping partly confined water in the valley fill.
Graph showing fluctuations of water level in a dug well tapping perched water in the soil mantle covering the Columbia River basalt.
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1953
1954
1955

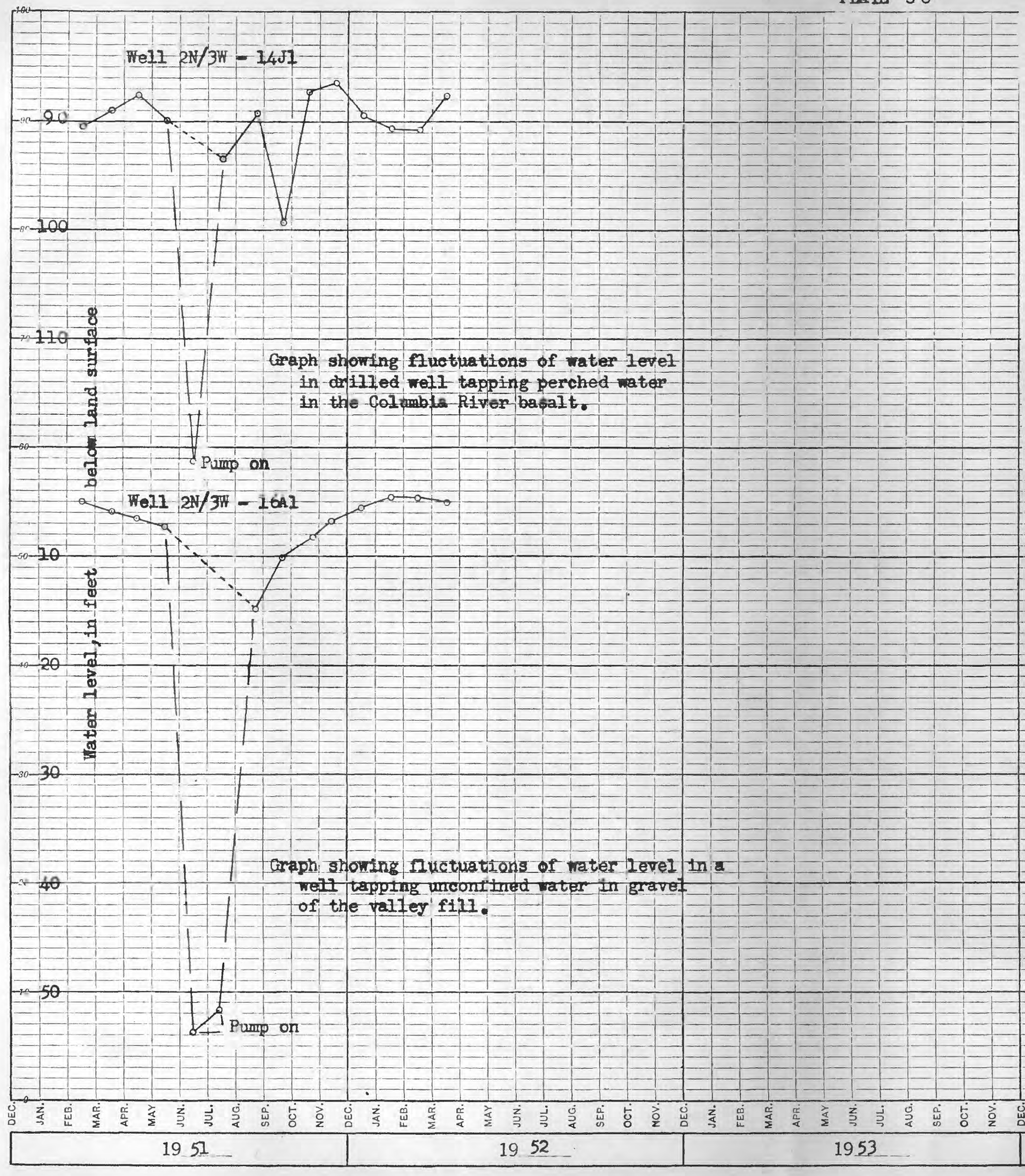
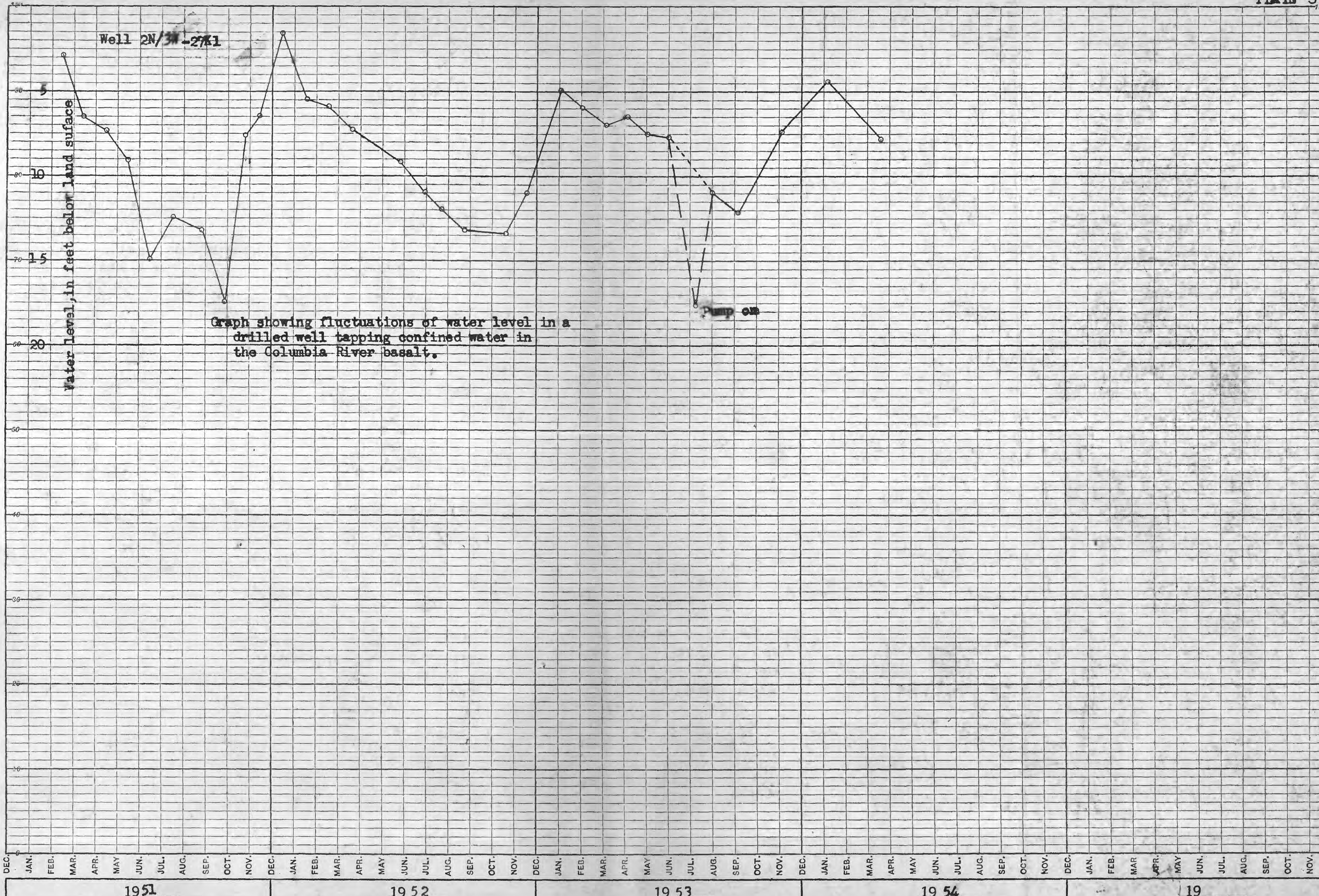
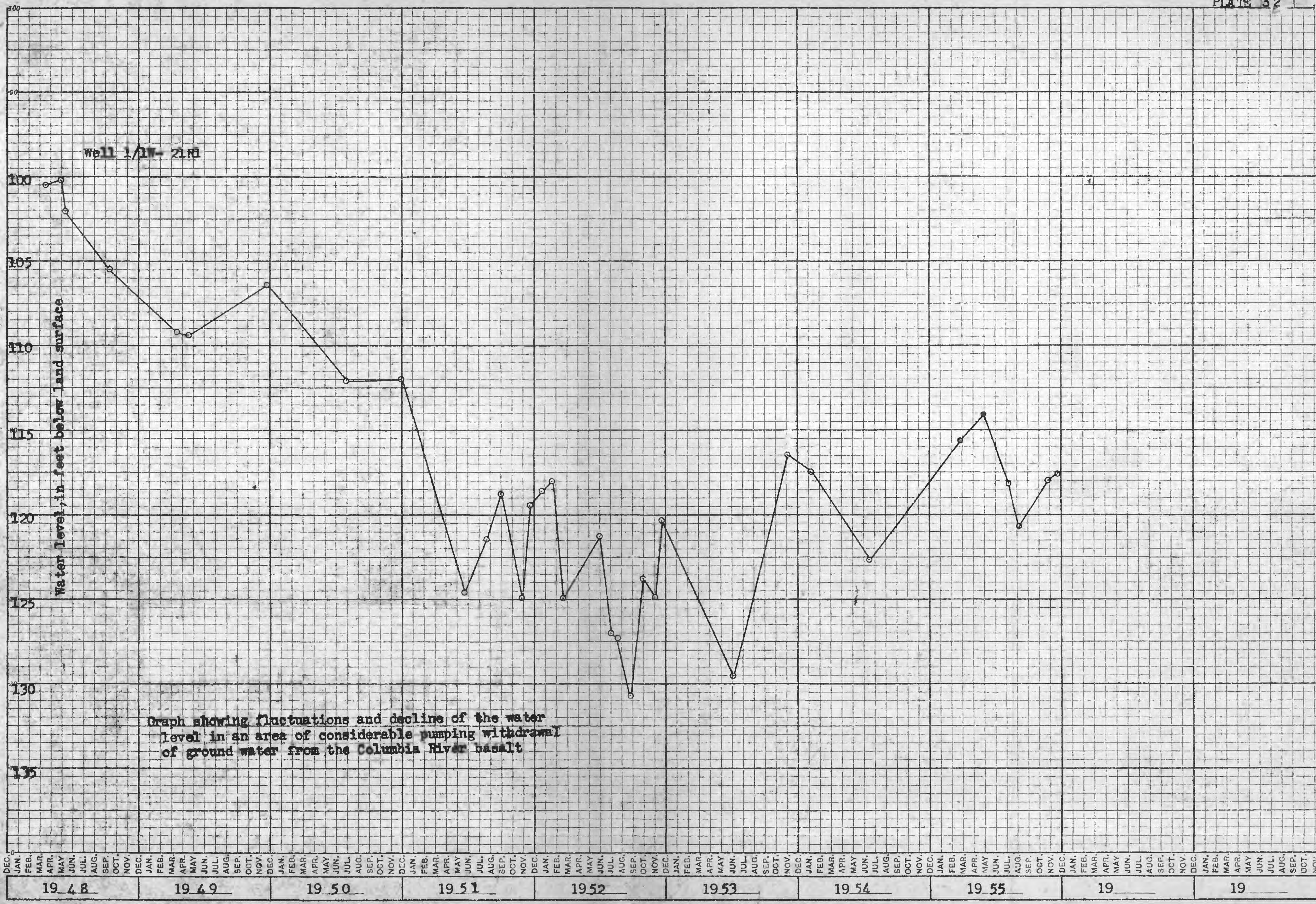

Well 2N/3W - 14J1
Pump on
Graph showing fluctuations of water level in drilled well tapping perched water in the Columbia River basalt.
Well 2N/3W - 16A1
Pump on
Graph showing fluctuations of water level in a well tapping unconfined water in gravel of the valley fill.
Water level, in feet below land surface
90
100
110
10
20
30
40
50
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.
1951
1952
1953

PLATE 30



Well 2N/3W-27K1
Water level, in feet below land suface
5
10
15
20
Pump on
Graph showing fluctuations of water level in a drilled well tapping confined water in the Columbia River basalt.
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV.
1951
1952
1953
1954
19



Graph showing fluctuations and decline of the water level in an area of considerable pumping withdrawal of ground water from the Columbia River basalt

Graph showing fluctuations of water level in a drilled well tapping confined water in the Columbia River basalt. Summer time lows are partly due to pumping withdrawals.

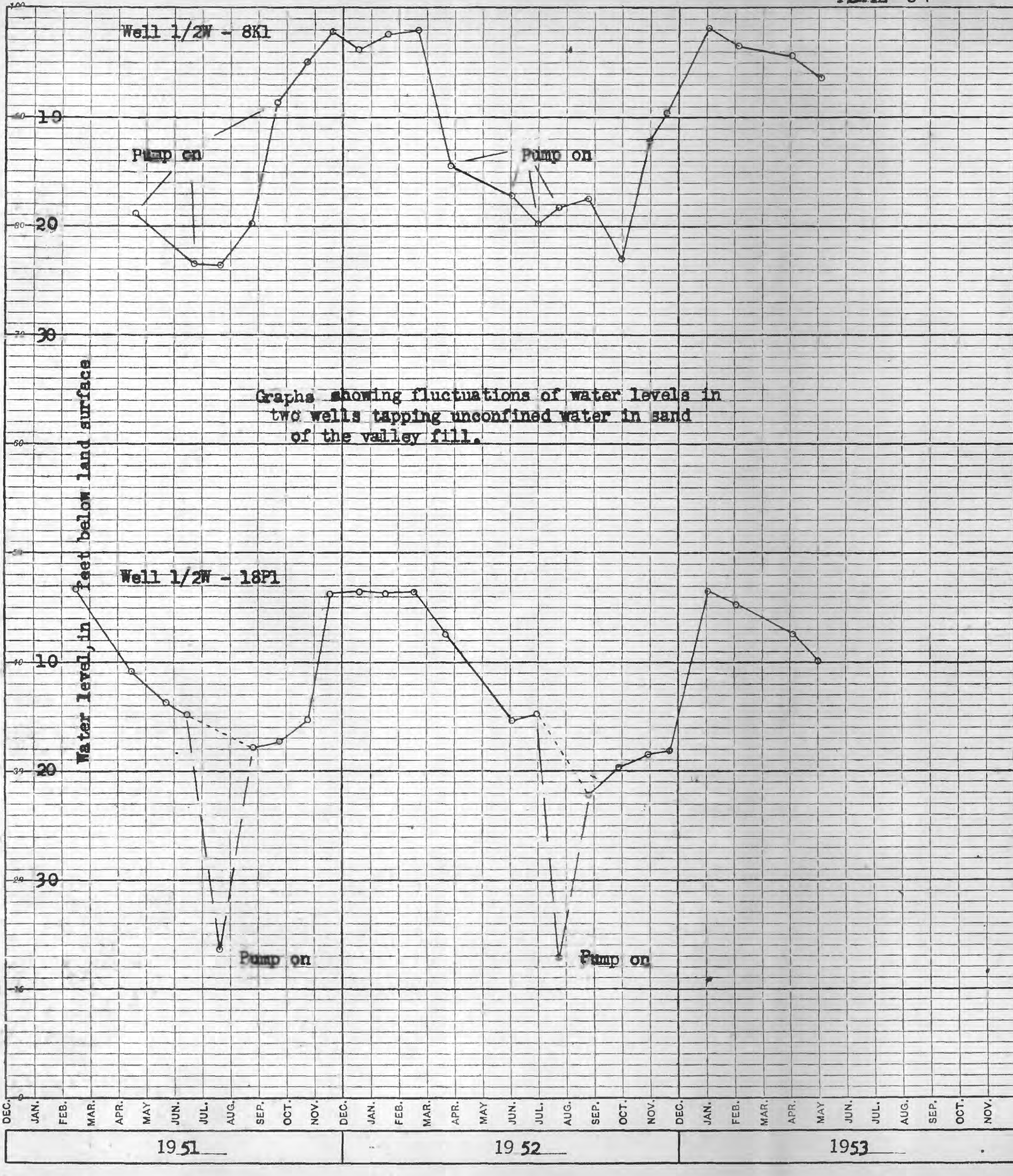
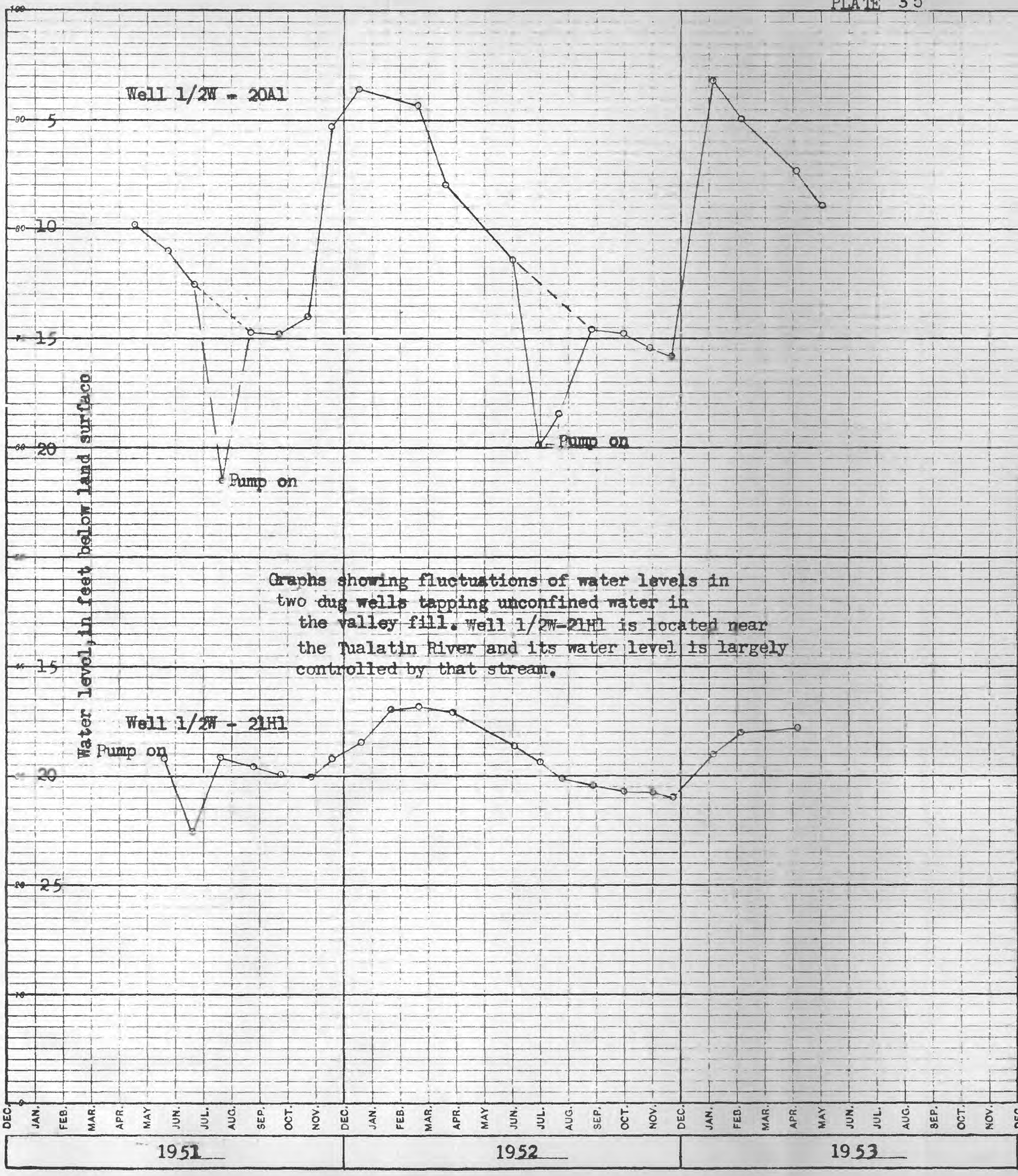

Well 1/2W - 8K1
Pump on
Pump on
Graphs showing fluctuations of water levels in two wells tapping unconfined water in sand of the valley fill.
Water level, in feet below land surface
Well 1/2W - 18P1
Pump on
Pump on
10
20
30
10
20
30
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV.
1951
1952
1953

PLATE 34



Graphs showing fluctuations of water levels in two dug wells tapping unconfined water in the valley fill. Well 1/2W-21H1 is located near the Tualatin River and its water level is largely controlled by that stream.

PLATE 35

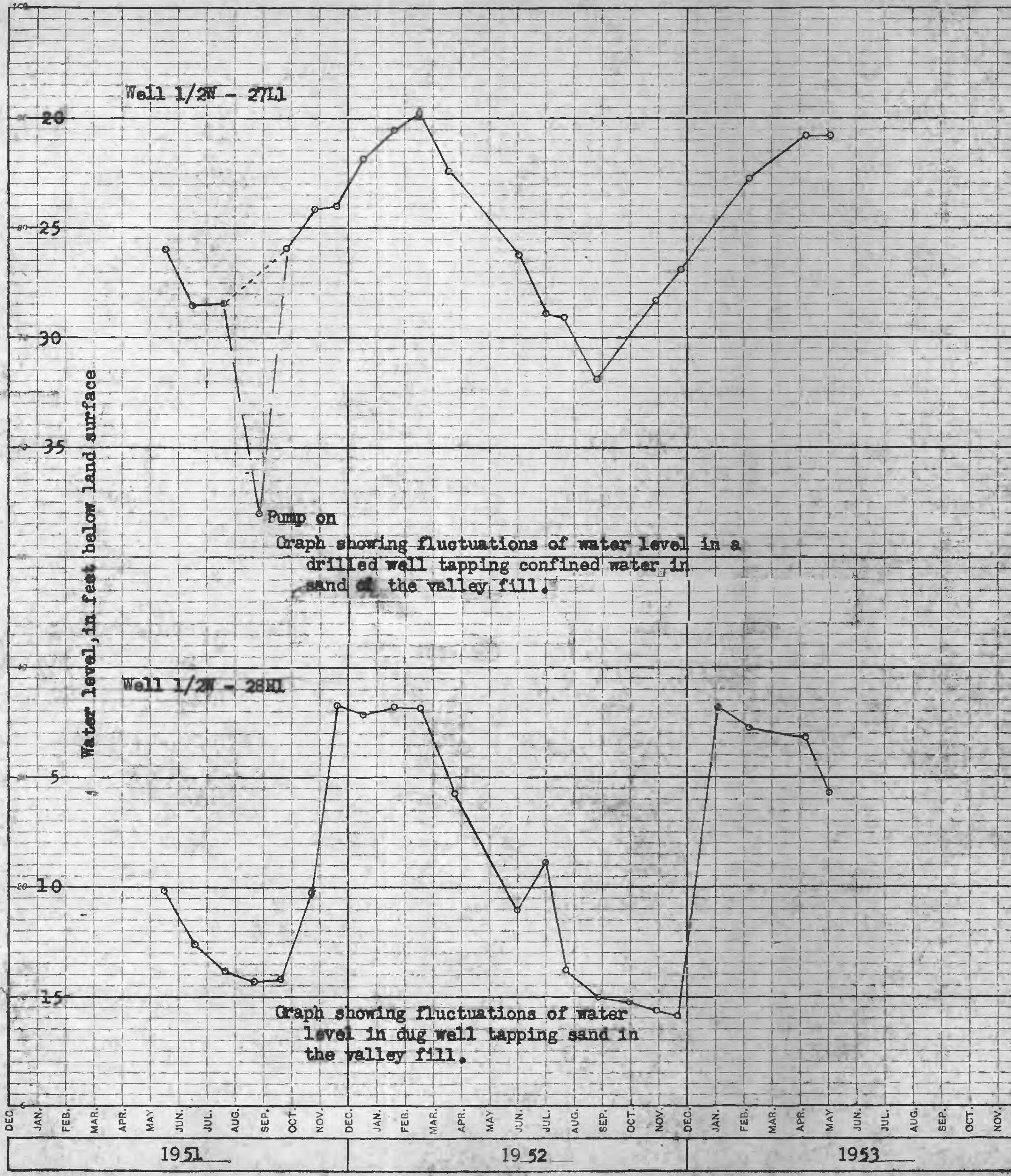
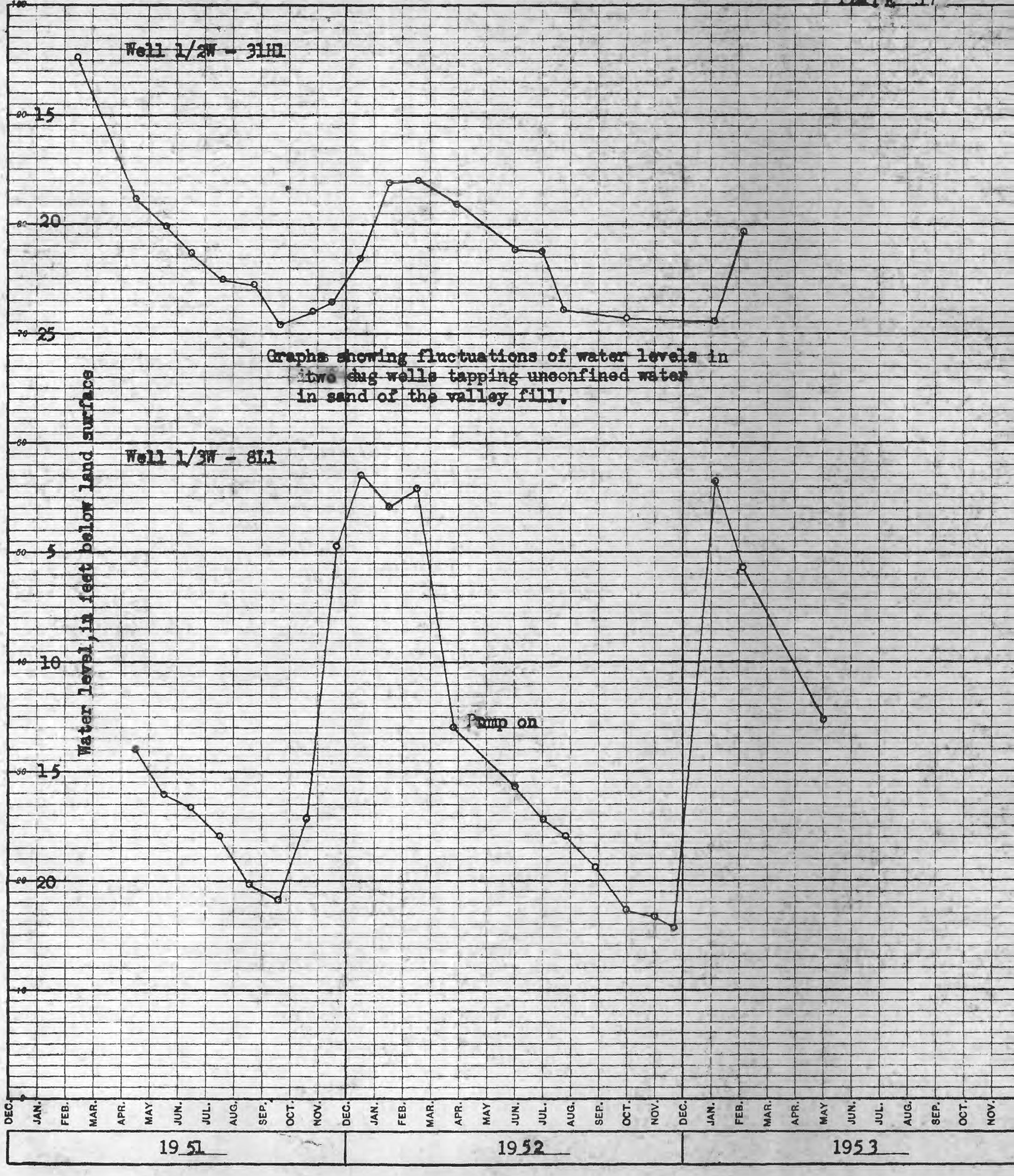

Well 1/2W - 27L1
Pump on
Graph showing fluctuations of water level in a drilled well tapping confined water in sand of the valley fill.
Well 1/2W - 28H1
Graph showing fluctuations of water level in dug well tapping sand in the valley fill.
Water level, in feet below land surface
20
25
30
35
5
10
15
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV.
1951
1952
1953

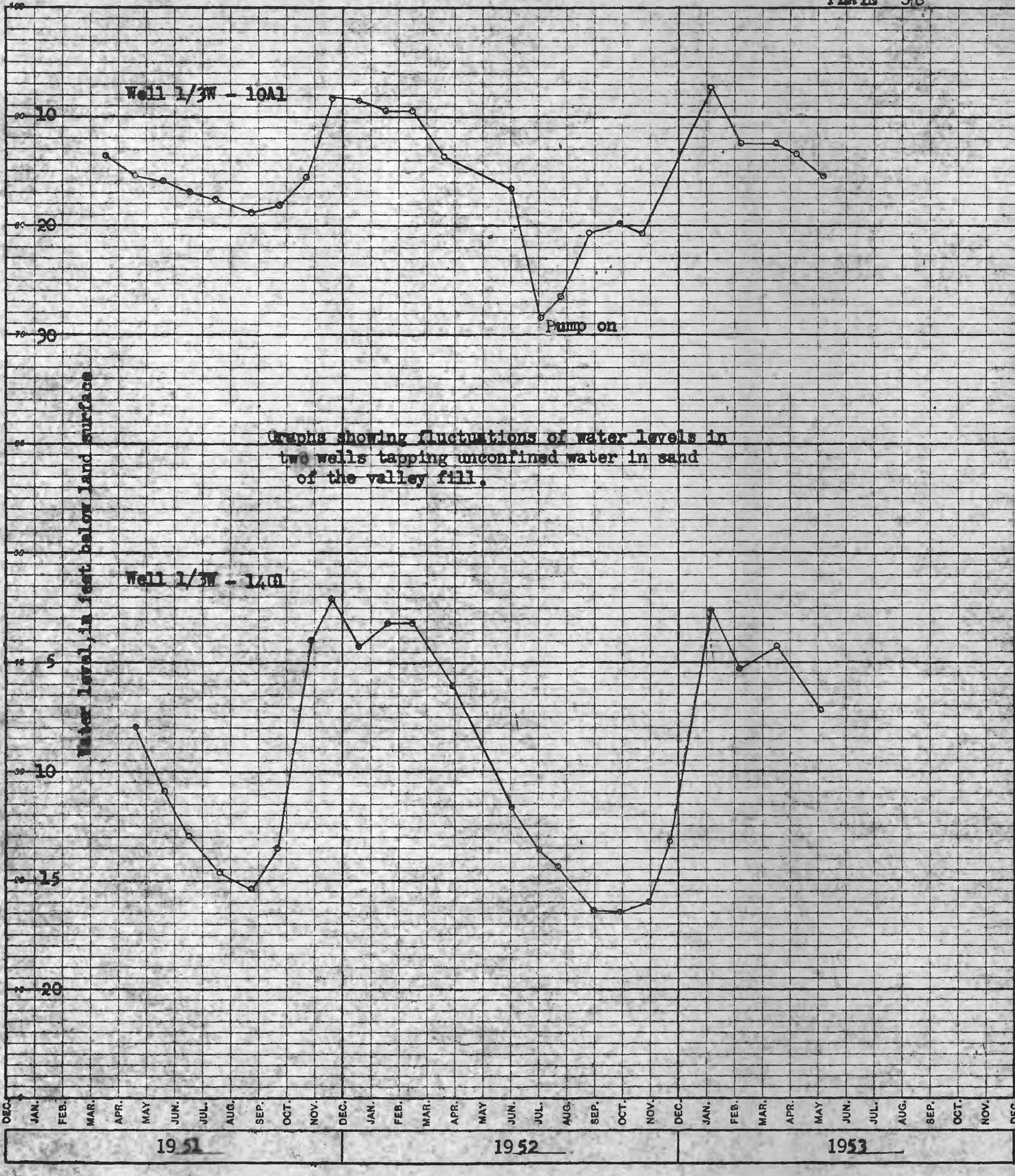
PLATE 36

PLATE 37



Graphs showing fluctuations of water levels in two dug wells tapping unconfined water in sand of the valley fill.

PLATE 37



Graphs showing fluctuations of water levels in two wells tapping unconfined water in sand of the valley fill.

