GEOLOGY AND HYDROGEOLOGY OF THE VIOLA AND MOSCOW WEST QUADRANGLES, LATAH COUNTY, IDAHO AND WHITMAN COUNTY, WASHINGTON

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Master of Science

with a

Major in Geology

in the

College of Graduate Studies

University of Idaho

by

Andrew P. Provant

December 1995

Major Professor: John H. Bush, Ph.D.

GEOLOGY AND HYDROGEOLOGY OF THE VIOLA AND MOSCOW WEST QUADRANGLES, LATAH COUNTY, IDAHO AND WHITMAN COUNTY, WASHINGTON

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Master of Science

with a

Major in Geology

in the

College of Graduate Studies

University of Idaho

by

Andrew P. Provant

December 1995

Major Professor: John H. Bush, Ph.D.

AUTHORIZATION TO SUBMIT

THESIS

This thesis of Andrew P. Provant, submitted for the degree of Master with a major in Geology and titled, "Geology and Hydrogeology of the Viola and Moscow West Quadrangles, Latah County, Idaho and Whitman County, Washington," has been reviewed in final form, as indicated by the signatures and dates given below. Permission is now granted to submit final copies to the College of Graduate Studies for approval.

Major Professor ______________ Date Oct 17/95
John H. Bush

Committee Members ______________ Date Oct 17, 1995
Dale R. Ralston

______________ Date 10-17-95
David S. Barber

Department Administrator ______________ Date Nov. 21, 1995
John Oldow

Discipline's College Dean ______________ Date Nov 27, 1995
Robert B. Bartlett

Final Approval and Acceptance by the College of Graduate Studies

______________ Date ______________
Jean'ne M. Shreeve

ABSTRACT

The Moscow-Pullman region of northern Idaho and southwestern Washington relies on ground water as its principal water source. The basin contains two major aquifers, in addition to a shallow ground water system, consisting of Miocene basalt and sediments partially surrounded and underlain by older crystalline rocks. The purpose of this study was to provide and discuss updated geologic and hydrogeologic models to refine concepts of shallow ground water movement in the basin.

Two geologic maps at a scale of 1:24,000 were produced including geologic cross-sections. Five hundred drillers' logs were cataloged, many of which were used to assist in construction of the maps and cross-sections. These maps more clearly define the extent of the Moscow-Pullman basin and separate Miocene sediments overlying bedrock from the Palouse Loess. Cross-sections and well data strongly suggest physical and hydraulic interconnection of Miocene sediments from the bottom to the surface, along the margin of the basin.

Seventy-four wells were measured several months apart to observe water level changes related to potential recharge events. Follow-up measurements indicate that the shallow sediment and upper basalt aquifers have a rapid response to seasonal recharge whereas the lower basalt aquifer does not.

Recharge within the basin occurs via three separate mechanisms. The primary contributor is infiltration through the Palouse Formation and sediments of Bovill. Secondary mechanisms are stream loss and basin-margin infiltration via paleo-channel pathways.

Continued updating of the 1:24,000 base maps, well inventory and periodic water-level measurements taken from selected private wells is recommended.

ACKNOWLEDGEMENTS

I would like to acknowledge the following individuals for their assistance and support of this study: the members of the Pullman-Moscow Water Resource Committee for providing funding for the project, the residents and well-owners of the Moscow-Pullman basin for their interest and cooperation, and Jack Pierce for sharing his information with me. Special thanks are extended to the members of my committee for their guidance, insight and patience throughout the project: Dr. David Barber, Dr. Dale Ralston and my major professor, Dr. John Bush.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PLATES

INTRODUCTION

Statement of Problem

The Moscow-Pullman region of northern Idaho and southwestern Washington relies on ground-water as its principal water source (Fig. 1). Water for municipal supplies is pumped primarily from the Miocene Grande Ronde Formation of the Columbia River Basalt Group and associated interbedded sediments of the Latah Formation. This aquifer is referred to as the lower or Grande Ronde aquifer. Water for private and older municipal wells is derived from the Miocene Priest Rapids Member of the Wanapum Formation which overlies the Grande Ronde Formation and also belongs to the Columbia River Basalt Group. In the Moscow area, this aquifer is referred to as the upper or Wanapum aquifer.

There is concern over the ground water withdrawal rates for the two cities of Moscow, Idaho and Pullman, Washington and two universities, the University of Idaho, located in Moscow and Washington State University in Pullman. In 1990, Lum and others published a three-dimensional, three-tiered computer model designed to gain a better understanding of present and future water level elevations under current and future pumping rates. Their conclusion, that ground-water levels would stop declining with a stabilization in the pumpage rate to early 1980 levels, has not been fully verified. Lum and others (1990) also recommend attempting to accurately define the location and method of recharge into the aquifer.

Previous investigations in the Moscow-Pullman basin have yielded much information concerning the subsurface, yet geologic maps for the area are at such a small scale they do not accurately delineate the distribution of lithologic units. Larger scale geologic maps that incorporate the subsurface data are needed in order to interpret structural and stratigraphic features that control water recharge.

2700 → 4500 / 9 = 200' contour

where is the 2500' contour? Pg 5 says Moscow is 2550', Albion at 2225'

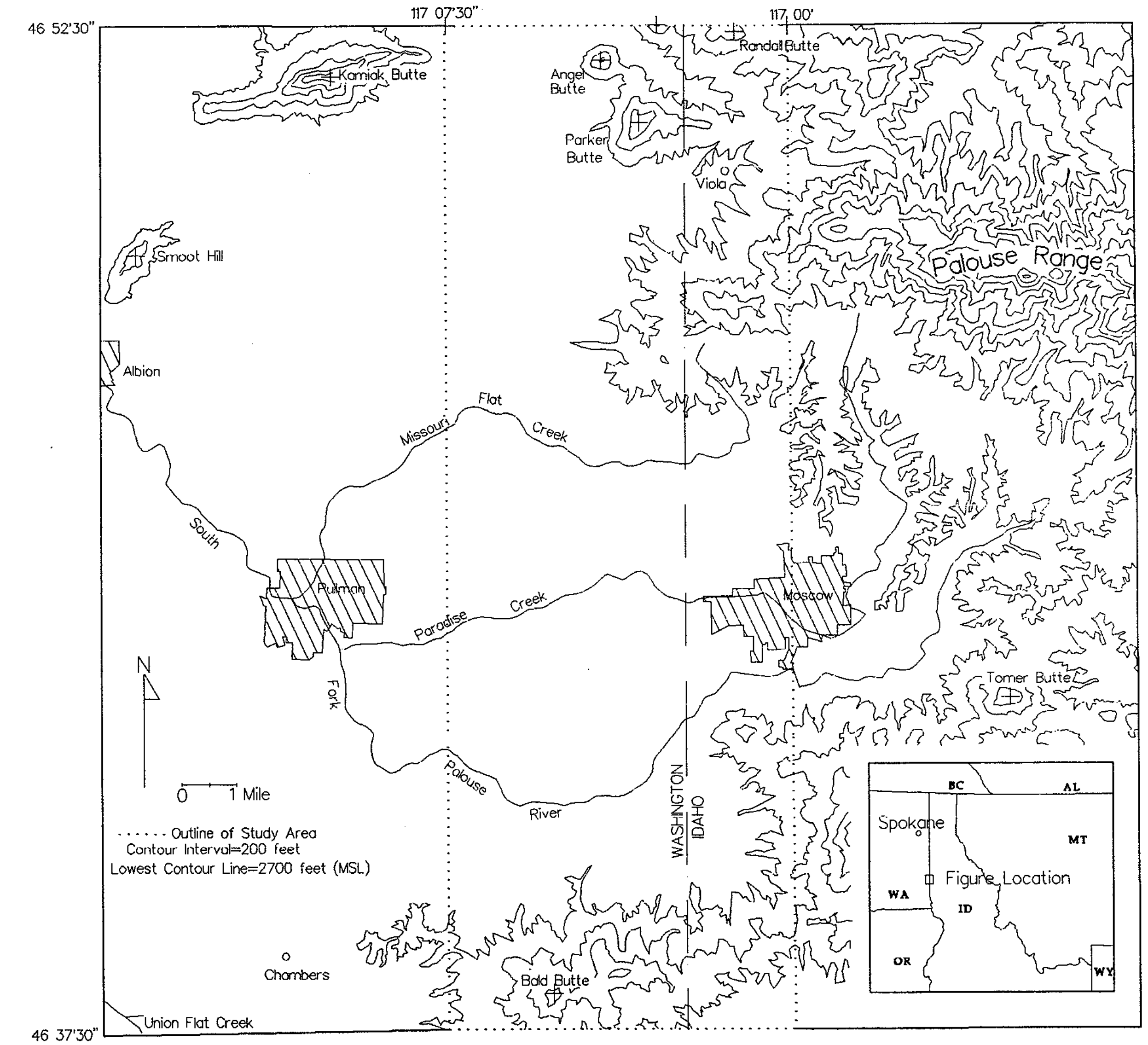


Figure 1. Location of the Moscow-Pullman basin.

The addition of deep wells in recent years has increased the understanding of subsurface geology, enabling a more accurate picture to be constructed.

Purpose and Objectives

The purpose of this study is to add to the present understanding of the aquifers by updating the geology and hydrogeologic controls of ground water movement in the Moscow-Pullman basin. General objectives of the study involve producing a geologic map and hydrogeologic conceptual model for the Moscow West and Viola quadrangle map units of the Moscow-Pullman basin and using the improved geologic understanding to refine concepts of shallow ground water movement. Specific objectives of the study include:

1) Review previous literature
2) Compile and tabulate data for wells located within the Moscow West and Viola quadrangle map areas.
3) Update an inventory of wells; locate new and existing wells and take measurements of water levels in the Moscow West and Viola quadrangle map areas.
4) Produce a 1:24000 scale geologic map of the USGS Moscow West and Viola 7.5-minute quadrangles.
5) Construct geologic cross-sections of the basin from geologic maps and collected well data.
6) Describe ground water flow characteristics of the overlying sediments and Wanapum Formation basalt, based on the refined hydrogeologic model of

the basin.

7) Discuss conclusions and present recommendations regarding future research.

BACKGROUND INFORMATION

Extent of Study Area

The two-quadrangle map study area encompasses approximately 65 square miles of Latah County in northern Idaho and Whitman County in southeastern Washington (Fig. 2). The total area of the Moscow-Pullman basin is approximately 750 square miles. The study area includes the 1:24000 scale Viola and Moscow West Quadrangles, which are bounded by latitudes 46° 52' 30" north and 46° 37' 30" north to the north and south, respectively. Longitude 117° 00' west and longitude 117° 07' 30" west define the east and west boundaries respectively (Fig. 3, Plates 1 and 2). Although not produced as a Plate, the 7.5 minute Pullman Quadrangle was compiled using Hooper and Webster (1982) for the purpose of extending the study further to the west. During the same time period, work was coordinated with a similar study (Pierce, unpub., 1995) conducted east of longitude 117° 00'.

Geography and Climate

The cities of Moscow, Idaho and Pullman, Washington are located along the eastern margin of the Columbia Plateau (Fig. 1). The Moscow-Pullman basin consists of a rolling hill topography, characteristically known as the "Palouse Hills" (Kirkham and others, 1929). The steptoes of Smoot Hill, Kamiak Butte and several smaller buttes define the boundaries of the basin on the north. The Palouse Range marks the eastern end of the basin, while Bald Butte and several smaller buttes define the southern boundary. The basin is open to the west. Elevations within the basin range from 2,550 feet in Moscow to 2,225 feet above sea level near Albion, Washington.

