STATE OF WASHINGTON
Daniel J. Evans, Governor
DEPARTMENT OF WATER RESOURCES
H. MAURICE AHLQUIST, Director

Water Supply Bulletin No. 27

GROUND-WATER RESOURCES AND RELATED GEOLOGY NORTH-CENTRAL SPOKANE AND SOUTHEASTERN STEVENS COUNTIES, OF WASHINGTON

By
DENZEL R. CLINE

Prepared in cooperation with
UNITED STATES GEOLOGICAL SURVEY
Water Resources Division
1969

STATE OF WASHINGTON
Daniel J. Evans, Governor
DEPARTMENT OF WATER RESOURCES
H. MAURICE AHLQUIST, Director

Water Supply Bulletin No. 27

GROUND-WATER RESOURCES AND RELATED GEOLOGY NORTH-CENTRAL SPOKANE AND SOUTHEASTERN STEVENS COUNTIES, OF WASHINGTON

By
DENZEL R. CLINE

Prepared in cooperation with
UNITED STATES GEOLOGICAL SURVEY
Water Resources Division
1969

Price $4.00, Department of Water Resources, 335 General Administration Building, Olympia, Wash.

FOREWORD

Northern Spokane County, like many areas of the State of Washington, has experienced an accelerated residential development. Many people working in Spokane because of improved highways have moved to the suburbs to take advantage of the aesthetic values and relaxed way of suburban living. Because many surface water sources in the area have been heavily appropriated, most of the water requirements for domestic and irrigation purposes must come from ground water reserves.

Geologically, the area is quite complex and consists of several different rock formations which have different water-yielding potentials. Therefore, a prerequisite to the orderly development and conservation of this important water resource is a thorough understanding of geologic factors which control the storage and movement of ground water in and through these materials.

An important goal of this study was to describe rock types and water-bearing characteristics of aquifers in the several subareas of the project and to serve as a guide for individuals and agencies who rely upon ground water for their water needs. This will make possible a coordinated development of both surface water and ground water to the end that the most beneficial use of the total resource will be realized.

Although this study was made primarily as a ground water evaluation, the data is presented in a manner that it will serve as a useful reference to geologists, engineers, and planners who have an interest in the geology of the area for purposes other than water resource development.

Water Supply Bulletin No. 27 was prepared as a part of the United States Geological Survey-Washington State Department of Water Resources Cooperative Program designed to describe and inventory the State's ground water resources. I wish to take this opportunity on behalf of the Department of Water Resources to express our appreciation to the author and members of the U. S. Geological Survey staff and to the well drillers and individuals whose contributions of time, effort, and data make this report possible.

-Robert H. Russell
Chief, Basic Data Section
Division of Planning & Development
Department of Water Resources

CONTENTS

CONTENTS

ILLUSTRATIONS

(Plates are in pocket)

TABLES

GROUND-WATER RESOURCES AND RELATED GEOLOGY OF NORTH-CENTRAL SPOKANE AND SOUTHEASTERN STEVENS COUNTIES, WASHINGTON

By Denzel R. Cline

ABSTRACT

The project area of 450 square miles, which includes the northern part of the city of Spokane, lies in a basin surrounded by low mountains and contains several basalt-capped mesas. Most of the project area is drained by the Little Spokane River, which joins the Spokane River at the southwest edge. Precipitation ranges from about 15 to 25 inches in the study area and is as much as 49 inches in the adjacent mountains.

Granitic and metamorphic basement rocks of pre-Tertiary age underlie the basin and form the surrounding mountains. Many wells tapping these rocks yield small amounts of water, up to about 35 gpm (gallons per minute), sufficient for domestic and stock use; however, many other wells yield no water. Shale, clay, and sand of the Latah Formation and, locally, interbedded lavas of the Yakima (?) Basalt overlie the basement rocks in much of the project area. Most wells tapping aquifers in the Tertiary formations yield enough water for domestic and stock use. Yields from these rocks are generally less than 35 gpm.

Unconsolidated Quaternary materials such as landslide debris, loess, dune sand, alluvium, and morainal, glaciolacustrine, and glaciofluvial deposits overlie the consolidated rocks throughout much of the basin. These deposits are at least several hundred feet thick in Spokane Valley, the Hillyard Trough, and the lower part of the Little Spokane River valley. In those valleys, wells tapping the unconsolidated materials commonly yield several thousand gallons per minute with only a few feet of drawdown. On the mesas, wells tapping the unconsolidated deposits generally yield less than 20 gpm; elsewhere, the range in yield is from 5 gpm to as much as 600 gpm.

Water levels in most wells in the project area are less than 100 feet below land surface. In the Hillyard Trough, levels in some wells exceed 200 feet. Under the mesas, more than one water level occurs, the deepest known being about 550 feet below land surface.

Recharge to the ground-water reservoir in the Little Spokane River basin probably amounts to about one-fifth of the precipitation that falls on the basin, or about 160,000 acre-feet per year. The ground water moves generally toward the river and discharges into it.

In 1964 about 9 billion gallons was pumped from wells in the project area. This quantity is equivalent to less than 10 percent of the average September flow of the Little Spokane River near its mouth. About 90 percent of the pumpage comes from unconsolidated deposits in the Spokane metropolitan area. The large ground-water withdrawals in the Spokane area have not affected the regional water level.

Ground water in the project area in 1964 was used for industrial purposes (48 percent), public supplies (39 percent) irrigation (8 percent), and rural domestic and stock supplies (about 5 percent). Although most of the water is pumped from wells, many springs are also used. Ground-water withdrawals probably will be one half again as large by 1980 as in 1964, probably mostly in the metropolitan Spokane area. Sufficient water is available to meet these needs.

Most of the wells yield a hard or moderately hard calcium magnesium bicarbonate water that is generally of good quality, except in some places where iron concentrations are excessive. Most of the ground-water temperatures are between 8 and 12 degrees Celsius (centigrade), or between 47° and 54° F.

INTRODUCTION

PURPOSE AND SCOPE

The project area is one of several in the State of Washington that is experiencing greatly accelerated residential and small-farm development. Because ground water is the only feasible source of potable water in much of the area, and because wells reportedly have been unsuccessful in some places, a need has arisen for reliable information concerning the broad aspects of ground water availability within the area as a whole. This report describes the source, occurrence, movement, availability, and chemical quality of ground water in the unconsolidated deposits and underlying bedrock in the project area. The relationships between ground water and surface water were studied in general, and a preliminary analysis made of the hydrologic system of the Little Spokane River basin.

The investigation was made by the U. S. Geological Survey in cooperation with the Washington State Department of Water Resources. The study was under the general supervision of L. B. Laird, District Chief of the Geological Survey's Water Resources Division, and Robert H. Russell of the State Department of Water Resources.

Fieldwork was done during 1963-65 and included an inventory of wells in the area and some geologic mapping. Further data for the report were provided by climatological and streamflow records.

The collection of data for this report was made possible by the cooperation of well owners, well users, well drillers, consulting engineering firms, local officials, and representatives of industries and public water-supply systems, to all of whom the author is greatly indebted.

PREVIOUS INVESTIGATIONS

The geology and ground-water resources in and adjacent to Spokane and along the Spokane Valley at the south edge of the project area were investigated by Piper and LaRocque (1944), Weigle and Mundorff (1952), and Simons and others (1953). Rorabaugh and Simons (1966) investigated the streamflow of the Spokane River. Flint (1936, 1937), Alden (1953), Bretz, Smith, and Neff (1956), Richmond and others (1965), and Weis and Richmond (1965) discussed the Pleistocene geology and history in the Spokane area, and Anderson (1927) discussed drainage changes. Griggs (1966) mapped the geology of the region in a reconnaissance study that covered most of the project area. A seismic profile across Hillyard Trough, the valley that extends north from Spokane, is given by the U. S. Corps of Engineers (1951) and by Newcomb and others (1953). The geology of the Latah Formation and the Columbia lava flows was discussed by Pardee and Bryan (1926) and Griggs (1965), with a further discussion of plant fossils by Knowlton (1926) and Berry (1929). Weaver (1920) discussed the general geology of that part of the project area in Stevens County. A geologic map of Washington, Huntting and others (1961), shows the general geology of the entire area. S. L. Glover (1941) described some of the clay and shale deposits in Spokane and Stevens Counties relative to their use in the ceramic industry. The soils in Spokane County were described by Van Duyne and others (1921) and by Maytin and Gilkeson (1962), and in Stevens County by Van Duyne and Ashton (1915).

GENERAL GEOGRAPHIC FEATURES

TOPOGRAPHY AND DRAINAGE

The project area covers about 450 square miles in the southeastern corner of the Okanogan-Selkirk highlands, and is bordered by the Columbia Plateau on the southwest (fig. 1). The area is, in general, a broad basin surrounded by mountains along the west, north, and east, and by the Spokane Valley along the south and southwest. The lowest altitude, 1,534 feet above sea level, is along the Spokane River on the western boundary, and the highest altitude of 3,588 feet is atop Dunns Mountain, only 2 miles northeast of the river (pl. 1 and fig. 2). The northwestern part of the basin lies mostly between 2,000 and 2,300 feet above sea level, although mountains about a mile west of the project boundary rise to 4,054 feet, and mountains several miles north of the project area rise nearly as high. Mountains along the eastern side culminate at Mount Spokane, altitude 5,878 feet. This prominent landmark is located in T. 28 N., R. 45 E., just 6 miles east of the area (fig. 3). The project area is hilly in part, and contains several mesas such as Orchard Bluff, Green Bluff, Foothills, Pleasant Prairie, Orchard Prairie, and Fivemile Prairie, which rise 400 to 500 feet above their bases (pl. 1 and fig. 2). The tops of the mesas are generally between 2,300 and 2,450 feet in altitude.

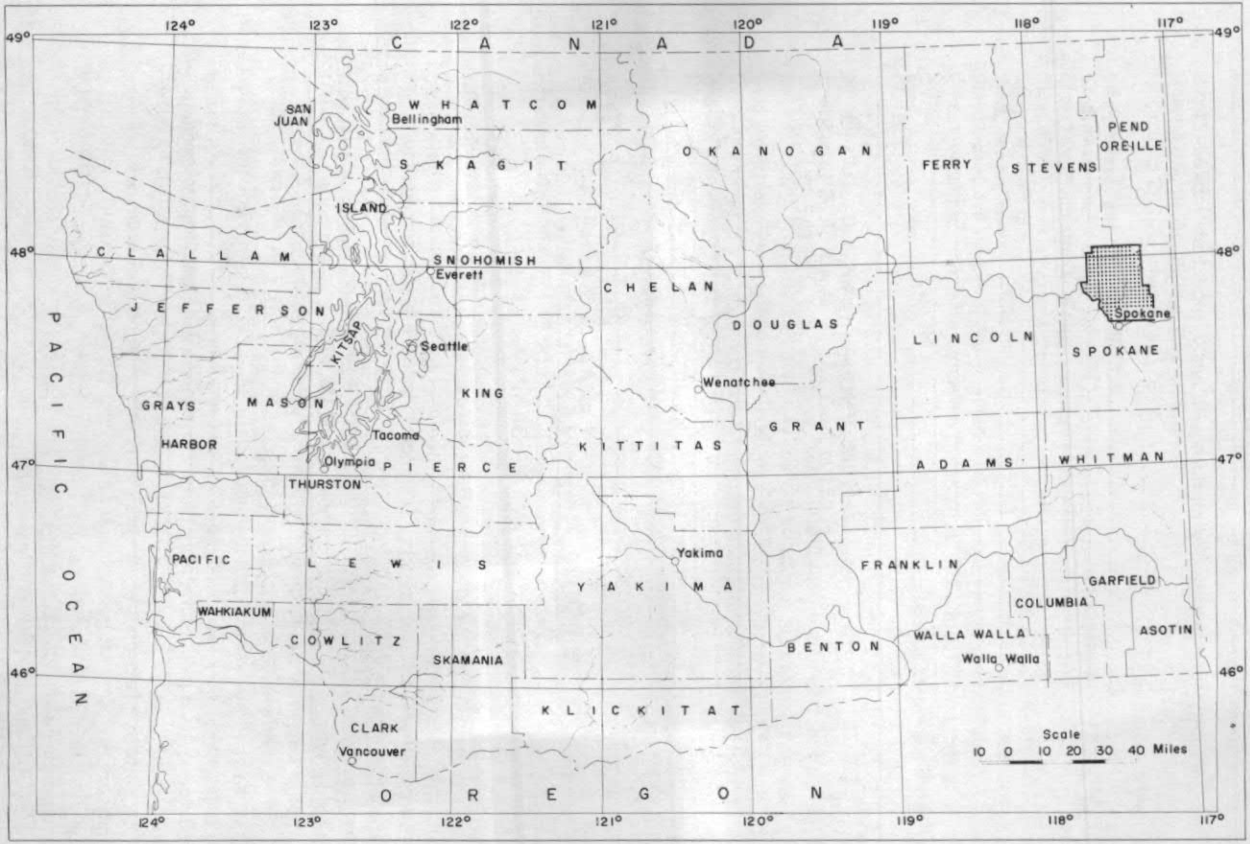


Figure 1 - State of Washington, showing location of the project area (in pattern)

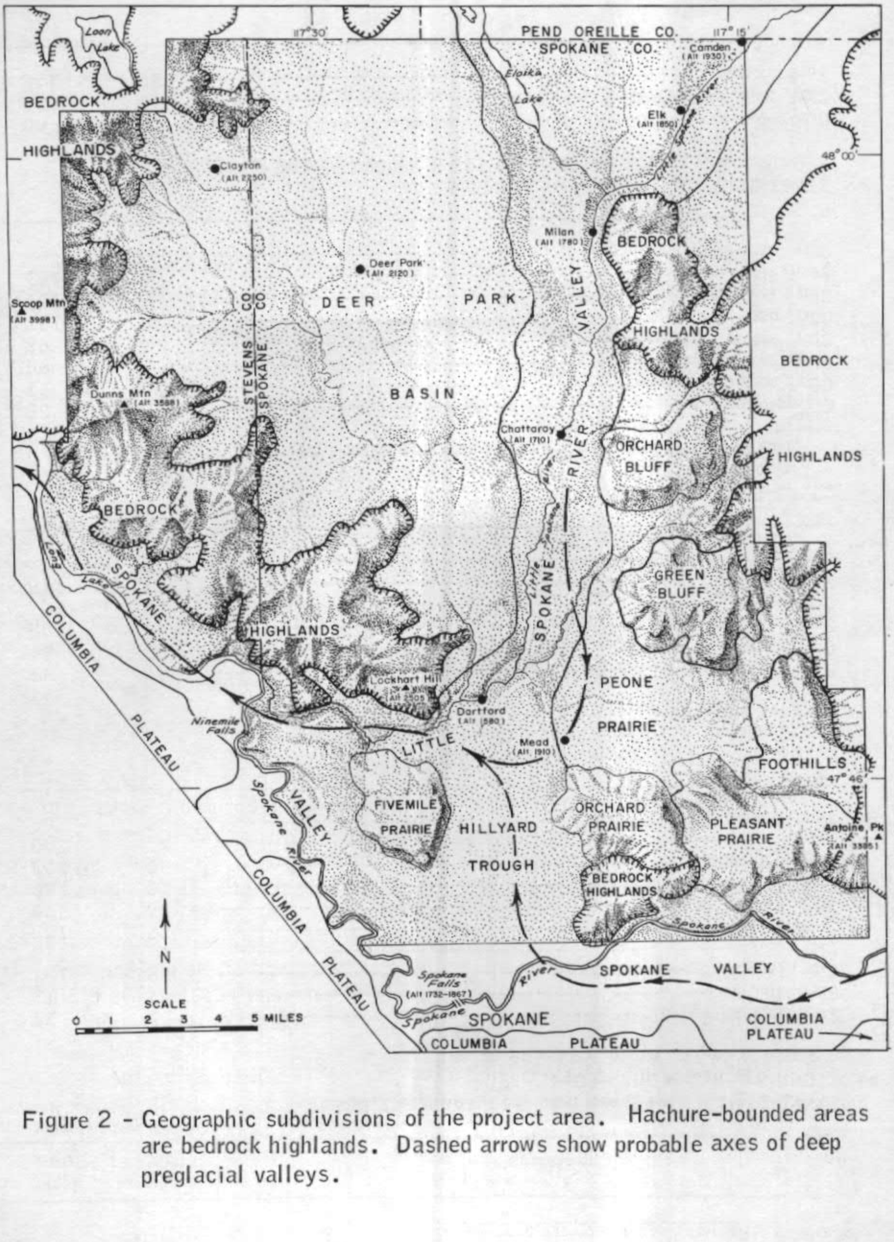


Figure 2 - Geographic subdivisions of the project area. Hachure-bounded areas are bedrock highlands. Dashed arrows show probable axes of deep preglacial valleys.

The Little Spokane River flows south through the project area from Camden, at the northeast corner, to a point 4 miles north of Spokane, where it turns westward and flows into the Spokane River. The Little Spokane River drains most of the project area; only along the Spokane Valley does water drain directly into the Spokane River. The altitude of Spokane Valley east of Spokane is about 2,000 feet. The Spokane River from Spokane to the confluence with the Little Spokane River drops about 375 feet (pl. 1). About 135 feet of this drop occurs at Spokane Falls in the center of Spokane, 1½ miles south of the project boundary (fig. 2).

CLIMATE

The climate in the project area ranges from semiarid to subhumid, with precipitation generally increasing with altitude. In Spokane Valley and the lower part of the Little Spokane River valley, the precipitation is usually less than 20 inches per year, whereas, in the higher northeastern part of the project area it is more than 25 inches per year (fig. 3). On top of Mount Spokane precipitation is almost 50 inches per year (U. S. Weather Bureau records). Most precipitation falls during the winter (fig. 3), much of it as snow, especially at the higher altitudes. Average annual snowfall at Deer Park, Spokane (Geiger Field), and atop Mount Spokane is 50 inches (1931-60), 58 inches (1948-64), and 170 inches (1953-60), respectively (Phillips, 1965a, p. 18; 1965b, p. 49).

Frost penetrates 12 to 18 inches into the ground during a normal winter. However, during a cold winter the frost may penetrate as deep as 30 inches in the Spokane area (Maytin and Gilkeson, 1962, p. 3).

Occasionally in winter a sudden warm wind or rain melts the snow rapidly. If this happens when the ground is frozen, the water runs off rapidly into the streams instead of soaking into the ground.

GEOLOGIC SETTING

The oldest rocks in the area are plutonic and metamorphic rocks of pre-Tertiary age (pl. 2). These rocks underlie the entire area and form the basement complex upon which the younger rock units rest (table 1). They have been deeply eroded, and therefore have a surface of considerable relief. The basement rocks form the mountains that surround the study area (pl. 1).

During late Tertiary time extensive basaltic lava flows flooded a vast region that included much of southeastern Washington and parts of the project area. These volcanic rocks are tentatively correlated with the younger basalt flows of the Columbia River Group and, therefore, are termed Yakima (?) Basalt in this report (pl. 2).

The lava flows blocked stream drainages, including that of the ancestral Spokane River, forming lakes into which sediments eroded from the higher lands were deposited. The resulting lake beds, called the Latah Formation (pl. 2), underlie and are interbedded with the basalt, particularly southwest of Spokane.

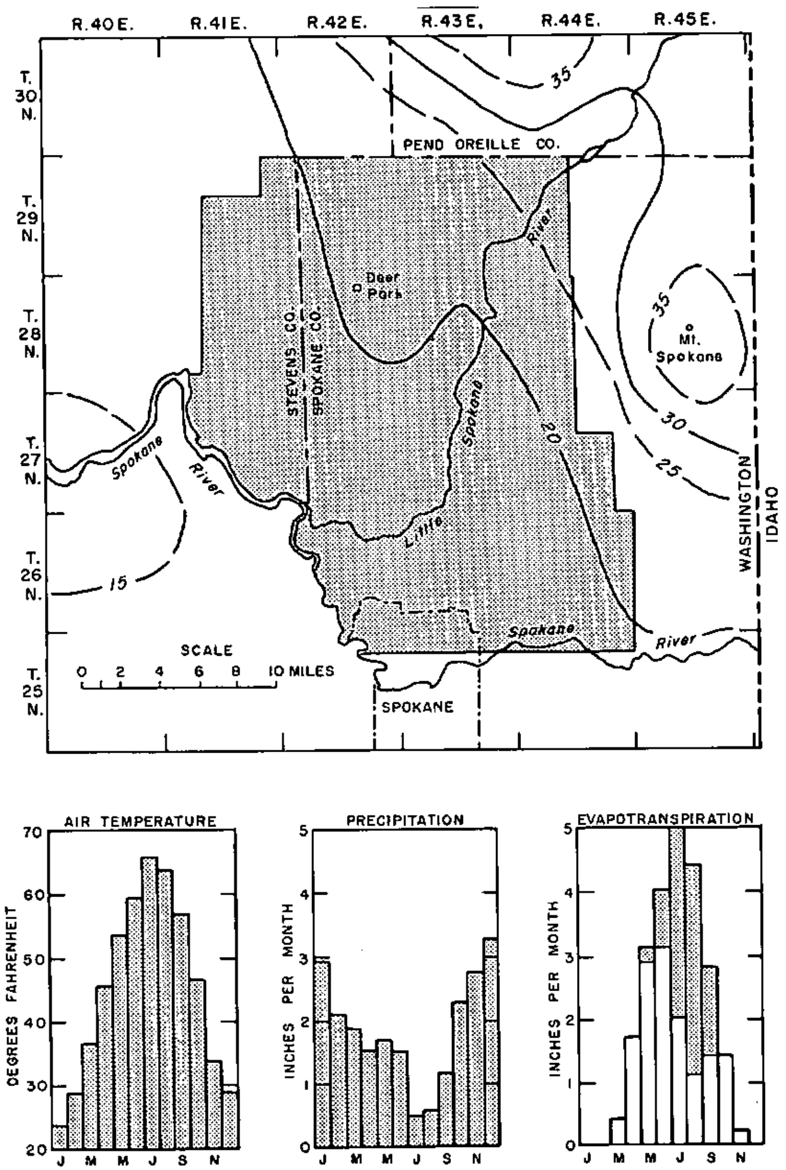


Figure 3 - Precipitation, air temperature, and evapotranspiration in the project area (stippled). Map shows areal distribution of annual precipitation in inches, based on data of U. S. Weather Bureau (1965). Graphs show average monthly values at Deer Park, for the period 1931-60. Evapotranspiration graph shows actual depth (black), and potential depth (black plus stipple), assuming a 6-inch water-holding capacity (after Phillips, 1965b, p. 64).

Table 1 - Lithology and water-yielding characteristics of rock units in the project area

Period	Epoch	Rock unit		Thickness (feet)	Lithology	Water-yielding characteristics 1/
QUATERNARY	Holocene (Recent)	Alluvium		0-40	Silt, sand, and gravel along stream valleys; silt and peat in filled ponds and lakes	Sand and gravel yield small to moderate amounts of water; silt and peat yield little water
		Dune sand		0-50	Wind-blown glacial sand	Situated above the water table; not an aquifer
	Pleistocene	Glacial deposits	Glaciofluvial deposits	0-700	Sand and gravel; contains some boulders in places	Yield moderate to very large quantities of water
			Glaciolacustrine deposits	0-300 (?)	Silt, sand, some clay, and a little gravel; usually stratified and well sorted	Yield small to moderate quantities of water
			Morainal deposits	0-40	Glacial till consisting of clay, silt, sand, gravel, and boulders	Yield little water
		Palouse Formation		0-75	Loess consisting of tan to brown silt, clay, and fine sand; mantles the mesas	Yields small amounts of water locally

		Landslide debris	0-100?	Disordered blocks of Yakima (?) Basalt and sedimentary rocks of Latah Formation	Water-yielding properties variable
		Unconformity			
TERTIARY	Miocene	Columbia River Group: Yakima (?) Basalt	0-350	Lava flows of dense, dark basalt; includes pillow lavas and altered glassy basalts	Yields small amounts of water
TERTIARY	Miocene	Latah Formation	0-1,500	Siltstone and claystone, some sandstone, and minor conglomerate; unconsolidated to moderately consolidated; mostly shades of gray, yellow, brown, and blue; predominantly lacustrine, but contains stream-laid deposits; thin-bedded to laminated; contains abundant plant remains in places. Underlies or is interlayered with Yakima (?) Basalt	Yields vary from small amounts of water to none
		Unconformity			
PRE-TERTIARY		Plutonic and metamorphic rocks, undifferentiated	Unknown	Mostly granitic rocks; metamorphic rocks are mostly gneiss	Mostly impermeable but yield small quantities of water from fractured or decomposed zones

1/ Approximate yield limits: "little", less than 5 gpm; "small", 5-35 gpm; "moderate", 35-600; "large to very large", 600-20,000 gpm.

Some erosion of the flows and lakebeds occurred between periods of deposition of these rocks.

With cessation of the outpouring of the basalt, the Spokane River carved a deep trench through the basalt and lakebeds. This trench, later buried beneath Quaternary glacial deposits, probably now underlies Hillyard Trough, thence turns westward along the Little Spokane River and northwestward down the present valley of the Spokane River (fig. 2). However, possibly two other locations of this preglacial Spokane River valley may exist: (1) along the south side of Fivemile Prairie, or (2) beneath Mead and the Little Spokane River valley to the north. Because of the importance of the preglacial valleys as ground-water reservoirs they are discussed in more detail on pages 34-36

During Pleistocene time, extensive glaciers moved into the area from the north and east, stopping just south of Milan, Wash., and a short distance east of Spokane in the Spokane River valley (Weis and Richmond, 1965, p. C129).

Erosion by the ice and intermittent torrential glacial streams left a number of basalt-capped mesas. At various times since, the edges of the mesas have given away in landslides (pl. 2). The glaciers also brought much debris that was deposited in a variety of ways, some directly by the ice (morainal deposits, pl. 2), some in glacial lakes (glaciolacustrine deposits), some by streams of glacial melt water (glaciofluvial deposits), and some, like the Palouse Formation, by long-distance wind transport.

During Holocene (Recent) time, following the retreat and disappearance of the glaciers, the rivers, principally the Little Spokane River, have been depositing alluvium along their channels, and winds have blown loose sand to form dunes at several places in the basin (pl. 2).

GEOLOGIC UNITS AND THEIR WATER-YIELDING CHARACTERISTICS

The general lithologic, stratigraphic, and hydrologic characteristics of the geologic units underlying the project area are discussed below. Where structural or erosional features are factors in determining local ground-water availability, these are discussed in greater detail on pages 36-38.

In this report, reported pump yields form a basis for discussing the potential yields of various geologic units. Potential yields of wells are generally greater than actual yields, however, because they assume a maximum efficiency of well development and construction.

CONSOLIDATED ROCKS

Plutonic and Metamorphic Rocks, Undifferentiated

Plutonic and metamorphic rocks of pre-Tertiary age constitute the basement complex that underlies the project area (table 1). Of the two, the plutonic rocks are the more widespread in the study area, and consist chiefly of granitic rocks such as granodiorite and quartz monzonite. The metamorphic rocks are

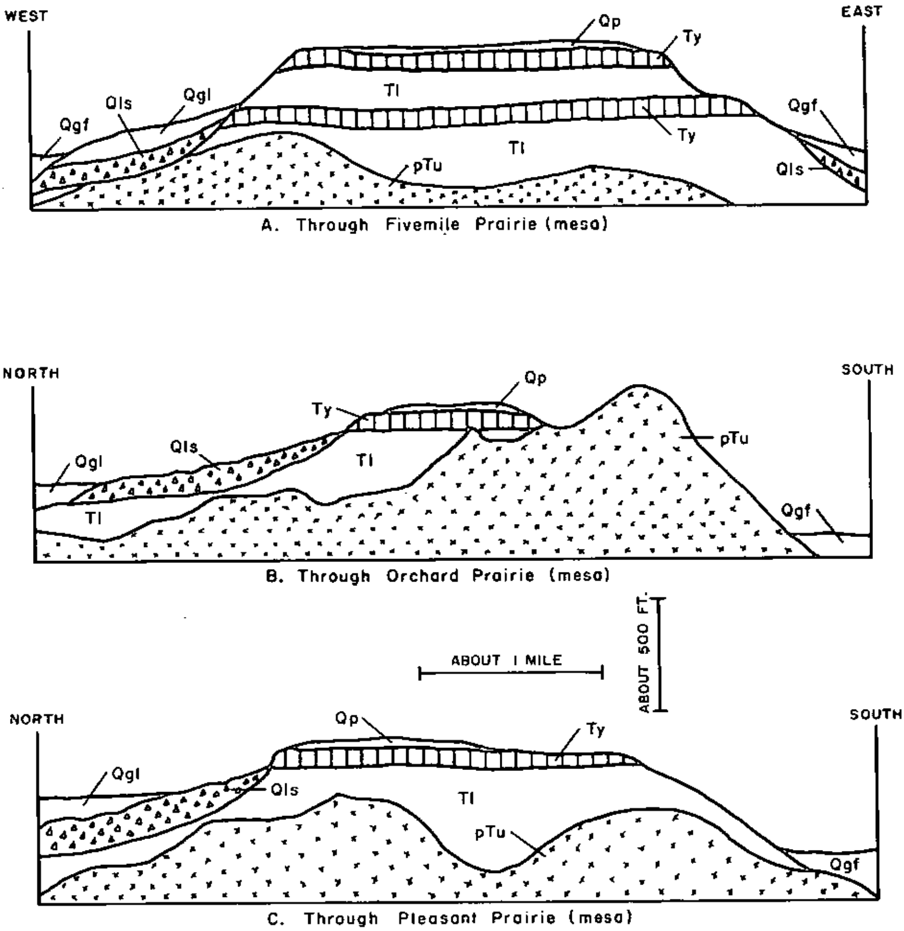


Figure 4 - Schematic geologic sections through the mesas, showing the variable relationships among geologic units: pTu, plutonic and metamorphic rocks, undifferentiated; Tl, Latah Formation; Ty, Yakima (?) Basalt; Qls, landslide debris; Qp, Palouse Formation; Qgl, glaciolacustrine deposits; and Qgf, glaciofluvial deposits.

predominantly gneiss. The resistant basement rocks are exposed in many places in the area (pl. 2). Where they abut against the mesas, they protect the mesa flanks, so that characteristic slumping of the Latah beds and of the capping basalt is retarded (fig. 4).

The maximum relief of the basement surface in the project area is more than 2,300 feet, the highest point being the top of Dunns Mountain (altitude 3,588 ft). The lowest known altitude of the basement surface is in the bottom of the ancient Spokane River valley where, well 26/43-20J2 penetrated unconsolidated sediments to a depth of 780 feet (altitude 1,231 ft) without encountering the basement rocks. However, because of the high relief of the basement-rock surface throughout the study area, wells unexpectedly may encounter that surface at shallow depth.

Water moves through the uppermost part of the basement rocks where they are fractured and weathered. That fractured and weathered zone generally is not more than a few tens of feet thick. Yields of wells tapping these rocks range from negligible quantities to 35 gpm (gallons per minute). In some places, granitic rocks are tapped in preference to the overlying saturated fine-grained sediments. For example, well 29/42-19P1 near Clayton was drilled and cased through 180 feet of clay and sand and obtained a large domestic and stock supply from water in 20 feet of granite.

Latah Formation

The Latah Formation of Miocene age, consists largely of semiconsolidated beds chiefly of clay and silt, with some sand and conglomerates (pl. 2). Those sediments were deposited either by streams or in lakes. At some places, the sand is unconsolidated and, where saturated, tends to flow into wells that penetrate it. Drillers commonly report trouble with this "quicksand".

The basal beds of the Latah Formation that rest on the granitic rocks commonly contain gravel derived from those rocks that grade upward into the more typical clay shale, according to Pardee and Bryan (1926, p. 4). The strata of the Latah Formation are generally thin-bedded to laminated, and locally exhibit crossbedding. Plant remains are common in places; pieces of wood and even tree trunks have been found during well drilling.

In many places in the Spokane area, the Latah Formation overlies the granitic basement rocks below an altitude of about 2,400 feet (schematically shown in fig. 4C). The formation is interbedded with the Yakima (?) Basalt, and is overlain by basalt or by Quaternary sedimentary deposits in most places, so that the areas of outcrop are small (pl. 2); they occur mainly on the sides of the mesas beneath the basalt cap (fig. 4). In places on the mesas, the Latah Formation overlies the basalt. A test hole in SW¼NW¼ sec. 14, T. 26 N., R. 44 E., penetrated 43 feet of the Latah above the basalt (J. W. Hosterman, U. S. Geological Survey, written commun., 1964). Although the Latah Formation is not exposed in the basin around Deer Park, the unit probably underlies much of the area at depth. However, in the vicinity of Clayton and to the north it is covered by only a few feet of glacial deposits.

The thickness of the Latah Formation is highly variable (fig. 4), ranging from 0 to 1,500 feet (Pardee and Bryan, 1926, p. 8, fig. 3). The thickness is generally much less than the maximum, due to both the irregular basement-rock surface, and erosion of the formation. In the Deer Park basin the unit probably does not exceed a few hundred feet in thickness.

Because of the preponderance of fine-grained sediments throughout the Latah Formation, the development of an adequate water supply is difficult in many places. Yields of generally less than 35 gpm are obtained from thin saturated beds of gravel and coarse sand that generally are few in number (well 27/43-20C1 below 35 feet, table 9). Some wells have been drilled to considerable depths in the Latah Formation, and even some of these have not been very successful (tables 7 and 9).

Yakima (?) Basalt

Where present in the project area, the Yakima (?) Basalt consists of nearly horizontal flows of dense, dark basaltic lava, which have an aggregate thickness of as much as 350 feet (well 28/42-28B1, table 9). At most places within the project area, the basalt is 50 to 150 feet thick. The flows lap against the granitic rocks, especially at the edges of the basin, and are both interbedded with, and rest upon, thick sections of the Latah Formation (fig. 4; Griggs, 1965).

The upper basalt flows form a hard, resistant cap in most places atop mesas where they overlie the soft and easily eroded Latah Formation (fig. 4). At the mesa edges the basalt commonly forms cliffs. The lower flows probably occur throughout much of the Deer Park basin and in places beneath the intermesa valleys such as Peone Prairie, where they would underlie glaciofluvial and alluvial deposits. In the city of Spokane, between Spokane Falls and Fivemile Prairie, the flows underlie glaciofluvial deposits.

The basalt flows that cap the mesas are commonly broken into large regular five- or six-sided columns as a result of jointing. The lower flows generally are more massive, and jointing has formed small, irregularly shaped blocks rather than large regular columns. In some places where these small blocks fall from the walls of wells they cause problems to drillers. Basalt with pillow structures, resulting from the flow invading water or wet muds, is more common in the earlier flows than in the later mesa-capping flows, according to Pardee and Bryan (1926, p. 11). Material between the pillows has been altered in many places to a yellowish clayey substance.

Water moves through vertical joints and cross fractures, and through rubbly zones at the tops and bottoms of the basalt flows. Where the basalt rests on rocks of low permeability such as clay and shale of the Latah Formation, the fractured basal part of the lava is the zone most likely to yield water. Yields of wells tapping the Yakima (?) Basalt range from negligible amounts to more than enough to supply domestic and stock needs. The maximum yield to be expected is approximately 35 gpm.

The lower basalt flows generally yield more water to wells than the upper flows. The lower flows yield adequate domestic supplies to roughly two-thirds of the wells that tap them. The basalt capping the mesas, however, provides water to only about one-third of the wells.

UNCONSOLIDATED DEPOSITS

Palouse Formation

The Palouse Formation consists of tan-to-brown silt, clay, and fine sand which was deposited by the wind during periods of glaciation in Pleistocene time. Although most of this material, termed loess, is stratified, the strata are difficult to discern owing to the characteristically uniform grain size of the loess in most places. The Palouse Formation mantles the mesas in the project area (pl. 2 and fig. 4). In most places it overlies the Yakima (?) Basalt and Latah Formation, but locally it also overlies unconsolidated deposits and granitic rocks. Generally, the loess ranges in thickness from 0 to 20 feet, although in places it is much thicker; a maximum known thickness in the project area of 73 feet is found in a test hole drilled on Orchard Prairie in the SE¼NE¼SW¼ sec. 24, T. 26 N., R. 43. (J. W. Hosterman, U. S. Geological Survey, written commun., 1964).

Because of their limited extent and thickness, and because of the difficulty in delineating them, undifferentiated glacial deposits that occur in minor amounts on the mesas are included with the Palouse Formation in this discussion.

The Palouse Formation is not an aquifer in many places because it is thin and unsaturated. Where the formation is saturated, sand zones may yield small amounts of water to wells, generally less than about 20 gpm. Atop the mesas, only 25 of 91 inventoried wells that penetrate unconsolidated deposits--mainly the Palouse Formation overlying the basalt (pls. 1 and 2)--obtain water from those deposits. Of the 25 wells, only 16 produced adequately for the minimum requirements of domestic and stock use.

A few springs, such as 26/44-27P1s and 28/44-32F1s, occur on the mesas, and drain the Palouse Formation where it is underlain by basalt or by other poorly permeable material. Generally, the springs are near the mesa edges.

In the project area, therefore, the Palouse Formation in most places cannot be relied upon to supply quantities adequate for domestic use (at least 5 gpm).

Landslide Debris

Landslide debris consists principally of slumped sediments of the Latah Formation and disordered blocks of the capping Yakima (?) Basalt. The broken basalt ranges in size from small cobbles to blocks hundreds of feet long. The landslides occur mainly around the margins of the mesas and along the sides of the Little Spokane River valley (as shown in pl. 2 and schematically in fig. 4). The maximum thickness of landslide material is unknown, but it is probably about 100 feet.

The movement of the rocks that compose landslides has disrupted their hydraulic continuity, both internally and with respect to the parent rocks; thus the water-yielding properties of the landslide debris are variable and unpredictable. In some places wells tapping these depósits probably will yield only enough water for domestic and stock needs.

Morainal Deposits

The morainal deposits, of Pleistocene age, consist of unsorted and unstratified clay, silt, sand, gravel, cobbles, and large boulders. This material, called till, was deposited directly by the glaciers. Till is found in the northeastern part of the project area, in the two valleys occupied by Lake Eloika and the Little Spokane River in the vicinity of Elk (pl. 2). The till at the lower end of Lake Eloika was deposited in ridges, some of which rise 30 to 40 feet above the surrounding terrain. The maximum thickness of the till is probably about 40 feet. The till probably would yield little water, if any, because it is generally unsaturated and of low permeability. No wells are known to penetrate the morainal deposits.

Glaciolacustrine Deposits

As defined in this report, the glaciolacustrine deposits of Pleistocene age, consist mostly of silt, sand and clay, and contain some interbeds of fluvial gravel. These predominantly glacial-lake deposits are generally stratified and well sorted. The beds are extensive, nearly flat lying, and were laid down in Glacial Lake Spokane, a large lake formed by the damming of the Spokane River at Long Lake by a glacier lobe (Richmond and others, 1965, p. 237). Glaciolacustrine deposits cover most of Deer Park basin and the floors of the valleys between the mesas east of the Little Spokane River (pl. 2). The glaciolacustrine deposits overlie the consolidated rocks, landslide debris, and glaciofluvial material, and are in turn overlain in places by sand dunes, alluvium, and glaciofluvial deposits.

The glaciolacustrine deposits range in thickness up to probably 300 feet. The greatest thickness penetrated is 264 feet, at well 27/43-26M1, 3 miles north of Mead (table 9); however, part of the material encountered may be landslide deposits. Well 29/43-29N1, 3 miles northeast of Deer Park (table 9) penetrated 202 feet of these sediments. The depth to bedrock below the bottom of this well is unknown, although, well 29/43-29N2, 400 feet away, penetrated granite at 189 feet.

The yields of wells tapping the glaciolacustrine deposits and some underlying undifferentiated glacial material vary widely, from 5 gpm to a maximum of 600 gpm. In many scattered places west of the Little Spokane River these deposits are thin and nearly or completely unsaturated.

In a few places, fluvial sand and gravel lenses and interbeds in the glaciolacustrine deposits yield enough water for irrigation and municipal use. The largest known yield from those coarser deposits in the project area is 600 gpm from 35-foot well 26/43-11F2, 1 mile east of Mead. Because the glacial-lake

Table 2 - Wells that yield 50 gpm or more from glaciolacustrine deposits 1/

Well number	Depth (feet)	Yield (gpm)	Static water level	Draw-down (feet)	Pumping period (hours)	Water-yielding material	Remarks
26/43-11F1	42	80	13	--	--	Sand	
-11F2	35	600	10	--	--	Sand?	
27/42-8H1	30	150	14	5	4	Sand	
-8J1	40	250	30	5	--	Sand and gravel	
-13B1	87	150	71	10	7	Coarse sand	Yields only 30 gpm after several weeks of pumping.
27/43-17H1	22	50	+3 (flows)	19	2½	Gravel	
-20E1	67	60	64	½	7	Sand	
-26M1	264	250	190	--	--	Coarse sand	
-34H1	83	108	64	0	--	Sand	
28/41-11P2	16	50	2	1	8	Clay and coarse sand	
-14A1	21	160	5	15	4	Fine to coarse sand	
-24A1	28	50 35	17	-- 9	-- 48	Sand and a few layers of clay	
28/42-2M1	32	300	15	--	--	Coarse and fine sand	
-3H2	28	250	14	--	--	Sand and gravel	
-3H4	36	380	14	--	--	Sand and gravel	
-21R1	14	150	5	1½	4	Gravel and clay	10 ft from creek.