PLA1E 38

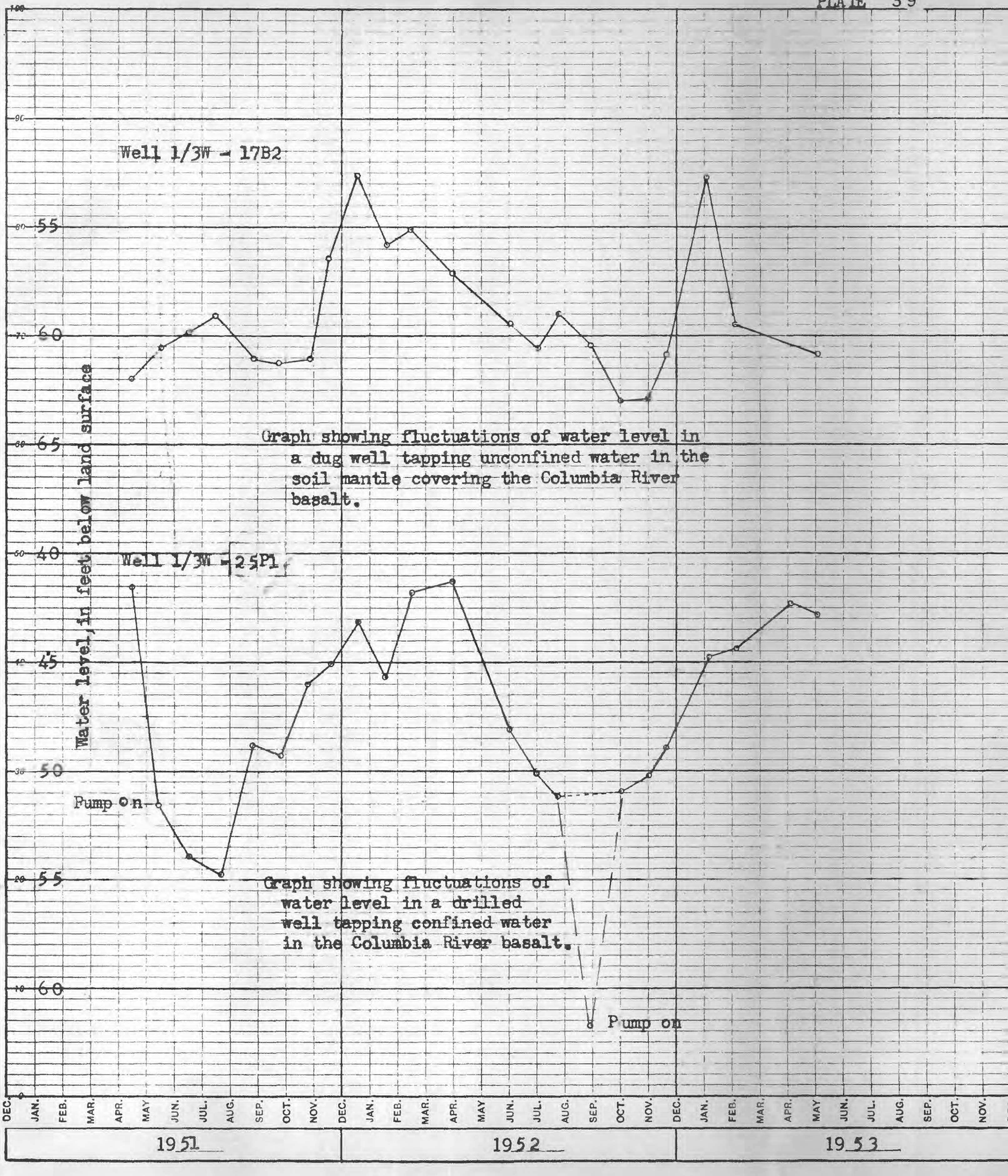
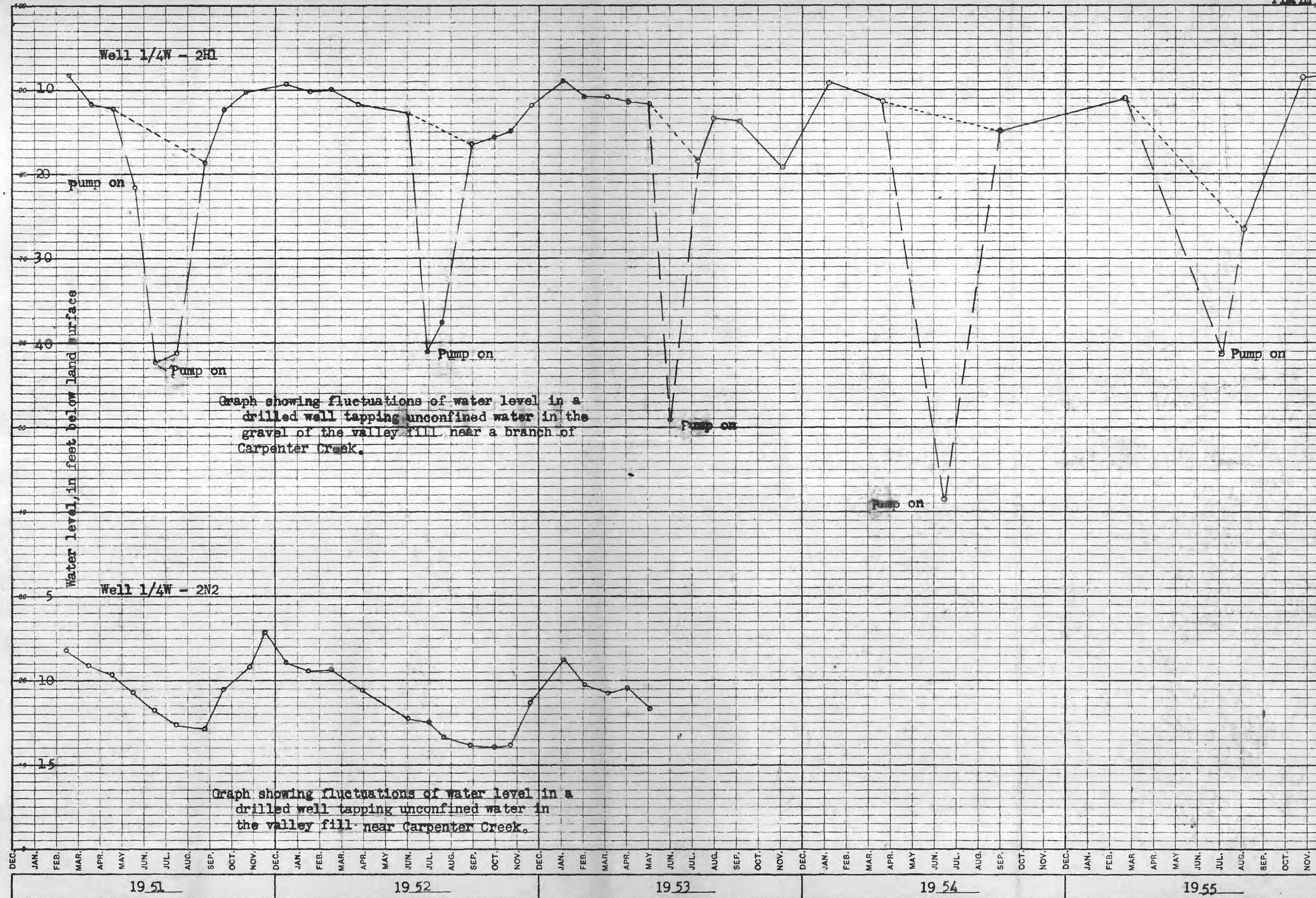
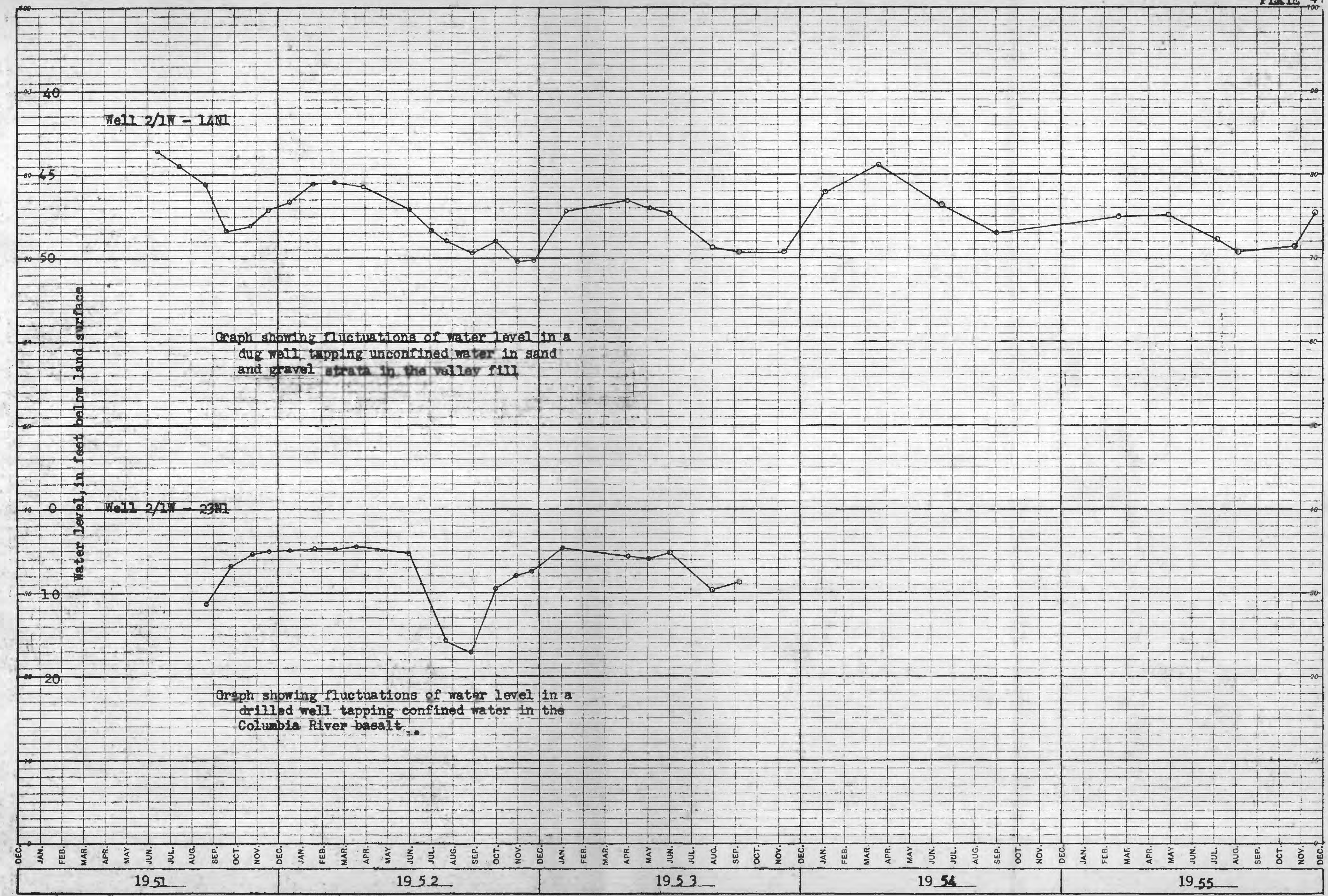

Well 1/3W - 17B2
Graph showing fluctuations of water level in a dug well tapping unconfined water in the soil mantle covering the Columbia River basalt.
Well 1/3W - 25P1
Pump on
Graph showing fluctuations of water level in a drilled well tapping confined water in the Columbia River basalt.
Pump on
Water level, in feet below land surface
55
60
65
40
45
50
55
60
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV.
1951
1952
1953

PLATE 39


Well 1/4W - 2H1
pump on
Pump on
Pump on
Pump on
Pump on
Pump on
Graph showing fluctuations of water level in a drilled well tapping unconfined water in the gravel of the valley fill near a branch of Carpenter Creek.
Water level, in feet below land surface
10
20
30
40
5
10
15
Well 1/4W - 2N2
Graph showing fluctuations of water level in a drilled well tapping unconfined water in the valley fill near Carpenter Creek.
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV.
1951
1952
1953
1954
1955


Well 2/1W - 14N1
Graph showing fluctuations of water level in a dug well tapping unconfined water in sand and gravel strata in the valley fill
Well 2/1W - 23N1
Graph showing fluctuations of water level in a drilled well tapping confined water in the Columbia River basalt.
Water level, in feet below land surface
40
45
50
0
10
20
DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV.
1951
1952
1953
1954
1955

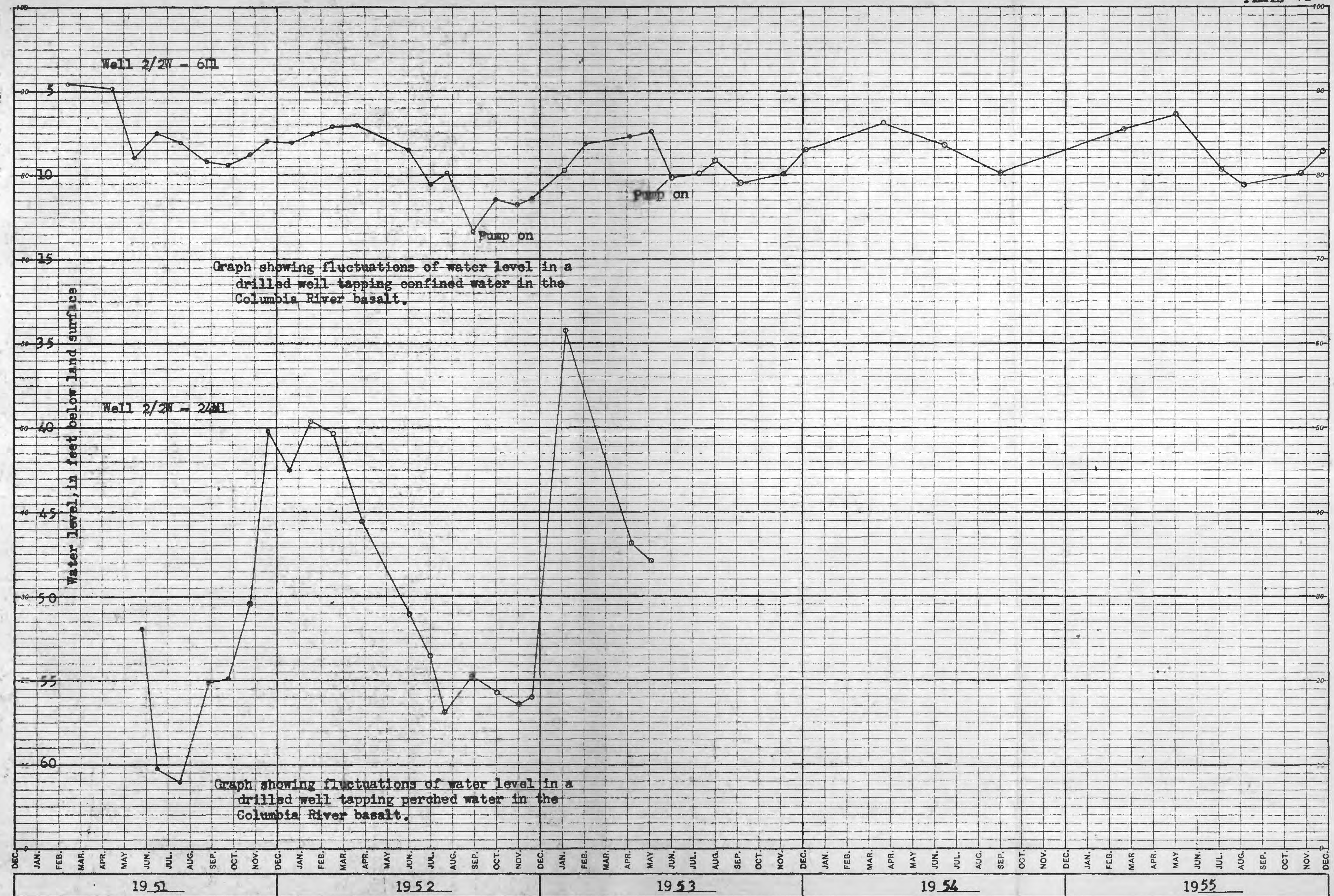
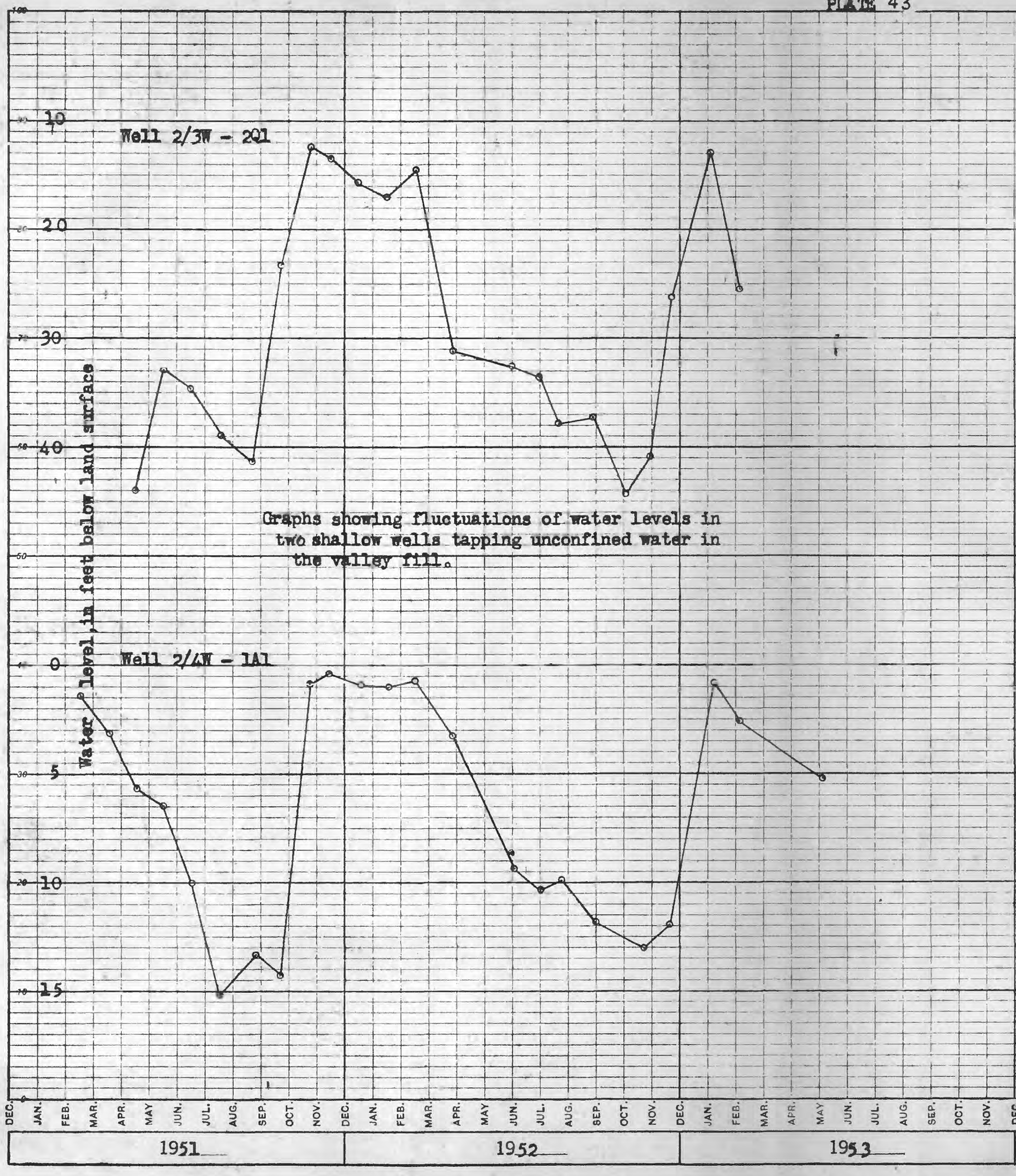

Well 2/2W - 6D1
Pump on
Pump on
Graph showing fluctuations of water level in a drilled well tapping confined water in the Columbia River basalt.
Well 2/2W - 24M1
Graph showing fluctuations of water level in a drilled well tapping perched water in the Columbia River basalt.
Water level, in feet below land surface
5
10
15
35
40
45
50
55
60
1951
1952
1953
1954
1955
CODEX BOOK COMPANY, INC. NORWOOD, MASSACHUSETTS. PRINTED IN U.S.A.

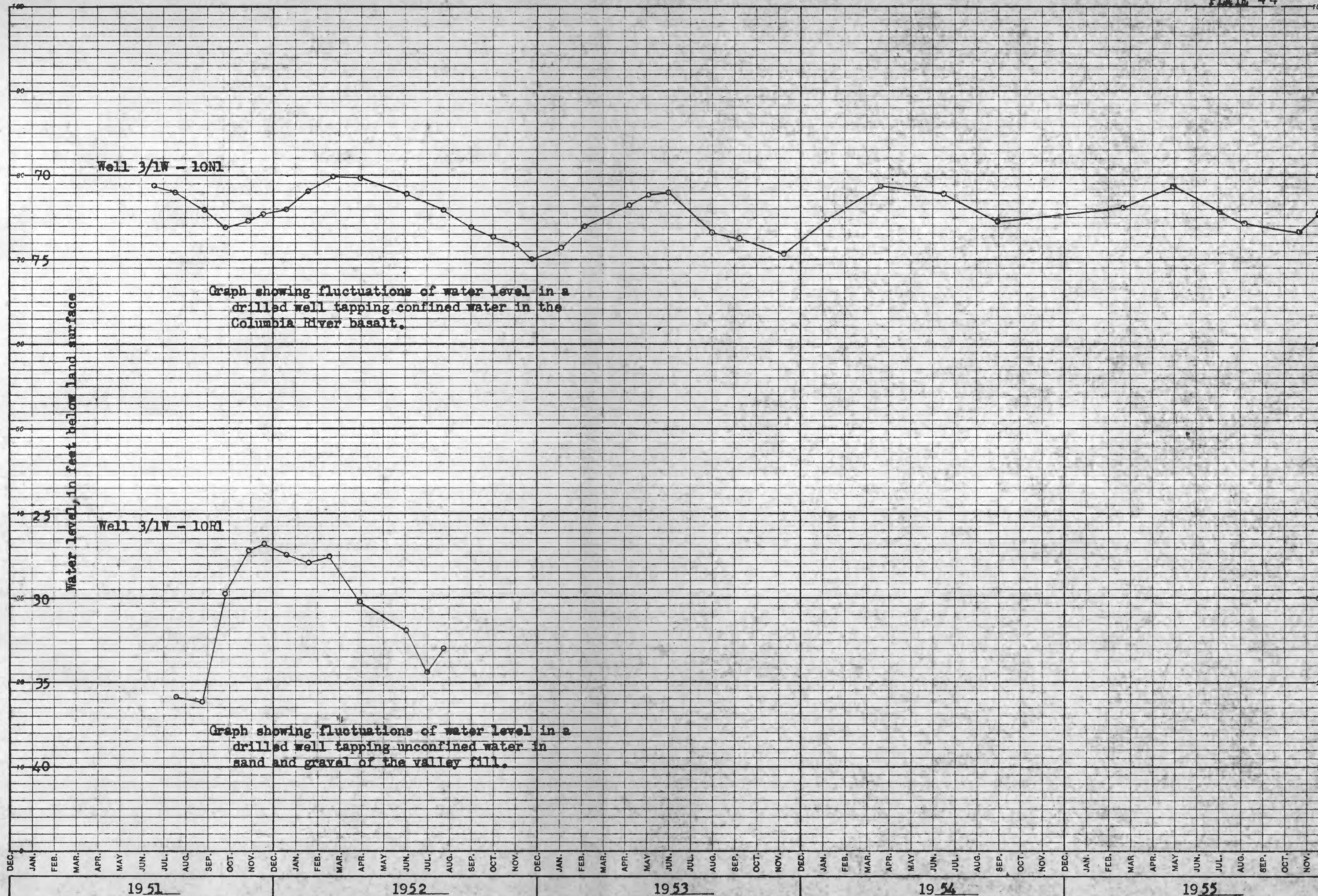
PLATE 43

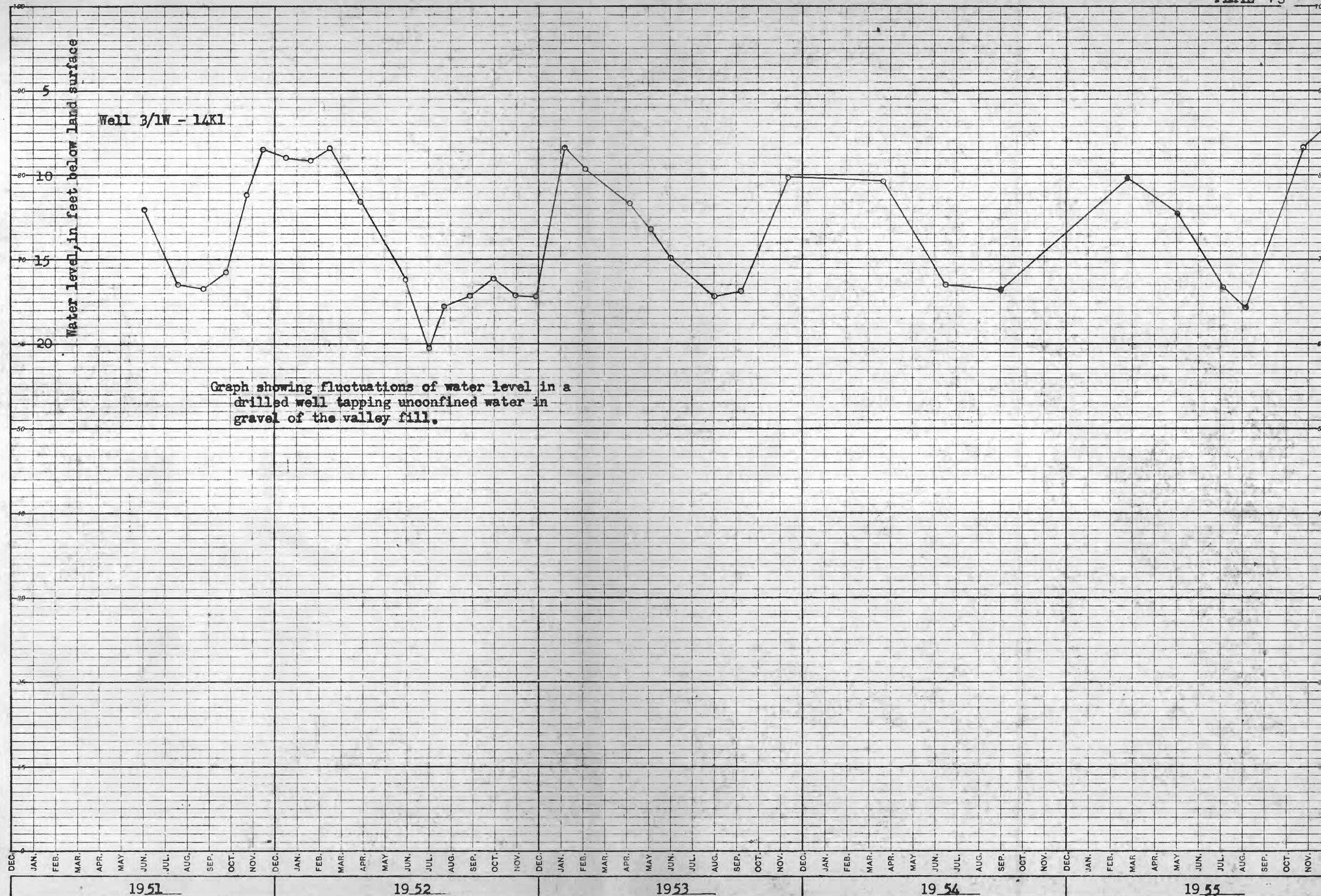


Graphs showing fluctuations of water levels in two shallow wells tapping unconfined water in the valley fill.

PLATE 43

PLATE 44


Well 3/1W - 10N1
Graph showing fluctuations of water level in a drilled well tapping confined water in the Columbia River basalt.
Well 3/1W - 10H1
Graph showing fluctuations of water level in a drilled well tapping unconfined water in sand and gravel of the valley fill.
Water level, in feet below land surface
70
75
25
30
35
40
1951
1952
1953
1954
1955



Graph showing fluctuations of water level in a drilled well tapping unconfined water in gravel of the valley fill.

Table 1.- Representative Wells

Topography where well is located: P, plain; S, slope; U, upland.
Type of well: Bd, bored; Dg, dug; Dn, driven; Dr, drilled.
Ground-water occurrence: C, confined; P, perched; U, unconfined.
Water level: Depths and water levels expressed in feet and decimals by owner or driller.
Type of pump: B, bucket; C, centrifugal; J, jet; P, plunger; T. turbine.
Use of water: D. domestic; Ind, industrial; Irr, irrigation; N, none.
Chemical character: Determinations made by field methods.

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W.								
4L1	J. E. Kielhorn	U, 920	Dr	495	6	31	359	136	Basalt
5B1	J. Kesswetter	U, 830	Dr	310+	4				do.
5C1	S. Luethe	U, 780	Dr	407	6	64	64	343	do.
5D1	Multnomah County	U, 805	Dr	550	10	185	485	38	do.
5J1	Edwin G. Boynton	U, 725	Dr	110	6		100	10	do.
6E1	Paul Boeckli	S, 455	Dr	186	8	184	184	2	do.
6H1	Harry Frace	U, 695	Dr	350	8	10	340	10	"Gravel"
6K1	H. A. Currin	S, 520	Dr	180	6				Basalt
6M1	John Boeckli	S, 485	Dr	282	6				"Rock"
7L1	George Dickson	S, 250	Dr	130	6	100			Basalt
7R1	Palmquist	S, 250	Dr	80	6	80			

Altitudes interpolated from topographic maps.

measured by the Geological Survey; those in whole feet were reported

O, observation; PS, public supply; S, stock.

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17) (18)	(19)
P	450	9/ /51	P, 5	D	128	6	Reported 105 ft of clay and 254 ft of rock above aquifer.
P			P, 3	D	130	4	
U	345	9/ /51	P, 3	D, S	78	5	Used by two families.
C	323	3/ /47	T, 20	Ind			Supplies rock quarry; see table 2 for log.
C			P, 10	D, Irr	82	5	Used for irrigating garden.
C	90	9/ /51	P, 10	D, Irr	100	5	
C	225	9/ /51	P, 3	D, S	44	4	Small yield.
U				N			Unused; inadequate yield.
C			P, 3	D, S			Small yield.
C	20	4/ /51	J, 20	D, Irr	372	144	Reported never pumped dry.
			J, 8	D	136	10	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W.- Continued								
8E1	Frieburg & Carlson	S, 435	Dr	110	6	110	95	15	Basalt
9A1	A. W. Anderson	U, 1,050	Dr	65	6				do.
9E1	R. D. Congdon	S, 535	Dr	240	6				
9E2	F. D. Welsh	S, 530	Dr	105	6	68	100	5	do.
9Q1	H. Granat	S, 650	Dr	245	8	38	195	45	do.
10E1	K. M. Bartlett	U, 925	Dr	180	6	115	110	70	do.
10M1	Skyline Store	U, 960	Dr	320	4		120	200	do.
10M2	A. J. Koeps	U, 960	Dr	85	6	81	81	4	do.
10N1	Skyline Tavern	U, 975	Dr	85	4	85	70	15	"Pebbles"
15H1	Dale Stahl	U, 1,010	Dr	75	6		60	15	Basalt
16D1	John Hahn	S, 250	Dr	100	6		75	25	do.
16E1	Ted Dobbs	S, 410	Dr	386	6	37	350	36	do.
17B1	Wilbur Meenen	S, 295	Dr	160	6				

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	90	9/ /51	J, 5	D, S	110	4	Provides water for two families.
C			J, 8	D			
			P, 5	D, Irr	92	5	Used for irrigating garden.
C			J, 10	D	80	6	Reported 5 ft of clay, then rock to 105 ft.
U	235	9/ /51	P, 5	D	112	4	
C			J, 3	D	76	5	Excellent supply of water reported
U							Inadequate; abandoned.
C			P, 3	D	74	5	
C	50.11	9/ 6/51	J, 5	D	68	4	Casing perforated near bottom.
U			J, 3	D			
C			J, 5	D	130	4	
C	108	9/ /51	P, 10	D, S	152	20	Encountered Boring lava from 37 to 287 ft, blue clay from 287 to 350 ft, and basalt from 350 to 386 ft
			P, 5	D			

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W. - Continued								
17E1	Walter Nichol	S, 275	Dr	130	6	30	30	100	Basalt
17L1	Bethany Presbyterian Church	S, 325	Dr	400+	8				do.
17N1	B. D. Graf	S 250	Dg	62.5	40	63			"Clay"
18G1	J. W. Dixon	S, 275	Dr	97	6				do.
18J1	Sam Joss	S, 250	Dr	162	6	162	155	7	Basalt
18J2	do.	S, 250	Dg	70.7	48	71	65	6	Quicksand
18P1	C. Schindler	S, 255	Dr	160	6	150			"Clay"
19B1	B. D. Graf	S, 260	Dr	276	4	246	246	30	"Rock"
19K1	J. J. Stroller	S, 260	Dg	75	42	75	6	69	"Clay"
19K2	Julius Jacroeni	S, 260	Dr	114	6				Sand
19M1	S. R. Berger	P, 215	Dr	115	8	115			do.
19P1	Ed East	P, 220	Dr	354	6	338	338	16	Gravel and sand
20H1	C. E. Wismer	S, 330	Dr	480	4	398	396	84	Basalt
21J1	E. Waerner, Jr.	S, 345	Dg	40	36				

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			P, 3	D, S	38	5	
C	62.06	7/15/54					Encountered basalt at 224 ft; still drilling.
U	24.71	4/11/51	J, 8	D, S	78	8	
U			J, 3	D	172	5	
C	36.92	4/11/51	P, 5	S	142	7	Water reported to have some irc casing perforated from 144 to 162 ft.
U	51.68	4/11/51	J, 8	D	122	14	Fifty ft west of well 18J1; see plate 20 for water-level recor
C	49	4/ /51	P, 5	D			
C			P, 5	D			Reported 213 ft of clay overlie aquifer.
U			J, 8	D, S	110	12	Water level very low in summer.
U			J, 15	D, S	116	8	
C	42.97	4/19/51	P, 3	D	372	6	Water carries fine sand; casing perforated near bottom.
C	40	1944	P, 5	D			Reported 338 ft of clay over-lies aquifer.
C	100	4/ /51	P, 5	D, S	120	45	See table 2 for log and table l for chemical analysis of water
U			J, 5	D, S	78	11	Inadequate supply of water in dry seasons.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W. - Continued								
20J2	Bethany Baptist Church	S, 350	Dg	40	48				"Rock"
20N1	John Morty	S, 240	Dr	100	6				Basalt
20N2	Layman	P, 240	Dr	85	6		65	20	Sandy silt
21J1	M. A. Kirkpatrick	S, 350	Dr	28	8	16	16	12	Basalt
21K1	H. Olson	S, 290	Dr	134	6	123	129	5	do.
21L1	C. C. Schaefer	S, 275	Dr	390	6	47	47	53	Boring lava
21Q1	George Finley	S, 335	Dr	365	6	363	363	2	Basalt
22N1	S. A. Fulton	S, 505	Dr	180	6		160	20	do.
22P1	J. Strope	S, 470	Dr	385	6		300	85	do.
22R1	H. M. Valentine	S, 620	Dr	129	5		40	89	do.
23E1	Northwest Memorial Gardens Association	U, 1,050	Dr	552	12-10		431	121	do.
23K1	Richfield Oil Co.	U, 1,055	Dr	7,885	12-8	811			

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	20.75	4/10/51	J, 5	D	56	5	Well bottomed on Boring lava; see plate 20 for water-level record.
C			P, 5	D, S	124	10	
C			P, 5	D, S			Only silt and clay encountered during drilling.
C	F[a]	4/10/51	J, 5	D	202	38	
C	3	7/ /50	J, 20	D	142	9	Bailed at 15 gpm without lowering water level.
U	7.99	4/14/53	J, 12	Irr			Materials reported as soil from 0 to 47 ft; Boring lava from 47 to 100 ft; clay of Troutdal formation from 100 to 390 ft; caved back to 250 ft; see plate 14 for gamma-ray log.
C	F[a]	4/ 9/50	J, 15	D, S	104	14	Flowed about 2 gpm in April 195
C			P, 5	D, S			
C			P, 5	D	148	4	
P			P, 8	D	144	4	Inadequate supply of water.
P	431	5/ /54					Well no. 3; test pumped 224 gpm for 33½ hours with 40 ft of drawdown.
			N	N			Oil test; see table 2 for log.

a Flowing.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W.- Continued									
23M1	Northwest Memorial Gardens Association	S,	980	Dr	515	12				
23N1	E. Stahly	U,	850	Dr	292	6	292	272	20	"Clay and gravel"
23R1	Alfred H. Corbett	U,	1,000	Dr	960	6	89			Sandstone (?)
26A1	F. C. McDonald	U,	1,095	Dr	400	6	98	314	86	Basalt
26D1	C. D. Brisun	S,	650	Dr	90					
26D2	Northwest Memorial Gardens Association	S,	650	Dr	525	8				
26E1	C. E. Olson	S,	510	Dr	168	6	168	167	1	Gravel
27B1	F. Prohaska	S,	650	Dr	95			45	50	"Rock"
27D1	V. Richardson	S,	485	Dr	182	6		162	20	Basalt
27E1	F. Heimbucher	S,	455	Dr	225	6		50	175	do.
27J1	J. J. Glidersleeve	S,	505	Dr	200	6				
27M1	E. H. Haskell	S,	525	Dr	80	6	80	79	1	Gravel

in the Tualatin Valley - Continued

Ground-water occurrence	Water level		Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million)		Remarks
	Ft below land surface datum	Date			Hardness as $CaCO_3$	Chloride	
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
			N				Basalt from 30 to 465 ft; sandstone from 465 to 515 ft well abandoned.
P	282	11/ /50	N	N			Not used; materials reported as "clay and gravel" for entire depth; casing perforated from 272 to 292 ft.
U	396	11/ /48		N			Inadequate supply of water; see table 2 for log.
P	200	1/ /46	P, 5	D	92	4	Reported 100 ft of clay and 114 ft of rock overlies aquifer.
			P	Irr			Used for irrigating two lawns.
							No basalt encountered; platy coal from 510 to 524 ft; sandstone from 524 to 525 ft contained shell fragments.
U	68	9/ /51	J, 15	D, S	70	5	Casing perforated near bottom
U			P, 3				
C	162	9/ /51	P, 8	D	64	5	
C			P, 5	D	72	3	
			P, 5	D	106	4	Water is cloudy occasionally.
U	20	9/ /51	J, 5	S			A 42-ft dug well furnishes domestic water; casing perforated near bottom.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W. - Continued									
27R1	Mrs. Sutton	S,	480	Dr.	250	4.5	190	80	10	Boring lava
28E1	Lindow Bros.	S,	290	Dr	576	12	481	470	106	Basalt
28G1	W. Bauer	S,	285	Dg	24	48	24	0	24	"Clay"
28M1	Clifford Bauer	P,	260	Dr	350	6	330	330	20	Basalt
28P1	Harry Burton	S,	210	Dg	37	48				
28P2	Fred E. Hartung	S,	260	Dr	755	6	600	650	105	Basalt
28R1	J. Peterkort	S,	455	Dr	250	5				do.
29D1	Ed Lehman	S,	255	Dr	105	6	100	100	5	Sand
29H1	V. H. Potter	S,	250	Dr	175	6	175	170	5	do.
30P1	Albert Maier	S,	185	Dr	266	6	153	100	166	Sandy "clay"
31B1	F. J. Zuercher	P,	240	Dr	148	6				"Clay"

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U			P, 3		98	8	Materials reported as clay to 30 ft; Boring lava to 93 ft; and clay of Troutdale formation to 250 ft; casing perforated from 80 to 190 ft.
C	F[a]	3/ 1/52	T, 230	Irr	800	908	Reported 470 ft of clay and sand above aquifer; flowing 80 gpm; pumped at 230 gpm when water level was drawn down to 145 ft.
U			J, 10	D	28	5	Water reported muddy after rain
C	10	4/ /51	T, 30	D, S	156	24	Blue clay overlies aquifer.
U			J, 10	D	100	10	
C	50.6	4/13/53	J, 20	D, Irr	148	65	Flows 40 gpm; encountered basalt from 595 to 755 ft; see plate 13 for gamma-ray log.
C			P, 5	D, S			
C	30	4/ /51	J, 10	D	210	5	
U			P, 8	Irr			Used for irrigating lawn; water carries some sand; drawdown 110 ft when pumping 10 gpm.
U	20	1949	J, 10	S	324	307	Materials reported as 160 ft of sand and silt, 100 ft of sticky clay; well has been plugged back to 100 ft; water from 266 ft "brackish."
C			P, 8	S	260	7	Pumps dry in summer.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W.- Continued								
31D1	Jesse Hansen	P, 200	Dr	152	6				
31E1	G. E. Thompson	P, 210	Dr	76	6	75			Sand
31E2		P, 210	Dr	150	6				
31L1	S. Ferrell	P, 210	Bd	65	9	65	20	45	"Clay"
31Q1	Emil Trachsel	P, 180	Dr	400	6	85	75	10	Sand
31R1	E. L. Pritchett	P, 180	Dg	25.8	48				do.
32B1	H. G. Reeb	P, 230	Dr	600	6	398			Gravel, fine
32C1	Ernest Lehman	S, 240	Dr	100	18	100			Sand
32J1	Luker	P, 230	Dr	530	6	390	240	3	do.
32L1	D. L. Cason	P, 225	Dr	427	6				do.
32P1	Emil Schlottmann	S, 210	Dr	128	6	123			do.
33A1	S. H. Bloedon	S, 440	Dr	447	6	411	410	37	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	14	4/ /51	P, 10	D, S	286	98	
U			J, 10	D	268	5	Water has an iron taste; casing perforated near bottom.
C	43.5	4/22/51					Not used.
U			J, 5	D	90	3	Contains tile casing.
U	10	4/ /51	J, 15	D, S	158	67	Casing pulled back to 85 ft and perforated from 75 to 85 ft; water below 85 ft carried sand
U	10.5	4/20/51	J, 5	D	166	6	See plate 21 for water-level record.
C	35	1952	J	D			Casing pulled back to 398 ft; hole filled with pea gravel below casing; material reportedly fine sand from 550 to 600 ft.
U	15	4/ /51	J, 15	D	152	12	
U	38.0	2/ 4/51	J, 20	D	52	8	Incomplete; casing pulled back to 240 ft.
C	48	1/ /51	J, 3	D, S	105	32	Pumps dry in 2 hours at 3 gpm.
C	23	12/ /50	P, 10	D. S	204	6	
C	103	6/ /53		O			Encountered gravel and boulders from 0 to 35 ft; Boring lava from 35 to 90 ft; clay (Troutdale formation) from 90 to 410 Basalt from 410 to 447 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 1 W.- Continued									
33D1	Ed Blampiedy	S,	255	Dr	200	6				
33F1	Herman Jenne	P,	255	Dr	107	6				
34C1	John Christianson	S,	395	Dr	110	6				Basalt
34D1	S. H. Bloedon	S,	450	Dg	33	40				Alluvium
34D2	do.	S,	450	Dr	140	6	60	60	80	Boring lava
34L1	Alfred Teufel	S,	310	Dr	200	6				Basalt
35H1	W. M. Perrault	S,	650	Dr	633	8-6	624	597	25	Conglomerate
35K1	Leahy Greenhouses	S,	550	Dr	238	8	145	230	8	"Rock"
35M1	West Hills Nursery	S,	455	Dr	527	6	70	80	20	do.
36E1	Portland Gas and Coke Co.	S,	750	Dr	421	12	65	406	6	Basalt
36N1	W. Strowger	S,	780	Dr	432	6				do.
	T. 1 N., R. 2 W.									
1A1	Ben Thomas	S,	460	Dr	140	8	20	139	1	do.
1B1	C. E. Shine	S,	425	Dr	79	6	10	70	9	do.
1G1	J. G. Densen	P,	230	Dr	155	12				do.