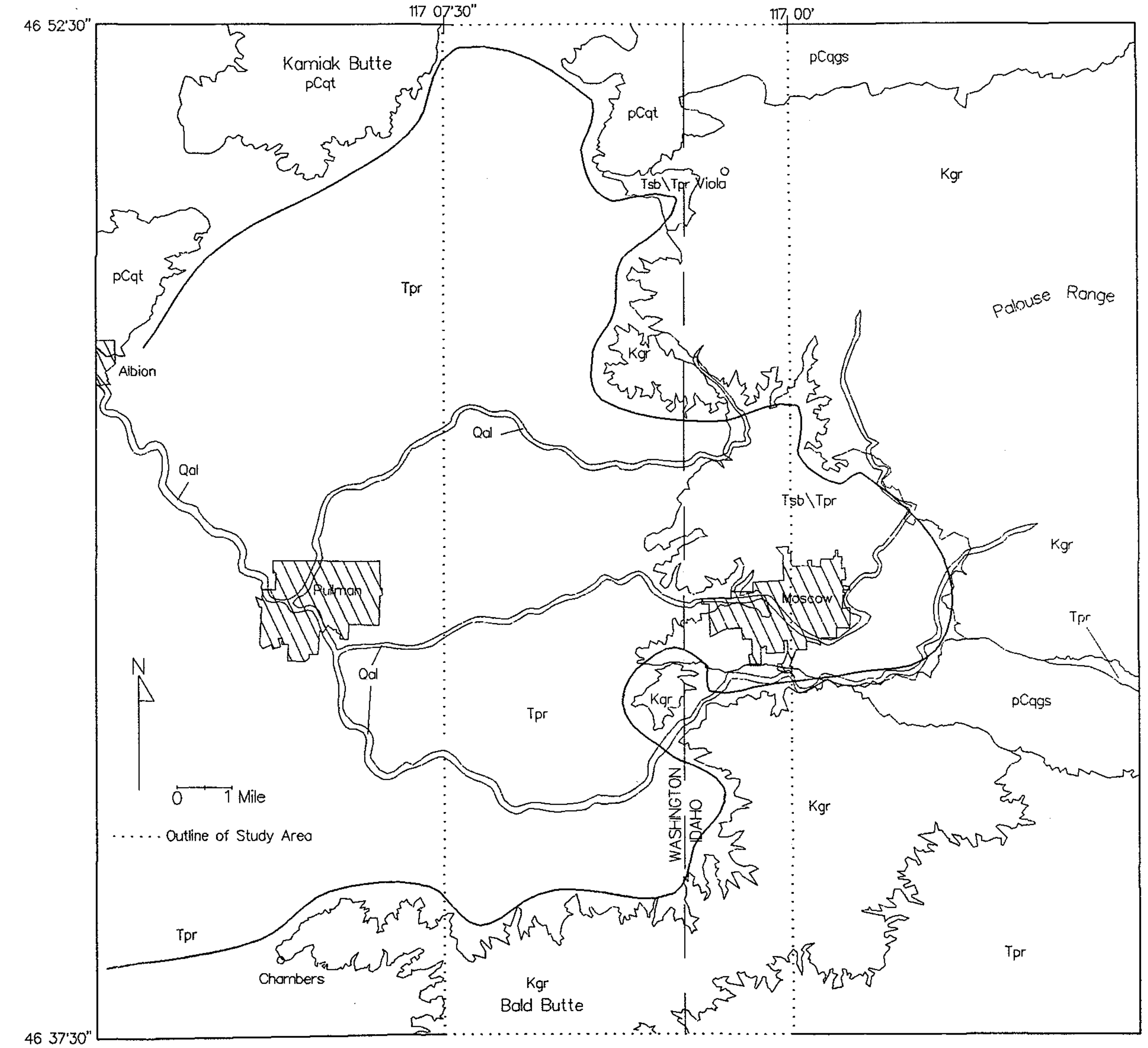


Figure 2. Aerial extent of the basalt-sediment ground water flow system in the Moscow-Pullman basin.

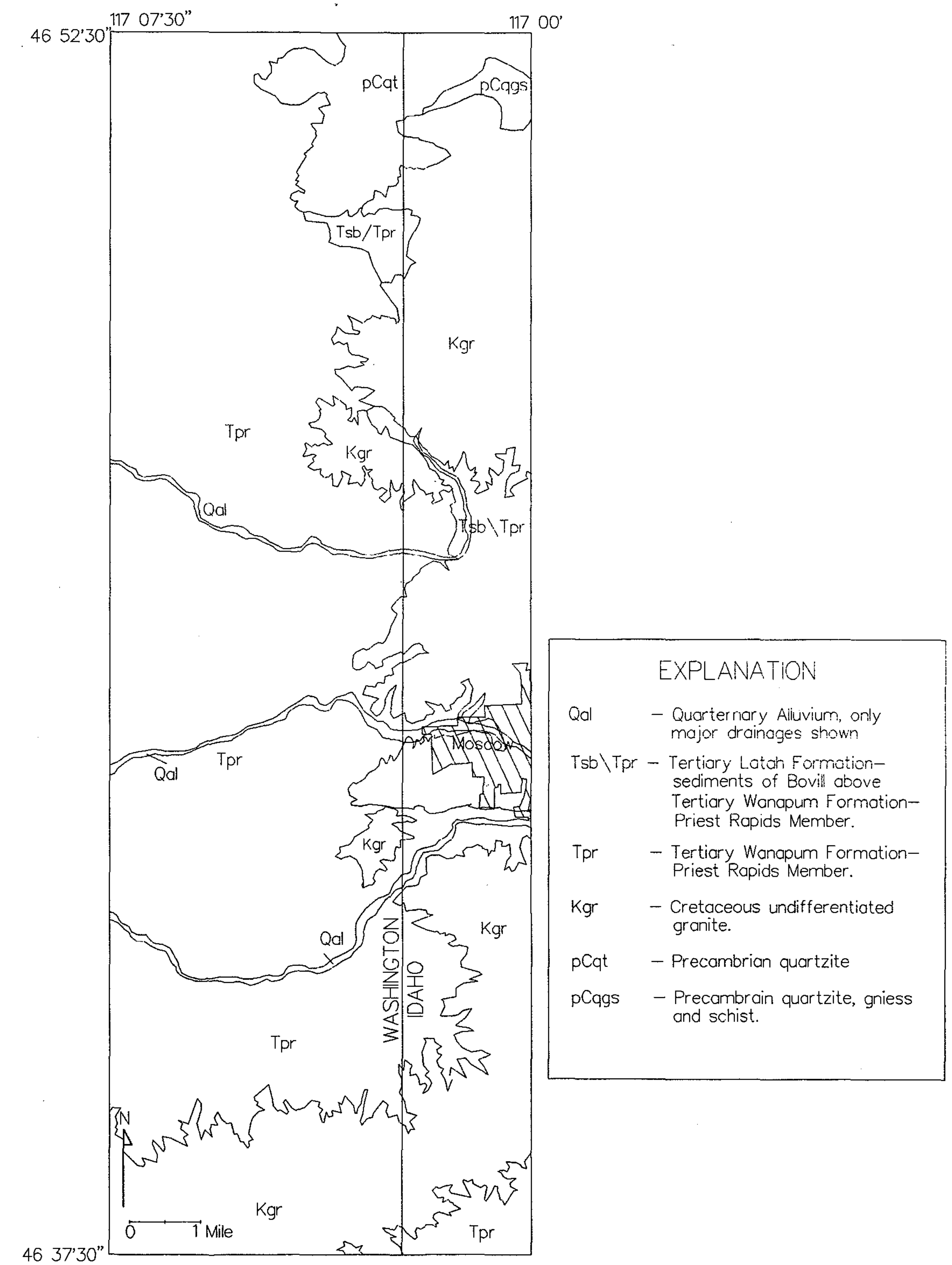


Figure 3. Interpretive generalized geologic map of the Viola and Moscow West quadrangles.

Precipitation averages 22 inches in Pullman and 24 inches in Moscow annually, with the higher elevations to the east of Moscow receiving up to 40 inches per year (U.S. National Oceanic and Atmospheric Administration, 1987a and 1987b). Precipitation usually occurs from November to April, with dry conditions during the summer months (Lum and others, 1990). The highlands and basin are drained by the perennial streams: Missouri Flat Creek, Paradise Creek and the South Fork of the Palouse River.

Well-Numbering System

Municipal and private wells from both Idaho and Washington were measured in this study. Idaho wells are referenced to the Boise baseline and meridian, while Washington references the Willamette baseline and meridian. Each state lists the township, range and section number of the well and then subdivides the section using alphabetic designations. Idaho identifies wells to the nearest 1\4, 1\4, 1\4 section, using the letters a,b,c and d in counter-clockwise rotation to label each segment of the quartered section (Fig. 4-1a). The appropriate letters are then added to the township, range and section number to provide the location of the well. Washington divides sections to the nearest 1\4, 1\4 section and then designates each division alphabetically A through R, deleting I and O. The 1\4, 1\4 section letter is then added to the township, range and section listings (Fig. 4-1b). Numerical designation following the alphabetic listing indicates the logged number of the well in that particular quarter section, (i.e. 1st well located, 2nd, etc.).

Precipitation averages 22 inches in Pullman and 24 inches in Moscow annually, with the higher elevations to the east of Moscow receiving up to 40 inches per year (U.S. National Oceanic and Atmospheric Administration, 1987a and 1987b). Precipitation usually occurs from November to April, with dry conditions during the summer months (Lum and others, 1990). The highlands and basin are drained by the perennial streams: Missouri Flat Creek, Paradise Creek and the South Fork of the Palouse River.

Well-Numbering System

Municipal and private wells from both Idaho and Washington were measured in this study. Idaho wells are referenced to the Boise baseline and meridian, while Washington references the Willamette baseline and meridian. Each state lists the township, range and section number of the well and then subdivides the section using alphabetic designations. Idaho identifies wells to the nearest 1\4, 1\4, 1\4 section, using the letters a,b,c and d in counter-clockwise rotation to label each segment of the quartered section (Fig. 4-1a). The appropriate letters are then added to the township, range and section number to provide the location of the well. Washington divides sections to the nearest 1\4, 1\4 section and then designates each division alphabetically A through R, deleting I and O. The 1\4, 1\4 section letter is then added to the township, range and section listings (Fig. 4-1b). Numerical designation following the alphabetic listing indicates the logged number of the well in that particular quarter section, (i.e. 1st well located, 2nd, etc.).

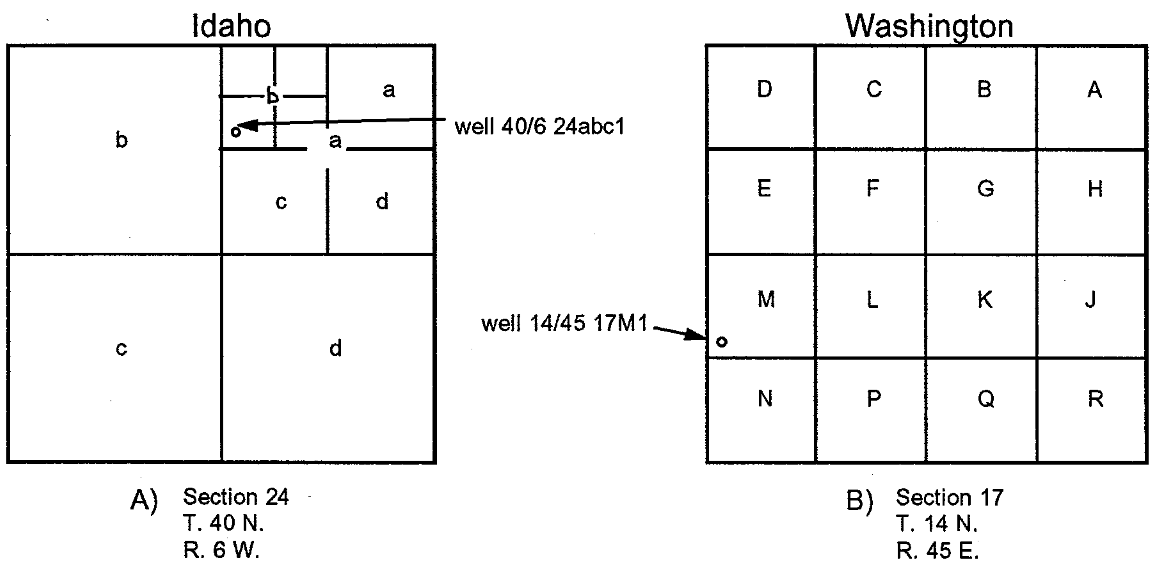


Figure 4. Well-Numbering System of Idaho and Washington

Previous Research

Ground-water reconnaissance and investigation began in the late 1800's, with Russell (1897). Agee, et. al. (1917) described topography and climate as well as different soil types present in the area. Fryxell and Cook (1965) and Baker and others (1991) focus specifically on the paleosol and loess deposits of the Columbia Plateau. Johnson and Myrene (1929), Tullis (1940, 1944), Carmichael (1956), Crosby and Cavin (1960), Hosterman and others (1960), Ross (1965), Sokol (1966), Lin (1967), Ringe (1968), and Brown (1976) discuss the general geology and hydrogeology of the Moscow-Pullman basin. Cavin (1964) investigated the inter-basaltic sediments. Najjar (1972) and Cotton (1982) discuss the geochemistry of the basalt aquifers. Swanson and others (1979) and Droste and Whiteman (1986) focus on the regional geology of the Columbia River Basalt Group. Geologic maps of the area were produced by Rember and Bennett (1979), Swanson and others (1980) and Hooper and Webster (1982). Crosby and Cavin (1960), Bockius (1985) and Klein and others (1987) attempted geophysical methods to define the basalt thicknesses and basalt-crystalline rock boundaries

Laney and others (1923) studied the effects of the local geology on the ground water system. Recharge of the aquifers was described by Williams and Allman (1969). Demotte and Miles (1933), Stevens (1960), Foxworthy and Washburn (1963), Walters and Glancy (1969) and Baines (1992) conducted general ground-water studies of the basin. Li (1991) and Kopp (1994) conducted aquifer tests in the basalt fractures and interbed sediments. Patrick (1990) and Pardo (1993) dealt with surface water-ground water interaction. Jones and Ross (1972), Barker (1979), Lum and others (1990) and Brown (1991) produced the previous ground-water modeling studies. Well data were collected by Ross (1965), Walters and Glancy (1969), Jones and Ross (1972), Ralston (1972), Crosthwaite (1975), Barker (1979), Whiteman (1986) and Lum and others (1990). Bauer and others (1985) provided regional well information. An annotated bibliography of ground-water and water supply studies in the area was produced by Eyck and Warnick (1984).