29/42-4Q1	19	100 60	8 --	9 --	¼ 3-4?	Coarse sand	Partly filled in with quicksand.
-14H1	25	250	18	4	--	Sand?	Well collapsed.
-23K1	48	240	12	3	4	Sand and gravel	
-23P1	38	200	9	--	--	Sand	
-35D1	28	224	15	3	4	Sand with some gravel and a few small rocks	
-35E1	48	228	26	--	--	Sand and gravel	
-35P1	54	350	30	3/4	24	Silty sand and some gravel	
29/43-29N2	178	87	88	62	--	Sand and clay	
-31M1	192	500	55	--	--	Fine to coarse sand	

1/ Some wells also tap underlying undifferentiated glacial sediments.

deposits in this area underlie highly permeable sand dunes, a large percentage of precipitation falling on them is transmitted to the underlying deposits.

Of the 25 canvassed wells that reportedly yield 50 gpm or more from the glaciolacustrine deposits (table 2), 18 yield more than 100 gpm. Ten of the 18 wells are in the area adjacent to and extending 4 miles north of Deer Park, and all ten reportedly yield 200 gpm or more. These wells tap sand or sand and gravel interbeds in the otherwise fine-grained material. Only three other wells that tap the glacial lake deposits in the project area yield more than 200 gpm (wells 26/43-11F2, 27/42-8J1, and 27/43-26M1).

Spring 29/42-23A1s, 3 miles north of Deer Park, yields 75 gpm from glaciolacustrine sand and gravel. Other moderately large springs occur below the high scarp just west of Lake Eloika, along the edge of the glaciolacustrine deposits. Those springs (29/43-5F1s, 29/43-5K1s, and 29/43-16M1s) drain the plateau to the west, and yield several hundred gallons per minute (table 8). They may be draining underlying consolidated rock units in addition to the glaciolacustrine deposits.

Glaciofluvial Deposits

The glaciofluvial deposits in the project area consist mainly of bedded sand and gravel, with minor amounts of silt and clay, and, in places, some boulders. Most of the beds exhibit poor to moderate sorting, and crossbedding is observed in many places. The deposits lie along the Spokane and Little Spokane River valleys, and in the Hillyard Trough between Fivemile Prairie and Orchard Prairie just north of Spokane (pl. 2 and fig. 2). In the Little Spokane River valley upstream from the north end of Hillyard Trough, glacial stream deposits are finer grained than in Spokane Valley and Hillyard Trough (Flint, 1936, p. 1863-1865). Some zones in the glaciofluvial deposits in the Spokane Valley are so coarse that reportedly in some wells water can actually be observed to flow in one side and out the other. The high permeability of these materials is corroborated by the high yields of wells tapping them.

The glaciofluvial deposits range in thickness from 0 to at least 700 feet, with the greatest known thickness being penetrated by well 26/43-20J2 in Hillyard Trough (table 9). This 780-foot well (filled back to 761 ft) did not penetrate the full thickness of the glacial deposits, although the bottom of the well, at altitude 1,231 feet, is probably close to consolidated rock. A seismic profile across the valley about 1,000 feet south of this well (U. S. Corps of Engineers, 1951, fig. 2; Newcomb, 1953, pl. 3) indicates that the deepest part of the valley is near the well. Granitic rocks at that point are estimated to be at an altitude of 1,285 feet by the U. S. Corps of Engineers, and at 1,165 feet by Newcomb. The thickness of glaciofluvial deposits in the Little Spokane River valley north of Mead, and particularly north of Chattaroy, is less than that in the Spokane River valley.

In some places, where they overlie buried rock benches or ridges, the glaciofluvial deposits are thin. Saturated deposits are also thin near edges of valleys and near the contacts with other geologic units (shown in pl. 2 and schematically in fig. 4).

The largest ground-water yields in the project area are obtained from saturated glaciofluvial materials. Yields of several hundred to several thousand gallons per minute are common and much higher yields can be obtained in many places. However, the glaciofluvial deposits in the northern part of the Little Spokane River valley are generally less productive than those in the preglacial Spokane River valley, because they are thinner and less permeable. Not much data on yields are available for the glaciofluvial deposits in the northern area; however, north of Chattaroy, 12-foot well 28/43-16L1 yields 150 gpm, and 96-foot well 28/43-23C1 yields 1,500 gpm with a 6-foot drawdown.

The most productive aquifers in the glaciofluvial deposits underlie Spokane Valley and the Hillyard Trough. Among the large yields obtained there are 5,800 gpm with only a 7-foot drawdown (well 25/43-4B2) and 19,200 gpm with only a 5-foot drawdown (well 25/43-8A1, just outside the south boundary of the project area). Data for some of the most productive wells in the project area are given in table 3.

Dune Sand

The dune deposits are of Holocene (Recent) age and consist of reworked and wind-blown glaciolacustrine and glaciofluvial sand. The dune areas are elongate in a northeast-southwest direction and occur east of Deer Park and adjacent to Mead (pl. 2). The dunes have a maximum thickness of about 50 feet (Flint, 1936, p. 1883); however, most are much thinner. Most of the dunes overlie the glaciolacustrine deposits, although some overlie consolidated rocks. The dune sand is unsaturated in the project area. However, it absorbs precipitation readily and transmits the water down to the underlying deposits.

Alluvium

The alluvium, of Holocene (Recent) age, consists of silt, sand, and gravel, with a little clay and some peat. The alluvium occurs mostly along the Little Spokane River, along Bear Creek, between Lake Eloika and Bear Lake, in places along the lower part of the Spokane River, and for a short distance up Deadman Creek (pl. 2). The maximum known thickness of alluvium is 38 feet, as reported at two locations by drillers' logs (well 27/43-33G1, 2 miles northeast of Dartford, and well 28/43-23C1, 2 miles north of Chattaroy).

Where saturated, sand and gravel in the alluvium generally yield more than 5 gpm and less than 100 gpm. Silt, clay, and peat yield little water. The largest known yield is that of 11-foot well 26/42-3E2 in the lower Little Spokane River valley; the well was pumped at 160 gpm for 3 hours with a 3-foot drawdown.

Table 3 - Selected wells that yield 1,000 gpm or more from glaciofluvial deposits

Well number	Depth (feet)	Yield (gpm)	Static water level	Draw-down (feet)	Pumping period (hours)	Water-yielding material	Remarks
25/42-3H1	124	2,600	14	--	--	Gravel and boulders	
		1,300		1	4		
25/43-4B1	212	5,800	172	9.1	4+	Sand and fine gravel	
-4B2	227	5,800	172	7.0	4	Sand and fine gravel	60 ft from B1.
25/44-2B1	127	1,800	98	--	--	Sand and gravel	
-3A1	148	1,000	81	--	--	Coarse sand and boulders	
		540		2	4		
-5D1	202	2,700	90	26.7	3	Sand	Pumped 2 of the 3 hours at a lesser rate.
-5K1	234	1,500	50	2.5	4	Sand and gravel	
-5N2	120	6,000	41	--	--	Gravel	
		3,500		8.5	--		
-5N3	46	1,400	25	--	--	Gravel	300 ft from N2.
-5P1	42	1,000	19	--	--	Gravel	
-6A1	104	1,550	85	1	--	Gravel	
26/42-12L1	136	1,000	88	--	--	Sand and gravel?	
-34N3	71	1,500	14	13	--	Sand and pea gravel	
26/43-7P1	126	1,700	43	6	10	Sand and some gravel	
-10K1	106	4,500	89	--	--	Sand and gravel	

-16D3	286	3,100 2,500	160	-- 30	-- ½	Sand and gravel	Not used because improper construction permits pumping of sand.
-16F2	268	2,300	157	4.6	--	Sand and gravel	
-16F3	284	5,000	162	10	--	Sand and gravel	150 ft from F2.
-19A1	161	1,000	137	3	--	Gravel	
-19P1	210	1,560	155	17.0	--	Sand, gravel, and boulders	
-20D1	286	1,800	152	9	4	Sand and gravel	
-20N1	238	1,000	208	--	--	Sand and some gravel	
-27E1	258	2,200	190	8.5	--	Sand and gravel?	New well.
-28D1	310	1,250	197	9	--	Sand and some gravel	
-28M1	251	1,000	212	4	--	Sand	
-30R2	293	1,200	229	--	--	Sand and gravel	
-31A1	270	8,000 4,200	225	-- 3	-- --	Sand and gravel	
-31A2	270	8,000	225	--	--	Sand and gravel	130 ft from A1.
26/44-32P1	142	1,000 470	88	-- 7	-- 2	Sand	
-35R1	140	3,000	89	--	--	Fine and coarse gravel	
27/41-26P1	185	1,950	61	4	2	Coarse sand and gravel	
27/43-22M1	125	1,000	90	--	--	Gravel	
28/43-23C1	96	1,500	16	6	5	Sand and gravel	

GROUND-WATER CONDITIONS

RECHARGE

Ground water is derived from precipitation that soaks into the ground and moves downward to the zone of saturation, where it becomes part of the ground-water reservoir. The quantity of recharge that is added to the ground-water reservoir in the Little Spokane River basin is estimated to be about one-fifth of the average annual precipitation that falls on the basin, or about 160,000 acre-feet of water. The estimate is based on the assumption that recharge to the reservoir is equal to discharge from the reservoir (see p. 27-31). This assumption is correct if the amount of ground water stored in the reservoir remains generally constant. Although storage varies during the year, and from year to year, the record of water levels since 1947, as shown in well 27/42-8H1, in the Deer Park basin, indicates that no significant net change in storage has occurred in 18 years (fig. 5).

Most recharge to the ground-water reservoir in the area occurs in the winter and early spring, and comes from snowmelt and winter rains. The large rise in water level each year shown in four representative wells (fig. 6) illustrates the seasonal character of recharge.

The quantity of recharge varies from year to year, and may be very small in some years. For example, the hydrograph of well 27/42-8H1 (fig. 5) shows that the water level declined throughout 1957. The below-normal precipitation during the winter of 1956-57 probably caused the decline.

Other conditions besides a lack of precipitation, such as rapid snowmelt on frozen ground, can cause the amount of recharge to be small. That situation occurred in February 1963 when the snow cover, which lay on solidly frozen ground, melted so rapidly that most of the water ran off directly into the streams and little water recharged the ground-water reservoir. Because of those conditions during the winter of 1962-63, little recharge occurred early in 1963 and the water level in well 27/42-8H1 continued to decline throughout most of 1963 (fig. 5) even though much precipitation fell in the late fall of 1962.

Another factor that can cause minimal recharge in spite of appreciable precipitation is the high rates of potential and actual evapotranspiration[1/] during the summer (fig. 3). Most summer precipitation returns to the atmosphere by evaporation or by the transpiration of plants and trees. Thus, the large amount of precipitation in May 1957 had little effect on the water level in well 27/42-8H1 (fig. 5).

[1/] According to Phillips (1965b, p. 13), "Potential evapotranspiration is defined as the maximum amount of water which, if available, could be removed from the soil by the combined processes of evaporation and transpiration under conditions of average temperatures. The term actual evapotranspiration is defined as the computed amount of water lost under existing conditions of temperature and precipitation. A comparison of the actual and potential evapotranspiration gives an estimate of the additional moisture plants could use if a moisture deficit did not exist at any time."

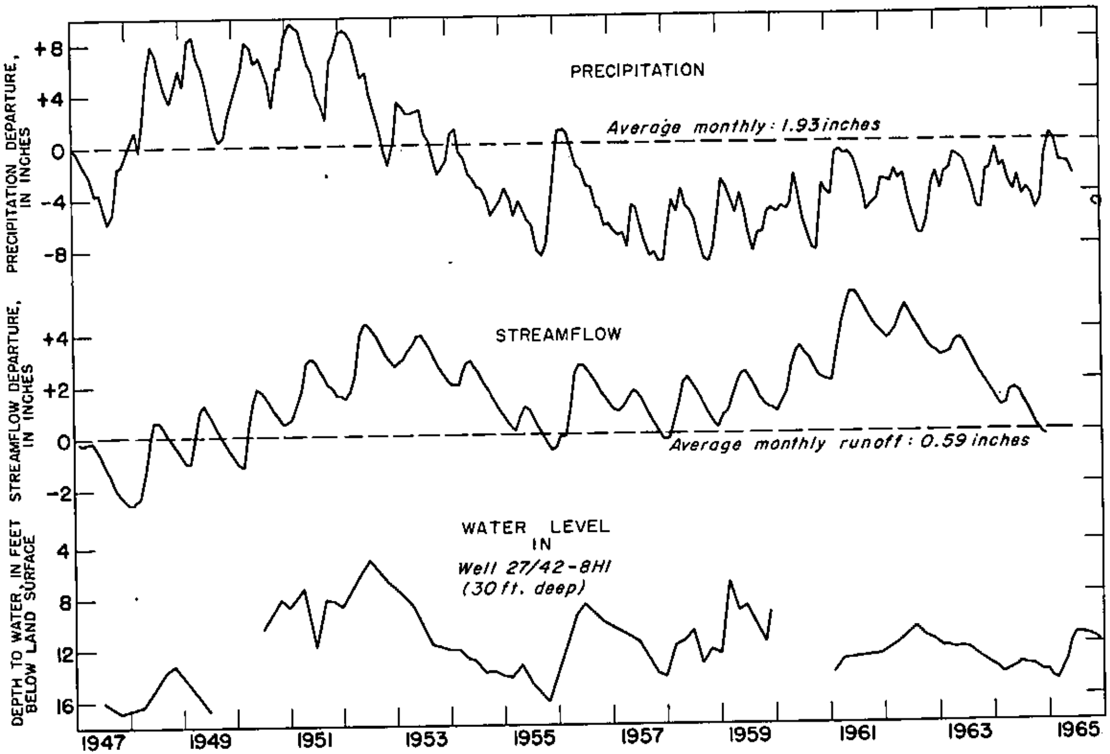


Figure 5 - Fluctuations in precipitation at Deer Park, streamflow of Little Spokane River at Dartford, and water level in well 27/42-8H1, 1947-65. Precipitation data are from U. S. Weather Bureau records.

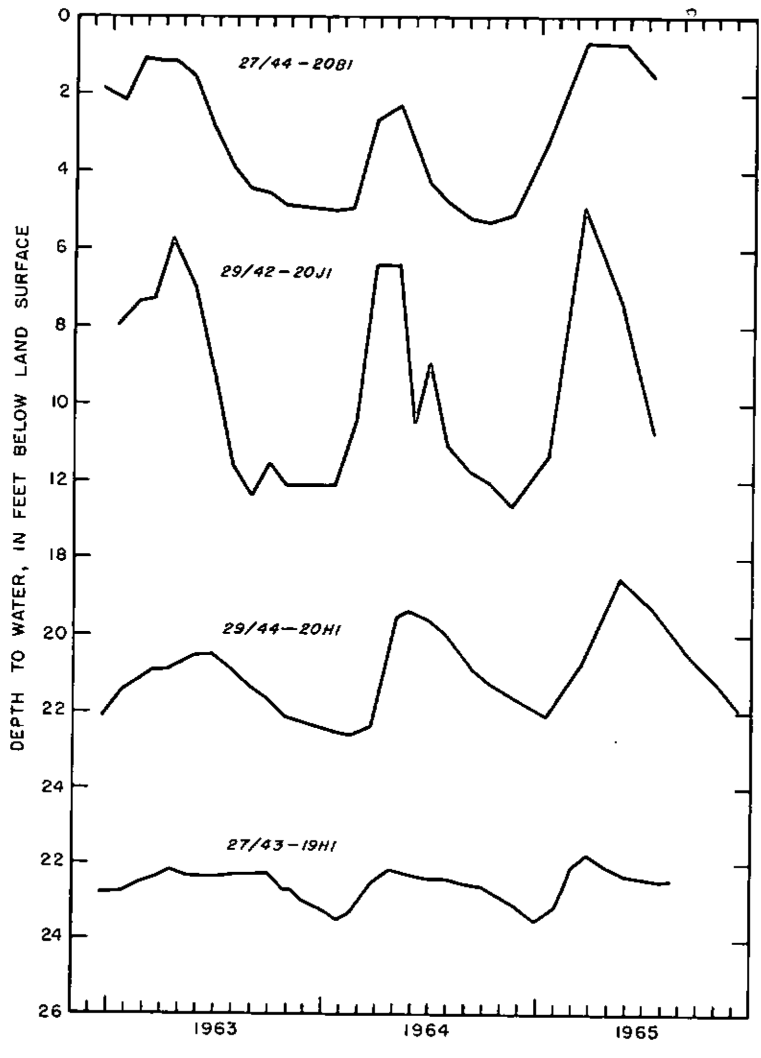


Figure 6 - Seasonal water-level fluctuations that occur commonly in most of the project area, December 1962-December 1965.

The response of a few wells to recharge varies considerably from the normal pattern, as is shown by the dissimilar hydrographs of wells 27/44-20N1, 28/44-19P1, and 28/43-22R1 (fig. 7). One of the wells, 27/44-20N1, is less than a mile from well 27/44-20B1, which shows a normal response to recharge and discharge (fig. 6). Both wells are on Green Bluff, but the reasons for a completely different pattern of response are not known. The abnormal hydrograph for well 28/43-22R1 is explained on page 27.

MOVEMENT AND OCCURRENCE

Ground water occurs in all the geologic units in the project area except the dune sand and the major part of the morainal deposits. In addition to water that is added to the reservoir by precipitation, some ground water comes from lateral underflow into the area from the mountains that surround the Little Spokane River basin. A large amount also enters as underflow through the glacial materials in Spokane Valley; much of that water comes from Idaho (Piper and La Rocque, 1944, p. 88-89; Simons and others, 1953, p. 177-178). Much of the ground water moving down Spokane Valley is naturally diverted through Hillyard Trough and into the lower part of the Little Spokane River valley (pl. 1; p. 60 and 70). Much of the remainder discharges into the Spokane River upstream from Spokane Falls, and some, possibly a large quantity, moves down the Spokane Valley as underflow.

Ground water in the Little Spokane River basin moves generally toward the Little Spokane River, and locally toward the tributary creeks. Except locally, the configuration of the ground-water surface conforms on a subdued scale to that of the land surface.

In parts of the project area, particularly under the mesas, more than one ground-water body occurs, each having a different water level. This situation is shown by the following data for four adjacent wells on Fivemile Prairie:

Well	Depth to water (feet)	Water-surface altitude (feet)	Aquifers
26/42-23L2	30	2,340	Yakima (?) Basalt
-23P4	84	2,266	Yakima (?) Basalt ?
-23P2	199	2,151	Latah Formation
-23P1	552	1,808	Latah Formation

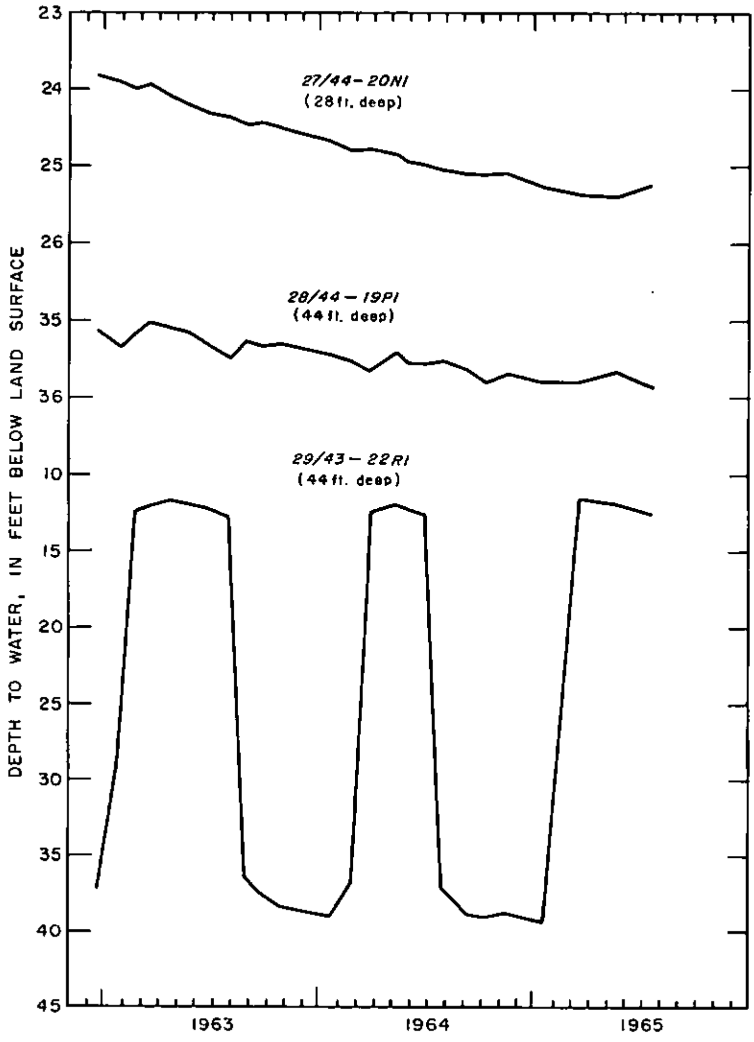


Figure 7 - Unusual seasonal water-level fluctuations, December 1962 - July 1965.

Several different water levels occur in the valleys between the mesas, and in the area just west of the escarpment along the west side of Little Spokane River valley. For example, the water level in well 28/43-32C1, which taps the Latah Formation, is 58 feet lower than that in well 28/43-32C2 about 500 feet away, which probably taps glacial deposits.

The occurrence of more than one ground-water zone is caused by one or both of the following conditions:

(1) retardation of the downward percolation of water by poorly permeable rocks, such as basalt, clay, shale, and granite, thus forming perched saturated zones above the regional water table.

(2) more rapid discharge of ground water laterally along bedding planes than vertically through the bedding, particularly where flat-lying strata are exposed and easily drained by springs along escarpments. That condition occurs beneath mesas, and back of the bluffs along the Little Spokane River.

The upper perched zones of saturation may be permanent or temporary, depending on whether recharge is sufficient to keep the zone saturated all year, or whether the water drains away before subsequent recharge occurs. An example of a well tapping both an upper temporary and a lower permanent water-yielding zone is well 28/43-22R1, 1 mile north of Chattaroy. The depth to water in this well is about 12 feet in the spring and early summer, whereas it drops suddenly in midsummer to about 39 feet because the upper zone is drained (fig. 7). The water surface stays at the lower level until winter recharge causes an abrupt rise to about 12 feet again.

In a few places in the project area, water levels in wells rise above the land surface. The most notable example of such artesian conditions is well 28/42-28B1, 4 miles south of Deer Park. The artesian head is reportedly 17 feet above land surface. The well penetrated granite from 346 to 348 feet, beneath basalt. The granitic rocks crop out only a mile away and more than 100 feet higher than the water level in this well. Apparently, water percolates along the contact between the basalt and granite to the well, where the basalt partially restricts the upward movement of water toward nearby Mud and Dragoon Creeks.

DISCHARGE

Most of the ground water discharged from the project area is springflow and subsurface seepage into the Little Spokane River and its tributaries. Some ground water also leaves the area at its southwestern edge by underflow down Spokane Valley. Some discharge occurs by evapotranspiration where the water table is near the land surface, and some occurs artificially when ground water is withdrawn from wells.

Springflow and Subsurface Seepage

Perennial discharge from the ground-water reservoir by springs and subsurface seepage explains the nearly uniform year-round flow of the Little Spokane

River. In fact, almost all of its flow during the summer and fall is derived from ground-water discharge. The continuous discharge from the ground-water reservoir is reflected in water-level declines in wells except when discharge is equaled or exceeded by recharge. Thus, water levels in most wells throughout the area decline during much of the year, and rise in the winter and spring when recharge occurs (fig. 5).

Average flows (1947-64) of the Little Spokane River at Dartford for the months of August and September, and annually, are 151, 155, and 344 cfs (cubic feet per second), respectively (table 4). The flows are lowest in August or September and consist almost entirely of effluent ground water. The yearly ground-water discharge to the Little Spokane River above Dartford probably averages at least 160 cfs. The base flow of the Little Spokane River is large throughout the year because the stream is continually receiving ground-water discharge. A comparison between the runoff of the Little Spokane River at Dartford and the precipitation at Deer Park (table 5) shows that the variation in runoff from one year to the next often does not correspond to that of the precipitation; the ratios have a wide range, from 20 to 57 percent. The annual runoff during 1 year is partly from precipitation of the preceeding year; this is due to the temporary storage of some of the precipitation in the ground-water reservoir and resultant delay in movement to the river. Thus, the river had 8.16 inches of runoff in 1952 although only 14.44 inches of precipitation fell, whereas, the next year, 1953, the runoff dropped to 6.46 inches even though the precipitation was 23.04 inches. In contrast to the large base flow and relatively small peak flow of the Little Spokane River, the base flow of a nearby stream 1/ draining a basin with similar total runoff and area, but limited ground-water storage, is about 10 times smaller, and the maximum flood peak of record is nearly 7 times larger (Rorabaugh and Simons, 1966, p. 26).

A large amount of ground water also discharges into the Little Spokane River in the 4-mile reach below the Dartford gage. For example, the difference in flow during the 1951 water year between Dartford and the station 4 miles downstream (pl. 1) averaged 233 cfs, or 105,000 gpm (Rorabaugh and Simons, 1966). Some of the largest springs along this reach of river are:

Spring	Owner	Discharge	
		cfs	gpm
26/42-11J1s	Washington State Fish Hatchery	15	6,700
-12A1s	Spokane Country Club	9	4,000
26/43-5L1s	Wandermere Inc.	7	3,300
-6Q1s	Waikiki Syndicate	10	4,500
-7B1s	Waikiki Syndicate	3.3	1,500

1/ Hangman (Latah) Creek, which drains southern Spokane County and joins the Spokane River at Spokane.

Table 4 - Mean discharge of the Little Spokane River at Dartford during August and September, and annually, 1947-64

Year	Mean discharge, in cfs		
	August	September	Annual
1947	112	127	220
1948	193	169	438
1949	138	141	340
1950	165	153	410
1951	149	162	395
1952	175	175	399
1953	151	151	316
1954	151	160	283
1955	138	135	279
1956	174	169	419
1957	130	142	278
1958	140	151	369
1959	151	174	378
1960	175	171	397
1961	148	152	429
1962	145	153	311
1963	132	142	265
1964	148	155	260
Average	151	155	344

Table 5 - Comparison between annual runoff of Little Spokane River at Dartford and annual precipitation at Deer Park, 1947-64

Year	Runoff of the Little Spokane River at Dartford (inches)	Precipitation at Deer Park (inches)	Ratio of runoff to precipitation (percent)
1947	4.50	22.48	20
1948	8.96	29.95	30
1949	6.93	[a] 20.85	33
1950	8.79	[a] 27.42	32
1951	8.07	[a] 23.85	34
1952	8.16	14.44	57
1953	6.46	23.04	28
1954	5.77	[a] 19.95	29
1955	5.70	[a] 26.24	22
1956	8.59	18.32	47
1957	5.67	20.29	28
1958	7.51	26.30	29
1959	7.72	23.93	32
1960	8.13	24.47	33
1961	8.79	24.30	36
1962	6.35	23.62	27
1963	5.43	23.24	23
1964	5.31	24.39	22
Average	7.05	23.17	30

[a] Estimated in part.

Most of the ground water that is effluent along the 4-mile reach below Dartford probably enters the Little Spokane River valley from adjacent Spokane Valley through Hillyard Trough. The progressively lower altitude of the water table from the Idaho border down Spokane Valley and through the Hillyard Trough to the Little Spokane River (pl. 1; Weigle and Mundorff, 1952, pl. 1) indicates the ground water is moving in that direction. However, some, and perhaps a substantial amount, of the ground water discharging into the Little Spokane River along this stretch originates within the Little Spokane River drainage basin itself. A reasonable estimate of the amount of ground water from the Little Spokane River basin that discharges into the river in the 4-mile stretch below Dartford is about one-fourth of the 233 cfs increase in streamflow, or about 60 cfs (M. I. Rorabaugh, oral commun., 1966).

Almost no ground water discharges into the Little Spokane River downstream from the 4-mile stretch discussed above, as is shown by streamflow measurements made 4 miles below Dartford and those near the mouth (sites shown on pl. 1). In fact, in that reach the stream actually loses a little water at times.

On the basis of the foregoing estimates, approximately 220 cfs of ground-water discharge is added to the Little Spokane River (160 cfs above Dartford and 60 cfs below Dartford). The annual ground-water discharge from the Little Spokane River basin is thus conservatively estimated to be 160,000 acre-feet per year, or about one-fifth of the precipitation that falls on the basin.

Discharge to Wells

Withdrawal from wells in the project area amounted to about 9 billion gallons in 1964--an average of approximately 17,000 gpm. That quantity is equivalent to about 38 cfs, or less than 10 percent of the September 1964 discharge (about 400 cfs) of the Little Spokane River 4 miles west of Dartford. About 90 percent of the water discharged from wells in the study area (about 8 billion gallons per year) is pumped from the Spokane metropolitan area. The distribution of the pumpage is shown in figure 8. In Spokane Valley just south of the project area probably 10 times that quantity is pumped from the ground-water reservoir.

Most of the ground water pumped from wells, except that used for irrigation, is returned to streams. Some of the water percolates back to the ground-water reservoir--especially water that goes into septic tanks instead of sewer systems. Much of the water used for irrigation is lost by evapotranspiration, but in the project area the quantity used for irrigation is small.

The records for wells 25/44-2B1 and 26/43-19A1 show that since measurements began in 1929 no long-term net lowering of the water levels has occurred in these wells (fig. 9) despite the large withdrawals in the metropolitan Spokane area.

Ground-water levels in Spokane Valley and Hillyard Trough rise and fall in response to changing water levels in the Spokane River, the high-water levels usually occurring in May or June, immediately following periods of peak streamflow. The magnitude of yearly water-level fluctuations in well 26/43-19A1 in

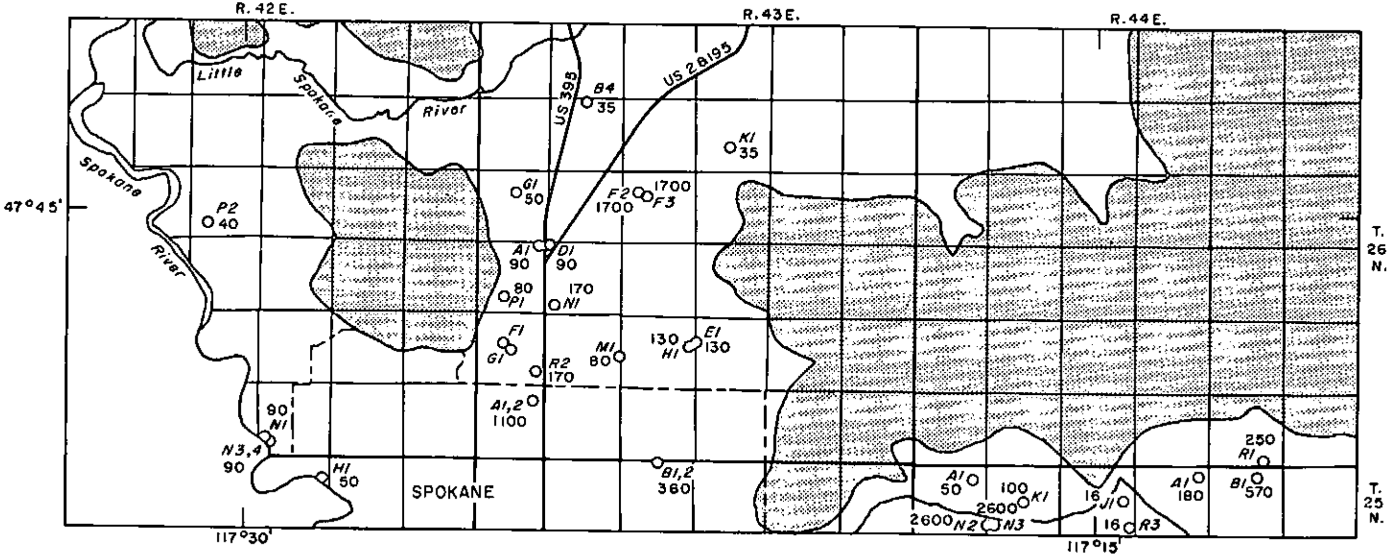


Figure 8 - Withdrawals from wells in northern metropolitan Spokane in 1964, in millions of gallons. Withdrawals of less than 10 million gallons are not shown. Solid circles indicate wells drilled or dug before 1950. Shaded areas are mesas and bedrock highlands.

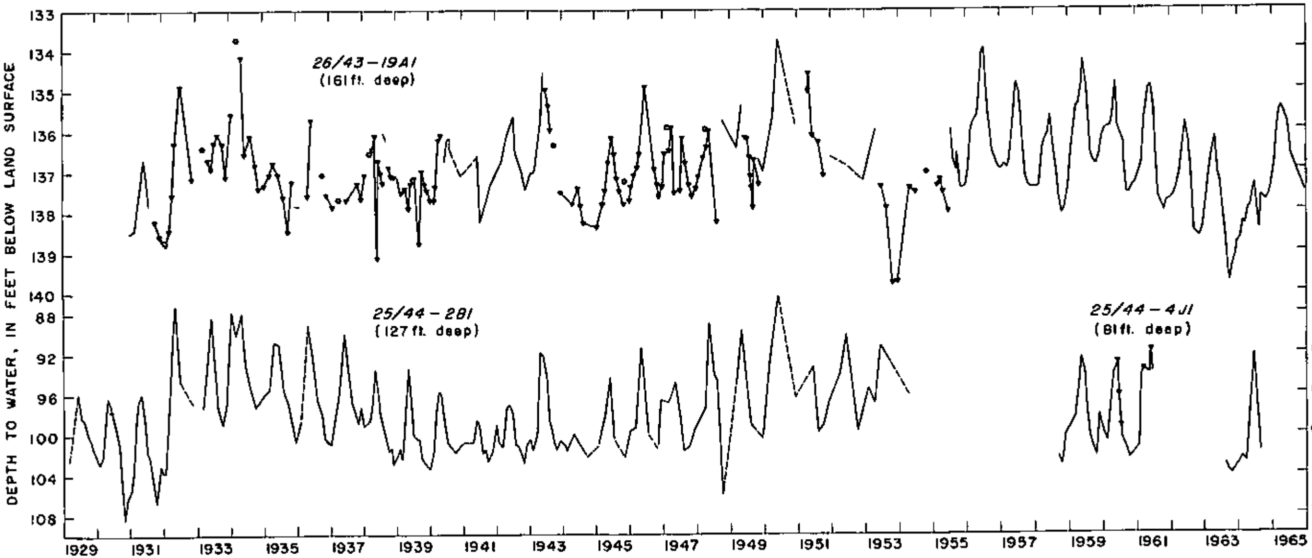


Figure 9 - Long-term water-level fluctuations in three wells, 1929-65. Triangle indicates measurement while well being pumped; dot indicates isolated static water-level measurement. Pumping water level is generally about half a foot or less below the static water level.

Hillyard Trough is less than that in wells in Spokane Valley (fig. 9) because this well (26/43-19A1) is a greater distance from the river.

Discharge by Evapotranspiration

Discharge of ground water from the project area by evapotranspiration occurs mostly in the summer, when temperatures are high and vegetation is abundant. However, probably less than one-tenth of the total annual ground-water discharge is by evapotranspiration. More than 50 percent of the potential 23-inch annual evapotranspiration occurs in May, June, and July, and 84 percent of the total occurs from May through September (fig. 3).

In the few places where the water table intersects the land surface, such as at streams, springs, and marshes, water can be freely evaporated at a rate comparable to the potential evapotranspiration. Where the water table is within roughly 10 feet of land surface, lesser amounts of ground water will be discharged by evapotranspiration. Such conditions occur generally along streams, and in much of the Deer Park basin north and west of Deer Park. Where the water table is generally below 10 feet below land surface probably little ground water is discharged by evapotranspiration, except where deep-rooted plants such as alfalfa, draw water from greater depths.

AVAILABILITY

The quantities of ground water produced from individual wells in northern Spokane and southeastern Stevens Counties vary considerably, ranging from many thousands of gallons per minute to little or nothing. Generally, to be adequate for domestic use, a well should yield at least 5 gpm.

Spokane Valley, Hillyard Trough and Little Spokane River Valley

The wells of greatest yield in the report area tap the thick glaciofluvial deposits in the deep preglacial valleys. The locations of the valleys are therefore very important, and are inferred, within limits, from drillers' logs of wells and from records of well yields, assuming that materials of maximum permeability are found only in the preglacial valleys.

The known deep preglacial valley beneath Hillyard Trough probably is a continuation of the preglacial Spokane River valley that lies beneath Spokane Valley east of Spokane (fig. 2). The ancient valley probably extends to the northwest, along the northeast side of Fivemile Prairie, thence westward beneath the Little Spokane River and back to the Spokane Valley. Although the present Little Spokane River valley north of Fivemile Prairie is narrow, projection of the steep slope of the sides beneath the valley fill at the same angle would put the bottom of the preglacial valley there as deep as it is beneath Hillyard Trough and Spokane Valley.

Yields of more than 5,000 gpm are obtained from the deposits in the Spokane Valley and Hillyard Trough (fig. 2), and considerably larger yields could be obtained if desired (table 3). Most wells only partly penetrate the glaciofluvial materials, and yet have only a few feet of drawdown when pumping at rates of thousands of gallons per minute. In a few places, however, large yields may be difficult to obtain because the water table is near or below the base of the sand and gravel deposits, and because relatively impermeable silt and clay layers occur in places in the sediments filling the valleys.

In the area south of Fivemile Prairie and north of the basalt outcrop in sec. 1, T. 25 N., R. 42 E. (pl. 2), consolidated rocks are probably not more than a few hundred feet below the surface. These rocks presumably form a subsurface dam across the deep preglacial Spokane Valley and block the downvalley movement of ground water. Much of the water thus blocked is diverted northward through Hillyard Trough to the Little Spokane River. Consequently, much of the glacial material south of Fivemile Prairie may be unsaturated or nearly so, thus greatly limiting the availability of ground water.

Whether or not a deep sediment-filled preglacial valley exists beneath Spokane Valley between Spokane and the confluence of the Little Spokane River is unknown. A preglacial valley probably does exist downstream from the confluence, however. If any deep preglacial valley extends down Spokane Valley beneath Spokane it must lie beneath sec. 36, T. 26 N., R. 42 E., because basalt is near or at the surface just south of the project area there.

The greater availability of ground water above Spokane Falls than below, due to the basalt barrier at the falls, is indicated by the much higher water levels that occur above the falls and in Hillyard Trough than in Spokane Valley to the west (pl. 1; Weigle and Mundorff, 1952, pl. 1). The marked difference between water levels east and west of the falls further suggests the following possibilities: (1) no deep preglacial valley exists just south of Fivemile Prairie (the most probable choice), and (2) the preglacial valley is narrow and(or) contains materials of relatively low permeability, thereby restricting the flow of the ground water through the valley.

Although glacial deposits yield large quantities of water in places downvalley from Spokane, the deposits are thin or missing, or are unsaturated or nearly so in other places. Granitic knobs protrude through the valley fill in several places (pl. 2), and some wells in the valley encountered granite at fairly shallow depths, such as at 104 feet in well 26/42-7G2, and at 187 feet in well 27/41-26P1. Although the latter well yields 1,950 gpm (table 3), other wells drilled in that part of the valley yield much less or are dry. Exploratory investigations are advisable before attempting to develop large ground-water supplies in that part of the project area.

Ground water is locally scarce in Spokane Valley at least half a mile upstream from Nine Mile Falls Dam, which is built on granitic rock (pls. 1 and 2). Ground-water levels in some places are lower than the reservoir level, and are near or below the base of the glaciofluvial deposits. For example, the water level in well 26/42-7G2 is about 60 feet lower than the reservoir level, but at about the same altitude as the river surface below the dam; only 15 feet of saturated sand and gravel overlies granite there.

Water levels in Spokane Valley above Spokane fluctuate about 5 to 15 feet during one year, and as much as 22 feet over a period of 25 years (wells 25/44-2B1 and 4J1, fig. 9). Water levels in the Hillyard Trough fluctuate much less than those in the Spokane Valley, the maximum measured variation being about 6 feet over a period of 35 years (well 26/43-19A1, fig. 9).

Northeast of Fivemile Prairie, from Hillyard Trough to the Little Spokane River valley, the ground-water surface drops much more rapidly (about 80 feet per mile) than it does in the southern part of Hillyard Trough and in Spokane Valley to the east (about 15 feet per mile) (pl. 1; Weigle and Mundorff, 1952, pl. 1). As in the area immediately south of Fivemile Prairie (p. 35), the steep gradient suggests either that the buried preglacial valley is narrow, or that it is partly blocked by bedrock or sediments of low permeability. Either of these conditions would restrict the flow of ground water and thereby cause the steep hydraulic gradient.