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
			J		148	6	Not used.
			P, 8	D	216	5	
C			P, 5	D	110	3	
U	6.78	4/10/51	C, 15	Irr			See plate 21 for water level record.
C	42.48	5/ 4/53	T	Irr			Well abandoned; insufficient supply.
C			T, 175	D, Irr	154	4	Drawdown 160 ft pumping 175 gpm for 36 hours.
C	200	11/ /48					See table 2 for log.
C	60	9/ /51	P, 20	Irr, D	84	5	
nC			P, 5	Irr	32	5	Easily pumps dry; see table 2 for log.
C	265			Ind			Pumped 350 gpm with 35 ft of drawdown.
C			P, 10	D	66	5	
C	80	1951	P, 8	D			
C			P, 5	D	108	5	Soft rock from 6 to 70 ft; hard rock from 70 to 79 ft.
C	34.81	10/ 5/51	N	N			

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 2 W. - Continued								
1G2	J. G. Densen	P, 230	Dr	120	8	110	110	10	Basalt
2A1	Charles Ensign	S, 430	Dr	135	6				do.
2A2	A. K. Borgeson	S, 430	Dr	160	6	35	120	20	do.
2M1	D. Hebeisen	S, 365	Dr	543	6	175	250	293	do.
2Q1	R. N. Coffey	S, 295	Bd	120	12	40	90	30	do.
3D1	Helvetia Church	S, 410	Dr	228	6	177	157	20	do.
3D2	Bob Kauer	S, 410	Dr	225	6	100	100	125	do.
3K1	Mrs. Nussbaumer	S, 285	Dr	145	6				do.
3R1	Ben Nussbaumer	S, 300	Dr	397	8	165	387	10	do.
4A1	Conrad Pieren	S, 380	Dr	101	6		59	42	do.
5M1	Clyde Lincoln	P, 205	Dg	30	48	30	0	30	"Clay"

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	22.7	10/ 5/51	T, 100	Irr			Reportedly 20 ft of clay and 90 ft of rock above aquifer; irrigates 15 acres.
C			J, 5				Inadequate.
C			P, 5	D	120	4	Pumps dry with heavy use; penetrated 34 ft of clay and 86 ft of rock above aquifer.
C	90	1952	T, 80	Irr			Basalt from 175 to 543 ft.
C							Inadequate; not used now.
C	102	7/ /49	P, 5	D	108	8	Reportedly 104 ft of clay above rock; casing perforated from 157 to 177 ft.
C			P, 8	D			
C	F[a]	4/11/51	P, 5	D	110	6	Flowing about 3 gpm; only the overflow is used.
C	80	8/ /53	T,	Irr			Struck basalt at 160 ft; used for irrigating 20 acres of pasture; reported 190 ft drawdown pumping 110 gpm.
C	36	1939	P, 5	S	108	8	
U	12	7/ /50	J, 15	D	100	10	Holes drilled laterally near bottom; never dry; used for irrigating garden.

a F, flowing.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 2 W. - Continued								
5N1	Irene Jackson	P, 205	Dr	80	6				Sand and gravel
5R1	A. W. Connell	P, 200	Dr	300	6				
5R2	E. Batchelder	P, 220	Dr	547	6	345	449	98	Basalt
6M1	John A Van Domelen	P, 180	Dr	452	6	327	327	125	do.
7E1		P, 160	Dr	960?	8				Sand
8E1	T. R. Connell	P, 200	Dr	60	6	60	20	40	Quicksand
9D1	W. Batchelder	S, 210	Dr	110	6				"Clay"
9Q1	R. D. Hays	P, 205	Dr	85	4	85			Sand
9R1	Pasley	P, 210	Dr	120	6				
10N1	Al Grossen	S, 215	Dr	180	6				
11B1		S, 250	Dr.	127	6				
11C1	Ralph Kind	S, 250	B	74	6				"Clay"
11C2	Albert Zander	S, 250	Dr	125	6	105	105	20	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U			J, 5	Irr			Water used for lawn and garden.
			P, 15	D, S	84	13	
C	19	8/ /53	T, 250	Irr			Basalt encountered at 342 ft; plans to irrigate 50 acres; pumped 300 gpm with 86 ft drawdown.
C	F[a]	11/ /50	J, 15	D, S	68	21	Flows about 4 gpm; main flow from 451 to 452 ft.
U							Clay and sand entire depth; gravel packed upper 200 ft; lower part of hole plugged.
U	4.55	4/ 2/51	J, 15	D, S			Encountered blue clay from 50 to 102 ft; no water below 50 ft; casing perforated from 28 to 60 ft; see plate 22 for water-level record.
C	23	8/ /50	J, 15	D, S	160	7	
C	20	10/ /49	J, 5	S			Casing perforated near bottom.
C			J, 10	D			Reportedly a good well.
C			J, 10	D, S	176	12	
C	33.23	4/11/51	N				
C	9.7	4/11/51	N				
C	57.14	5/17/51	J, 5	D	300	4	See plate 22 for water-level record.

a Flowing.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 2 W. - Continued								
11K1	F. J. Schmidt	S, 255	Dg	40	48	40	0	40	Sandy clay
11K2		S, 225	Dr	156	6				Basalt
11L1	Leroy Barker	S, 240	Dr	195	6				do.
12F1	Mercer	S, 270	Dr	100	6				
12J1	Claude Davison	S, 305	Dr	196	5	140	190	6	Sandy gravel
12P1	Louis Zurcker	S, 240	Dr	160	6	120	120	40	"Rock"
12Q1	Chris Reichen	S, 300	Dr	173	6	60	163	10	Pea gravel
13F1	Jaggi Brothers	S, 250	Dr	225	6	215	215	10	Sand
13H1	J. L. Copeland	S, 225	Dr	44	10	44			
14F1	John Caravatta	S, 245	Dr	40	6	40			
14Q1	John Babcock	S, 240	Dr	315	6	315	312	3	Pea gravel
14R1	Alvin Hergert	P, 225	Dr	102	6	102	102		do.
15C1	West Union School	P, 210	Dr	560	6	330	330	230	Basalt
16P1	Walt Erdman	S, 200	Dr	230	6	230	220	10	Sand and gravel

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	12	4/ /51	C, 5	D			Easily pumped dry in summer anc fall.
			P, 15	D, S	226	8	
C			P, 5	D	164	7	Water used for garden.
	55	1951	J, 5	D, S	180	5	Reportedly a good well.
C	50	6/ /47	J, 5	D, S	88	4	
C	33	9/ /50	J, 15	D, S	258	9	
C	35	4/ /51	J, 10	D, S	96	6	Drilled in red clay and red "shot soil" to 163 ft.
C	50	4/ /51	P, 3	D, S	138	3	
U	12.05	4/ 4/51	J, 10	D			
U			J, 5	D	86	8	Dry in summer.
C	40	8/ /45	P, 15	D, S	138	14	Casing perforated from 307 to 315 ft.
C	52	4/ /51	J, 10	Ind	216	5	Used by service station; clay and silt over and clay under aquifer.
C	35	1948	P, 40	PS	72	7	Pumps large amounts of fine re silt; see table 2 for log.
C	50.67	4/ 2/51	J, 10	D	88	18	Produced sufficient water from 195 ft but continually pumped sand; reported 228 ft of clay and sand above aquifer; botto 6 ft of casing perforated.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 2 W. - Continued								
16R1	W. F. Evans	P, 185	Dr	108	6				Sand
17F1	Ernest Zurcker	P, 200	Dg	53	60	53			
17F2	do.	P, 200	Dr	98	12	98	70	15	Sand
17J1	R. Kauer	P, 175	Dr	125	6				do.
18A1	R. Scherrer	P, 190	Dg	28	60	28			do.
18E1	W. J. Smith	P, 160	Dr	60	6				
18J1	W. J. Vanderzanden	P, 190	Dr	150	6	150			
19P1	A. W. Wilcox	P, 185	Dg	22	66	22	0	22	do.
19R1	Joe VanderZanden	P, 190	Dg	25	12	25			do.
20P1	Ben Coussens	P, 180	Dr	45	6	38	38	7	do.
21D1	G. P. Frost	P, 160	Bd	35	6	35			do.
21P1	Scotty LeFore	P, 195	Bd	40	6	15	15	25	do.
21R1	John Reilly	P, 205	Dg	22	48	22			"Clay"
22D1	Carl Voges	P, 200	Dr	85	6				Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	4.86	4/ 2/51	N				
U	7.2	4/ 2/51	J, 8	D	132	9	See plate 23 for water-level record.
U	25	10/ /52	J, 4	D			Concrete tile casing; every third tile perforated; blue clay reportedly above and below aquifer.
C	45	8/ /50	J, 5	D, S	134	16	
U	25	1950	J, 8	D, S	120	9	
U			J, 5	D, Irr	132	6	Water used for garden; drilled much decayed wood and vegetation.
C	71.97	3/28/51	J, 15	S			
U	3.66	3/28/51	P, 10	D, S	108	6	Also used for garden.
U	6.56	3/28/51	P, 5	D, S	106	8	
U	6.59	3/28/51	P, 20	D, Irr	94	6	Irrigates garden.
U	5.27	3/28/51	P, 25	D, Irr	240	8	See plate 23 for water-level record
U	34	8/ /50	J, 50	Irr			Irrigates 11 acres of pasture; see table 4 for chemical analysis.
U	4	4/ /51	J, 10	D	196	9	
C	34.0	4/ 2/51	J, 10	D, S	178	5	Waters 40 head of cattle.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 2 W. - Continued									
22N1	Perry Stream	P,	215	Dr	24	48	25	0	25	Alluvium
23F1	Carl G. Bechen	P,	205	Dr	290	6	290	120	169	Sand
23F2	Do.	P,	205	Dg	70	72	70	0	70	"Clay"
24H1	F. N. Jeffries	P,	190	Dg	32	48	32			Sand
24J1	Marie Berger	P,	210	Dr	160	6				
25G1	W. F. Stucki	P,	200	Dr	126	6				
25N1	G. Krautscheid	P,	175	Dr	118	6	88	78	10	Gravel and sand
26G1	Berger Brothers	P,	200	Dr	140	6	140	120	20	Sand
26P1	Rich and Sons Nursery	P,	210	Dr	339	6	290			do.
26R1	R. E. Klinger	P,	170	Bd	55	8	55			do.
28K1	James A. Gibbs	P,	185	Dr	84	6				do.
28K2	do.	P,	185	Dg	26	48	26	0	26	Alluvium
29G1	Gus Johnson	P,	195	Dn	32					Sand
29Q1	D. Fletcher	P,	195	Bd	32	6	24	25	7	do.
29Q2	N. A. Seidel	P,	200	Bd	45	6	37	38	7	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	2.46	4/ 5/51	P, 10	D	120	13	Reported never dry.
C	45	4/ /51	P, 10	S	230	7	Penetrated clay from 0 to 120 ft; water-bearing blue sand from 120 to 289 ft; "shale" from 289 to 290 ft; casing perforated from 270 to 290 ft.
U	35	4/ /51	P 5	D	128	6	Water level low in summer months.
U	5.0	4/ 4/51	J 10	D	118	6	
			P, 5	D, S	266	5	Reportedly a good well.
			P, 8	D, S	242	6	
C	15	11/ /49	J, 10	D, S	106	9	Reported 78 ft of clay above and 30 ft below aquifer; casing perforated from 78 to 88 ft.
C	30	1950	P, 8	D, S	302	4	Casing perforated from 120 tO 140 ft.
C	31.0	4/16/51	P, 30	Irr			Casing perforated near bottom.
U	16	1951	J, 5	D	126	8	
U			P, 3	D	146	5	
U	7.8	4/ 5/51	J, 5	D	110	5	
U	4.45	4/ 2/51	J, 5	D, Irr	150	6	Irrigates garden.
U			J, 5	D, Irr	112	9	Used for irrigating 1/2 acre.
U	1.29	3/28/51	J, 5	D	216	9	

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 2 W. - Continued									
30G1	C. W. Wright	P,	185	Bd	38	6	30	30	8	Sand
30R1	Henry Arp	P,	180	Dr	35					do.
32C1	C. J. Wojohn	P,	200	Bd	23	6				do.
32P1	Yantlis Greenhouse	P,	175	Dg	30	72	30			do.
32R1	Don Chapman	P,	180	Bd	31	6	27	28	4	do.
33J1	A. J. Largio	P,	150	Bd	45	6				do.
33M1	Jesse Gallop	P,	185	Dr	37	6				do.
33R1	Robert Rice	P,	150	Dr	42	6				do.
34G1	E. F. Brauer	P,	185	Dg	25	36	25			do.
34H1	E. M. Johnson	P,	205	Dr	1,385	8	500			
35E1	E. L. Lewis	P,	195	Dg	23	36	23	17	6	Sand
35P1	C. E. Hines	P,	150	Dr	200	6	200	196	4	do.
35Q1	G. Losli	P,	185	Dg	32	48	32			Clay
35R1	W. L. Steed	P,	180	Dr	135	4	133			

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	3	3/ /51	J, 20	Irr			Water used on 7 acres of pasture.
U	7	8/ /50	J, 5	D	104	5	
U	1.96	3/27/51	J, 5	D, Irr	142	6	See plate 24 for water-level record.
U	8.5	3/30/51	C, 10	D, Irr	128	7	Water level low in summer.
U	4	3/ /51	J, 3	D	112	12	Water contains some sand.
U			J, 5	D	148	3	
U	9	3/ /51	J, 5	D			
U	24.0	3/30/51	J, 5	D	154	7	See plate 24 for water-level record.
U			J, 5	D	118	14	
							Reportedly encountered basalt at 1,335 ft; some water in sand at 50 ft; none from 50 to 1,385 ft; hole caved from 500 to 1,385 ft; drilled for Oregon Nursery Co.
U	4.8	4/ 5/51	J, 3	D	166	16	See plate 25 for water-level record.
C	2.73	4/16/51	J, 5	Irr	366	102	Nearby 28-ft dug well supplies house.
U			J, 3	D, S	140	14½	Adequate supply.
C			J, 8	D, S	286	61	

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 2 W. - Continued								
36B1	F. Rofinot	P, 185	Dr	120	6	120			Clay
36P1	H. E. Scruggs	P, 180	Dg	40	44	38	34	4	Sandy clay
	T. 1 N., R. 3 W.								
1G1	M. V. Jackson	P, 210	Dr	654	6	509	600	4	Basalt
1K1	North Plains Water District	P, 190	Dr	506	6	360	360	146	do.
1K2	do.	P, 190	Dr	710	6	386	386	324	do.
1L1	Bates Lumber Co.	P, 185	Dr	110	6				Sand(?)
1M1	C. M. Bates	P, 175	Dr	440	6	324	325	115	Basalt
2D1	W. C. Baugh	P, 225	Dr	147	6				Sand
2J1	Damon Leonard	P, 205	Dg	24	36	24	0	24	Silty clay

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	40	4/ /50	J, 10	D	256	23	Casing perforated near bottom.
U	9.83	4/20/51	P, 10	D, S	78	4	Inadequate supply.
C	37.0	8/10/53	N				Encountered basalt at 509 ft; reported that sand is coming in above basalt; produces 8 gpm with 280 ft of drawdown.
C	18	11/ /50	P, 20	PS			Drilled in 1903; now standby well.
C	18	8/ /48	T, 35	PS	70	23	Located 150 ft west of well 1K1; see table 2 for log and table 4 for chemical analysis.
C			P, 15	Ind	144	7	Formerly flowed at surface; iron precipitates from water after exposure to air.
C	F	9/13/51			72	13	Flows about 5 gpm; pumped at 75 gpm with 150 ft of drawdown.
C			J, 10	D	114	6	Iron precipitates from water after exposure to air.
U	12	11/ /50	P, 5	D			Reported to go dry in summer; 83-ft drilled well 60 ft to west yields iron-bearing water.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 3 W. - Continued								
5A1	George Corey	P, 200	Dr	449	6				Basalt
5A2	do.	P, 200	Dg	41	48	41	0	41	
5H1	Joe Duyck	P, 200	Dr	600	6	475	475	125	Basalt
5K1	William Meeuwsen	P, 205	Dr	104	8			v	"Brown rock"
5K2	do.	P, 205	Bd	51	18	51			Sand
5Q1	J. J. Moore	P, 175	Dr	523	6	512	513	10	Basalt
5R1	Roy Catholic School	P, 180	Dr	406	6	359	387	19	Sand
5R2	do.	P, 180	Dr	633	6	528	528	105	Basalt
6B1	William Herinchx	P, 200	Bd	65	6	65	45	20	Sand
6E1	August Vandehey	P, 195	Bd	70	24	70			"Sandstone"
6E2	do.	P, 195	Dr	125	6				Quicksand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	F	11/21/50	J, 15	S, Irr	116	3	Flowing about 1 gpm; used for garden irrigation.
U	5.63	11/21/50	P, 5	D	38	3	Water level low in summer; located 50 ft southwest of well -5A1.
C	F	12/ 4/50	J, 15	D, S	46	4	Flowing about one half gpm.
C	24	11/ /50	P, 10	S, Irr	46	5	Water contains large amount of iron and has sulfur taste.
C	10.82	11/21/50	J, 5	D	92	9	Located 50 ft east of well -5K1.
C	F	12/12/51	J, 20	D			Flowing about 3 to 5 gpm; water from 335-ft sand has sulfur taste, a hardness of 20 ppm and chloride of 3 ppm.
C	F	11/27/50	J, 40	PS	40	4	See table 2 for log; well destroyed; pumped large amount of sand.
C	F	12/18/52	20	PS			
C	20	11/ /50	J, 10	D, S	40	5	Casing perforated from 45 to 65 ft.
U	20	8/ /50	C, 5	D, S	102	10	Pumps dry in summer; see tab1 4 for chemical analysis.
C	7	11/ /50	C. 10	S, Irr	138	7	Sand in water; located 200 ft east of well -6E1.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 3 W. - Continued								
7A1	G. P. Vandehey	P, 170	Dg	43	60	43	0	43	Sand
7A2	L. J. Spiering	P, 165	Dr	946	6-4	907	900	46	Basalt
7E1	Glen P. Ireland	P, 170	Bd	100	18	100	36	4	
7H1	Leo Akerman	P, 165	Bd	85	12	85			"Quicksand"
8B1	Julius Duyck	P, 180	Dr	376	6	372	372	4	Gravel
8E1	Al Peters	P, 170	Dr	965	6	930	930	35	Basalt
8P1	G. H. Vander-Zanden	P, 170	Dg	33	36	33	0	33	Aluvium
10F1	James Vander-Zanden	P, 180	Dg	25	48	25	0	25	do.
11A1	R. N. Shearer	P, 185	Dr	102	6		100	2	"Shot" clay
11J1	Clarence Dykes	P, 175	Dg	29	48	29			
12E1	Floyd Beach	P, 210	Dr	645	6	553	553	92	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	8	11/ /50	J, 5	D, S	92	9	Water level low in summer.
C	F	4/ /51	J, 40	D	24	7	See table 2 for log.
U	F	11/ /50	J, 50	Irr			Water level about 14 ft from surface in summer; water cascades down well from 36 to 40 ft; concrete tile casing.
U	2.5	11/21/50	J, 5	D, S	76	6	
C	20	11/ /50	J, 20	D, S			Water carries some sand.
C	F	11/21/50	P, 25	D, S			Estimated flow about 1 gph; encountered basalt at 910 ft; known as the Rieling well; farm vacant.
U	3.75	11/21/50	J, 5	D, S			See plate 25 for water-level record.
U	2.72	11/17/50	J, 5	D	143	6	Similar well (300 ft west) goes dry in summer.
C	18	1938	P, 10	D, S	76	4	Iron precipitates from water after exposure to air; water from shallow well nearby contains 208 ppm hardness and 12 ppm chloride.
U	2.55	11/17/50	J, 5	D			Water level low in summer.
C			P, 10	D, S	276	13	Driller encountered charred wood and "fir" cones at 300 ft depth.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 3 W. - Continued									
13F1	Marie Starkey	P,	200	Dg	24	36	24	0	24	Alluvium
13F2	Edwin Simantel	P,	200	Dr	104	6		89	15	Sand
13F3	do.	P,	200	Dr	340	4	340			do.
15F1	Perkins	P,	160	Dg	57	18	18			do.
15H1	Art Salzwedel	P,	185	Dg	30	36	30			
15H2	J. L. Cawrse	P,	180	Dr	100	12	100	70	30	Sand
18J1	Clarence VanDyke	P,	160	Bd	70	6	70	50	20	do.
19C1	A. J. Giesbers	P,	170	Bd	56	6	54	54	2	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	4.68	11/24/50	P, 3	D	162	10	
C			J, 5	D, S, Irr	122	4	Used for irrigating lawn and garden.
C	21.83	11/24/50	N		49	6	Reportedly pumps sand; located about 60 ft west of well 13F2; see plate 26 for water-level record.
U				D, Irr			Supplies 2 houses and a half acre of garden.
U	2.92	11/17/50		D	242	7	Water level has large annual variation; see plate 26 for water-level record.
U	6.06	4/22/52	J, 100	Irr			Gravel packed well; concrete casing perforated from 0 to 100 ft; pumped 100 gpm for 90 hours with 25 ft of drawdown; used for irrigating 15 acres of pasture.
U	8	1949	J, 10	D, S	162	3	Test pumped at 10 gpm for 7 days; casing perforated from 50 to 70 ft; a dry hole 260 ft deep drilled 50 ft north of 18J1.
U	2.5	11/22/50	J, 10	D	106	6	See plate 27 for water-level record; water from a 25-ft well about 60 ft southeast reportedly contains iron and is hard.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 3 W. - Continued									
20H1	Bill Marsh	P.	145	Dr	320	6	320			
20P1	W. M. Hermens	P,	200	Dg	27	30	27			Quicksand
20P2	Verboort Catholic Church	P,	200	Dr		8				
21L1	Bill Marsh	P,	165	Dr	220	6-5	220	219	1	Gravel
22G1	A. F. Delplanche	P,	165	Bd	45	8	45			Sand
22R1	Martin Vander-Zanden	P,	170	Bd	40	4	38			do.
23R1	VanDomelen	P,	180	Dg	22	48	22	0	22	"Clay"
24C1	A. Griffing	P,	180	Bd	57	12	57			Sand
25A1	Clarence Rice	P,	185	Bd	60	8	50	40	20	do.
25H1	H. P. McConnell	P,	180	Bd	52	6				do.
25J1	L. C. Stone	P,	175	Bd	55	6	30	30	25	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
							Abandoned; reported black clay entire depth.
U	4.74	11/22/50	P, 5	D	88	2	Pumps dry in summer.
			J, 10	D	108		Water contains small amount of iron.
C	15	1947	J, 20	D			Materials penetrated were clay from 0 to 70 ft; black, sticky clay from 70 to 150 ft; whitish clay from 150 to 219 ft; gravel from 219 to 220 ft.
U			J, 30	D, S	106	2	Test pumped 50 gpm for 7 hours.
U	7.0	11/24/50	J, 10	Irr	88	2	Used for irrigating lawn and garden; water has slight sulfur odor.
U	4.1	11/24/50	P, 5	D, S	116	7	
U	2.0	11/24/50		Irr	242	16	Hardness and chloride of water from 40-ft well 200 ft away.
U	3	3/ /51	J, 50	Irr			Water used for irrigating 14 acres; reported 40 ft of clay above aquifer.
U			J, 5	Irr			Used for irrigating lawn and garden.
U			J, 8		62	4	Casing is reportedly set on hard clay at 30 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 3 W. - Continued								
26G1	Dale Sheller	P, 180	Dg	22	36	22			
26G2	do.	P, 165	Dr	95	8				
27G1	A. F. Steinke	P, 150	Dr	101	6	85	95	6	Pea gravel
28K1	Joe Vanoudenhae-gen	P, 175	Dg	39	60	39			Quicksand
28K2	J. N. Jepson	P, 170	Bd	54	12	54			"Silt"
29M1	M. C. Mathison	P, 200	Dr	125	6	125	103	22	Gravel and "silt"
29N1	Porter	P, 205	Bd	80	6	80			
30D1	George Spiesschaert	P, 175	Bd	73	12	70	70	3	Sand
30L1	Rod VanderZanden	P, 160	Dr	195	6				do.
30L2	do.	P, 160	Bd	32	12	32			"Silt"
31F1	Bud Smith	P, 180	Dr	103	6	103	95	8	Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	3.59	11/24/50	P, 3	D, S	133	8	
C			T, 20	D, S	136	9	Located 300 ft south of well 26G1.
C	20	11/ /50	J, 10	D, S	98	4	Some iron in water at 101 ft; materials penetrated were sand to 75 ft; cemented gravel from 75 to 95 ft; pea gravel from 95 to 101 ft.
U	3.08	11/29/50	J, 10	D, S			
U	4.87	11/29/50	J, 5	D	164	4	See plate 27 for water-level record.
C	20	8/ /50	J, 20	Irr			Water reported to contain much iron.
C			P, 10	D, Irr			Used for irrigating a garden.
C			J, 20	D, S	106	16	
C	66	8/ /50	P, 15	Irr	68	5	Water carries sand and contains iron; see plate 28 for water-level record.
U	5.08	11/29/50	J, 5	D	180	12	See plate 28 for water-level record; located about 150 ft north of well 30L1.
C	40	8/ /50	J, 15	D,			Water used for irrigating 1½ acres; reported 95 ft of clay and silt above aquifer.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 3 W. - Continued								
31G1	H. D. Stites	P, 185	Dr	119	6	119	106	13	Gravel
32B1	G. L. Moeller	P, 175	Dg	25	36	25			
32P1	Masonic and Eastern Star Home	P, 175	Dr	177	10-8	177	141	5	Gravel
32P2	Fowles	P, 175	Dr	288	12				Sand
34H1	Ross Baer	P, 170	Dr	115	6	100			
34M1	Arrow Meat Co.	P, 175	Bd	65	6	65	30	30	Sand
34M2	do.	P, 175	Dr	100	6	100	97	3	Sand and gravel
35M1	Vincent Henrich	P, 150	Dr	72	6	62	62	10	Sand
35P1	Fred Gordon	P, 160	Bd	65	6	45	50	15	do.
36R1	Birdseye Cannery	P, 180	Dr	50	12				do.
36R2	do.	P, 180	Dr	171	12				do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 20	Irr			Water used for irrigating 7 acres; materials reported as clay, silt and sand to 106 ft.
U	3.6	11/27/50	J, 20	D	190	4	
C	25	1929	J, 60	Irr	224	4	Water-Supply Paper 890 well 22; lower 50 ft of 8-inch casing perforated; pumped 50 gpm with 5 ft drawdown.
U	23.22	12/13/50		Irr			Drilled for the city of Hillsboro; water originally carried too much sand.
	30		J	D	190	4	
U	20	11/ /50	T, 25	Ind	208	4	Pumps fine sand; replaced by well 34M2.
U				Ind			
U	20	8/ /48	J, 10	S	174	10	Water irrigates lawn and garden.
U			J, 20	Irr			Water used for irrigating lawn garden and 2 acres of pasture
U	12.85	12/ 5/50	N		106	3	Not used; insufficient water.
U	10.14	12/ 5/50	N		124	17	Not used; see plate 29 for water-level record; located 300 ft northwest of well 36R1.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
36R3	Birdseye Cannery	P. 180	Dr	1,619	18		170	5	Sand and gravel
	T. 1 N., R. 4 W.								
1C1	Ray Dierickx	P, 225	Dr	239	6	239	139	100	Sand(?)
3B1	Henry W. Stafford	S, 310	Dr	57	6				do.
3R1	Wayne Hensley	P 175	Dr	341	6	311	309	32	Basalt
5K1	A. B. Dober	U 710	Dr	167	6	124			do.
6G1	Emil Jossy	P 300	Dr	75	6				Gravel
6R1	Lars Larson	P 280	Dr	417	8	100	0	30	do.
7C1	Albert Jesse	S 350	Dr	38	5	36	34	4	do.
8M1	Tom Heisler	P 230	Dg	15	12				Gravel(?)
9M1	Jennsen	S 240	Dr	212	6	212			Fine sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U							Water-Supply Paper 890 well 23; casing removed; only water was at 175 ft; located 300 ft east of well 36R1; see table 2 for log.
C	13	2/ /51	J, 10	D, S	72	4	Bailed 15 gpm with a 55-ft drawdown.
U	40.75	12/13/50	N				Never used; water from nearby spring has hardness of 10 ppm and chloride of 3 ppm.
C	F	12/13/50	J, 15	D, Irr	56	4	Flowing 25 gpm; materials reported as sand, clay, and gravel to 309 ft; temperature of water is 56° F.
U	100	12/ /50	P, 5	D	6	4	Believed in top part of basalt.
U	5	12/ /50	P, 10	D, S	62	6	
U			J, 10	D			Casing pulled back to 30 ft; reported 387 ft of shale (dry) below aquifer.
U	15.54	11/17/51	J, 10	D	20	4	Water becomes cloudy after a rain.
U	6.2	11/29/50	C, 5	D	40	6	
C	F	12/ 4/50	P, 15	D, S			Started flowing 4 or 5 years after drilling in 1929.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 4 W.- Continued									
10A1	John C. Aydelott	P	170	Dr	211	6	211	200	11	Sand
11D1	Vernon Lyda	P	175	Dr	410	6-4	356	356	54	Basalt
12A1	Lester Susbauer	P	175	Dr	260	6				
12Q1	Agnes Malensky	P	175	Dr	240	6				
14B1	L. J. Heesacker	P	170	Dr	585	6	380	500	79	Basalt
14J1	Ernest Heesacker	P	170	Dr	260	6				
14J2	do.	P	170	Dg	60	12-36				
14L1	George Hostyneh	S	180	Dr	420	6	237	363	57	Basalt
14P1	N. S. Willis	S	185	Bd	85	6	85			
14Q1	R. Lepschat	S	170	Dr	132	6				Sand and silt
14Q2	R. L. Wood	S	175	Dr	145	6	140			Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	F	12/13/50	J, 10	D, S	78	4	Flowing 1/2 gpm; clay 0-200 ft; temperature 54° F.
C	F	4/ /53	N	D			Flowing 10 gpm; gamma-ray log made of this well; see plate 14 for water-level record.
C	F	11/21/50	J	D	62	5	Flows when not used; some iron reported in water.
C	F	11/ /50	P, 5	D, S	27	4	Flows 1/2 gpm when not in use.
C	F	11/29/50	J, 25	D, S	74	4	Flows 8 gpm; see table 2 for log; temperature 56° F.
C	F		N	N			Capped; reported "saline" water.
U	7.9	11/29/50	P, 10	D	66	9	Located 10 ft north of well 14J1.
C	F	11/ /50	J, 10	D, Irr	58	4	Driller encountered wood at 137 ft; 225 ft of clay above aquifer; flowing 2 gpm.
U			J, 10	D, S	92	8	Gravel packed on outside of casing 15 to 85 ft.
C	F	11/ /50	J, 10	D, S	58	4	Flowing 3 gpm; water temperature 58° F.
C	F	11/ /50	P, 10	D, S	44	4	Has very small flow.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 N., R. 4 W.- Continued									
15C1	B. W. Gent	S	175	Dr	343	6	324	323	23	Basalt
21C1	George McDonald	S	255	Dr	201	6	36	36	165	do.
23R1	Arnold Goff	S	245	Dr	301	6	165	261	1	do.
24D1	M. H. Lull	P	180	Dr	173	6	115			Silt
26J1	Frank Russell	S	250	Dr	57	6				
35F1	E. A. Rueter Est.	S	200	Dr	225	6	158	140	1	"Rock" (shale)
	T. 1 N., R. 5 W.									
1R1	John Wilson	S	285	Bd	47	12	47	30	17	"Soapstone" (shale)
12Q1	F. S. Rohr	U	1,075	Dg	50	22		40	10	"Clay"