COMPILATION OF COLLECTED WELL DATA

Method of Study

Research began in May of 1994. Approximately seven weeks during the summer of 1994 were spent conducting field work and collecting data for this study. Construction of the 1:24000 geologic map for the Moscow West and Viola quadrangles was done using previous researchers' work, well log data and field examination (Plates 1 and 2). Geologic cross-sections were constructed from collected well log data plotted on the 1:24000 geologic map. Compilation of well data was done using existing well log data, the work of previous researchers, information from well owners and field measurements. Water level and pumpage rate data for the two cities and two universities were obtained through their respective agencies.

Well Inventory

The objective of the inventory of wells conducted as part of this study was to compile a data framework containing pertinent information for all wells located in the Moscow-Pullman basin. Though this study concentrates on the Moscow West and Viola quadrangles, the well inventory also includes data for wells located in the Pullman Quadrangle.

The well inventory provides data with which a more accurate picture of the geology and hydrogeology may be constructed. The inventory also provides information regarding well construction and water level records for wells in the Moscow-Pullman basin.

The inventory containing information on well location, well construction, elevation, use and references to well log records, is presented in Appendix A. Data regarding past and present water level measurements for private wells are located in Appendix B. Data concerning municipal well water level and pumpage records are located in Appendix C. Data for wells located east of longitude 117° 07' 30" west, can be found in Pierce (unpub., 1995).

GEOLOGIC SETTING

General Geology

The geology of the Moscow-Pullman area consists of a relatively shallow basin in pre-basalt crystalline rocks, open to the west and defined to the north, east and south (Fig. 5). The basin is filled with Miocene basalts of the Columbia River Basalt Group and associated sediments, which cover an irregular buried surface (Lum and others, 1990) of Precambrian and Cretaceous crystalline rocks. The Miocene basalts and sediments are bounded to the north by Belt Supergroup quartzite, schist and gneiss of Smoot Hill, Kamiak Butte and the Randall Butte area. In places, these rocks are underlain and intruded by granite of the Idaho Batholith, which makes up the Palouse Range. The granite defines the eastern edge of the basin. The western end of Paradise Ridge and Bald Butte, consisting of granitic gneiss of the Idaho Batholith, define the southern boundary.

The Columbia River Basalt Group is a sequence of flows which erupted from fissure systems in northeastern Oregon and southeastern Washington (Swanson and others, 1980) (Fig. 6). On a regional scale, the flows are thickest in the Pasco Basin area of south-central Washington and thin toward the margins (Lin, 1967, Bush and Seward, 1992). The total thickness of basalt flows in the Moscow area is approximately 1,300 feet, thickening to over 2,000 feet at Pullman and increasing to almost 4,000 feet northwest of Pullman (Lum and others, 1990, Li, 1991). Within the Moscow-Pullman basin the basalts dip shallowly to the west and northwest with little structural deformation, though barriers to ground water flow are believed to be present in the subsurface west of Pullman (Brown, 1976, Barker 1979, Lum and others 1990).

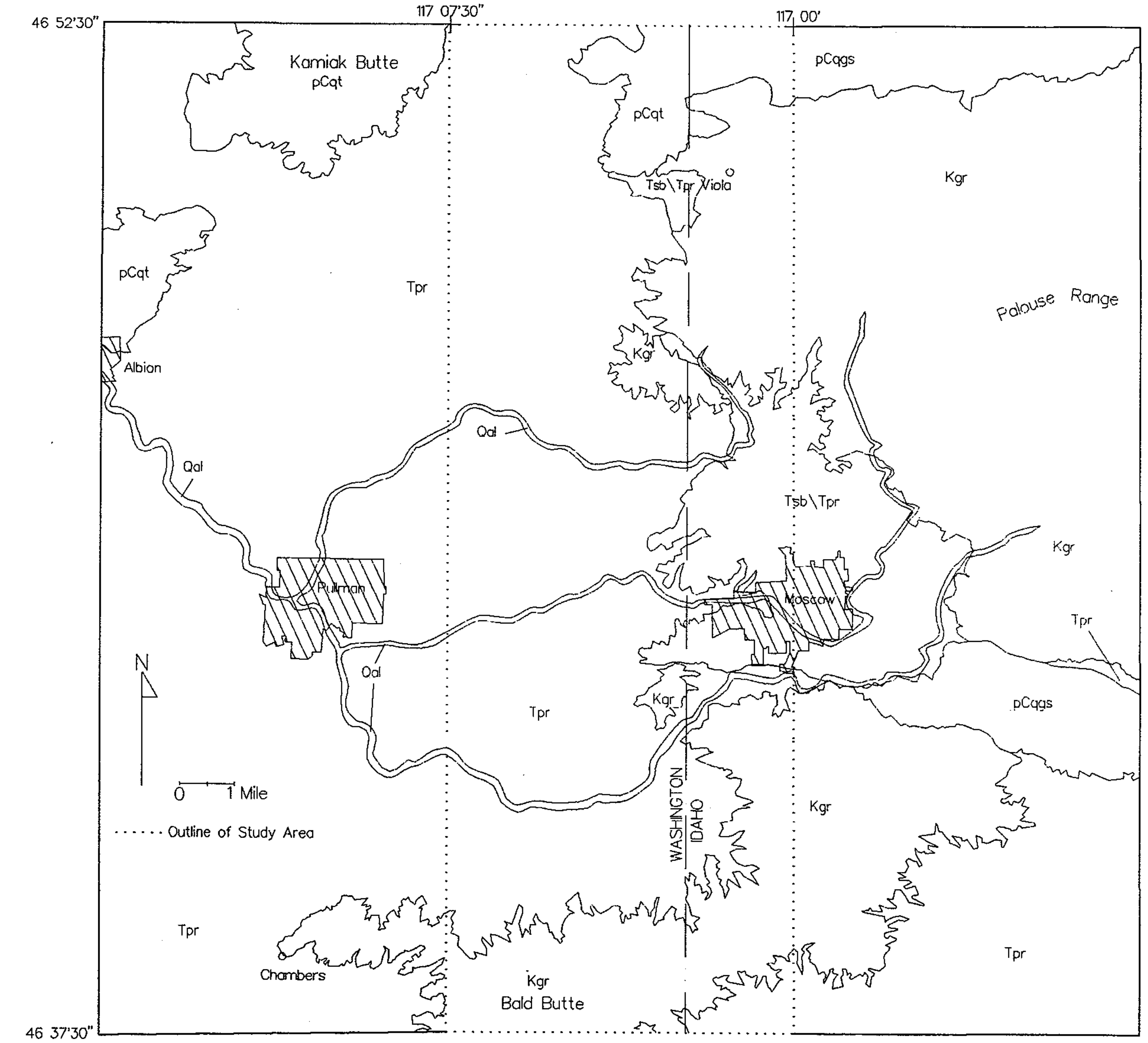


Figure 5. Interpretive generalized geologic map of the Moscow-Pullman basin (Robinson Lake and Moscow East quadrangles modified from Pierce, unpub., 1995, Moscow West and Pullman Quadrangle modified from Hooper and Webster, 1982).

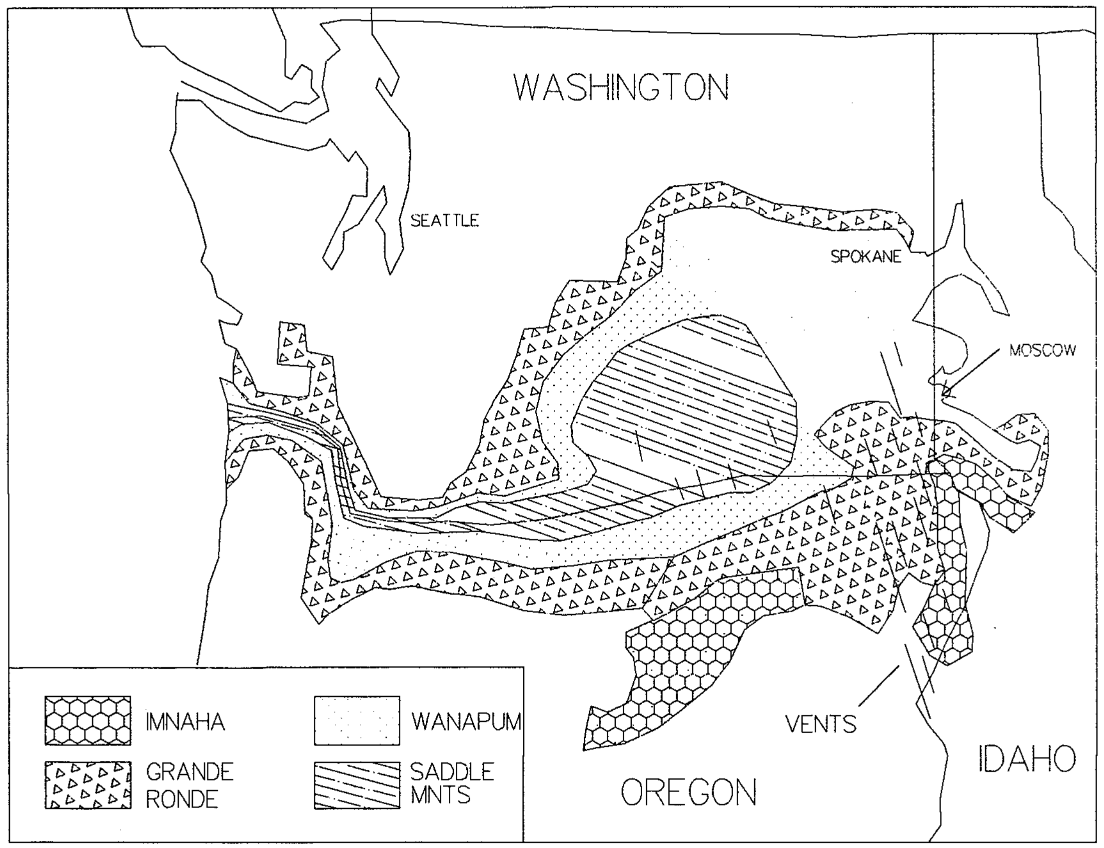


Figure 6. Generalized distribution of the Columbia River Basalt Group (modified from Bush and Seward, 1992; Reidel and others, 1989).

The basalts present within the Moscow-Pullman basin are divided into four major formations listed in stratigraphic order: the Imnaha, Grande Ronde, Wanapum and Saddle Mountain basalts (Fig. 7). The Imnaha, though not present at the surface in the study area, has been tentatively identified in a deep well in Pullman (Bush, personal commun., 1995). The other formations can be identified either at local outcrops or from well logs.

As the individual basalt flows flooded the Moscow-Pullman basin, deposition of lacustrine and stream sediments occurred because of raising of the local base level and damming of drainages. These sediments occur as interbeds between individual flows and also overlie younger flows at the surface. Eolian loess (Palouse Formation) deposits cap the basalt and these sedimentary deposits throughout most of the basin. The 1:24,000 maps produced as part of this study are interpretive because of the amount of area covered by the loess. Since few outcrops are present in the study area (Fig. 8), many of the contact lines were inferred to produce an interpretive geologic map without the Palouse loess cover. Geologic cross-sections of the basin were constructed along north-south and west-east lines and are presented in Plate 3.

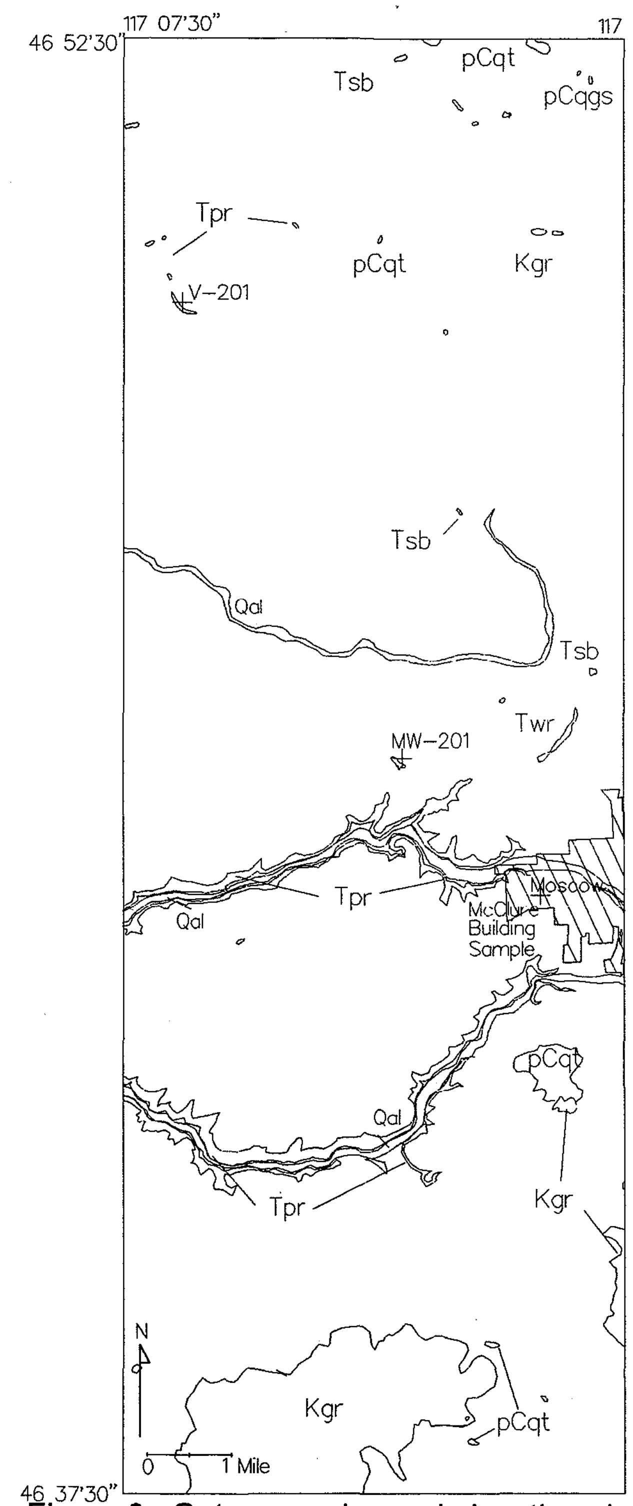
Crystalline Rocks

Quartzite

Precambrian quartzite (pCqt) occurs in the northern portion of the study area (Plates 1 and 2), forming prominent steptoes (buttes). Quartzites also crop out in the southern portion of the study area, surrounded by the Cretaceous igneous rocks. The quartzites consist of recrystallized quartz, with muscovite, biotite and zircon accessories. They are similar to quartzites present on Paradise Ridge in