The controlling factor that affects the low rate of ground-water movement down the Little Spokane River valley is the restrictive narrowing of the valley between Fivemile Prairie and Lockhart Hill on the north side. That the preglacial valley may also be partly blocked by bedrock is suggested by the presence of granite at the surface; about a mile upstream at spring 26/43-7B1s the water flows across a ridge of granite.

Another buried preglacial valley probably extends northward from Hillyard Trough beneath Mead and east of the basalt and granitic rocks that are exposed in sec. 4, T. 26 N., R. 43 E. (pl. 2 and fig. 2). The depth to bedrock decreases rapidly to the north, and no deep preglacial valley exists 2 or 3 miles north of Chattaroy; outcrops of consolidated rocks across the valley in this area are shown in pl. 2.

In the Little Spokane River valley proper, from 3 miles north of Chattaroy to the Spokane River, the glaciofluvial and alluvial deposits where saturated generally yield large quantities of ground water. Wells produce as much as 1,700 gpm, and larger yields should be available.

A few wells in the northern part of the Little Spokane River valley yield several hundred gallons per minute. However, because the distribution, thickness, and topographic position of the geologic units vary markedly in short distances (pl. 2), yields vary considerably.

Moderate and even large supplies of ground water may be obtainable locally in other places. Generally less than 35 gpm is available from the granitic rocks, Latah Formation, Yakima (?) Basalt, and morainal deposits, which are at or near the land surface in much of the upper Little Spokane River valley.

Valleys Between the Mesas

In the valleys bordering the mesas east of the Little Spokane River (shown in fig. 2 as Peone Prairie, the area between Green Bluff and Orchard Bluff, and the area immediately north of Orchard Bluff) ground-water yields range from 0 to

600 gpm. The wide range in yields is due to the variety of rock types beneath these areas (glacial-lake deposits, glaciofluvial deposits, landslide debris, the Latah Formation, Yakima (?) Basalt, and granitic basement rocks). Small to moderate quantities of water are available from sand and gravel zones that occur mainly in the glaciolacustrine deposits. Less than 35 gpm can be expected from the clay and silt deposits that occur extensively in the valleys.

The rate of ground-water yield to wells below a depth of a few hundred feet is probably small (0-35 gpm), because of the absence of coarser glacial sand and gravel. Deeper wells are most likely to encounter the Latah Formation and perhaps landslide debris, except at the upper ends of the valleys where they become narrow and shallow, and glacial deposits overlie the granitic rocks. Depth to the basement rocks is probably the greatest in Peone Prairie. However, there the Latah Formation is probably the thickest and well yields would be small.

Deer Park Basin

The yields of wells in the Deer Park basin range from negligible quantities to about 500 gpm, and vary from place to place because of changes in composition, thickness, and depth of the geologic units. Moderate quantities of water are obtained mainly from sand and gravel beds in the glaciolacustrine deposits (table 2). The greatest reported yield is 500 gpm from well 29/43-31M1 near Deer Park, which taps fine to coarse sand to a depth of 192 feet. Spring 29/43-16M1s at the base of the high scarp just west of Lake Eloika also yields about 500 gpm, from sand and clay. Small quantities of water are generally available from the glacial-lake deposits and from the underlying Yakima (?) Basalt, Latah Formation, and granitic rocks.

Owing to the presence of consolidated rocks, as well as the fine-grained glaciolacustrine deposits, little or no water is obtained in some parts of the Deer Park basin, particularly in the vicinity of Clayton and to the north where much clay occurs. Depths to water in the Deer Park basin are generally shallow except along the eastern part of the basin near the Little Spokane River valley where water levels range from 101 to 147 feet below the surface.

Mesas

Ground water is generally available in small quantities beneath the mesas (Orchard Bluff, Green Bluff, Orchard and Pleasant Prairies, Foothills, and Fivemile Prairie). Wells drilled or dug on the tops and flanks of those mesas obtain water from the Palouse Formation, Yakima (?) Basalt, Latah Formation, landslide debris, and the intrusive igneous rocks. Because the relationships of the rocks to one another vary from place to place (fig. 4), the task of obtaining water on the mesas can be difficult and some wells do not produce enough for domestic use. The largest yields obtained on each mesa are tabulated as follows:

Mesa	Well number	Depth (feet)	Yield (gpm)	Draw-down (feet)	Source
Fivemile Prairie	26/42-23P1	578	30	--	Latah Formation
Orchard Bluff	26/44-30D2	113	35	17	Basalt
Pleasant Prairie	26/44-29A1	22	60	8	Glacial sand
Green Bluff	27/44-20A1	70	70	24	Granite, basalt

The most promising water-yielding zones atop the mesas are as follows:

(1) At the top of the basalt where it is buried. The basalt tends to restrict the downward movement of water so that it may collect in the overlying unconsolidated deposits or Latah Formation.

(2) At the base of the basalt. Where clay or shale of the Latah Formation underlies the basalt, ground water can be locally obtained within fracture zones at the base of the basalt.

(3) At the top of the buried granitic rocks. Ground water can be obtained in places where permeable zones in the Latah Formation are underlain by granitic rocks, or where the upper part of the granitic rocks is fractured or partly decomposed. However, because the depth to granitic rocks under some parts of the mesas is probably very great, any water-yielding zones at or adjacent to the surface of the basement rocks are generally inaccessible.

Bedrock Highlands

The basement rocks that underlie the highlands are of low permeability, and therefore are not important to the production of ground water. Only small quantities of water can be developed in the highlands, primarily in local valleys where thin deposits of alluvium or decomposed basement rocks have retained some ground water.

CHEMICAL QUALITY AND TEMPERATURE

Ground water in the project area, on the basis of analyses of 47 samples from 42 wells (table 11), is generally low in mineral content, is moderately hard to hard, and at some places has iron content great enough to cause staining of clothing and laundry fixtures. Calcium and magnesium are the predominant cations, ranging from 21 to 54 mg/l (milligrams per liter), and from 2.4 to 22 mg/l, respectively. Bicarbonate is the predominant anion, ranging from 37 to 228 mg/l.

The sulfate and chloride contents of ground water in the project area are low, with maximum recorded concentrations of 27 and 47 mg/l, respectively. A few wells, mostly in the northwestern part of the project area, reportedly yield water that is corrosive.

Dissolved Solids

In the samples where it was determined, the dissolved-solids content ranged from 94 mg/l to 243 mg/l and averaged 166 mg/l. In the samples in which dissolved-solids content was not determined, but in which specific conductance was measured, the dissolved-solids content of water in one well is interpreted to be as much as 460 mg/l and in two wells may be as much as 300 mg/l.

Hardness of Water

Hardness of the ground water sampled ranges from 43 mg/l to 348 mg/l, with values from three-quarters of the wells being between 60 and 180 mg/l. The distribution of hardness in samples of ground water in the project area is as follows:

Hardness as $CaCO_3$ (mg/l)	U. S. Geological Survey Classification	Number of well and spring waters in range (table 10)
0-60	Soft (suitable for most uses without softening)	3
61-120	Moderately hard (usable except in some industrial applications)	12
121-180	Hard (softening required by laundries and some other industries)	18
More than 180	Very hard (softening desirable for most purposes)	6

Iron

Iron is in solution in ground water pumped from many wells in the project area. Were the iron to remain in solution when the ground water is pumped to land surface it would--except in large concentrations--pass unnoticed. However, in the presence of oxygen, very little iron can remain in solution. This characteristic causes iron to be somewhat of a nuisance: deposits on clothing and laundry fixtures cause staining, and deposits in pipes reduce their inside diameter. Generally, the nuisance threshold is reached when the water contains at least 0.3 mg/l of iron. According to reports of well owners in the west part of the Deer Park basin, nuisance concentrations of iron are commonplace on Peone Prairie, and on Foothills mesa. Most ground water in Spokane Valley and Hillyard Trough contains no noticeable iron. Except for the generalized areal distribution described above, no pattern of iron occurrence has been detected.

The occurrence of iron in places may be controlled by the depth of the water-yielding zone. However, much more information is needed to define the relationship between iron content and ground-water environment. Both deep and shallow wells may or may not yield water containing iron; also adjacent wells of comparable depth may yield water containing dissimilar amounts of iron.

Temperature

The temperature of ground water discharged from inventoried wells and springs in the project area averages about 10 Celsius (centigrade) or about 50°F. Although the range in measured temperatures is from 6° to 16° C (42° to 61°F), about 80 percent of the temperatures are between 8° and 12° C (47° and 54°F). The average ground-water temperature in the area is approximately 2°C (4°F) above the average annual air temperature. The warmest water sampled was 16°C (61°F) from well 28/42-34J1, a 2,000-foot oil-test hole 5 miles south of Deer Park. This water is warmer because the earth's temperature increases with depth.

Suitability

The concentration of chemical constituents of ground water is generally low enough so that the water can be used domestically with little or no inconvenience. Where the use of the harder waters appears to require excessive amounts of soap, softening treatment will materially reduce the soap-consuming character of the water. For waters high in iron, simple aeration and filtration before storage generally reduces the iron content below the nuisance threshold.

The suitability of water for irrigation is dependent chiefly on (1) the total concentration of soluble salts, and (2) the relative proportion of sodium to other cations. According to Agriculture Handbook 60 (U. S. Salinity Laboratory Staff, 1954, p. 71), water having a conductivity (specific electrical conductance) of less than 750 micromhos per centimeter generally is satisfactory insofar as content of soluble salts is concerned.

Only one well in the project area had water with a conductance greater than this amount, namely 770 micromhos. In all but 5 of the 37 sampled waters, the specific conductance is less than 400 micromhos (table 11). In all the waters analyzed, the proportion of sodium among the cations is so low that no concern need be given to the possibility of crop damage from this cause alone.

For industrial use, the requirements of water are so varied that no criteria can be set up that will determine categorically whether or not ground waters from any part of the project area can be used without treatment. In most cases the amount of treatment necessary for use in any given process can be determined only after an analysis of the water.

GROUND-WATER USE

In 1964, about 9 billion gallons of ground water was pumped from the project area (table 6). Of the total, about 90 percent was withdrawn from that part of the Spokane metropolitan area that lies within the project area (fig. 8). Almost all that water was pumped by industrial and public-supply systems.

Almost all of the industrial use was by two plants in the Spokane area, one for the manufacture of paper, and the other for smelting aluminum.

The next largest use of ground water in 1964 was for public supplies. The largest withdrawal for public supply (1.5 billion gallons) was by the city of Spokane. However, this quantity of water withdrawn from within the project area was only 8 percent of the total city withdrawal; most of the city wells are south of the project boundary. Most of the other public-supply systems are north of the city, or to the east in Spokane Valley.

The third largest use of ground water in the study area was for irrigation. Approximately three-fourths of the water used for irrigation was pumped from wells, with the remainder coming from springs.

In 1964, 450 million gallons (about 5 percent of the ground-water withdrawal) was used for rural domestic and stock purposes. About two-thirds of the

Table 6 - Withdrawals and uses of ground water during 1964

Use	Approximate withdrawals (millions of gallons)	Percent of total
Industrial	4,400	48
Public supply	3,500	39
Irrigation	700	8
Rural domestic	300	3
Stock	150	2
Total	9,050	100

quantity was used for domestic needs and one-third for stock and poultry. Most of the water was pumped from wells; however, many springs also supply domestic and stock needs.

The use of ground water has been increasing, particularly in the Spokane metropolitan area. For example, the Spokane Terrace water system (wells 26/43-20N1 and 26/43-30R2) supplied only 30 homes in 1951, but in 1964 it supplied 950 homes. Another indication of the expanding ground-water use in the metropolitan area is the increase in number of large-capacity wells. Of those wells that are shown in figure 8, only half were in existence before 1950. The increasing use of ground water can be expected to continue. By 1980 withdrawals will probably be half again as much as in 1964. Most of the increase probably will be in the Spokane metropolitan area.

SUMMARY

The most productive aquifers in the project area are the glaciofluvial deposits that yield many thousands of gallons per minute to wells, and the glaciolacustrine deposits and alluvium that yield as much as 600 gpm. Wells tapping the Yakima (?) Basalt, Latah Formation, granitic basement rocks, Palouse Formation, and landslide deposits generally yield less than 35 gpm.

The areas most suitable for developing additional ground-water supplies are Spokane Valley, Hillyard Trough, and Little Spokane River valley. Where the deep preglacial valleys occur there, yields of as much as 20,000 gpm can be obtained from glaciofluvial deposits. Other areas suitable for ground-water development are the Deer Park basin and the valleys between the mesas where underlain by glaciolacustrine deposits. Little ground-water development can be anticipated in those parts of the mesas and highlands where bedrock is near the surface.

Ground water in the Little Spokane River basin comes from both direct precipitation, and from underflow moving north from Spokane Valley through Hillyard Trough. Estimates indicate that about one-fifth of the precipitation, or about 160,000 acre-feet, annually recharges the ground-water reservoir in the Little Spokane River basin, while roughly 130,000 acre-feet per year enters the basin as underflow through the glaciofluvial deposits in Hillyard Trough.

In 1964, about 90 percent of the 9 billion gallons withdrawn by wells in the project areawas from metropolitan Spokane. This withdrawal has had little effect on the hydrologic system. The total withdrawal is distributed as follows: industrial purposes, 48 percent; public supplies, 39 percent; irrigation, 8 percent; and rural domestic and stock supplies, about 5 percent. Withdrawals probably will increase by 1980 to half again as much as in 1964; most of the increase probably will be in the Spokane metropolitan area where a quantity of water many times the expected increase can be supplied from the glaciofluvial deposits that fill the deep preglacial valley. In the Deer Park basin withdrawals probably can be at least several times the amount withdrawn from that area in 1964 without seriously affecting the hydrologic system. A quantity of water sufficient for widespread irrigation is probably not available, however.

The quality of the water is generally good. Hardness of the water from three-fourths of the wells sampled was between 60 and 180 mg/l. Some water contains excessive iron.

REFERENCES CITED

Alden, W. C., 1953, Physiography and glacial geology of western Montana and adjacent areas: U. S. Geol. Survey Prof. Paper 231, 200 p.

Anderson, A. L., 1927, Some Miocene and Pleistocene drainage changes in northern Idaho: Idaho Bur. Mines and Geology Pamph. 18, 29p.

Berry, E. W., 1929, A revision of the flora of the Latah Formation: U. S. Geol. Survey Prof. Paper 154-H, p. 225-265.

Bretz, J H., Smith, H. T. U., and Neff, G. E., 1956, Channeled scablands of Washington: new data and interpretations: Geol. Soc. America Bull., v. 67, p. 957-1049.

Flint, R. F., 1936, Stratified drift and deglaciation of eastern Washington: Geol. Soc. America Bull., V. 47, p. 1849-1884.

-----1937, Pleistocene drift border of eastern Washington: Geol. Soc. America Bull., v. 48, p. 203-232.

Glover, S. L., 1941, Clays and shales of Washington: Washington Div. Mines and Geology Bull. 24, 368 p.

Griggs, A. B., 1965, Stratigraphic relationships between the Columbia River Basalt and the Latah Formation in Spokane area, Washington [abs:] Geol. Soc. America Spec. Paper 82, p. 328.

-----1966, Reconnaissance geologic map of the west half of the Spokane quadrangle, Washington and Idaho: U. S. Geol. Survey Misc. Geol. Inv. Map I-464.

Huntting, M. T., Bennett, W. A. G., Livingston, V. E., Jr., and Moen, W. S., compilers, 1961, Geologic map of Washington: Washington Div. of Mines and Geology.

Knowlton, F. H., 1926, Flora of the Latah Formation of Spokane, Washington, and Coeur d'Alene, Idaho: U. S. Geol. Survey Prof. Paper 140-A, p. 17-81.

Maytin, I. L., and Gilkeson, Raymond, 1962, Soils of Spokane County [Washington]: Washington State Univ., Washington Eng. Soils Manual, 198p.

Newcomb, R. C., and others, 1953, Seismic cross sections across the Spokane River Valley and the Hillyard Trough, Idaho and Washington: U. S. Geol. Survey open-file report, 16p.

Pardee, J. T., and Bryan, Kirk, 1926, Geology of the Latah Formation in relation to the lavas of the Columbia Plateau near Spokane, Washington: U. S. Geol. Survey Prof. Paper 140-A, p. 1-16.

Phillips, E. L., 1965a, Climate of Washington: U. S. Weather Bur., Climatography of the United States no. 60-45, 27 p.

-----1965b, Washington Climate for these counties-Adams, Lincoln, Spokane, and Whitman: Washington State Univ., Agr. Ext. Service, 64p.

Piper, A. M., and LaRocque, G. A., Jr., 1944, Water-table fluctuations in the Spokane Valley and contiguous area, Washington-Idaho: U. S. Geol. Survey Water-Supply Paper 889-B, p. 83-139.

Richmond, G. M., Fryxell, Roald, Neff, G. E., and Weis, P. L., 1965, The Cordilleran ice sheet of the northern Rocky Mountains, and related Quaternary history of the Columbia Plateau, in The Quaternary of the United States: Princeton, New Jersey, Princeton Univ. Press, p. 231-241.

Rorabaugh, M. I., and Simons, W. D., 1966, Exploration of methods of relating ground water to surface water, Columbia River basin-second phase: U. S. Geol. Survey open-file report, 62 p.

Simons, W. D., and others, 1953, Spokane-Coeur d'Alene River basin, Washington-Idaho, in Interior and Insular Affairs Committee, The physical and economic foundation of natural resources, pt. IV, Subsurface facilities of water-management and patterns of supply--type area studies: U. S. Cong., House of Representatives, p. 162-185.

U.S. Corps of Engineers, 1951, Seismic survey of the Spokane River Valley: Vicksburg, Mississippi, Waterways Expt. Sta., 9 p.

U. S. Weather Bureau, 1965, Mean annual precipitation, 1930-1957, State of Washington: Portland, Oreg., U. S. Soil Conserv. Service, Map M-4430.

Van Duyne, Cornelius, and Ashton, F. W., 1915, Soil survey of Stevens County, Washington: U. S. Dept. Agr., Bur. of Soils, 137 p.

Van Duyne, Cornelius, Mortlock, H. C., Heck, A. F., and Alvord, E. D., 1921, Soil survey of Spokane County, Washington: U. S. Dept. Agr., Bur., of Soils, 108 p.

Weaver, C. E., 1920, The mineral resources of Stevens County [Washington]: Washington Div. Mines and Geology Bull. 20, 350 p.

Weigle, J. M., and Mundorff, M. J., 1952, Records of wells, water levels, and quality of ground water in the Spokane Valley, Spokane County, Washington: U. S. Geol. Survey open-file report, 102 p.

Weis, P. L., and Richmond, G. M., 1965, Maximum extent of late Pleistocene Cordilleran glaciation in northeastern Washington and northern Idaho in Geological Survey research 1965: U. S. Geol. Survey Prof. Paper 525-C, p. C128-C132.

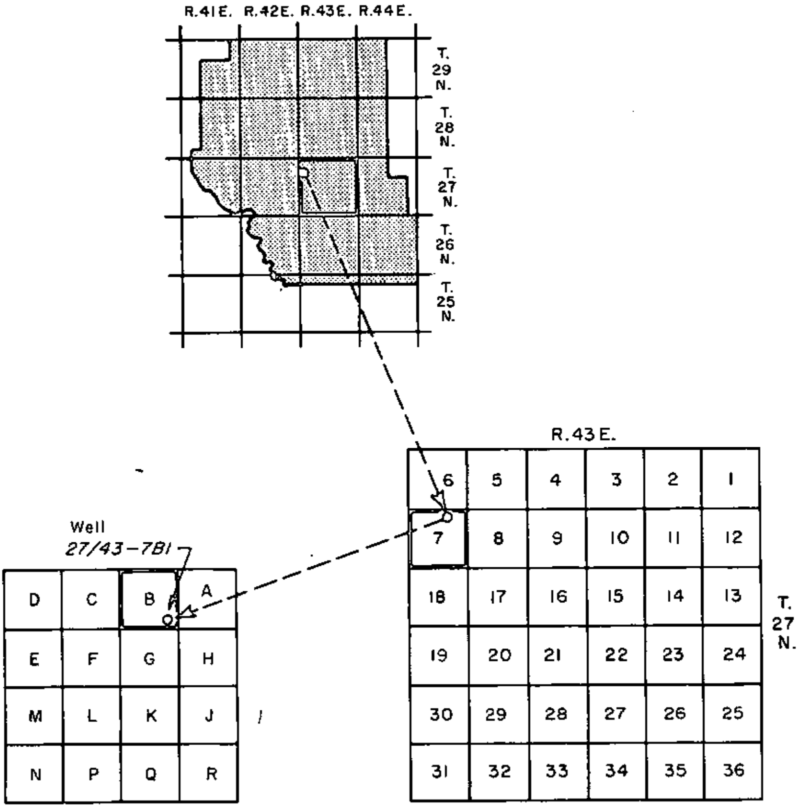
APPENDIX

WELL- AND SPRING-NUMBERING SYSTEM

A system of numbers and letters is used to designate the location of wells and springs in Washington (fig. 10). Using the example shown in figure 10, the second well inventoried in the NE¼ of the SW¼ of sec. 20, T. 28 N., R. 43 E., was designated well 28/43-20L2. The first part of the numbering system indicates the township and range; the number following the hyphen gives the section; and the capital letter gives the 40-acre tract within that section. The last number is the serial number, which is assigned according to the order in which the wells are inventoried in each 40-acre tract.

Springs are numbered in the same manner as wells, except that the letter "s" is added after the serial number. Thus, the first spring inventoried in the NE¼SW¼ sec. 20, T. 28 N., R. 43 E., would be designated 28/43-20L1s.

Figure 10 - Well-numbering system



BASIC DATA

Data in the appendix include records of representative wells (table 7) and springs (table 8), well logs (table 9), water-level measurements in observation wells (table 10), and chemical analyses of ground water (table 11). All wells and springs shown on plate 1 are included in table 7 and 8. Plate 1 also indicates which of the wells are observation wells and which of them have logs or chemical analyses. Well logs with three or more entries, or with long single or double entries, are included in table 9; otherwise, the log appears in the "Remarks" column of table 7.

Table 7 - Records of representative wells

Well number: Numbering system is described on pages 44-45.

Altitude: Land-surface altitude at well. Most values are interpolated from topographic maps.

Water level: Values indicate depth below land surface, unless preceded by a "+" or indicated as "flowing". A "+" after the number means that the depth to water is greater than the given number. A "p" after the number means that the water level was affected by pumping. Measurement date reported as summer is abbreviated "sum".

Water-yielding material: Geologic designations are based on well data and surficial geology, and are abbreviated as follows (see pl. 2 for more detailed information): pTu, plutonic and metamorphic rocks, undifferentiated; Tl, Latah Formation; Ty, Yakima (?) Basalt; Qp, Palouse Formation; Qls, landslide deposits; Qgl, Glaciolacustrine deposits; Qgf, glaciofluvial deposits; Qgu, undifferentiated glacial deposits; Qal, alluvium.

Pump type: C, centrifugal; J, jet; N, non; P, piston; S, submersible; T, turbine.

Pump Horsepower: G, gravity flow; H, hand-operated; W, wind-operated.

Use: D, domestic; De, destroyed; I, irrigation; In, industrial; N, not used; P, public supply; S, stock; T, test hole.

Remarks: C, chemical analysis in table 11; D, partial field analysis of uncertain accuracy listed by Weigle and Mundorff (1952, p. 99-102); dd, drawdown; diam, diameter; Fe, water contains noticeable iron; gpm, gallons per minute; hr, hour; hp, horsepower; I, well yields inadequate amount of water; L, log in table 9; max, maximum; min, minutes; N, well yields little or no water; O (1947-65), observation well, with period of record in parentheses, (see table 10); perf, perforated casing; mg/l, milligrams per liter; temp, temperature; Tl, Latah Formation. Most yield and drawdown data are reported by driller or owner.

Table 7 - Records of representative wells

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 25 N., R. 42 E.												
3H1	City of Spokane, wells 10, 11, (Baxter Station)	124	132	144-24	1,679	26.52 13.7	4-10-51 8-13-65	Gravel, boulders; Qgf	T	200,200	P	Pumps 2,600 gpm. Pumped 1,300 gpm for 4 hr, dd 1 ft. Used in summer only. Temp 52°F. C,D,L.
T. 25 N., R. 43 E.												
4B1	City of Spokane, well 8, (Hoffman Ave. Station)	212	212	72-60	2,047	171.8	8-13-65	Gravel, sand; Qgf	T	600	P	Fine gravel, sand, 193-212 ft. Perf., 198-212 ft. Pumped 5,800 gpm for 4+ hr, dd 9.1 ft. Used in summer only.
4B2	City of Spokane, well 9, (Hoffman Ave. Station)	227	227	72-48	2,047	171.8	8-13-65	Gravel, sand; Qgf	T	600	P	Perf., 208-227 ft: Pumped 5,800 gpm for 4 hr, dd 7.0 ft. Used in summer only. Temp 52°F. C,L.
T. 25 N., R. 44 E.												
2B1	Trentwood Irrig. Dist. 3, well 1	127	127	72	2,035	99p	4-30-65	Sand, gravel; Qgf	T	75,50,20	P	Pumps 1,800 gpm. C,D,O(1928-54).
3A1	Trentwood Irrig. Dist. 3, well 2	148	148	12	2,015	81	9- 1-47	Sand, boulders; Qgf.	T	75	P	Perf., 77-147 ft. Pumps 1,000 gpm; pumped 540 gpm for 4 hr, dd 2 ft. L.

4J1	Ideal Cement Co.	81	81?	96	1,974	61.47p 70.30	5-25-51 9- 9-58	-- --	T	30, 30	In	Temp 50°F. D, 0 (1958-65).
4R3	Irvin Water Dist. 6, well 3	118	118	16	1,989	73.06	4-30-65	Gravel, cobbles; Qgf	T	100	P	Perf., 82-112 ft. L.
5D1	Pasadena Park Irrig. Dist. 17, well 3	202	157	16-14	1,996	89.52	4-29-65	Sand; Qgf	N	--	N	Screen, 157-172 ft, 182-202 ft; cased 172-182 ft. Pumped up to 2,700 gpm for 3 hr, dd 26.7 ft. Temp 51° F. 150 hp turbine pump to be installed. L.
5D2	Pasadena Park Irrig. Dist. 17	239	225	8	1,996	--	--	-- --	--	--	DeT	L.
5K1	Pasadena Park Irrig. Dist. 17, well 2	234	234	16	1,958	50	4-28-65	Sand, gravel; Qgf	T	150	P	Perf., 50-70 ft, 190-232 ft. Pumped 1,500 gpm for 4 hr, dd 2.5 ft. L.
5N1	Inland Empire Paper Co.	98	98	6	1,963	57.16	4-14-42	Gravel; Qgf	N	--	NT	
5N2	Inland Empire Paper Co., "New well"	120	120	120-20	1,954	41.00 40.00p	12- 5-56 4-28-65	Gravel; Qgf	T	200,200	In	Perf., 71-75 ft, 78-120 ft. Pumps 6,000 gpm; pumped 3,500 gpm, dd 8.5 ft.
5N3	Inland Empire Paper Co., "Mill well"	46	46	72	1,941	25.38	12- 5-56	Gravel; Qgf	T	100	In	Perf., 39-46 ft. Pumps 1,400 gpm.
5P1	Inland Empire Paper Co., "Domestic well"	42	42	120	1,943	18.69	4-28-65	Gravel; Qgf	T	100,75, 30	In	Pumps 1,000 gpm. Standby well.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 25 N., R. 44 E. - Cont.												
6A1	Pasadena Park Irrig. Dist. 17, well 1	104	104	84-46	1,982	84.20 85.4	4-15-42 2- 5-62	Gravel; Qgf	T	100, 50	P	Gravel, 0-104 ft. Perf., 88-104 ft. Pumped 1,550 gpm, dd 1 ft. C.
T. 26 N., R. 42 E.												
2N1	Pat Barrett	29	--	72-6	1,560	8.95	1-17-63	Sand & gravel? Qgf?	C	5, 1	D	
3E1	J. W. Willis	12	--	36	1,555	6.36 6.95	5-19-51 1-17-63	--	C	1½	D	Temp 49°F. D.
3E2	C. W. Charlton	11	12	48	1,558	3	--	Sand, gravel; Qal	CPT	1, 1½, 3	D	Sand, gravel, 0-11 ft. Pumped 160 gpm for 3 hr, dd 3 ft. Supplies 2 houses.
4L1	A. C. Rettig	9	--	12	1,550	6.61 8.13	5-17-51 8-19-65	--	C	1½	D	Temp 50°F. D.
5F1	R. M. Brown	15	15	48-60	1,545	4.40 5.71p	5-17-51 8-19-65	Gravel, sand and boulders; Qgf	J	3/4?	D	Perf., 7½-15 ft. Pumped 105 gpm, dd 3½ ft. Temp 50° F. D, L.

7G2	Juanita Ramey	106	104	8	1,628	89	7- -63	Sand, gravel; Qgf	J	--	D	Sand, pea gravel, 0-104 ft; granite, 104-106 ft. Perf., 92-97 ft. Pumped 30 gpm, dd 0 ft; inadequate now because sand enters well, has filled to 95 ft. Temp 55°F. D.
12L1	Washington Water Power Co., Kingswood Addition	136	136	12	1,705	88.30	3-30-65	Sand, gravel? Qgf	JS	5, 10	P	Perf., Reported yield 1,000 gpm. Supplies 35 houses. Temp 56°F. C.
13P1	James Bledsoe	53	8	48	2,405	38.59	7-21-64	Sand, clay; Tl	N	--	N	I.
13P2	James Bledsoe	70	15	4	2,405	40.66	7-21-64	Sand, clay; Tl	J	3/4	D	L.
14C1	Doris Sijer	42	13	60	2,420	33.85	7-21-64	Basalt; Ty	J	½	DS	Fe, I.
14F1	Kenneth Kempe	53	15	60	2,430	52.41	7-21-64	Basalt; Ty	N	--	N	Sand, 0-15 ft; basalt, 15-53 ft. I.
16P1	Sundance Golf Course, Inc.	96	86	6	1,675	65	6- -64	Sand; Qgf?	S	1½	D	Topsoil, gravel, "overburden", 0-26 ft; sand with clay streaks, 26-97 ft. Screen, 86-96 ft. Pumped 13 gpm for 1 hr, dd 9 ft.
16P2	Sundance Golf Course, Inc.	101	80	14	1,660	62.15	8-12-65	Sand; Qgf ?	T	40	I	"Overburden", boulders, 0-35 ft; sand interspersed with layers of clay, 35-101 ft. Screen, 80-101 ft. Pumped 450 gpm for 2 hr, dd 4 ft.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 42 E. - Cont.												
16P3	Sundance Golf Course, Inc.	98	75	12	1,660	57.41	8-12-65	Gravel; Qgf	N	--	N	Screen, 75-98 ft, plugged 98-100 ft. Pumped 700 gpm, dd 3 ft. 40 hp turbine pump to be installed. L.
21G1	Gertrude Hubler Estate	65	65	72	1,661	57.11 55.25	12-15-41 8-28-65	Gravel; Qgf	N	--	N	Temp 53°F. D.
21Q1	James Bryson	85	85	12	1,655	55	--	Gravel; Qgf	T	15	I	Gravel, some boulders 0-85 ft. Perf.
23J1	Owen Click	32	32	36	2,365	26.44	7-22-64	-- Qp	C	½?	DS	Supplies 3 houses.
23L2	R. F. Weinhandl	66	13?	6	2,370	30.32	10-28-64	Basalt; Ty	N	--	N	Black "dirt", 0-12 ft; basalt, 12-66 ft. Yields 12 gpm.
23P1	Robert Titars	578	578	6-4	2,360	552	1959	Sand; Tl	S	3	DI	Perf. Yields 30 gpm. Used for greenhouse. L.
23P2	James Bledsoe	284	284	5	2,350	198.63	7-22-64	Sand; Tl	N	--	N	Well has filled with sand to 199 ft. N.

23P3	James Bledsoe	102	102	3	2,360	Dry	--	-- --	--	--	T	Basalt, 0-?; yellow and white clay; fine sand to 102 ft. Plugged at 36 ft. N.
23P4	James Bledsoe	90	9	36	2,350	84.09	7-22-64	Basalt? Ty?	P	3/4	N	Only yields 300 gallons per day. N.
25H1	Robert Avey	71	4	6	2,330	--	--	Basalt; Ty	J	--	D	Yields 10 gpm max. I, L.
25P1	C. L. Shuler	355	107	12	2,060	222.12	4-13-65	Sand; basalt? Tl; Ty?	N	--	N	Pumped 50 gpm. L.
25R1	Gary Owens	150	--	6	2,030	--	--	Sand; --	--	--	De	Sand (?), 0-150 ft.
25R2	Western Builders	230	130	6	2,025	97.96	5- 3-65	"Rock". --	N	--	N	Pumped 360 gpm, dd 25.6 ft. L.
27N1	W. K. McCrea	129	129	6	1,690	60-70	--	Sand? Qgf?	J	3/4?	D	Perf., 118-129 ft. C.
27N2	D. R. Costello	150	150	6	1,710	90	--	Gravel; Qgf	?	1½	D	Perf., 140-150 ft. Pumped 60 gpm, dd 0 ft. C, L.
28R1	Spokane Rifle Club	17	--	12	1,625	9.43	5-17-51	-- --	--	--	De	
28R2	Spokane Rifle Club	39	39	6	1,625	14.64	4-12-65	Sand; Qgf	J	½	D	Medium sand, 0-39 ft. Pumped 170 gpm for 48 hr, dd 1 ft.
34N1	Fairmount Memorial Park	22	22	48	1,650	10.30p 10.66	4-24-51 4-13-65	Sand, gravel; Qgf	T	40	I	Coarse sand, gravel, 0-24 ft; finer sand at 24 ft. Pumped 300 gpm, dd 0.5 ft. Temp 49°F. D.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 42 E. - Cont.												
34N2	Fairmount Memorial Park	16	16	48	1,649	9.06	4-24-51	-- Qgf	--	--	De	
34N3	Fairmount Memorial Park	71	71	12	1,650	14	--	Sand, gravel; Qgf	T	100	I	Perf., 40-69 ft. Pumped 1,500 gpm, dd 13 ft. Temp 50° F. L.
34N4	Fairmount Memorial Park	60	60	6	1,650	--	--	Sand, gravel; Qgf	T	30	I	
T. 26 N., R. 43 E.												
1D1	O. B. Humphries	112	112	24	1,870	104.15	11-14-62	-- --	J	1	DS	Fe.
2A1	O. B. Humphries	150	--	6	1,870	100	1957	-- --	N	--	N	
2M1	Leighton Kern	37	37?	12	1,880	32.35	11-20-63	Sand; Qgl?	J	3/4	D	
2P1	Ray Lessig	15	15?	12	1,870	12.68	11-20-63	-- --	J	½	D	Perf. Pumps 12 gpm.
2Q1	Milton Gaskill	18	18?	36?	1,880	15	--	Sand; Qgl	J	3/4	DS	Fe.

3R1	Jack Dschaake	40	40?	36?	1,880	32.86	11-20-63	Sand; Qgl	J	3/4	D	Fe.
4P1	Mead School Dist. 354	146	126	12	1,830	85	7-17-64	Sand; Qgl or Qgf	T	30	I	Screen, 126-146 ft. Pumped 390 gpm for 24 hr, dd 44 ft. Temp 48°F. L.
6G1	RiVilla Water Co.	30	30	12	1,580	8.27	3-30-65	Gravel; Qgf	C	7½, 10	P	Clay, gravel, sand, 0-18 ft; clean "water" gravel, 18-30 ft. Perf., 21-29 ft. Pumped 800 gpm, dd 3 ft. Supplies 12 houses. Temp 49°F. C.
7P1	Washington Water Power Co., Woodway Park	126	93	16	1,780	43.42	5- 7-63	Sand, some gravel; Qgf	T	40	P	Screen 93-114 ft; cased 114-126 ft; plugged, 126-180 ft. Pumped 1,700 gpm for 10 hr, dd 6 ft. L.
7Q1	Marr Estate	88	88?	72	1,795	76.31 75.68	4-27-42 5- 7-63	Gravel; Qgf	N	--	N	Gravel, 0-88 ft. Pumped 300 gpm, dd 4 ft. O(1942-53).
8B1	M. F. Deshler	54	54	6	1,775	40	10- -63	Sand; Qgf or Qgl	J	3/4	D	Perf. at bottom. Pumps 8 gpm.
8B2	Meader	63	--	10	1,790	55	9- -63	Sand, rocks; Qgf or Qgl	JS	½-1	D	Supplies 5 houses. Well has 5 pumps. Fe.
8B3	Paul Lemn-Maragg	65	--	30	1,790	49+	--	Sand; Qgf or Qgl	J	1	DS	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing: Depth (ft)	Casing: Diam (in)	Land surface altitude (ft)	Water level: Below land surface (ft)	Water level: Date	Water-yielding material & Geologic designation	Pump: Type	Pump: Horse-power	Use	Remarks
T. 26 N., R. 43 E. - Cont.												
8B4	Washington Water Power Co., Mead well 2	90	90	12	1,765	38	--	Coarse sand, silt; Qgf or Qgl	T	25	P	Reportedly drilled to 620 ft in blue sand, silt. Perf., 59-88 ft. Pumped 480 gpm dd 9.5 ft. Temp 52°F. C, L.
10K1	Washington Water Power Co., Mead well 1	106	106	48-22	1,910	88.80	3-29-65	Sand, gravel; Qgf	T	10, 25	P	Perf. Yields 4,500 gpm. C, L.
11B1	Ronald Wicklund	21	21	36?	1,870	16.55	11-20-63	-- --	J	3/4	DS	Fe.
11C1	Kathleen & Ethlyn DeCamp	15	15	60	1,865	8.55	11-20-63	Sand; Qgl	J	1	D	Fe.
11F1	Kathleen & Ethlyn DeCamp	42	42	54	1,870	12.64	11-20-63	Sand; Qgl	C	3	I	Perf., 21-30 ft. Pumps 80 gpm. Fe, L.
11F2	Kathleen & Ethlyn DeCamp	35	--	--	1,865	10	4- -65	Sand? Qgl	C	10	I	Pit, 60 x 100 ft. Pumps 600 gpm. C.
11N1	J. L. Johnson	50	50	30	1,890	Dry	11-18-63	-- --	N	--	--	Sand in well stopped use.

11Q1	Abram	22	22	30	1,890	18.57	11-18-63	-- --	J	½	D	Fe.
11Q2	Abram	125	125?	6	1,890	120.75	11-18-63	-- --	N	--	N	
12F1	Richard Martens	26	--	30?	1,860	21	1962	-- --	J	--	D	
12G1	C. V. Brand	363	355	6	1,860	102.65p	9- 9-63	Very fine sand; Tl	S	1½	S	Blue clay, 0-350? ft; very fine blue-gray micaceous sand, 350?-363 ft. Bottom of well filled with gravel. Used to water yard also. Temp 52°F. C, Fe.
12G2	C. V. Brand	37	37	36-96	1,860	24.82	9- 9-63	-- --	C	½	D	Only enough water for domestic use.
13E1	Kelley Cooper	120	--	6?	1,960	--	--	-- --	--	--	DS	Fe.
13E2	W. L. Richter	18	18	36?	1,960	4.59	11-18-63	Sand, Qgl	C	3/4	D	
13G1	George Shauvin	12	12	48	1,885	2.75	11-18-63	Sand; Qgl	J	1/3	D	
14A1	R. A. Elston	45	45	36	1,935	44.52	11-18-63	Sand; Qgl	P	3½	DS	Fe.
16D3	Kaiser Aluminum and Chem. Corp., well 4	286	286	20-16	1,938	160	4-17-51	Sand, gravel; Qgf	T	250	N	50 ft of perf. Pumped 3,100 gpm; pumped 2,500 gpm for ½ hr, dd 30 ft. Not used because pumped sand. Temp 52°F. D, L.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 43 E. - Cont.												
16F2	Kaiser Aluminum and Chem. Corp., well 5	268	238	24-18	1,940	157	4-25-55	Sand, gravel; Qgf	T	400	In	Screen, 238-268 ft. Pumped 2,300 gpm, dd 4.6 ft. Temp 53°F. C, L.
16F3	Kaiser Aluminum and Chem. Corp., well 6	284	242	30-18	1,940	161.5	10-27-63	Sand, gravel; Qgf	T	250	In	Screen, 242-283 ft. Pumped 5,000 gpm, dd 10 ft. L.
16G1	Bonneville Power Admin.	556	346	10	1,942	154	11-24-42	Sand, gravel; Qgf	N	--	N	Perf. in many places; sand enters well. L.
17B1	Nelson Landscaping Service	224	224	8-6	1,940	173.51	5- 1-64	Sand, gravel; Qgf	N	--	N	Perf., 199-220 ft. Pumped 50 gpm for 2 hr, dd 0 ft. L.
17J1	El Paso Natural Gas Co.	248	248	6	1,945	175.12	4-27-65	Coarse sand, gravel; Qgf	S	1	D	Perf., 228-243 ft. Pumped 55 gpm, dd 5 ft. Temp 52°F. L.
18G1	Whitworth College	200	200	72-31	1,915	160.80	12-23-41	Coarse sand, pea gravel; Qgf	T	50	P	Coarse sand, fine gravel, 20-200 ft. Perf., 160-200 ft. Pumps 460 gpm.