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	F	12/ /50	N	D, S	84	4	Flows 8 gpm and has 57 ft of pressure head; yield same with 200-ft drawdown.
C			J, 10	D, Irr	5	12	Water reportedly has sulfur taste.
C	F	11/ /50	T, 35	Irr	38	2	Flows 15 gpm; test pumped 35 gpm with drawdown 166 ft below surface; see table 2 for log and table 4 for chemical analysis.
C	F		J, 10	Irr			Flows in winter; water level about 12 ft in summer.
			J, 8	D	16	3	Water contains iron; supplies three houses.
U			T, 5	D	60	4	Readily pumped dry; casing perforated from 138 to 158 ft.
U	32	11/ /51	J, 15	D, S			Readily pumped dry in summer.
U			P, 3	D	16	4	Do.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 N., R. 1 W.									
31L1	Alex Linden	S	600	Dr	156	6	52	101	55	Basalt
31M1	L. Stieger	U	745	Dr	592	6	100±			do.
31Q1	Plainview School	S	710	Dr	417	8	70	256	161	do.
	T. 2 N., R. 2 W.									
20A1	Otto Solberger	U	910	Dr	545	6				
20A2	do.	U	910	Dg	88	40	12	81	7	Basalt
22K1	Glen Minshall	U	820	Dr	140	6	10			do.
22M1	C. Christiansen	U	910	Dr	200	6		170	30	do.
23P1	J. S. Harris	U	930	Dr	200	6				
24M1	Bessie M. Flanegan	U	975	Dr	6	77				do.
25N1	W. L. Nelson	U	720	Dr	110	6				"Gravel"
26B1	E. T. Folkenbergh	U	880	Dr	86	6		80	6	Basalt
26G1	Foote	U	855	Dr	74	6				do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	102	9/ 5/51	P, 8	D	138	6	Reported 45 ft of clay and 10 ft of hard rock above aquifer.
P	300	1951	P, 8	120	6		
U	332	1938	P, 10	D	134	5	Supplies water for two families; see table 2 for log.
							Well destroyed; see table 2 for log.
U	65.5	8/24/51	J, 5	D	80	4	
P			P, 3	D, S	36	4	
P			P, 5	D, S	138	5	Encountered basalt at 100± ft.
			P, 5	D, S			
P			P, 5	D	104	7	
U			J, 8	D, S	52	5	Readily pumped dry; water sometimes has a reddish color.
P			J, 5	D, S	30	3	
P			J, 5	D, S	92	3	Readily pumps dry.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 N., R. 2 W.- Continued									
27E1	Joe Meyer	U	810	Dr	200	6				
27Q1	C. Rittar	U	780	Dg	90	48	90			"Clay"
28E1	G. A. Weisenbach	U	730	Dr	180	6	80	80	100	Basalt
29N1	H. Brewer	S	210	Dg	45	48				Clay
29R1	I. W. Lucas	S	400	Dr	154	6		104	2	Basalt
30J1	W. H. Wainscott	P	165	Bd	55	6	45	40	15	"Clay"
31K1	John Vanmoock	S	210	Dr	157	4	157	127	30	Basalt
32L1	Walter VanDer-Zanden	S	225	Dr	625	8	438			"Clay"
33G1	Ed Meyer	S	505	Dr	346	8	256	256	90	Basalt
33H1	F. Rufener	S	555	Dr	170	6	130	140	30	do.
33N1	Emile York	S	345	Dr	180	4		160	20	do.
34G1	Jim Dixon	U	535	Dr	156	6		152	2	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
			P, 5	D, S	82	6	Water sometimes has a reddish color.
U	54.4	8/29/51	P, 5	D, S	104	5	Adequate.
P	90	1951	P, 5	D, S	70	4	
U			P, 3	D, S	58	6	Provides small supply of water.
U							Encountered basalt at 70 ft; provides small supply of water.
U	5	1951	J, 5	D	94	4	
U	7	1951	P, 5	D	70	4	Reported 127 ft of clay overlying aquifer.
C	38.7	9/ 3/52	N				Shells encountered in blue shale at 625 ft; casing pulled back to 300 ft.
U	120	1951	P, 8	D, S			
U	40	1951	P, 5	D, S	92	4	Easily pumped dry.
C	65	1942	P, 5	D, S	88	4	Reported 160 ft of clay above aquifer.
C			P, 8	D, S			Encountered rock at 70 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 N., R. 2 W.- Continued									
34R1	Ed Meier	U	520	Dr	370	6				Basalt
35A1	G. W. Bentley	S	470	Dr	23	6	5	5	19	do.
	T. 2 N., R. 3 W.									
2P1	John Hurnesh	U	1,175	Dg	65	60	65			do.
4F1	Bradford Fowles	P	350	Dr	61	6	57	50	11	"Sandstone"
10Q1	N. H. Welch	S	585	Dr	500±	6	300±	300±	200±	Basalt
11G1	Jack Ness	U	1,175	Dg	78	54	0			do.
11G2	Charles Adams	U	1,050	Dg	82	60	0			do.
11Q1	Matus and Weave	S	950	Dg	82	48	0			do.
12N1	A. A. Griffels	U	900	Dg	83	48	83	0	83	do.
14J1	O'Connor and Corriery	U	800	Dr	165	6-5	165	160	5	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	60	1951	P, 8	D, S	98	5	Water sometimes has a reddish color.
U			J, 5	D	72	4	
U	15	1/ /51	J, 10	D	14	8	
C	9	1953		D			
C			P, 10	D	70	4	
U	48	6/ /50	J, 5	D	14	4	Water level reportedly 68 ft in August 1950; well pumps dry easily in summer.
U	58.63	1/ 9/51	N	D, S	9	6	Water drawn from well with bucket; see plate 29 for water-level record.
U	27.68	1/ 9/51	N	D	16	6	Water drawn from well with bucket.
U			P, 3	D, S	12	5	Located 300 ft east of a 54-ft dug well.
C	87.84	1/ 6/51	P, 5	D	100	4	Casing perforated from 152 to 165 ft; see plate 30 for water-level record.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 N., R. 3 W.- Continued									
15K1	Chris Johnson	S	250	Dg	25	36	25	0	25	Sand and gravel
15N1	D. Denison	P	215	Dr	89	8	88	88	1	Gravel
16A1	Dennis Hall	P	275	Dr	150	6	33	34	21	Gravel and boulders
16H1	J. H. Powers	P	225	Dr	65	8	65			
19J1	Hubert Davies	S	60	Dr	260	6				
22E1	S. A. Appleton	S	200	Dr	300	6	208	280	20	"Sandstone"
23E1	Martin Stadelman	S	360	Dr	275	4	125	125	150	do.
24P1	A. M. Anderson	S	575	Dr	457	6	201	201	4	Basalt
25J1	Roy Bills	S	430	Dr	140	6	122	90	32	do.
25M1	Fred Miller	S	250	Dr	80	6	79	79	1	do.
25P1	Charles Huber	S	325	Dr	177	6	170	170	7	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U			P, 1	D			
C	7	8/ /50	P, 20	D, Irr	48	12	Produced 20 gpm with 40 ft of drawdown; used for irrigating 2 acres.
U	5.3	1/ 3/51	N	Irr			Material from 55 to 150 ft possibly marine shale; used for irrigating about 1 acre; see plate 30 for water-level record.
U	40	8/ /47	J, 5	D, S	94	12	
							Dry hole; "basalt" at 80 to 90 ft; "sandstone" from 200 to 260 ft.
	8.4	4/19/51	J, 5	D			
C	40	1951	P, 10	D, S	62	3	Reported 125 ft of clay above aquifer.
C			P, 5	D, S	158	5	See table 2 for log.
C	30	10/ /50	J, 15	D, S	64	4	Water has a reddish color during times of little pumpage
C	F	1/ 9/51	T, 25	D, Irr	70	4	Flows about 3 gpm; used for irrigating 8 acres of pasture.
C	35	1951	P, 5	D	80	5	Has some iron in water.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 N., R. 3 W.- Continued									
25R1	C. Hatfield	S	425	Dr	140	6				Basalt
27K1	G. C. Connelly	P	185	Dr	86	6	85	85	1	do.
27L1	C. B. Henderson	P	190	Dg	54	48	35	0	35	Alluvium
29J1	Schlegel Bros.	U	450	Dr	622	6				
29R1	do.	S	225	Dr	120	6				
31R1	David Vandehey	P	195	Dr	55	6	55			
32B1	W. H. Rufner	P	190	Dr	150	6	140	140	10	Sand
32J1	Rieben Brothers	S	200	Dr	160	6				do.
36A1	J. Ryan	S	330	Dg	60	36	2			"Rock"
36M1	H. L. Miller	P	195	Dg	47	60				

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 115	D	52	4	Water has reddish color.
C	2.89	3/16/51	P, 6	D	130	9	Produces about 6 gpm with 8 ft of drawdown; see plate 31 for water-level record.
U			J, 15	D, S	146	6	Inadequate during dry season.
U	250	1950		N			Produced 35 gpm; not used because of high lift.
C	18	1950		N			
U	13	10/ /48	C, 3	D	58	4	Casing perforated from 15 to 55 ft; 18-inch drill hole, gravel packed.
C	F	1/ 3/51	J, 10	D, S, Irr	58	4	Flows about 8 gpm; clay for 140 ft above aquifer.
C	18.64	11/22/50	J, 5	D, S	58	3	
U	40.07	11/ 8/51	J, 5	D	72	13	Easily pumped dry in summer.
U	4	1951	J, 5	D	48	4	Inadequate supply.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 N., R. 4 W.									
4E1	R. B. Powers	S	290	Dg	30	48				
4E2	Bill Riggle	S	325	Dg	25	48				
4N1	Sun Valley Gas Station	P	230	Dr	100	8				Gravel
5H1	McCall	P	249	Dg	16	36	16	0	16	Alluvium
10F1		S	265	Dg	22	48	22	0	22	Alluvium
14L1		P	220	Dg	14	36	14	0	14	do.
15B1	N. H. Baker	P	240	Dg	18	48	18	0	18	do.
15G1		S	220	Dg	51	48	51	0	51	do.
24D1	Charles Schmidlin	S	190	Dg	37	48	37	0	37	do.
26E1	Morgan Brothers	U	420	Dr	396	6				"Sandstone"
26E2	do.	S	415	Dg	34	36				Colluvium
33G1	Julius G. Winterfield	S	350	Dr	116	8-6	116	95	21	do.
33R1	J. W. Seavey	U	600	Dr	200	5		160	40	do.
35A1	Noby Eberly	S	260	Dg	200	48	N			do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	8.21	12/ 8/50	P, 4	D	28	7	Water level very low in September.
U	3.26	12/ 8/50	N	D	10	5	Water drawn from well with bucket; waterlevel low in September.
C			J, 10	D, Ind	102	3	Water is slightly murky.
U	3.77	12/ 8/50	P, 5	D, S	90	6	
U	2.22	12/ 8/50	J, 5	D, S	10	4	Water level very low in summer.
U	5.6	12/ 8/50	C, 5	D	10	3	
U	8.18	12/ 8/50		D	20	6	
U	23.46	12/ 8/50	J, 8	D, S	52	3	
U	0.00	12/ 8/50	N	N			
C	156.5	12/ 8/50	P, 5	D, S	70	4	Hit log at 200 ft.
U	8.16	12/ 8/50	N	D	6	5	Water level very low in late summer; well not used now.
C	60	1950	J, 15	D, S	90	3	Bottom 25 ft of casing perforated.
C			P, 8	D	17	4	
U	24.30	12/ 8/50	N	D	13	3	Water drawn from well with bucket.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 N., R. 4 W.- Continued									
35A2	William Eberly	S	260	Dg	68	48				Colluvium
35E1	W. C. Weber	S	270	Dr	305	6				do.
	T. 1 S., R. 1 W.									
1B1	Thompson Nursery	U	895	Dr	402	8	116	370	32	Basalt
1Q1	Sunnyslope Cemetery Assoc.	S	700	Dr	900	8				
2J1	J. R. Dant	S	530	Dr	904	8	777	885	16	Basalt
2L1	J. Peterkort	S	415	Dr	580	8				
2L2	do.	S	425	Dr	208	8	50			Boring lava
2P1	Commonwealth, Inc.	S	420	Dr	875	8-6	728	854	18	Basalt
3J1	J. Peterkort	S	375	Dr	292	6	227			Boring lava

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	21.0	12/ 8/50	N	D	20	4	Water drawn from well with bucket.
C	50	1950	P, 5	D, S	52	3	
C	30	1951	50	D			Materials penetrated were soil from 0 to 21 ft; Boring lava from 21 to 40 ft; clay (Troutdale formation) from 40 to 114 ft; Columbia River basalt from 114 to 402 ft. Insufficient supply of water.
C	341.0	4/10/53	T, 100	Irr			Water level measured with air line; used for irrigating large lawn; when drilled April 10, 1942, water level was 322 ft.
C	120	1951	T, 100	Irr	64	5	Used for irrigation in greenhouse.
C	140	1951	T, 50	Irr	72	5	Do.
C	235.99	11/12/53	N, 175	Irr			Test pumped 175 gpm with 68 ft of drawdown; see table 2 for log; water temperature 59° F.
C			T, 25	D			Previously drilled to 170 ft; no additional water from 170 to 292 ft.

Unpublished records subject to revision.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W.- Continued								
5J1	Windolph	P 200	Dr	165	6				Sand
5L1	R. R. Cornelius	P 225	Dr	195	6	195			do.
5L2	Gus Draheim	P 225	Dg	22	48				"Clay"
6B1	L. C. Houk	P 195	Dg	27	60	27	0	27	Alluvium
6F1	Alan Moore	P 200	Bd	70	12	70	61	9	Sand
6G1	J. A. McKnight	P 205	Dr	380	6	360			do.
6J1	J. E. Wilson	P 225	Dg	22	60	22	0	22	"Clay"
7A1	N. Bue	P 200	Dr	120	6				Sand
10F1	Dan Ryan	S 235	Dr	70	6				
10G1	D. Hirschberger	S 245	Dr	500	6-4	500	485	10	Basalt
10H2	Ivan Clark	S 245	Dr	468	4	464	460	8	do.
11Q1	M. B. Hinds	P 240	Dr	415	6	401			

in the Tualatin Valley - Continued

Ground-water occurrence	Water level		Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million)		Remarks
	Ft below land surface datum	Date			Hardness as $CaCO_3$	Chloride	
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 10	D, S	144	10	
C			P, 8	D	288	5	Water occasionally carries sand.
U	15	9/ /50	J, 5	D	334	13	
U	6.4	4/20/51	C, 5	D	122	6	
U	2.7	4/20/51	J, 25	Irr	230	6	Gravel packed; water used for greenhouse irrigation.
C			J, 5	D	264	7	Has small supply of water.
U	6	4/ /51	P, 3	S	252	19	
U			J, 8	D, Irr	208	8	
	40.15	9/28/51	J, 8	D, Irr	138	3	
C	75	4/ /49		D			Reportedly 485 ft of clay above aquifer.
C	101	1946	10	D			Drawdown 34 ft bailing 10 gpm.
							Materials penetrated were clay and sand to 401 ft; basalt from 401 to 415 ft; bottom of casing fractured while blasting rock to straighten hole; well destroyed; plan to drill 8-inch well a few ft away.

Unpublished records subject to revision.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W.- Continued									
11L1	City of Beaverton	S	360	Dr	735	10-8	610	650	85	Basalt
12N1	Allen	S	300	Dr	480	6	420	420	60	do.
14K1	Kieser Engineering, Inc.	S	255	Dr	102	6	102			"Clay" and sand
14Q1	Denny	S	255	Dr	76	6	76			do.
15G1	O. R. Nicholson	P	185	Dr	90	8				
15K1	Southern Pacific Co.	P	180	Dr	390	8				Sand
16A1	Horseradish Processing Co.	P	190	Dr	340	8	340	313	27	"Clay"
16M1	Carmen Gallucci	P	200	Dr	310	6	297	189	121	Sand
16N1	Harry Hanson	S	225	Dr	64	8	63	63	1	Gravel

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	174.98	1/29/54	T, 420	PS	95	48	City well no. 1; see table 2 for log.
C	90	7/ /49					Water level draws down 200 ft after one hour bailing 30 gpm.
C			J, 25				
C			P, 10	D	120	5	
C	11.15	8/22/51	P, 8	D	148	12	Supplies three families.
C	F	3/ /48		N	40	16	See table 4 for chemical analysis of water.
C	35	5/ /50	10	Ind			Pumped 15 gpm with 110 ft of drawdown; materials reported as sand and clay entire depth; well deepened after aquifer (sand) at 103 ft depth collapsed in April 1950.
C	20	1945	J, 10	D	170	4	Layers of sand and clay entire depth.
C	30.8	5/11/51	J, 5	D	118	9	Reported clay and sand above aquifer.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W. - Continued									
17A1	St. Mary's of the Valley Academy	P	200	Dr	220	8		215	5	Sand
17A2	do.	P	200	Dr	1,507	8 6	700 1100	1,270	235	Basalt
17H1	C. J. Redfield	P	180	Dg	20	36	20			Sand
17L1	L. F. Pike	P	210	Dr	90	6				
17R1	Moe Gollock	P	225	Dr	222	6-4	222	220	2	do.
17R2	E. P. Headberg	P	230	Dr	101	6				Quicksand
18J1	L. R. Martyn	P	200	Dr	66	6	66	56	5	Gravel
18Q1	George Heitzman	P	230	Dr	101	5-4	101	98	3	Sand and gravel
19A1	Henry Nielson	S	250	Dr	200	6				

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	56.9	5/14/51	T, 30	Irr			Was bailed at 25 gpm with 35 ft of drawdown; one of three similar wells; well not in use, pumps sand; well destroyed in May 1954.
C	17.65	1/18/54	115	N	740	960	See table 2 for log and table 4 for chemical analysis of water; taken when well was 1,374 ft deep.
U	6.05	5/11/51	P, 3	D			
			J	D	134	17	
C	41.95	5/11/51	T, 10	D	160	50	Caved after being poorly finished in sand at 95 ft; drilled to deeper sand; casing perforated from 218 to 222 ft.
C	46.95	5/11/51	J, 8	D	146	5	
C	20	4/ /51	J, 10	Irr	220	7	Reported 56 ft of clay above aquifer; when completed was bailed at 30 gpm; casing perforated from 46 to 66 ft.
C			J, 8	D	104	6	Reported 98 ft of sand and clay above aquifer; casing perforated from 60 to 68 ft and from 94 to 101 ft.
			P, 8	Irr	100	7	Adequate to irrigate small acreage.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W. - Continued									
19D1	Paul Leopold	P	225	Dr	127	6				Sand
19E1	K. Amstad	S	270	Dr	145	6	14			"Rock"
19J1	Barron	S	300	Dr	312	6				Basalt
19R1	Cooper Mountain School Dist. 3	S	325	Dr	150			140	10	do.
20R1	O. C. Norvell	S	265	Dr	138					
21J3	J. A. Kelly	S	270	Dr	110	6				
21K1	R. M. Steward	S	265	Dr	96	6	45			do.
21K2	Mrs. James Barlow	S	250	Dr		6				
21P1	City of Beaverton	S	330	Dr	800	16	63	90	760	do.
21R1	Mrs. W. H. Shively	S	290	Dr	141	6	21			do.
21R2	H. C. Walther	S	245	Dg	24					do.
21Q1	A. E. Hansen	S	295	Dr	124	6	40	111	13	do.
21Q2	Guy Woodworth	S	345	Dr	164	6	162	84	80	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			P, 5	S	146	8	
C			P, 10	D, S	100	7	
C	100	1/ /49					Reportedly the most productive well in area; has been pumped at 95 gpm.
C			3	PS			
			P, 8	D	75	10	Water has reddish stain on standing.
	66.50	1/28/48	J, 5	D	70	11	
U	73.04	2/ 3/48	J, 10	D	70	10	
	59.46	2/ 5/48	J, 5	D	80	17	Went dry; was deepened in 1947.
C	155.23	3/12/48	T	PS	95	26	Test pumped 950 gpm with a drawdown of 80 ft; city well no. 2; see table 2 for log.
U	100.21	2/26/48	P, 10	D, S	95	11	See plate 32 for water-level record.
U	2.48	1/23/48	P, 5	N			
U	99.5	1/20/48	P, 8	D	60	10	Inadequate supply of water; well no. 49 of WSP 890.
U	153.16	1/23/48			70	10	Materials reported as 18 ft of clay and 146 ft of rock.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W. - Continued									
22F1	Ralph Beck	P	230	Dr	98	6	90	90	8	Sand
22H1	W. E. Wyttenbigh	P	185	Dr	89	6				
22K1	Tony Ghiglietti	S	205	Dr	90	6				Sand
22P1	J. H. Richter	S	255	Dr	246	6	246	190	56	"Clay"
23F1	C. W. Browning	P	195	Dr	100+	6				
23F2	L. Milne	P	210	Dr	367	6-5	367	358	9	Sand
23P1	R. B. Helfrich	S	235	Dr	60	4				do.
23P2	do.	S	235	Dr	195			191	4	Basalt
24D1	Portland Golf Club	P	205	Dr	400	8		300	100	do.
24D2	do.	P	205	Dr	515	12				do.
24D3	do.	P	205	Dr	500	14-12	500	410	90	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	15	6/ /49	J, 15	Ind	100	5	Bailed 18 gpm for 2 hours with 55 ft of drawdown.
C	29.90	8/23/51	P, 8	D	190	15	Used by two families.
C	29.04	8/23/51		N			Has been partly filled with sand.
U				N			Inadequate supply of water; not in use.
			J, 10	Irr	130	5	Used for irrigating lawns.
C	35	10/ /47	P, 5	D	140	70	Bailed at 5 gpm for one hour with 60 ft of drawdown;casing perforated from 346 to 367 ft; reported 358 ft of clay and sand above aquifer.
U			J, 8	D			Can readily be pumped dry; not in use.
C			J, 8	D, S			
C	25	5/ /36	T, 450	Irr			Used for grounds and pond; well no. 51 of WSP 890; temperature of water 56° F.
C				Irr			
C	30.17	4/ 8/51	N	Irr			Casing perforated from 410 to 430 ft and 460 to 500 ft; see table 2 for log; see plate 15 for gamma-ray log; test pumped 1,000 gpm with 190 ft of drawdown.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W. - Continued									
24F1	Aaron Frank	P	225	Dr	520	8		450	70	Basalt
24F2	do.	P	210	Dr	800	8	470	470	330	do.
24N1	M. Murugg	S	245	Dr	200	6	160	160	40	do.
25M1	Warren Forsythe	S	200	Dr	242	6	134	236	2	do.
26E1	Sawyers, Inc.	P	250	Dr	162	12	18	14	148	do.
26G1	L. E. Byrne	P	230	Dr	70	6	62	48	22	do.
26M1	P. M. Olson	S	225	Dr	130	6				
26M2	Henry Erickson	S	250	Dr	102	6	20	20	82	do.
26Q1	James Gordon	S	240	Dr	128	6		28	100	do.
26Q2	A. Zuercher	S	220	Dr	98	6		20	78	do.
27C1	Robert Murphy	P	170	Dr	314	16-8	280	288	15	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	53.0	5/14/53	T, 500	S, Irr			Water contains iron; well no. 52 of WSP 890; see plate 33 for water-level record; water temperature 58° F.
C	28.16	6/ 4/53	N	N			Reported 460 ft of clay above basalt; well no. 53 of WSP 890/
C			P, 3	D			Inadequate supply of water; not in use.
C	14	3/ /49	T, 30	D, Irr	152	4	Used for irrigating 6 acres; see table 2 for log.
C			T, 300	Ind			See table 4 for chemical analysis.
C	15	1949	J, 8	D, Irr	140	4	Reported 48 ft of clay above aquifer.
			P, 8	D	146	7	Used as water supply for two families.
C	40	1951	J, 10	D	130	6	Water reportedly contains some iron.
C	60	1951	J, 5	Irr	120	5	Used for irrigating garden.
C			J, 5	Irr	128	13	Do.
C	F	3/ /52	N	N	1,485	1839	To be plugged back for test of higher water-bearing zones; see table 2 for log and table 4 for partial chemical analysis; temperature 55° F.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W. - Continued								
27R1	R. J. Thomas	S, 190	Dr	124	6	126	120	4	Basalt
28A1	G. G. Brinsley	S, 285	Dr	310	6	234	159	151	do.
28B1	B. F. Blethen	P, 275	Dr	105	6	64	90	15	do.
28C1	G. C. Carr	S, 325	Dr	158	6	20			do.
28G1	Fred Brandt	S, 290	Dr	126	6	35			do.
28M1	George Davies	S, 280	Dg						Clay(?)
28M2	do.	S, 290	Dr	60	6	20			Basalt
28N1	Charles T. Annis	S, 270	Dr	80	6		56	19	do.
29P1	Wheeler	S, 325	Dr	182	6		175	7	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level		Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million)		Remarks
	Ft below land surface datum	Date			Hardness as $CaCO_3$	Chloride	
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 15	D, S	170	8	Water sometimes has a reddish color.
C	2	6/ /23	C, 20	D	45	10	Materials reported as clay for 159 ft; hard and soft rock for 151 ft; well no. 54 of WSP 890.
C	83.6	1/21/48	P, 5	D, S	70	9	Reported 30 ft of clay, 40 ft decomposed basalt, 20 ft hard basalt above aquifer.
C	139.30	1/21/48	P, 2	D, S	50	10	
C	96	1/ /48	J, 5	D	60	8	Provides small water supply; clay from 0 to 35 ft, rock from 35 to 126 ft.
U	11.37	1/27/48	N				Inadequate during dry season.
U	38.91	1/27/48	J, 8	D, S	65	9	Has drawdown of 15 ft after 10 minutes pumping at 6 gpm.
C	40	6/ /49	J, 5	D, S	125		Has 55 ft of clay and 1 ft of sand overlying aquifer.
C				D			Has drawdown of 15 ft after 1 hour pumping at 15 gpm; basalt encountered at 115 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W. - Continued									
29R1	Adam Miller	S,	250	Dr	294	6	279	279	15	Basalt
30F1	Reed	S,	625	Dr	450	6				do.
30L1	J. D. Kemmer	U,	790	Dr	592	6				do.
33H1	E. H. Hite	S,	230	Dg	40	36	40			"Clay"
33N1	George N. Clark	S,	200	Dr	390	6	383	380	3	Basalt
33P1	Kirk Freeman	S,	25	Dr	157			150	7	do.
33P2	S. J. Dahlen	S,	180	Dr	445	6	438	438	7	do.
34A1	William Robinson	S,	170	Dr	60	6				Sand
34C1	do.	S,	180	Dg	25	42		20	5	Quicksand
34C2	do.	S,	180	Dr	250	6	250	245	5	Basalt
34L1	R. H. Savage	S,	230	Dr	90	6				do.
34L2	W. A. Butler	U,	230	Dg	20	60				Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	30	1951	P, 3	D	84	5	Bailed at 3 gpm for 1 hour with 170 ft of drawdown; reported 279 ft of clay above aquifer.
U	390	7/ /50	T, 5	D			
U	575	5/ /51	P, 12	D, S	106	6	Reportedly "soft" rock entire depth.
U	20	6/ /51	P, 2	D, S	70	8	
C	30.85	5/18/52	J, 20	D	300	46	Reportedly bailed 25 gpm for 1 hour with 90 ft of drawdown; see table 2 for log.
C	142	1949	J, 10	D, S			
C	F	1949		D			Flows 3 gpm.
C	F	6/11/51	J, 5	D	334	200	Flowing 2 gpm.
U	20	9/ /50	C, 5	D	188	53	Water level low in summer.
C	F	6/ /51	P, 10	S	412	450	Flows when not pumped for 3 to 4 days; water has sulfur taste.
C			J, 8	D, S	126	6	
U	15.92	8/13/51	J, 5	D, S	78	9	Readily pumps dry in summer.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 W. - Continued								
35A1	Ben Carsh	P, 185	Dr	128	6	30	75	53	Basalt
35B1	Doty and Dorner Nursery	P, 175	Dr	200+					do.
36L1	E. C. Hall Co.	S, 225	Dr	600	6-4	510	145	3	Gravel
36Q1	Schen	S, 225	Dr.	165					Sand
36Q2	Tower	S, 225	Dr	465	6				Basalt
	T. 1 S., R. 2 W								
1H1	E. Beshore	P, 175	Dr	198	6	198	50	148	Sand
1L1	R. Schoales	P, 180	Dg	20	48	20	0	20	Alluvium
1N1	A. F. Fisher	P, 185	Dr	300	4				Sand
2C1	A. Milligan	P, 160	Dr	125	6				"Quicksand"

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	16	1951	J, 8	D	162	6	Encountered basalt at 14 ft below surface.
C			T, 25	Irr	346	120	Used for greenhouse
C			J, 10	Irr			Casing perforated from 142 to 150 ft; materials penetrated were clay from 0 to 145 ft; gravel from 145 to 148 ft; clay from 148 to 412 ft; basalt from 412 to 600 ft; used for irrigating 2 acres of lawn.
C			P, 8	D			Clay overlying aquifer.
C			J, 15	D			
U			J, 25	D, Ind	124	57	Used for potato-processing plant; casing perforated near bottom.
U	5.8	4/17/50	J, 3	D	62	8	Water level reported low in dry season.
C			J, 4	D, S	134	5	
C			J, 3	D	360	104	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 2 W. - Continued								
2G1	Bertha Hinton	P, 180	Dg	23	36	23	0	23	Alluvium
2H1	John Walters	P, 175	Bd	55	6	52	52	3	Sand
2L1	James Higgins	P, 190	Dr	74	6-5	74	67	4	do.
2P1	C. W. Sinclair	P, 185	Dr	75	6	75	65	10	do.
3A1	Don Wick	P, 170	Dr	115	6-5	115	92	12	Sand and gravel
3D1	Thelien	P, 150	Dr	42	6	28	33	9	do.
3K1	E. F. Bonegard	P, 175	Dr	141	6-5	141	130	11	Sand
3Q1	L. C. Johnson	P, 165	Dg	28	40	28	0	28	Alluvium
4B1	Albert A. Lewis	P, 175	Bd	55	6	45	35	10	Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	14	9/ /50	P, 3	D	32	3	
C	20	7/ /48	J, 5	D	98	4	
C	30	9/ /50	J, 5	D, S	208	6	Reported 67 ft of clay above aquifer; casing perforated from 63 to 74 ft.
C	34	8/ /50	J, 5	D	156	4	Reported 40 ft of silt and 25 ft of clay above aquifer; casing perforated from 65 to 75 ft.
C	F	3/30/51	J, 3	D, Irr	170	27	Reported 92 ft of sand and clay above aquifer and 11 ft of clay below aquifer; casing perforated from 90 to 115 ft; flows about ½ gpm.
U			J, 5	D			Was test pumped at 20 gpm.
C	5	6/29/51		D			Materials reported as clay and sand entire depth; 5-inch casing perforated from 125 to 141 ft.
U	11.38	4/ 3/51	J, 5	Irr	142	14	Pumps dry in summer, but reported to recover in 20 minutes.
U	20	7/ /50	J, 5	D	126	7	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 1 S., R. 2 W. - Continued										
4D1	Sawmill	P,	180	Dr	30	6	30			Sand
4E1	Earl Ready	P,	185	Dg	23	48	22			do.
4R1	D. O. Kimberling	P,	170	Dr	42	6				do.
5C1	A. Mohr	P,	175	Dr	42	6				Quicksand
5F1	A. S. Ewing	P,	170	Dr	42	6	62			Sand
5F2	H. E. Susbauer	P,	175	Dr	62	6	62			do.
5P1	E. Johnson	P,	170	Dr	98	6	87	66	32	do.
6A1	Hughes and Son	P,	180	Dr	85	6	85	15	70	do.
6H1	City of Hillsboro	P,	178	Dr	200	6				
8C1	H. Freudenthal	P,	160	Dr	55	12				Sand
8C2	do.	P,	160	Dr	120	8				do.
8C3	do.	P,	160	Dr	196	10	196			do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	2.82	3/30/51	J, 15	Ind			Used for filling small mill pond.
U	4.07	3/30/51	P, 4	D	220	30	
U			J, 10	D	92	6	Water level is very low in summer.
U	4.96	3/27/51	J, 5	Irr			
U			J, 3	S, Irr	106	8	Used for irrigating acre of garden.
U			J, 5	Irr	112	7	
U	15	2/ /51		S			Reported clay and sand entire depth.
U	10	8/ /51	J, 5	Ind	154	13	Has been gravel packed.
							Was a dry hole; casing removed.
U			J, 10	D	160	4	Well caved in; abandoned.
U				D			About 50 ft south of well 8C1; well caved in; abandoned.
U	20	1953	T, 190	Irr			Materials penetrated were alternating layers of sand and clay; 20-inch rotary hole gravel packed to surface with 3/4-inch minus gravel around perforated 10-inch casing.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 1 S., R. 2 W. - Continued									
8K1	A. Hornecker	P, 155	Dr	32	4				Sand
8L1	R. M. Alden	P, 170	Dr	55	6	43	40	15	do.
8M1	W. P. Hanson	P, 170	Dr	48	6				do.
9H1	D. G. Zoucha	P, 180	Dr	49	6				do.
9Q1	Joan Waters	P, 160	Dr	39	6	39			do.
10B1	M. Baughman	P, 180	Dr	88	6	88	77	11	do.
10F1	Clyde Yount	P, 180	Bd	38	6	38			do.
10R1	C. G. Johannensen	P, 195	Dg	22	42	42	12	10	Quicksand
11F1	Community Water Co.	P, 205	Dr	112	6 18	77			
11F2	Reedville Dairy	P, 205	Dr	100	8	105	65	32	Sand
11J1	Ray Mathis	P, 225	Dg	22	48	48	0	22	Alluvium

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	2.82	2/23/51	J, 25	Irr	118	3	Used fpr irrigating 10 acres; see plate 34 for water-level record.
U	5	9/ /50	J, 25	Irr			Used for irrigating 7 acres.
U	4.5	2/26/51	J, 5	D, Irr	70	3	
U	20	9/ /50	J, 5	D	148	7	
U	10	10/ /50	J, 5	D	60	3	Supplies two families.
C			J, 10	D	144	3	Reported clay and sand entire depth; casing perforated from 77 to 88 ft; see table 4 for chemical analysis.
U	4.18	4/ 3/51	C, 3	Irr	110	4	
U	7.7	4/24/51	J, 5	D	100	5	Water level is low in summer and fall.
			J, 25	D	158	3	Used by four families.
U	25	11/30/49	T, 50	Irr			18-inch well gravel packed; 8-inch casing perforated from 65 to 105 ft; used for irrigating 10 acres; reported clay and sand entire depth.
U	5.66	4/25/51	C, 5	Irr			Barely adequate during dry season; used for irrigating lawn.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 2 W. - Continued									
11R1	A. C. Lange	P,	225	Dr	66	4				Sand
13C1	D. J. Rogers	P,	225	Dg	24	36	24	0	24	Alluvium
13H1	L. Kinnaman	P,	225	Dr	93	6	93	92	1	Sand
13J1	C. L. Kirkland	P,	200	Dr	132	6	80	80	52	do.
13M1	R. A. Ruth	P,	210	Dr	185	6				do.
13Q1	Morrison	P,	205	Dr	960	6-4	700	900	60	Basalt
14A1	B. J. Kassebaum	P,	220	Dr	90	6				
14K1	do.	P,	205	Dr	230	6	215	215	15	Sand
14K2	Oscar Hagg	P,	195	Dr	225	4	225	225	2	Sand and gravel
14L1	do.	P,	194	Dr	735	6				

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U			J, 5	D	180	4	Reported clay and sand entire depth.
U	9.42	5/ 7/51	N	N			
C	30	9/ /50	J, 15	D, S	134	6	
C			J, 10	D, S	98	4	Inadequate supply of water for 5,000 chickens.
C			J, 15	D, Irr	98	6	Water carries large amount of sand; see table 4 for chemical analysis.
C	3	Reported	T, 100	D, S	100	4	Supplied several farms a few years ago; reportedly contains weathered basalt from 700 to 900 ft; basalt from 900 to 960 ft.
C			J, 10	D, Irr	146	3	Used for irrigating 1 acre.
C	30	4/ /51	J, 20	D, Irr			Used for irrigating 1 acre; casing perforated at 215 to 270 ft.
C			J, 10	D, S	120	5	Casing perforated from 216 to 225 ft; reportedly test pumped 12 gpm.
							Reported clay and sand entire depth; well destroyed.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 2 W - Continued								
15A1	Preston Young	P, 205	Dr	90	6				
15R1	Pete Bilos	P, 190	Dg	11					Alluvium
16K1	J. R. Amrein	P, 150	Dg	33	60	33			Sand
16M1	Albert Geener	P, 155	Dg	32	48	32			do.
17C1	R. J. Perkins	P, 175	Dr	55	6	45	45	5	do.
18L1	R. J. Maier	P, 175	Dr	145	6	144	140	4	Sand and gravel
18P1	Louis Malensky	P, 180	Dr	70	6				Sand
19A1	Louis Hilleke	P, 180	Dr	903	10-4	269-822	232 822	37 81	do. Basalt
19K1	R. C. Enschede	P, 150	Dg	23	40	22			Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
			J, 15	D	190	5	
U	5.84	4/24/51	J, 5	D	122	5	
U			J, 5	D, S	68	7	
U	3	2/ /51	J, 15	D, S	164	11	
U	20	10/ /46	J, 5	D, Irr	68	4	Pump tested at 16 gpm for 2 days.
C			J, 15	D	180	3	Reported 140 ft of sand, silt and clay above aquifer; bailed 10 gpm for 1 hour with 144 ft drawdown.
U	3.6	1/30/51	J, 50	Irr	153	2	Used for irrigating 8 acres; see plate 34 for water-level record.
C	40 21	9/23/50 1953	T, 100	Irr			Test pumped 100 gpm for one hour with 200 ft drawdown; casing perforated from 232 to 269 ft; see table 2 for log and table 4 for partial chemical analysis; pumped 35 gpm with 130 ft of drawdown from basalt when 4-inch casing was at surface.
U	10.8	2/26/51	C, 5	D	36	3	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 1 S., R. 2 W. - Continued									
20A1	J. W. Wolf	P, 170	Dg	37	36				Sand
20P1	John Kamna	P, 180	Dr	450	10	140	140	310	Basalt
20Q1	Ole Erickson	P, 180	Dg	20	48				Quicksand
20Q2	John Cavanaugh	P, 180	Dr	425	10	172			Basalt
21A1	H. C. Schmeling	P, 160	Dg	18					Sand
21H1	O. Slater	P, 160	Dg	24	48				Alluvium
21H2	E. F. Gonty	P, 150	Dr	780					Sand
21H3	do.	P, 150	Dg	20	48				Alluvium
22G1	Jose Churchley	P, 170	Dr	85	6	85			Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	4.05	2/26/51	J, 5	D	132	7	See plate 35 for water-level record.
C	11	11/ 53	N, 100	Irr			Reported 140 ft of clay above aquifer; test pumped at 100 gpm with 150 ft of drawdown.
U			J, 5	D, S	178	7	Water level is low in fall.
C	80	9/ /55	N, 100	Irr			Reported 170 ft of sand and clay above aquifer.
U			J, 5	D	196	6	
U	15.6	2/27/51	J, 5	D	82	5	See plate 35 for water-level record.
C							Water-bearing sand at 175, 300, and 780 ft; all water unfit for human consumption or irrigation; well destroyed; see table 4 for partial chemical analysis.
U			J, 3	D			See table 4 for partial chemical analysis.
C	16	1946	J, 5	D	212	5	Water has reddish color; reported sand and clay entire depth.