		FORMATION	MEMBER	MAGNETIC POLARITY	K/Ar Date (M.Y.)
COLUMBIA RIVER BASALT GROUP	YAKIMA BASALT SUBGROUP	SADDLE MOUNTAINS BASALT	LOWER MONUMENTAL	N	6
			ICE HARBOR	N_1 R	8.5
			BUFORD	R	
			ELEPHANT MOUNTAIN	N_1 T	
			POMONA	R	12
			ESQUATZEL	N	
			WEISSENFELS RIDGE	N	
			ASOTIN	N	13
			WILLOW CREEK	N	
			UMATILLA	N	
		WANAPUM BASALT	PRIEST RAPIDS	R_3	14.5
			ROZA	T_1 R_3	
			FRENCHMAN SPRINGS	N_2	15.3
			ECKLER	N_2	
		GRANDE RONDE BASALT		N_2	15.5
		PICTURE GORGE BASALT	R_2	R_2	
			N_1	N_1	
				R_1	16.5
		IMNAHA BASALT		T	17.5
				N_0	
				$R_{0?}$	

Figure 7. Generalized stratigraphic terminology of the Columbia River Basalt Group. N=normal magnetic polarity, T=transitional magnetic polarity, R=reverse magnetic polarity (Bush and Seward, 1992; modified from Swanson and others, 1979; Hooper, 1982; and Reidel and Fecht, 1987).



EXPLANATION

Tsb	– Tertiary Latah Formation– sediments of Bovill.
Tpr	– Tertiary Wanapum Formation– Priest Rapids Member.
Kgr	– Cretaceous undifferentiated granite.
pCqr	– Precambrian quartzite.
pCqgs	– Precambrian quartzite, gniess and schist.
MW–201	– Identifies collection site of chemically analyzed basalt samples.

Figure 8. Outcrop and sample locations in the Viola and Moscow West quadrangles. Moscow West Quadrangle outcrop patterns from Hooper and Webster, (1982).

the Moscow East quadrangle which have been mapped as Prichard Formation of the Belt Supergroup (Tullis, 1944), pre-Belt basement rocks (Bond, 1978) and Revett Formation of the Belt Supergroup (Anderson, 1991). Hooper and Webster (1982) tentatively correlated these quartzites with Cambrian units located in northwestern Washington and with quartzites located on Kamiak Butte in the Albion quadrangle adjacent to the study area (Fig. 5). From additional mapping, it is interpreted that these rocks in Idaho are part of a gneiss, schist and quartzite unit (pCqgs) rather than a single unit dominated by quartzite. On Plate 2, the designation pCqt is the equivalent to the pCqgs symbol on the Robinson Lake quadrangle map by Pierce (unpub., 1995).

Undifferentiated Intrusive Rocks

Compositions of the Cretaceous rocks (Kgr) vary with quartz tonalite, hornblende monzodiorite and hornblende granodiorite being the most common (Bush and others, unpub. map, 1995). Grain sizes range from medium-grained equigranular to coarse-grained equi-granular. The monzodiorite contains plagioclase (An_{27}) with slight normal zoning, microcline and hornblende (Hooper and Webster, 1982). The tonalites are composed of quartz, unzoned andesine (An_{38}), muscovite and biotite (Hoffman, 1932). Pegmatite veins are locally present but more common in the tonalites. Foliation on Bald Butte is steep and irregular but trends approximately E-W parallel to the ridge (Hooper and Rosenberg, 1970). Hooper and Webster (1982) report a date of 69.8 +/- 2.6 m.y. for similar rocks on the adjoining Pullman quadrangle. Granite mapped in S. 8, R 46E, T. 14N (Plate 1), is based on data from Carmichael (1956) and Walters and Glancy (1969). It is possible however, that drill cuttings for the well were misinterpreted, and might actually be Latah Formation sediments since these deposits characteristically contain weathered granitic fragments.

Columbia River Basalt Group

Grande Ronde Formation

The Miocene Grande Ronde Formation (Tg) consists of fine-grained to very fine-grained aphyric flows (Wright and others, 1973, Swanson and others, 1977, 1979a, Reidel and others, 1989). Erupting as a series of flows between 15.6 and 17.0 Ma (Reidel and others, 1989), the Grande Ronde does not outcrop in the study area but is encountered in several deep wells. In the study area, flows occur between the 2070 and 1371 foot elevations and are interbedded with sediment of the Latah Formation (Figs. 9 and 11). The Grande Ronde flows and associated interbasalt sedimentary units make up the lower aquifer in the area (Jones and Ross, 1972, Kopp, 1994).

Wanapum Formation - Priest Rapids Member

The Priest Rapids Member (Tpr) in the Moscow area consists primarily of basalt flows that are described as medium to coarse-grained with small phenocrysts of plagioclase and olivine in a matrix of intergranular pyroxene, ilmenite blades and minor devitrified glass (Bingham and Grolier, 1966, Wright and others, 1973, Swanson and others, 1977, 1979a). Age dates indicate these flows erupted approximately 14.5 million years ago (Swanson and others, 1979a; Tolan and others, 1989). Mapping by Hooper and Webster (1982) shows that these basalts constitute the majority of outcrops in the study area. The Priest Rapids Member generally consists of one flow in the Moscow-Pullman area. This flow is the basalt

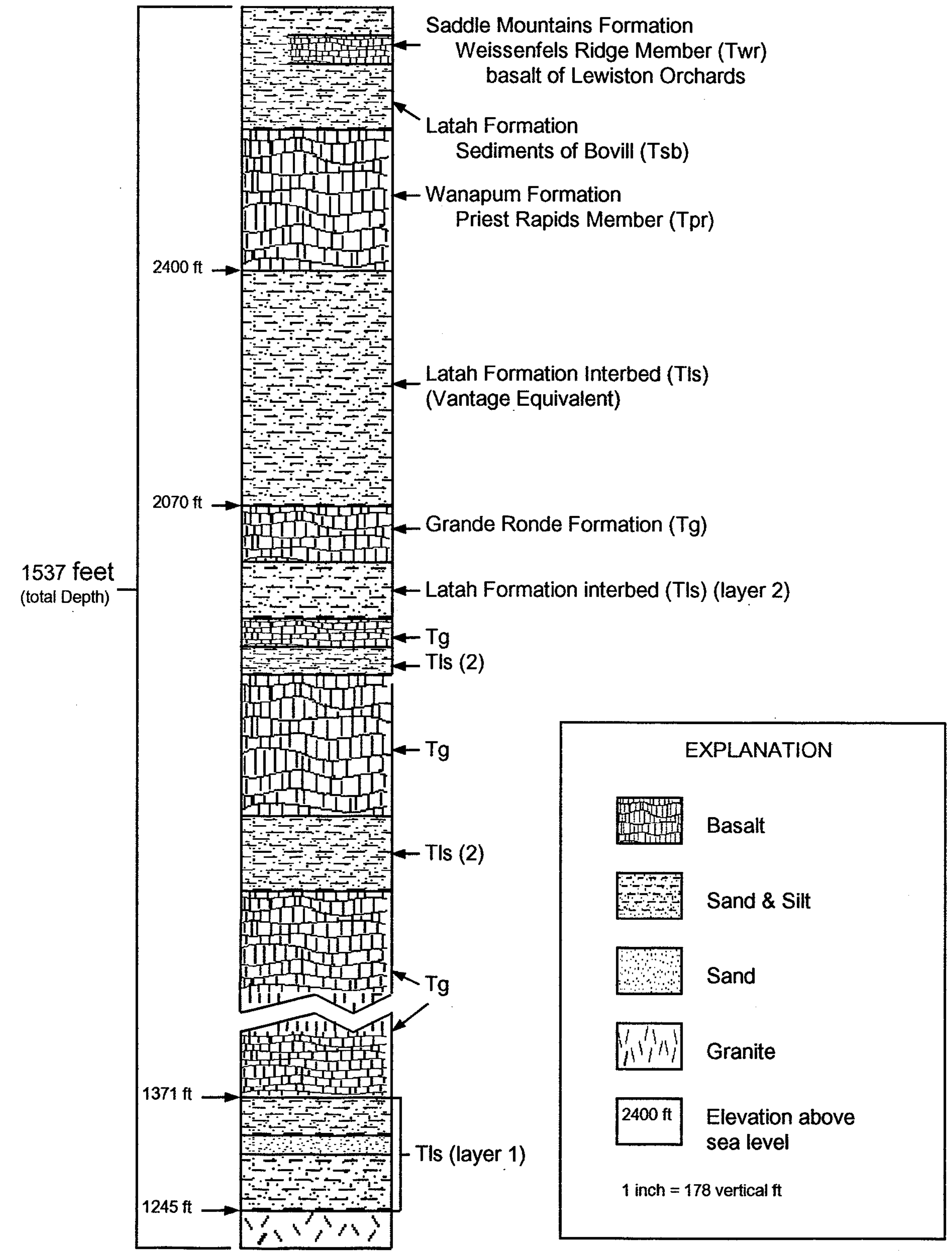


Figure 9. Stratigraphic column of the Moscow area. Compiled as a composite of wells (39N 6W 13cd2), (39N 5W 7cbb1) and surface outcrops.

of Lolo (Hooper and Webster, 1982), ranges from 160 to 200 feet thick according to well data and exposures (Fig. 9). Chemical analysis of sample MW-200 collected at 1\4 NE, S. 31, R. 46 E, T. 15N., and another analysis of V-200 at 1\4 NW, S. 35, R. 45E, T 16N., yield results typical of basalt of Lolo flow chemistry (Table 1, Fig. 8). The Priest Rapids Member and the associated sediments constitute the upper aquifer in the Moscow-Pullman basin.

Table 1. Normalized Results (Weight %) of Chemical Analysis of Basalt Samples (Analysis by WSU GeoAnalytical Laboratory using XRF, 1994)

	McClure Building	MW-201	V-200
SiO2	50.19	51.18	50.87
Al2O3	14.80	13.67	13.62
TiO2	2.60	3.26	3.26
FeO	11.47	13.10	12.92
MnO	0.19	0.22	0.22
CaO	11.00	9.30	9.28
MgO	6.18	4.84	5.29
K2O	0.36	1.01	1.06
Na2O	2.60	2.63	2.69
P2O5	0.59	0.78	0.79

Regional dip for the Priest Rapids basalt, calculated between WSU #7 (14/46 5G1), Pullman Test #11 (14/45 1F1), Moscow City #9 (39/6 12dba1) and Moscow City #2 (39/5 7dad2), averages about 0.1 degrees to the west. In the eastern basin, compaction of Latah sediments caused by loading may have resulted in easterly dipping flow margins (Lum and others, 1990, Kopp 1994). However, well logs in the central and extreme eastern margin of the basin indicate no discernable slope toward the east; the base of the Priest Rapids flow at Moscow City #9 is about the same elevation as in the Parker Farm well (39/5 15bca1, Moscow East quadrangle). In addition, cross-sections compiled from selected well logs (Fig. 10, Plate 3) show minimal westward dip for the Priest Rapids Member, suggesting little or no compaction of the Latah sediments.

The Priest Rapids flow in the Moscow-Pullman basin is 200 to 300 feet lower in elevation than it is south of Paradise Ridge. Although compaction of Latah sediments may account for a minor part of the 200 to 300 feet of elevation difference between the basalt flow in the Moscow-Pullman basin and the same basalt member south of Paradise Ridge, differential basement tilting in each area is more likely the cause (Bush, personal commun., 1995).

Cross-section line D-D' through Moscow City wells #7 and #8 (39/5 7dba1 and 2), records what appears to be a possible structural feature beneath Moscow. The structure (Fig. 12), displays a dip of 3.6 degrees to the northeast from University of Idaho #3 (39/5 7cbb1) to Moscow City #8 (39/5 7dba2). Cavin's (1964) attempt at using earth resistivity methods to define this structure was indeterminate due to surficial topographical effects.