19A1	Whitworth Water Dist. 2, well 1	161	161?	74-60	1,936	137.06 136.86	1-22-38 1-21-65	Gravel; Qgf	T	60, 100, 100	P	Pumped 1,000 gpm, dd 3 ft. Temp 50° F. C, D, O(1931-65).
19P1	Town and Country Utilities Co., well 2	210	210	16	1,975	155	--	Sand, gravel, boulders; Qgf	T	150	P	Perf. Pumped 1,560 gpm, dd 17.0 ft. L.
20D1	Whitworth Water Dist. 2, well 2	286	253	16	1,950	152	6-12-62	Sand, gravel; Qgf	T	150	P	Screen, 253-286 ft. Pumped 1,800 gpm for 4 hr, dd 9 ft. L.
20J1	Washington Water Power Co.	430	270	6	2,011	190.28	5- 2-63	Fine sand; Qgf	N	--	T	Perf., 195-215 ft; well filled to 193 ft with sand. L.
20J2	Washington Water Power Co.	761	768	3-4	2,011	215.56 214.60 213.94	2- 7-63 3- 7-63 5- 2-63	Sand, boulders; Qgf	N	--	T	Perf., 755-759 ft; plugged, 761-780 ft. Water added at 107 gpm for 43 hr, rise 0 ft. C, L.
20N1	Washington Water Power Co., Spokane Terrace well 2	238	238	12	2,040	208.19	3-29-65	Sand, some gravel; Qgf	T	125	P	Pumps 1,000 gpm.
23F1	David Durheim	365	88	5	2,385	275	--	Sand; Tl	P	3	D	Sand enters well.
23G1	Fred VanLeuven	230	230?	6	2,325	152.52	9-16-64	White sand; Tl	S	1½	DS	Pumps 10 gpm.
23G2	Fred VanLeuven	61	40+	48	2,320	54.78	9-16-64	Basalt; Ty	J	3/4	N	Yields 2 gpm. Fe, I.
23R1	Washington Parks & Recreation, Comm., St. Michael's Mission	8	--	36	2,140	8.06	9-10-64	-- --	--	--	N	I.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 26 N., R. 43 E. - Cont.												
24H1	R. W. Lage	56	56	24	2,385	43.12	9-25-64	Sand? Qp	J	½	DS	Red clay, 0-56 ft; water at 56 ft, from sand zone?
24J1	Roy Cutler	100	--	30-5	2,375	--	--	Basalt; Ty	--	--	De	Red clay, 0-56 ft; basalt, 56-100 ft.
24K1	Roy Cutler	39	39	30	2,345	29.71	9-15-64	Sand & clay? Qp	J	½	N	Clay at bottom. I.
24L1	Roy Cutler	250	250	5	2,350	188.77	9-15-64	Fine sand; Tl	N	--	N	Well filled, 250-262 ft. Pumped 18 gpm until earthquake allowed sand to enter well.
24L2	Roy Cutler	43	43	30	2,350	37.85p	9-15-64	Clay, sand; Qp	J	½	D	Clay and sand layers, 36-43 ft. Yields 5 gpm. Supplies 2 houses. Temp 52° F. C.
24L3	Maynard Cutler	40	32	6	2,345	25	9-15-64	Sand; Qp	J	3/4	--	Screen, 32-40 ft. Yields 7 gpm. Used to water yard. L.
24N1	Walter Highberg	365	340	6	2,295	274.60	9-14-64	Sand; Tl	S	1	D	Well filled, 365-370 ft. Yields 25 gpm. Temp 57°F. C, L.

24N2	Walter Highberg	21	5	60	2,280	8.97	9-14-64	Basalt; Ty	J	1/3	N	"Dirt", 0-5 ft; basalt, 5-30 ft. Plugged, 21-30 ft. Flows in spring at times. Inadequate; in summer after pumping water level rises only a few in. in 24 hr. Water is corrosive.
24P1	A. A. Jensen	32	32	24-48	2,355	24.99	9-14-64	Sand, clay; Qp	J	½	D	Yields 3 gpm. I.
24P2	A. A. Jensen	35	35	36-54	2,355	24.47	9-14-64	Sand, clay; Qp	J	1	--	Used to water yard, gardens. I.
24P3	A. A. Jensen	91	34	6	2,360	62.65	9-14-64	Clay; Tl	J	½	--	Yields ½ gpm. Used to water yard, garden. I.
24P4	A. A. Jensen	131	--	6	2,355	--	--	-- --	--	--	De	N.
24R1	Carrie Nelson	47	10	36	2,315	39.89	9-28-64	Basalt; Ty	JP	3/4?,H	D	"Dirt", 0-10 ft; basalt, 10-47 ft. I.
25G1	Spokane Co. Fire Protection Dist. 9 Orchard Prairie Fire Station 4	85	55	6	2,225	21.23	9-10-64	-- --	J	3/4	D	"Rock" at 55 ft. Screen, 39-49 ft. Used to fill fire trucks also.
25G2	Central Grange	60	--	6	2,225	21.29	9-25-64	-- --	J	½	D	
25G3	Marjorie Havercroft	170	130	8	2,255	50.75	9-28-64	Quartzite; pTu	N	--	N	Yellow brown sticky clay, 0-120 ft; hard white quartz with Fe stain, 120-170 ft. Perf., 120-130 ft. Yields 9 gpm.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 43 E. - Cont.												
25G4	Marjorie Havercroft	48	--	6	2,255	36.31	9-28-64	Clay; Tl	--	3/4	D	Yellow brown sticky clay, 0-48 ft. l.
25J1	Don Renz	50	50	36	2,320	39.95	9-25-64	Gravel, some clay & sand; Qgu	J	1	D	Gravel, some clay & fine sand, 0-50 ft; granite at 50 ft. Yields 1½ gpm. l.
25R1	Edward Sharman	78	40	6	2,320	40.02	9-28-64	Decomposed granite; pTu	J	½	D	Yellow & orange clay, 0-40 ft; decomposed granite, 40-78 ft. Yields 4 gpm.
25R2	Edward Sharman	73	40	6	2,320	39.59	9-28-64	Decomposed granite; pTu	N	--	N	
27E1	North Spokane Irrig. Dist. 8, old well 1	237	237	84-44	2,032	185.84	3-18-42	Sand & gravel? Qgf	--	--	P	Temp 51°F. C, D. Two 16-in. casings, called wells 1 & 3, were later placed 1 ft apart inside the original 237-ft well, and gravel was packed around them to the surface. Wells 1 & 3 pumped 2,200 gpm, dd 8.5 ft.

	new well 1	258	231	16	2,032	190	5- 2-64	Sand and gravel? Qgf	T	100	P	Screen, 231-251 ft. Cased 251-262 ft. Plugged at 258 ft.
	well 3	257	232	16	2,032	190	5- 2-64	Sand and gravel? Qgf	S	100	P	Screen, 232-252 ft. Cased 252-264 ft. Plugged at 257 ft.
28D1	C. C. Calkins	310	310	30-19	2,025	197.02	10- 9-64	Sand, gravel; Qgf	T	125	N	Perf., 210-292 ft. Pumped 1,250 gpm, dd 9 ft. L.
28H1	North Spokane Irrig. Dist. 8, well 2	250	--	96	2,031	190	5- 2-64	Sand, gravel; Qgf	T	100	P	
28M1	C. C. Calkins	251	251	40	2,051	211.91	10- 9-64	Sand; Qgf	T	100	I	Perf., 211-251 ft. 94-in. diam. well 184-207 ft. Pumps 1,200 gpm. Pumped 1,000 gpm, dd 4 ft. L.
29R1	G. S. Charter	259	259	8	2,053	209.53	7-16-64	Gravel, some sand; Qgf	N	--	N	Perf., 239-259 ft. Supplied trailer court in past. Temp. 54°F. L.
30F1	Town and Country Utilities Co., well 1	312	312?	16	2,050	210	--	Sand, gravel; Qgf	T	75	P	Perf. Pumped 900 gpm, dd 22 ft. Temp 48°F. L.
30G1	Holy Cross Cemetery	220	220	60-36	2,046	204.77 203.79	4-21-42 3-25-65	Sand; Qgf	T	40, 60	DI	Topsoil, 0-2 ft; fine, coarse sand layers, 2-220 ft. Perf., 200-220 ft. 132 in. diam. well 165-195 ft. Pumped 150 gpm, dd 0.22 ft.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 43 E. - Cont.												
30R2	Washington Water Power Co., Spokane Terrace, well 1	293	293	16	2,070	230.45 229.00	11-16-51 3-29-65	Sand, gravel; Qgf	T	150	P	Perf.? Pumps 1,200 gpm. C. Labeled 30J1 by Weigle & Mundorff (1952, p. 74).
31A1	City of Spokane Central Ave., well 1	270	270	96-84	2,081	225	8-13-65	Sand, gravel; Qgf	S	450,450	P	Perf., 214-265 ft; plugged, 270-272 ft. 192-in. diam. well, 170-210 ft. Pumps 8,000 gpm. Pumped 4,200 gpm, dd 3 ft. Used in summer only. Temp. 52°F. L.
31A2	City of Spokane, Central Ave., well 2	270	270	96-84	2,081	225	8-13-65	Sand, gravel; Qgf	S	450,450	P	Perf., 214-265 ft. 192-in. diam. well, 170-210 ft. Pumps 8,000 gpm. Used in summer only.
31A3	City of Spokane, Central Ave. Station	280	280	6	2,081	213.68 210.88 216.56	12- 8-59 5-31-60 9-20-60	Sand, gravel; Qgf	N	--	DeT	L.

34E1	Robert Camp	190	190	60-42	2,049	172.90	4-27-65	Very coarse gravel; Qgf	C	30	D	Gravel with much "dirt", 0-10 ft; very coarse gravel, 10-190 ft. Perf., 166-190 ft. Pumped 300 gpm. Supplies warehouse. Used for ice plant in past. Temp 52°F. D.
T. 26 N., R. 44 E.												
3G1	Herbert Jacobson	127	--	6	2,420	96	9- 9-63	-- --	J	1½	D	
3Q1	W. C. Wruble	113	--	8	2,410	106	--	Clay; Tl	J	3/4	D	Fe.
4E1	Albert Riedinger	15	--	36?	1,890	--	--	-- --	J	½	D	Fe.
4G1	Diamond Ashle	12	9	36?	1,900	3.60	11-15-63	Clay; Qls	J	½	D	Fe, I.
4N1	Clarence Bicha	85	--	30	1,880	56.75	11-15-63	-- --	J	½	DS	Fe.
5N1	Oscar Feryn	12	12	36	1,820	0.98	11-19-63	-- --	J	1½	I	Fe.
5N2	Oscar Feryn	12	12	48	1,820	--	--	-- --	J	1	DS	Fe.
5Q1	Royder Hintz	22	22?	30?	1,845	11	1963	Sand, gravel; Qgl	J	3/4	D	L.
7R1	Leonard Durheim	100	100	36?	1,970	91.70	11-19-63	-- --	J	1	N	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 44 E. - Cont.												
8A1	C. G. Jamieson	22	22?	6	1,840	14	--	Sand; Qgl	C	1½	DS	Fe.
8Q1	P. A. Hedrick	25	25	54	1,960	16.65	11-20-63	Sand; Qls	J	1½	D	Fe.
10A1	C. F. Goodman	28	--	48	2,405	20.92	1-10-64	-- --	J?	½ ?	D	Fe, I.
10C1	Calvin Hudlow	120	--	6	2,400	102.36	1- 9-64	-- --	S	1	D	Fe.
10H1	M. J. Arnhold	110	--	6	2,410	60	--	Clay; black basalt; Tl; Ty	J	3/4	DS	Fe.
11E1	Howard Capell	--	--	8	2,420	83.25	1-15-64	-- --	J	3/4	D	Fe.
11Q1	J. E. Olinger	100	96	6	2,380	41.32	1- 9-64	Clay; Tl	P	3/4	DS	
12N1	J. W. Steel	85	--	6	2,400	--	--	Granite; clay; pTu?	J	½	DS	Fe.
13D1	Earl Reinbold	14	--	60	2,410	3.01	1-16-64	Sand & clay ? Qp?	J	¼	DS	Fe.

14E1	Carol McConahy	13	13?	72	2,415	12.31	1-16-64	Sand, red clay; Qp	P	3/4	D	Fe.
14F1	W. H. Hagemann	12	12?	24	2,415	11.52	1-15-64	Sand; Qp	P	H	D	Fe.
14H1	Quinton	24	--	48	2,410	2.33	1-16-64	-- --	J	½	D	Fe.
14M1	Carol McConahy	10	10?	48	2,410	6.96	1-16-64	Sand, clay; Qp	P	3/4	D	Fe.
14R1	Everett Martin	230	--	6	2,430	28.00	1-14-64	Sand, clay; Tl	N	--	N	
14R2	Everett Martin	12	12?	36	2,420	4.46	1-14-64	Clay; Qp	J	½	D	Fe.
15F1	William McConahy	8	--	36	2,390	--	--	-- Qp?	--	--	D	
15J1	M. J. Foss	12	12?	48	2,395	7.51	1-15-64	Clay; Qp	J	3/4	D	Fe.
16B1	Marian Rickel	12	12	36	2,150	1.37	11-19-63	-- Qls?	C	½?	D	Fe.
19E1	J. C. LeFave	103	--	6	2,360	80+	--	Basalt? Ty?	J	1	D	Basalt under sand & clay to 101 ft; [Tl], 101-103 ft. Inadequate in summer. Hardness rept. about 320 mg/l.
19M1	David Durheim	57	--	6	2,325	45.57	9-11-64	-- --	J	3/4?	N	I.
19M2	David Durheim	161	--	6	2,325	157.12	9-11-64	"Quicksand"; Tl	N	--	N	Not adequate, much sand enters well.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 44 E. - Cont.												
19R1	Byron Leeper	350	320	6	2,200	212.32	8-31-65	Gray sand; Tl or Qls	P	3/4	DS	Yields 40 gpm; pumps sand at this rate. Rept. 3 mg/l, Fe, L.
19R2	Byron Leeper	200	200	6	2,290	98.97	8-31-65	-- Tl	N	--	N	Drilled in glacial gravel; [Tl]. Perf. in many places; much very fine sand enters well. Pumped 10 gpm.
22L1	Joe Sander	100	--	8	2,420	53+	--	Basalt? Ty?	J	½	D	Bottom of well is in yellow sticky clay. I.
23A1	Everett Martin	89?	--	8	2,450	30.27 29.04	1-14-64 9-11-64	-- --	P	H	N	
23Q1	Leo Snodgrass	38	38	48	2,430	9.69	9- 1-65	Sand; Qp or Tl	J	½	D	Inadequate from June to Dec. L.
27K1	J. A. Caldwell	550	--	6	2,440	--	--	Basalt; ? Ty; Tl	--	--	De	Basalt at 20 ft. N.
27M1	Oscar Camp	54	45+	24	2,410	44.54	3-24-65	-- --	J	½	DS	Can be pumped dry in summer.

28D1	N. E. Brown	320	269	6	2,405	212 206.95	9-25-62 8-31-65	Sandy clay; Tl	S	3/4	D	Yields 8 gpm. Pumped some fine sand for a year after drilled. Well cased to 45 ft when drilled; depth to water was 185 ft. Well caved in a few days later, so casing extended to 269 ft. Fe, L.
28D2	N. E. Brown	39	39	30-48	2,400	22.08	8-31-65	-- --	J	½	--	Used to water yard. Fe, I.
28M1	L. M. Thompson	47	--	48	2,415	28.92 22.27	6-23-42 3-24-65	"Quicksand"; Qp	J	½?	DS	
28M2	B. F. Thompson	166	42	6	2,415	100	9- -64	Decomposed gneiss; pTu	S	--	D	Pumped 12 gpm for 7 hr, dd 25 ft. L.
29A1	C. M. Thurman	22	22	36	2,385	12.62	9- 1-65	Sand; Qgu	J	3/4?	D	Perf., 19-22 ft. Pumped 60 gpm, dd 8 ft. Irrigated nursery in past. L.
29L1	Gordon Burnett	68	6	8	2,370	12.86	3-25-65	Basalt; Ty	J	½	D	Yields 10 gpm. Hardness rept. about 150 mg/l. L.
30D1	Walter LeFave	96	96	6	2,330	59.29	9-11-64	Basalt? Ty?	P	½	D	Yields 20 gpm.
30D2	Walter Clothier	113	57?	42	2,340	65.85	9-11-64	Basalt; Ty	T	3	I	Unknown, 0-57 ft; basalt, 57-113 ft. Pumped 35 gpm, dd 17 ft. Temp 51°F. C.
30E1	Walter Clothier	495	--	8	2,285	135.07	9-25-64	-- --	P	1½	D	Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 26 N., R. 44 E. - Cont.												
30G1	H. R. Lorenson	230	188	6	2,310	55.08	3-24-65	Decomposed granite; pTu	N	--	N	Pumped 4 gpm, dd 175 ft. L.
32D1	R. W. Yeo	312	57	6	2,225	78.71 84.46	6-24-47 3-25-65	Granite; pTu	J	5	DS	Pumped 5 gpm for 2 hr, dd 200 ft. Hardness rept. 80 mg/l; chloride rept. 2 mg/l. L. Labeled 32E1 by Weigle & Mundorff (1952, p. 74).
32H1	Donald Hagan	140	--	6	2,365	Dry	--	--	--	--	De	L, N.
32J1	Donald Hagan	391	315	4	2,225	240.37	8-20-65	Granite; pTu	N	--	N	Yields 2 gpm. I, L.
32J2	Donald Hagan	455	397	8	2,225	260	6- -65	Granite; pTu	S	3	D	I, L.
32L1	J. J. Stantus	17	7	72	2,070	14.50	8-20-65	Clay; Tl or Qgl	C	1/3	D	Clay, 0-17 ft. I.

32P1	Mrs. J. C. Fraser	142	142	12	1,990	88.15	4-14-65	Sand; Qgf	N	--	N	Rept. yields 1,000 gpm. Pumped 470 gpm for 2 hr, dd 7 ft.
32R1	Hutton Settlement	113	113	72.46	2,002	96.08	4-14-65	Gravel, sand; Qgf	T	10	P	C, O(1928-54).
33E1	Walter Brincken	508	400	6	2,395	460	--	"Quicksand"; Tl	N	--	N	Much fine sand enters well. L.
33E2	Walter Brincken	510	480	6	2,390	440	--	Sand, clay; Tl	P	1½	DS	Pumps 3½ gpm.
33E3	Walter Brincken	135	18	36	2,395	Dry	--	-- --	N	--	N	Cased 50-135 ft. L, N.
33L1	L. R. Powell	128	128?	6	2,390	97.21	8-31-65	Gravel; --	J	1½	DS	Topsoil, 0-4 ft; soft "dirt", gravel, 4-128 ft. Temp 53° F.
33M1	L. D. Gonder	315	338	6	2,370	190	4-15-65	Sand; Tl	S	1½	D	Drilled to 352 ft & backfilled with gravel to 315 ft. Pumped 9 gpm, dd 105 ft. L.
35R1	Trentwood Irrig. Dist. 3, well 3	140	140	20	2,035	89.07	4-30-65	Gravel; Qgf	T	250	P	Perf., 112-138 ft, filled, 140-142 ft. Pumps 3,000 gpm. Used in summer only. L.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 27 N., R. 41 E.												
1D1	Unknown	4	--	--	2,380	1.5	8- 8-63	Soil, boulders weathered granite; pTu	N	G	--	10-ft diam pit. Used to water garden.
10N1	Unknown	4	4	24	1,795	1.07	5-10-63	-- --	N	--	N	
14M1	Unknown	6	--	60	1,865	4.00	5-10-63	-- --	N	--	N	
26M1	George Thomas	16	16	48	1,540	3.90	7-31-63	Sand, gravel, boulders; Qgf	C	3/4	D	L.
26P1	Washington Water Power Co., Lake View Heights	185	155	14	1,580	69.49 60.44 61.04	5- 8-63 7-31-63 5- 7-64	Coarse sand, gravel; Qgf	N	--	N	Screen, 155-185 ft; filled, 185-199 ft. Pumped 1,950 gpm for 2 hr, dd 4 ft. Water level affected by Long Lake reservoir level. L.
26Q1	Virgil Stricker, Raymond Felts	99	99	6	1,590	60	--	Sand; Qgf	--	--	D	Pumped 30 gpm for 6 hr, dd 0 ft. L.

T. 27 N., R. 42 E.												
1C1	E. J. Grafmiller	49	6	6	2,035	17.06	10-11-63	Basalt; Ty	P	3/4	N	"Dirt", 0-5 ft; basalt, 5-49 ft. Yields 5 gpm.
1C2	E. J. Grafmiller	245	6	6	2,035	17	10- -63	Basalt; Ty	--	--	DS	Yields 5 gpm. L.
1P1	Gordon Larson	245	--	6	2,050	17.68	10-11-63	-- --	J	1	DS	
2B1	H. A. Perry	135	--	6	2,050	45	10- -63	-- --	P	½?	D	Fe.
2C1	G. L. Losh	168	119	6	2,060	37.08	11- 2-64	Sand, clay; granite; Qgl?; pTu	S	3/4	D	Sand, clay, 0-119 ft; decomposed granite, 119-168 ft. Perf., 110-118 ft. Pumped 12 gpm for 2 hr, dd 100 ft. Temp 48°F.
2E1	Andrew Fisher	--	--	36	2,100	38.40	11- 2-64	-- --	P	H	N	I.
3E1	H. M. Eickmeyer	80	--	6	2,090	34.58	12-23-63	-- --	J	I	DS	Fe.
3N1	Wild Rose Cemetery	50	50	48	2,120	45.44	8- 8-63	Sand; Qgl ?	J	½?	I	Used to water grass. L.
5C1	N. J. Finafrock	471	--	6	2,230	105.97	12-24-63	Granite; pTu	P	3	D	Decomposed granite, 0-22 ft; solid granite, 22-471 ft. Fe.
5F1	N. J. Finafrock	30	30	36	2,190	23.77	12-24-63	Sand; Qgl	S	3/4	DS	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 27 N., R. 42 E. - Cont.												
5H1	Harold Weger	30	--	48	2,115	23.99	12-24-63	-- --	J	½	DS	Bottom of well in or to "rock". Fe, I.
5Q1	A. K. Eickmeyer	146	110	6	2,155	39.50	10-27-64	Granite; pTu	J	1	DS	Pumped 55 gpm. Fe, L.
5Q2	A. K. Eickmeyer	500	279	8	2,155	38.70	10-27-64	Granite; pTu	N	--	N	L.
8B1	Dean Oiland	89	--	8	2,175	49.27	12-27-63	Granite; pTu	S	3/4	D	Fe.
8C1	John Funk	128	--	6	2,180	12	--	Granite? pTu?	J	2	DS	
8H1	Dean Oiland	30	30	48-27	2,120	12.12	8-13-48	Sand; Qgl	C	7½	N	Perf., 25-30 ft. Pumped 150 gpm for 4 hr, dd 5 ft. O (1947-65).
8J1	Howard Oiland	40	40	96-48	2,150	29.55	10-20-64	Sand, gravel; Qgl	C	10?	I	Perf., 32-40 ft. Pumped 250 gpm, dd 5 ft. L.
9R1	G. H. Rock	903	147	12	2,210	65.74	10- 7-64	Sand, clay; granite; Qgl?, pTu	S	10	I	Pumped 70 gpm, dd 365 ft. Well has filled to about 400-500 ft; did not affect yield. L.

9R2	G. H. Rock	76	46	6	2,190	25.52	10- 7-64	Granite; pTu	S	1?	DS	Pumps 5 gpm, supplies 2 houses.
10J1	Mrs. Robert Kenney	18	0	72	2,200	13.90 3.37	9- 6-63 4- 6-64	Sand, clay, gravel; Qgu	N	G	N	Well goes dry in late summer. Fe.
10K1	Mrs. Robert Kenney	15	15	12	2,110	5.05	9- 6-63	Sand; Qgu	J	½	D	Fe, I.
10R1	James Sills	113	33?	6	2,220	32.90	4- 6-64	Granite; pTu	S	1?	D	L.
12B1	Thomas Walsh	32	--	36	2,080	24.27	10-22-63	-- --	J	1	DS	
12C1	Gordon Larson	17	--	48	2,080	12.51	10-11-63	-- --	N	--	N	
12C2	Gordon Larson	--	--	6	2,080	43.04	10-11-63	-- --	J	1	D	I.
12K1	S. A. Jones, Jr.	35?	--	30	2,100	7.70	10-14-63	-- --	C	½	DS	Fe.
12Q1	Clyde Reeder	86	--	8	2,180	64.99	10-11-63	-- --	J	½?	D	
13B1	W. F. Rudolph	87	56	16	2,180	70.64	10-14-63	Coarse sand; Qgl	T	7½	I	Screen, 56-87 ft. Pumped 150 gpm for 7 hr, dd 10 ft, after several weeks can pump only 30 gpm. I, L.
13B2	W. F. Rudolph	85	85?	6	2,180	54.94	10-14-63	Sand; Qgl	J	3/4	DS	Pumps 7-8 gpm.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 27 N., R. 42 E. - Cont.												
13C1	W. F. Rudolph	178	172	12	2,180	63.04	10-14-63	Sand; basalt; Qgl; Ty	T	7½	I	Perf., 60-75 ft and 90-110 ft. Pumped 150 gpm for 7 hr, dd 30 ft, after several weeks can pump only 50 gpm. I, L.
13D1	Arnold Korupp	35	35	6	2,190	12.84	10-14-63	Sand? Qgl?	J	3/4	D	Pumps 16 gpm. Fe.
13K1	Samuel Veltry	68	68	30	2,160	60.56	10-11-63	Sand, gravel; Qgl	J	½	D	"Dirt", sand, a little gravel, 0-68 ft.
13P1	Wesley Olsen	150	--	6	2,160	89.07	8- 5-63	-- --	J	1½	DS	Can be pumped dry.
14G1	James Sicilia	46	--	6	2,250	20.34	10-25-63	Granite; pTu	J?	3/4?	D	
14J1	Joseph Cerenzia	37	--	24	2,160	12.23	10-25-63	-- --	J	3/4	DS	Fe.
14K1	Tony Sicilia	18	18	30	2,170	11.53	10-25-63	-- --	J	1	D	I.

14P1	G. S. Charter	300	1	6	2,240	54.94	7-16-64	Granite; pTu	S	2	DS	Granite, 0-300 ft. Pumped 15 gpm for 55 min, dd 155 ft. Fe.
16J1	M. Rock	65?	25	6	2,320	30	--	Granite; pTu	P	½	D	Inadequate, yields only 300-400 gallons per day.
16L1	G. H. Rock	18	18	36	2,330	10.34p	10- 7-64	Sand; Qgu	J	½?	S	Clay, 0-16 ft; sand, boulders, 16-18 ft. Yields 3 gpm. I.
16R1	May Wegner	25	25	42	2,340	19.48	8- 1-63	Decomposed granite; pTu	J	1/3	N	I.
17A1	Leonard Decker	10	10	36?	2,240	8	--	Sand; Qgl	--	--	DS	Fe.
18A1	Norman Gunning	130	--	6	2,250	26.82	12-31-63	-- --	P	3/4	DS	Fe.
19D1	Warren Allen	21	21	30	2,120	19.85	7-31-63	-- --	C	¼	S	Bottom of well is in blue clay. Inadequate in late summer, yields only 25 gallons per day.
19M1	C. M. Sterritt	16	16	48	2,050	0.05	5-10-63	"Dirt", clay; --	N	--	N	Clay, "dirt", 0-16 ft; granite at 16 ft.
19N1	C. M. Sterritt	80	80	6	1,905	8.65	5-10-63	Sand, clay; Qgu	J	1	D	Fe, I.
21A1	Gordon Tilson	130	--	6	2,430	48.88	8- 1-63	Granite; pTu	J	½	DS	Most of well is in granite.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 27 N., R. 42 E.---Cont.												
21A2	Gordon Tilson	20	20	84	2,550	9.33	8- 1-63	-- --	N	G	--	Bottom of well is in blue clay. Used to water garden. Well goes dry every year.
21C1	Charles Bale	16	16	42	2,450	7.70	8- 1-63	-- --	C	1/3	DS	
21E1	Charles Bale	20	20	48	2,500	--	--	"Dirt"; --	C	1/3	D	"Dirt", 0-15 ft; blue clay 15-20 ft. l.
22L1	Bertha Batty	90	10	6	2,470	49.15	8- 2-63	Granite; pTu	J	1/2	DS	Clay, 0-7 ft; granite, 7-90 ft. Pumps 10 gpm.
22L2	Bertha Batty	24	24	48	2,450	Flowing	all year	-- --	N	G	S	Bottom of well is in clay.
23B1	Leonard Cresswell	36	36	30	2,120	27.00	8- 5-63	Sand, gravel; Qgl	J	3/4?	DS	
23C1	E. W. Haggard	169	6	6	2,240	56.23	7-16-64	Granite; pTu	J	1 1/2	DS	"Dirt", 0-6 ft; granite, 6-169 ft. Pumps 10 gpm.

23L1	Clarence Burchett	275	5	6	2,350	61.48	8-2-63	Granite; pTu	S	1 1/2	DS	Topsoil 0-4 ft; granite, 4-275 ft. Yields 10 gpm.
23L2	Clarence Burchett	146	6	6	2,350	64.88	8-2-63	Granite; pTu	J	1 1/2	DS	Topsoil, 0-6 ft; granite, 6-146 ft. Water is corrosive. I.
24C1	Calvin Rhoads	60	60?	30	2,140	50.78	8-5-63	-- --	J	1/2	DS	Can be pumped dry in 3-4 hrs.
24L1	Lester Mize	33	33	24	2,010	22.05	10-25-63	Gravel; Qgu	J	1/2	D	
24N1	Keith Austin	60?	--	6	2,140	42-36p	8-5-63	Granite; pTu	J	3/4?	DS	Can be pumped dry in 3/4 hr.
24P1	Keith Austin	198	--	6	2,120	17.36	8-5-63	Granite; pTu	N	--	N	Yields 3-5 gpm.
25R1	Lawrence Carlson	20	8	4	2,080	8.30	6-4-64	Granite; pTu	N	--	N	N.
25R2	Lawrence Carlson	29	8	4	2,080	8.56	6-4-64	Granite; pTu	N	--	N	Yields 15 gpm.
25R3	R. A. Bieker	140	--	4	1,990	22.20	6-4-64	Granite; pTu	N	--	N	I.
25R4	Lawrence Carlson	210	10	4	2,080	14.69	9-29-64	Granite; pTu	N	--	N	"Dirt", 0-5 ft; granite, 5-210 ft. N.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 27 N., R. 42 E.---Cont.												
26L1	G. S. Charter	169	12	6	2,440	19.95	7-16-64	Granite; pTu	N	--	N	"Dirt," 0-12 ft; granite, 12-169 ft.
26P1	Georgia Hammond	110	10	6	2,400	6	--	Granite; pTu	S	1?	D	Topsoil, 0-4 ft; granite, 4-110 ft. Yields 6½ gpm.
26P2	George Burchett	16	16	36	2,400	9.62	8-2-63	"Dirt". --	C	1/2	D	"Dirt", 0-16 ft; granite at 16 ft. I.
27B1	G. S. Charter, E. W. Haggard, Burchett	200+	--	6	2,590	11	--	Granite; pTu	J	3/4?	D	Pumped 30 gpm for 24 hr.
36A1	Arthur Jackson	201	2	2	2,020	44.25	10-1-64	Granite; pTu	N	--	T	"Dirt", 0-2 ft; granite 2-201 ft. N.
36A2	Arthur Jackson	100	9	6	2,010	24.05	10-5-64	Granite; pTu	N	--	N	"Dirt", 0-4 ft; granite, 4-100 ft. Inadequate, yields only 600 gallons per day.

36A3	Arthur Jackson	130	16	2	2,010	27.03	10-13-64	Granite; pTu	N	--	T	"Dirt", sand, clay, 0-16 ft; granite, 16-130 ft. Inadequate, yields less than ½ gpm.
36A4	Arthur Jackson	128	14	6	2,010	24.22	11-12-64	Granite; pTu	N	--	N	Yields 15 gpm. L.
36H1	W. H. Austin	90	--	6	2,000	39.33	6-4-64	Granite; pTu	J	1 1/2	DS	I.
36H2	Castanola	80	--	6	1,940	36.24	10-1-64	Granite; pTu	N	--	N	
T. 27 N., R. 43 E.												
1H1	Nick Devita	13	13	24	2,370	5.29	7-1-63	Sand, clay; Qp	C	3/4?	D	Sand, clay, 0-13 ft; basalt at 13 ft. Canbe pumped dry.
1P1	Edward Stevenson	55	55	36	1,910	39.45	11-1-63	-- Qls or Tl	J	--	D	Well penetrated much blue clay. Perf. at bottom. Fe. I.
1P2	Edward Stevenson	58	58	30	1,910	50.16	11-1-63	-- --	N	--	N	Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 27 N., R. 43 E.---Cont.												
2K1	R. W. Mattix	57	57	6	1,900	30	--	Sand?; clay; Qgl or Qls	J	1/3	--	Perf., 37-47 ft. Inadequate, can pump 75 min. must then wait 15 min. Used to water yard. L.
2P1	Sydney Green	97	97	42-8	1,870	91.33	7-3-63	Sand, gravel; Qgf	J	3/4	DS	Well dug in sand and gravel, bottom in blue-gray clay. Adequate, but can be pumped dry.
4E1	Francis Lendersmith	8	8	48	2,040	3.38	10-16-63	Gravel, clay; --	N	--	--	Used to water garden.
5C1	Earl Wells	159	--	6	2,130	47.57	10-21-63	-- --	P	1	DS	
5F1	Dennis	70	--	42	2,140	57.07	10-21-63	-- --	J	1	DS	Fe, I.
5J1	George McIntosh	18	18	36	2,070	17.17	10-16-63	Blue sand; Tl?	P	H	D	

5N1	McBride	33	33	36	2,120	28.29	10-21-63	Sand; Qgl?	C	1/4	D	Fe.
5Q1	Holmes	8	8	48	2,120	6.62	10-17-63	Sand; Qgl	J	1/2	DS	Clay, 0-2 ft; sand, 2-8 ft. Fe, I.
6P1	Mrs. Longbathom	165	--	6	2,120	--	--	-- --	P	--	DS	Bottom of well in solid "rock"?
6Q1	Rolland Akers	165	--	6	2,120	76.50	6-19-63	Solid "rock"; Ty?	P	1	DS	Fe.
7B1	D. A. Barton	90	90	30	2,130	34.26	10-21-63	Sand, clay; Qgl?	J	1 1/2	DS	Inadequate in summer. Fe.
8D1	P. G. Poffenroth	44	44	36	2,130	34.25	6-19-63	-- Qgl	C	1/2	D	Well did not penetrate solid "rock".
8D2	Gady	225	--	6	2,130	147.07	10-17-63	Basalt? Ty?	P	3/4	D	[Sand and clay?], 0-200 ft; bedrock [Basalt?], 200-225 ft.
8E1	John Riley	224	224	6	2,090	112.83	6-19-63	Basalt; Ty	S	1?	N	Pumped 20 gpm for 2 hr, dd 0 ft. L.
8J1	Cecile Baade	26	--	42	1,950	13.59	10-18-63	-- --	P	H	N	
8L1	Henry Weitz	72	72	42	2,080	67.44	10-17-63	-- --	J	3/4?	DS	Can be pumped dry. Fe.
9M1	Millard	225	225	6	1,900	34.44	10-18-63	Decomposed granite; pTu	N	--	N	Clay, 7 colors, 0-220 ft; decomposed granite, 220-225 ft.
11B1	K. C. Ackerman	100	90	8	1,875	--	--	Hard clay? --	J	1	DS	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 27 N., R. 43 E.---Cont.												
11F1	J. D. Davis	192	192	8	1,865	168.34	10-31-63	Coarse sand, gravel, Qgf?	T	5	DS	Perf., 170-186 ft. Pumped 30 gpm for ½ hr, dd 18 ft. Temp. 54°F.
11N1	E. J. Lange	100	101	6	1,860	91.40	10-31-63	Gravel, clay; Qgu	J	3/4	D	Perf.? Plugged bottom foot of well because lost water. Fe.
11Q1	Ralph Garrison	108	108	36?	1,860	106	--	Gravel; Qgf	P	1	DS	Sand, 12-32 ft; smooth gravel, some clay, 32-108 ft.
12C1	G. P. Dowell	125	115	6	1,900	--	--	Sandy clay; --	J	--	DS	Sandy clay, 40-125 ft. Yields 3 gpm. Inadequate (have 40 head of stock). Fe.
12D1	M. W. Clark	135	--	30-6	1,920	69.57	11-5-63	-- --	S	1/2	DS	Pumps 5 gpm.
12L1	G. P. Dowell	65	65	42?	1,900	58.41	7-3-63	-- --	P	H	S	

12N1	J. L. Wilks	155	155?	8	1,870	153.18	10-30-63	-- --	P	1	DS	
12P1	K. C. Doggett	39	--	30	1,890	32.44	10-30-63	-- --	N	--	N	
12R1	K. C. Doggett	14	14	36	1,870	9.53	10-30-63	"Quicksand"; Qgl	J	1 1/2	DS	Well can be pumped dry.
12R2	Russell Meador	93	60	8	1,880	40.56	10-31-63	Solid "rock"; pTu?	J	1	D	Clay, 0-60 ft; solid "rock", 60-93 ft.
14D1	Byron Kirk	116	--	10	1,860	94.67	11-12-63	-- --	P	1 1/2	D	Fe.
14 N1	Edward Shukle	108	108?	6	1,840	93.90	10-29-63	Sand? Qgf?	J	1	DS	
15F1	Carl Swanson	87	--	6?	1,840	--	--	-- --	J	3/4?	D	
15J1	Ben. McCleary	97	97	36	1,850	95.05	10-29-63	-- --	J	1	DS	
16D1	Unknown	140?	--	6	1,900	53.36	10-18-63	-- --	N	--	N	
16F1	John McPhee	100	--	6	1,720	23.24	11-21-63	Blue-black clay; Qls?	J	1/2	DS	Fe.
17A1	Unknown	9	9	48	1,880	4.69	10-18-63	-- Qgl	J	1/2	N	
17C1	Henry Weitz	19	19	36	2,000	15.07	10-18-63	"Quicksand"; Qgl	N	--	N	
17F1	John Riley	56	45	6	1,990	32.20 32.28	6-14-63 6-19-63	Gravel and basalt; Qgu, Ty	N	--	N	Yields 8 gpm. L.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 27 N., R. 43 E.---Cont.												
17H1	Charles Uhden	22	22	4	1,950	+3	Fall 1964	Gravel; Qgu	P	1/4	D	Perf., 10-22 ft. Flows 1-2 gpm. Pumped 50 gpm for 2½ hr, dd 19 ft. C, L.
18J1	W. G. Putnam	160	140	6	2,130	75	--	Basalt; Ty	S	3/4	DS	Pumped 25 gpm for 2 hr, dd 55 ft. Water is soft in spring, hard in fall. Temp. 48° F. C, L.
18N1	Roger Mantese	30	30	18	2,080	23.74	10-10-63	Gravel, clay; Qgu	J	1	DS	Sand, clay, 0-20 ft; yellow clay, gravel, 20-30ft.
19A1	Ralph Decker	301	113	6	2,080	--	--	Granite; pTu	P	1	DS	Yields 8 gpm. L.
19D1	Tony Mantese	21	21	84	2,030	14.90	10-10-63	Sand; Qgl	J	1	D	
19H1	Gregory Sandford	41	22	6	2,010	22.82	12-17-62	Granite; pTu	N	--	N	I, L, O(1962-65).
19H2	Gregory Sandford	211	86	8	2,020	87.34	12-17-62	Granite; pTu	N	--	N	Clay, 0-84 ft; granite, 84-211 ft. N. O(1962-65).