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 2 W. - Continued								
22M1	O. G. Grove	P, 175	Dr	106	6	100	100	6	Sand
22R1	J. T. Cook	P, 180	Bd	45	6				do.
23C1	A. O. Neal	P, 205	Dr	165	6				Gravel
23E1	Santoro Brothers	P, 180	Dr	175	6				Sand
23E2	A. J. Looney	P, 180	Dr	80	6				"Clay"
23F1	R. H. Kincheloe	P, 190	Dr	300	8				Basalt(?)
23Q1	L. W. Taute	S, 255	Dr	115	6	65	65	50	Basalt
23Q2	Santoro Brothers	S, 225	Dr	139	12	42			do.
24F1	Ole Johnson	P, 225	Dg	27	48	27	0	27	"Clay"
24H1	C. W. Koch	S, 225	Dr	214	4	210	210	4	Basalt
24H2	W. A. Hayes	S, 250	Dg	49	36				do.
24J1	A. D. Keller	S, 285	Dr	140	6	130	130	10	do.
24J2	M. Falb	S, 300	Dr	220	4				do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 15	D	194	3	Water reported to carry sand when pumped heavily.
U			J, 5	D, S	158	5	
C			J, 5	D	128	5	
C			J, 10	D, S	182	5	
U			J, 3	D, S	144	5	Inadequate supply of water.
C	47.4	4/24/51	P, 10	D, S	76	6	Water reported to contain iron.
C	60	6/ /49	J, 10	D	68	6	Test pumped 20 gpm for 1 hour with 100 ft drawdown.
C	F	11/ /52		Irr	124	4	Encountered basalt at 40 ft; test pumped 220 gpm.
U	8	5/ /51	J, 3	D	100	3	
C			J, 8	Irr	102	5	Penetrated 210 ft of brown clay above aquifer; used for irrigating garden.
U	38.56	5/ 7/51	P, 5	D	108	11	
C			P, 5	D	102	5	
C			P, 10	D	80	5	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 2 W. - Continued								
24M1	George Altishin	S, 275	Dr	180	6		110	70	Basalt
25F1	O. Pierson	S, 635	Dr	459	6	18	444	15	do.
25J1	Jane S. Hackman	U, 765	Dr	9,263	20-7	7,862			
25M1	A. Gronlund	S, 580	Dr	600	6	15	390	210	Basalt
25N1	Fred Kelly	S, 525	Dr	345	4		335	10	do.
26A1	R. H. Jenkins	S, 460	Dr	400	6		270	130	do.
26L1	J. K. Frazer	S, 275	Dr	145	8				do.
26M1	W. P. Brisbine	P, 215	Dr	90	6	29	89	1	do.
27J1	A. VanPoucke	S, 190	Dr	95	6		60	35	Basalt(?)
27K1	Edwin C. Lux	P, 185	Dr	90	6	50	50	40	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	90	1951	P, 10	D, S	124	6	Aquifer is alternating hard and soft rock.
U	444	7/ /41	P, 10	D	84	6	Supplies two families.
			N	N			Drilled as oil test; see table 2 for log and table 4 for chemical analysis.
U			P, 20	D	82	7	Supplies five families; encountered rock at 10 ft.
U			P, 5	D, S	92	6	Reported to have penetrated 2 ft top soil, 343 ft hard and soft rock.
U			T, 40	D, Irr	122	19	
C			P, 20	D, S	80	6	Encountered rock from 10 to 145 ft.
C	20.6	4/25/51	J, 10	D	114	4	Materials encountered, clay 22 ft, rock 68 ft.
C			J, 10	S	130	5	Reported 60 ft of clay above aquifer.
C	12	3/ /51	T, 10	D	122	5	Pumped 10 gpm for 24 hours with 60 ft of drawdown.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 2 W. - Continued									
27L1	E. H. Butcher	P,	180	Dr	365	4	350	350	15	Basalt
27M1	W. Conroy	P,	180	Dg	27	48	27			Sand
27P1	N. M. Prodehl	P,	185	Dr	60	6				do.
28B1	Gus Kaufmann	P,	155	Dg	13	48	13	0	13	Alluvium
28H1	G. E. Garrison	P,	160	Dg	24	4	24			Sand
28P1	Clarence Rosenow	P,	155	Dr	400	6	371	302	33	Sand and "clay"
29C1	E. Lorenrehse	S,	205	Dr	102	6	40	90	12	Basalt
29P1	W. Schallberger	P,	165	Dr	750	6		450	300	do.
29Q1	W. T. Putnam	P,	155	Dr	505	6	445	445	60	do.
30C1	E. Burkhalter	S,	170	Dr	78	6	5	73		do.
30N1	R. H. Schnoor	P,	180	Dr	60	6				Sand
30R1	S. Dalby	P,	155	Dr	373	6		353	20	Basalt

<u>in the Tualatin Valley</u> - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	19.97	4/24/51	J, 5	D	78	8	See plate 36 for water-level record.
U			P, 3	S			
U			J, 10	D	140	8	
U	6.2	2/27/51	C, 5	D, S	122	3	
U	7.55	4/24/51	C, 5	D, S	84	11	See plate 36 for water-level record.
C	22	8/ /37	P, 10	D, S	74	17	Sand and clay entire depth.
C	27	4/ /51	J, 10	D	130	7	Entered rock at 30 ft below surface.
C	F	2/ 9/51	J, 50	D	168	38	Reportedly flows 120 gpm; test pumped 600 gpm with centrifugal pump without breaking suction.
C	F	2/27/51	C, 50	D, S	162	4	Reportedly flows 100 gpm; see table 2 for log.
C	15	1/ /51	P, 15	D, S	118	17	
U			J, 5	D	118	3	Water has a yellow color.
C	F	2/ 9/51	J, 10	D	168	29	Water flows 3 gpm.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 1 S., R. 2 W. - Continued									
31C1	C. E. Asbahr	P, 175	Dr	715	6	266	266	449	Basalt
31F1	Julius Christenson	P, 175	Dr	620	6	425	425	195	do.
31H1	J. C. Jones	P, 180	Dg	27	60	27			Sand
31R1	F. O. Erickson	P, 160	Dr	578	6	463	463	115	Basalt
32D1	Edwin Jesse	P, 125	Dr	330+	6				do.
33A1	Emily Boge	P, 170	Dg	19	72	19	0	18	Alluvium
33C1	Loyal Davis	P, 170	Dr	345	6-4	319	340	5	Sand(?)
33E1	Lloyd Bellamy	P, 150	Dr	375	6	355	365	10	Basalt
34C1	F. M. Thomas	P, 180	Dr	640	12-6	610	600	40	do.
34E1	W. F. Gembella	S, 175	Dr	113	6-5	113	80	30	Gravel

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	2.5	11/ /49	C, 300	D, Irr	144	11	Used for irrigating 30 acres; see table 2 for log and table 4 for chemical analysis of water.
C	5	7/ /50	J, 20	D	2	3	Reported 364 ft of sand and clay, 256 ft of rock.
U	10.06	2/ 9/51	J, 3	D	68	7	See plate 37 for water-level record.
C	F	2/ 8/51	J, 30	D	100	4	Supplies two families; reported 464 ft of clay and sand above aquifer; flows about 3 gpm.
C	F	2/ 9/51	J, 10	D	142	23	Flows about 3 gpm.
U	6.63	4/24/51	P, 5	D			
C	5	8/ /37	P, 3	D	74	17	Tested 3.4 gpm with 217 ft of drawdown.
C	22.3	4/24/51	J, 10	D, S	56	11	Well flowed 1/2 gpm in 1937; bailed 20 gpm with 180 ft of drawdown.
C	3.13	4/20/54					Reportedly test pumped 75 gpm with 210 ft of drawdown.
U	4	2/ /51	J, 5	D, S	80	5	Reported 80 ft of sand above aquifer; casing perforated from 96 to 113 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 2 W. - Continued								
35D1	C. J. Wollertz	S, 235	Dr	55	4	20	54	1	Basalt
35N1	Ann Algesehimer	P, 175	Dr	200	6				Basalt(?)
35N2	do.	P, 175	Dg	23	36	23	0	23	Alluvium
35P1	E. L. Cox	P, 175	Dr	86	4	27			Basalt
36D1	William Wenzel	S, 400	Dr	222	6	20			do.
	T. 1 S., R. 3 W.								
2B1	A. Hadley	P, 175	Dg	28	36	28	20	8	Quicksand
2G1	W. F. Robinson	P, 175	Dr	101	6	98	98	3	Sand and gravel
4H1	J. F. Sunko	P, 150	Bd	50	12	50			Sand
4Q1	D. W. McBeth	P, 130	Dr	120	6	120	114	6	Gravel
5C1	W. E. Stevens	P, 180	Dr	130	6	126	126	4	do.
5F1	West and Scott	P, 165	Dr	112	6	112	96	16	do.
8L1	J. W. Nelson	S, 160	Dg	24	48	24	0	24	Alluvium

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	32.57	5/ 9/51	J, 10	D, S	82	6	
C	2.43	5/14/51	J, 5	D, S	118	6	
U	8.11	5/14/51	N	N			Was barely adequate in summer; replaced by drilled well.
C			J, 8	D			
U	170	1950	P, 10	D, S	106	5	
U	1.0	3/14/51	J, 10	D, S	44	7	
C	35.74	3/14/51	J, 15	D, S	82	5	
U	0	3/ /51	J, 15	Irr			Water level in summer is about 5 ft below surface; water used for irrigating 1½-acre nursery.
C	12	3/ /51	J, 15	D, S	86	5	Used for irrigating garden.
C	30	11/ /50	J, 15	Irr			Bailed at 30 gpm with 35 ft of drawdown.
C	14.58	3/14/51	T, 30	D, Irr	293	2	Used for irrigating 5 acres of pasture; see table 4 for chemical analysis.
U	.55	1/25/51	C, 3	D	16	3	See plate 37 for water-level record.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 1 S., R. 3 W. - Continued									
9M1	A. Duncalf	P, 175	Dg	21	60	21	10	11	Quicksand
10A1	E. F. McCormacke	P, 125	Bd	47	12	47	8	39	do.
11J1	Kummer Meat Co.	P, 150	Dr	78	8-7	78	65	13	Sand
12R1	R. A. Furby	P, 180	Dr	148	6	148			do.
14C1	F. H. Bowlby	P, 155	Dg	50	60	50	16	34	do.
14G1	W. Demmin	P, 160	Dg	20	48	20			do.
15D1	F. Krahmer	P, 160	Dg	24	60	24			do.
15G1	D. Miller	P, 165	Dr	65	6				
15M1	Forest Hills Golf Course	P, 160	Dr	320	6				
16E1	V. Lorenz	P, 205	Dr	161	6	88	88	73	Basalt
16N1	F. J. Brandaw	S, 200	Dg	31	48	48			Quicksand
17B1	E. G. Kiephe	S, 175	Dg	22	48	10			Rock(?)

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U			P, 10	D, S	37	5	
U	6.25	3/14/51	J, 10	Irr			Gravel packed from 6 to 47 ft; used for irrigating garden; see plate 38 for water-level record.
C	18	7/ /50	J, 20	Ind			Bailed 30 gpm with 20 ft of drawdown; used for slaughter house.
C			J, 10	D	143	3	
U	15	1/ /51	J, 15	D, Irr			Used for irrigating lawn.
U	3.3	1/ /51		D, S	82	4	See plate 38 for water-level record.
U	2.5	1/ /51	P, 5	D, S	81	6	Barely adequate in dry season.
			J, 5	D	157	4	
							Reportedly drilled in shale; dry hole.
U	112	9/ /50	J, 30	D	114	14	
U	25	9/ /50	J, 10	D, S	15	5	Water level reported low in summer.
U	15	1950	J, 5	D	30	3	Do.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 3 W. - Continued									
17B2	L. Newburg	S,	205	Dg	65	48				
17D1	B. Grimson	S,	175	Dr	302	6-4	145	103	40	Clay and sand
18J1	January	S,	200	Dg	28	12	28			Residual soil
18K1	P. L. Liebeck	P,	180	Dr	125	6	100			Sand
18Q1	F. P. Muhly	S,	190	Dr	80	6				do.
20E1	Kant	S,	750	Dr	200					"Shale"
20M1	R. P. Nixon	S,	600	Dg	60	60	48			Residual soil
21C1	E. Meyer	P,	200	Dg	28	60				"Clay"
21C2	do.	P,	200	Dr	600	8-6	400			Basalt
22E1	R. Meyer	S,	240	Dr	161	6	116	100	61	do.
23A1	G. Kennel	P,	250	Dg	42	60				
24K1	Simpson Brothers	P,	200	Dr	460	6-4	459	459	1	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	46.68	1/29/51	P, 5	D	18	5	See plate 39 for water-level record.
U			J, 15	D	192	4	Reportedly in shale for 157 ft below aquifer; casing perforated from 97 to 145 ft.
U	23	9/ /50	C, 5	D			Can be pumped dry in summer.
C	18	1950	J, 15	D, S	80	5	Used for irrigating garden and lawn.
U	20	10/ /50	P, 10	D, S	162	4	
			N	N			Water reported to have saline taste; well destroyed.
U	48	1/ /51	J, 10	D	72	4	Water level reportedly varies little during summer.
U	23	9/ /50	P, 5	D, S	43	6	
C	5	1/18/56	N, 80	Irr			Still drilling; pumped 80 gpm with a drawdown of 200 ft when well was 529 ft deep.
C	F	1/ /51	T, 80	D, Irr	102	3	Used for irrigating 16 acres of pasture; flows about ½ gpm.
			J, 10	D, S	77	6	
C	7	1/ /51	J, 20	D, Irr	156	4	Produced 76 gpm with 150 ft of drawdown.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 3 W. - Continued								
24R1	F. McDonald	P, 160	Dr	604	6	106	160	200	Basalt
25A1	Public school	P, 200	Dr	160	6				do.
25P1	E. Simantel	P, 175	Dr	565	8	65			do.
25P2	C. Peterson	P, 175	Dr	67	6	57	57	1	"Clay"
25Q1	J. T. Roberts	S, 185	Dr	180	6-4	180	175	5	Basalt
25R1	Nettie DeFord	P, 185	Dr	178	6	149	140	38	do.
26E1	Beevor	S, 440	Dr	110	6				do.
26P1	W. L. Redding	S, 250	Dg	43	48	43	0	43	Alluvium
26R1	B. L. DeFord	P, 250	Dr	128	6-5	128	83	45	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	F	1/30/51	T, 200	Irr	125	12	Reported 160 ft of clay above aquifer; flows about 8 gpm; used for irrigating about 35 acres.
C							
C	45.33	2/14/51	J, 10	D, S	144	4	See plate 39 for water-level record; rock reported from 60 to 565 ft.
C	8	10/ /49	J, 20	D			Reportedly clay entire depth; flows in winter.
C				D			Materials reported, 75 ft of clay, 100 ft of rock above aquifer.
C	14	1946	T, 25	D	122	4	Reported 140 ft of clay and sand above aquifer; test pumped 40 gpm with 100 ft of drawdown.
C			P, 8	D, Irr			Used by two families and for irrigation of lawn and garden.
U			P, 8	D	32	3	Inadequate.
C	F	2/14/51	P, 5	D	100	3	Reported 83 ft of clay and sand above aquifer; liner perforated at 88 to 128 ft; flows about 1/2 gpm.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 3 W. - Continued								
26R2	E. Meyer	P, 250	Dr	91	6	86	80	11	Basalt
27A1	Joe Dober	P, 350	Dr	55	6	50	42	13	do.
27M1	Minnie Haase	S, 550	Dg	19	60	19	0	19	Residual soil
30C1	Frank Winners	S, 250	Dg	20	18	20	0	20	do.
31B1	W. R. Withycombe	S, 330	Dg	53	48		8	42	"Shale"
31J1	George Withycombe	S, 350	Dr	110	4	80	80	30	Basalt
31M1	Tony Hardebeck	S, 310	Dr	128	5	128	108	20	
32Q1	J. W. Dixon	U, 700	Dr	78	6				do.
33M1	do.	U, 910	Dr	80	6				do.
35E1	Percy Jarrell	S, 300	Dr	85	6		72	13	"Rock and gravel"
35L1	I. Van Derbom	S, 360	Dr	261	6	116	257	4	Basalt
36L1	J. W. Twigg	P, 150	Dr	135	6				Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	F	2/14/51	J, 5	D	114	4	Reported 80 ft of clay above aquifer; flows about 1 gpm; test pumped 8 gpm with 40 ft of drawdown.
C			J, 10	D, S			Reported 42 ft of clay above aquifer.
U	12.23	2/ 5/51	P, 3	N			Using small spring for water supply.
U			J, 8	D	28	4	Casing perforated and gravel packed.
U			N	N			Inadequate supply of water.
C	40	1951	J, 15	S, Irr	60	4	Water contains iron.
C			J, 15	D	58	4	Casing perforated from 108 to 128 ft and gravel packed.
C	15.1	2/ 5/51	J, 20	Ind			Used for sawmill.
C	50	2/ 5/51	J, 15	D			
U	72	2/ /51	J, 5	D	66	3	
C			J, 15	D	90	4	Reported 116 ft of clay and 141 ft of rock above aquifer.
C	20	9/ /50	J, 8				

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 3 W. - Continued									
36R1	C. Wood	R,	180	Dr	200	6				Basalt
	T. 1 S., R. 4 W.									
1N1	G. C. Coe	P,	170	Dr	60	8-6	60	44	16	Gravel
2H1	Miran Sheelar	P,	170	Dr	78	6		48	30	do.
2H2	do.	P,	170	Dg	28	42		0	28	Alluvium
2H3	do.	P,	170	Dr	48	6				Gravel
2L1	Paul Ritchey	P,	180	Dg	42	42	42			"Rock"
2L2	do.	P,	185	Dr	230					"Shale"
2M1	Albert Lindenman	S,	200	Dr	70	6				Gravel(?)
2N1	R. Curtis Ritchey	P,	185	Dr	100	6	90	85	15	Sand and gravel

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	10	1951	J, 15	D, S	116	4	Water said to contain small amount of iron.
U	15	7/ /50	J, 40	Irr	60	6	Used for irrigating 10 acres; reported 44 ft of clay above aquifer; casing perforated from 44 to 60 ft.
U	10.18	1/12/51	J, 10	Irr	154	26	Used for irrigating lawn and garden; see plate 40 for water-level record.
U	11.38	1/12/51	J, 5	D, S	100	11	
U			J, 8	S	126	9	
U	7.58	1/12/51	J, 8	D, S	82	9	Reportedly has a water level of 35± ft in summer.
			N	N			A dry hole; well destroyed.
C			J, 8	D			Barely adequate during dry season; water contains large amount of iron; encountered log at 48 ft.
C	5	12/ /50	J, 8	S	136	215	Water reportedly has saline taste; casing perforated from 80 to 90 ft.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 4 W. - Continued								
2N2	R. Curtis Ritchey	P, 190	Dr	92	6	73	65	27	Shale
3B1	Fred Lunger	S, 235	Dr	112	6	111	109	3	Gravel
3G1	A. A. Rogers	S, 260	Dr	480	6	408			Clay
3Q1	V. E. Koshi	S, 230	Dg	45	48	45	0	45	Alluvium
3Q2	do.	S, 200	Dr	140	6				
17E1	Charlie Scott	S, 260	Dg	25	48	25	0	25	Alluvium
23F1	V. Stowell	S, 200	Dr	84	6	80			
23H1	E. F. Blackmore	P, 200	Dg	46	48		36	10	"Sandstone"
23R1	Larkins Lumber Mill	P, 180	Dr	80	6		35	45	Sand
24A1	Virginia Bridges	S, 225	Dr	90	6	90			
28R1	E. P. Hoodenpyl	S, 450	Dg	11	48				"Rock"
30N1	Wicklund	S, 350	Dr	105	6	16	41		Basalt
36K1	George V. Heagy	P, 150	Dg	20	52	20	16	4	Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	8.02	1/12/51	N	N	88	228	See plate 40 for water-level record; see table 2 for log.
C	30	12/ /50	J, 8	D, S			Reportedly sand and clay entire depth to aquifer.
C	50	9/ /46	P, 3	D	38	5	Barely adequate during dry season.
U	3.38	1/12/51	P, 3	N	34	6	
C	18.4	1/12/51	N	N			Insufficient supply of water.
U			C, 3	D	42	3	
C	F	1/24/51	J, 8	Irr	4	3	Barely adequate during dry season.
U			J, 5	D	22	4	Pumps dry during summer.
U	35	1950	J, 5	N			Not in use; inadequate.
			J, 8	D, Irr	16	4	
U			J, 5	D	8	3	Has inadequate supply of water.
C	3.15	1/24/51	N				Water reported to come from fractured zone in basalt at 41 ft.
U	15	9/ /50	J, 5	D,	34	4	Easily pumped dry in September; recovers in about 12 hours.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 5 W.								
25K1	Earl Wells	S, 500	Dr	73	6	18	51	22	Basalt of the Tillamook volcanic series
25Q1	Dorand	S, 525	Dr	71	6	26	23	48	do.
	T. 1. S., R. 1 E.								
6C1	Mt. Calvary Cemetery Assoc.	S, 975	Dr	832	12				Basalt
6D1	do.	U, 1,025	Dr	896	16-10	520	829	9	do.
7A1	W. L. Corbin	S, 800	Dr	515	6	179	480	35	do.
7K1	Columbia Preparatory School	S, 385	Dr	499					do.
8E1	Robert Dant	S, 610	Dr	502	12-10		500	2	do.
8N1	Kaufman Mortgage Co. (former)	S, 375	Dr	169	8	110	110	59	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	12	9/ /50	J, 5	D			Reported 15 ft of soil and 57 ft of "rock" above aquifer.
C	F	1/29/51	J, 5	D	56	3	Flows in winter; water level about 12 ft below surface in summer.
P				Irr			Penetrated 59 ft of clay, 211 ft broken rock and 562 ft of basalt.
P	423	8/ /54		Irr	280		Penetrated 92 ft of clay and 804 ft of basalt; pumped 280 gpm with 62 ft of drawdown.
U	400	9/ /48		D			Materials reported were clay at 0 to 50 ft, rock at 50 to 515 ft.
C			T, 100	D, Irr	106	4	Reportedly once used for irrigating 15 acres; now used for school and to irrigate 4 acres.
C	350	8/ /29	80	Irr			Used for irrigating 5 acres; basalt at 40 to 502 ft; well no. 61 of WSP 890.
C	75	10/ /47		D			Encountered basalt at 100 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 E. - Continued								
17Q1	Doty Nursery, Inc.	S, 400	Dg	15	86	15	0	15	Alluvium
18N1	Alpenrose Dairy	S, 330	Dr	400	12-10				Basalt(?)
19P1	R. C. Coffell	S, 435	Dr	557	8 6	43 99	500	57	do.
20D1	Ann Tannler	S, 400	Dr	200					do.
27D1	Riverview Cemetery	U, 450	Dr	700	12	412	300	395	do.
29N1	John J. Wojcik	S, 600	Dr	80	6		70	10	Boring lava
30F1	First Federal Savings and Loan	S, 500	Dr	450	6				
30J1	L. Rosellini	S, 610	Dr	150	6	73	72	78	Boring lava
31C1	Mrs. Francis Connolly	S, 425	Dr	175	6		136	5	do.
31D1	Cathryns Charcoal Broiler Restaurant	S, 400	Dr	610	6	396	396	214	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	2	1951	P, 5	Irr	90	8	Pumps dry with heavy use.
C			T, 60	S, Ind	130	5	
C	250	1946	T, 80	D			See table 2 for log.
C			P, 5	S	98	5	Water reportedly stains porcelain yellow.
U	300	8/10/54	T, 200	Irr			Materials penetrated were basalt from 60 to 695 ft; shale from 695 to 700 ft.
C			J, 10	Irr	114	4	Used for irrigating lawn and garden.
							Never used; drilled to drain surface water; reportedly never hit basalt.
C	30	8/ /51	J, 10	Irr	102	3	Used for irrigating lawn and garden.
C	80	8/ /51	T, 10	D	120	4	Bailed 28 gpm for 1/2 hour with 10 ft of drawdown; see table 2 for log.
C	210	11/ /53	N				Test pumped 35 gpm for 12 hours with 30 ft of drawdown; see table 2 for log.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 1 S., R. 1 E. - Continued									
31M1	Earl Gunther	S,	475	Dr	218	8-6				"Shale"
31P1	Charles E. Kern	S,	430	Dr	97	6	20	50	47	Boring lava
32B1	McKinney	S,	475	Dr	265	6				
33E1		S,	545	Dr	312	6	300			Basalt
33M1	Dickinson Family Preserves Co.	S,	525	Dr	344	6	31	256	88	do.
	T. 2 S., R. 1 W.									
1B1	Ann Raymond	S,	230	Dr	180	6				Quicksand
1D1	E. C. Hunziker	P,	175	Dg	20	36	20	0	20	Alluvium
1G1	M. Holder	S,	230	Dr	125	4	125	80	45	"Clay"
1K1	E. C. Metzger	S,	255	Dr	100	6		10	100	Boring lava
1L1	L. H. Nichols	S,	215	Dr	125	6				Sand
1L2	Raymond Ems	S,	240	Dr	340	6				do.
1Q1	Gus Greco	S,	215	Dr	148	6-5	148	125	7	Boring lava

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			T, 75	D, Irr	60	6	Materials reported, 138 ft of rock (Boring lava) over 80 ft of "shale" (Troutdale formation)(?); operates 14 irrigation sprinklers.
C	23	11/ 1/51	J, 10	D	102	4	Used by two families.
							No water at 265 ft; reported clay entire depth.
C	260	1945		Ind			Encountered rock (Boring lava) at 25 ft; struck basalt at 256 ft.
C			P, 8	D			Water carries much sand.
U			P, 8	D, S			Water supply for two families.
C			J, 5	D, S			
C			J, 5	D			
C			P, 8				Filled back to 100 ft to shut off running sand.
C			P, 8	D, S			
C	31	4/ /51	T, 10	D			Reportedly pumped 5 gpm for 1 hour with 145 ft of drawdown.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued								
1Q2	Kertis	S, 225	Dr	350					Basalt
1Q3	do.	S, 225	Dr	625	10				do.
2A1	Tigard High School	S, 185	Dr	660					None
2M1	Tigard Public School	S, 210	Dr	260	6	260	252	8	Sand
2M2	E. W. Bredmeier	S, 230	Dr	510	6	362	496	14	Basalt
2R1	O. H. Herbig	P, 170	Dr	110	6				Sand
3N1	Loomis	S, 335	Dr	190	6				Basalt
4B1	R. Sunamoto	S, 250	Dr	385	8				do.
4C1	Miles	S, 250	Dr	190	6				do.
4C2	Sandness	S, 300	Dr	170	6	42			do.
5N1	Frank Roshak	S, 380	Dr	230	6	20	125	105	do.
6J1	C. R. Walstrom	S, 325	Dr	198	6	32	181	17	Basalt "gravel"
6R1	Ed Roshak	S, 255	Dg	30	48	30	0	30	"Clay"