Contours of the pre-Wanapum Formation surface by Lin (1967), suggests that Moscow Wells #7 and #8 may be located within a major paleo-stream channel. Therefore, what appears as compaction, may actually be the Priest Rapids and Grande Ronde basalts following pre-flow topography. Calculations of flow thickness show that the Priest Rapids Member is at least 217 feet at Moscow City well #8, measurably thicker than the normal average range of 160 to 200 feet for this flow. A pre-Wanapum stream channel might explain the 159 feet and 91 feet of vertical relief calculated from the bottom of the Priest Rapids flow at Moscow City #8 to the flow base at University of Idaho well #3 and well 39/5 6dca1 (Harden, R.E.) respectively.

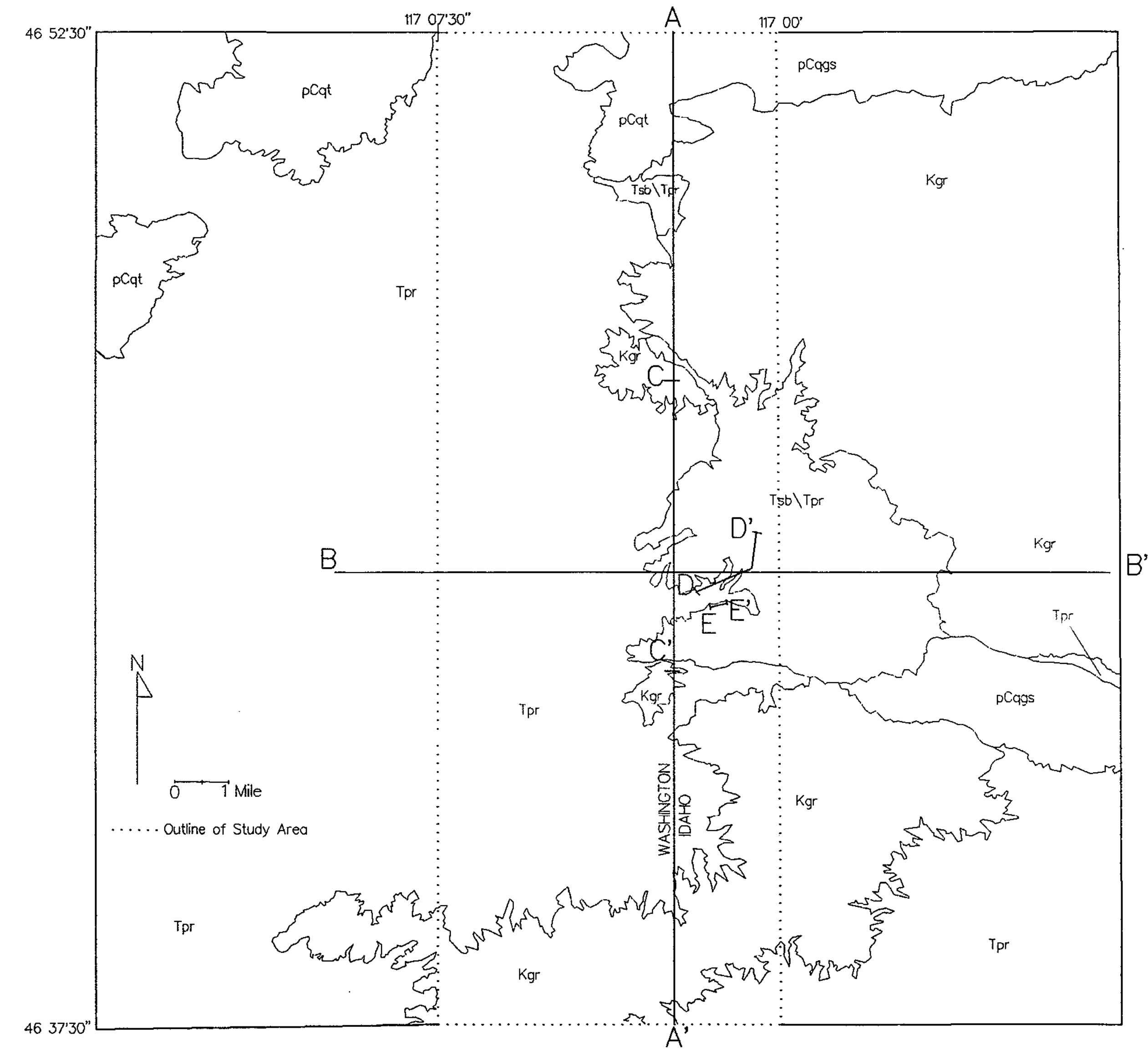


Figure 10. Cross-section lines through the Moscow-Pullman basin. Lines A-A' and B-B' presented in Plate 3. C-C' cross-section line presented in Figure 11. Line D-D' is presented in Figure 12. Line E-E' is presented in Figure 19.

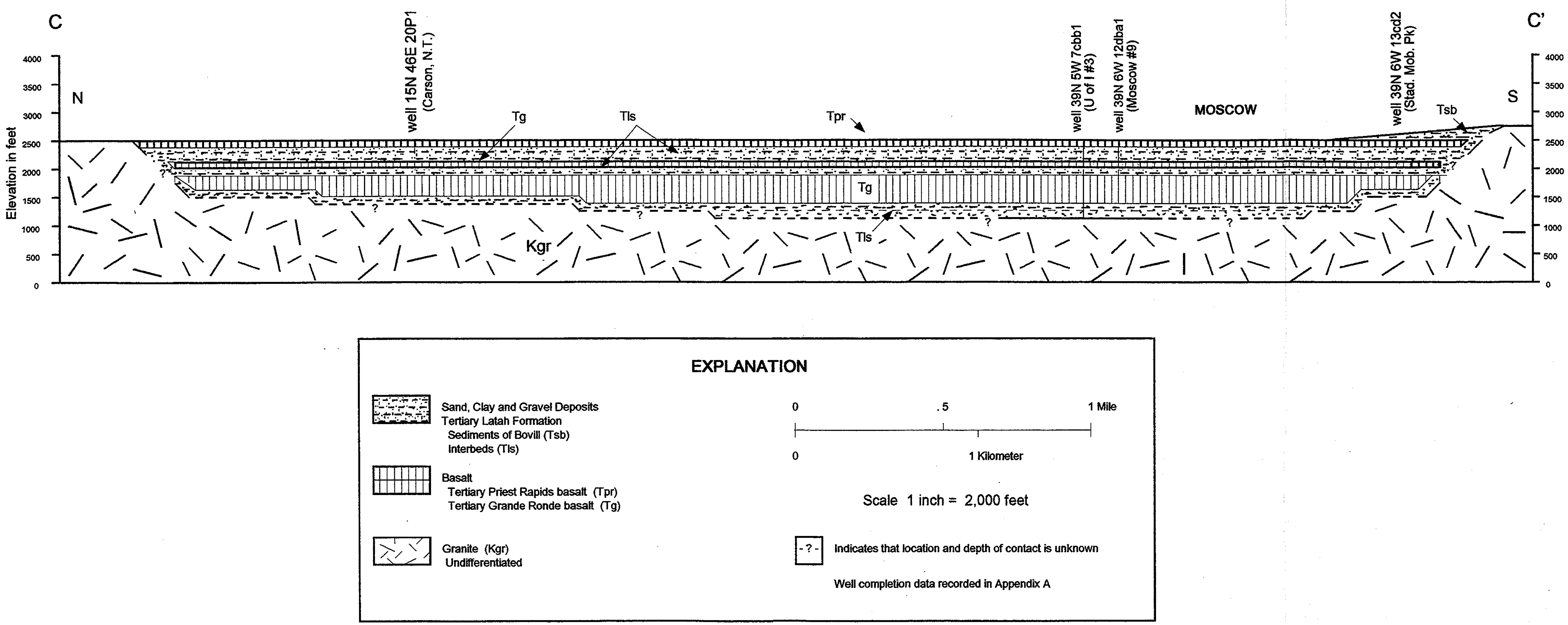


Figure 11. North-south geologic cross-section through the line C-C' as depicted on Figure 10.

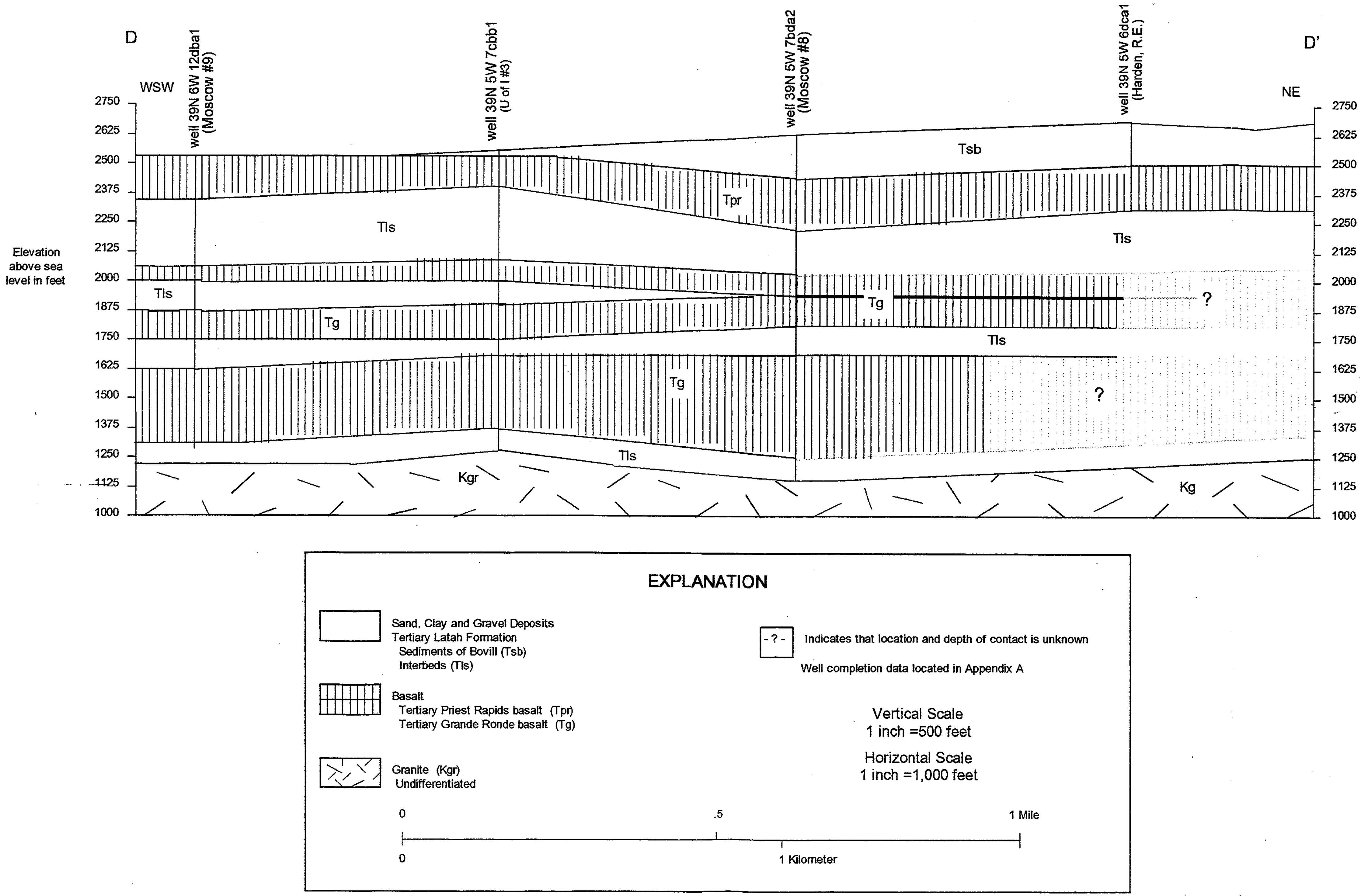


Figure 12. Southwest-northeast geologic cross-section through the line D-D' as depicted on Figure 10, showing dip of basalts beneath Moscow City well #8 (39N 5W 7bda2).

Calculations for the Grande Ronde basalt indicate that the depression continues into the lower flows with a gradient of 1.3 degrees from University of Idaho #3, northeast to Moscow City #8 (Fig. 12). The thickness of the Grande Ronde at University of Idaho #3 is approximately 700 feet and approximately 780 feet at Moscow City #8.

Two possible reasons for the difference in thicknesses for each formation are: 1) as the basalt flows advanced successively into the basin, they encountered paleo-stream channels that were continually recurring in the vicinity of the Moscow City wells; or 2) that localized faulting occurred in the basalt beneath Moscow City wells #7 and #8. Both alternatives may play an influential role on how shallow ground water moves through this region of the basin.

<u>Saddle Mountains Formation - Weissenfels Ridge Member</u>

Weissenfels Ridge Member (Twr) consists of isolated outcrops of a single unit, classified as the basalt of Lewiston Orchards, in the Moscow-Pullman area. The basalt of Lewiston Orchards is medium to coarse-grained, with microphenocrysts of plagioclase and olivine in an intergranular matrix with minor glass (Camp, 1976, Hooper and others, 1985). Saddle Mountains flows erupted between 6.0 and 14.5 million years ago (Ma) (Swanson and others, 1979a; Tolan and others, 1989), and are considered to be intravalley flows.