19J1	John Fleming	90	65	8	1,920	44.95	7-17-64	Sand, gravel; Tl?	N	--	N	L. 0(1964-65).
19P1	H. A. Nevdahl	78	--	6	1,920	38.06p	6-13-63	-- --	J	1/3	D	
19P2	Kermit Petersen	76	76	6	1,920	41.53p	6-13-63	Gravel; Qgu	J	1 1/2	DS	Sand, gravel, 0-76 ft. Fe 0.5 mg/l; hardness 120 mg/l.
19Q1	Nelson Worden	36	36	48	1,920	33.89p	6-13-63	"Quicksand"; Qgl	J	3/4	DS	I.
20C1	Walter Nunn	200	96	6	1,950	41.80	6-13-63	Gravel; Tl	J	1	D	Perf. 94-96 ft. L.
20E1	J. T. Thompson	67	67	36	1,930	64	--	Sand; Qgl	J	1	D	Pumped 60 gpm for 7 hr, dd ½ ft.
20J1	Willard Rowley	7	--	--	1,970	2.28	6-11-63	"Dirt"; Qgl	N	--	N	Basalt at 7 ft. Pit 5 ft. across.
20K1	Willard Rowley	22	22	36	1,980	19.00	6-11-63	Sand, clay; Qgl	C	1/2?	D	Inadequate when water yard.
20P1	R. W. Merkel	51	51?	18	1,950	37.41	6-11-63	Sand? Qgl	J	1/2	N	
21K1	W. H. Skaife	9	--	36	1,650	5.43	11-21-63	-- Qal	J	3/4	D	
22M1	Washington Water Power Co., Riverview Hills	125	125	12	1,780	89.67	3-29-65	Gravel; Qgf	ST	10,5	P	Perf. Reportedly can pump 1,000 gpm. Supplies 34 homes. C.

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 27 N., R. 43 E.---Cont.												
22R1	Unknown	99	99	10	1,820	52.11	3-12-65	Sand, gravel; Qgf	N	--	N	Perf., 70-99 ft. Pumped 110 gpm, dd 29 ft. L.
23C1	Guy Bergstrewser	29	29	36?	1,850	20	1963	Coarse sand; Qgf	C	1/2	D	
23D1	Robin Hauser	66	66	30	1,830	60.89	11-12-63	Sand; Qgf?	J	1	D	Fe.
23D2	Lyle Baker	68	68	28	1,820	--	--	-- Qgf?	J	1/2	DS	
23D3	Henry Becker	65	65	--	1,820	50	1963	Sand, Qgf?	J	3/4	D	Fe.
24A1	Willard Farrell	67	67	42	2,010	60.09	11-12-63	-- --	J	1/2?	D	
24H1	J. H. Jess	361	--	6?	2,400	250	1963	-- --	S	1 1/2	DS	[Bottom of well in granite?] Fe.

25F1	J. L. Shafer	42	42	6	1,920	39.16	6-26-64	Gravel; --	J	1/2	DIS	Pea gravel, 41-42 ft; granite at 42 ft. Perf., 36-42 ft. Yields 30 gpm, spring; 10 gpm, fall. Inadequate in fall. Hardness rept. about 85 mg/l. Fe.
25F2	J. L. Shafer	127	70	6	1,950	38.24	6-26-63	Granite; pTu	P	1	N	"Dirt", gravel, clay, 0-70 ft; granite, 70-127 ft. Pumps 4 gpm.
25F3	J. L. Shafer	220	220	6	1,900	65.15	6-26-63	Sand, clay; Tl	P	1	N	Pumps 6 gpm. I.
25G1	Fred Weise	26	26	36	2,020	19.04	6-24-63	Sand, clay; Qgl or Tl	C	1	DS	
26M1	Mead School Dist. 354	264	242	10	1,885	190.18	7-15-64	Coarse sand; Qgl	S	--	P	Screen, 242-264 ft. Yields 250 gpm. L, 0(1964-65).
27J1	C. I. Nyberg	150	150	6	1,850	129	10-29-62	Sand, gravel; Qgu	S	1 1/2	I	Perf., 137-147 ft. Pumped 15 gpm for 4 hr, dd 6 ft. L.
27K1	C. I. Nyberg	16	16	42?	1,830	9.33	6-20-63	Fine sand; Qgu	C	1/2?	DS	Inadequate, pumps dry in 1 hr. Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 27 N., R. 43 E.---Cont.												
29B1	Unknown	15	--	30	1,870	12.30	6-12-63	-- --	N	--	N	
29G1	Howard Scott	143	143	48-6	1,900	60	--	Fine sand; Tl	J	3/4	DS	Perf., 135-143 ft. Pumped 32 gpm for 37 hr, dd 5 ft. L.
29H1	Paul Simons	143	143	6	1,880	78.98	6-12-63	Sand; --	J	2	D	Drilled through sand; 20 ft. of clay; sand; decomposed granite. Perf. Pumps sand at 15-20 gpm, so pumps only 9 gpm. Fe.
29H2	L. D. Ward	73	--	8	1,880	49.26	6-12-62	-- --	J	1	DS	Yields 3½ gpm.
29K1	Joseph Marx	88	88	24	1,900	83.59	6-12-63	Sand; --	S	3/4	N	
30P1	Joseph Whitfield	135	50	6	1,910	81.90	6- 5-64	Granite; pTu	S	3/4	DS	Fine sand, 0-50 ft; granite, 50-135 ft. Yields 5-6 gpm. Fe.

30P2	Joseph Whitfield	70	70	6	1,910	63.10	6- 5-64	Fine sand; Qgl	N	--	N	Granite at 70 ft. Inadequate, yields about 2 gpm.
30P3	Gerald Otto	151	--	6	1,980	21.12	6- 5-64	Granite; pTu	N	--	N	N.
30P4	Gerald Otto	11	0	72	1,950	3.48	6- 5-64	Granite; pTu	N	--	N	Water is bad at times.
30P5	Joseph Whitfield	52	50	6	1,910	22.62	6-25-64	Fine sand; Qgl	N	--	N	Fine sand, 0-50 ft; granite, 50-52 ft. I.
30P6	Joseph Whitfield	70	70	6	1,910	--	--	Fine sand ; Qgl	--	--	De	Fine sand, 0-70 ft; granite at 70 ft. N.
30R1	Ernest Lindsey	305	120	6	1,900	120.35	6- 5-64	Granite; pTu	S	1	D	Sand (?), 0-120 ft; granite 120-305 ft.
32D1	Clark Cordill	160	--	6	1,810	125	--	-- --	P	1	DS	
32H1	O. B. Vrem	142	148	8	1,650	43.20	3-12-65	Coarse sand; Qgf	J	5	DIS	Perf., 126-142 ft; well plugged 142-148 ft. Pumped 45 gpm, dd 0 ft. Temp. 50°F. Fe, L.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing: Depth (ft)	Casing: Diam (in)	Land surface altitude (ft)	Water level: Below land surface (ft)	Water level: Date	Water-yielding material & Geologic designation	Pump: Type	Pump: Horse-power	Use	Remarks
T. 27 N., R. 43 E.---Cont.												
32H2	O. B. Vrem	51	51	36	1,650	40.25	3-12-65	Gravel, sand; Qgf	J	1	D	Used in summer only. Fe.
32J1	Washington Water Power Co., Pine River Park	208	208	6	1,610	10.53	5- 7-63	Broken granite under sand and gravel; pTu; Qgf	T	40	P	Pumped 320 gpm for 24 hr., dd 43 ft. L.
32K1	Henry Lewis	--	--	6	1,620	12.50	10-28-63	-- --	J	--	DS	
32M1	Oliver Zinkgraf Estate	200+	--	6	1,810	52.78	6-11-63	-- --	N	--	N	
32Q1	John Lucas	85	--	6	1,620	25.01	10-24-63	-- --	J	1	D	Pumps 15 gpm. Fe.
33F1	H. L. Fernalld	42	42	48-12	1,620	25	--	Sand; Qgf?	J	3/4	D	Fe.
33G1	Little Spokane Water Dist. 8	146	146	12	1,620	26	--	Sand, gravel; Qgu	T	10	P	Perf., 41-45 ft, 60-64 ft, 81-86 ft, 92-96 ft, 134-142 ft. Pumped 120 gpm, dd 74 ft. L.

34H1	Kellog Service Co.	83	83	8	1,890	64	--	Sand; Qgl	T	5	P	Sand, 0-83 ft; clay at 83 ft. Perf., 63-83 ft. Pumped 108 gpm, dd 0 ft. Supplies gas station and 8 houses.
34J1	Mount Spokane Motel water supply	98	98	16-10	1,900	90 94.14p	5-28-54 6-21-63	Gravel; Qgl	T	7 1/2	P	Perf., 84-94 ft. Pumped 48 gpm, dd 4½ ft. Supplies 10 houses and motel. L.
35B1	Unknown	5,283	--	12-4	1,920	30	--	-- --	--	--	DeT	Mead oil test well. L.
35Q1	W. F. Hastings	42	42	36	1,870	35.98	11-14-63	-- --	J	1/2	DS	Fe.
36B1	Bruce VanLeuven	53	53	36	1,960	45.09	11-11-63	-- --	J	3/4	DS	Fe.
36P1	Jess York	40	--	30	1,870	20	--	-- --	J	1	DS	
T. 27 N., R. 44 E.												
5D1	Roy Smith	180	--	6	2,340	113.41	7-1-63	-- --	P	1	D	
6E1	Nick Devita	9	9	240	2,365	3.85	7-1-63	Basalt; Ty	C	15	I	Inadequate, pumps dry at 250 gpm in 5-6 hr, then must wait 2-3 days. L.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 27 N., R. 44 E.---Cont.												
7B1	L. A. Woody	52	52	48	1,910	45.96	11-1-63	Sand; Qgl?	J	1	DS	
7N1	Russell Meador	37	37	36	1,920	31.12	10-31-63	Sand; --	P.	1/2?	D	Clay, 0-36 ft; sand, 36-37 ft.
7Q1	Penelope Willey	80	80	36	2,000	38.37	11-5-63	-- --	J	1	D	
8D1	Elmer Mecklenburg	30	--	30	1,920	19.90	10-4-63	-- --	N	--	N	I.
8Q1	G. W. Delbridge	155	155	6	1,910	113.10	11-4-63	-- --	S	1	D	
15P1	David Schertzer	50	--	12?	2,030	23.65	1-10-64	Granite; clay; pTu; ?	J	1	D	I.
15P2	Glenn Finch	22	22	36	2,010	13.18	1-14-64	Sand; Qgl	J	1/2	DS	Fe.
19E1	A. Schimanski	16	16	36	2,400	--	--	-- Qp?	J	1/2	DS	

19L1	Allen Huckaba	250	--	6	2,390	140.07	11-13-63	Decomposed granite; pTu	P	1	DS	I.
19L2	W. J. Rinck	150	--	6	2,390	90	--	Basalt; Ty	P	1	D	Fe.
19R1	T. L. Thompson	99	--	6	2,380	79.27	5-24-63	-- --	J	1	D	
20A1	Roy Marlowe	70	20	6	2,330	28.80	12-18-62	Decomposed granite; basalt; pTu; Ty	T	2	DI	Pumped 70 gpm for 4 hr, dd 24 ft. Supplies 2 houses. L.
20A2	F. L. Andrews	75	30	6	2,350	63	--	Basalt; Ty	J	1 1/2	D	"Dirt", 0-30 ft; solid black basalt, 30-75 ft. Fe.
20B1	Andrews-Holcomb Co.	50	50	8	2,270	1.84	12-19-62	Sand; broken granite; ?; pTu	N	--	N	Perf., 12-38 ft. pumped 140 gpm for 4 hr. dd 14 ft; yields much less over a long time. Used for irrigation in past. L, 0(1962-65).
20L1	J. L. Atkinson	70	21	6	2,330	32	1939	Gravel; Tl	J	2	D	Filled, 70-83 ft. Pumped 20 gpm for 4 hr, dd 25 ft. L.
20N1	Carl Reese	28	--	36	2,370	23.83	12-18-62	-- Qp?	P	H	N	0(1962-65).

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 27 N., R. 44 E.---Cont.												
21E1	T. L. Brownlee	24	--	36-108	2,360	22.77	1-13-64	-- Qp	J	1	D	Black basalt at bottom. Fe.
21E2	T. L. Brownlee	386	--	9	2,360	320	--	-- --	P	3/4	D	
21G1	Ed Johnson	245	239	6	2,280	184.03	1-13-64	Clay; decomposed granite, Tl; pTu	S	6	D	Perf., 220-239 ft. Pumped 12 gpm for 5 hr, dd 10 ft. Fe, I, L.
21J1	Walter Doty	30	30	36	2,310	3.40	1-13-64	"Quicksand". --	J	1/3	DS	Fe.
21J2	Thomas Forkner	216	--	6	2,320	200	--	-- pTu?	P	1	D	Fe, I.
22C1	David Schertzer	11?	--	36	1,990	9.25	1-14-64	Sand; Qgl	N	H	S	Fe.
22P1	Kenneth Thain	20	20	18	2,030	13.88	1-10-64	Sand, clay; Qgl	J	1/2	DS	Fe.
23P1	Leroy Ackaret	50?	--	36	2,040	22.49	1-17-64	-- --	J	1/3	DS	Fe, I.
26E1	W. D. Riddle	30	--	48	1,930	16.35	1-17-64	-- --	P	3/4	D	Fe.

26F1	Charles Weyer	17	--	36	1,910	3.25	1-17-64	-- Qgl?	J	1/4	D	[Granite at 17 ft?]
27F1	R. A. Jerred	87	87?	6	2,040	--	--	Clay, "Quick-sand"; Tl	J	1	D	Fe.
27G1	C. A. Noyd	15	--	72	2,000	12.18	1- 9-64	Clay; Tl	C	3/4	DS	Fe.
27P1	Gordon Smith	32	--	32	1,880	30	--	-- --	J	1 1/4	D	Fe, I.
29G1	John Cool	106	56	6	2,360	102.69	1-13-64	Black basalt; Ty	S	3/4	DS	Supplies 2 houses.
30P1	Gordon Hastings	82	82	6	1,960	48.27	11-11-63	-- --	S	1	D	Fe.
30Q1	Ray Harmon	50?	50?	8	1,970	50?	1961	-- --	J	3/4	DS	Fe.
31D1	R. W. Christensen	101	--	8	1,970	30.82	11-11-63	-- --	J	3/4	DS	Fe.
32R1	F. B. Heglar	--	--	72	1,910	--	--	-- --	C	5	D	
33G1	Fred Mildes	52	--	96-8	1,870	20	--	-- --	J	1 1/2	DS	Fe.
34B1	Julian Paulsen	35	--	30-24	1,880	17.03	1-14-64	-- --	J	1/2	D	Fe.
34B2	Julian Paulsen	120	--	6	1,880	33.38	1-14-64	-- --	P	--	I	Fe.
T. 28 N., R. 41 E.												
1C1	Donald Ball	20	--	36?	2,200	--	--	-- --	J	3/4?	DS	Fe, I.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 41 E.---Cont.												
1H1	L. N. Weldert	50	50	72	2,165	37.93	12-11-63	-- --	J	1/2	DS	I.
1J1	Donald Lenhard	28	28	24	2,180	23.80	9- 6-63	Fine sand; Qgl ?	P	H	N	Yields 4-5 gpm. I.
1N1	J. W. Clark	14	--	48	2,170	6.21	12-6-63	-- Qgl ?	J	1/4	S	
2C1	Albert Snodderly	20	--	48	2,250	6	--	-- Qgl ?	P	1/2	D	Bottom of well on solid "rock"? I.
2J1	Dale Milner	15	--	72	2,185	7.09	12-6-63	-- Qgl ?	C	1/2	S	Fe.
2M1	Melvin Dury	35	--	36?	2,245	4	--	-- --	J	1/2?	D	
2N1	William Swanson	20	--	36?	2,205	--	--	-- --	J	1/2	D	
3J1	F. O. Reynolds	28	28	48	2,250	11.54	12-6-63	Sand; Qgl ?	J	1/2	DS	Fe.
3Q1	Charles Heffley	15	15	36?	2,255	12.88	12-6-63	"Quicksand"; Qgl ?	P	1/4	D	Well goes dry in winter.
3R1	Wayne Lenhard	10	--	36	2,220	6.05	12-6-63	-- Qgl ?	P	1/4	I	

9P1	Gerald Knight	65	20	48	2,375	46.69	12-30-63	Granite; pTu	J	1	DS	Sand, 0-20 ft; decomposed granite, 20-65 ft.
10J1	R. C. Agar	30	30	36	2,205	25	--	"Quicksand"; Qgl?	J	1/2?	D	Fe.
10J2	W. L. Krick	--	--	36	2,200	9.30	5-18-64	-- Qgl?	J	1/2?	D	Shallow well.
10P1	W. L. Krick	10	--	--	2,215	0	5-18-64	-- Qgl	C	7 1/2	I	Pit, 50x125. I.
10Q1	Reynolds	66	--	6	2,235	18.30	5-18-64	-- --	P	H	N	
11B1	Owen Parker	16	16	36?	2,180	8.37	12-17-63	Gravel, clay; Qgu	P	1/4	D	Fe.
11P1	E. O. Schmidt	16	16	36	2,195	13.98	5-18-64	Decomposed granite; pTu	C	1/3	DS	Temp. 49°F. C.
11P2	E. O. Schmidt	16	--	--	2,190	2	5-18-64	Sand, clay; Qgl	N	--	N	Clay "hardpan", 0-8 ft; coarse sand, clay, 8-16 ft. Pit, 75x75 ft. Pumped 50 gpm for 8 hr, dd 1 ft. Inadequate, can irrigate only 5 acres.
12M1	Fred Hamilton	28	28	36	2,155	13.07	12-9-63	Clay? Qgl?	N	--	N	
12N1	Williams Valley Ladies Club	18	18	36	2,175	13.61	8-30-63	Sand; Qgl	P	H	D	Sand, 0-18 ft.
12N2	Williams Valley Ladies Club	100+	--	6	2,175	14.10	8-30-63	Sand and clay? Ty; Tl?	N	--	N	Water had swampy taste. Well filled with junk.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 41 E.---Cont.												
13A1	Gordon Heath	20	20	48	2,150	12	Sum. 1962	Sand; Qgl	J	3/4	DS	
13R1	Bud Howe	22	22	36	2,160	12.12	8-30-63	Sand; Qgl	C	1/2?	N	Sand and clay layers, 0-22 ft.
13R2	Bud Howe	20	20	30	2,160	12.50	8-30-63	Sand; Qgl	N	--	N	Sand and clay layers, 0-20 ft. I.
14A1	S. K. McIlvanie	21	21	72-36	2,185	5 18.05p	5- -45 8-30-63	Sand; Qgl	J	7 1/2	I	Perf., 17-21 ft. Pumped 160 gpm for 4 hr, dd 15 ft. L.
14A2	S. K. McIlvanie	18	18	24	2,185	10.06	8-30-63	Sand; Qgl	N	--	N	
14A3	S. K. McIlvanie	16	16	48	2,185	6.68	9- 3-63	Sand; Qgl	N	--	N	
14A4	S. K. McIlvanie	15	--	30	2,185	7.52	9- 3-63	Sand; Qgl	N	--	N	
14B1	S. K. McIlvanie	20	21	30-60	2,185	10.97	8-30-63	Sand; Qgl	N	--	N	
14B2	S. K. McIlvanie	21	21	30	2,185	5	5- -45	Sand; Qgl	--	--	De	

14C1	S. K. McIlvanie	250	--	6	2,185	--	--	Granite? pTu?	--	--	De	Yielded 10 gpm. Inadequate for irrigation. L.
14G1	S. K. McIlvanie	10	--	--	2,185	6	8-30-63	Sand; Qgl	N	--	N	Pit, 45x45 ft. I.
14G2	S. K. McIlvanie	68	68	72-10	2,185	6	10-4-61	Sand, gravel; Qgl, Tl	T	40	I	Perf. Pumps 200 gpm in spring, 100 gpm in summer. Temp. 48° F. I, L.
14J1	Gordon Klingenberg	17	17	36	2,190	12.38	6-3-64	Sand; Qgl	C	1/2	DS	Inadequate in fall.
14Q1	Gordon Klingenberg	12	--	--	2,205	--	--	-- --	N	--	N	Pit, 50-100 ft. Inadequate for irrigation.
15C1	Frank Kohler	40	40	48	2,250	24.99	12-9-63	-- --	J	3/4	DS	
16A1	Floyd Huit	35	--	42	2,310	24.21	12-30-63	-- --	C	1/2	DS	
16H1	Robert Koehler	54	54	48	2,335	42.27	12-30-63	Sand, clay, gravel; Qgl?	J	1	S	Fe.
24A1	C. J. Davis	28	28	36	2,165	17 21.46p	7-8-54 8-30-63	Sand; Qgl	C	2,1/2	DIS	Sand and a few layers of clay, 0-28 ft. Yields 50 gpm. Pumped 35 gpm for 48 hr, dd 9 ft.
25B1	Unknown	8	8	30	2,220	0.90	5-19-64	-- --	N	--	N	
25H1	Lloyd Fricke	40	40	48	2,225	28.82	12-31-63	Sand, gravel; Qgl	J	1	DS	Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 41 E.---Cont.												
25M1	E. H. Clark	14	14	72	2,360	4.10	5-19-64	Sand and clay? Qgl	P	1/4	DS	Fe.
25R1	Morgan Endsley	40	40	36	2,185	13.23	12-31-63	Sand, clay; Qgl?	J	2	DS	Fe.
26R1	L. M. Russell	12	12	36	2,300	9	--	Gravel; Qgl	C	1/2	DS	Fe.
36A1	W. A. Prufer	25	25	36	2,190	14.47	8- 8-63	Sand, clay; Qgl	C	1/3	D	L.
T. 28 N., R. 42 E.												
2M1	Town of Deer Park	32	32	72	2,115	12.6 15.4 20.10p	10-28-58 4-30-59 2-21-63	Sand; Qgl	T	20	P	Perf., 22-32 ft. Pumps 300 gpm. L.
3A1	Town of Deer Park	30	--	--	2,110	--	--	Sand, gravel ; Qgl	--	--	DeT	C.
3C1	D. E. Kelley	300	115	6	2,170	46.59	4-29-63	Granite; pTu	S	2	DS	Pumps 33 gpm. Hardness rept. about 190 mg/l. L.
3C2	D. E. Kelley	36	34	42	2,130	9.52	4-29-63	Sand, clay; Tl	N	--	N	2-in. diam., 34-36 ft. L.

3H2	Town of Deer Park	28	28	32	2,115	14.3 12.1 13.63	10-27-58 4-30-59 2-21-63	Sand, gravel; Qgl	T	15	P	Perf., 19-28 ft. Pumps 250 gpm.
3H4	Town of Deer Park	36	36	72	2,115	13.54	2-21-63	Sand, gravel; Qgl	T	30	P	Pumps 380 gpm.
3L1	Harvey Bowgs	14	12	2	2,110	--	--	Sand? Qgl	J	1/4	D	Screen, 12-14 ft.
3R1	William Fracier	--	--	30	2,110	11.88	11-26-63	-- --	J	1/2	D	Fe.
4C1	Oscar Hale	14	14	36	2,145	13.18	11-27-63	Sand; Qgl	J	1	D	
4D1	Oscar Hale	80	--	6	2,130	12.61	11-27-63	-- --	J	3/4?	DS	Fe.
5C1	N. H. Inman	20	20	54	2,145	6.44	12-11-63	Blue clay, "quicksand"; Qgl or Tl	P	1	DS	Fe.
5J1	B. F. Witt	140	--	8	2,135	79.54	12-4-63	-- --	J	2	DS	Fe.
5Q1	Edwin Shallbetter	45	45	36	2,160	38.16	12-13-63	Gravel; Qgl?	J	1	DS	I.
6D1	Chester Washburn	27	27	36	2,175	14	--	"Quicksand"; Qgl	P	3/4	D	Fe.
6M1	Donald Lenhard	30	30	30-60	2,180	27.15	9-6-63	Fine sand; Qgl	J	1	DS	Fine sand with a few 1-2 in. clay layers, 0-30 ft. Perf., 27-30 ft. Pumps 20 gpm.
6P1	A. N. Davis	17	17	36	2,135	9.76	6-3-64	"Quicksand"; Qgl	C	1/4	DS	Hardness rept. about 270 mg/l. Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 42 E.---Cont.												
6P2	A. N. Davis	20	--	--	2,125	5	--	Sand, rocks; Qgl	T	5	I	Peat, clay, rocks, sand, 0-20 ft; tough gumbo clay at 20 ft. Pit, 50x150 ft. Inadequate, seldom used.
6Q1	Donald Lenhard	21	21	30-132	2,140	12.14	9- 6-63	Sand ; Qgl	J	3/4	DS	Fine sand with some thin clay layers 0-30 ft. Pumps 20 gpm.
6Q2	Donald Lenhard	16	16	36	2,140	9.50	9- 6-63	-- --	S	3/4?	S	
7D1	A. N. Davis & Gary Doughtery	35	35	36	2,150	19.17	6- 3-64	Sand; Qgl?	J	1/2	DS	
7H1	Kenneth Jurgens	10	10	72	2,135	7.17	12-18-63	Sand; Qgl	J	3/4?	DS	Inadequate in summer. Fe.
7N1	Williams Valley Grange	32	32	36	2,150	19.63	5-18-64	Sand; Qgl?	J	3/4?	D	Brown sand and clay, 0-25 ft; blue sand, 25-32 ft.
8G1	Paul Berger	60	--	48	2,155	52	--	Basalt; Ty	J	1	DS	Sand, clay. 0-17 ft; black basalt, 17-60 ft. Fe.

8Q1	Roy Mason	24	24	36?	2,115	20	--	Sand, clay; Qgl	C	1/3	D	
9B1	Martha Johnson	15	--	30	2,070	7.80	12-4-63	-- --	J	1/4	DS	[Basalt at 15 ft?]
9C1	C. D. Parker	14	--	48	2,095	5.39	12-13-63	-- --	P	1/2	DS	
9L1	H. W. Noble	21	21	42	2,080	13.55	9-6-63	Sand; Qgl	C	1/2?	DS	
10Q1	E. C. Shepard	49	49	6	2,155	34	--	-- --	J	1/2	DS	Perf. Fe.
11E1	Jack Walters	160	30	6	2,110	60	--	Black basalt; Ty	J	1 1/2	D	I.
11L1	William Giland	30	--	36	2,090	10	--	-- --	J	1/4	S	
14C1	William Ervin	25	--	36	2,125	9.20	11-26-63	-- --	--	--	N	
14C2	William Ervin	120	--	6	2,125	--	--	-- --	J	1	D	
14P1	H. J. Wohle	93	30	6	2,040	35	--	Basalt; Ty	S	1	D	[Clay and sand?] 0-30 ft; black basalt, 30-93 ft.
15B1	E. W. Barnhouse	71	--	6	2,155	30	--	-- --	J	1/2?	D	Fe.
15E1	Neal Udel	20	20	36	2,040	15.36	1-7-64	-- --	J	1	D	Fe.
15H1	H. A. Boese	60	--	60	2,135	--	--	-- --	P	1?	DS	
16D1	Norman Severson	--	--	8	2,140	33.68	12-18-63	-- --	J	1	D	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 42 E.---Cont.												
16M1	W. M. Brooks	20	20	36?	2,115	7	--	Sand, clay; Qgl	C	1/2?	D	I.
17C1	Oliver Layton	50	50	36	2,130	35.62	12-18-63	Sand, clay; Qgl?	J	1/2	DS	Fe.
17N1	David Babb	40	--	48	2,155	25.81	1-3-64	-- --	--	--	S	
17R1	B. L. Casteel	--	--	48	2,130	28.48	12-23-63	Sand; Qgl?	J	2	DS	
18J1	Frank Merkt	105	--	6	2,160	34.63	1-3-64	Solid "rock"; Ty?	J	1	DS	Fe.
18R1	Mrs. Jacobson	81	--	6	2,155	33.50	8-30-63	-- --	P	H	N	
20D1	David Babb	47	47	48	2,155	38.94	1-3-64	Sand, clay; Qgl?	J	3/4	DS	Fe.
20R1	R. W. French	24	24	40	2,100	5.87	12-19-63	Sand, clay; Qgl	P	1/4	D	Fe.
21D1	Milford Crowley	60	60?	36	2,140	33.17	8-9-63	Sand and clay? Qgl?	J?	3/4?	D	

21N1	Ward Crowley	30	24	48	2,085	7 6.97	8-1-52 8-9-63	"Rock", mostly broken; Ty?	C	7 1/2	I	Pumped 60 gpm for 4 hr, dd 17 ft. Well has filled in to 23 ft. with sand. Now used only to water yard and garden occasionally. L.
21N2	Ward Crowley	125	--	6	2,110	47.52	8-9-63	Solid "rock"; Ty?	S	3/4?	D	
21R1	Lloyd Thompson	14	14	54	2,030	5 4.87	11-20-49 8-9-63	Gravel, clay; Qgl	C	1	DS	Pumped 150 gpm for 4 hr, dd 1½ ft. L.
21R2	Lloyd Thompson	49	--	6	2,045	20.34	8-9-63	-- --	N	--	N	I.
22N1	Washington Dept. of Game	227	11	10	2,040	23 82	5-1-47 8-7-63	Basalt; Ty	T	5	DS	Pumped 30 gpm for 4 hr, dd 128 ft. Pheasant farm. L.
23G1	Edward Harton	163	--	8	2,080	26	--	-- --	S	2	DS	
23J1	Joseph Hinnenkamp	125	--	6	2,040	7.09	11-22-63	-- --	J	3/4	D	
23L1	George Collins	30	30	36	2,085	19.68	11-22-63	Sand, clay; Qgl	P	1/2	D	
23R1	Joseph Hinnenkamp	90	--	6	2,050	19.36	11-22-63	-- --	J	1	DS	Fe.
24C1	Mary Agar	48	48	36	1,990	44.18	12-3-63	Sand, clay, Qgl?	J	1/2	D	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 42 E.---Cont.												
24D1	A. R. Hunt	50	50	6	2,000	37.94	12-17-62	Sand; Qgl	N	--	N	Sand, 0-49 ft; basalt, 49-50 ft. Perf., 45-49 ft. Adequate until Feb. 1964 when well filled in to 43 ft. with sand. O(1962-65).
24D2	A. R. Hunt	68	68	6	2,005	42.42	5-25-64	Broken basalt; Ty	J	3/4	DS	Fine sand, 0-51 ft; broken basalt, 51-68 ft. O(1964-65).
24F1	William Matlock	16	16	36	1,985	15.62	11-3-63	"Quicksand"; Qgl	C	3/4	D	Perf. Fe, I.
24N1	Joseph Hinnenkamp	10	--	36	2,045	3.56	11-22-63	--; --	C	1/4	S	
24P1	Bruce Dingman	--	30	6	2,050	94	--	Solid "rock"; Ty?	J	1	D	Can be pumped dry. Fe.
25B1	Ruben Schaal	126	32	6	1,990	--	--	Black basalt; Ty	J	1	D	Fe.
26B1	Ralph Durheim	85	20?	6	2,100	64.94	8-7-63	"Rock"?; --	J	1/2	DS	

27N1	Carl Bennett	94	--	6	2,085	52	--	-- --	J	3/4	DS	Fe, I.
28B1	Lester Roberts	348	348	6	2,045	+17	--	Basalt; granite; Ty; pTu	C	7 1/2	IS	Perf., 338-348 ft. Flowing 60 gpm on 5-12-52; pumped 400 gpm for 6 days, dd 67 ft. Temp. 57°F. Fe, L.
28C1	John Mithofer	15	15	48	2,070	2.80	12-19-63	-- --	J	1/3	DS	Fe.
28H1	Lester Roberts	70	50	6	2,080	50	--	Basalt; Ty	J	1	DS	Pumps 6 gpm. I.
28J1	William Sicilia	132	40	6	2,090	35	--	Basalt; Ty	J	1	S	Sand, 0-40 ft; basalt, 40-132 ft. Pumps 7 gpm. Fe.
29A1	L. W. Roberts	83	40	6	2,100	29.82	12-19-63	Solid "rock"; Ty?	S	2	DS	[Clay and sand?], 0-40 ft; solid "rock" [basalt?], 40-83 ft.
29R1	N. H. Hickel	270	--	8	2,140	50.97	12-19-63	-- --	P	3/4	D	Bottom of well in white clay. [Tl].
30D1	F. J. Watson	32	--	36	2,180	26	--	-- --	J	1/3	S	Fe, I.
30L1	Bud Prufer	12	--	108	2,155	7.38	12-31-63	-- --	P	1/3	DS	Fe.
30R1	M. A. Gray	124	16	6	2,230	75	--	Granite; pTu	P	H	N	Sand, 0-2 ft; solid granite, 2-124 ft. Fe.
30R2	M. A. Gray	24	24	40	2,170	4	--	"Quicksand", clay; Qgl	P	3/4	DS	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 28 N., R. 42 E.---Cont.												
31A1	Thomas Justice	12	--	96	2,175	6	--	-- --	P	1/4	D	
32B1	Fred Ellsworth	6	6	48	2,190	2.73	8-15-63	"Dirt", clay; Qgl	P	H	N	Water is corrosive. Fe.
32P1	E. M. Jens	49	--	6	2,230	26.22	12-24-63	-- --	J	1/2	D	Fe.
32R1	H. M. Weger	40	40	36	2,145	41.89	12-24-63	Sand; Qgl	J	1/2	DS	Fe.
34D1	Mike Burdega	4,005	267	12	2,090	37.97	8-13-63	-- --	J	3/4	NT	Sand, gravel, 0-90 ft; basalt at 90 ft; granite at depth. Pumped 225 gpm for 48 hr, dd 170? ft. Got strong flow of water with a sulfur odor at about 2,420 ft. Oil test hole.
34J1	Mike Burdega	2,000	--	6	2,010	+10	--	-- --	N	--	NT	Flows 2 gpm. Temp. 61° F. Oil test hole.
34L1	Mike Burdega	2,180	--	8	2,020	0.0	8-15-63	-- --	N	--	NT	Oil test hole.

34P1	Mike Burdega	33	33	36	2,045	23.17	8-15-63	Sand, clay; Qgl	J	3/4	DS	Sand, clay, 0-33 ft. Yields 10 gpm. Temp. 48° F, C.
36Q1	Virgil Grafmiller	20	20	48	1,990	12	1961	Sand, clay; Qgl	?	--	DS	Topsoil, 0-3 ft; sand, some clay. 3-20 ft.
T. 28 N., R. 43 E.												
3R1	L. B. Jett	16	16	4	1,880	6.43	2-28-63	Gravel ; Tl	C	1/4	D	L.
6G1	Arthur Ratliff	135	--	6	2,150	--	--	-- --	C	3/4?	D	
6L1	Jack Wainwright	45	--	36?	2,155	20	--	-- --	J	1	DS	Fe.
6N1	U. R. M. Stores, Inc.	107	102	6	2,150	36.09	2-21-63	Sand, gravel; basalt; Qgl; Ty	S	1	N	Perf., 95-100 ft. Pumps 30 gpm. Standby well. C, I, L.
6N2	U. R. M. Stores, Inc.	115	72	8	2,150	33.54	2-21-63	Sand, gravel, basalt; Qgl	S	5	InS	Perf., 65-70 ft. Pumped 70 gpm. dd 5 ft. Supplies 125,000 chickens. C, L.
6P1	M. E. Darrow	100	--	6	2,150	--	--	-- --	J	1/2	D	
7C1	Eldon Booher	45	--	36	2,150	28.96	11-26-63	-- --	J	1/2	D	Fe, I.
7E1	Alta Joy	20	20	36	2,150	17.79	11-29-63	Clay? Qgl?	P	1/4	D	
7L1	C. C. Hagan	100	--	6	2,145	38.40	12-2-63	-- --	J	1/4	D	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 43 E.---Cont.												
7Q1	C. H. Houston	16	16	68	2,090	14	--	Sand; Qgl	P	1/2	D	I.
8D1	Jess Pratt	19	--	60	2,085	7.23	5- 1-63	-- --	C	1/4	DS	
8K1	Wilbur Leinweber	40	--	48	2,030	20.60	5- 1-63	-- --	C	1/2	DS	Fe.
8K2	Wilbur Leinweber	90	--	6	2,035	19.85	5- 1-63	-- --	P	H	N	Water is dirty.
8L1	Lloyd Stallings	120	80	8	2,060	53.74	5- 1-63	Solid "rock"; Ty?	J	1	DS	Sand, 0-80 ft; solid "rock". [basalt?], 80-120 ft. I.
9J1	Phillip McDonald	10	10	36	1,960	2.33	3-13-63	Sand and clay? Qgl	J	3/4?	DS	Fe.
10B1	Herbert Kummer	6	6	48	1,870	2.94	2-28-63	Gravel; Qal	C	1/2	DS	
10F1	F. W. Johnson	19	--	36	1,920	8.67	3-13-63	-- --	N	--	N	
10F2	F. W. Johnson	11?	--	24	1,920	7.14p	3-13-63	-- --	C	1/2	DS	Inadequate in summer.
10J1	Carl Olson	26	15	48	1,855	4.76	3- 5-63	Gravel; Tl	C	1/3	N	L.

10M1	N. L. Smith	16	--	60	1,935	4.30	2-28-63	-- --	J	1	DS	
10P1	E. B. Humes	15	5?	60	1,900	.84	3- 5-63	Granite; pTu	J	3/4 ?	D	Pumps dry in 10 min. in summer. Fe.
10P2	E. B. Humes	19	--	24	1,905	7.40	3- 5-63	-- --	P	H	S	Inadequate in fall.
10R1	William Hohenstreet	5	--	36?	1,845	1.62	3-13-63	Silt and sand? Qal	C	1/2	DS	
12G1	Unknown	8	--	42	1,970	7.35	2-13-63	-- --	C	3/4?	N	Well goes dry in summer.
13L1	Clyde Allen	7	7	30-48	1,960	Flowing	2-13-63	Sand? Tl	N	G	DS	Clay overlies sand? Flows 2 gpm.
13L2	Clyde Allen	7	7	15	1,960	1.44	2-13-63	Sand; Tl	N	G	DS	Clay overlies sand.
13L3	Clyde Allen	4	4	15	1,960	.18	2-13-63	Sand? Tl	N	G	DS	
13L4	Clyde Allen	5	5	15	1,960	.42	2-13-63	Sand? Tl	N	G	DS	
14A1	E. N. Johnson	18	18	30	1,720	12.95	2-13-63	Gravel, boulders; Qal, Qgf	C	2	D	Gravel, 0-15 ft; gravel, 1 ft diam. rocks, 15-20 ft. Perf.,14-18 ft.
14F1	Leonard Linebarger	127	127	6	1,815	103.66	12-21-62	Sand or gravel; Tl	S	1	D	Clay, 0-about 127 ft; sand or gravel at bottom. Pumps 25 gpm.
15B1	C. F. Venneau	205	205	6	1,890	39.39	3-5- 63	Clay; Tl	J	1	DS	Hardness rept. 510 mg/l. Fe, I, L.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 43 E.---Cont.												
15B2	David Mutrie	9	--	36	1,870	2.36	3- 5-63	Gravel; Qal	N	--	N	
15D1	D. S. Reynolds	19	19?	36	1,920	15.67	3- 6-63	-- --	C	1/3	N	
16K1	Loren Middleton	8	--	60	1,940	.29	3- 6-63	-- --	C	7 1/2	I	
16L1	Joseph Jones	12	--	48	1,940	Flowing	5- 1-63	-- --	C	5	I	Flowing 3 gpm; pumped 150 gpm for 12 hr, dd 10 ft.
16L2	Joseph Jones	14	14	48	1,945	--	--	-- --	C	1?	DS	
16R1	Robert Owen	14	14	36	1,910	8.87	3- 6-63	Gravel; Qgf	J	1/3	D	Gravel, 0-14 ft; bedrock, [granite?] at 14 ft.
17H1	Ernest Neuman	50	50	48-6	1,980	33.08	5- 1-63	Sand; Qgl	P	H	D	Sand, 0-110 ft; clay [Tl?] 110-185 ft. Perf., 42-50 ft. Temp. 42° F.
18C1	Jack Hoffman	296	--	6	2,160	35.49	12-2-63	Black basalt; Ty	S	1?	S	Not much casing. Well originally 350 ft. deep, bottom part caved in. Fe.