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			P, 10	D			
C			T, 15	S			Supplies large poultry farm.
							Drilled 660 ft through clay; destroyed; well no. 68 of WSP 890.
C	65	8/ /29	P, 5	PS			Well no. 69 of WSP 890.
C	23	7/ /53	J, 8	D			
C	F	8/ 1/51	J, 15	N			Well readily pumped dry.
C			P, 8	D, S	82	4	
C			T, 300	Irr			Reportedly encountered basalt from 135 to 385 ft.
C	150	6/ /49		D, S			
C	142	7/ /49	T, 10	D, S			
U	195	1924	P, 8	D, S	114	7	Drilled in basalt from 8 to 230 ft.
C	143	9/ /48	P, 10	D	160	14	Reported 29 ft of clay and 152 ft of rock above aquifer.
U	8	1951	J, 8	D, S	136	8	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued									
8G1	John J. Bushnell	U,	600	Dr	500	6	13	395	105	Basalt
8K1	M. H. Bishop	S,	480	Dr	339	6	18	300	39	do.
8Q1	Y. Hasuike	S,	335	Dr	240	5	40	220	20	do.
9G1	Paul Haberfeld	S,	580	Dr	500	6				do.
9Q2	H. H. Foskett	S,	300	Dr	265	10	10	130	125	do.
10C1	City of Tigard	S,	375	Dr	381	12	71	260	121	do.
10E1	Stewart	S,	475	Dr	400	6				do.
10F1	R. V. Jenkins	S,	365	Dr	220	6	210	210	10	do.
10F2	E. Moore	S,	360	Dr	110	6	31	98	12	do.
10G1	J. V. Chandler and Co.	S,	315	Dr	183	6	10	10	173	do.
10N1	John Lindley	S,	235	Dg	28	42				Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	397	1946	P, 8	D	128	9	See table 2 for log.
U	200	6/ /49	P, 8	D, S	130	5	Reported 15 ft of top soil and 285 ft of "rock" above aquifer.
U	220	4/ /51	P, 8	D	126	5	Penetrated basalt from 8 to 240 ft; used by two families.
U			P, 8	D	100	6	
U	130	8/ /50	T, 35	D	110	13	
C	188	4/ /47	T, 40	PS			City well no. 2; see table 2 for log and table 4 for chemical analysis; test pumped 97 gpm for 1 hour with 210 ft of drawdown.
C			T, 10	D	100	5	
C	200	1946	P, 8	D	118	7	
C			J, 10	D	98	7	Penetrated 27 ft of soil and 83 ft of basalt.
C	70	4/ /48	T, 35	Ind	124	6	Has a drawdown of 60 ft after several hours pumping at 35 gpm.
U	14.69	6/14/51	J, 5	D	88	4	Encountered solid "rock" at 28 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued								
11E1	City of Tigard	S, 385	Dr						Basalt
11F1	Olson	S, 330	Dr	135	6				
11J1	Mrs. Sattler	P, 185	Dg	16	60				Sand
11K1	F. A. Stephanson	S, 215	Dr	114	6		80	34	do.
11L1	N. C. Kable	S, 265	Dr	132	6	68	76	56	Basalt
11Q1	Albert Scheihla	S, 190	Dg	15	48		6	9	Sand
11R1	John A. Sattler	P, 180	Dr	87	6				Gravel
12G1	Carl Huber	P, 145	Dr	274	6-5	274	257	17	Sand
12E1	J. R. Ridgeway	P, 180	Dg	32	36	32			do.
12N1	G. L. Sternes	P, 180	Dr	96	5	87	89	7	Gravel
13B1	Pilkington Nursery	P, 160	Dr	640	8-6	640	630	2	Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			T, 200	PS			City well no. 1.
C			P, 4	D	64	5	Water supply inadequate.
U			P, 8	D, S	130	10	
C			J, 10	D	128	4	Used by two families.
C	50	1947	J, 10	D, S	70	6	Reported 66 ft of sandy clay and 10 ft of basalt above aquifer; bailed 25 gpm for 1 hour with 30 ft of drawdown.
U	11.1	8/ 4/51	P, 5	D	162	18	For domestic use only.
U			J, 8	D, S	162	4	
C	+0.5	8/ /51	J, 3	D	74	4	Reported materials, clay and sand entire depth; casing perforated from 257 to 274 ft.
U			J, 8	D, S	136	6	
C			J, 8	D			
C	2	1929					Penetrated gravel and boulders from 0 to 80 ft, black clay from 80 to 640 ft with sand seam at 630 ft; well had small yield; abandoned because of high chloride content; see table 4 for chemical analysis; well no. 71 of WSP 890.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued								
13B2	Pilkington Nursery	P, 160	Dr	162		92	90	2	Sand
13D1	Durham School	P, 170	Dr	150	6	142	135	13	Gravel
13L1	M. Eastham	P, 180	Dr	87	6	86	75	12	do.
13L2	do.	P, 185	Dr	120	8	110	80	25	do.
13P1	Otto P. Boeckel	P, 180	Dr	84	6	83	50	34	do.
14A1	Tigard Senior High School	P, 190	Dr	680	10	664	667	3	Basalt
14D1	Frank Scheckla	P, 200	Dg	25	36	25	10	15	Quicksand
14N1	A. J. Martinazzi	P, 155	Dg	51	36	51	41	10	Sand and gravel
15K1	C. E. Dean	P, 125	Dr	22	8	22			Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 15	D, Irr	92	12	Reported sand, clay, and boulders from 0 to 60 ft; blue clay from 60 to 90 ft; sand from 90 to 92 ft; clay from 92 to 162 ft; casing pulled back to 92 ft; see table 4 for chemical analysis.
U			J, 8	PS	136	8	Reported water-bearing sand from 65 to 135 ft and clay from 148 to 150 ft; see table 2 for log.
U	65	1939	J, 10	D	94	8	Reported 75 ft of clay and sand above aquifer.
U	80	1941	J, 30	PS	60	7	Supplies 7 families; casing perforated at 80 to 104 ft; see table 2 for log.
U	66	1950	J, 15	D	60	7	Reported 2 ft topsoil, 48 ft gravel and boulders above aquifer.
C	7	8/ /53	T, 20	PS			See table 2 for log.
U	20	1951	J, 5	D, S	92	5	
U	44.0	6/24/51	J, 5	D, S	58	7	See plate 41 for water-level record.
U			P, 5	D, S	102	9	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued								
15F1	R. Van Mere	P, 150	Dg	42	36	42			Sand
16A1	E. Schlatter	P, 180	Dg	18	36		0	18	"Clay"
16D1	V. Aguino	S, 215	Dr	121	6	15	15	121	Basalt
16E1	J. E. Wolf	P, 200	Dr	86	6	37	34	52	do.
16F1	R. E. Woods	P, 175	Dr	188	6-5	188	175	13	do.
16G1	W. G. Boehmer	P, 150	Dr	161	6	71	71	90	Sand
16K1	R. C. Holmes	P, 135	Dr	42	2	42	40	2	Pea gravel
16M1	E. C. Walls	P, 150	Dr	105	6	54	58	47	Sand
17A1	N. E. Holmgren	S, 250	Dr	130	6		126	4	Basalt
17B1	T. Hasuike	S, 275	Dr	293	12	12			do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U			J, 5	D, S	290	9	Alternating layers of clay and sand.
U			J, 3	D	46	6	Barely adequate in dry season.
C			J, 10	D	94	5	Reported rock from 15 ft to 121 ft.
C			J, 10	D	70	6	Reported 34 ft of soil above aquifer.
C	40	8/ /49		D			Materials reported as 175 ft of clay and gravel above aquifer; casing perforated from 168 to 188 ft.
C	40	5/ /51	J, 10	D			Materials reported were clay and sand from 0 to 20 ft; sand from 20 to 69 ft and rock from 69 to 161 ft.
U	10	1951	P, 5	D	96	6	
C	30	8/ /49	J, 10	D			Clay reportedly from 0 to 18 ft, gravel from 18 to 40 ft, clay and rock from 40 to 58 ft, and rock from 58 to 105 ft.
U	126	12/ /50	J, 5	D	114	8	Reported rock from 10 to 130 ft; insufficient supply of water..
U	218	1953	T,	Irr			Plans to irrigate about 30 acres of berries and vegetables; encountered basalt at 8 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued								
17H1	W. K. Scott	S, 200	Dr	85	6	10	70	5	Basalt
17L2	Stewart B. Strong	P, 135	Dr	208	6	183	165	43	do.
18J1	James Hasuike	P, 140	Dr	161	10	48			do.
18Q1	R. Livingston	P, 130	Dr	406	6-4.5	364	364	42	do.
19F1	E. Schlichting	P, 170	Dg	26	48	26			Alluvium
20K1	Eoff Brothers	S, 125	Dg	30	48	30			Sand
21A1	Oregon State Highway Dept.	P, 175	Dr	500	6	404	415	2	"Gravelly clay"
21F1	Chester Feschbuch	S, 135	Dg	30	48	30			Quicksand
21Q1	Don O. Galberth	S, 150	Dg	16	36				Sand
22A1	F. F. Eberly	S, 150	Dr	253	6	220			Basalt
22H1	R. F. Brink	P, 130	Dg	18	36	18			Sand
22L1	S. Cereghinal	P, 130	Dg	16	38	16			do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	69	1951	J, 5	D	130	6	Reported rock from 10 to 85 ft.
C	34	1946		D			Reported 165 ft of clay and sand above aquifer; test pumped 20 gpm with 107 ft of drawdown.
C	.41	10/ 5/53	T, 150	Irr			Used for irrigating about 20 acres of berries and vegetables; struck basalt at 40 ft.
C	11.8	10/ 5/53	J, 10	D	190	53	Encountered basalt at 350 ft.
U	14.94	6/14/51	J, 15	D, S	80	8	
U	23.35	8/13/51	J, 10	D, S	80	8	
C	80	7/ /48	J, 3	D			No rock encountered; material all clay, sand and silt.
U	26	1951	P, 5	D, S	50	55	
U			C, 5	D, S	54	6	
C	50	1/ /46	J, 20	D, Irr	82	5	
U			C, 3	D	78	9	
U			P, 3	D, S	44	7	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 1 W. - Continued									
23C1	W. Pickens	S, 135	Dg	30	48	30			Sand
23N1	G. Kogiso	S, 155	Dr	125	6	65	65	60	Basalt
24C1	E. T. Schultz	P, 130	Dr	165	6				
24M1	City of Tualatin	P, 120	Dr	278	8	78	78	200	Basalt
24M2	do.	P, 120	Dr	325	8	172	273	52	do.
24Q1	A. E. Dunstan	S, 225	Dr	204	8	204	190	14	Gravel
25D1		S, 200	Dg	31	60	31			
25D2	G. W. Avery and Son	S, 225	Dr	400	6-4	400	385	15	Basalt
25L1	S. Shrenk	S, 230	Dg	20	36	20	12	8	Clay, sandy
25P1	Alice S. Peterson	S, 250	Dr	240	6	240	190	50	Gravel
26B1	J. F. Johnston	S, 220	Dg	20	36	20			Quicksand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	4.90	6/24/51	P, 3	D	118	11	
C	6.0	11/27/51	J, 30	D, Irr	120	6	Used for irrigating 10 acres; see plate 41 for water-level record.
			P, 5	D	196	132	Water has a sulfur odor.
C	3	1951	T, 150	PS			Reportedly test pumped 110 gpm with 35 ft of drawdown after pumping 11 hours; city well no. 1.
C	17.40	7/11/51	T, 250	PS			See table 2 for log.
C	80	1951	P, 8	D, S	152	4	
U	10.02	6/28/51	J, 8	D, S	62	5	
C	90	10/ /43	P, 8	D, S	52	11	Reported materials, sand and blue clay entire depth to aquifer; water reported to contain iron.
U	12	1951	C, 3	D, S	28	6	
C	55.81	6/28/51	J, 15	D, S			Water level drawn down 140 ft after 1 hour pumping at 10 gpm.
U	18	1951	C, 3	D	82	9	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued								
26B2	Portland Gas and Coke Co.	P, 225	Dr	450	64	450	433	17	Basalt
26E1	Mrs. Peura	P, 210	Dg	26	48	26	22	3	Gravel
26F1	J. W. Demke	S, 215	Dg	15	36	15			Sand
26G1	B. Sunde	S, 250	Dr	435	6	435			do.
26Q1	G. E. Berry	S, 280	Dr	110	6	51	50	60	Basalt
26Q2	J. Byron	S, 280	Dr	97	6	30	30	67	do.
27E1	Joe Itel	S, 180	Dr	119	6	45	95	24	do.
27E2	do.	S, 170	Dr	114	6	33	95	19	do.
27G1	C. L. George	P, 180	Dg	32	48	32			Sand
27H1	Bryan Tykeson	P, 205	Dr	323	6	245	242	81	Basalt
27R1	D. J. McNamee	S, 250	Dr	75	6				
28A1	H. E. Cole	P, 160	Dg	39	48	35	3	36	Sand and gravel
28F1	A. S. Peterson	P, 165	Dg	32	48	32	23	9	Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	40	1947	P, 10	Ind	62	34	Casing perforated from 424 to 450 ft; see table 2 for log.
U	10	1951	P, 3	D, S	52	6	
U	6.33	6/28/51	J, 8	D	60	5	
C	80	1951	P, 10	D	70	9	
C	52	1949	J, 8	D	110	6	Reported 50 ft of clay above aquifer.
C			J, 8	D	95	5	
C	70	10/ /50	J, 10	D, S	204	9	Materials reported were 12 ft of soil and 83 ft of basalt above aquifer.
C			J, 10	D	104	9	Encountered basalt at 43 ft.
U	24.08	7/ 2/51	J, 5	D, S	24	7	
C	20	1948	J, 10	D, S	102	5	Bailed 21 gpm for 1 hour with 80+ ft of drawdown; see table 2 for log.
			J, 10	D	76	5	
U	35	12/ /50	J, 10	D	58	4	
U	27.52	6/26/51	J, 8	D, S	196	21	Can be pumped dry but recovers in a few hours.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued									
28H1	Glen Orr	S,	200	Dg	31	36	31			
28L1	James R. McPoland	S,	210	Dr	104	6	30	88	16	Basalt
29H1	O. W. Harvey	S,	150	Dg	15	36	15			Quicksand
29M1	Fred Langer	P,	205	Dg	30	60	30			Sand
30B1	Arthur Rupprecht	P,	180	Dg	43	48	43			do.
30E1	LeRoy Hornschuh	P,	185	Dr	366	6	366	354	12	"Clay"
30H1	Arnold Borchers	P,	205	Dg	35	36	35			Quicksand
30M1	Labahan	P,	185	Dr	140	6	140	35	80	do.
30N1	A. Keul	S,	260	Dg	30	36				"Rock"
30Q1	Albert Johnson	S,	180	Dg	26	48	26			
31C1	H. H. Unger	S,	210	Dr	101	6	49	53	48	Basalt
31K1	Sawyer	P,	215	Dr	135	6				
31N1	Elmer Lewis	S.	250	Dr	80	6	46	60	20	Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	19.27	7/23/51	J, 10	D	64	9	
C	60	1947	J, 10	D, S	74	8	Reported 10 ft of soil, 78 ft of rock above aquifer.
U			P, 3	D	20	5	
U	19.79	6/26/51	P, 10	D, S	120	11	Used by five families.
U	37	1951	J, 8	D, S	62	7	
C	20	11/ /50	J, 15	D	132	6	Casing perforated near bottom.
U	25.30	6/21/51	J, 5	D	70	6	
U	35	1951	P, 5	D, S	116	4	Pumps dry in about an hour; casing perforated.
U			J, 3	D	44	5	
	24.5	8/13/51	P, 4	D	124	12	Inadequate in summer.
C			J, 10	D, S	104	5	Reported 48 ft of soil above the basalt.
			J, 10	D	128	6	Supplies two families.
C			J, 10	D			Reported 40 ft of soil and 20 ft of rock above aquifer.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 1 W. - Continued									
32D1	City of Sherwood	P, 190	Dr	339	16-12	113	137	202	Basalt
32F1	do.	P, 190	Dr	275	6	90	130	145	do.
32F2	do.	P, 190	Dr	281	4	120	130	151	do.
32K1	P. Christianson	S, 360	Dr	120					do.
32R1	R. Schlarbaum	S, 340	Dr	92	6				do.
33E1	G. Lampart	S, 260	Dr	165					do.
34A1	Art Eaton	S, 300	Dr	80	8	60	40	40	do.
34A2	E. R. Hughes	S, 350	Dr	85	6	39	35	50	do.
34E1	Peterson	S, 200	Dg	40	72	40			Residual basalt
34H1	G. E. Bradley	S, 350	Dr	115	6	70	70	75	Basalt
34J1	W. E. Reber	S, 325	Dr	100	6		15	85	do.
34J2	do.	S, 310	Dg	23	60	12	12	11	Residual basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	38	7/ /46	T, 500	PS	34	2	Test pumped at 500 gpm with a drawdown of 42 ft; city well no. 3; see table 2 for log.
C	29	7/ /51	T, 125	PS			City well no. 1; well no. 73 of WSP 890.
			T, 125	PS			City well no. 2, about 14 ft from well no. 1.
C			P, 8	D	76	4	Used by five families.
C			J, 8	D	94	4	Inadequate supply of water.
C	60	1951	P, 5	D, S	68	6	
C	32.5	6/28/51	J, 10	D	24	6	
C	39.41	6/28/51	J, 10	D	50	5	Materials reported, 35 ft of soil and decomposed rock; 55 ft of rock.
U			J, 5	D, S	100	4	Easily pumped dry.
C	45.98	6/29/51	J, 5	D	64	6	
C			J, 8	D, S	44	6	Inadequate
U	10.5	7/ 2/51	P, 4	D, S	44	6	

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 W. - Continued								
34P1	J. T. Curtis	S, 235	Dg	18	36	18	16	2	Residual basalt
35B1	M. W. Pennington	S, 300	Dr	100	6	29	29	71	Basalt
35E1	Charles Manewell	S, 285	Dr	100	6	7	89	11	do.
35F1	Foster Bither	S, 250	Dr	74	6	6	40	34	do.
35F2	Dr. Pennington	S, 300	Dr	123	6	24	111	12	do.
35K1	Ben Andrews	S, 325	Dr	200	6	49	150	48	do.
36C1	Betty Mitchell	S, 290	Dr	65	6				do.
36D1	D. C. Rumrey	S. 285	Dg	18	36	18			Sand
36E1	Howard Ellman	S, 315	Dr	112	6				Basalt
36N1	Don Scott	S, 410	Dr	100	6				do.
36R1	E. A. Eligsen	S, 455	Dr	224	6	12			do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	12	1951	P, 4	D	42	7	Inadequate during dry months.
C	35	1950	P, 8	D			
C	38	1943	J, 10	D, S	74	4	Reported rock entire depth.
U	40	1951	N	D			Bailed 8 gpm with 30 ft of drawdown.
U	82	1947	J, 15	D	82	5	Basalt from 18 to 123 ft; can be pumped dry.
U	125	1947	P	D, S	82	5	Used by two families; see table 2 for log.
U	15	1951	P, 5	D, S	82	5	
U	6	1951	J, 8	D	110	5	
C			J, 5	D	84	5	Basalt reported from 21 to 112 ft.
C			J, 8	D, S	66	2	
P			P, 8	D, S	74	4	Pumps dry in about an hour; basalt from 12 to 224 ft.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 2 W.									
1D1	Bert Sparks	S, 230	Dr	65	6				Basalt
1J1	Bierly Brothers	S, 285	Dr	588	12	57	368	220	do.
1K1	C. Sparks	S, 255	Dr	158	6 6	11	150	8	do.
1N1	Alice E. Richards	S, 265	Dr	126	6	20			do.
2A1	McAlpin	S, 220	Dr	108	4	30	25	83	do.
2B1	C. H. Thompson	S, 200	Dr	90	6	40	38	52	do.
2N1	H. L. Flint	P, 165	Dg	29	36	5			Sand
2P1	Waldo B. Flint	P, 160	Dr	196	6	158	160	33	Basalt
3K1	Fred Groner	S, 175	Dr	400	10-6	250			do.
3R1	E. Hesse	P, 175	Dr	68	6	15	65	3	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 5	D, S	188	6	
C	112.0	9/20/51	T, 590	Irr			Used for irrigating 50 acres of pasture; see table 2 for log; pumped at rate of 588 gpm with 45 ft of drawdown for 4 hours during aquifer test by USGS.
C			J, 20	D, S	106	5	
C			P, 8	D	92	7	
C			J, 8	D	146	5	
C			J, 8	D, S	144	4	Reported 38 ft of clay above aquifer.
C	13.98	5/15/51	C, 10	D, S	110	11	Water supply for three families.
C	10	1953	J, 15	D			Materials reported, clay and sand to 86 ft, rock to 91 ft, clay to 150 ft, rock to 193 ft, clay to 196 ft.
C	F	5/15/51	C, 10	D, S	82	5	Plugged at 250 ft.
C	31	1948	J, 10	D, S	94	6	Materials reported, clay 17 ft, hard and soft rock 51 ft; bailed 18 gpm with 37 ft of drawdown for 1 hour.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 2 W. - Continued									
5G1	Christianson Brothers	P, 130	Dr	64	6	60	60	4	Gravel
5Q1	William Waibel	P, 135	Dr	50	6	50			Sand
6A1	J. E. Hiatt	P, 180	Dr	165	6		158	7	Basalt
6D1	S. R. Rotchstrom	P, 180	Dr	486	6	250	482	4	do.
6M1	Ernest Losli	P, 175	Dg	24	48	24	20	4	Quicksand
6P1	J. Spiering	P, 180	Dr	437	6	218	218	219	Basalt
6Q1	Walter Reese	S, 200	Dg	31	36	31	25	6	Sand
7Q1	E. H. Taylor	S, 350	Dr	193	6	40	120	73	Basalt
8E1	Robert Hiatt	P, 180	Dr	215	6	195	195	20	do.
8K1	C. Armitage	P, 185	Dg	27	48	27	17	10	Quicksand
8L1	John Raymond	P, 185	Dr	260	6				Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	5	1950	J, 10	D, S	108	5	
C	F	2/23/51	J, 10	S	158	4	Flowing 1/2 gpm.
C	F	2/ 8/51	J, 10	D	122	4	Flowing 3 gpm.
C	4.56	2/23/51	C, 100	Irr	78	5	Used for irrigating 10 acres; reportedly pumped 150 gpm with little drawdown; see table 2 for log and plate 42 for water-level record.
U	7.30	2/23/51	P, 3	S	122	17	Water level very low during summer.
C	F	2/23/51	J, 8	D, S	98	2	Reported 218 ft of clay above aquifer; well flowing 1/2 gpm.
U	4	1950	J, 5	D, S	66	7	Water level reported low from August to January.
U	150		P, 5	D	54	7	
C	18	1945	J, 10	D	106	4	Water reported to contain iron.
U	4	1950	C, 8	D	52	5	Used by three families and a store.
C			J, 10	D	90	4	See table 4 for partial chemical analysis.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 2 W. - Continued									
8Q1	Art Linden	P,	175	Dg	28	60	28	0	28	Alluvium
9M1	P. C. Robinson	P,	185	Dg	23	72	23			Quicksand
10L1	J. A. Rowell	P,	150	Dg	23	72	23			do.
10P1	Scholls Methodist Church	P,	135	Dr	553	4	513	152	15	Basalt
11C1	Waldo B. Flint	P,	150	Dg	22	60	22			Sand
12B1	J. Winiger	S,	235	Dr	104	6	18	85	19	Basalt
12L1	A. O. Oleson	P,	160	Dr	300	6	300			Sand
12P1	Ed Mulenburgh	P,	125	Dg	20	36	36			Quicksand
13A1	H. Unger	P,	125	Dr	426	6	418	410	16	Basalt
13Q1	E. T. Sheppart	P,	180	Dr	67	6	20	20	47	do.
14D1	Jesse Snyder	P,	170	Dg	27	36	27			Quicksand
14Q1	F. E. Jewett	S,	265	Dg	26	36	26			Alluvium
15B1	Fred Barker	P,	175	Dg	31	36	31			Sand
15E1	W. T. Jackson	P,	175	Dr	344	6	330			Basalt

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	14	9/ /50	P, 8	D, S	68	6	
U	14	9/ /50	P, 5	D	86	18	
U	12.04	5/15/51	C, 10	D			
C	F	7/31/51	J, 10	PS			Reported materials, 512 ft of clay and sand; 41 ft of rock; flows about 2 gpm.
U	12.3	5/15/51	C, 8	D, S	100	6	
U	86	5/ /51	P, 5	D, S	118	11	
C			T, 75	S	84	11	Reportedly no rock encountered.
U	5	5/ /51	P, 5	D, S	50	5	
C				D, S			Materials reported, 410 ft of sand and silt above aquifer.
C			J, 10	D, S	84	7	
U	24	6/ /51	J, 5	D	50	5	
U	13.48	6/26/51	C, 10	D	44	3	Basalt encountered at bottom of well.
U	14.37	6/26/51	P, 5	D	120	12	Readily pumped dry in summer.
C	10	8/ /53		D			Reportedly bailed 15 gpm with 55 ft of drawdown.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 2 W. - Continued								
15L1	A. G. Williams	S, 155	Dg	30	36	30			"Clay"
16E1	C. R. Seiffert	S, 265	Dr	130	4	76			Basalt
16H1	Scholls Store	S, 175	Dr	500	6				do.
16J1	E. J. Bartlett	S, 185	Dr	86	6		80	6	do.
17E1	D. E. Mann	S, 225	Dr	70		40			do.
17F1	Charles Newton	S, 165	Dr	272	6	140	140	132	do.
17H1	Wenstron	S, 220	Dr	115	6				
17R1	R. N. McClur	S, 350	Dr	100	5	30			Basalt
18B1	Eggar Brothers	S, 225	Dr	120	6	50	50	55	do.
18D1	R. Lorenz	S, 375	Dr	103	6	59	70	11	do.
19E1	C. V. Jackson	U, 590	Dg	45	60	45	0	45	"Clay"
19G1	Homer Flynn	U, 580	Dr	190	6		50	140	Basalt
22A1	Herman Holznagel	S, 385	Dg	30	36	30	0	30	"Clay"
23L1	Dallas Crawford	S, 525	Dg	48	36	48	0	48	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U	25	6/ /51	J, 5	D	90	6	
C	90	2/ /51	P, 5	D	56	3	
C			J, 15	D	74	4	Reported plugged back to 175 ft.
C	20	12/ /46	J, 10	D	142	6	Water has slight yellow color.
C	50	1950	J, 5	D	90	3	Water reportedly contains iron.
C	F	2/28/51	C, 12	D	80	4	Water said to flow 3 gpm from December to July.
	38	5/ /43	J, 8	D, S	48	3	
C	60.4	8/ 2/51	J, 15	D, S	22	3	Water sometimes has reddish color.
C	15	2/ /51	J, 10	S	96	4	
C	F	2/28/51	J, 10	D, S	48	5	Flows only in winter.
U			J, 8	D, S	46	5	Easily pumped dry during summer.
P			P, 8	D, S	50	4	
U			J, 8	D, S	20	6	Inadequate; bottomed on rock.
U	31.43	6/27/51	J, 8	D, S	44	5	Stopped on rock.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 2 W. - Continued									
24D1	Weerre Brothers	S, 275	Dr	190	6	40			Basalt
24H1	L. McLoughlin	S, 200	Dg	23	48	23	0	23	Alluvium
24J1	Paulin	S, 290	Dr	50	6	42	42	3	Basalt
24M1	William Stenek	S, 375	Dr	88	6	22	72	16	do.
25A1	O. Krouse	S, 200	Dr	153	6	31			do.
25K1	E. W. Rehwalt	S, 200	Dg	52	36	52			
26E1	C. Allen	U, 660	Dr	83	6	66	60	23	do.
26H1	Mrs. A. Smith	S, 475	Dr	89	6	72	40	49	do.
27F1	Mountain Home parsonage	U, 775	Dg	90	48	8			do.
28H1	J. G. Toomey	U, 650	Dr	180	6				do.
30G1	James McConn	U, 830	Dg	80	48				

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	30	6/ /51	P, 10	D, S	56	6	
U	4.04	6/14/51	J, 8	D	38	4	Easily pumped dry.
U			J, 8	D	30	4	Reported materials, 39 ft of clay and boulders, 11 ft of basalt.
C	51.0	6/27/51	J, 8	D, S	34	6	Reported 10 ft of clay, 62 ft of rock above aquifer; see plate 42 for water-level record.
C	113	6/ /51	P, 8	D, S	72	4	Reported 32 ft of clay and 122 ft of rock.
	40.68	6/27/51	P, 5	D, S	32	6	
P	49	6/ /46	J, 15	D, S	20	4	Reported 40 ft of soil and 34 ft of rock.
P			J, 8	D	160	5	Reported 40 ft of clay over aquifer.
P							Inadequate; abandoned; parsonage uses water from spring; well entered basalt.
P			P, 10	D	105	4	Water has a reddish color.
P	61.79	8/ 6/51	P, 3	N			Inadequate; unused; using spring water.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 2 W. - Continued									
31A1	L. Clark	U, 1,200	Dr	155	6		80	75	Basalt
33K1	W. M. Strickland	U, 1,070	Dg		48	8			"Clay"
34E1	Stretcher	U, 900	Dr	429	6	90	329	100	Basalt
35A1	Oliver Coleman	S, 490	Dr	225	6	56	170	55	do.
35N1	R. B. Joyce	U, 750	Dr	128	6				Sand(?)
36E1	Carl Schollenbrank	S, 425	Dr	232	6	49	50	182	Basalt
36J1	Don Holmes	S, 310	Dg	48	48	35	18	30	do.
T. 2 S., R. 3 W.									
1A1	Harold Haase	P, 180	Dr	405	6	289	286	119	Basalt
1C1	Richard Kiefer	P, 180	Dr	369	6	160	168	201	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
P			J, 10	D, S	78	5	Adequate for domestic use only.
P	19.52	8/ 2/51	P, 5	D, S	8	3	Inadequate during summer.
P	329		P, 10	D, S	70	4	Barely adequate; basalt from 90 to 429 ft.
C	130.25	7/30/51	N				Reported 55 ft of clay and 115 ft of rock above aquifer.
P	68	1951	P, 8	D, S	10	3	Water sometimes has reddish color.
U	122	1947	P, 2	D	58	4	Inadequate; materials reported, 35 ft of soil, 100 ft of soft basalt and 97 ft of hard basalt.
U			J, 8	D	32	5	Pumps dry in summer; basalt soft.
C	1.68	2/23/51	J, 5	D	78	3	Drawdown reported to be 13 ft when pumped at 45 gpm for 5 hours; reportedly flowed 10 gpm in 1948; see table 2 for log.
C	45	3/ /50	J, 15	D, S	124	5	Reportedly test pumped 240 gpm with 55 ft of drawdown; see table 2 for log.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 3 W. - Continued								
1F1	Walter Schmidt	P, 180	Dr	170	6	153	155	15	Basalt
1R1	Charles E. Schmidt	S, 175	Dr	264	8	95	120	101	do.
1Q1	Herman Egger	P, 175	Dg	25	48	25	0	25	Alluvium
2Q1	John Will	S, 600	Dg	52	48	52	0	52	Alluvium(?)
5L1	Andress	S, 190	Dr	63	6		60	3	Gravel
6L1	C. E. Jorrgen	S, 150	Dg	34	48				Shale(?)
6P1	Robb	P, 150	Dg	24	48	24	0	24	"Clay"
6Q1	Harold McAdams	P, 175	Bd	35	18	35	10	25	do.
6R1	J. N. Strever	P, 180	Dr	150	6				Shale
7Q1	A. W. King	S, 210	Dg	10	48				Basalt
10B1	S. A. Whitmore	U, 1,000	Dr	108	6	50	50	58	do.
10N1	Earl Baker	U, 1,125	Dg	25	48				Alluvium

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	20	1945	J, 8	D, S	44	3	Water reported to contain carbon dioxide; test pumped 8 gpm with 70 ft of drawdown.
C	F	10/ /51	T, 80	Irr			Reported to flow 3- gpm.
U	17	7/ /50	J, 8	D, S			
P	22.93	3/ 2/51	J, 8	D, S	26	9	See plate 43 for water-level record.
U			J, 8	D, S	90	5	Used by two families; water reported to have mineral taste.
U			J, 8	D	50		Inadequate during dry season.
U	17	7/ /50	J, 8	D, S	108	3	Do.
U	15	8/ /50	J, 10	D	78	3	Readily pumps dry during summer.
C	12.5	5/18/51	N		271	1000	Not used.
U					24	3	Used by three families; water reported to come from "crevice" in rock.
P	20	6/ /48	J, 8	D	50	4	Water level reported to draw down considerably under normal use.
P			N				

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 3 W. - Continued									
11C1	Max Reeher	S, 740	Dr	183	6				Basalt
11D1	B. B. Cooley	S, 760	Dr	125	6				do.
11K1	A. Vendegan	S, 690	Dr	250	6	72	72	78	do.
11R1	M. J. Murphy	S, 750	Dr	112	6	106	103	9	do.
12A1	Fred Schmidt	P, 175	Dr	135	6	112	110	25	do.
12H1	M. Cady	S, 200	Dg	35	48	35			
13A1	E. R. Tompkins	S, 455	Dr	93	8				
13D1	John R. Thorp	S, 710	Dr	120	6				
26J.	O. J. Ornduff	U, 1,275	Dr	396	6		20	376	do.
T. 2 S., R. 4 W.									
1A1	R. B. McBurney	S, 180	Bd	30	18	30			Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
P			P, 8	D	352	5	
P			P, 8	D, S	124	3	
P	45	7/ /50	P, 5	D	46	4	"Upper water"lost in crevices; back-filled to 150 ft; basalt from 72 to 250 ft.
P	52	9/ /49	J, 10	D	46	4	Some water reported at 70 ft in gravel.
C	F	2/21/51	J, 8	D	110	3	Materials reported, 68 ft of clay, 14 ft of boulders, 28 ft of broken rock and clay, 25 ft of lava rock; flows 3 gpm.
U			J, 8	D, S	84	3	Water said to have reddish color.
P			J, 15	D, S	60	6	
P	35	7/ /50	J, 10	D, S	11	4	Water reported to contain iron.
P	360	3/ /50	J, 15	D	190	6	Can be readily pumped dry; inadequate.
U	1.53	1/26/51	J, 10	D	82	3	Water carries sand; see plate 43 for water-level record.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 4 W. - Continued								
1J1	Walter Cate	S, 200	Dr	300					
2M1	H. L. Beck	S, 525	Dr	480	6				
2M2	S. G. Matheson	S, 450	Dr	96	6	45	82	14	Basalt(?)
2Q1	James Saunders	S, 300	Dr	85	4	35	72	13	do.
3G1	T. H. Johnson	S, 400	Dg	45	36				
3H1	E. Eddings	S, 400	Dg	12	33	12			Alluvium
4R1	S. R. Bristow	U, 750	Dg	24	48	24	0	24	Alluvium(?)
10N1	W. R. Conn	S, 825	Dg	38	48	38	0	38	do.
11R1	K. D. Etter	S, 450	Dr	92	6	32	72	20	
12L1	Kuemin	S, 200	Dr	200	6				
12N1	August J. Lange	S, 380	Dr	100	6	18			
14A1	R. S. Hudson	S, 525	Dr	87	6	19	84	3	
16C1	Harold Jefferis	P, 650	Dg	43	48	N	0	43	Alluvium(?)
22K1	R. R. Oester	S, 375	Dr	120	6				Sandstone(?)
23N1	Lillie Bangs	P, 275	Dr	92	6				"Shale"

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
							Dry hole; reportedly drilled through blue clay and shale.
							Dry hole; shale entire depth.
P	16	9/ /50	P, 10	D, S	24	4	
C	25	7/ /50	J, 10	D	60	6	Readily pumped dry.
P	14.8	2/12/51	J, 5	D	124	10	Water level low in summer.
P	3	9/ /50	N	D			
P	5	1951	J, 5	D	30	7	Readily pumped dry in summer.
P	12		P, 8	D	12	3	Do.
P	32.5	2/12/51	N				
			J, 12	D	18	5	
	29	7/ /50	J, 10	D	58	4	
P			J, 10	D	36	3	
P	26.4	2/13/51	B	D			
U	60	1951	J, 10	D	258	35	Inadequate during summer.
C	1	9/ /45	J, 8	D	5,400	5,010	See table 4 for chemical analysis of water.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 E.								
2N1	City of Oswego	P, 80	Dr	225	12	25			Basalt
2N2	do.	P, 60	Dr	450	16	25			do.
3L1	do.	S, 250	Dr	980	10-6	762	957	23	do.
4L1	A. S. Platou	S, 325	Dr	175	6	94	142	1	do.
5K1	H. E. Davis	S, 400	Dr	218	6	21	140	78	do.
5M1	V. R. Casebeer	S, 370	Dg	39	36	39	16	23	do.
6A1	C. E. Yongue	S, 585	Dr	210	6	58	170	40	do.
6H1	W. Bode	U, 425	Dr	235	6	155	155	80	do.
6J1	A. L. Fields	S, 375	Dr	535	8	443	576	60	do.
6R1	A. L. Fields	S, 315	Dr	90	8-6				Boring lava
8C1	George H. Carl	S, 200	Dg	30	36	30	20	10	Sand

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	20	1951	T, 375	PS			City well no. 3
C	20	1951	T, 375	PS			City well no. 4.
C		4/ /39	T, 100	PS			City well no. 1; see table 2 for log.
C	130	1946		D			
C							
U	15.0	11/ 1/51	J, 8	D			Inadequate.
C	73	1948	J, 10	D	106	3	Materials, clay and sand to 55 ft; rock to 210 ft.
C	60		J, 8	D			Readily pumped dry.
C	210	8/ /53		D			Materials reported, clay from 0 to 6 ft; rock (Boring lava) from 6 to 143 ft; clay (Troutdale formation) from 143 to 433 ft; rock (basalt) from 433 to 535 ft.
			J, 15	D, S	122	3	
U	15	1951	J, 5	D			

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 1 E. - Continued									
8H1	Lake Oswego Water Co.	S, 200	Dr	188	10	40	178	22	Basalt
8N1	do.	S, 215	Dr	258	10-8	51	99	159	do.
8R1	do.	S, 225	Dr	607	12	58			do.
9D1	do.	S, 325	Dr	405	10	20	190	215	do.
9J1	do.	S, 225	Dr	502	10 8	165 267-347	140 280	20 60	do.
14C1	Marylhurst College	S, 175	Dr	500	12	38	305	195	do.
14F1	do.	S, 175	Dr	519	12	81	301	218	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	5		T, 135	PS			Materials, peat from 0 to 20 ft; basalt from 20 to 178 ft; see table 4 for chemical analysis; water company well no. 1.
C	1	1945	N				See table 2 for log.
C					354	285	Reported not used because of hardness of water; see table 4 for chemical analysis; water company well no. 3.
C	75	1946	T, 275	PS	85	4	See table 2 for log and table 4 for chemical analysis; water company well no. 4.
C	129	5/ /48	T, 200	PS	63	3	See table 4 for chemical analysis; water company well no. 5; 10-inch casing perforated from 130 to 140 ft and 150 to 160 ft; 8-inch casing perforated from 280 ft to 290 ft and 330 to 340 ft.
C	125	1929	T, 350	D, Irr			
C	120	6/ /47	T, 200	D, Irr			See table 2 for log; reported drawdown of 80 ft pumping 300 gpm.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 1 E. - Continued									
15C1	City of Oswego	S, 560	Dr	640	10		260	340	Basalt
15G1	Ferry Smith	S, 685	Dr	470	12	64	450	20	do.
16F1	Emily B. Jonston	S, 485	Dr	407					do.
16K1	R. Luscher	S, 450	Dr	138	6	130			do.
16M1	Emily B. Jonston	S, 550	Dr	569	6	120			do.
16Q1	Carl Anderson	S, 430	Dr	90	6				
17Q1	H. B. Morse	S, 370	Dr	462	6				do.
18H1	I. L. Hefford	P, 135	Dr	89	6		50	39	do.
18M1	Frank Herbst	P, 170	Dr	105	6	102	104	1	Sand
19C1	R. W. Walter	P, 130	Dr	27	6	27			Gravel
19G1	E. A. Gates	P, 125	Dr	150	6				
19J1	C. Alplanap	S, 230	Dr	146	6	146	135	11	do.
19P1	Julius Skog	P, 210	Dr	210	6		200	10	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
U			T	PS			See table 2 for log; city well no. 2.
U	364	12/24/48	T, 60	D	98	3	Planned as water supply for 12 to 15 families.
U	387	7/ /51	P, 10	S	68	3	Well originally drilled to 237 ft; deepened to obtain adequate water supply.
P	26	1951	J, 10	D, S	68	4	
U	434	1947	P, 12	D, S	110	3	Water will iron-stain porcelain; inadequate supply of water.
P			J, 8	D, S	86	5	Inadequate supply of water.
U	400	1949	P, 10	D	120	10	
C			J, 5	D	60	3	
U	42	1951	J, 8	D	98	6	
U			P, 5	D, S	74	5	
			J, 8	D, S	700	316	Water reported to be hard.
C	100	1944	P, 8	D, S	104	2	
C	70	1951	J, 5	D	98	7	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Water-bearing zone or zones: Thickness (ft)	Water-bearing zone or zones: Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 E. - Continued								
19Q1	J. T. Miller	P, 210	Dr	440	6	422	423	17	Basalt
20A1	R. L. Hoffman	S, 475	Dr	208	6				do.
20D1	C. J. Mason	S, 175	Dr	108	6				do.
20E1	M. E. Stonebrink	P, 130	Dr	300 (?)	6				
20N1	A. W. Borland,Sr	S, 190	Dr	240	6				Gravel
21Q1	R. A. Holmes	S, 230	Dr	128	6		119	9	Basalt
22C1	K. B. Hall	S, 450	Dr	527	6	35	123	280	do.
22C2	do.	S, 400	Dr	825	10-8		300	525	do.
22G1	S. A. Swanson	S, 525	Dr	98	6	60	83	15	do.
22G2	Mrs. Roe Cloud	S, 575	Dr	173	6	80	153	20	do.
22P1	Joe Hartman	S, 525	Dr	410	6	13	235	5	do.
23F1	K. Cummings	S, 650	Dr	650	8				do.
23M1	W. F. Carrington	U, 730	Dr	150					do.
23N1	H. H. Gewecke	U, 675	Dr	270	6				