Outcrops of the basalt of Lewiston Orchards, to the north of Moscow on the Viola quadrangle were noted by Hooper and Webster in (1982) (Fig. 8, Plate 2). The basalt of Lewiston Orchards in Moscow was noted in the foundation of the McClure Building on the University of Idaho campus where 15 feet of basalt overlies clay, silt and sand with organic debris. Chemical analysis verifies that this flow belongs to the basalt of Lewiston Orchards (McClure Building, Table 1). In the Moscow-Pullman area these flows are interpreted to occupy shallow channels in the Priest Rapids Member of the Wanapum Formation.

Latah Formation

Latah Formation sediments in the Moscow area are defined as marginal-type deposits by Bond (1963). He characterizes marginal deposits as being situated near the basalt-basement contact and the result of deposition due to ponding caused by advancing basalt flows into Miocene streams and rivers. The marginal deposits occur as overlying and interbedded sediments upon or within the basalt flows. They are composed primarily of clay and detrital grains, ranging from sand to fine gravel, derived from surrounding basement rocks. Minor amounts of organic matter and basalt fragments may also be present. Sedimentary structures representing both fluvial and lacustrine deposition may be present. Areas of greater accumulation are often situated near ample supply sources. Large deposits around solitary steptoes are uncommon, since they often lack larger stream systems.

The term Latah Formation is used for all the sediments that are associated with the Columbia River Basalt Group. Those that do not occur between basalt flows or are not overlain by basalt flows are informally referred to as the sediments of Bovill. The sediments between basalt flows generally have not been named in the eastern part of the plateau and are loosely referred to as Latah interbeds. A few workers have referred to the sediments between the lower-most Priest Rapids and upper-most Grande Ronde as the "Vantage Horizon" or "Vantage Member" (Siems and others, 1974, Kopp, 1994).

Latah Interbeds

The Miocene Latah Formation interbeds (Tls) consist of sand, silt and clay deposits that separate the various Columbia River basalt flows (Figs. 9 and 11, Plate 3). Each interbed represents deposition which occurred as successive basalt flows flooded the basin.

According to Cavin (1964) and Lin (1967), there are three major interbasalt sedimentary layers in the Moscow-Pullman basin. These sedimentary layers are designated from base upward, one through three. Layer three, the uppermost deposit, separates the basalts of the Wanapum Formation from those of the Grande Ronde Formation, and may be considered the equivalent of the Vantage Member of the Ellensburg Formation in central Washington. Layer two separates individual flows of the Grand Ronde Formation, while layer one separates the basalts from crystalline basement rock.

The deposits thin to less than twenty feet in areas near Pullman or are missing altogether in the western portion of the basin. Beneath Moscow these units are interbedded and overlie Grande Ronde flows. The Vantage-equivalent unit immediately underlying the Priest Rapids flow ranges to over three hundred feet thick in some areas.

It is believed that when the basalt flows advanced into the basin, they did not fully contact the basement complex. The area between the basalt flows and crystalline basement rocks was filled by deposition of the Latah sediments. In addition, the surface of the crystalline rocks was highly weathered in most places. The weathered zones and the Latah sediments are probably connected from the surface to the lowest depths of the basin. These sediments are possible conduits for ground water flow.

Sediments of Bovill

Clay, silt sand and gravel deposits make up the sediments of the Miocene Latah Formation (Tsb). In places near the edge of the basin, these sediments overlie basalts (Fig. 9 and 11, Plates 1, 2 and 3). The sediments that overlie the basalts have been informally labeled as sediments of Bovill, since they are similar to sequences near Bovill, Idaho, where they are better exposed. In Moscow, the unit was referred to as the Canfield-Rogers clay deposit by Scheid and Hosterman (1951), Hubbard (1956), and Hosterman and others (1960). They are considered equivalent to the First Latah Horizon of Lin (1967). Lin (1967) arbitrarily chose yellow, brown and red colored clays on drillers' logs, to separate the Palouse Formation from the sediments of Bovill. For this study, when color differentiation was not available, the division was selected where the drillers encountered thick clay or sand deposits beneath the loess, but above the Wanapum Formation.

Excavated areas in the Moscow East quadrangle (Pierce, unpub., 1995) show upward fining sequences (2 ft to 5 ft) of poorly sorted, subrounded quartz gravels or coarse sand grading upward into fine sand overlain by a generally kaolinite-rich clay. Cross-bedding occurs in two of the east Moscow exposures. Drill cores from similar deposits in the Deary area east of Moscow contain upward fining cycles of poorly sorted micaceous sand to laminated, massive and bioturbated clays (Bush and others, unpub. map, 1995).

Outcrops in this study area occur at 1\4 NE, S. 31, R. 5 W., T. 40 N., 1\4 SE, S. 8, R. 46 E., T. 15 N and 1\4 SE, S.18, R. 46 E., T. 16 N. in the Viola quadrangle (Fig. 8, Plate 2). The unit thickens toward the crystalline highs to the north, east and south. An isopach map (Fig. 13) shows the thicknesses of these sediments in the study area. The lateral extent of the deposit is unknown, but "granitic sand and

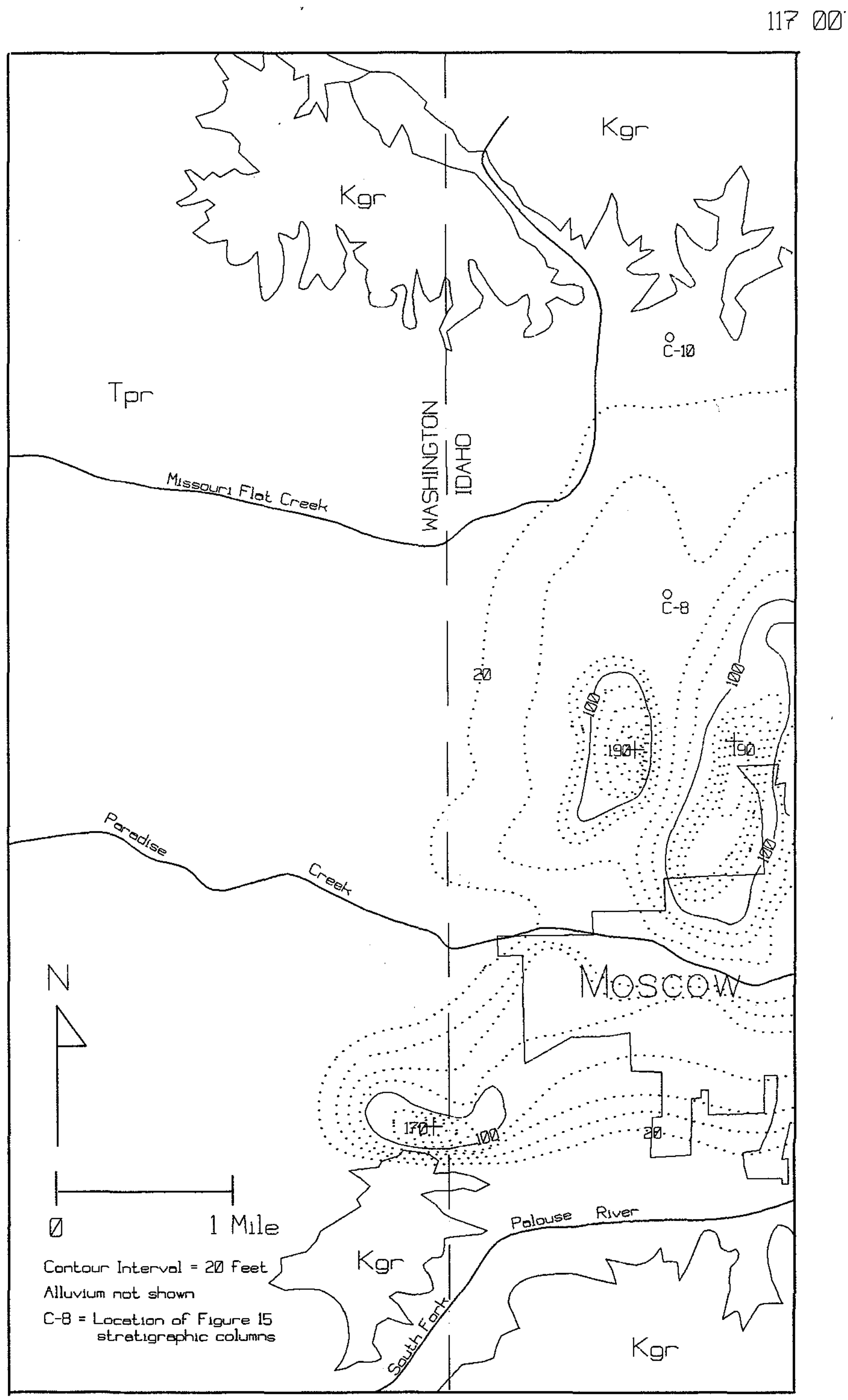


Figure 13. Isopach map showing aerial thickness of the sediments of Bovill near the city of Moscow.

clay" was reported by landowners and well logs in the Sunshine Creek area of Washington, noticeably west of known deposits (Plate 1). These sediments were believed to have been deposited when a local stream base was raised by Priest Rapids basalt, forcing overladen streams to deposit kaolinite clay, quartz sand and minor gravel eroded from the nearby weathered crystalline highs. Drilling logs from Hosterman and others (1960)(Fig. 14), show most water-bearing layers within these sediments as lenses composed of sand or gravel. It has been suggested by Bush (personal commun., 1995) that leaching from the iron-rich units in the sediments of Bovill may be the cause for the iron-rich nature of the Wanapum aquifer system.

Surficial Deposits

Palouse Loess

The Quaternary Palouse Formation consists of paleosols integrated with eolian volcanic, glacio-fluvial and glacio-lacustrine sediments ranging in thickness from one foot to more than 150 feet (Lin, 1967; Baker and others, 1991). Considered Pleistocene in age, Fryxell and Cook (1965) divide the loess into four stratigraphic units, ranging from the Pleistocene to recent. General features of the paleosols and loess include either massive or blocky structure, multiple layers and faunal burrowing. Exposures near the town of Washtucna, Washington include twelve zones of carbonate-silica cementing interlayered among twenty-one separate paleosols (Baker and others, 1991). The eastern Palouse however, lacks biogenic soil structures, but does retain pale, bleached zones above paleosol argillic horizons. These zones may indicate "intense chemical weathering and leaching" (Baker and others, 1991). Grain size analysis of the deposit was conducted by Lotspeich and Smith (1953). The Palouse loess is considered a silt-clay loam, with

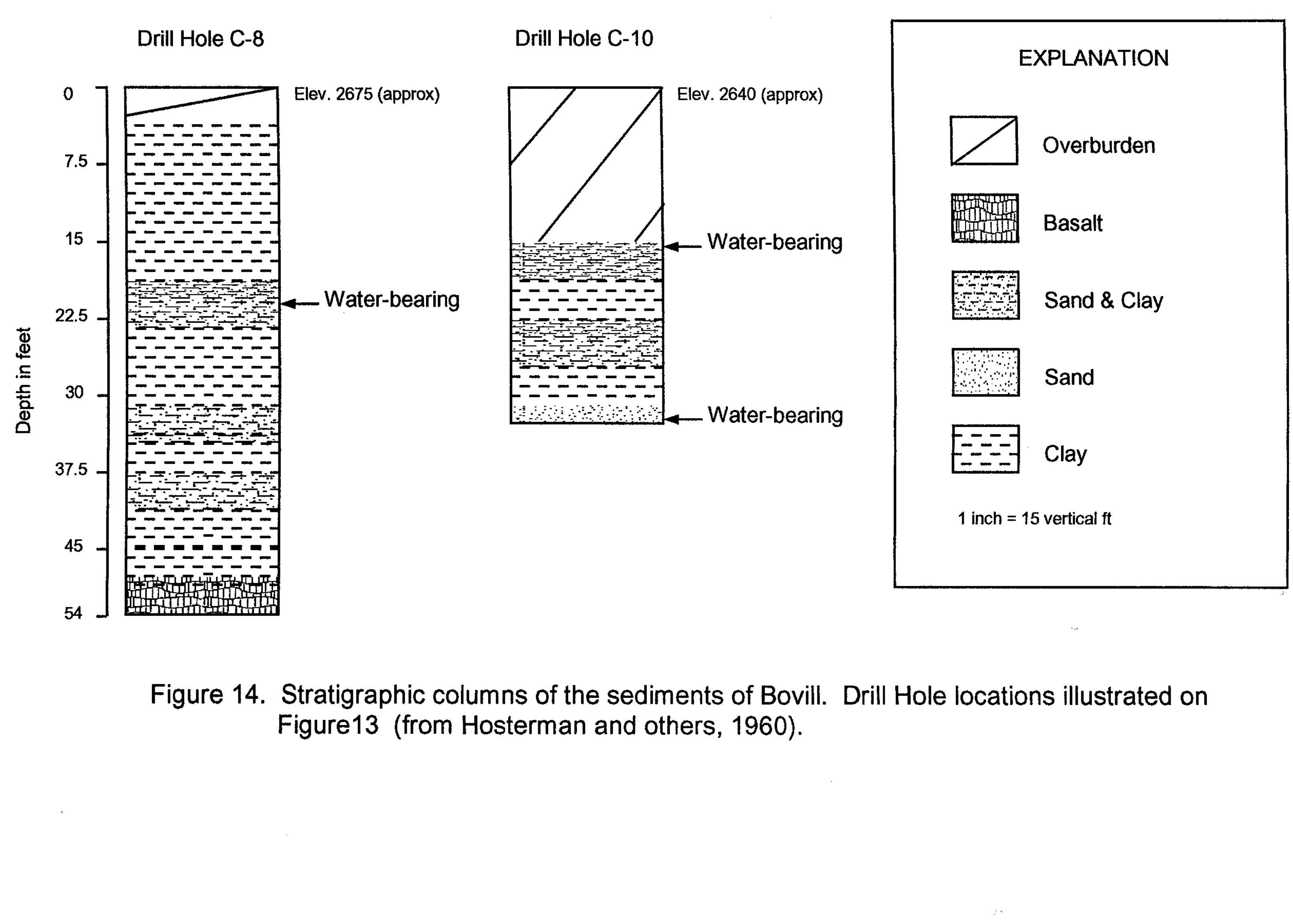


Figure 14. Stratigraphic columns of the sediments of Bovill. Drill Hole locations illustrated on Figure13 (from Hosterman and others, 1960).

very low sand percentages (Lin, 1967). Changes in nomenclature, stratigraphy, composition and physical properties continue to define these soils (Baker and others, 1991). This formation was not mapped on the 1:24,000 interpretive geologic maps included with this report.