18E1	J. S. Koch	92	60	6	2,120	55.96	12- 2-63	Basalt; Ty	J	3 1/2	DS	Sand, 0-40 ft; black basalt, 40-92 ft. Fe.
18P1	A. R. Jovan	40	40	36	2,080	33.51	12-2-63	Sand, clay; Qgl	J	1	D	
20H1	Joseph Jones	88	--	6	2,080	42.56	5- 1-63	Basalt? Ty?	P	H	N	
20L1	Charles Walters	253	150?	6	1,960	90	--	"Quicksand"; Qgl or Tl	P	3/4	DS	I.
20L2	Charles Walters	120	120	4	1,940	88.67	8- 9-63	Coarse sand; Qgl or Tl	J	1	DS	Mostly sand, 0-120 ft.
20M1	Charles Walters	114	--	--	1,965	--	--	"Quicksand"; Qgl or Tl	--	--	De	Mostly quicksand, 0-114 ft. N.
20P1	Lena DeLuca	150	--	6	1,970	107.83	3- 7-63	-- --	J	3/4	D	
21J1	Dan Day	53	53	36-18	1,910	49.12	3- 6-63	Gravel; Qgf	J	--	N	Gravel, 0-56 ft. N.
21K1	Laura Mercer	10	10	36?	1,910	3	--	-- --	C?	1/2?	D	Decomposed granite [sand?], 0-6 ft; blue clay, 6-10 ft.
21K2	Herbert Day	7	7	42	1,910	1.76	3- 7-63	Clay; --	J	1/3	S	Clay, 0-7 ft. Can be pumped dry.
21P1	Lawrence Lemery	250	--	6	1,920	151+	3- 7-63	White volcanic ash, "muck", sand; Tl	P	3	DS	Fe, I.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 43 E.---Cont.												
22B1	Chattaroy Hills Subdiv.	106	100	12	1,870	19.94	7-17-64	Decomposed granite; pTu	N	--	N	Perf., 90-100 ft. Pumped 35-10 gpm for 4 hr, dd 37 ft. Supplied 5 houses. Fe, I, L. 0(1964-65).
22D1	Chattaroy Hills Subdiv.	268	268	8	1,920	20.53	12-21-62	Fine sand and gravel; Tl	S	3	P	Mostly clay, some "quicksand", small gravel, 0-300 ft. Perf. at about 60 ft, at about 180? ft. Pumped 35 gpm for 5 hr, dd 215 ft. Supplies 5 houses. Temp. 53°F. C, 0(1962-64).
22N1	Chattaroy Hills Subdiv.	334	248	8	1,865	93.16	10-7-63	Granite; pTu	--	--	De	L, N, 0(1963-64).
22R1	Chattaroy Hills Subdiv.	100+	54	36-6	1,830	37.14	12-20-62	Sand, gravel; clay; Qgf; Tl?	N	--	N	Sand and gravel (?), 0-14? ft; mostly clay(?), 14?-100+ ft. Well has filled in to 44 ft. N, 0(1962-65).

22R2	Glen Jones	152	152	6	1,830	137.45	12-21-62	-- --	S	1 1/2	D	Perf. at bottom. Pumps 25 gpm. Supplies cafe. 0(1962-65).
23A1	Patrick Murray	170	170	30-8	1,865	152.40	7-23-64	-- --	N	--	N	
23A2	Ray Hubert	205	205	4	1,865	158+	7-23-64	Sand and gravel? --	S	--	DS	Perf. at bottom. Pumps 10-15 gpm.
23C1	Chattaroy Hills Subdiv.	96	96	12	1,710	16.30	5-26-64	Gravel, sand; Qgf	N	--	N	Perf., 50-62 ft, 85-90 ft; filled, 96-106 ft. Pumped 1,500 gpm for 5 hr, dd 6 ft. L.
23E1	Chattaroy Hills Subdiv.	182	--	12	1,830	143.27	6-26-63	-- --	N	--	N	I.
23J1	James Whitney	65	65	6	1,875	56.72	7-23-64	Sand and clay? Qgl or Tl	P	H	D	I.
26G1	Roy Butler	240	240	5½	1,875	167?	7-23-64	Sand; --	S	1 1/2	DS	Perf., 220-240 ft. Pumped 15 gpm, dd 10-12 ft. Fe.
26J1	A. R. Jarvis	86	86	6	1,880	71.08	7-23-64	Sand and clay; Tl or Qls	P	1/2	--	Can pump 3 gpm for 30-60 min. before well goes dry. Used to water yard and garden. L.
27K1	Victor Reames	47	47	8	1,740	40.22	11-8-63	Sand; Qgf	J	3/4?	D	
27P1	Vernon Bushnell	17	17	36	1,710	12.88	11-8-63	Gravel, sand; Qal	C	1/4	D	Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 28 N., R. 43 E.---Cont.												
27P2	C. A. Schmidt	18	18	30	1,715	17.66	11-8-63	-- --	C	1/2	D	
27Q1	Richard Rowley	33	33	36	1,720	29.86	11-8-63	-- --	J	1/2	DS	Fe.
27Q2	Francis Olander	12	12	30?	1,710	9	--	Sand, gravel; Qal	J	1/2	D	Fe.
30D1	Carl Wold	45	45	6	1,960	32.70	3- 7-63	Sand; Qgl	J	3/4?	D	Sand, 0-45 ft.
31Q1	Mrs. Rudy Coon	100	--	6	2,060	62.67	10-15-63	"Quicksand"? Tl or Qgl	J	1/2	DS	
31R1	Mrs. Rudy Coon	20	20	36	2,010	14.61	10-15-63	Sand; Qgl	N	--	N	Perf., 10-20 ft. Pumps 12 gpm.
32C1	D. S. Moore	65	--	6	2,020	60.82	10-22-63	Yellow clay; Tl	P	1	DS	Inadequate in fall.
32C2	D. S. Moore	21	21	45	2,030	12.81	10-22-63	-- --	J	1/2	D	[Basalt at 21 ft?] I.
32P1	Delmer Nokes	146	71	6	2,110	63.90	10-18-63	Sand; basalt; Tl; Ty	N	--	N	Clays of various colors, fine sand, 0-143 ft; basalt, 143-146 ft. Yields 20 gpm.
33E1	W. H. McGill	14	14	36?	1,920	--	--	Clay, sand; Qgl	P	1/4	D	Fe.

33K1	C. A. Schmidt.	34	34	6	1,710	17.99	11-8-63	Decomposed granite; pTu	J	3/4	DS	Fe.
33M1	Alma Austin	14	14	42	1,940	11.27	10-23-63	Sand, clay, boulders; --	J	1/2	D	
33N1	M. V. Richards	26	26	30	2,050	17.54	10-15-63	-- --	J	1/2	D	Blue clay at 26 ft. I.
34A1	J. M. Schneider	28	27.	6	1,710	16	--	Basalt; Ty	P	3/4	D	Fe.
36J1	Carl Knott	200	30?	6	2,370	119+	7- 1-63	-- --	P	--	N	I.
36J2	Carl Knott	9	--	48	2,370	3.99	7- 2-63	-- --	N	--	N	
36J3	Carl Knott	480	9	10	2,370	85+	7- 2-63	Basalt; sand, clay; Ty; Tl	N	--	N	Plugged at 85 ft. N.
36Q1	Alex Lungo	17	--	36	2,370	13.71	7- 2-63	-- Qp?	JP	1/3, H	DS	
T. 28 N., R. 44 E.												
5A1	Lewis Schrader	60	60	8	2,190	50.57	11-7-63	Sand ; Qgl?	J	1/2	DS	Perf., 54-60 ft. Well is pumped dry often.
5J1	John Daubel	12	12	36	2,245	7.55	11-7-63	Sand ; Qgl	J	1/2	D	Clay, 0-4 ft; sand, 4-12 ft.
7K1	Ralph Reed	76	--	6	2,390	27.45	11-5-63	-- --	N	--	N	
7L1	Alfred Kehn	73	12	6	2,390	32.35	11-5-63	Basalt; Ty	J	3/4	S	Pumps 20 gpm.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 28 N., R. 44 E.---Cont.												
8A1	Samuel Sullens	135	135	6	2,235	46.39	11-7-63	-- --	J	--	DS	I.
8H1	Roy Inks	213	110	6	2,170	37.09	11-7-63	Decomposed granite, clay; pTu	S	1	DS	Fe, I.
18H1	T. E. Haile	93	45?	8	2,300	50.51	11-6-63	Granite; pTu	J	3/4	D	Pumps 8 gpm. Fe.
18H2	Neal Haile	30	30	36?	2,270	10.90	11-6-63	-- --	P	2 1/2	D	Well goes dry in summer at times. Fe.
19D1	G. A. Heritage	37	37	36	1,950	34.05	11-5-63	Sand, clay; Qgl?	N	--	N	Originally drilled to 120 ft. No water from clay or granite. L.
19K1	Don Schneider	46	--	36	1,950	17.63	11-6-63	-- --	J	1	D	Fe.
19L1	Edward Loshbaugh	41	41	54	1,950	36.60 36.95	12-19-62 11-6-63	Sand; Qgl	J	1	DS	L.
19P1	T. D. Cummins	44	44	48-24	1,940	35.12	12-19-62	Sand, some gravel; Qgl	J	3/4	DS	Temp. 47°F. C, L, O(1962-65).
32M1	Jack Schmidt	998	--	6?	2,340	--	--	-- --	--	--	De	L, N.

12N1	O. Higgins Estate	40	--	6	2,385	36.08	4-25-63	Granite? pTu?	J	3/4	N	Can be pumped dry. Fe.
13J1	Harold Russell	50	20	48	2,355	7.64	4-24-63	Granite; pTu	P	H	N	"Dirt". 0-20 ft; granite, 20-50 ft. Well dry at times.
14A1	R. B. Fleenor	30	30	36	2,350	14.51	4-25-63	Sand; Qgl	P	H	DS	
23R1	Ella Baker	12	12	42	2,275	4	--	Sand; Qgl	J	1/3	DS	Fe.
24A1	T. M. Steele	52	14	42	2,315	26.05	4-24-63	Granite; pTu	N	--	N	
24G1	Harold Klawunder	18	18	36	2,260	10.68	1-3-64	Sand, clay; Qgl	J	1/2	D	Fe.
24J1	S. R. Twidwell	16	16	48	2,260	9.91	1-3-64	Sand; Qgl	C	1	D	Pumps 16 gpm.
24L1	J. E. Anderson	17	--	48	2,260	12	--	-- Qgl?	J	1/4	DS	Fe.
24R1	C. C. Nord	18	18	36	2,230	14.69	12-10-63	Sand; Qgl	P	1	DS	Fe.
25E1	Richard Casberg	20	--	48	2,240	5.25	12-10-63	-- Qgl?	J	3/4	D	
25J1	Unknown	36	6	36	2,265	13.94	5-20-64	Granite; pTu	P	HW	N	Sandy soil, 0-6 ft; granite, 6-36 ft.
25L1	Gerna Bryan	13	--	36	2,230	7.34	5-20-64	-- Qgl?	P	H	N	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 41 E.---Cont.												
25N1	John Forsberg	20	20	24	2,220	6.78	12-10-63	"Quicksand"; Qgl ?	J	3/4	N	
27F1	F. H. Jenkins	17	--	--	2,330	15	--	Clay, sand; Qgl	P	1/2	DS	
27K1	Cecelia Johnson	12	--	48	2,325	7.27	12-17-63	-- --	P	1/2	DS	I.
27L1	Robert Posch	30	--	--	2,330	18	--	-- --	J	1/2	DS	
34B1	George Barns	20	20	48	2,280	10.46	12-10-63	"Quicksand"; Qgl ?	P	H	D	
35A1	Stanley Forester	18	18	18	2,220	8.70	12-10-63	Sand; Qgl ?	J	1/2	DS	Fe, I.
35D1	Joseph Dury	32	4	--	2,300	28	--	Granite ; pTu	C	1/2	D	Sand, 0-4 ft; solid granite, 4-32 ft. I.
35H1	Mrs. E. A. Casberg	8	--	48	2,200	0.25	4-29-63	Sand, silt; Qgl	C	3/4?	D	Supplies 2 houses.
36E1	F. D. Grant	10	--	36	2,205	3.22	4-29-63	-- Qgl	C	1/2?	N	I.
36E2	F. D. Grant	11	--	--	2,200	--	--	Sand, gravel; Qgl	N	--	N	Pit, 65x160 ft. L.

36R1	Robert Kewash	16	16	36	2,170	6.73	5-20-64	-- Qgl?	J	1/2	DS	Fe.
T. 29 N., R. 42 E.												
1E1	Roger Janson	24	15	48	2,350	19.82	6-7-63	Granite; pTu	C	3/4?	DS	Granite, 2?-24 ft. Well E2 is inside well E1. Fe. I.
1E2	Roger Janson	150	27	4	2,350	19.77	6-7-63	Granite; pTu	N	--	N	Granite, 2?-150 ft. Well E2 is inside well E1. N.
1E3	Roger Janson	42	40	8	2,375	21.28	6-7-63	Decomposed granite; pTu	N	--	N	L.
1E4	Roger Janson	55	54	8	2,375	26.56	6-7-63	Decomposed granite; pTu	N	--	N	Yields 6 gpm. L.
1N1	Leonard Rasmussen	61	61?	24-6	2,320	30.91p	6-7-63	Decomposed granite; pTu	J	1/2	DS	Topsoil, 0-8 ft; decomposed granite, 8-61 ft.
2C1	Earl Stanford	28	--	6	2,380	10.20	6-10-63	Granite? pTu?	J	3/4?	DS	
2N1	Don Wolf	26	26	48	2,270	5.91	1-18-63	Fine sand; Qgl?	C	3/4	D	Fe.
3B1	Lawrence Mattausch	26	--	48	2,360	15.82	6-10-63	-- --	CP	1/2?,H	DS	Pumps dry all the time.
3H1	Lawrence Mattausch	--	--	24	2,350	10.79	6-10-63	-- --	P	H	N	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing: Depth (ft)	Casing: Diam (in)	Land surface altitude (ft)	Water level: Below land surface (ft)	Water level: Date	Water-yielding material & Geologic designation	Pump: Type	Pump: Horse-power	Use	Remarks
T. 29 N., R. 42 E.---Cont.												
3J1	Leo Wolf	167	140	6	2,330	15	--	Basalt; Ty	S	2	DS	Inadequate, can pump dry at 15 gpm; has 125 cows. Fe.
3N1	Unknown	28	--	48	2,265	14.06	6-14-63	-- --	P	H	N	
3P1	Clara Hallgarth	20	20	36	2,250	7.54p	6-14-63	Sand; Qgl	C	1/2?	DS	Sand, 0-20 ft.
4K1	L. C. Lucas	224	22	60-6	2,235	10.93	7-20-64	Basalt; Ty	C	3/4?	D	Yields 3 gpm. Supplies 2 houses. I, L.
4N1	Harold Shives	214	--	6	2,260	12.39	4-26-63	Granite; pTu	J	3/4	DS	Fe.
4Q1	L. C. Lucas	19	19	36	2,235	7.98	7-20-64	Sand; Qls	C	1/2	S	Pumped 100 gpm for ¼ hr, dd 9 ft. After pumping 60 gpm for several hours the well partly collapsed. Temp. 48°F. L.
5E1	Virgil Jones	10	10	48	2,290	Flowing	4-25-63	Clay, sand; Qls	C	1/2	DS	

5R1	Leo Wolf	--	--	--	2,265	5.10	4-26-63	-- --	P	H	N	
6E1	R. E. Gordon	14	14	48	2,340	1.83	4-25-63	Sand; Qls	P	H	S	
6Q1	R. E. Gordon	45	45	30	2,290	25.26	4-25-63	Granite; pTu	J	1/2	N	Topsoil, sand, 0-11 ft; "soft" granite, 11-45 ft. Inadequate in fall. Fe.
6Q2	R. E. Gordon	15	15	36	2,300	11.30	4-25-63	Gravel; Qgu	J	1/2	DS	Fe, L.
7P1	I. C. Gibbs	13	13	36	2,460	5.73	4-24-63	Sand, gravel, clay; Qgu	C	1/4	D	Water is corrosive. L.
9N1	Hannah Aamodt	24	24	48	2,205	12.16	4-26-63	Sand; Qgl?	C	3/4	D	
10N1	Wayne Seimer	13	13	60	2,205	8.68	6-10-63	Sand; Qgl	C	3/4	DS	Used for stock in winter only. Inadequate during summer when watering yard. Fe.
11E1	Ray Scheller	200	--	6	2,260	10.58	6-10-63	Sand; Qgu or Tl	P	0	N	Well has filled in to 50 ft. with sand. I.
11E2	Ray Scheller	14	14	24	2,260	9.53	6-10-63	Sand? Qgl	P	H	D	
12E1	E. C. Rossen	65	65	36	2,280	47.66	5-24-63	Clay, sand, gravel; Qgu	--	--	De	Sand, gravel, 1 boulder, 0-62 ft; clay, water, 62-65 ft.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 42 E.---Cont.												
12E2	E. C. Rossen	54	54	36	2,280	43.36	7-20-64	Sand, gravel; Qgu	J	1/3	D	Blue clay at bottom.
13Q1	Claire Koron Estate	63	--	6	2,220	30.92	5-24-63	-- --	J	1/2	N	
14B1	Oliver Cox	5	--	3	2,210	2.5	6- 4-63	Dirt; Qgl	N	--	T	
14G1	Oliver Cox	90?	--	6	2,230	37.87p	6- 4-63	-- --	P	3/4	DS	
14H1	Oliver Cox	25	25	48	2,200	18	11- -52	Sand? Qgl	--	--	De	Pumped 250 gpm. dd 4 ft. Well collapsed.
14H2	Oliver Cox	15	--	--	2,200	9.2	6- 7-63	Sand; Qgl	C	7 1/2	I	Pit, 70x100 ft. Inadequate, can pump 75 gpm only 9 hr a day. L.
14L1	Vern Townsend	10	10	48	2,220	3.36	5-23-63	Clay; Qgl or Tl	C	2	--	Sand, 0-4 ft; clay, 4-10 ft. Used to water yard. Inadequate in fall.
14M1	W. B. Killeen	147	47	6	2,250	38.95	5-23-63	Basalt; Ty	J	1 1/2	D	Temp. 47°F. C, L.

14M2	W. B. Killeen	45	105	36-6	2,250	40	--	Basalt; Ty	N	--	N	Sand, gravel, clay, 0-45 ft; basalt, 45-105 ft. Well filled in to 45 ft.
14P1	Robert Johnson	115	--	6	2,240	48.87	5-23-63	-- --	J	3/4?	DS	Inadequate in summer.
15J1	L. H. Bergau	29	30	48?	2,250	24.71p	5-23-63	Sand, clay; Qgl	C	1/4?	D	Sand, clay, 0-39 ft.
15Q1	Clarence Greer	225	200?	6	2,210	35.61p	5-23-63	Solid "rock"; Ty or pTu	S	3/4?	DS	
15Q2	Clarence Greer	30	30	60	2,210	18.87	5-23-63	"Quicksand"; Qgl	J	3/4?	N	Clay, sand, 0-30 ft. I.
16E1	Len Smalling	18	18	30	2,200	1.59	4-26-63	Sand? Qgl?	P	H	S	
16N1	Harold Seitz	72	20	6	2,195	8.14	1-18-63	Basalt; Ty	J	1/2	D	Clay, a little sand, 0-20 ft; solid black "rock" [basalt], 20-72 ft.
17C1	Arthur Simshauser	18	5	42	2,360	3.01	4-26-63	Granite; pTu	C	1 1/2	D	Topsoil, 0-4 ft; granite, 4-18 ft. Inadequate in winter. Fe.
17N1	Alvin Johnson	11	--	54	2,280	9.09	4-23-63	-- Qgl?	N	--	N	Flows in spring, dry in fall.
17N2	Alvin Johnson	13	--	54	2,270	2.74	4-23-63	-- Qgl?	C	3/4?	DS	
17R1	Martin Abbott	52	48	6	2,200	2	--	-- --	J	3/4	DS	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 29 N., R. 42 E.---Cont.												
18J1	R. C. Carr	7	--	--	2,320	Flowing	5-15-64	Sand; Qgl	N	--	N	Topsoil, 0-2 ft; coarse sand, 2-7 ft. Pit.
18M1	Harold Russell	11	11	36	2,360	0.92	4-24-63	Sand? Qgl	J	1	DS	
18N1	T. M. Steele	21	21	48	2,315	4.82	4-24-63	Sand, some clay; Qgl	N	--	N	Sand, some clay, 0-21 ft. Water is corrosive. Fe.
18P1	A. H. Wind, G. W. Cowan	33	5	60	2,330	10.67	4-24-63	Granite; pTu	J	1/3	D	Topsoil, 0-5 ft; granite, 5-33 ft. Temp. 46°F. C.
19C1	Town of Clayton	500	143	13	2,290	39.85 39.99 40.78	4-22-63 8-28-63 5-15-64	Granite; pTu	N	--	N	Yields 0.15 gpm. L, N.
19E2	Washington Brick and Lime Co.	43	43	96	2,260	13	11-15-53	Decomposed granite; pTu	--	--	De	Sandy clay, 0-18 ft; decomposed granite, 18-43 ft. Pumped 25 gpm for 6 hr, dd 20 ft. I.
19F1	Town of Clayton	310	209	6	2,260	200	4-25-53	Granite; pTu	--	--	De	Yielded 1½ gpm. L, N.

19J1	Eddy Olson	13	13	60	2,230	11.03	12-16-63	Gravel; Qgl?	J	3/4?	DS	
19K1	Bruce Fisher	22	22	36	2,240	13.15	12-16-63	-- --	J	1/2	DS	Fe.
19L1	Ralph Bristow	48	48	6	2,250	+0.04	4-23-63	Sand, gravel; Tl	J	3/4	D	Fe, L.
19M1	Robert Huffman	26	26	48	2,270	7.20	4-23-63	Clay, fine sand; Tl	N	--	N	Fe, I, L.
19P1	R. W. Gardner	200	180	6	2,230	8.05	5-20-64	Granite; pTu	J	1 1/2	D	Clay, sand, 0-180 ft; granite, 180-200 ft. Watered 75 cows in past. Fe.
20D1	W. K. Kratzer	28	28	72	2,260	12.69	5-15-64	Sand; Qgl	J	1/2	DS	
20D2	W. K. Kratzer	10	--	--	2,250	Flowing 7	Spr. Fall	Sand, clay; Qgl	C	--	I	Inadequate, can pump 150 gpm 12 hr a day for 3 days, then must wait 2-3 days. In late fall practically no water comes into the pit.
20J1	Delbert Marr	18	20	42	2,210	8.05	1-18-63	Sand; Qgl	C	1/2	DS	Water is corrosive. Temp. 45°F. C, Fe, O(1963-65).
20N1	C. H. McLain	17	18	30	2,215	10.43	12-16-63	"Quicksand", clay; Qgl?	J	1/2	S	Inadequate in winter. Fe.
21A1	Unknown	10	--	48	2,180	4.90	10-19-64	-- --	P	H	N	

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 42 E.---Cont.												
21N1	William Moll	22	22	72-48	2,210	11.25	1-18-63	Sand; Qgl	C	1/2	DS	Water is corrosive. Fe.
22A1	Jack Weiler	19	19	36	2,190	12.73	6-3-63	"Quicksand"; Qgl ?	J	3/4?	DS	
22A2	Jack Weiler	26	26	48	2,180	1.50	6-3-63	Sand, clay; Qgl ?	N	--	N	Well has filled in to 12 ft.
22H1	Michael Stocke	12	12	36?	2,180	10.68	11-29-63	Sand, clay; Qgl	P	3/4	DS	
23A1	George Bloss	14	12?	2	2,180	11.20	5-21-63	Sand; Qgl	C	1/2	DS	
23E1	Melvin Dunham	30	--	--	2,170	--	--	Gravel; Qgl ?	J	1/2	DS	Fe.
23K1	Paul Bates	48	48	60	2,160	12.43	5-9-63	Sand, gravel; Qgl	C	10, 5	I	Pumped 240 gpm for 4 hr, dd 3 ft. C.
23N1	Ted Ollen	15	--	36	2,155	6.58	11-29-63	-- Qgl	J	1	DS	(Basalt at 15 ft?). Fe.
23P1	Ted Ollen	38	38	48	2,155	8.50	11-29-63	Sand; Qgl	C	7 1/2	I	Yields 200 gpm.
23Q1	Paul Bates	34	--	6	2,170	27.37	5-9-63	-- --	N	--	N	

23R1	Paul Bates	50?	--	4	2,180	25?	--	Sand ? --	J	3/4	DS	Can be pumped dry.
24B1	L. J. Faucett	32	35	48	2,220	28.73	5-23-63	Sand; Qgl	J	1 1/2	DS	Sand, 1 boulder, a few pebbles, 0-35 ft. Pumped 33 gpm for 8 hr, dd 0 ft.
24B2	L. J. Faucett	30	30	48	2,220	26.43	5-22-63	Sand; Qgl	C	3/4	S	Sand, some gravel, 1 boulder, 0-30 ft. Pumped 30 gpm for 9 hr, dd 0 ft.
24D1	Leonard Todd	48	46	36-1¼	2,200	24+	--	Sand, some boulders; Qgu	C	3/4?	DS	Screen, 46-48 ft.
24M1	John Faucett	27	27	30	2,180	23.37	5-22-63	Sand; Qgl?	C	3/4?	D	
25D1	John Faucett	12	12	48	2,180	11.4	5-21-63	Sand, gravel, clay; Qgl	N	--	N	Sand, gravel, clay 0-12 ft; basalt at 12 ft. Well is not finished.
26F1	J. E. Olson	31	32	36	2,160	24.88	6- 3-63	Sand, gravel; Qgl	J	1	D	Perf., 26-32 ft.
27A1	Mrs. O. O. Bartlett	60	60	6	2,165	21.95p	6- 3-63	Sand, gravel; Qgl?	J	1/2	D	Fe.
27J1	Don Reiter	12	12	36	2,140	5.49	6- 4-63	"Quicksand"; Qgl	C	3/4	DS	
27J2	Don Reiter	135	4	6	2,145	6.90	6- 4-63	Basalt; Ty	N	--	N	Topsoil, 0-4 ft; basalt, 4-135 ft. I.
27P1	Herbert Reiter	14	14	48	2,135	9.40p	6- 7-63	Sand; Qgl	C	--	DS	Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing Depth (ft)	Casing Diam (in)	Land surface altitude (ft)	Water level Below land surface (ft)	Water level Date	Water-yielding material & Geologic designation	Pump Type	Pump Horse-power	Use	Remarks
T. 29 N., R. 42 E.---Cont.												
28A1	M. R. Simpson	78	--	6	2,195	31	--	Sand, clay; Qgl or Tl	J	1/2	DS	[Basalt at 78 ft?] Pumps 7 gpm. Fe.
28B1	B. R. Marshall	56	52	6	2,200	22.14	1- 2-64	Basalt? Ty?	C	1/2	DS	Fe.
28E1	Elmer Brown	100	--	6	2,190	16	--	-- --	J	1	D	Fe.
28M1	John Schurman	27	27	28	2,200	20	--	Sand, clay; Qgl ?	C	3/4	DS	Fe.
28N1	Uel Hand	28	28	--	2,200	20	--	"Quicksand"; Qgl	J	3/4	DS	Fe.
28P1	Gladys Potter	--	--	60	2,190	--	--	-- --	J	1/4	D	Fe.
29A1	Leo Wolf	21	--	24	2,200	11	--	-- Qgl ?	J	1/4	D	Fe.
30A1	R. W. Gardner	18	18	36	2,210	9.02	5-20-64	-- --	N	--	N	I.
30A2	R. W. Gardner	8	--	--	2,200	Flowing	all year	Sand, gravel ; Qgl	C	--	I	Pit, 50x150 ft. L.
30B1	R. W. Gardner	10	--	--	2,200	Flowing	all year	Sand, gravel ; Qgl	C	--	I	Pit, 50x300 ft.

30H1	Joseph Kewash	20	20	48	2,210	13	--	Sand, clay; Qgl	J	1/2	DS	
30N1	Patrick Henry	16	16	36	2,210	9.84	12-10-63	"Quicksand"; Qgl	P	1/3	DS	Sand, 0-9 ft; "quicksand" 9-16 ft. Fe, I.
31A1	Gust Sjostrand	17	17	--	2,200	14	--	"Quicksand"; Qgl	P	H	D	Fe.
31P1	M. W. Henning	220	59	6	2,175	12	--	Basalt; Ty	P	3/4	DS	"Quicksand", 0-59 ft; basalt, 59-220 ft. Fe.
32D1	L. H. Zimmerer	19	19	48?	2,185	12.77	11-27-63	Sand, clay; Qgl	J	1/2	DS	
32Q1	Earl Jones	99	56	6	2,120	1.5 1.79	4-30-63 11-27-63	Basalt; Ty	N	--	N	Topsoil, clay, "quicksand", 0-56 ft; basalt, 56-99 ft. Supplied 2 houses and 50 head of stock for 7 years then quit yielding water. Fe.
32Q2	Earl Jones	18	18	24-72	2,120	5.38	4-30-63	"Quicksand"; Qgl	N	--	N	"Quicksand", 0-18 ft. Well fills with "quicksand". I.
32Q3	Earl Jones	14	14	42	2,120	2.14	11-27-63	"Quicksand"; Qgl	J	2	D	Fe.
33B1	Roy Knapp	101	--	6	2,190	20	--	Sand, clay; Qgl or Tl	J	3/4	DS	Basalt at 101? ft. Fe.
33M1	M. E. Olson	12	--	48	2,135	8.95	11-27-63	-- Qgl	J	1	D	
34H1	Robert Olson	18	18	48	2,120	13	--	Sand; Qgl	C	1 1/2	DS	L.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 42 E.---Cont.												
34N1	Earl Jones	112	45	8	2,180	41.42	4-29-63	Basalt; clay; Ty; Tl	N	--	N	Plan to supply 9 houses. L.
34N2	Church of Christ	62	38	6	2,180	54.68	4-29-63	Clay, boulders. --	N	--	N	Drilling stopped by boulders. L, N.
35D1	C. F. Thorson	28	28	36	2,130	14.51	5- 9-63	Sand, gravel; Qgl	C	7 1/2	N	Pumped 224 gpm for 4 hr, dd 3 ft. Used for irrigation in past. L.
35E1	C. F. Thorson	48	48	36	2,140	25.87	5- 9-63	Sand, gravel; Qgl	C	15	N	Pumped 228 gpm. Used for irrigation in past. Temp. 50°F. L.
35P1	Town of Deer Park	54	54	72	2,137	34.29p 30	8-27-63 --	Sand, gravel; Qgl	T	25	P	Perf. 34-54 ft. Pumped 350 gpm for 24 hr, dd 3/4 ft. L.
35P2	Town of Deer Park	45	--	--	2,137	--	--	Sand, gravel; Qgl	--	--	DeT	C.

T. 29 N., R. 43 E.												
1A1	A. P. Nilles	35	--	36	2,090	--	--	-- --	C	1/3	D	
1H1	T. W. Hall	11	11	60	2,090	5.53	2-7-63	Sand; Qgl	C	1/2	DS	Water is corrosive. Fe.
1P1	Charles Corley	18	18	36?	2,090	15.16	2-4-63	Sand, clay; Qgl?	C	1/4	DS	
2A1	W. L. Harter	16	16	48	2,110	5.21	5-29-63	Sand; Qgl	J	1/2	D	
2D1	Charles O'Neil	10	--	36	2,170	8.26	1-9-63	-- --	N	--	N	
3D1	C. M. McPherson	55	55	30	2,170	39.40	2-8-63	Sand, clay; Tl?	N	--	N	Well is not finished. Can be pumped dry. I. L.
3H1	Amanda Halgren Estate	52	10	36	2,190	34.70	1-9-63	Granite; pTu	P	H	D	"Dirt", 0-10 ft; granite, 10-50 ft. I, O(1963-65).
3H2	Amanda Halgren Estate	15	15?	42	2,230	3.21	1-9-63	Blue clay; --	N	--	N	
4N1	Bernice Rule	20	20	48	1,930	--	--	-- --	C	1/4	D	Perf., 19-20 ft. Inadequate in late summer. Water level fluctuates from near top to near bottom of well. Fe.
5F1	Joseph Thain	26	26	36	2,130	21.39	5-16-63	"Hardpan"; Qgl	J	3/4?	DS	Supplies 2 houses.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 43 E.---Cont.												
5L1	J. F. Preston	8	--	60	2,150	2.79	5-16-63	--; Qgl?	N	--	N	
7P1	Ralph Lyons	74	--	6	2,240	42.27	5-17-63	--; --	J	1/2?	N	
8A1	E. M. Stark	23	23	6	2,060	5.46	5-16-63	Sand, clay, gravel, boulders; Qgu	C	1/2	D	Sand, clay, gravel, boulders, 0-22 ft; "rock" [granite], 22-23 ft. Perf., 17-23 ft.
8C1	E. M. Spencer, Sr.	11	11	42	2,180	4.06	5-17-63	Sand, gravel; Qgl	C	1	D	Fe.
8C2	E. M. Spencer, Sr.	7	7	72	2,180	1.36	5-17-63	Sand, gravel; Qgl	N	--	N	
8K1	Melvin Dugger	102	102	6	2,150	24.15	5-15-63	--; --	J	3/4	DS	Fe.
8N1	J. C. Brummett	127	107	6	2,250	84.12	5-17-63	Granite; pTu	S	1	DS	Pumped 13 gpm for 1 hr, dd 4 ft.
9N1	W. F. & L. K. Stockwell	12	--	--	2,050	1	5-16-63	Sand, some clay, gravel, boulders; Qgf	C	10	I	Pit, 50x110 ft.

10R1	F. D. Arnold	59	59	30	2,080	54.55	2-8-63	Sand; Qgf	P	3/4	D	Supplies gas station, cafe also.
11E1	N. V. Merritt	95	95	42	2,110	83.60	2-8-63	-- Qgf?	N	--	N	Used for irrigation in past.
14D1	George Tufty	67	67	36	2,080	61	--	Gravel; Qgf	J	1/2	D	Pea gravel, 0-67 ft. Supplies store, cabins also. Temp. 50° F, C.
15N1	W. R. Higgins	40	40	6	1,930	2.33	5-15-63	Sand. --	J	1/2	D	Fe.
15P1	Adolph Helgeson	60	20?	4	1,930	2.64	5-14-63	Blue clay; Tl	J	1	D	Mostly blue clay, 0-60 ft. Can be pumped dry.
15P2	Adolph Helgeson	200	50?	4	1,930	3.20	5-14-63	Blue clay; Tl	P	H	D	Mostly blue clay, 0-200 ft. Can be pumped dry.
15R1	Lawrence Martin	100	95	6	1,970	15.65p	1-9-63	Granite; pTu	J	1/2	D	Yields 3½ gpm. Fe, L.
16C1	A. E. Terry	15	15	48	2,000	2.16	5-15-63	Sand; Qgu	C	1/2	DS	Inadequate in late summer. Fe.
16M1	L. E. Frantz	6	6	32	2,130	1.27	5-16-63	Sand, silt, some gravel; Qls?	N	G	D	Can be pumped dry in 1 hr.
20E1	C. C. Hagen	130	130	6	2,230	101.16	5-21-63	Sand; Qgl?	P	2	N	Sand, 0-130 ft. Perf., 110-130 ft.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 43 E.---Cont.												
22A1	J. M. Stork	55	20	6	1,900	--	--	Granite; pTu	J	1/4	D	"Dirt", boulders, 0-10 ft; granite, 10-55 ft. Yields 2-3 gpm. Can be pumped dry in 10-15 min.
22A2	Ludwig Wilbrecht	65	20	6	1,905	11.86p	5-13-63	Granite; pTu	J	1/4	D	"Dirt:, 0-10 ft; granite, 10-65 ft. Fe.
22C1	Richard Vaughn	13	--	12	1,930	7.17	5-14-63	-- Qgf?	C	1/2	DS	Fe.
22F1	Eldon Morrill	17	15	24	1,940	13.42	5-15-63	Sand, gravel; Qgf	C	1/2	D	Sand, gravel, some boulders, 0-17 ft. Screen, 15-17 ft.
22H1	L. G. Keller	110	20	6	1,885	31.72	5-13-63	Decomposed granite; pTu	J	3/4	D	"Dirt", 0-2 ft; decomposed granite, 2-110 ft.
22M1	James Reed	7	7	48	1,920	4.92	11-29-63	-- Qgf	J	1/2	D	
22Q1	G. R. Price	35	35?	30	1,965	31.62	5-13-63	-- --	J	3/4	D	

23E1	Charles Miller	16	16	36	1,880	6.87	5-13-63	Sand, gravel; Qgf	C	1/4	D	Sand, gravel, 1 large boulder, 0-16 ft. Fe.
23N1	Farley Dean	39	39	42	1,955	35.83	5-13-63	Sand, gravel, some boulders; Qgf	C	3/4?	D	Sand, gravel, some boulders, 0-39 ft.
23N2	Farley Dean	18	--	--	1,955	Dry	--	-- --	--	--	De	Sand, gravel, boulders, 0-18 ft. granite at 18 ft. N.
23N3	Farley Dean	70	--	--	1,960	65?	--	Sand, clay, gravel; Qgu?	--	--	De	L., N.
23R1	Warren Bogart	4	4	30	1,920	0.70	2-12-63	-- Qls?	C	1/4?	D	Inadequate, can be pumped an hour at a time.
24L1	Wes Morris	16	--	48	1,940	5.65	2-12-63	-- --	N	--	N	Inadequate in summer.
26E1	J. I. Dean	14	14	48	1,910	Flowing	2-27-63	Gravel; Qgf	C	--	D	Peat, clay overlie gravel. Fe.
26J1	Fred Weisschadel	206	18	4	1,810	24.89	2-12-63	Granite; pTu	J	1	D	"Soil", [glacial deposits] 0-18 ft; granite, 18-206 ft.
26P1	J. D. Reese	35	--	48?	1,915	9.08	2-27-63	-- --	J	1/4	DS	Inadequate during dry summers. Fe.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 43 E.---Cont.												
29N1	U. S. Air Force Missile Site 1 well 1-C	202	192	8	2,211	91	7- -59	Sand, silt, clay; Qgl	S	3	InP	Screen, 192-202 ft. Pumped 42 gpm, dd 81 ft. Cooling is largest use. Temp. 54° F, C, L.
29N2	U. S. Air Force Missile Site 1, well 2-C	178	183	8-6	2,208	88	12- -59	Sand, clay; Qgl	S	3	InP	Perf., 165-183 ft; backfilled with gravel, 178-192 ft. Pumped 87 gpm, dd 62 ft. Cooling is largest use. Temp. 52°F.C,L.
31H1	U. S. Corps of Engineers	99	--	--	2,181	--	--	-- --	--	--	DeT	L.
31H2	U. S. Corps of Engineers	51	--	--	2,179	--	--	-- --	--	--	DeT	L.
31H3	U. S. Corps of Engineers	43	--	--	2,179	32	6-10-58	-- --	--	--	DeT	Sand and silty sand layers. 0-32 ft; basalt, 32-43 ft.
31J1	U. S. Corps of Engineers	61	--	--	2,181	36	10-15-58	-- --	--	--	DeT	L.

31J2	U. S. Corps of Engineers	202	--	--	2,177	--	--	-- --	--	--	DeT	L.
31M1	Town of Deer Park	192	--	8	2,195	55.31	2-21-63	Sand; Qgl?	T	1 1/2		Fine to coarse sand, 0-192 ft. Yields 500 gpm. Used for car racing events.
34B1	David Molony	101	101	40-18	1,990	--	--	Sand; Qgf	P	3/4	D	L, N.
34G1	George Millard	163	163	6	2,005	105.07	5-29-63	Sand, gravel; Qgf ?	N	--	N	Sand, gravel, clay, boulders, 0-163 ft.
34H1	Riverside High School	153	153	6	1,980	116	1962	Gravel; Qgf	S	3	P	Gravel, 0-153 ft.
34J1	Church of Jesus Christ of Latter Day Saints	266	100	6	1,990	111.77 110.23 110.85	4-30-63 5- 9-63 5-15-63	Granite; pTu	N	--	N	Yields 1½-2 gpm. I, L.
34J2	Church of Jesus Christ of Latter Day Saints	188	145	6	1,985	106.65 106.34	5-15-63 5-20-63	Granite; pTu	N	--	N	Do.
34R1	F. E. Howard	240	--	6	2,010	--	--	Gravel; Qgf?	S	1 1/2	DS	
35D1	J. D. Reese	6	3	60	1,915	3.25	2-27-63	Gravel, clay; --	N	--	N	
35E1	Richard Bond	486	88	6	1,965	68.08	6-14-63	Granite; pTu	N	--	N	L, N.
35H1	Great Northern Ry. Co.	67	13	6	1,770	2.32	1-29-63	"Rock"; pTu	S	3/4?	N	Topsoil, gravel, clay, 0-12 ft; "rock", 12-67 ft. Yields 2-7 gpm. I.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 43 E.---Cont.												
35H2	Great Northern Ry. Co.	42	14	6	1,780	--	--	"Rock"; pTu?	--	--	De	Pumped 15 gpm for 8 hr. L.
35J1	Weber Marsh	13	13	42	1,840	6.04	2-13-63	-- --	J	1/2?	D	I.
35K1	Ray Toner	65	--	6	1,770	11.25	2- 4-63	Granite; pTu	J	1/2?	D	Granite, 0-65 ft. I.
35M1	C. R. Reynolds	60?	--	6	1,980	43.35	3- 5-63	-- Qgf?	J	1 1/2	D	
T. 29 N., R. 44 E.												
4G1	Lester Johnson	12	--	48	1,930	7.54	2- 6-63	Granite; pTu	N	--	N	Sand, gravel, 0-5 ft; granite, 5-12 ft.
5A1	K. R. Cox	79	--	6	2,200	36.87	2- 6-63	Sand. --	J	1	DS	
5D1	Frank Podlas	16	16	48	2,140	8.60	2- 6-63	Sand; Qgl	J	3/4	D	L.
6H1	Lloyd Ambacher	10	--	--	2,100	0	--	Sand, clay; Qgl	C	5	I	Pit, 50x100 ft. Inadequate, can pump 12 hr. a day for 1 week, then must wait 2 wks to fill. L.