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	95	8/ /51	P, 8	D	74	27	Deepened August 1951, from 261 to 440 ft to obtain more water.
U			P, 8	D, S	86	4	Used by two families.
C	37	1951	J, 15	D	46	5	Basalt at 4 to 108 ft.
	15	1951	J, 15	D, S	140	3	
C			P, 8	D, S	60	4	
C				D			Materials reported, clay from 0 to 37 ft; basalt from 37 to 228 ft.
C			T, 35	D, S	96	5	See table 2 for log.
C	100	1950					Reportedly drilled for irrigation but found inadequate.
P	83	1937	P, 5	D, S	122	4	Basalt from 60 to 98 ft.
P	108	1928	P, 8	D			Basalt from 80 to 173 ft.
U	320	1945	P, 8	D, S	102	4	Basalt from 8 to 410 ft.
U	400	7/ /54	N, 5				Supply inadequate; well being deepened.
P	52.38	10/16/51	P, 8	D, S	72	7	Inadequate supply of water.
			P, 10	D	90	3	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 E. - Continued								
24D1	Robinwood Water District	P, 135	Dr	275	5		20	255	Basalt
25E1	H. E. Ibach	S, 620	Dr	455	6	50	440	15	do.
26B1	Brownsville Timber Co.	U, 700	Dr	100	6				do.
26H1	W. D. Miles	U, 680	Dr	121					do.
26J1	G. M. Shearer	U, 630	Dr	90	6	35	35	55	do.
26N1	Rolloy	S, 600	Dr	320	6				do.
26P1	J. E. Monteith	S, 600	Dr	88	6				
27G1	Community well	S, 425	Dr	226	6	43	197	29	do.
27J1	T. Bino	S, 285	Dr	214	6				do.
27Q1	H. N. Bower	S, 165	Dr	93	6		36	57	do.
28B1	Jerry Fiala	S, 150	Dr	186	6				
28D1	C. B. Pike	S, 185	Dr	150	6	119	125	25	Basalt
28M1	E. K. Ewald	S, 175	Dr	104	6	90	90	14	Basalt(?)
28P1	do.	S, 175	Dr	80	6	80			Gravel

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	123	6/ /47	T, 250	PS			Reported to have produced 250 gpm with a drawdown of 9 ft after 2 hours of pumping; temperature of water 60° F.
U	335	1949	P, 12	D, S	54	3	See table 2 for log.
P	52.38	10/15/51	J, 15	D	74	3	Water reported cloudy after rain.
P			J, 5	D	76	3	
P	35	1951	J, 10	D, S	56	3	
P			P, 8	D	98	4	Rock from 12 to 320 ft.
P			P, 10	D	110	3	
P			P, 10	D, S	82	6	Used by seven families.
C	20		P, 8	D	102	5	
U			P, 10	D	124	4	Inadequate.
C	50	1944	P, 10	D	134	3	
C			J, 15	D, S	130	4	
C			J, 8	D	92	5	Adequate for domestic use only.
U	75		J, 10	D, S	56	5	Used by two families.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T. 2 S., R. 1 E. - Continued									
29J1	Earl H. Bywer	S, 265	Dr	185	6	167	172	13	Basalt
30J1	G. Keller	S, 400	Dr	317	6	20	300	17	do.
31D1	Gene Wilhelm	S, 330	Dr	82	6	39	40	42	do.
31J1	Lloyd C. Tiedeman	S, 415	Dr	290	6	60	60	230	do.
31K1	E. O. Barnes	S, 445	Dr	218	6	26	160	58	do.
31P1	J. E. Youmans	S, 475	Dr	146	6	23	120	26	do.
32A1	Sherman C. Hill	S, 510	Dr	435	6	80	400	35	do.
32C1	Charles Tiedeman	S, 470	Dr	392	6				do.
32E1	Susan Eisele	S. 410	Dr	400	6	40	395	5	do.
32G1	Richard Denley	S, 600	Dr	580	6				do.
33B1	D. R. Diebold	S, 175	Dr	24	8				
33C1	Karl Koch	S, 310	Dr	202	6	34	195	7	do.
34G1	H. Rohe	S, 110	Dr	350	6		345	5	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	35	1944	P, 10	D	78	3	Used by two families.
C	30	1916	P, 15	D, S	78	3	
U	40	10/ /49	J, 10	D	66	4	Bailed 10 gpm for 1 hour.
C	60	1/ /51	T, 20	D, S	40	4	
U			J, 15	D, S	68	3	
C	90	1948	P, 5	D	50	4	Materials peported, 24 ft of clay and boulders, 122 ft of basalt.
U	400	7/ /51	N				
U			P, 10	D	78	3	
U	350		P, 8	D, S	64	7	Inadequate; can be pumped dry in half an hour.
U	380	1951					Drilled through 570 ft of soft, porous rock with occasional layers of hard rock.
U	15.10	10/17/51	J, 5	D	40	4	
U	180	1950	J, 20	D	62	4	Rock from 34 to 202 ft.
C	10	1946	J, 8	D	88	142	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 2 S., R. 1 E. - Continued								
34H1	N. O. Wright	S, 160	Dr	428	6		426	2	Gravel(?)
34J1	Ward Wills	S, 170	Dr	204	6	180			
35F1	Lloyd Hinkle	S, 500	Dr	433	6	20	413	20	Basalt
35G1	F. W. Cairy	S, 500	Dr	107	6	29	105	2	do.
	T. 3 S., R. 1 W.								
1K1	William Elligsen	S, 310	Dr	165	8	22			do.
1M1	T. C. McCoy	S, 285	Dr	135	6				do.
1P1	Sarah Ohling	S, 335	Dr	132	6	15			do.
2C1	M. Redding	S, 305	Dg	38	48				do.
2E1	Thad Stevens	P, 230	Dg	42	36	20			do.
2F1	L. Harbick	S, 275	Dg	30	60	12			"Clay"
2N1	M. G. Christopoulos	P, 225	Dr	94	6-4	94	85	9	Basalt
2N2	Bonneville Power Administration	P, 239	Dr	300	12	214	200	100	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	70	1943	P, 10	D, S	252	250	
			P, 8	D, S	90	6	
U	400	1943	P, 8	D, S	98	3	
P	40	8/ /48	J, 10	D	88	3	
U	85	1950	P, 20	D, S	88	4	Basalt from 22 to 165 ft.
U	47	7/ /49	J, 10	D, S	48	6	
U	101		P, 8	D	108	5	Basalt from 15 to 117 ft.
P	34	6/ /51	J, 8	D	36	8	Aquifer is soft rock.
P	12	6/ /51	J, 10	D	34	8	Do.
U			J, 5	D	32	6	
C	F	7/ 6/51		D	66	4	Reported 21 ft of clay, 2 ft of gravel and 52 ft of clay overlying aquifer.
C	19.5	10/ /41	P, 20	Ind	82	3	See table 2 for log; elevation is to top of casing; levels by BPA well at Oregon City substation.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 3 S., R. 1 W. - Continued									
2Q1	Doty & Doorner Nursery	P,	255	Dr	100	6				
3A1	L. Garfield	S,	265	Dr	80	6	47	50	30	Basalt
3D1	H. Okazakie	S,	125	Dg	20	48				"Clay"
3J2	Mrs. Terry	P,	215	Dr	92	6	60	60	32	Basalt
3Q1	Mrs. Davies	P,	175	Dg	21					Alluvium
4G1	C. W. Kemp	S,	250	Dr	114	6	50	112	2	Basalt
4J1	Floyd Rains	S,	155	Dg	12	36				Alluvium
4N1	F. G. Chapman	S,	290	Dr	95	6	60	60	35	Basalt
4Q1	Joe Taylor	S,	325	Dg	43	48		36	7	do.
5A1	Mrs. Hunter	S,	335	Dr	125					do.
5D1	W. C. Speaks	S,	275	Dr	133	6	20	40	93	do.
5D2	H. Nixon	S,	255	Dr	112	6	21	100	12	do.
5L1	Al Oberst	S,	410	Dr	100	6	67	65	35	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	36.06	7/11/51	J, 20	D, Irr	38	6	Used for irrigating 15 acres.
U	51	6/ /51	J, 8	D, S	36	6	
U			J, 8	D	38	6	
C	40	1946	J, 5	D	104	5	Basalt from 47 to 92 ft.
U	18.14	7/ 2/51	J, 5	D	56	7	Water reportedly corrodes pipes.
C			J, 10	D, S	90	6	Reported 50 ft of decomposed rock and 64 ft of hard rock.
U	5.97	7/23/51	J, 5	D	82	8	Inadequate.
C	35		J, 8	D, S	52	5	
P	34.75	7/23/51	P, 5	D, S	16	5	Aquifer decomposed basalt from 36 to 43 ft.
C			J, 10	D, S	84	4	
C	22	1943	J, 10	D	68	4	See table 2 for log.
C	83	5/ /43	J, 10	D	66	4	Material encountered, 17 ft of clay and 83 ft of basalt above aquifer.
C	72	10/ /46	J, 10	D, S	20	5	Reported 65 ft of clay above aquifer.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 3 S., R. 1 W. - Continued									
6D1	W. L. Dobson	S,	215	Dr	50	6	40	35	15	Basalt
7A1	Perry Weston	U,	700	Dg	52	60	52	0	52	"Clay"
7B1	Neal Dickenson	U,	750	Dg	84	36	84	0	84	do.
8B1	John K. Smeed	S,	540	Dr	210	6		70	140	Basalt
9E1	Oliver Todd	S,	480	Dg	50	24	25	25	25	do.
9H1	W. Edwards	S,	380	Dr	225	6	27	210	15	do.
10K1	G. Selander	P,	155	Dg	21	36	21	16	5	do.
10N1	H. C. Conklin	S,	235	Dr	115	6				do.
10N2	H. H. Bryant	P,	265	Dg	60	4		59	1	Sand and gravel
10R1	R. W. Clark	S,	155	Dr	45	6				do.
11A1	Elmer Beckman	P,	235	Dg	44	36	44	30	14	Basalt
11G1	E. Ritter	P,	225	Dr	145	6		120	25	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	F	8/13/51	J, 8	D	60	6	Reported 35 ft of clay and 15 ft of rock.
P	27	1951	P, 5	D, S	20	4	Aquifer probably decomposed basalt.
P	56.81	7/25/51	J, 10	D	46	4	
P			P, 8	D	32	5	Adequate only for domestic use.
P	45	1951	J, 3		20	8	
U	206	1944	P, 5	D, S	58	4	Used by three families.
U	19.36	7/11/51	C, 90	D, Irr	30	6	Pumps dry but has quick rate of recovery; operates 16 sprinklers till the first of July.
C	70.02	7/11/51	J, 10	D	28	5	See plate 44 for water-level record.
U	38.76	7/24/51	P, 8	D, S	26	5	
U	35.82	8/20/51	P, 5	D, S	50	6	See plate 44 for water-level record.
U	24	7/ /51	J, 8	D, S	80	6	
C			P, 8	D, S	54	6	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
							Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 3 S., R. 1 W.- Continued								
11L1	H. L. Lockman	P, 210	Dr	130	6				Basalt
11L2	Don Boeckman	S, 200	Dr	150	6	130	130	20	do.
12N1	Henry Lzicar	P, 215	Dr	180	6	162	166	14	Basalt(?)
13C1	Jack Meyers	S, 220	Dg	24	36	36	0	24	"clay"
13E1	Walter Schlickeiser	S, 210	Dr	106	6				Sand(?)
13P1	F. H. Stangel	S. 165	Dr	90	6	90	85	5	Gravel(?)
14G1	C. F. Berning	P, 170	Dg	43	36				Gravel
14K1	Susan Seely	P, 155	Dr	38	14	38	29	36	Gravel, bouldery
15D1	Luther Brown	S, 235	Dr	100	6	70	90	10	Basalt
15G1	Charles A. Achilles	S, 200	Dr	175	6				
15J1	Otto Jaeger	S, 200	Dg	22	72				Basalt
15R2	H. S. Young	S, 190	Dg	30	36				do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			J, 10	D,S	88	3	Inadequate
C	100	8/ /49	J, 8	D, S	40	5	Water has a reddish color; reported materials, 78 ft of clay and 72 ft of rock.
C	30	1944	P, 8	D	84	4	Reported 166 ft of clay and sand above aquifer.
U	15.30	7/ 8/51	J, 5	D	80	9	Inadequate during dry season.
C			P, 5	D, S	98	5	
C	27		J, 10	D, S	62	6	
C	25.41	7/ 9/51	J, 8	D	40	4	Reportedly water sometimes has reddish color.
U	17.92	7/ 8/51	C, 200	Irr	60	5	Used for irrigating 10 acres; casing perforated from 29 to 36 ft; see plate 45 for water-level record.
C			J, 5	D, S	54	5	
			P, 8	D, S	102	5	
U			P, 5	D, S	52	7	Aquifer decomposed basalt.
U	21.14	7/11/51	J, 5	D, S	72	12	Do.

Unpublished records subject to revision

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 3 S., R. 1 W. - Continued								
23A1	Falco Hollies	S, 185	Dr	640	8				Basalt
23F1	Wilsonville Lumber Products	P, 135	Dr	346	12-8	347	314	33	do.
23F2	Flynn	P, 130	Dr	71	6				Boulders
23L1	Tomason & Nuting	P, 125	Dr	300	6				
23M1	Mary F. Jobse	P, 100	Dr	237	6				
	T. 3 S., R. 2 W.								
1A1	Jack Grover	S, 225	Dr	105	6	68	90	15	Basalt
1E1	U. A. Brugger	S, 435	Dr	155	6	41	129	26	do.
1G1	Mrs. Agnes Dewey	S, 300	Dg	50	60				do.
1H1	Fred Brickleys	S, 175	Dr	142	6	90	90	52	do.
1P1	Ludwig Gimm	S, 200	Dr	82	6	36	80	2	do.
2N1	J. R. Blake	U, 730	Dr	176	6	82	82	23	do.
3P1	Jones	U, 835	Dr	99	6	99	83	16	do.
4R1	N. F. Biesang	U. 850	Dr	210	6	200			do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level		Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million)		Remarks
	Ft below land surface datum	Date			Hardness as $CaCO_3$	Chloride	
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	26	1940	P, 30	Irr			
C	F	7/10/51	T, 40	Ind	162	26	Reportedly 314 ft of clay and decomposed rock above aquifer.
U	54		J, 10	D	36	6	Has supplied about 20 families.
C	F		J, 5	D	154	28	Flows less than 1/2 gpm.
C	F			D, S	128	26	
C	20	9/ /50	J, 5	D	120	3	Reported 90 ft of soil and decomposed rock above aquifer.
P	110	1945	J, 10	D, S	72	3	Reported rock entire depth.
U	39.13	7/31/51	J, 5	D, S	20	4	Aquifer of decomposed basalt.
C			J, 15	D, S	124	5	
C	53.79	8/13/51	J, 5	D	94	5	Reported 20 ft of clay and 52 ft of rock above aquifer.
P	75		J, 8	D, S	24	6	Water sometimes has reddish color; rock from 82 to 176 ft.
P			J, 5	D	32	3	Inadequate water supply.
P			J, 15	D, S	40	3	Do.

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft) above sea level		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
)1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 3 S., R. 2 S. - Continued									
10C1	E. Sidel	U,	820	Dr	188	6	59	59	129	Basalt
11Q1	P. B. Wilkins	S,	330	Dr	93	6				
12Q1	T. G. Landwarhr	U,	1,100	Dg	80	48		4	76	Basalt
	T. 3 S., R. 1 E.									
3N1	Emil Nodurft	U,	710	Dr	290	6	23			do.
4C1	R. P. Corderman	U,	810	Dr	643	6	33	520	123	do.
4N1	L. A. Read	S,	470	Dr	230	6	50	220	10	do.
5A1	F. F. Fellows	S,	525	Dr	365	6				do.
5B1	H. R. Nelson	S,	525	Dr	145	6	20			do.
5Q1	Walter Moser	S,	350	Dr	190	6				do.
6C1	Gould	S,	475	Dr	340	6	58			do.
6H1	Haven Nutting	S,	600	Dr	413	6	30			do.
6N1	Sattler	S,	310	Dr	180	4				do.
6P1	C. I. Sharp	S,	275	Dr	135	6				do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
P			P, 5	D			Adequate only for domestic use.
P			J, 5	D	98	4	Readily pumped dry during summer.
P				N			Inadequate; abandoned.
P	270	1930	P, 8	D, S	50	3	Can easily be pumped dry.
U	550	1945	P, 5	D	64	8	See table 2 for log; water level was 68 ft when well was 110 ft deep.
U	203	7/ /51	P, 8	D, S	60	4	Reported 50 ft of clay and 180 ft of basalt.
U	325	1947	P, 10	D	96	3	Used by two families.
P	105.38	10/ 8/51	P, 8	D	84	4	Has been pumped dry occasionally.
C			P, 10	D, S			Used by two families.
U	235	1927	P, 12	D, S	88	3	Used by 11 families.
U			P, 15	D	86	5	Used by three families; rock from 30 to 413 ft.
C			P, 10	D, S	78	2	
C			J, 10	D, S	62	2	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft) above sea level)	Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones: Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 3 S., R. 1 E. - Continued								
6R1	George Oldstead	S, 190	Dr	85	6				Basalt
7A1	C. L. Chapman	S, 170	Dr	85	6	12	9	74	do.
7E1	Harry F. Lane	P, 230	Dr	235	6	118	118	117	do.
7H1	Ed Mosier	S, 205	Dr	280					do.
7N1	Stanley Kruse	P, 215	Dr	203	5	190			"Clay"
8C1	John P. Wilkins	S, 330	Dr	189	6	20	20	169	Basalt
8D1	Chester R. Kiellermier	S, 285	Dr	176	6	15	150	26	do.
8L1	George Horning	S, 280	Dr	187	8	20	185	2	do.
9D1	E. F. Breckman	S, 290	Dr	140	6	100	100	40	do.
10E1	John Hellberg	S, 600	Dr	311	6	22			do.
16A1	H. H. Hering	S, 625	Dr	180					do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C			P, 8	D, S			
C	F	10/ 8/51	J, 20	D, Irr	100	4	Used for irrigating 3 acres; reportedly has drawdown of 20 ft with pump running continuously.
C	62	8/ /49	T, 100	D, Irr	80	4	Used for irrigating 25 acres; reported to have yielded 230 gpm with drawdown of 120 ft after 10 pays of pumping.
C			do.	do.	84	9	Used for irrigating 10 to 15 acres.
C			P, 8	D, S	92	4	Inadequate supply of water.
U	150	1910	P, 10	D, S	94	3	
U	128	1930	P, 10	D, S	94	2	
U	120	1911	P, 12	D, S	96	5	
U	128	1920	P, 8	D, S	88	4	
P	271	1951	T, 12	D	66	3	Drilled through alternating layers of hard and soft rock.
			P, 8	D	108	2	

Table 1.- Representative Wells

Well no.	Owner or occupant of property	Topography and approximate altitude (ft) above sea level		Type of well	Depth (ft)	Diameter (inches)	Depth of casing (ft)	Water-bearing zone or zones		
								Depth to top (ft)	Thickness (ft)	Character of material
(1)	(2)	(3)		(4)	(5)	(6)	(7)	(8)	(9)	(10)
	T. 3 S., R. 1 E. - Continued									
16C1	Fred Baker	S,	250	Dr	375	6				Basalt
16G1	Robert Hunt	S,	275	Dr	226					do.
17A1	William Loellermier	S,	225	Dr	135	6	100	75	60	Gravel
17F1	George Moser	P,	200	Dg	20	48	20	14	6	Sand
18C1	W. Bruck	P,	210	Dr	250	6	230	230	20	Basalt
18C2	L. Wolf	P,	210	Dr	60	6				do.
18Q1	Kruse and Sons	P,	185	Dg	30	60	30			Sand
22G1	C. P. Pynn	S,	100	Dr	100					Basalt
22J1	A. K. Schmeer	S,	80	Dr	42	6				do.
22J2	C. P. Pynn	S,	80	Dr	68	6	12	8	60	do.

in the Tualatin Valley - Continued

Ground-water occurrence	Water level: Ft below land surface datum	Water level: Date	Type of pump and yield (gallons per minute)	Use	Chemical character (parts per million): Hardness as $CaCO_3$	Chemical character (parts per million): Chloride	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
C	100	1930	P, 10	D	130	5	
			P, 8	D, S	95	4	
U	70	1925	P, 10	D, S	116	3	
U	16	1925	J, 5	D	54	3	
C	60	1950	T, 100	D, Irr	110	3	Used for irrigating 15 acres; reported to have yielded 160 gpm with drawdown of 60 ft after pumping 24 hours.
			P, 5	D, S	62	4	Well encountered local high in basalt bedrock.
U	3.67	10/ 2/51	P, 5	D	54	3	Used by three families; can be pumped dry in the fall.
			J, 5	S			Reportedly encountered rock at 10 ft.
U	27		J, 5	D	54	9	
C	20	1945	J, 10	D, S	168	66	

Unpublished records subject to revision

Table 2. Drillers' Logs of Representative Wells
[Stratigraphic designations by Florian J. Frank]

1N/1W-5D1. Multnomah County. Altitude about 805 feet. Drilled by R. J. Strasser Drilling Co., 1947

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	38	38
Columbia River basalt:		
Rock, decomposed, brown	114	152
Rock, hard and soft, brown	46	198
Rock, hard, gray	51	249
Rock, hard, black	34	283
Rock, hard, brown	14	297
Rock, hard, gray	7	304
Rock, medium-hard, brown	19	323
Rock, hard, gray	39	362
Rock, hard, brown	4	366
Rock, hard, gray and black	113	479
Rock, brown, creviced	6	485
Rock, soft, brown and black	14	499
Rock, hard, black, water-bearing	24	523
Rock, hard, black	27	550

1N/1W-20H1. C. E. Wismer. Altitude about 330 feet

Soil and mantle (undifferentiated):		
Clay	43	43
Boring lava (basalt):		
Rock	147	190
Troutdale formation:		
Clay	206	396
Columbia River basalt:		
Rock	84	480

Table 2.- Drillers' Logs of Representative Wells - Continued

1N/1W-23K1. Richfield Oil Co. Altitude about 1,055 feet. Drilled by Fowler Drilling Co., 1946

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Soil and weathered basalt	97	97
Columbia River basalt:		
Boulders, "shale" hard, and basalt	84	181
Basalt	500	681
Basalt and shale	25	706
Basalt	97	803
Sedimentary and volcanic rocks of Tertiary age:		
Sand and shale, fossiliferous	1,242	2,045
Volcanic sand, agglomerate, shale, clay, and lava flows	2,882	4,927
Basalt	349	5,276
Volcanic agglomerate and lava flows	2,609	7,885

1N/1W-23R1. Alfred H. Corbett. Altitude about 1,000 feet. Drilled by A. M. Jannsen Drilling Co., 1948

Soil and mantle (undifferentiated):		
Clay	50	50
Quicksand	10	60
Clay	18	78
Columbia River basalt:		
Rock, black	397	475
Rock, red and brown	85	560
"Shale, sandy" (basalt?)	290	850
Sedimentary strata of Tertiary age:		
Clay, sandy, and sandstone	110	960

Table 2.- Drillers' Logs of Representative Wells - Continued

1N/1W-35H1. W. M. Perrault. Altitude about 650 feet. Drilled by A. M. Jannsen Drilling Co., 1948

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	82	82
Boring lava (basalt)(?):		
Rock, hard, crevice at 115 ft	33	115
Rock, soft	23	138
Rock, hard	101	239
Rock, soft, red, water-bearing	12	251
Rock, broken, red and gray	29	280
Rock, hard, gray	93	373
Troutdale formation(?):		
Clay, blue	137	510
Clay, yellow	17	527
Clay, red	53	580
Clay, brown	17	597
Conglomerate, water-bearing	15	612
Sand, coarse	3	615
Conglomerate, water-bearing	18	633

1N/1W-35M1. West Hills Nursery. Altitude about 455 feet. Drilled by A. Gaunt, 1948

Boring lava (basalt) and interfingered beds:		
Clay	70	70
Rock, hard, water-bearing at 80-100 ft	72	142
Clay	20	162
Rock, hard	43	205
Clay and rock	10	215
Rock	19	234
Troutdale formation:		
Clay, red	216	450
Clay, black and gray	77	527

Table 2.- Drillers' Logs of Representative Wells-Continued

1N/1W-36E1. Portland Gas and Coke Co. Altitude about 750 feet. Drilled by Harty Bros.

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay, sandy, yellow	63	63
Boring lava (basalt)(?):		
Rock, gray	211	274
Rock, soft, red, water-bearing	36	310
Rock, hard, gray	96	406
Rock, soft, red, water-bearing	6	412
Troutdale formation(?):		
"Shale," blue	9	421

1N/2W-15C1. West Union School. Altitude about 210 feet. Drilled by A. Gaunt, 1948

Valley fill:		
Clay and sand, varicolored	190	190
Clay	140	330
Columbia River basalt:		
Rock, fairly hard, creviced toward bottom	230	560

1N/3W-1K2. North Plains Water District. Altitude about 190 feet. Drilled by A. Gaunt, 1945

Valley fill:		
Clay	314	314
Clay, sandy	21	335
Sand, blue, and some gravel, water-bearing	5	340
Clay	46	386
Columbia River basalt:		
Rock, soft	200	586
Rock, hard	28	614
Rock, soft	96	710

Table 2.- Drillers' Logs of Representative Wells - Continued

1N/3W-5R1. Roy Catholic School. Altitude about 180 feet. Drilled by Blair Drilling Co., 1950

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay, blue and gray	343	343
Wood and vegetation	1	344
Clay, blue	43	387
Sand, black	2	389
Clay, gray	9	398
Sand, black	8	406

1N/3W-7A2. L. J. Spiering. Altitude about 165 feet. Drilled by A. M. Jannsen Drilling Co., 1951

Materials	Thickness (feet)	Depth (feet)
Valley fill (and decomposed rock?):		
Sand and clay	368	368
Sand, clay and gravel	63	431
Clay and sand	129	560
Clay	70	630
"Rock, rotten"	248	878
Columbia River basalt:		
Rock, rotten	22	900
Rock, soft lava	30	930
Rock, hard	16	946

1N/3W-36R3. Birdseye Cannery. Altitude about 180 feet. Drilled by A. M. Jannsen Drilling Co., 1929

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay and soil	150	150
"Shale, sandy" (clay?)	20	170
Sand and gravel, water-bearing	2	172
Shale and hard clay	1,208	1,380
"Wood and vegetation"	100	1,480
Columbia River basalt:		
Rock, igneous	20	1,500
Basalt and clay, gray	119	1,619

Table 2.- Drillers' Logs of Representative Wells - Continued

1N/4W-14B1. L. J. Heesacker. Altitude about 170 feet. Drilled by Blair Drilling Co., 1950

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay, blue and gray	483	483
Columbia River basalt:		
Basalt, red, burnt	14	497
Basalt, hard	14	511
Basalt, red	42	553
Basalt, hard	32	585

1N/4W-23R1. Arnold Goff. Altitude about 245 feet. Drilled by Blair Drilling Co., 1950

Valley fill:		
Clay, red, yellow	141	141
Columbia River basalt:		
Basalt, weathered, gray	42	183
Basalt, hard, blue	3	186
Basalt, brown, soft	54	240
Basalt, brown	21	261
Basalt, soft, water-bearing	1	262
Basalt, hard, blue to black	39	301

2N/1W-21Q1. Plainview School. Altitude about 710 feet. Drilled by Steinman Bros. Drilling Co., 1938

Soil and mantle (undifferentiated):		
Clay	34	34
Columbia River basalt:		
Rock, soft	34	68
Rock, hard, black, water-bearing	123	191
Rock, soft	20	211
Rock, hard, black	28	239
Rock, soft, black	17	256
Rock, hard, black, water-bearing	125	381
Rock, hard, gray	5	386
Rock, black	29	415
Rock, whitish, talcose	2	417

Table 2.- Drillers' Logs of Representative Wells - Continued

2N/2W-20A1. Otto Solberger. Altitude about 910 feet. Drilled by Hardy Bros., 1949

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Soil	5	5
Clay, red	20	25
Clay, brown and yellow, water-bearing at 70 ft	120	145
Columbia River basalt:		
Rock and clay, soft	30	175
Rock	110	285
Sedimentary strata of Tertiary age:		
Clay, shale	60	345
Silt and sand, fine, black, containing sea shells	180	525
Sand, coarse, black and gray, containing sea shells	20	545

2N/3W-24P1. A. M. Anderson. Altitude about 575 feet. Drilled by A. Gaunt, 1946

Soil and mantle (undifferentiated):		
Clay	201	201
Columbia River basalt:		
Rock, soft, water-bearing at top	112	313
Sedimentary strata of Tertiary age:		
Clay and sandstone	144	457

Table 2.- Drillers' Logs of Representative Wells - Continued

1/1W-2P1. Commonwealth, Inc. Altitude about 425 feet. Drilled by R. J. Strasser Drilling Co., 1953

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay and soil	9	9
Boring lava (basalt):		
Rock, broken	18	27
Rock, gray, medium-hard	9	36
Rock, gray, hard	73	109
Rock, gray, hard (some broken crevices with brown seams)	42	151
Rock, gray, crevices	7	158
Rock, gray, hard	56	214
Rock, gray, very hard	17	231
Rock, brown	8	239
Troutdale formation:		
Conglomerate	14	253
Clay, yellow	44	297
Clay, blue	7	304
Clay, yellow	12	316
Clay, blue	13	329
Clay, yellow	35	364
Clay, blue	129	493
Clay, red	34	527
Clay, blue	66	593
Clay, red	27	620
Clay, yellow	7	627
Conglomerate	46	673
Columbia River basalt:		
Rock, decomposed	44	717
Rock, brown, hard	12	729
Rock, gray, hard	41	770
Rock, brown, hard, broken	7	777
Rock, gray	57	834
Rock, black	20	854
Rock, black, water-bearing	18	872
Rock, gray, hard	3	875

Table 2.- Drillers' Logs of Representative Wells - Continued

1/1W-11L1. City of Beaverton. Altitude about 360 feet. Drilled by A. M. Jannsen Drilling Co., 1932

Materials	Thickness (feet)	Depth (feet)
Boring lava (basalt):		
Rock, red and gray (crevice at 59 feet)	59	59
Rock, red (crevice at 88 feet)	52	111
Troutdale formation:		
Clay, yellow, blue, red.	442	553
Sandstone, yellow	10	563
Clay, yellow	52	615
Columbia River basalt:		
Rock, woth clay	35	650
Rock, hard	10	660
Rock, lava	38	698
Rock, black	10	708
Rock, black, very hard	27	735

Table 2.- Drillers' Logs of Representative Wells - Continued

1/1W-17A2. St. Mary's of the Valley Academy. Altitude about 200 feet. Drilled by A. M. Jannsen Drilling Co., 1953

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay, yellow, and soil	25	25
Clay, brown	13	38
Clay, blue	7	45
Clay, yellow	42	87
Clay, blue	30	117
Clay, blue-green	3	120
Clay, gray-green	18	138
Clay, blue	247	385
Clay, gray	65	450
Clay, blue	95	545
Clay, gray	90	635
Clay, blue-green	15	650
Clay, gray	20	670
Clay, blue	12	682
Clay, gray	35	717
Clay, blue	25	742
Clay, gray	16	758
Clay, blue	46	804
Clay, gray	7	811
Clay, blue	7	818
Clay, gray	38	856
Sand, gray	19	875
Clay, gray	71	946
Clay, gray and sandy	13	959
Clay, gray, sticky	16	975
Clay, brown, gray, sandy	43	1,018
Clay, gray	22	1,040
Clay, blue	34	1,074
Clay, gray	26	1,100
Clay, blue	22	1,122
Clay, brown	48	1,170
Columbia River basalt:		
Rock, hard, broken lower 28 feet	69	1,239
Rock, hard (cavity at 1,249 ft)	14	1,253
Rock, hard, broken (some water)	15	1,268
Rock, hard (cavity at 1,269 ft)	6	1,274
Rock, broken (water-bearing from 1,274 to 1,279 ft).	16	1,290
Rock, hard	14	1,304
Rock, broken (cavity at 1,359 ft; increase in water)	56	1,360
Rock, hard (cavity at 1,369 ft); test pumped 80 gpm with 230 ft of drawdown	14	1,374
Rock, hard, broken lower 31 ft	113	1,487
Rock, hard (crevice at 1,488 ft)	6	1,493
Rock, broken	1	1,494
Rock, hard (crevice from 1,494 to 1,495 ft)	3	1,497
Rock, medium-hard	5	1,502
Rock, broken	5	1,507

Unpublished records subject to revision

Table 2.- Drillers' Logs of Representative Wells - Continued

1/1W-21P1. City of Beaverton. Altitude about 350 feet. Drilled by R. J. Strasser Drilling Co., 1945

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	34	34
Rock, soft, gray (clay?)	4	38
Clay, yellow	16	54
Columbia River basalt:		
Rock, soft, gray, water-bearing from 90 to 96 ft	142	196
Rock, hard, gray to blue	524	720
Rock, hard, blue, with seams	15	735
Rock, soft, water-bearing	1	736
Rock, hard, blue	64	800

1/1W-24D3. Portland Golf Club. Altitude about 205 feet. Drilled by A. M. Jannsen Drilling Co., 1951

Valley fill:		
Clay and soil	20	20
"Quicksand"	22	42
Clay, blue	123	165
Clay, brown	20	185
Clay, red	119	304
Clay, hard, sandy	44	348
Columbia River basalt:		
Rock	20	368
"Clay"	10	378
Rock	52	430
"Clay"	8	438
Rock, hard	53	491
Rock, soft, porous	3	494
Rock, hard	6	500

1/1W-25M1. Mr. Forsythe. Altitude about 200 feet. Drilled by John Beck, 1949

Soil and mantle (undifferentiated):		
Clay, blue	88	88
Columbia River basalt:		
Basalt, hard	5	93
Shale, soft near top (basalt?)	41	134
Basalt, hard	102	236
Basalt, interflow zone, water-bearing	2	238
Basalt, hard	4	242

Table 2.- Drillers' Logs of Representative Wells - Continued

1/1W-27C1. Robert Murphy. Altitude about 170 feet. Drilled by A. M. Jannsen Drilling Co., 1952