Alluvium

The Quaternary alluvial deposits (Qal) are primarily stream and slope-wash deposits. Composition is variable with reworked loess or mixtures of loess, basalt and minor granitoid fragments being the most common. Most areas are stream deposits that grade laterally into loess of the Palouse Formation and in places contain slope wash deposits derived from the loess hills (Plates 1 and 2).

HYDROGEOLOGIC MODEL FOR THE SHALLOW AQUIFERS

The hydrogeologic model for the Moscow area of the Moscow-Pullman basin contains all the lithologies mentioned in the geologic model: Grande Ronde basalt, Latah Formation interbeds, Wanapum basalt, sediments of Bovill and the Palouse Formation. The proposed model shows how the shallow stratigraphic units are physically and hydraulically connected, thus aiding the understanding of how ground water flows into and through the hydrostratigraphic units in the Moscow portion of the basin.

In general, ground water in the basin flows from the east to the west and northwest (Bauer and others, 1985; Whiteman, 1986, Kopp, 1994). A downward gradient is also present, moving ground water from the upper aquifer toward the lower aquifer (Lum and others, 1990, Kopp, 1994). Flow within the aquifers is aided by vertical jointing in basalt flows, permeability of interbed sediments and upper and lower flow contacts. As basalt flows thicken to the west, such pathways decrease, while dense flow interiors become more restrictive to vertical flow. Sedimentary surficial deposits and interbeds constitute almost 60 percent of water-bearing stratigraphy (Lin, 1967; Jones and Ross, 1972), in the eastern portion of the basin. Movement of water through these deposits is dependent upon the hydraulic conductivity of the material. Low hydraulic conductivity clays retard water infiltration while higher hydraulic conductivity sands and gravels provide easier passage. Impact of the surface sediments and interbeds on water movement also depends upon aerial extent, thickness, and homogeneity of the deposits (Lum and others,1990).

Hydrogeologic setting

Ground water within the basin comes from three hydrostratigraphic units identified by Kopp (1994) as: 1) the loess and shallow alluvial sediments; 2) the basalt and associated Latah interbeds; and 3) the crystalline basement rocks (Fig. 15). This study is concerned only with the potential for recharge and ground water movement in the shallow sediments and Wanapum basalt; therefore the Grande Ronde basalt and crystalline basement rock aquifers are not discussed.

Hydrostratigraphic Units

Shallow Sedimentary Aquifer

The combined thickness of the Palouse Loess, sediments of Bovill and flow top of the Priest Rapids basalt form the shallow sedimentary aquifer. Ground water movement within the shallow sedimentary aquifer is controlled by the silty-clay of the Palouse Formation Loess, the sand and gravel lenses occurring within the sediments of Bovill and nature of the flow top.

Lum and others (1990) chose to ignore the horizontal and vertical conductivities of the sediments of Bovill, instead combining them with the Palouse Formation loess when producing their numerical ground water model. Observations of these two sedimentary units indicate that they differ hydrogeologically with regard to the control of ground water flow.

The Palouse Formation is considered a silt-clay loam with very low sand percentages (Lin, 1967). The high clay content for the loess controls the permeability; ground water movement must be aided by structural features such as plant roots and animal burrows (Baker and others, 1991). The horizontal hydraulic conductivity of the Palouse Formation was estimated by Lum and others (1990) at five feet

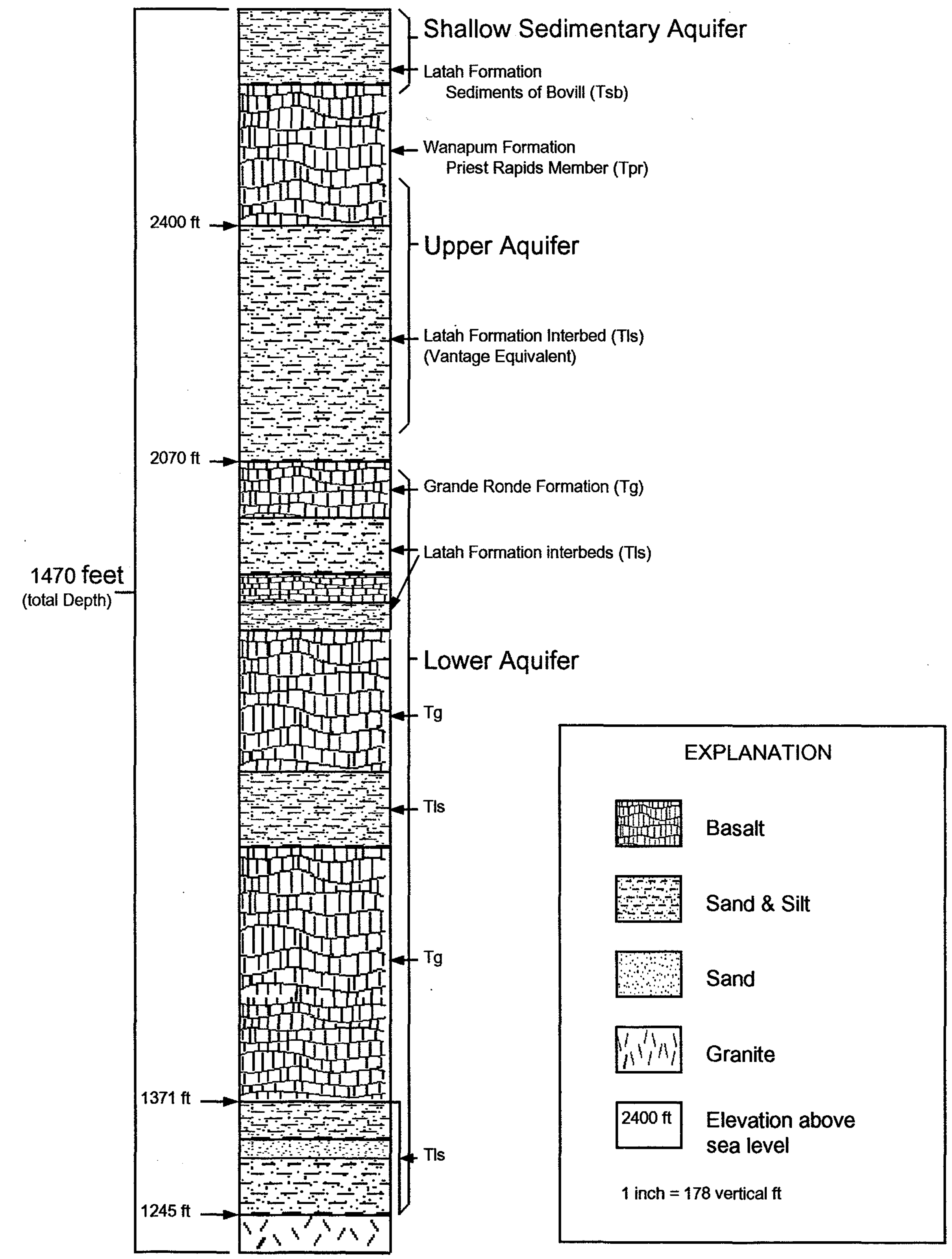


Figure 15. General locations of upper and lower aquifers at U of I well #3 (39N 5W 7cbb1) in the stratigraphic sequence of the Moscow-Pullman basin.

per day, based on long-term infiltration rates calculated by Williams and Allman (1969), and the hydraulic conductivity values of loess as described by Freeze and Cherry (1979). Horizontal flow within the unit, primarily through locally thin layers of sandy silt and supported by a local flow system, may account for the numerous springs and seeps in the Moscow area (Fig. 16). Vertical hydraulic conductivity was estimated by Lum and others (1990), at 0.05 ft/d, assuming an anisotropy value of 0.01.

Horizontal and vertical hydraulic conductivity values for the sediments of Bovill are unknown, but can be estimated. Detailed logs from holes drilled as part of Hosterman and others' (1960) study on the Canfield-Rodgers (sediments of Bovill) clay deposits provide thickness and grain-size distribution data for sand and gravel lenses within the clay deposits. Evaluation of ten drilled holes show sandy-silt, coarse-grained sand, coarse-grained sand mixed with pebble-sized gravel and pebble-sized gravel lenses within the dominant finer clay and silt deposits of the sediments of Bovill. Ranges for the hydraulic conductivity of individual sediment layers are located in table 2.

Table 2. Horizontal Hydraulic Conductivity (K) Values for Sediment of Bovill Coarse-Grained Lenses.

Sediment	Low K (ft/s) (Freeze and Cherry, 1979)	High K (ft/s) (Freeze and Cherry, 1979)	Low K (ft/s) (Domenico and Schwartz, 1990)	High K (ft/s) (Domenico and Schwartz, 1990)
Sandy-Silt	6.56E-06	6.56E-05	6.56E-06	6.56E-05
Coarse-Grained Sand	3.28E-04	3.28E-03	2.95E-06	1.96E-02
CG Sand & Pebble-sized Gravel	3.28E-03	3.28E-02	2.29E-05	1.96E-02
Pebble-sized Gravel	3.28E-02	3.28E-01	9.84E-04	9.84E-02

Grain-size distribution throughout the sediments of Bovill, as indicated by the

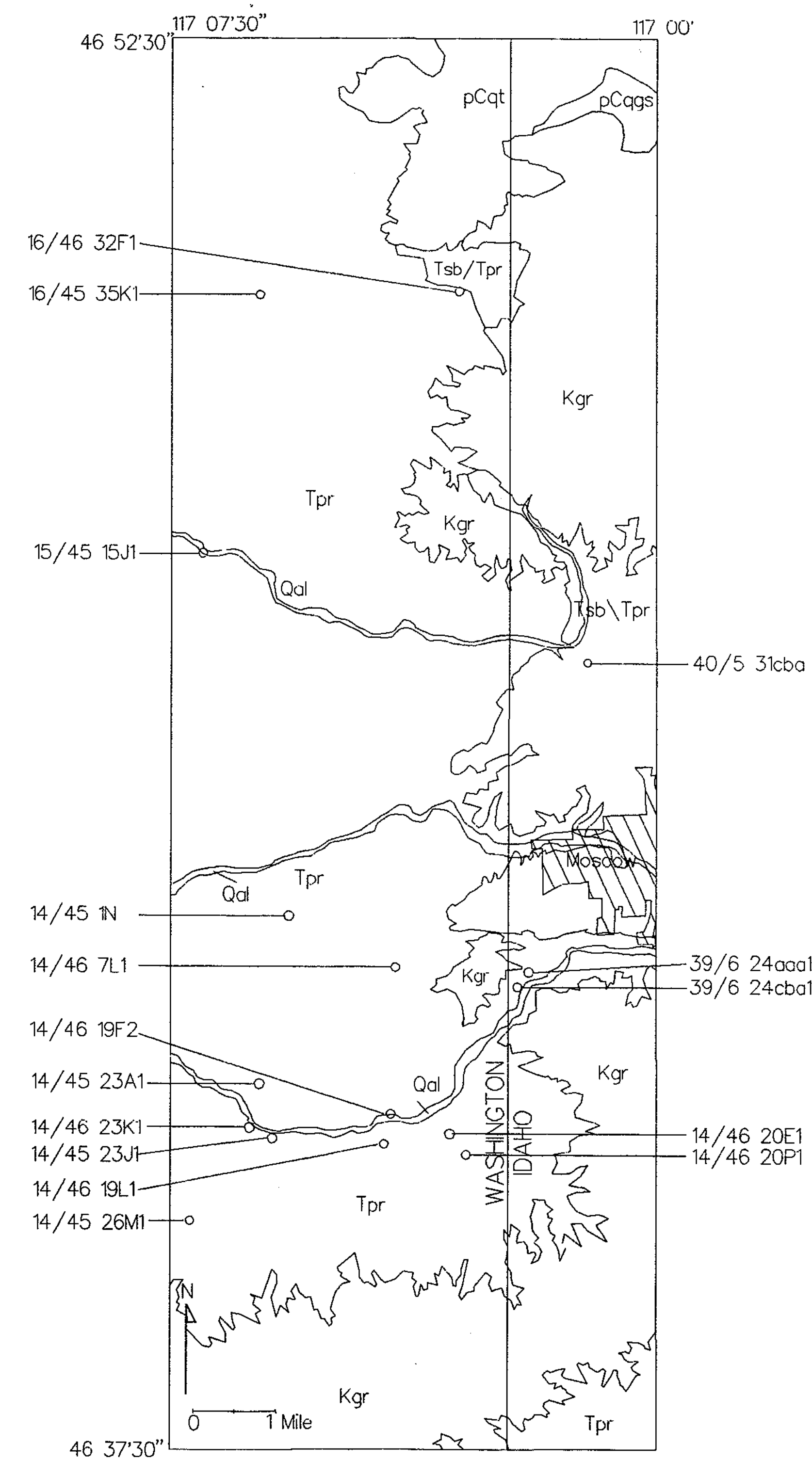


Figure 16. Locations of springs and seeps in the Viola and Moscow West quadrangles.

drilling logs, shows a fining upward sequence. Also according to the drilling logs, forty-five percent of the holes drilled for Hosterman and others (1960) have coarse-grained sand and pebble-sized gravel in the bottom ten feet of the hole. Coarse-grained sand and sandy-silt are the dominant size percentages in lenses toward the top of the hole. Ratios showing the percentage of fine-grained to coarse-grained material for individual drill holes distributed throughout the Moscow area are presented in figure 17.