6H2	Lloyd Ambacher	14	14	48	2,110	9.78	2- 6-63	Clay; Qgl?	C	1/4	DS	Can be pumped dry when water lawn and garden. Temp. 45°F. C, I.
6N1	Delbert Countryman	250	235	6	2,050	6	--	Decomposed granite; pTu	S	3/4	DS	Pumps 6 gpm.
6N2	Delbert Countryman	35	35	36	2,050	16.20	2- 7-63	"Quicksand"; Qgl	J	3/4	S	Can be pumped dry in 30-45 min.
7A1	Alfred Anderson	35	35	36	2,140	29.62	2- 4-63	Sand; Qgl?	J	3/4?	DS	Inadequate, not enough to water yard.
7H1	Sharon Kruger	55	33+	36	2,110	25.02	2- 6-63	-- --	J	3/4?	DS	Fe.
7M1	Ralph Hager Estate	19	19	60	2,070	9.23	2- 4-63	Sand; Qgl	C	3/4?	DS	
16A1	W. K. White	27	27	42	2,120	23.95	3-12-65	Sand, gravel; Qgf	J	1/2	D	
17D1	Riverside School Dist. 416, Elk Grade School	107	--	6	1,890	--	--	Granite; pTu	S	1	P	Sand, decomposed granite, 0-40 ft; granite, 40-107 ft. Yields 7 gpm.
17D2	Riverside School Dist. 416, Elk Grade School	45	15	60	1,900	17.00	2- 7-63	Granite; pTu	P	1	--	Sand, decomposed granite, 0-15 ft; granite, 15-45 ft. Used to water lawn. Inadequate, can pump 6 hr, then must wait 3-4 days.

Table 7 - Records of representative wells - Continued

Well	Owner	Well Depth (ft)	Casing		Land surface altitude (ft)	Water level		Water-yielding material & Geologic designation	Pump		Use	Remarks
			Depth (ft)	Diam (in)		Below land surface (ft)	Date		Type	Horse-power		
T. 29 N., R. 44 E.---Cont.												
20H1	Henry Sudhoff	28	28	36	2,020	22.13	12-19-62	Sand; Qgf	N	--	N	Sand (layers 3-4 ft thick) and clay (layers 1-4 in. thick), 0-28 ft. 0(1962-65).

Table 8 - Records of representative springs

Spring number: Spring-numbering system is described on pages 44-45.

Altitude: Land-surface altitude of spring. Values are interpolated from topographic maps.

Yield: Yields are reported or estimated.

Water-yielding materials: Geologic designations are based on surficial geology, and abbreviated as follows (see pl. 2 for more detailed information): pTu, plutonic and metamorphic rocks, undifferentiated; Tl, Latah Formation; Ty, Yakima (?) Basalt; Qp, Palouse Formation; Qls, landslide deposits; Qgl, glaciolacustrine deposits; Qgf, glaciofluvial deposits; Qgu, undifferentiated glacial deposits; Qal, alluvium.

Use: D, domestic; I, irrigation; In, industrial; N, not used; P, public supply; S, stock.

Remarks: C, chemical analysis in table 11; Fe, water contains noticeable iron; I, yield inadequate.

Table 8 - Records of representative springs

Spring no.	Owner	Altitude (ft)	Yield: Gallons per minute	Yield: Date	Water-yielding material: Geologic designation	Water-yielding material: Character	Temperature: °F	Temperature: Date	Use	Remarks
T. 26 N., R. 42 E.										
11J1s	Washington Dept. of Game, Fish Hatchery	1,590	6,800	6-15-65	Qgf	Gravel	50	--	DIn	Supplies 4 houses also. C.
12A1s	Spokane Country Club	1,590	4,000	--	Qgf	Gravel, "quicksand"	51	8-27-65	IP	Supplies golf course and 13 houses.
T. 26 N., R. 43 E.										
2C1s	H. P. Wicklund	1,840	12	--	Qls?	Blue clay	--	--	D	
5L1s	Wandermere Inc.	1,670	3,300	5-21-55	Qgf	Sand, gravel over granite	51	--	DI	Supplies golf course, 4 houses, YMCA camp, and Lake Wandermere.
6Q1s	Waikiki Syndicate	1,665	4,000	1900	Qgf	Gravel over granite	50	--	N	Used in past to run a power plant.
7B1s	Waikiki Syndicate	1,662	1,500	1900	Qgf	Gravel over granite	51	8-26-65	DI	Supplies fish hatchery also.
13C1s	Oran Scott	1,900	10	--	Qgl	Sand, clay	--	--	D	

T. 26 N., R. 44 E.										
27P1s	Oscar Camp	2,360	--	--	Qp; Ty?	"Dirt" over basalt	--	--	S	Adequate.
T. 27 N., R. 41 E.										
35A1s	Mrs. Lemon	1,640	1	5- 8-63	Qgf?	--	--	--	DS	
T. 27 N., R. 42 E.										
6J1s	Thelma McBride	2,400	3-4	--	pTu?	--	--	--	DS	
6J2s	Thelma McBride	2,400	2	--	pTu?	--	--	--	S	
15M1s	M. Rock	2,280	30	--	Qgl	"Quicksand"	--	--	DS	
20Q1s	J. B. French	2,340	5	8- 1-63	--	Whitish-blue clay, dirt	52	8- 1-63	DS	
25C1s	Edward Bloom	2,040	0.5	8- 5-63	Qgu	Clay, boulders	--	--	DS	
T. 27 N., R. 43 E.										
2G1s	R. W. Mattix	1,940	2	--	Qls	Blue-gray clay	--	--	DS	I.
8Q1s	Henry Weitz	1,960	1-2	10-18-63	Qgl?	--	53	10-18-63	S	
16E1s	Fruin	1,880	--	--	Qgl?	--	51	10-23-63	DS	
30L1s	Gerald Otto	2,040	--	--	pTu	Granite	--	--	DS	Supplies 2 houses. Fe, I.
T. 27 N., R. 44 E.										
6P1s	Leonard Coulston	1,960	2	--	Qls	Blue clay	--	--	D	Fe.

Table 8 - Records of representative springs - Continued

Spring no.	Owner	Altitude (ft)	Yield: Gallons per minute	Yield: Date	Water-yielding material: Geologic designation	Water-yielding material: Character	Temperature: °F	Temperature: Date	Use	Remarks
T. 27 N., R. 44 E.---Cont.										
18D1s	Frank Stedman	1,940	0.5	--	Qgl or Qls	--	--	--	DS	
18D2s	Frank Stedman	1,930	2	--	Qgl or Qls	--	47	10-31-63	--	Used to water yard. Fe.
T. 28 N., R. 42 E.										
32B1s	Fred Ellsworth	2,220	3-4	--	--	"Dirt"	--	--	DS	Corrodes pipes. Fe.
T. 28 N., R. 43 E.										
1E1s	Unknown	1,920	1	2-13-63	Qgf?	"Dirt"	43	2-13-63	N	
3F1s	Raymond Koesel	1,870	12	--	Qal	--	--	--	DS	
10J1s	Carl Olson	1,870	0.5	3- 5-63	Tl	Blue-gray clay	--	--	D	Supplies tavern in summer also.
32Q1s	C.F. White	2,120	--	--	Qgl	Fine sand	54	10-22-63	D	
33N1s	M. V. Richards	2,040	8	--	Qgl?	Fine sand, clay	--	--	DS	
T. 28 N., R. 44 E.										
8P1s	Francis Zimmerly	2,130	20	--	Qgl	Gravel over blue clay	--	--	D	Fe.

T. 28 N., R. 44 E. Cont.									
32F1s Jack Schmidt	2,300	--	--	Qp	Sand	--	--	DS	Adequate.
T. 29 N., R. 41 E.									
12Q1s Unknown	2,440	1-2	4-25-63	pTu?	--	45	4-25-63	N	
T. 29 N., R. 42 E.									
4H1s C. S. Conner	2,260	3-4	--	Qgl	Clay	--	--	DS	
23A1s George Bloss	2,170	75	5-21-63	Qgl	Sand, gravel	--	--	S	Used in past for irrigation.
T. 29 N., R. 43 E.									
5F1s Joseph Thain	2,110	200	5-16-63	Qgu	Sand, gravel, clay, boulders	48	5-16-63	I	Maximum flow occurs in Aug.
5K1s Loy Hodgson	2,140	300-400	5-16-63	Qgu	Clay, sand, gravel, boulders	48	5-16-63	DIS	
16C1s A. E. Terry	1,990	75	--	Qgf	--	53	5-15-63	I	
16M1s L. E. Frantz	2,130	500	5-16-63	Qgl; ?	Sand, clay	48	5-16-63	S	Used to water lawn and garden also.
22H1s J. M. Stork	1,890	3-5	5-13-63	pTu?	Sand, clay, boulders over granite	44	5-13-63	N	Used in past for tavern.
28C1s E. R. Roberts	2,080	6	5-14-63	Qgl	Fine sand	51	5-14-63	DS	
28J1s Ralph Reed	1,900	3-5	5-14-63	Qgf or Qal	Sand, gravel, silt	47	5-14-63	D	

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
The following drillers are listed in this table by last name only: D. E. Bartholomew, Nine Mile Falls; Mr. Bergren, deceased; Iry L. Fry, Spokane; James F. Noonan, Valley; A. R. Reed, Chico, Calif.; Clyde Reeder, Mead; Jim Sager, Spokane; Herb Sams, Elk; R. M. Skidmore, Colville; George Weideman, Spokane; and Oliver F. Zinkgraf and Sons, Spokane.		
Abbreviations used in this table are explained at the beginning of table 7. Short well logs are given in the "Remarks" column of table 7.		
Terms placed in quotes are drillers' or owners' descriptions that are either colloquial, ambiguous, or not specific. Terms in brackets are interpretations by the author.		
25/42-3H1. City of Spokane, wells 10, 11, (Baxter Station). Altitude 1,679 ft. Dug and drilled by Zinkgraf, 1945. 144-in. diam casing to 47 ft; 2 24-in. diam casings, called wells 10 and 11, placed 6 ft apart inside big casing at the bottom.		
Well 10: cased 47-131 ft; perf., 93-124 ft, plugged 124-131 ft.		
Boulders, large, and gravel	6	6
Clay, boulders, and gravel	4	10
Gravel, cemented	2	12
Sand, coarse, gravel, and small boulders	75	87
Clay	6	93
Gravel	11	104
Boulders	1	105
Gravel	10	115
Boulders	4	119
Gravel	6	125
Well 11: cased 47-132 ft; perf., 93-122 ft, plugged 124-132 ft.		
Boulders, large, and gravel	6	6
Clay, boulders, and gravel	4	10
Gravel, cemented	2	12
Sand, gravel, and black boulders	76	88
Clay	6	94
Gravel	6	100
Gravel and boulders	32	132
25/43-4B2. City of Spokane, well 9, (Hoffman Ave. Station). Altitude 2,047 ft. Dug in 1938. Cased to 227 ft; perf., 208-227 ft.		
No record	189	189
Gravel, fine, grading to medium sand	23	212
Clay	1	213
Gravel, fine, to medium sand	9	222
Sand, coarse to fine	5	227

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
25/44-3A1. Trentwood Irrig. Dist. 3, well 2. Altitude 2,015 ft. Drilled by Reeder, 1947. Cased to 148 ft; perf., 77-147 ft.		
Sand, coarse, and boulders	86	86
Sand, fine	29	115
Clay, blue	5	120
Sand, coarse, and boulders	28	148
25/44-4R3. Irvin Water Dist. 6, well 3. Altitude 1,989 ft. Drilled by Holman Drilling Corp., 1961. Cased to 118 ft; perf., 82-112 ft.		
Boulders and some gravel	22	22
Gravel	78	100
"Hardpan"	17	117
Gravel and cobbles	1	118
25/44-5D1. Pasadena Park Irrig. Dist. 17, well 3. Altitude 1,996 ft. Drilled by Holman Drilling Corp., 1965. Cased 0-157 ft, 172-182 ft; screen, 157-172 ft, 182-202 ft.		
Topsoil	1	1
Gravel, less than $1\frac{1}{2}$ in. diam, sand, and clay	42	43
Sand, brown [and fine gravel?]	37	80
Sand and some clay [and fine gravel?]; water-yielding	40	120
Sand, clean [and fine gravel?]; water-yielding	30	150
Sand, fine gravel, and some clay; water-yielding	30	180
Sand and fine gravel, clean; water-yielding	22	202
25/44-5D2. Pasadena Park Irrig. Dist. 17, Altitude 1,996 ft. Drilled by Holman Drilling Corp. Cased to 225 ft.		
No record	10	10
Gravel	25	35
Sand, coarse	27	62
Sand, "muddy", brown	10	72
Sand, coarse	15	87
Sand, coarse, and gravel	10	97
Sand, coarse, brown	44	141
Gravel, 1/8 to 1/4 in.	35	176
Sand and clay, hard	14	190
Sand, coarse	5	195
"Conglomerate, decomposed granite" (clay and gravel)	15	210
"Granite, decomposed" [gravel ?]	5	215
Sand, coarse	24	239

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
25/44-5K1. Pasadena Park Irrig. Dist. 17, well 2. Altitude 1,958 ft. Drilled by E. A. Holman, 1960. Cased to 234 ft; perf., 50-70 ft, 190-232 ft.		
Gravel and boulders	39	39
Gravel	40	79
Clay	6	85
Sand, fine	20	105
Sand, medium-fine	69	174
Sand, coarse	13	187
Sand and small gravel	47	234
26/42-5F1. R. M. Brown. Altitude 1,545 ft. Dug by Reeder, 1947. Cased to 15 ft; perf., 7½-15 ft.		
Topsoil, gravel, and boulders	8	8
Gravel, sand, and boulders	7	15
26/42-13P2. James Bledsoe. Altitude 2,405 ft. Drilled by Sams, 1962. Cased to 15 ft. Log from owner's memory.		
Clay	15?	15
Basalt	3?	18
Clay with thin layers of sand	52?	70
26/42-16P3. Sundance Golf Course, Inc. Altitude 1,660 ft. Drilled by Bartholomew, 1965, Cased to 75 ft; screen, 75-98 ft, plugged 98-100 ft.		
"Overburden"	15	15
Gravel	15	30
Sand	70	100
26/42-23P1. Robert Titars. Altitude 2,360 ft. Drilled by Bergren, 1910. Cased to 578 ft; perf. Log from owner's memory.		
"Dirt"	3?	3
Basalt	97?	100
Clay, brown, black, yellow and white	150?	250
Basalt	100?	350
Shale, yellow and white, and fine sand	228?	578

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/42-25H1. Robert Avey. Altitude 2,330 ft. Drilled by E. A. Holman, 1957. Cased to 4 ft.		
Topsoil	2	2
Basalt, hard, gray	47	49
Basalt, soft, brown	22	71
26/42-25P1. C. L. Shuler. Altitude 2,060 ft. Drilled by P. Olson, 1954. Cased to 107 ft.		
Sand or gravel	107	107
Basalt	133	240
Clay or shale	100	340
Sand	15	355
26/42-25R2. Western Builders. Altitude 2,025 ft. Drilled by Holman Drilling Corp., 1954. Cased to 130 ft.		
Sand	80	80
"Rock"	25	105
Sand	25	130
"Rock", water at 215 ft.	100	230
26/42-27N2. D. R. Costello. Altitude 1,710 ft. Drilled by R. Eddy. Cased to 150 ft; perf., 140-150 ft.		
"Dirt" and boulders	10	10
Sand and "quicksand"	134	144
Gravel	6	150
26/42-34N3. Fairmount Memorial Park. Altitude 1,650 ft. Drilled by E. A. Holman, 1958. Cased to 71 ft; perf., 40-69 ft.		
Boulders and gravel	9	9
Gravel and sand	18	27
Sand and pea gravel	44	71
26/43-4P1. Mead School Dist. 354. Altitude 1,830 ft. Drilled by Holman Drilling Corp., 1962. Cased to 126 ft; screen, 126-146 ft.		
Topsoil	2	2
Sand	41	43
Clay, brown	9	52

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-4P1 - Continued		
Sand and pea gravel	18	70
Sand, silty	8	78
Gravel mixed with clay	2	80
Sand, very silty	45	125
Sand, coarse, water-yielding	13	138
Sand, fine, water-yielding	2	140
Sand with clay lenses, water-yielding	6	146
26/43-7P1. Washington Water Power Co., Woodway Park. Altitude 1,780 ft. Drilled by Reeder, 1962. Cased 0-93 ft, 114-126 ft; screen, 93-114 ft; plugged, 126-180 ft.		
Sand and topsoil	87	87
Sand and some gravel	40	127
Silt	7	134
Granite	46	180
26/43-8B4. Washington Water Power Co., Mead well 2. Altitude 1,765 ft. Drilled by Reeder, 1959. Cased to 90 ft; perf., 59-88 ft.		
Sand and gravel	12	12
Clay	9	21
Sand and silt, water-yielding	5	26
Clay	42	68
Sand, coarse, and silt, water-yielding	22	90
26/43-10K1. Washington Water Power Co., Mead well 1. Altitude 1,910 ft. Dug by Reeder, 1946. Cased to 106 ft; perf.		
Sand, medium and fine	44	44
Clay, brown	3	47
Sand, fine	32	79
Sand, coarse	10	89
Gravel, small pea, and thin layers of fine sand	11	100
No record	6	106
26/43-11F1. Kathleen & Ethlyn DeCamp. Altitude 1,870 ft. Dug by J. G. Moss. Cased to 42 ft; perf., 21-30 ft.		
Sand, hard	15	15
Sand, loose, water-yielding	10	25
Clay, blue	17	42

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-16D3. Kaiser Aluminum and Chem. Corp., well 4. Altitude 1,938 ft. Drilled by A. A. Durand, 1951. Cased to 286 ft; 50 ft of perf.		
Sand, coarse	25	25
Sand and gravel	23	48
Sand and gravel, small clay break	12	60
Sand and gravel	36	96
Sand, hard, and gravel	24	120
Sand with clay breaks	28	148
Sand, hard	16	164
Clay, blue and yellow	4	168
Shale, blue	17	185
Sand, loose, water-yielding	5	190
Shale, sandy	8	198
Sand	12	210
Sand and gravel, water-yielding	7	217
Sand and gravel	64	281
Clay, sticky, blue	5	286
26/43-16F2. Kaiser Aluminum and Chem. Corp., well 5. Altitude 1,940 ft. Drilled by Gaudio Drilling Co., 1955. Cased to 238 ft; screen, 238-268 ft.		
Sand and gravel	11	11
Sand, medium to coarse, "dirty" in streaks	29	40
Sand and gravel	5	45
Sand, medium to coarse	15	60
Sand, coarse, and some fine gravel; "dirty"	30	90
Sand, medium to coarse, and fine gravel; cemented	40	130
Gravel, coarse	10	140
Sand, medium to coarse, and fine gravel; cemented	25	165
Sand, coarse, and some fine gravel	5	170
Sand, coarse, and medium to fine gravel, boulders at 176 ft.	36	206
Sand, medium, and clay	6	212
Sand, medium	6	218
Sand, medium to coarse, cemented with clay	22	240
Gravel, medium to coarse	6	246
Gravel, medium to coarse, and coarse sand, more tightly packed at bottom	22	268
26/43-16F3. Kaiser Aluminum and Chem. Corp., well 6. Altitude 1,940 ft. Drilled by Holman Drilling Corp., 1963. Cased to 242 ft; screen, 242-283 ft.		
Sand, fine	45	45
Sand and gravel, ½-in. or less	95	140
Sand and gravel, ½-in. or less, with some clay, water at 178 ft.	40	180

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-16F3 - Continued		
Gravel and sand with boulders up to 8 in.	45	225
Sand, coarse	5	230
Sand, coarse, and gravel to ½-in.	31	261
Sand and gravel with layers of brown clay	22	283
Clay, blue	1	284
26/43-16G1. Bonneville Power Admin. Altitude 1,942 ft. Drilled in 1942. Cased to 346 ft; perf.		
Sand, fine, silty, boulder at 11 ft	161	161
Gravel, water-yielding	3	164
Sand, fine	13	177
Clay, blue	16	193
Gravel, water-yielding	7	200
Sand, fine	42	242
Sand, water-yielding	9	251
Sand, fine, water-yielding	21	272
Sand and clay, hard and packed	23	295
Clay	15	310
Clay, hard	21	331
Gravel, coarse	1	332
Clay, hard	156	488
"Rock" with crevices	25	513
"Rock" (diorite)	43	556
26/43-17B1. Nelson Landscaping Service. Altitude 1,940 ft. Drilled by Noonan, 1964. Cased to 224 ft; perf., 199-220 ft.		
Sand and a few boulders	50	50
Sand, some clay	55	105
Boulder, large granite	10	115
Clay and fine sand	35	150
Sand, coarse, and clay	11	161
Gravel, coarse, and clay	3	164
Clay, pea gravel, and coarse sand	26	190
Sand, coarse, and clay	6	196
Gravel and sand	14	210
Clay, hard, and gravel	14	224
26/43-17J1. El Paso Natural Gas Co. Altitude 1,945 ft. Drilled by Reeder, 1961. Cased to 248 ft; perf., 228-243 ft.		
Loam, sandy	3	3
Sand, fine	157	160

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-17J1 - Continued		
Clay and fine sand	68	228
Sand, coarse, gravel, and some fine sand	20	248
26/43-19P1. Town and Country Utilities Co., well 2. Altitude 1,975 ft. Drilled by Reed, 1955. Cased to 210 ft; perf.		
Sand	42	42
Gravel and some sand	16	58
Gravel and very little sand	16	74
Sand	14	88
Sand and some gravel	58	146
Gravel, coarse	9	155
Gravel, coarse, water at 155 ft	19	174
Sand, coarse	8	182
Sand, coarse, and small boulders	3	185
Sand, coarse, and gravel	5	190
Gravel and 4- to 6-in. diam stones	12	202
Gravel and small boulders	2	204
Sand, coarse, gravel, and small boulders	6	210
26/43-20D1. Whitworth Water Dist. 2, well 2. Altitude 1,950 ft. Drilled by Holman Drilling Corp., 1962. Cased to 253 ft; screen, 253-286 ft.		
Topsoil	2	2
Sand, silty	103	105
Sand and gravel, very hard	93	198
Sand, coarse, water-yielding	9	207
Sand and gravel, water-yielding	79	286
26/43-20J1. Washington Water Power Co. Altitude 2,011 ft. Drilled by Diamond Drill Co., 1962. Cased to 270 ft; perf., 195-215 ft. Log from owner, and examination of scattered samples.		
Sand, some boulders	100	100
Sand, fine, black	50	150
Sand, medium to very coarse, some fine	58	208
Clay, blue-gray	2	210
Sand, very fine to very coarse, some very fine gravel, and clay streaks	150	360
Clay, blue-gray, micaeous, in layers with fine blue-gray sand mixed with clay	70	430

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-20J2, Washington Water Power Co. Altitude 2,011 ft. Drilled by Diamond Drill Co., 1962. Cased to 768 ft; perf., 755-759 ft, plugged 761-780 ft. Log condensed from data of Ball Assoc., Ltd., Consultants, Denver, Colo.		
No record; see J1, 50 ft east	345	345
Sand, coarse	15	360
Sand, fine to medium, and some clay	15	375
Sand, fine, and silt	15	390
Sand, fine	15	405
Sand, fine with some coarse, and silt	7	412
Clay, silt, and sand	8	420
Sand, fine	10	430
Clay and silt, blue-gray	21	451
Sand, very fine to medium, gray; blue, gray, and tan clay and silt	11	462
Clay and silt, gray, blue and tan	30	492
Boulder	7	499
Sand	6	505
Clay and silt, gray	5	510
Sand, very fine, gray, and a little clay	4	514
Sand, coarse, and 2 boulders	6	520
Clay, gray	2	522
No record [very coarse sand?]	28	550
Sand, coarse to fine, light-gray	35	585
Sand, coarse to fine, and pebbles	35	620
Sand, very coarse to medium	40	660
Gravel and sand	5	665
Sand and boulders	5	670
Sand and gravel	15	685
Sand, coarse to medium	25	710
Sand, fine	8	718
Boulders	2	720
Sand, fine	10	730
Boulders and some sand	30	760
Sand, fine to medium and boulders	10	770
Boulders	10	780
26/43-24L3. Maynard Cutler. Altitude 2,345 ft. Drilled by Bartholomew, 1964. Cased to 32 ft; screen 32-40 ft. Log from owner's memory.		
Clay and sand	9	9
Clay	22	31
Sand, water-yielding	6	37
Basalt	3	40

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-24N1. Walter Highberg. Altitude 2,295 ft. Drilled by E. A. Holman, 1964. Cased to 340 ft; Well filled, 365-370 ft.		
"Hardpan" (Hard yellow clay and a little sand)	12	12
Gravel	1	13
Basalt	70	83
Sand	71	154
Clay, brown, gray; a thin layer of "quicksand" at 160 ft with $1\frac{1}{2}$ gpm of dirty water; pieces of wood at 240 ft	106	260
Clay, dark-brown, thin layers of green clay about 295 ft; water-yielding	70	330
Sand, granitic	40	370
26/43-28D1. C. C. Calkins. Altitude 2,025 ft. Dug and drilled by Reeder, 1957. Cased to 310 ft; perf., 210-292 ft.		
Sand, fine, with some coarse sand strata	235	235
Silt and clay seams	8	243
Sand, fine, water-yielding	7	250
Clay, hard	5	255
Sand, fine, water-yielding	9	264
Clay, hard	3	267
Sand, coarse, and gravel; water-yielding	6	273
Sand, fine, and clay	8	281
Clay, hard	3	284
Sand, coarse, and gravel; water-yielding	5	289
Clay, hard	2	291
Sand, coarse, and gravel; water-yielding	11	302
Clay, hard, dry	8	310
26/43-28M1. C. C. Calkins. Altitude 2,051 ft. Dug by Zinkgraf, 1956. Cased to 251 ft; perf., 211-251 ft.		
Topsoil	3	3
Sand, loose and fine mixture	12	15
Sand, loose and fine, with gravel	32	47
Sand, loose and fine	38	85
Sand packed with clay	5	90
Sand, coarse, and small gravel	56	146
Sand, coarse to fine	49	195
Sand, fine and packed	5	200
Sand, fine and packed, changing to "muck"	4	204
Clay and "muck", sticky	3	207
Sand, and clay	20	227
Sand, cemented, with large boulders	2	229
Sand, coarse, loose, water-yielding	22	251

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-29R1. G. S. Charter. Altitude 2,053 ft. Drilled by Spokane Drilling Co., 1954. Cased to 259 ft; perf., 239-259 ft.		
Clay, sand, and gravel	218	218
Sand and gravel, water-yielding	21	239
Gravel, with some sand, water-yielding	20	259
26/43-30F1. Town and County Utilities Co., well 1. Altitude 2,050 ft. Drilled by Reed, 1955. Cased to 312? ft; perf.		
Sand	66	66
Sand and clay	4	70
Sand	8	78
Sand and clay	6	84
Sand	50	134
Sand, coarse, and small egg-sized stones	12	146
Sand, coarse, and a few small boulders	26	172
Sand, coarse, and some gravel	18	190
Sand, coarse	22	212
Sand, coarse, and some gravel	28	240
Gravel, pea	8	248
Sand, coarse, and some gravel	32	280
Sand, very coarse, and gravel	5	285
Gravel and coarse sand	5	290
Sand, coarse, and gravel	20	310
Sand, fine	1	311
Sand, coarse, and gravel	1	312
26/43-31A1. City of Spokane, Central Ave., well 1. Altitude 2,081 ft. Dug by Zinkgraf, 1959. Cased to 270 ft; perf., 214-265 ft; plugged, 270-272 ft.		
Sand, medium, silt and some clay	150	150
Sand, medium, some clay and gravel	5	155
Sand, coarse, some clay	5	160
Sand and clay, packed	5	165
Sand, coarse, and gravel	50	215
Sand and gravel	57	272

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/43-31A3. City of Spokane, Central Ave. Station. Altitude 2,081 ft. Drilled by Zinkgraf, 1959. Cased to 280 ft.		
Sand, medium, and silt	60	60
Sand, medium, and some clay	5	65
Sand, medium, and silt	20	85
Sand, medium, and some clay	5	90
Sand, medium, and silt	15	105
Sand, medium, and some clay	10	115
Sand, medium, and silt	35	150
Sand, coarse, some clay and gravel to 3/4-in. diam	5	155
Sand, coarse, some clay	5	160
Sand, packed, and some gravel to 5/8-in. diam	5	165
Sand, coarse, with gravel to ½-in. diam	10	175
Sand, coarse, and small gravel	10	185
Sand, coarse, gravel, and some stones to 2-in. diam	15	200
Sand, coarse, gravel, and stones to 3-in. diam	5	205
Sand and gravel to 1-in. diam	15	220
Sand and silt	10	230
Sand, some gravel to ½-in. diam, water-yielding	20	250
Sand and small gravel, more fine sand than above; water-yielding	10	260
Sand and gravel, finer than previous sample; water-yielding	20	280
26/44-5Q1. Royder Hintz. Altitude 1,845 ft. Dug in 1938. Cased to 22? ft. Log from owner's memory.		
Clay	18	18
Sand, medium	1	19
Gravel	1	20
Sand and gravel	2	22
26/44-19R1. Byron Leeper. Altitude 2,200 ft. Drilled by E. A. Holman, 1962. Cased to 320 ft. Log from owner's memory.		
Clay, hard, brown, thin sand zones at 55 ft and 85 ft with 1 gpm each	320?	320
Sand, gray, water-yielding	5?	325
Clay, hard, brown	25?	350
26/44-23Q1. Leo Snodgrass. Altitude 2,430 ft. Dug by owner, 1962. Cased to 38 ft.		
Sand	28	28
"Hardpan"	3	31

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/44-23Q1 - Continued		
Sand	5	36
Clay, sticky	2	38
26/44-28D1. N. E. Brown. Altitude 2,405 ft. Drilled by Zinkgraf, 1962. Cased to 269 ft.		
Topsoil	2	2
Clay, sandy, firm to medium-hard, tan-brown	6	8
Sand, firm, tan-brown	3	11
Clay, sandy, medium-hard, brown	2	13
Clay, hard, gray-brown	2	15
Clay, medium-hard, brown	5	20
Sand, black, and brown clay; cemented	2	22
Clay, medium-hard, creamy-brown	20	42
Clay, hard, green-brown	3	45
Basalt, medium-hard, black, with some broken layers	35	80
Basalt, hard, black	23	103
Basalt, medium-hard to hard, gray-black, yields 1 gpm	4	107
Clay, medium-hard, brown	2	109
Clay, medium-hard, gray-tan	4	113
Clay, medium-hard, creamy-yellow	8	121
Clay, medium-hard, yellow	28	149
Clay, medium-hard, creamy-gray	25	174
Basalt, medium-hard, black, and creamy-brown clay; in layers	7	181
No record	3	184
Clay, medium-hard, creamy-brown	14	198
Clay, medium-hard, gray-brown	8	206
Clay, medium-hard, dark-brown	36	242
Clay, medium-hard, rusty-brown, with a few "rock ledges"	7	249
Clay, medium-hard, gray-white	25	274
Clay, medium-hard, sandy, cemented, gray	17	291
Clay, medium-hard, sandy, brown, yields some water	7	298
Clay, firm to medium-hard, brown	22	320
26/44-28M2. B. F. Thompson. Altitude 2,415 ft. Drilled by A. Benander, 1964. Cased to 42 ft.		
Topsoil	8	8
Clay and broken basalt	34	42
Basalt, hard, with seams; yields 1-2 gpm at 100 ft	58	100
Clay, white grading to dark-gray	63	163
Gneiss, decomposed, water-yielding	3	166

Table 9.- Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/44-29A1. C. M. Thurman. Altitude 2,385 ft. Dug by H. E. Biggar, 1953. Cased to 22 ft; perf., 19-22 ft.		
Topsoil	1	1
Subsoil	3	4
Clay	4	8
Sand and clay	4	12
Sand, coarse, water-yielding	8	20
Sand, coarse, with clay mixture	1	21
Sand, fine, with clay mixture	1	22
26/44-29L1. Gordon Burnett. Altitude 2,370 ft. Drilled by A. Gish, 1965. Cased to 6 ft.		
Topsoil	1	1
Basalt	64	65
Clay, gray	3	68
26/44-30G1. H. R. Lorenson. Altitude 2,310 ft. Drilled by Spokane Drilling Co., 1965. Cased to 188 ft.		
Clay and a little sand	10	10
Boulders	10	20
Clay	168	188
Granite, decomposed, caving at bottom	42	230
26/44-32D1. R. W. Yeo. Altitude 2,225 ft. Drilled by Zinkgraf, 1947. Cased to 57 ft.		
Topsoil, sandy, granitic	6	6
Sand, clean, and a few granite blocks	44	50
Granite; yields 1 gpm at 100 ft and 150 ft, 3 gpm at 290 ft	262	312
26/44-32H1. Donald Hagan. Altitude 2,365 ft. Drilled by E. A. Holman, 1956.		
Sand, fine	15	15
Sand, coarse	50	65
Granite, decomposed	75	140

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/44-32J1. Donald Hagan. Altitude 2,225 ft. Drilled by owner to 350 ft in 1957, and deepened to 391 ft by E. A. Holman. Cased to 315 ft.		
Sand, coarse, and broken basalt	75	75
Clay, blue	10	85
Sand, fine, white, water-yielding	12	97
Clay, gray	223	320
Granite, hard, broken, water-yielding	30	350
Granite	41	391
"Sand" [decomposed granite] encountered at 391 ft	--	--
26/44-32J2. Donald Hagan. Altitude 2,225 ft. Drilled by owner, 1965. Cased to 397 ft.		
Sand, coarse, and broken basalt	75	75
Clay, blue	10	85
Sand, fine, white	12	97
Clay, gray, at 156 ft hit boulder?, yields 1 gpm at 170 ft	83	180
Clay, blue	4	184
Clay, yellow-brown	120	304
Clay, blue, and white grit	5	309
Granite, soft zone from 385 ft to 393 ft	146	455
26/44-33E3. Walter Brincken. Altitude 2,395 ft. Dug by owner, 1947. Cased 0-18 ft, 50-135 ft.		
"Dirt" and sandy clay	18	18
Basalt	32	50
Sand and a little clay; at 85 ft and 135 ft were 6-in. thick water-soaked clay layers	85	135
26/44-33M1. L. D. Gonder. Altitude 2,370 ft. Drilled by Zinkgraf, 1965. Cased to 338 ft; backfilled with gravel, 315-352 ft.		
Sand and clay	19	19
Basalt	37	56
Sand and silt	168	224
Clay	114	338
Sand, fine- and coarse-grained layers; thin layers of clay; silt; pieces of wood	14	352

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
26/44-35R1. Trentwood Irrig. Dist. 3, well 3. Altitude 2,035 ft. Drilled by Holman Drilling Corp., 1963. Cased to 140 ft; perf., 112-138 ft; filled, 140-142 ft.		
Gravel, coarse, and boulders	16	16
Gravel, coarse	54	70
Gravel, with "hardpan" and clay	16	86
Gravel, coarse	10	96
Gravel and "hardpan"	5	101
Gravel and sand	2	103
Gravel, fine, and clay	7	110
Gravel, fine	2	112
Gravel, coarse	20	132
Gravel, fine	2	134
Gravel, coarse	4	138
Sand mixed with small gravel	4	142
27/41-26M1. George Thomas. Altitude 1,540 ft. Dug by owner, 1963. Cased to 16 ft.		
Sand, clay, brown	8	8
Sand, gray, gravel and boulders	3	11
Sand, black	5	16
27/41-26P1. Washington Water Power Co., Lake View Heights. Altitude 1,580 ft. Drilled by Reeder, 1962. Cased to 155 ft; screen, 155-185 ft; filled, 185-199 ft.		
Gravel, clay, and boulders	67	67
Clay	7	74
Silt	78	152
Sand, coarse, and gravel	35	187
Granite, broken	12	199
Granite, solid (bedrock)	--	--
27/41-26Q1. Virgil Stricker, Raymond Felts. Altitude 1,590 ft. Drilled by Sager. Cased to 99 ft. Log according to Washington Water Power Co.		
Boulders, large	10	10
Sand, fine	80	90
Sand, coarse	9	99

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/42-1C2. E. J. Grafmiller. Altitude 2,035 ft. Drilled by Bergren, 1945. Cased to 6 ft. Log from owner's memory.		
"Dirt"	5?	5
Basalt	240?	245
Granite encountered at 245 ft	--	--
27/42-3N1. Wild Rose Cemetery. Altitude 2,120 ft. Dug by several neighbors, 1961. Cased to 50 ft.		
Sand, some boulders at 5 ft	35	35
Clay, tough, blue	5	40
"Quicksand"	10	50
27/42-5Q1. A. K. Eickmeyer. Altitude 2,155 ft. Drilled in 1910. Cased to 110 ft.		
Loam, sandy	5	5
Sand	25	30
Granite, decomposed	80	110
Granite, solid	36	146
27/42-5Q2. A. K. Eickmeyer. Altitude 2,155 ft. Drilled by Reeder, 1952. Cased to 279 ft.		
Topsoil, "heavy" clay, and granitic sand	50	50
Sand, coarse, water-yielding	24	74
Clay, yellow	6	80
Clay, white	9	89
Sand, coarse, water-yielding	15	104
Clay	18	122
Sand, water-yielding	34	156
Boulder	4	160
Clay	52	212
Sand, water-yielding	67	279
Granite, decomposed	33	312
Granite, solid	188	500

Table 9.--Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/42-8J1. Howard Oiland. Altitude 2,150 ft. Dug by M. Q. Castle, 1953. Cased to 40 ft; perf., 32-40 ft.		
Clay loam	6	6
Clay, sandy, and gravel	18	24
Sand and gravel	16	40
27/42-9R1. G. H. Rock. Altitude 2,210 ft. Drilled by Barnett Plumbing and Heating Co. Cased to 147 ft.		
Topsoil and clay	44	44
Clay, red	16	60
"Hardpan"	10	70
Sand and clay	30	100
Boulders and "granite" [?]	6	106
Sand and clay, water-yielding	56	162
Granite, decomposed, water-yielding	38	200
Granite, hard	703	903
27/42-10R1. James Sills. Altitude 2,220 ft. Drilled by Bartholomew, 1964. Cased to 33? ft.		
Clay, some sand and gravel	30	30
Granite, "rotten"	3	33
Granite, solid	80	113
27/42-13B1. W. F. Rudolph. Altitude 2,180 ft. Drilled by Reeder, 1953. Cased to 56 ft; screen, 56-87 ft.		
Topsoil	2	2
Sand and decomposed granitic material	54	56
Sand, coarse, and decomposed granitic material	31	87
27/42-13C1. W. F. Rudolph. Altitude 2,180 ft. Drilled by Reeder, 1953. Cased to 172 ft; perf., 60-75 ft, 90-110 ft.		
Topsoil	3	3
Sand, silica, and decomposed granitic material	62	65
[Gravel and sand], granitic, decomposed	10	75
Clay	15	90
Sand, medium, water-yielding	35	125

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/42-13C1 - Continued		
Clay	37	162
Basalt; cavity 176-178 ft., water-yielding	16	178
27/42-36A4. Arthur Jackson. Altitude 2,010 ft. Drilled by Sams, 1964. Cased to 14 ft.		
Sand, gravel, clay, and 1 large boulder	13	13
Granite; crevice several inches wide at bottom, water-yielding	115	128
27/43-2K1. R. W. Mattix. Altitude 1,900 ft. Drilled by J. Lewis, 1962. Cased to 57 ft; perf., 37-47 ft. Log from owner's memory.		
"Dirt"	3?	3
Sand and some gravel	34?	37
Clay, blue-gray	20?	57
27/43-8E1. John Riley. Altitude 2,090 ft. Drilled by Sager, 1963. Cased to 224 ft. Log from owner's memory.		
Clay; encountered gravel at about 40 or 50 ft	190	190
Basalt	34	224
27/43-17F1. John Riley. Altitude 1,990 ft. Drilled by T. W. Liepold, 1963. Cased to 45 ft.		
Topsoil	3	3
Gravel, clay, and sand	33	36
Gravel and clay	7	43
Basalt; broken basalt and gravel at top, hard basalt at bottom	13	56
27/43-17H1. Charles Uhden. Altitude 1,950 ft. Bored in 1964. Cased to 22 ft; perf., 10-22 ft.		
"Dirt" [soil]	2	2
"Dirt", hard, black	2	4
Gravel, granitic, "rotten"	16	20
Clay, gray	2	22
"Rock" [basalt?] encountered at 22 ft	--	--