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Soil, clay, and silt	31	31
Columbia River basalt:		
Rock, soft and rotten	10	41
Rock, soft, caving, water-bearing lower 3 ft	31	72
Rock, soft	3	75
Rock, harder, honeycombed	22	97
Rock, hard with soft layers, water-bearing, with static level 3 ft below surface.	30	127
Rock, hard, brown	15	142
Rock, soft, honeycombed	12	154
Basalt, harder, gray, water flowing at 184 ft	34	188
Basalt, hard, but broken, loose	22	210
Rock, shale(?), green, soft, mucky	13	223
Rock, gray, crisp, like shale(?)	25	248
Basalt, gray, water-bearing from 250 to 260 ft	13	261
Basalt, broken, rubbly with muck	19	280
Rock, more solid, black	8	288
Rock, soft, black, water-bearing, flowing 10 gpm	15	303
Basalt, rubble, loose, running, in cubical blocks	11	314

1/1W-33N1. George N. Clark. Altitude about 200 feet. Drilled by Steinman Bros. Drilling Co., 1951

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay, yellow, sandy	15	15
Muck, blue (almost quicksand)	20	35
Clay, red, brown, and yellow	215	250
Clay, brick-colored	55	305
Clay, yellow	45	350
Columbia River basalt:		
Rock, soft, brown	33	383
Rock, gray	7	390

Unpublished records subject to revision

Table 2.- Drillers' Logs of Representative Wells - Continued

1/2W-19A1. Louis Hilleke. Altitude about 180 feet. Drilled by A. M. Jannsen Drilling Co., 1950

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay, brown	15	15
Clay, sandy	10	25
Quicksand	35	60
Mud, blue	30	90
Clay, blue, and sand	48	138
Clay, blue, and boulders	5	143
Clay, blue and yellow, with gravel	117	260
Gravel and sand	7	267
Clay, varicolored	426	693
Clay, red	68	761
Clay, yellow	31	792
Clay, varicolored	26	818
Columbia River basalt:		
Rock, decomposed	14	832
"Sand and clay," gray	9	841
Rock, red and brown, decomposed	23	864
Rock, gray	9	873
Rock, brown	30	903

1/2W-25J1. Jane S. Hackman. Altitude about 765 feet. Drilled by The Texas Oil Company, 1947

Soil and mantle (undifferentiated):		
Clay and weathered basalt	100	100
Columbia River basalt:		
Basalt	939	1,039
Sedimentary and volcanic rocks of Tertiary age:		
Sand and shale, fossiliferous	1,801	2,840
"Volcanic" sand, agglomerate, shale	1,430	4,270
Shale, sandstone and agglomerate	4,936	9,206
"Volcanic" agglomerates and flows	57	9,263

Table 2.- Drillers' Logs of Representative Wells - Continued

1/2W-29Q1. W. T. Putnam. Altitude about 150 feet. Drilled by A. Gaunt, 1945

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Soil	10	10
Quicksand	70	80
Clay, blue	80	160
Sand, brown, containing wood	50	210
Clay, blue	10	220
Sand, brown, containing wood	50	270
Clay, blue	80	350
Sand, dark-brown, containing a log	50	400
Columbia River basalt:		
Rock, broken	45	445
Rock, "solid"	50	495
Rock, soft, water-bearing	10	505

1/2W-31C1. C. E. Asbahr. Altitude about 175 feet. Drilled by A. M. Jannsen Drilling Co., 1949

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay, brown	20	20
Creek sand	2	22
Mud, blue	15	37
Sand, fine, blue	6	43
Mud, blue	34	77
Clay, brown and gray	91	168
Clay, sticky, blue	26	194
Clay and gravel	6	200
Gravel	4	204
Clay, red	21	225
Clay, brown	36	261
Columbia River basalt:		
Rock, decomposed	9	270
"Gravel, cemented"(?)	15	285
Rock	143	428
Rock, "sand"	35	463
Rock, decomposed	6	469
Rock	246	715

Table 2.- Drillers' Logs of Representative Wells - Continued

1/4W-2N2. R. Curtis Ritchey. Altitude about 190 feet. Drilled by Blair Drilling Co., 1950

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay and topsoil	30	30
Clay, blue, containing wood and decomposed vegetation	28	58
Sedimentary beds of Tertiary age:		
Shale, blue	34	92

1/1-19P1. R. C. Coffell. Altitude about 435 feet. Drilled by Steinman Bros. Drilling Co., 1946

Soil and mantle (undifferentiated):		
Clay	30	30
Boring lava (basalt):		
Rock, red	9	39
Rock, hard, black	38	77
Rock, gray	23	100
Rock, brown	10	110
Troutdale formation:		
Clay, red, yellow, blue	75	185
Clay, red	170	355
Clay, yellow (streaks of sand and gravel)	80	435
Clay, dark	50	485
Columbia River basalt:		
Rock, green	15	500
Rock, black, water-bearing	57	557

1/1-31C1. Mrs. Francis Connolly. Altitude about 420 feet. Drilled by Steinman Bros. Drilling Co., 1951

Soil and mantle (undifferentiated):		
Clay, yellow	36	36
Boring lava (basalt):		
Rock, hard	15	51
Rock, soft, red	19	70
Rock, hard	66	136
Rock, soft, yellow, water-bearing	5	141
Rock, hard	5	146
Rock, brown, honeycombed	9	155
Troutdale formation:		
Clay, yellow	20	175

Table 2.- Drillers' Logs of Representative Wells - Continued

1/1-31D1. Cathryns Charcoal Broiler Restaurant. Altitude about 400 ft. Drilled by A. M. Jannsen Drilling Co., 1953

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	12	12
Boring lava:		
Rock, black, broken	14	26
Rock, gray	69	95
Troutdale formation:		
Clay, red	85	180
Clay, brown	4	184
Clay, red and brown	206	390
Sand, fine	2	392
Columbia River basalt:		
Rock, broken	18	410
Rock	200	610

2/1W-8G1. John J. Bushnell. Altitude about 600 feet. Drilled by Steinman Bros. Drilling Co., 1946

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	10	10
Columbia River basalt:		
Rock, brown and red	20	30
Rock, gray, containing crevices	55	85
Rock, brown and gray	185	270
Rock, greenish-gray	66	336
Rock, red, black and gray	59	395
Rock, brown, water-bearing	12	407
Rock, hard, black	20	427
Rock, soft, brown, with seams	9	436
Rock, black and green, crevice at 440 feet	11	447
Rock, soft, red	3	450
Rock, hard, black	38	488
Rock, soft, brown	8	496
Rock, hard, black	4	500

Table 2.- Drillers' logs of Representative Wells - Continued

2/1W-10C1. City of Tigard. Altitude about 375 feet. Drilled by R. J. Strasser Drilling Co., 1947

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Top soil	2	2
Clay, yellow	9	11
Hardpan, with some sand	11	22
Silt and clay, yellow	25	47
Columbia River basalt:		
Rock, lava, soft	17	64
Rock, lava, gray and green	20	84
Rock, lava, glack, gray, and red, medium hard	84	168
Rock, black and red, medium hard	24	192
Rock, black, hard	10	202
Rock, red and black, soft, porous, water-bearing	10	212
Rock, black, gray, medium hard	48	260
Rock, gray, porous, water-bearing	12	272
Rock, black and red, containing crevices	37	309
Rock, yellow and gray, water-bearing	16	325
Rock, gray, hard	20	345
Rock, gray, medium hard	25	370
Rock, gray, hard	11	381

2/1W-13D1. Durham School. Altitude about 170 feet. Drilled by Frank Zell, 1951

Valley fill:		
Sand	45	45
Clay	20	65
Sand	70	135
Gravel	13	148
Clay	2	150

2/1W-13L2. M. Eastham. Altitude about 185 feet. Drilled by Steinman Bros. Drilling Co., 1941

Valley fill:		
Topsoil and boulders	15	15
Gravel and sand, packed	21	36
Gravel and boulders	44	80
Gravel, loose, water-bearing	25	105
Clay and gravel	15	120

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Table 2.- Drillers' Logs of Representative Wells-Continued

2/1W-14A1. Tigard Senior High School. Altitude about 190 feet.
Drilled by Steinman Bros. Drilling Co., 1953

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay and sand	18	18
Clay, yellow, blue	48	66
Clay, blue, and sand, yellow	50	116
Clay, blue, gray	34	150
Clay and "quicksand"	40	190
Clay, blue	52	242
Sand and gravel	2	244
Clay, blue-gray	16	260
Sand, water-bearing	1	261
Clay, blue-gray	63	324
Clay, yellow	17	341
Clay, blue	9	350
Clay, brown	10	360
Clay, blue	18	378
"Shale," blue-gray	6	384
Clay, blue	46	430
Clay, brown	7	437
One gpm with rotten wood in water	--	437
Clay and weathered gravel	8	445
Clay, blue-gray	32	477
Clay, brown, "gritty"	2	479
Clay, gray	33	512
Clay, "chocolate"-brown	16	528
Clay, blue, sandy	5	533
"Shale," hard, brown	5	538
Clay, red	21	559
Columbia River basalt:		
Rock, soft, and clay, red	31	590
Rock, soft, and clay, yellow	37	627
Rock, soft, brown, yellow (5 gpm at 615 ft)	23	650
"Shale," blue	7	657
Rock, brown	8	665
"Shale," hard, blue	2	667
Rock, black	13	680

Table 2.- Drillers' Logs of Representative Wells - Continued

2/1W-24M2. City of Tualatin. Altitude about 120 feet. Drilled by Steinman Bros. Drilling Co., 1951

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Top soil	8	8
Gravel, cemented, and boulders	12	20
Clay, blue, sandy	45	65
Clay, yellow	20	85
Clay, red	15	100
Clay, yellow, with a little fine gravel	50	150
Columbia River basalt:		
Rock, soft	22	172
Rock, with a hardpan	10	182
Rock, red and brown	17	199
Rock, soft, brown	37	236
Rock, hard	3	239
Rock, brown, containing crevices	35	274
Rock, red	4	278
Rock, brown, honeycombed	40	318
Rock, hard, containing crevices	7	325

2/1W-26B2. Portland Gas and Coke Co. Altitude about 225 feet. Drilled by Steinman Bros. Drilling Co., 1947

Valley fill:		
Clay, yellow, sandy	18	18
Quicksand, yellow and blue	42	60
Clay, yellow and blue, sandy	115	175
Clay, red, brown and blue	50	225
Clay or "shale"(?), gray, soft	145	370
Clay or "shale"(?), brown, containing wood	40	410
Clay, red, soft	23	433
Columbia River basalt:		
Rock, honeycombed, water-bearing	17	450

2/1W-27H1. Bryan Tykeson. Altitude about 200 feet. Drilled by Steinman Bros. Drilling Co., 1948

Valley fill:		
Sand, silty, red and yellow	63	63
Sand, silty, blue, with some clay	12	75
Clay, sandy, blue	10	85
Clay, red, yellow and blue	87	172
Sand and gravel	5	177
Clay, yellow	33	210
Columbia River basalt:		
"Shale"(?), blue and yellow	10	220
"Shale"(?), red and yellow, hard	22	242
Rock, brown	65	307
Rock, dark-brown, hard	16	323

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Table 2.- Drillers' Logs of Representative Wells - Continued

2/1W-32D1. City of Sherwood. Altitude about 190 feet. Drilled by A. M. Jannsen Drilling Co., 1946

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	20	20
Quicksand and clay, blue	18	38
Columbia River basalt:		
Rock, "sand"	99	137
Rock, "lava"	38	175
Rock	7	182
"Gravel, cemented"(?)	24	206
Rock, "lava"	48	254
"Gravel, cemented(?)	15	269
Rock, "lava"	4	273
"Gravel, cemented"(?)	23	296
Rock, broken	43	339

2/1W-35K1. Ben Andrews. Altitude about 315 feet. Drilled by Steinman Bros. Drilling Co., 1947

Soil and mantle (undifferentiated):		
Soil and clay, sandy	46	46
Columbia River basalt:		
Rock, soft	64	110
Rock, hard, gray, water-bearing	40	150
Rock, brown and gray	30	180
Rock, hard, gray	10	190
Rock, soft, brown	8	198
Rock, very hard	2	200

Table 2.- Drillers' Logs of Representative Wells - Continued

2/2W-1J1. Bierly Bros. Altitude about 285 feet. Drilled by A. M. Jannsen Drilling Co., 1950

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	30	30
Columbia River basalt:		
Rock	150	180
Rock, gray	37	217
Rock, brown and black	73	290
Rock, hard, gray	78	368
Rock, soft, black, "lava"	20	388
Rock, brown	32	420
Rock, hard, black	80	500
Rock, brown, "lava"	15	515
Rock, gray	10	525
Rock, brown, "lava"	8	533
Rock, gray	37	570
Rock, black, "lava"	18	588

2/2W-6D1. S. R. Rotchstrom. Altitude about 190 feet. Drilled by A. M. Jannsen Drilling Co., 1947

Valley fill:		
Clay	281	281
Columbia River basalt:		
Rock	177	458
"Clay"(?)	1	459
Rock, water-bearing	23	482
"Sand"(?)	4	486

2/3W-1A1. Harold Haase. Altitude about 190 feet. Drilled by A. M. Jannsen Drilling Co., 1948

Valley fill:		
Clay	15	15
Sand	5	20
Quicksand	15	35
Clay	251	286
Columbia River basalt:		
Rock	119	405

Table 2.- Drillers' Logs of Representative Wells - Continued

2/3W-1C1. Richard Kiefer. Altitude about 190 feet. Drilled by A. M. Jannsen Drilling Co., 1950

Materials	Thickness (feet)	Depth (feet)
Valley fill (and decomposed rock?):		
"Clay, red" and boulders	155	155
Columbia River basalt:		
Rock broken	3	158
Rock, brown and blue	22	180
Rock, soft, porous	35	215
Rock, hard, blue	27	242
Rock, soft	6	248
Rock, hard	1	249
Rock, brcken	4	253
Rock, soft	9	262
Rock, broken	40	302
Rock, hard	11	313
Rock, broken	12	325
Rock, hard	10	335
Rock, hard, gray	28	363
Volcanic ash, fine, loose	3	366
Rock, loose	3	369

3/1W-2N2. Bonneville Power Substation. Altitude 238.6 feet. Drilled by R. J. Strasser Drilling Co., 1941

Materials	Thickness (feet)	Depth (feet)
Valley fill (and decomposed rock?):		
Clay with boulders	51	51
Clay, blue, red, and yellow	142	193
Clay, sand, gray	8	201
Columbia River basalt:		
Basalt, water-bearing	99	300

3/1W-5D1. W. C. Speaks. Altitude about 275 feet. Drilled by Steinman Bros. Drilling Co., 1943

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay, yellow	14	14
Columbia River basalt:		
Rock, soft	43	57
Rock, fairly hard, water-bearing	47	104
Rock, soft	29	133

Table 2.- Drillers' Logs of Representative Wells - Continued

2/1-3L1. City of Oswego. Altitude about 180 feet. Drilled by A. M. Jannsen Drilling Co., 1939

Materials	Thickness (feet)	Depth (feet)
Valley fill:		
Clay	50	50
Gravel and clay	10	60
Clay	20	80
Clay, red	35	115
Clay, brown	27	142
Clay, dark-brown	53	195
Clay, black	33	228
Columbia River basalt:		
Rock "shale"(?), hard, brown	14	242
Rock	32	274
Rock, hard	6	280
Rock	40	320
Basalt, gray	26	346
Rock	13	359
Rock "lava", black	3	362
Rock, porous	20	382
Lava, black and red	36	418
Basalt, gray	6	424
"Shale"(?)	11	435
Clay(?), yellow and red	10	445
"Shale"(?), gray	45	490
Rock	24	514
Rock, "sand," gray	9	523
Rock	83	606
"Sand"(?)	5	611
Rock, "cavey"	19	630
Rock, red	25	655
"Shale"(?), blue	14	669
Rock	56	725
"Shale"(?), blue	10	735
Rock, hard	5	740
Clay and rock	81	821
Rock, red	16	837
Rock and clay	95	932
Rock, blue, gray	25	957
Rock, red, water-bearing	15	972w
Rock, blue, gray	8	980

Table 2.- Drillers' Logs of Representative Wells - Continued

2/1-8N1. Lake Oswego Water Co. Altitude about 150 feet. Drilled by R. J. Strasser Drilling Co., 1945

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	10	10
Columbia River basalt:		
Rock, soft, brown	27	37
Rock, hard, blue	5	42
Rock, soft, brown	6	48
Rock, hard, gray	4	52
Rock, soft, brown	21	73
Rock, hard, green	5	78
Rock, hard, gray and black	21	99
Rock, soft, brown, water-bearing	23	122
Rock, hard, black	18	140
Rock, hard, green	19	159
Rock, soft, brown	13	172
Rock, hard, gray	7	179
Rock, soft, brown	12	191
Rock, hard, gray	6	197
Rock, hard, black, water-bearing crevice from 231 to 234 ft	46	243
Rock	15	258

2/1-9D1. Lake Oswego Water Co. Altitude about 325 feet. Drilled by R. J. Strasser Drilling Co., 1946

Materials	Thickness (feet)	Depth (feet)
Columbia River basalt:		
Rock, broken, red	6	6
Rock, solid, red	10	16
Rock, hard, gray	87	103
Rock, black	25	128
Rock, hard, gray	37	165
Rock, black	25	190
Rock, soft, honeycombed, water-bearing	7	197
Rock, hard, black	3	200
Rock, soft, black, carries some water	4	204
Rock, black	15	219
Rock, hard, black	68	287
Rock, soft, black, water-bearing	15	302
Rock, gray	7	309
Rock	96	405

Table 2.- Drillers' Logs of Representative Wells - Continued

2/1-14F1. Marylhurst College. Altitude about 150 feet. Drilled by R. J. Strasser Drilling Co., 1947

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	5	5
Sand, brown	13	18
Sand and gravel	17	35
Columbia River basalt:		
Rock, soft	14	49
"Gravel, cemented"(?)	15	64
Rock, medium hard, brown	17	81
Rock, hard, gray, seams from 161 to 163 ft	82	163
Rock, hard, gray	11	174
Rock, brown	7	181
Rock, hard, gray	12	193
Rock, medium hard, black	16	209
Rock, gray	45	254
Rock, porous, red and gray, water-bearing	12	266
Rock, brown, green and black	35	301
Rock, hard, gray	50	351
Rock, hard, brown	18	369
Rock, hard, gray and black	78	447
Rock, porous, black, water-bearing	9	456
Rock, hard, gray	20	476
Rock, hard, black	25	501
Rock, broken, water-bearing	11	512
Rock, hard, gray	7	519

Table 2.- Drillers' Logs of Representative Wells - Continued

2/1-15C1. City of Oswego. Altitude about 560 feet. Drilled by A. M. Jannsen Drilling Co., 1935

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay	10	10
Columbia River basalt:		
Rock, red and gray	149	159
Rock, brown	24	183
Rock, decomposed, brown	12	195
Rock, gray	20	215
"Rock, broken, brown" and clay	26	241
Rock, gray, water-bearing from 260 to 265 ft . . .	89	330
Rock, porous	15	345
Rock, black	73	418
Rock, brown, creviced	54	472
Rock, with streaks of shale	27	499
Rock, black, some broken	19	518
Rock, black, with streaks of shale	23	541
Rock, gray	99	640

2/1-22C1. K. B. Hall. Altitude about 455 feet. Drilled by A. M. Jannsen Drilling Co., 1945

Soil and mantle (undifferentiated):		
Clay, sandy, red	35	35
Columbia River basalt:		
Rock, water-bearing at 123 feet	257	292
Rock, black	93	385
Rock, water-bearing	18	403
Rock, black	73	476
Rock, gray	51	527

Table 2.- Drillers' Logs of Representative Wells - Continued

2/1-25E1. H. E. Ibach. Altitude about 590 feet. Drilled by Steinman Bros. Drilling Co., 1949

Materials	Thickness (feet)	Depth (feet)
Soil and mantle (undifferentiated):		
Clay and boulders	30	30
Columbia River basalt:		
Rock, soft	20	50
Rock, solid, gray	82	132
Rock, soft, black	10	142
Rock, hard, gray	10	152
Rock, soft, black and gray	72	224
Rock, hard, gray	46	270
Rock, soft, black, with crevices	2	272
Rock, gray and black	75	347
Rock, soft, black and red	8	355
Rock, hard, gray and black	24	379
Rock, soft, red	8	387
Rock, hard, gray, with seams toward bottom	68	455

3/1-4C1. R. P. Corderman. Altitude about 790 feet. Drilled by Steinman Bros. Drilling Co., 1944

Soil and mantle (undifferentiated):		
Clay	29	29
Columbia River basalt:		
Rock, some water at 70 feet	81	110
Rock, soft, yellow	45	155
Rock, brown, hard and soft	305	460
Rock, black, hard and soft	60	520
Rock, brown, water-bearing	123	643

Table 3.- Hydrologic data

Topography: P, plain; S, slope to valley.
Yield: (e) estimated; (m) measured with 90° v-notch weir; (r) reported.
Use of water: D, domestic; Irr, irrigation; PS, public supply; S, stock

Location	Owner or occupant of property	Spring name	Topography and Approximate altitude (feet above sea level)	Water-bearing material
(1)	(2)	(3)	(4)	(5)
1N/4W-6D1	Melvin Green		P 300	Gales Creek gravels
1N/4W-9Q1	L. E. Bamford		S 250	Columbia River basalt
1N/4W-14N1	Beverly Davis		P 190	do.
1N/4W-26J1	Frank Russel		S 250	do.
2N/2W-10F1	A. A. Albright		S 1,250	Residual soil on Columbia River basalt
2N/2W-19R1	A. J. Logan		S 300	do.
2N/2W-23R1	Oscar Emery		S 900	do.
2N/3W-20Q1	Jacob Bass		S 275	Columbia River basalt
2N/3W-28E1	M. L. Smith		S 300	do.

for Representative Springs in the Tualatin Valley

Occurrence	Yield: Gallons per minute	Yield: Date	Use	Hardness as $CaCO_3$ (ppm)	Cloride (Cl (ppm)	Remarks
(6)	(7)	(8)	(9)	(10	11	(12)
Intersection of water table	15 (r)	7/ /50	D	50	4	Reportedly larger flow in winter.
Fissures in rock	30 (r)	12/ 4/50	D, S, Irr	38	4	Supplies six families; irrigates garden and lawn.
Hillwash material	60 (e)	12/ 4/50	D, S	14	3	Flow reportedly drops to 10 or 15 gpm in summer
Near contact with underlying marine shale (?)	30 (r)	11/27/50	Irr			Irrigates about 5 acres.
Seep from clay bank	1 (r)	8/28/51	D, S	44	3	Reportedly has some flow the entire year.
do.	3 (r)	8/24/51	D, S	38	3	Reportedly has very little fluctuation.
do.	5 (r)	9/ 4/51	D, S	40	4	Fluctuates with season.
Near contact with marine shale (?)	5 (e)	1/ 3/51	D, S	44	4	Very little fluctuation reported.
do.	50 (m)	1/ 3/51	D, S, Irr	14	3	Flow reportedly about 20 gpm in summer; used for irrigating garden.

Table 3.- Hydrologic data

Location	Owner or occupant of property	Name	Topography and approximate altitude (feet above sea level)	Water-bearing material
(1)	(2)	(3)	(4)	(5)
2N/3W-31A1	H. J. Vandehey		S 225	Alluvium
1/1W-4H1	Wolf Creek Highway Water District	Johnson Spring	P 200	Boring lava
1/1W-10H1	Polsky	Wessinger Spring	P 200	Boring lava
1/3W-19J1	Lena Hinkle		S 400	Columbia River basalt
1/3W-19R1	J. T. VanDyke		S 300	do.
1/3W-35F1	John Haase		S 300	Residual soil on Columbia River basalt
2/1W-17L1	Lester Bennett		P 160	Alluvium
2/2W-17N1	R. Neugebauer		S 325	Residual soil on Columbia River basalt
2/2W-35G1	Howell		S 650	do.
2/3W-1L1	Lee Brown		S 250	do.

Unpublished records subject to revision

for Representative Springs in the Tualatin Valley - Continued

Occurrence	Yield		Use	Hardness as $CaCO_3$ (ppm)	Chloride (Cl) (ppm)	Remarks
	Gallons per minute	Date				
(6)	(7)	(8)	(9)	(10	11	(12)
	5 (e)	1/ 3/51	S	32	5	Used for Grade "A" dairy; reportedly very little fluctuation.
Valley fill; contact with Boring lava	340 (M)	7/ /50 3/22/51 12/ 4/52	PS	40	8	See table 4 for chemical analysis.
Fissures at base of cliff in Boring lava	625 (m)	3/23/51	D	35	7	Most of flow is waste to Beaverton Creek; see table 4 for chemical analysis.
Contact with marine shale			D, S	56	3	Supplies two houses and one dairy; reportedly very little fluctuation.
do.	40 (r)	1/25/51	D	40	6	Supplies nine houses.
Seep in soil zone	1 (e)	2/ 4/51	D	44	3	Reportedly flowing about the same for 70 years.
do.			D	54	3	Very little fluctuation reported.
do.	2 (r)	8/ 6/51	D,S	10	4	Typical of small springs in Chehalem Hills.
do.	15 (r)	7/30/51	D, Irr	40	5	Do.
do.	5 (r)	2/21/51	D,S	58	6	

Table 3.- Hydrologic Data

Location	Owner or occupant of property	Name	Topography and approximate altitude (feet above sea level)	Water-bearing material
(1)	(2)	(3)	(4)	(5)
2/3W-4K1	Laurelwood Academy		S 650	Columbia River basalt
2/3W-10N2	Earl Baker		S 1,100	Residual soil on Columbia River basalt
2/3W-16C1	Laurelwood Academy		S 950	Columbia River basalt
2/3W-23N1	Kenneth Whitmore		S 1,100	Residual soil on Columbia River basalt
2/4W-8H1	J. P. Hoodenply		S 530	Colluvium
2/1-5M2	W. B. Wilmont		S 400	Boring lava
2/1-33Q1	Community Spring		S 300	Columbia River basalt
3/1W-3D2	H. Okagakie		P 140	Residual soil on Columbia River basalt
3/1-2F1	City of Willamette		S 125	Columbia River basalt
3/1-5L1	Ben Mosier		S 275	Residual soil on Columbia River basalt

Unpublished records subject to revision

for Representative Springs in Tualatin Valley - Continued

Occurrence	Yield: Gallons per minute	Yield: Date	Use	Hardness as $CaCO_3$ (ppm)	Chloride (Cl) (ppm)	Remarks
(6)	(7)	(8)	(9)	10	11	(12)
Near contact with marine shale	25 (r)	2/ 5/50	D			Used as a standby supply; spring 2/3-16C1 main source of water for school.
Seep in soil zone	3 (e)	3/ 2/51	D	12	7	Reportedly very little fluctuation; supplies three houses.
Near contact with marine shale	340 (m)	3/23/51	D			Measured 1/4 mile below source; diversion for school supply.
Seep in soil zone	5 (e)	3/ 2/51	D,S Irr	26	7	Used for irrigating garden; reportedly has very small fluctuation.
do.			D,S	22	4	Reported to have large annual fluctuation.
Contact of alluvium with Boring lava	10 (r)	11/ 1/51	D	82	4	Supplies five families.
Many small seeps in soil zone			D	20	3	Supplies about 30 families.
Do.	100 (r) ?		Irr	38	5	Large annual fluctuation.
Interflow zone				72	5	Used for supplying pond in city park; at one time sole supply for city.
Seep in soil zone	4 (r)	10/ 4/51	D,S			Smaller flow during dry season.

Unpublished records subject to revision

Table 4.- Chemical Analyses of Water

(In parts per million except first and last 4 items.)

Well number Date of collection	1N/1W-20H1 5/17/51	1N/2W-21P1 5/15/51	1N/3W-1K2 4/3/51
Temperature (° F)	57	54	59
Silica (SiO_2)	52	46	49
Iron (Fe)			
(Total)	.13	h 2.32	.03
(In solution)	.03	.01	.00
Calcium (Ca)	37	44	15
Magnesium (Mg)	2.7	15	7.9
Sodium (Na)	68	8.9	31
Potassium (K)	11	9.5	9.0
Bicarbonate (HCO_3)	174	241	136
Sulfate (SO_4)	6.6	.6	2.1
Chloride (Cl)	83	2.9	23
Fluoride (F)	.2	.4	.2
Nitrate (NO_3)	.1	.3	.1
Boron (B)	.26	.26	.3
Dissolved solids (total)	346	247	204
Hardness as $CaCO_3$			
(Calcium, magnesium)	104	172	70
(Noncarbonate)	0	0	0
Percent sodium	56	10	45
Sodium-adsorption ratio (SAR)	2.9	.3	1.6
Specific conductance			
(Micromhos at 25° C.)	541	383	283
pH (Hydrogen -ion concentration)	7.6	7.2	7.6

h, Includes 0.12 ppm manganese.

from Representative Wells and Springs in Tualatin Valley
[Analyses by U. S. Geological Survey unless otherwise indicated.]

1N/3W-6E1[a] 5/20/46	1N/3W-32P2[a] 10/17/40	1N/4W-23R1 6/19/51	1/1W-3E1[a] 4/23/45	1/1W-10H1[a] 9/20/41	1/1W-15K1[a] 11/18/41
	30	42	55	57	25
1.8	f 3.5	.120	f 1.3	.04	.16
		.06			
	20	8.4	11	14	13
	8.2	4.1	5.4	7	6.6
38	g82	7.7	g 8.5	11	98
		1.8			.9
136	277	62	59	77	285
	.8	1.4	2.6	3.4	.6
7	2.1	2.3	12	4.8	29
		.1		.2	.1
		.1			
	303	99	134	162	348
67	85	38	47	64	60
	0		1	1	0
	70	29	26	28	78
	3.9	.55	.5	.63	
		99			
6.9		7.4	6.7		

a Analysis by Charlton Laboratories, Inc., Portland, Oreg.
f Iron and aluminum.
g Sodium and potassium as sodium.

Table 4.- Chemical Analyses of Water

Well number Date of collection	1/1W-17A2 11/19/53	1/1W-26E1[a] 6/ /50	1/1W-26E1[a] 12/21/51
Temperature (°F)	73		
Silica (SiO_2)	45	30	51
Iron (Fe)			
(Total)	.33	f 1.2	f .78
(In solution)			
Calcium (Ca)	222	30	34
Magnesium (Mg)	45	30	15
Sodium (Na)	290	g 9.3	g 9.3
Potassium (k)	40		
Bicarbonate (HCO_3)	63	171	167
Sulfate (SO_4)	2.7	3.7	2.3
Chloride (Cl)	960	22	22
Fluoride (F)	.1		
Nitrate (NO_3)	.3		
Boron (B)			
Dissolved solids (total)	1,640	224	293
Hardness as $CaCO_3$			
(Calcium, magnesium)	739	198	146
(Noncarbonate)	687	58	10
Percent sodium	44	9	12
Sodium-adsorption ratio (SAR)	4.6	.29	.33
Specific conductance			
Micromhos at 25° C)	3,140		
pH Hydrogen ion concentration)	8.2		6.8

a Analysis by Charlton Laboratories, Inc., Portland, Oreg.
f Iron and aluminum.
g Sodium and potassium as sodium.

from Representative Wells and Springs in Tualatin Valley - Continued

1/1W-26E1[a] 9/22/52	1/1W-27C1[a] 3/17/52	1/2W-10B1[d]	1/2W-10M1[d] 4/2/51	1/2W-19A1[e]	1/2W-21H2[a] 2/16/38
	55				
47.3					
f 1.1		.1	.8	.1	6.0
41	587				
16					
g 15.9	g 510				
192		344	184	71	54
2.5					0
38	1,840		22	14	2,000
295	3,640		100		3,940
170	1,480	136	100	72	540
21					
.68					
7.4		7.5	7.6	6.5	6.9

a Analysis by Charlton Laboratories, Inc., Portland, Oreg.
d Analysis by the Permutit Co., Los Angeles, Calif.
e Source of analysis unknown.
f Iron and aluminum.
g Sodium and potassium as sodium.

Table 4.- Chemical Analyses of Water

Well number Date of collection	1/2W-21H3[a] 1/11/38	1/2W-25J1[a] [k] 5/9/46	1/2W-25J1[a] [m] 5/9/46
Temperature (^{o}F)			
Silica (SiO_2)			
Iron (Fe)			
(Total)	0.1		
(In solution			
Calcium (Ca)		15,400	17,900
Magnesium (Mg)		31	24
Sodium (Na)		8,980	10,000
Pctassium (K)		608	412
Bicarbonate (HCO_3)	104	196	99
Sulfate (So_4)	0	16	21
Chloride (Cl)	7.8	43,700	49,700
Fluoride (F)			
Nitrate (NO_3)			
Boron (B)			
Dissolved solids (total)	215	68,800	78,300
Hardness as $CaCO_3$			
(Calcium, magnesium)	36	38,500	44,700
(Noncarbonate)		38,300	44,600
Percent sodium		33	32
Sodium-adsorption ratio (SAR)		20	20.6
Specific conductance			
(Micromhos at 25° C)			
pH (Hydrogen ion concentration)	6.6		

a Analysis by Charlton Laboratories, Inc., Portland, Oregon.
k Off-bottom water sample taken at depth of 9,203 ft.
m Water sample taken from interval 7,862 to 9,263 ft.

from Representative Wells and Springs in Tualatin Valley - Continued

1/2W-25J1[d] [n] 2/7/46	1/2W-31C1 5/15/51	1/3W-5F1 9/15/51	2/1W-10C1[a] 4/30/49	2/1W-13B1[e]	2/1W-13B2[e]
	50	44		13	23
	.43	j 2.16	0.1		
	.25	.04			
15,900	24	68			
10	15	30			
4,180	12	30			
85	5.3	1.9			
34	156	428	162	120	171
25	1.6	.1			
35,500	15	2.4	3.6	350	8.7
	.2	.3			
	.1	.1			
	.15				
62,300	200	389	206	780	253
39,700	122	293	50	240	82
39,700	0	0			
18	17	18			
9.3	.47	.76			
	427	595			
6.9	7.7	7.4	6.8		

a Analysis by Charlton Laboratories, Inc., Portland, Oreg.
d Analysis by the Permutit Co., Los Angeles, Calif.
e Source of analysis unknown.
j Includes 0.96 ppm manganese.
n Water sample taken from interval 3,505 to 3,534.ft.

Table 4.- Analyses of Water

Well number / Date of collection	2/2W-8L1[c] 1/5/51	2/4W-23N1 4/19/51	2/1-8H1[b] 11/4/53
Temperature (°F)			
Silica (SiO_2)	34	19	30
Iron (Fe)			
(Total)	5.1	[i] 1.75	.1
(In solution)		.07	
Calcium (Ca)		1,980	21
Magnesium (Mg)		113	14
Sodium (Na)	38	824	[g] 8.2
Potassium (K)		12	
Bicarbonate (HCO_3)	122	51	120
Sulfate (SO_4)	8	30	15
Chloride (Cl)	10	5,010	16
Fluoride (F)		.2	
Nitrate (NO_3)			
Boron (B)		2.1	
Dissolved solids (total)		8,010	163
Hardness as $CaCO_3$			
(Calcium, magnesium)	84	5,400	110
(Noncarbonate)		5,360	12
Percent sodium		25	
Sodium-adsorption ratio (SAR)		.49	.34
Specific conductance			
(Micromhos at 25° C)		13,300	
pH (Hydrogen ion concentration)	7	7	

b Data from Oregon State Board of Health.
c Analysis from F. E. Myers Laboratory, Ashland, Ohio.
i Includes 1.5 ppm manganese.
g Sodium and potassium as sodium.

from Representative Wells and Springs in Tualatin Valley - Continued

2/1-8R1[a] 11/6/45	2/1-9D1[a] 5/14/46	2/1-9J1[b] 11/4/53
55	49	
h .52	.5	0.1
92	21	17
30	7.8	6
g 76	g 17	g 6.1
168	132	85
.6	.7	10
285	4.3	12
.9	0	.02
	.2	
807	175	158
353	84	67
216	0	0
32	31	
1.75	.81	.33
7.4	7.5	6.8

a Analysis by Charlton Laboratories, Inc., Portland, Oreg.
b Data from Oregon State Board of Health.
g Sodium and potassium as sodium.
h Includes 0.12 ppm manganese.

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