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/43-18J1. W. G. Putnam. Altitude 2,130 ft. Drilled by B. Harbough, 1950. Cased to 140 ft.		
Clay and sand	135	135
Basalt, some water at 135 ft, water from 159-160 ft	25	160
27/43-19A1. Ralph Decker. Altitude 2,080 ft. Drilled by Zinkgraf, 1953. Cased to 113 ft.		
No record [glacial deposits?]	49	49
Basalt, medium hard	58	107
Sand and clay	5	112
Granite	189	301
27/43-19H1. Gregory Sandford. Altitude 2,010 ft. Drilled by J. Fleming, 1961. Cased to 22 ft.		
Sand	3	3
Clay	18	21
Granite	20	41
27/43-19J1. John Fleming. Altitude 1,920 ft. Drilled by Bartholomew, 1964. Cased to 65 ft. Log from owner's memory.		
Topsoil	10	10
Clay, hard, various colors	70	80
Sand and gravel	10	90
27/43-20C1. Walter Nunn. Altitude 1,950 ft. Drilled by Sager, 1960. Cased to 96 ft; perf., 94-96 ft. Log from owner's memory.		
Gravel	35?	35
Clay, white	59?	94
Gravel, water-yielding	2?	96
Clay, white	104?	200
27/43-22R1. Unknown. Altitude 1,820 ft. Drilled by Reeder, 1955. Cased to 99 ft; perf., 70-99 ft.		
Topsoil and boulders	5	5
Gravel and sand	73	78
Sand, coarse, and some gravel	21	99

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/43-26M1. Mead School Dist. 354. Altitude 1,885 ft. Drilled by Holman Drilling Corp., 1964. Cased to 242 ft; screen, 242-264 ft.		
Sand, coarse, and silt	25	25
Sand, fine	47	72
Clay, brown with streaks of blue	29	101
Clay, gray	17	118
Sand and brown clay	17	135
Sand, coarse, brown	35	170
Clay, brown, and sand	10	180
Clay, blue-gray	23	203
Sand, fine	37	240
Sand, coarse, water-yielding	24	264
27/43-27J1. C. I. Nyberg. Altitude 1,850 ft. Drilled by E. A. Holman, 1962. Cased to 150 ft; perf., 137-147 ft.		
Sand and gravel	47	47
Clay, gray	22	69
Sand	39	108
Clay	13	121
Sand and gravel	27	148
Clay, gray	2	150
27/43-29G1. Howard Scott. Altitude 1,900 ft. Dug to 38 ft; drilled to 143 ft by Sager, 1963. Cased to 143 ft; perf., 135-143 ft. Log from owner's memory.		
Old well-no record	38	38
Clay, orange	54	92
Clay, hard, and sand	2	94
Clay, yellow	4	98
Clay, dark-blue, tree limb at 99 ft	39	137
Clay, sky-blue	2	139
Sand, fine	4	143
Clay, dark-blue, encountered at 143 ft	--	--
27/43-32H1. O. B. Vrem. Altitude 1,650 ft. Drilled by Reeder, 1955. Cased to 148 ft; perf., 126-142 ft.		
Gravel	40	40
Clay, blue, or "quicksand"	80	120
Sand, coarse	28	148

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/43-32J1. Washington Water Power Co., Pine River Park. Drilled by Reeder, 1961. Cased to 208 ft.		
"Till"	7	7
Topsoil	1	8
Sand	2	10
Sand and gravel, water-yielding	7	17
Clay, sand and silt	37	54
Clay, blue, and silt	60	114
Sand, coarse, and silt, water-yielding	71	185
Sand, coarse, gravel, and clay	15	200
Sand, coarse, and gravel	6	206
Granite, broken (bedrock)	2	208
27/43-33G1. Little Spokane Water Dist. 8. Altitude 1,620 ft. Drilled by Noonan, 1956. Cased to 146 ft; perf., 41-45 ft, 60-64 ft, 81-86 ft, 92-96 ft, 134-142 ft.		
Gravel	38	38
Gravel, cemented, in layers	10	48
No record	12	60
Sand, loose, water-yielding	4	64
Gravel, cemented, in layers; water-yielding between layers	70	134
Sand and clay, water-yielding	12	146
27/43-34J1. Mount Spokane Motel water supply. Altitude 1,900 ft. Drilled by E. J. Stotts, 1954. Cased to 98 ft; perf., 84-94 ft.		
Sand, coarse, 1/16-in. to 1/8 in.	45	45
Clay, silty, blue	2	47
Sand, coarse, a little coarse gravel	31	78
Clay, hard, blue	4	82
Gravel, pea, and sand	9	91
Clay, hard, yellow	1	92
Gravel, pea, very little sand	6	98
27/43-35B1. Unknown. Altitude 1,920 ft. Drilled 1929 to 1941. Log from files of Wash. Div. of Mines and Geology.		
Sand, coarse, brown	60	60
Clay, yellow, and sand; water-yielding	55	115
Shale, brown	180	295

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/43-35B1-Continued		
Shale, black	109	404
Shale, blue	66	470
Shale, gray	120	590
Sand, fine, water-yielding	80	670
"Quicksand", water-yielding	24	694
Shale, black	84	778
Shale, light-green	26	804
Log indicates a variety of rock types; probably all are granitic. Well is known to penetrate granite below 2,600 ft	4,479?	5,283
27/44-6E1. Nick Devita. Altitude 2,365 ft. Dug by L. J. Noland, 1957. Cased to 9 ft.		
"Dirt", black	2	2
Clay and sand	7	9
Basalt encountered at 9 ft	--	--
27/44-20A1. Roy Marlowe. Altitude 2,330 ft. Drilled by Reeder, 1944. Cased to 20 ft.		
Clay	19	19
Basalt, yields 10 gpm	28	47
Granite, decomposed, with white clay streaks	12	59
Granite, decomposed, coarse, yields 60 gpm	9	68
"Dolomite" [granite]	2	70
27/44-20B1. Andrews-Holcomb Co. Altitude 2,270 ft. Drilled by Reeder, 1950. Cased to 50 ft; perf., 12-38 ft.		
Sod and clay	3	33
Sand and clay, water-yielding	16	19
Basalt	3	22
Granite, decomposed, sand, and brown clay streaks	14	36
Granite, broken, water-yielding	2	38
"Dolomite", white [granite]	12	50
27/44-20L1. J. L. Atkinson. Altitude 2,330 ft. Drilled by Zinkgraf, 1939. Cased to 21 ft; filled, 70-83 ft.		
No record [clay and sand?]	21	21
"Rock", solid [basalt]	21	42
Gravel, water-yielding	4	46
"Soapstone" [clay?]	20	66
Gravel, water-yielding	5	71
"Soapstone" [clay?]	12	83

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
27/44-21G1. Ed Johnson. Altitude 2,280 ft. Drilled by Reeder, 1950. Cased to 239 ft; perf., 220-239 ft.		
Topsoil	12	12
Clay	36	48
"Quicksand"	34	82
Clay, white and gray	143	225
Granite, decomposed	20	245
28/41-14A1. S. K. McIlvanie. Altitude 2,185 ft. Dug by D. E. Lenhard, 1945. Cased to 21 ft; perf., 17-21 ft.		
Topsoil	5	5
Clay, solid layer	1	6
Sand, fine at top, coarse at bottom	15	21
28/41-14C1. S. K. McIlvanie. Altitude 2,185 ft. Drilled by E. A. Holman, 1953.		
Sand with thin clay layers	25	25
Clay with gravel	75	100
Granite	150	250
28/41-14G2. S. K. McIlvanie. Altitude 2,185 ft. Dug and drilled by Reeder, 1961. Cased to 68 ft; perf.		
Topsoil - clay ash, gravel, and sand	7	7
"Quicksand", granitic sand and broken granite, water-yielding	6	13
Sand, decomposed, granitic, water-yielding	2	15
Sand, decomposed, granitic, mixed with clay	2	17
Clay, solid, blue and gray	17	34
Sand and gravel, decomposed, coarse and fine; water-yielding	4	38
Clay, hard, gray	14	52
Clay, blue	16	68
28/41-36A1. W. A. Prufer. Altitude 2,190 ft. Dug by owner, 1959. Cased to 25 ft.		
Sand; a little gravel at 7 ft	7	7
Clay	3	10
Sand and clay layers	15	25

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
28/42-2M1. Town of Deer Park. Altitude 2,115 ft. Dug by Zinkgraf; A. Hudson, 1947. Cased to 32 ft; perf., 22-32 ft.		
Topsoil	2	2
Sand, fine	5	7
Sand, fine, and clay streaks, sand coarser at base	5	12
Sand, coarse	16	28
Sand, fine	1	39
Sand, coarse	3	32
28/42-3C1. D. E. Kelley. Altitude 2,170 ft. Drilled by Zinkgraf, 1962. Cased to 115 ft.		
Topsoil	1	1
[Boulders], granitic, gray	14	15
Clay, firm to medium-hard, creamy and brown	17	32
Clay, firm, brown and gray, yields 2 gpm of muddy water	68	100
Basalt, hard and medium-hard layers, black	14	114
Basalt, hard, black	12	126
Basalt, medium-hard, black, yields 2½ gpm of water	12	138
Basalt, hard, black	55	193
Clay, medium-hard to firm, tan-gray	11	204
Shale, medium-hard, gray, with silver specks	4	208
Clay, medium-hard to firm, gray	64	272
Granite, decomposed, medium-hard to firm, with a few clay layers, yields 33 gpm	28	300
28/42-3C2. D. E. Kelley. Altitude 2,130 ft. Dug and bored by P. R. Kelley, 1952. Cased to 34 ft.		
Topsoil	1	1
Clay	6	7
Sand and clay	10	17
Clay, "heavy", 1 ft of silt	7	24
Clay, hard, yields some water	3	27
Silt and clay layers	7	34
Clay, blue, water-yielding	2	36

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
28/42-21N1. Ward Crowley. Altitude 2,085 ft. Dug in 1952. Cased to 24 ft.		
Topsoil	6	6
Clay	3	9
Sand, yields some water	4	13
Clay	1	14
Sand, fine	6	20
Clay	1	21
Sand with broken rock	3	24
"Rock", mostly broken, water-yielding [basalt?]	6	30
28/42-21R1. Lloyd Thompson. Altitude 2,030 ft. Dug by P. P. Werner, 1949. Cased to 14 ft.		
Topsoil	2	2
Clay	6	8
Gravel becoming clayey with depth	6	14
28/42-22N1. Washington Dept. of Game. Altitude 2,040 ft. Drilled by Zinkgraf, 1947. Cased to 11 ft.		
Topsoil	4	4
Basalt, very hard, black	222	226
Basalt, soft, black, and sand, water-yielding	1	227
28/42-28B1. Lester Roberts. Altitude 2,045 ft. Drilled by Reeder, 1952. Cased to 348 ft; perf., 338-348 ft.		
Basalt, broken, and clay	18	18
Basalt, creviced	142	160
Basalt, solid	186	346
Granite, decomposed	2	348
28/43-3R1. L. B. Jett. Altitude 1,880 ft. Bored by H. Kummer, 1953. Cased to 16 ft.		
Topsoil	6	6
Clay, hard, compact, blue	8	14
Gravel	2	16

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
28/43-6N1. U.R.M. Stores, Inc. Altitude 2,150 ft. Drilled by E. A. Holman, 1961. Cased to 102 ft; perf., 95-100 ft.		
Sand	65	65
Sand and pea gravel	37	102
Basalt, broken	5	107
28/43-6N2. U.R.M. Stores, Inc. Altitude 2,150 ft. Drilled by E. A. Holman, 1961. Cased to 72 ft; perf., 65-70 ft.		
Sand	63	63
Sand and gravel	5	68
Basalt, broken	4	72
Basalt	43	115
28/43-10J1. Carl Olson. Altitude 1,855 ft. Dug and bored by owner, 1948. Cased to 15 ft.		
Clay, brown	15	15
Clay, blue-gray ("hardpan"); a 6-in. gravel layer near bottom, water-yielding	11	26
28/43-15B1. C. F. Venneau. Altitude 1,890 ft. Drilled in 1950 to 90 ft; deepened to 205 ft by Spokane Drilling Co., 1956. Cased to 205 ft. Log from owner's memory.		
Gravel	15	15
Clay, soft, white	190	205
Granite bedrock encountered at 205 ft	--	--
28/43-22B1. Chattaroy Hills Subdiv. Altitude 1,870 ft. Drilled by Reeder, 1961. Cased to 100 ft; perf., 90-100 ft.		
Clay, sticky, bluish-brown	90	90
Granite, decomposed	10	100
Granite	6	106

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
28/43-22N1. Chattaroy Hills Subdiv. Altitude 1,865 ft. Drilled by Reeder, 1963. Cased to 248 ft.		
Clay and boulders	50	50
Clay, blue, and some thin layers of very coarse sand	198	248
Granite	86	334
28/43-23C1. Chattaroy Hills Subdiv. Altitude 1,710 ft. Drilled by E. A. Holman. Cased to 96 ft; perf., 50-62 ft, 85-90 ft; filled, 96-106 ft.		
Sand and gravel, a little clay	38	38
Sand and gravel, coarse, water-yielding	4	42
Sand, gravel, and clay	12	54
Sand and gravel, water-yielding	11	65
Sand, fine, blue ("quicksand")	7	72
Gravel, pea, and coarse sand	16	88
Sand, fine, blue ("quicksand")	8	96
Clay, blue	10	106
Sand, fine, blue ("quicksand") encountered at 106 ft.	--	--
28/43-26J1. A. R. Jarvis. Altitude 1,880 ft. Drilled by Sager, 1963. Cased to 86 ft. Log from owner's memory.		
Topsoil	4?	4
Sand and gravel	14?	18
Basalt	13?	31
Sand and clay, gray	55?	86
28/44-19D1. G. A. Heritage. Altitude 1,950 ft. Drilled by Sams to 120 ft; enlarged to 36-in. diam. 0-37 ft and filled 37-120 ft, 1963. Cased to 37 ft.		
Sand and clay, water-yielding	37?	37
Clay	62?	99
Granite	21?	120

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
28/44-19L1. Edward Loshbaugh. Altitude 1,950 ft. Dug by owner and T. D. Cummins, 1959. Cased to 41 ft.		
Sand and a little clay	20	20
Clay, hard, blue	6	26
Sand; some small gravel near bottom	15	41
28/44-19P1. T. D. Cummins. Altitude 1,940 ft. Dug by owner to 40 ft in 1959, deepened to 44 ft, 1964. Cased to 44 ft.		
Sand and a little clay	20	20
Clay, blue	2	22
Sand; some small gravel in the lower part	18	40
Sand and gravel	4	44
28/44-32M1. Jack Schmidt. Altitude 2,340 ft. Drilled by Bergren. Log from neighbor's memory.		
No record of thickness of silt? overlying the basalt	10?	10?
Basalt	18	28?
Clay, blue	36	64?
Basalt	18	82?
Clay	400	482?
Sand, white	1	483?
Granite	515?	998
29/41-36E2. F. D. Grant. Altitude 2,200 ft. Dug by Skidmore, 1961.		
Peat, black	4	4
Clay	1	5
Loam and sand	3	8
Sand	2	10
Gravel, coarse, in streaks with clay	1	11
29/42-1E3. Roger Janson. Altitude 2,375 ft. Drilled by owner, 1962. Cased to 40 ft.		
Topsoil, sandy loam	1	1
Granite, decomposed	19	20
Quartz, hard (or similar "rock")	1	21
Granite, decomposed, and clay layers	21	42

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
29/42-1E4. Roger Janson. Altitude 2,375 ft. Drilled by owner, 1962. Cased to 54 ft.		
Topsoil and sandy loam	2	2
Granite, decomposed, and some "hardpan" layers	18	20
Clay "hardpan"	3	23
Gravel, water-yielding	1	24
Granite; some hard pink quartz	8	32
Granite, decomposed	23	55
Granite, very hard, water-yielding	--	--
29/42-4K1. L. C. Lucas. Altitude 2,235 ft. Drilled to 224 ft by Bergren; enlarged by owner to 60-in. diam 0-20 ft; 1947. Cased to 22 ft. Log from owner's memory.		
Clay and rounded stones about 2-in. in diam	22?	22
Basalt, yields 3 gpm at 32 ft	168?	190
Granite	34?	224
29/42-4Q1. L. C. Lucas. Altitude 2,235 ft. Dug by owner, 1962. Cased to 19 ft.		
Topsoil	1	1
Clay and gravel	4	5
Clay, blue	12	17
Sand, coarse	2	19
29/42-6Q2. R. E. Gordon. Altitude 2,300 ft. Dug by owner, 1958. Cased to 15 ft.		
Topsoil	7	7
Gravel and sand	5	12
Clay and "quicksand"	2	14
Gravel	1	15
29/42-7P1. I. C. Gibbs. Altitude 2,460 ft. Dug by owner, 1946. Cased to 13 ft.		
Fill	4	4
Soil	2	6
Clay, hard, and fine gravel	3	9
Sand, gravel, and balls of clay	4	13

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
29/42-14H2. Oliver Cox. Altitude 2,200 ft. Dug by A. E. Young, 1956.		
Topsoil, black	3	3
Sand, gravel and boulders	6	9
Sand strata	6	15
29/42-14M1. W. B. Killeen. Altitude 2,250 ft. Drilled by Spokane Drilling Co., 1955. Cased to 47 ft.		
Sand	30	30
"Hardpan" (clay and gravel)	15	45
Basalt	102	147
29/42-19C1. Town of Clayton. Altitude 2,290 ft. Drilled by Reeder, 1957. Cased to 143 ft.		
Clay	15	15
No record	2	17
"Quicksand"	20	37
Clay and a boulder	7	44
Clay?	46	90
Granite, broken	53	143
Granite, crevices at 145, 160, 200, and 290 ft	357	500
29/42-19F1. Town of Clayton. Altitude 2,260 ft. Drilled by Spokane Drilling Co., 1953. Cased to 209 ft.		
Fill	4	4
Clay	36	40
Sand and silt	42	82
Clay	113	195
Granite	60	255
Granite, soft, yields 1½ gpm	5	260
Granite	50	310
29/42-19L1. Ralph Bristow. Altitude 2,250 ft. Drilled by Spokane Drilling Co., 1955. Cased to 48 ft.		
"Quicksand"	7	7
Clay with some sand	20	27
Clay, blue, with red streaks	20	47
Sand and some gravel, water-yielding	1	48

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
29/42-19M1. Robert Huffman. Altitude 2,270 ft. Dug by owner, 1959. Cased to 26 ft.		
Clay, fine sand, and some "ironstone" boulders (cemented sand?) Clay is white, sticky at top, red in middle, and brown at bottom	26	26
29/42-30A2. R. W. Gardner. Altitude 2,200 ft. Dug by Kettle Stevens Soil Conservation Dist., 1954.		
Silt and "muck" black	3	3
Clay, blue	3	6
Clay, sandy	1	7
Sand and decomposed granitic gravel	1	8
29/42-34H1. Robert Olson. Altitude 2,120 ft. Dug by owner, 1956. Cased to 18 ft.		
Sand	10	10
Clay, hard	2	12
Sand	6	18
29/42-34N1. Earl Jones. Altitude 2,180 ft. Drilled by owner, 1962. Cased to 45 ft.		
Topsoil	3	3
Clay	37	40
Basalt	12	52
Clay, yellow	20	72
Clay, gray	20	92
Clay, black	18	110
Basalt	2	112
29/42-34N2. Church of Christ. Altitude 2,180 ft. Drilled by E. Jones, 1962. Cased to 38 ft.		
Topsoil	3	3
Clay	35	38
Basalt [boulder]	2	40
Clay and boulders	22	62
29/42-35D1. C. F. Thorson. Altitude 2,130 ft. Dug by owner, 1953. Cased to 28 ft.		
Loam, sandy	2	2

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
"Hardpan"	2	4
Sand	3	7
Gravel and small rocks	1	8
Sand and some gravel	6	14
Sand, some gravel, and a few small rocks; water-yielding	14	28
29/42-35E1. C. F. Thorson. Altitude 2,140 ft. Dug by owner, 1956. Cased to 48 ft.		
Loam, sandy	3	3
Sand	18	21
Gravel	3	24
Sand, water-yielding	21	45
Sand and gravel, water-yielding	3	48
29/42-35P1. Town of Deer Park. Altitude 2,137 ft. Dug by Zinkgraf, 1963. Cased to 54 ft; perf., 34-54 ft.		
Sand, silty, brown	11	11
Sand, fine, silty, gray	2	13
Sand, silty, brown, and some gravel	41	54
29/43-3D1. C. M. McPherson. Altitude 2,170 ft. Dug by owner, 1963. Cased to 55 ft.		
Topsoil	3	3
Sand, reddish	20	23
Sand, gray	3	26
Clay, black	4	30
Sand, gray	2	32
Clay, black	19	51
Sand, gray	2	53
Boulder, decomposed granite	1	54
Clay, red	1	55
29/43-15R1. Lawrence Martin. Altitude 1,970 ft. Drilled by Reeder, 1960. Cased to 95 ft. Log from owner's memory.		
Clay, sticky, gray and blue	80?	80
Sand and clay	14?	94
Granite	6?	100

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
29/43-23N3. Farley Dean. Altitude 1,960 ft. Dug by owner		
Sand, clay and gravel	30	30
Clay	2	32
Sand, clay and gravel	38	70
Clay encountered at 70 ft	--	--
29/43-29N1. U. S. Air Force Missile Site 1, well 1-C. Altitude 2,211 ft. Drilled by Western Drilling & Equipment Co., 1959. Cased to 192 ft; screen, 192-202 ft.		
Sand, silty	40	40
Sand, silty, with clay	10	50
Sand, silty	92	142
Sand, clayey	33	175
Sand, coarse, silty	27	202
29/43-29N2. U. S. Air Force Missile Site 1, well 2-C. Altitude 2,208 ft. Drilled by Western Drilling & Equipment Co., 1959. Cased to 183 ft, perf., 165-183 ft, backfilled with gravel 178-192 ft.		
Sand, silty	95	95
Sand, coarse	15	110
Sand, silty	40	150
Sand, coarse	28	178
Boulder, basalt	3	181
Sand, coarse, and clay	8	189
Granite	3	192
29/43-31H1. U. S. Corps of Engineers. Altitude 2,181 ft. Drilled in 1958.		
Sand, medium, brown	8	8
Sand, medium, gray	10	18
Sand, medium to fine, brown	5	23
Sand, fine, silty, brown	2	25
Silt, clayey, greenish-brown	3	28
Sand, fine, silty, gray	5	33
Sand, and a little silt, gray	4	37
Sand, silty, brown	3	40
Clay, brown	3	43
Sand, silty, brown	5	48
Sand, medium, gray	2	50
Sand, medium, silty, gray	3	53

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
29/43-31H1 - Continued		
Sand, coarse to medium, gray	5	58
Sand, coarse, silty, gray	2	60
Clay, sticky, white	3	63
Silt, white, yellow, brown, gray, and orange	6	69
Gravel, clayey	3	72
Basalt	11	83
Basalt, massive, highly fractured	16	99
29/43-31H2. U. S. Corps of Engineers. Altitude 2,179 ft. Drilled in 1958.		
Silt, brown	8	8
Sand and some silt, gray	10	18
Sand, fine, silty, brown	15	33
Basalt, vesicular	3	36
Basalt, massive, highly fractured	15	51
29/43-31J1. U. S. Corps of Engineers. Altitude 2,181 ft. Drilled in 1958.		
Sand, brown	8	8
Sand, gray	10	18
Sand and some silt, gray	5	23
Sand, silty, brown, and clay seams	15	38
Basalt, massive, fractured	22	60
Clay and silt, gray and white	1	61
29/43-31J2. U. S. Corps of Engineers. Altitude 2,177 ft. Drilled in 1958.		
Sand, brown	13	13
Sand, gray	5	18
Sand and some silt, brown	5	23
Sand, medium to fine, brown	10	33
Sand, fine, and some silt, brown	20	53
Sand, medium, brown	5	58
Sand, fine, and some silt, brown	7	65
Sand, fine, silty, brown	3	68
Sand, fine, and some silt, brown	2	70
Clay, gray	3	73
Sand, gray	9	82
Sand and some silt, gray	8	90
Clay, sticky, brown	1	91

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
29/43-31J2 - Continued		
Sand and some silt, gray	31	122
Sand and some silt, brown	23	145
Sand, silty, brown	10	155
Sand, clayey, brown	11	166
Sand and some silt, gray	11	177
Sand, gray	8	185
Granite	17	202

29/43-34B1. David Molony. Altitude 1,990 ft. Dug by owner, 1958. Cribbed to 101 ft.

Materials	Thickness (feet)	Depth (feet)
Sand, gravel, and boulders	50	50
Gravel, boulders, and clay balls composed of rolled up clay layers	10	60
Boulders, encrusted with a sooty black material; open in between	8	68
Gravel, pea	7	75
Sand, coarse	10	85
Clay, sticky, brown; some white, cream, and gray clay	16	101

29/43-34J1. Church of Jesus Christ of Latter Day Saints. Altitude 1,990 ft. Drilled by E. A. Holman, 1963. Cased to 100 ft.

Materials	Thickness (feet)	Depth (feet)
Sand and clay	60	60
Gravel, cemented	20	80
Clay	20	100
Granite (upper part decomposed)	166	266

29/43-34J2. Church of Jesus Christ of Latter Day Saints. Altitude 1,985 ft. Drilled by E. A. Holman, 1963. Cased to 145 ft.

Materials	Thickness (feet)	Depth (feet)
Gravel	25	25
Gravel and clay, cemented	83	108
Clay	8	116
Granite, decomposed	72	188

29/43-35E1. Richard Bond. Altitude 1,965 ft. Drilled by Zinkgraf, 1963. Cased to 88 ft.

Materials	Thickness (feet)	Depth (feet)
Gravel, boulders, some sand, and a little clay	62	62
Clay, brown, with hard brown "rock" layers [shale]	16	78
Granite, white	408	486

Table 9 - Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
29/43-35H2. Great Northern Ry. Co. Altitude 1,780 ft. Drilled by C. M. Wick, 1954. Cased to 14 ft.		
Clay and gravel	9	9
"Rock", hard	27	36
"Rock", hard, water-yielding	4	40
Granite	2	42
29/44-5D1. Frank Podlas. Altitude 2,140 ft. Dug by owner, 1960. Cased to 16 ft.		
"Dirt"	2	2
"Hardpan" (sand and clay)	4	6
Sand, fine	6	12
Clay	1	13
Sand, very fine	3	16
29/44-6H1. Lloyd Ambacher. Altitude 2,100 ft. Dug by Skidmore, 1959.		
Topsoil	1	1
Sand, coarse, with clay layers	7	8
Clay, "heavy", blue	2	10

Table 10 - Water-level data from observation wells

Table 10 - Water-level data from observation wells

Date	Depth below land surface (feet)
27/43-19H2	
12-17-62	87.34
2-20-63	87.37
3-16-63	87.38
4-17-63	87.35
5-20-63	87.41
6-25-63	87.48
7-31-63	87.56
8-28-63	87.57
9-25-63	87.62
10-14-63	87.67
10-29-63	87.72
1-14-64	87.83
2-19-64	87.89
3-26-64	87.81
5- 4-64	87.81
5-25-64	87.88
6-25-64	87.98
7-24-64	87.99
9- 9-64	88.00
10- 8-64	87.97
11-12-64	87.94
1-12-65	88.04
3-12-65	87.73
5-13-65	87.61
7-12-65	87.87
27/43-19J1	
7-17-64	44.95
9- 9-64	45.50
10- 8-64	45.67
11-12-64	45.81
1-12-65	45.98
3-12-65	42.61
5-13-65	43.06
7-12-65	44.04
27/43-26M1	
7-15-64	190.18
9- 9-64	190.33
10- 8-64	190.44
27/43-26M1 - cont.	
11-12-64	190.54
1-12-65	191.12
3-12-65	188.94
5-13-65	185.73
7-12-65	185.47
28/42-24D1	
12-17-62	37.94
1-28-63	37.77
2-20-63	37.62
3-16-63	37.22
4-17-63	36.75
5-20-63	36.06
6-25-63	36.24
7-30-63	36.75
8-28-63	37.27
9-23-63	37.75
10-29-63	38.34
1-14-64	39.49
2-20-64	39.97
3-26-64	39.96
5- 4-64	38.64
5-25-64	38.70
6-25-64	38.93
7-24-64	39.28
9- 9-64	39.99
10- 8-64	40.40
11-12-64	40.86
1-12-65	41.62
3-12-65	40.65
5-13-65	36.57
7-12-65	36.70
28/42-24D2	
5-25-64	42.42
7-24-64	43.24
10- 8-64	44.06
11-12-64	44.52
3-12-65	44.52
5-13-65	40.34
7-12-65	40.39
28/43-22B1	
7-17-64	19.94
11-12-64	18.97
3-12-65	8.34
7-12-65	16.96
9- 8-65	17.44
11- 2-65	17.89
28/43-22D1	
12-21-62	20.53
1-28-63	20.75
2-20-63	20.58
3-16-63	20.60
4-17-63	20.59
5-20-63	20.85
6-25-63	20.94
7-30-63	20.99
8-28-63	21.00
9-23-63	20.92
10-29-63	20.78
1-14-64	20.60
2-20-64	20.60
3-26-64	20.50
5- 4-64	20.68
5-25-64	20.93
6-25-64	20.83
28/43-22N1	
10- 7-63	93.16
5-26-64	90.18
7-24-64	89.99
9- 9-64	89.82
10- 8-64	89.69

Table 10 - Water-level data from observation wells

Date	Depth below land surface (feet)
28/43-22R2	
12-21-62	137.45
1-28-63	137.56
2-20-63	137.41
3-16-63	137.19
4-17-63	136.86
5-20-63	136.66
6-25-63	137.29
7-30-63	137.69
8-28-63	137.95
9-23-63	138.17
10-29-63	138.19
1-14-64	138.21
2-20-64	137.96
3-26-64	137.65
5- 4-64	136.69
5-25-64	136.95
6-25-64	137.26
7-24-64	137.60
9- 9-64	138.16
10- 8-64	138.29
11-12-64	138.28
1-12-65	137.96
3-12-65	137.26
5-13-65	136.14
7-12-65	137.14
9- 8-65	137.62
11- 2-65	137.93

Date	Depth below land surface (feet)
29/43-3H1	
1- 9-63	34.70
2-20-63	34.98
3-16-63	35.36
4-17-63	36.39
5-20-63	36.03
6-25-63	36.21
7-30-63	37.83
8-28-63	40.15
9-23-63	41.91
10-29-63	43.02
1-14-64	44.49
2-20-64	46.16
3-26-64	47.40
5- 4-64	45.55
5-25-64	44.09
6-25-64	43.15
7-24-64	40.74
9- 9-64	35.17
10- 8-64	32.79
11-12-64	31.01
1-12-65	28.82
3-12-65	27.33
5-13-65	21.09
7-12-65	19.45

Date	Depth below land surface (feet)

In addition, water levels also have been measured in the following wells for the years indicated, and are shown by hydrographs in the present report (figures indicated) or are listed in U. S. Geological Survey Water-Supply Papers (denoted by "W.S.P."):

Well no.	Period of record	Where found
25/44-2B1	(1928-54)	Fig. 8; W.S.P.
25/44-4J1	(1958-65)	Fig. 8
26/43-7Q1	(1942-53)	W.S.P.
26/43-16D1	(1943-55) [a]	W.S.P.
26/43-19A1	(1931-65)	Fig. 8; W.S.P.
26/43-34P1	(1928-53) [a]	W.S.P.
26/44-32R1	(1928-54)	W.S.P.
27/42-8H1	(1947-65)	Fig. 6; W.S.P.
27/43-19H1	(1962-65)	Fig. 5
27/44-20B1	(1962-65)	Fig. 5
27/44-20N1	(1962-65)	Fig. 7
28/43-22R1	(1962-65)	Fig. 7
28/44-19P1	(1962-65)	Fig. 7
29/42-20J1	(1963-65)	Fig. 5
29/44-20H1	(1962-65)	Fig. 5

[a] Well not included in present report.

Water levels reported by the U. S. Geological Survey appear in the following Water-Supply Papers: W.S.P. 889-B (measurements for 1928-38), W.S.P. 886 (for 1939), W.S.P. 910 (1940), W.S.P. 940 (1941), W.S.P. 948 (1942), W.S.P. 990 (1943), W.S.P. 1020 (1944), W.S.P. 1027 (1945), W.S.P. 1075 (1946), W.S.P. 1100 (1947), W.S.P. 1130 (1948), W.S.P. 1160 (1949), W.S.P. 1169 (1950), W.S.P. 1195 (1951), W.S.P. 1225 (1952), W.S.P. 1269 (1953), W.S.P. 1325 (1954), W.S.P. 1408 (1955), and W.S.P. 1760 (1956-60).

Table 11 - Chemical analyses of ground water

Iron and manganese: Unless preceded by "T", values indicate amounts actually in solution at the time of sample collection, based on information that the sample was clear and sediment free when collected. "T" indicates a total iron or manganese concentration, which includes quantities in solution, in suspension, and in sediment at the time of collection. "T" also is used for analyses having no description of sample appearance when collected.

Dissolved solids: Values for U. S. Geological Survey analyses were determined by weighing the residue dried at 180° C. following evaporation. Other values presumably were determined in a similar manner, but the exact method is uncertain.

Analyst: B, U. S. Bureau of Reclamation; C, Brunner Co., Calif.; D, F. H. Dettmer, Washington State Game Dept.; G, U. S. Geological Survey; H, U. S. Geological Survey field-laboratory analysis (analytical results are subject to some error); M, Dr. C. D. Moodie, Washington State University; R, Ralston Purina Feed Co., St. Louis, Mo.; S, City of Spokane; T, Washington Testing Laboratories, Spokane; W, Washington State Department of Health.

[Results in milligrams per liter, except specific conductance and pH]

Table 11 - Chemical analyses of ground water - Continued

Well or spring number	Depth (ft)	Date of collection	Milligrams per liter															Specific conductance (micromhos at 25° C)	pH	Analyst or laboratory
			Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophospate (PO_4)	Dissolved solids	Hardness as $CaCO_3$			
25/42-3H1	124	12-12-44	6.4	T0.0	--	37	13	4.1	--	145	27	5.7	--	0.4	--	--	146	--	8.2	S
25/43-4B2	229	4-18-52	12	.07	0.00	39	19	4.1	2.1	178	19	3.7	0.1	16	--	200	175	333	7.9	G
25/44-2B1	127	1-3-55	--	--	--	39	12	4.1	1.6	87	17	.4	--	6.8	--	--	148	325	7.8	B
-6A1	104	1-3-55a/	--	--	--	24	9.6	2.8	.8	52	10	.7	--	5.0	--	--	150	204	7.8	B
26/42-11J1s	--	10-22-46	--	T.10	T.0	33	15	--	--	139	4.1	.0	--	8.9	--	166	148	--	7.7	D
-12L1	136	5-12-64	12	.32	.01	33	17	2.0	1.3	160	18	.5	.0	9.6	0.0	145	140	312	8.0	W
-27N1	129	2-19-62	15	T.08	T.01	36	14	2.5	1.8	151	12	2.5	.0	22	.29	152	143	275	8.0	W
-27N2	150	2-19-62	16	T.11	T.01	31	9.8	2.6	1.7	152	11	2.0	.0	21	.20	152	143	278	8.0	W
26/43-6G1	30	5-12-64	15	T.10	T.15	47	13	2.1	1.9	149	15	3.8	.0	5.9	.37	134	142	--	--	W
-8B4	90	5-12-64	11	.0	.46	37	17	1.9	1.7	146	15	29	.0	7.8	.05	185	176	375	8.0	W
-10K1	106	5-12-64	12	.10	.03	45	22	2.7	3.7	228	20	4.8	.1	24	.02	243	240	472	7.7	W
-11F2	35	5- -59a/	--	--	--	49	7.4	10	3.9	210	6.2	5.0	--	.2	--	--	--	370	7.5	M

See footnote at end of table, p. 195.

-12G1	363	1-29-65	--	--	--	--	--	--	--	--	--	2	--	--	--	--	113	270	--	H
-16F2	268	10-22-59	11	.01	--	34	14	3.5	2.2	137	13	14	.0	5.0	.05	170	142	291	8.1	G
		5-17-60	--	--	--	--	--	--	--	139	--	--	--	--	--	--	140	290	8.1	G
-19A1	163	5- 7-42	9.4	.04	--	27	14	2.6	1.7	134	12	2.0	.0	4.5	--	136	125	243	--	G
26/43-20J2	761	12-26-62	--	--	--	--	--	--	--	--	--	--	--	--	--	170	54	--	9.0	T
-24L2	43	1-29-65	--	--	--	--	--	--	--	--	--	13	--	--	--	--	214	520	--	H
-24N1	365	1-28-65	--	--	--	--	--	--	--	--	--	2	--	--	--	--	114	280	--	H
-27E1	258	6-6-51a/	12	0.08	0.00	28	10	2.6	2.1	123	11	2.3	0.1	3.9	--	142	111	248	8.0	G
-30R2	293	5-12-64	10	T.04	T.09	26	14	1.6	1.1	117	13	1.3	.0	4.6	0.13	120	118	240	8.1	W
26/44-30D2	113	1-29-65	--	--	--	--	--	--	--	--	--	3	--	--	--	--	210	500	--	H
-32R1	113	1-3-55a/	--	--	--	33	20	4.8	3.1	88	14	1.8	--	11	--	--	167	358	7.9	B
27/43-17H1	22	8-25-64	--	T.1	--	--	--	--	--	--	--	--	--	--	--	185	144	--	7.2	C
-18J1	160	1-28-65	--	--	--	--	--	--	--	--	--	1	--	--	--	--	167	340	--	H
-22M1	125	5-12-64	27	.06	.0	54	13	2.4	1.5	216	6.0	7.8	.2	4.1	.10	207	180	385	8.0	W
28/41-11P1	16	1-27-65	--	--	--	--	--	--	--	--	--	2	--	--	--	--	79	200	--	H
28/42-3A1	30	1961	--	T.3	--	--	--	--	--	113	20	14	--	--	--	185	107	--	--	T
-34P1	33	1-28-65	--	--	--	--	--	--	--	--	--	2	--	--	--	--	194	390	--	H
28/43-6N1	107	4- 2-63	--	--	--	--	--	4	--	110	--	--	--	--	--	113	46	--	7.4	R
-6N2	115	4- 2-63	--	--	--	--	--	0	--	88	--	--	--	--	--	94	72	--	6.9	R

See footnote at end of table, p. 195.

Table 11 - Chemical analyses of ground water - Continued

Well or spring number	Depth (ft)	Date of collection	Milligrams per liter															Specific conductance (micromhos at 25°C)	pH	Analyst or laboratory
			Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Orthophospate (PO_4)	Dissolved solids	Hardness as $CaCO_3$			
-22D1	268	8-14-64	35	T2.5	T.01	21	7.0	4.3	3.1	118	6.8	.5	.6	.0	.04	143	86	172	7.2	W
28/43-22D1	268	9-1-64	--	T2.7	--	--	--	--	--	--	--	--	0.6	--	--	--	--	--	--	W
28/44-19P1	44	1-29-65	--	--	--	--	--	--	--	--	--	2	--	--	--	--	43	110	--	H
29/42-14M1	147	2-2-65	--	--	--	--	--	--	--	--	--	2	--	--	--	--	187	410	--	H
-18P1	33	1-27-65	--	--	--	--	--	--	--	--	--	3	--	--	--	--	99	240	--	H
-20J1	18	1-27-65	--	--	--	--	--	--	--	--	--	47	--	--	--	--	348	770	--	H
-23K1	48	5- -59a/	--	--	--	39	2.4	3.9	1.6	156	3.8	2.8	--	0.8	--	--	--	280	7.7	M
-35P2	45	1961	--	T .4	--	--	--	--	--	112	9	3.6	--	--	--	129	80	--	--	T
29/43-14D1	67	1-28-65	--	--	--	--	--	--	--	--	--	22	--	--	--	--	89	300	--	H
-29N1	202	10-9-61	23	.06	0.0	32	10	16	1.2	174	7.6	2.5	.5	.4	--	178	122	282	7.5	G
		10-1-62	23	.15	.0	32	11	17	1.3	184	6.6	--	.3	.5	--	182	126	304	7.5	G
		4-29-64	24	.02	.0	32	12	14	1.1	187	5.4	.8	.4	.4	--	180	130	297	7.4	G

See footnote at end of table, p. 195.

-29N2	178	10-9-61	25	.02	.0	40	8.2	4.9	2.3	166	3.0	1.0	.2	5.2	--	174	134	270	8.0	G
		10-1-62	25	.00	.0	40	8.4	6.9	2.2	167	3.0	--	.1	5.7	--	177	134	282	8.0	G
		4-29-64	24	.02	.0	42	7.8	6.7	1.9	170	3.2	3.2	.2	4.9	--	178	137	286	8.0	G
29/44-6H2	14	5-2-61	30	.00	--	30	7.8	11	5.1	37	21	5.5	.2	96	0.09	238	107	303	6.3	G

a/ Boron (B) content: 25/44-6A1, 0.00 mg/l; 26/43-11F2, 0.19 mg/l; 26/43-27E1, 0.01 mg/l; 26/44-32R1, 0.0 mg/l; 29/42-23K1, 0.13 mg/l.