According to the drilling logs, many of the coarser-grained lenses contained water. Observations made in the field by construction crews and private citizens indicate that in areas where the coarse-grained lenses within the sediments of Bovill are exposed or excavated, water can be seen discharging at variable rates, depending on the time of year (Bush, personal commun., 1995).

Recharge to the loess and sediments of Bovill is primarily from precipitation infiltration, with the highest rates occurring in the eastern portion of the basin (Kopp, 1994). According to Lum and others (1990), pre-development recharge conditions in the Moscow area were given a value of 4.5 in/yr, while a range of 1.5 to 4.5 in/yr was applied to developed and farmed areas of their models uppermost layer. Any reduction in the estimated recharge was attributed to municipal pumping (the greatest use of ground water in the basin) and the practice of growing crops on a yearly basis (Bauer and Vaccaro, 1989; Lum and others, 1990). Estimates of recharge into the sediments of Bovill, when considered a distinct stratigraphic unit, are unknown.

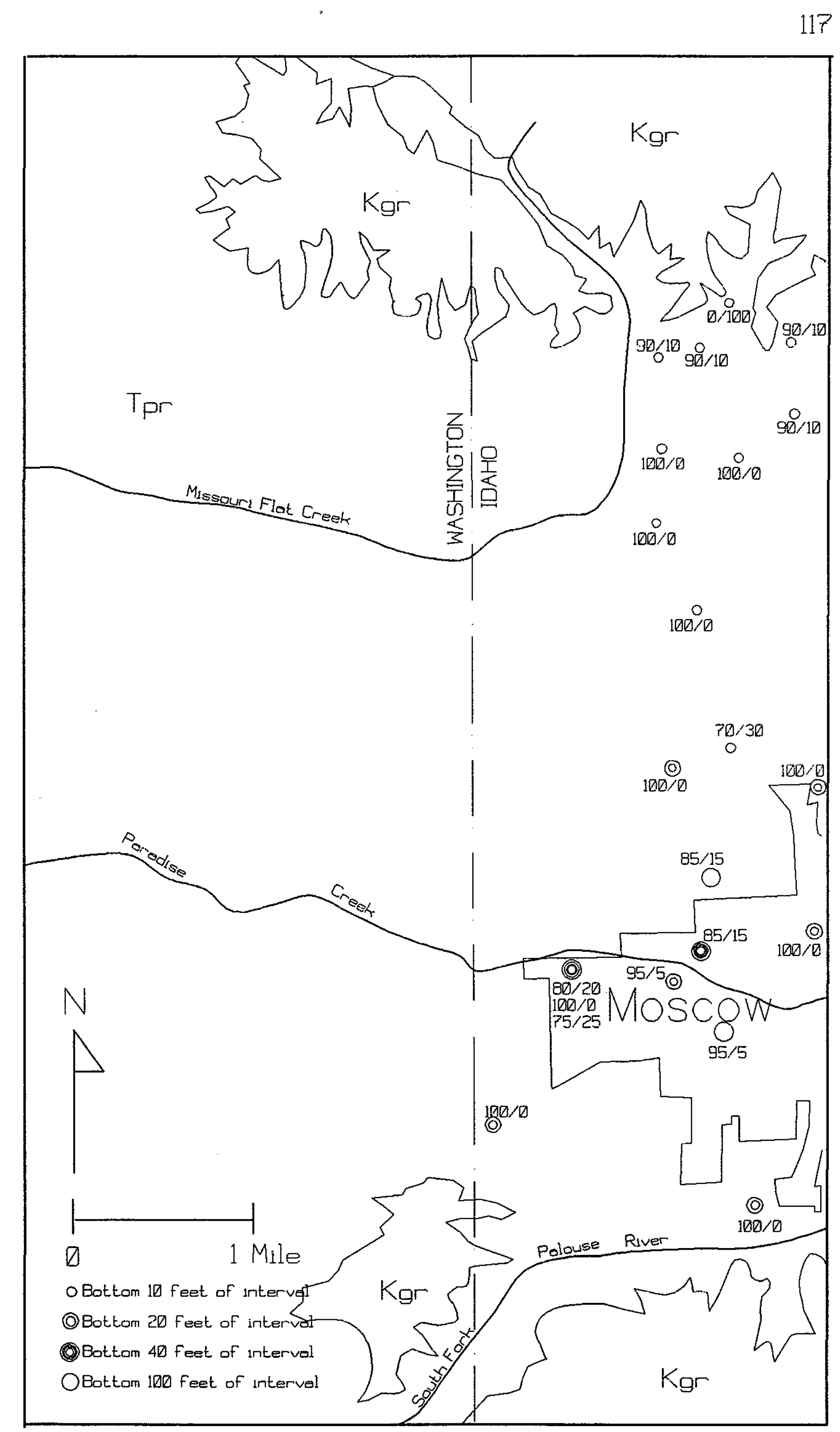


Figure 17. Map showing estimated percentage of fine-grained (top #) to coarse-grained (bottom #) material in individual wells. Percentage calculated from bottom of sediment of Bovill interval.

Wanapum Aquifer

In general, the top of individual basalt flows are composed of zones of weathered material caused by erosion, and possibly vesicular flow tops formed by gas and vapor escaping as the flow cooled (Fig. 18). Basalt flow interiors tend to be more dense, with two types of jointing: an entablature portion which contains closely spaced, irregular joints; and the lower colonnade made up of widely-spaced columnar joints, often perpendicular to the cooling surface. Pillow structures may be common where the flow entered water. Specifically, movement of ground water in basalt involves permeable flow-interbed contacts and cooling-fracture zones found at the top and base of basalt flows serving as potential sources for ground water storage and flow.

Values for horizontal and vertical hydraulic conductivity, as well as storativity in the Wanapum and Grande Ronde Formations in the western portion of the Columbia Plateau, have been estimated by Tanaka and others (1974), Luzier and Skrivan (1973), MacNish and Barker (1976), Barker (1979) and Strait and Spane (1982a and b). Horizontal hydraulic conductivities for these formations range from 0.4-12.0 ft per day and vertical hydraulic conductivities range from 0.0001-0.0025 ft per day. The ranges appear to represent variations in fractures and permeable zones within the individual basalt flows. A storativity of 0.001 was calculated for both formations.

The University of Idaho Groundwater Research Site (UIGRS) has provided much information regarding the hydrogeologic characteristics of the Priest Rapids Member and Vantage-equivalent interbed within the Moscow-Pullman basin. Testing of two fracture systems within the Lolo flow of the Priest Rapids basalt yielded transmissivity (T) and storativity (S) values ranging between 14 and 580

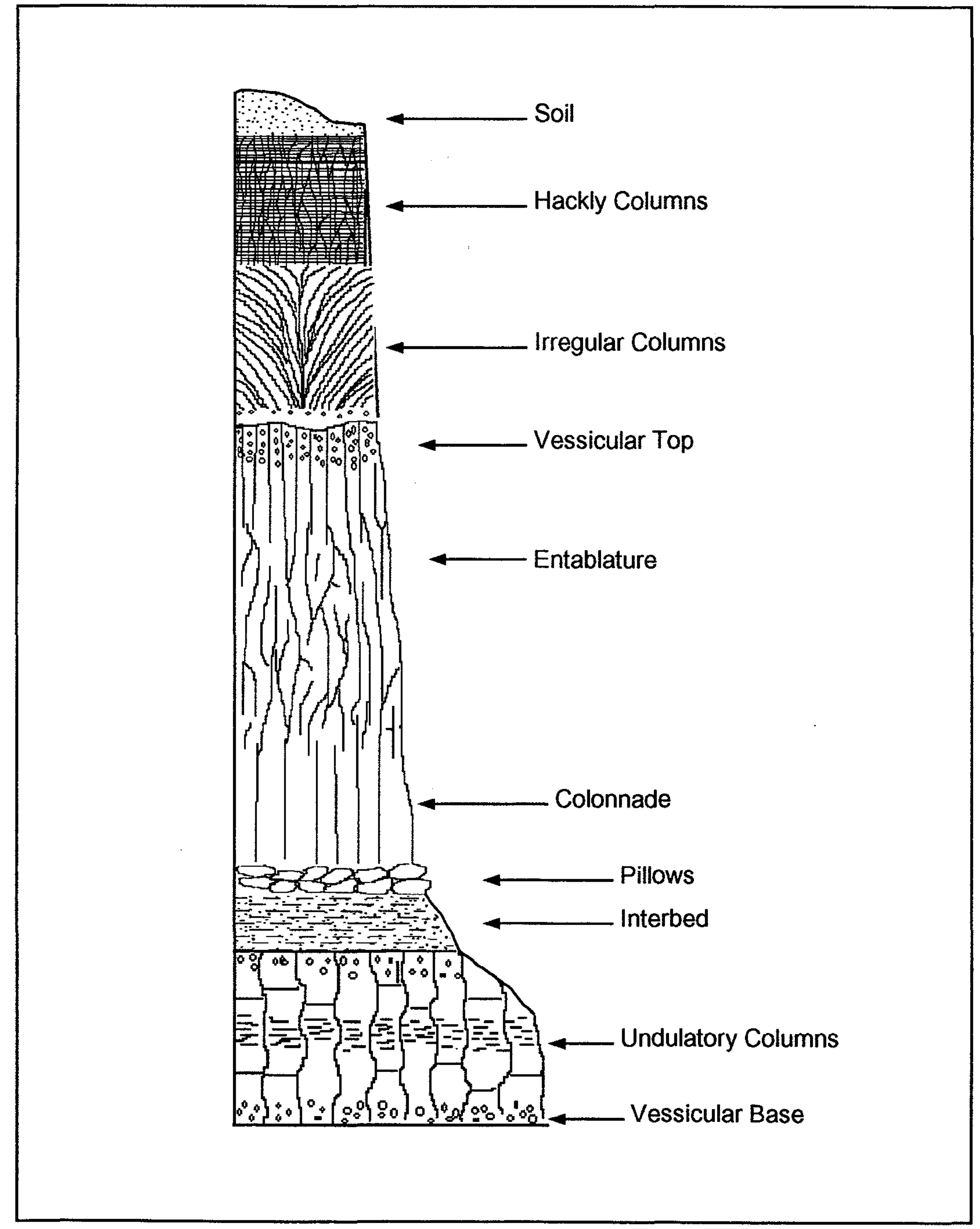


Figure 18. Physical characteristics of Columbia River basalt flows (Bush and Seward, 1992)

ft^2/day and $2x10^{-5}$ to $5x10^{-4}$, respectively, for the E-fracture set. Values for the W-fracture set range from 0.4 to 3 ft^2/day and $5x10^{-7}$ and $5x10^{-5}$ respectively (Li, 1990). A basalt aquitard consisting of a basalt section with poorly connected minor horizontal and vertical jointing separates the two fracture systems (Li, 1991). The aquifers are confined above and below by similar basalt aquitards. Lumped parameter estimates for vertical hydraulic conductivity (K') multiplied by specific storage (Ss') for the aquitards yielded values of $2x10^{-7}$ to $8x10^{-5}$ 1/day for the middle and upper aquitards and $2x10^{-10}$ to $2x10^{-7}$ 1/day for the middle and lower aquitards (Li, 1991).

Previous research has demonstrated that the W and E-fracture systems of Li (1991) are poorly connected (Fig. 19), but does show a hydraulic connection between the E-fracture system and the shallow alluvial aquifer present in the Palouse loess. In addition, even though the lower aquitard separates the W-fracture system from the Vantage-equivalent (layer 3) Latah sediments (Kopp, 1994), it has been demonstrated that the W-fracture system and Vantage-equivalent Latah sediments under the flow are poorly to moderately connected through vertical fractures and columnar joints (Kopp, 1994). This W-fracture-Vantage-equivalent system constitutes the upper portion of the Wanapum aquifer (Fig. 15).

Kopp (1994) depicts the upper 113 feet of the Vantage-equivalent Latah sediment under the Priest Rapids flow as very heterogeneous and anisotropic. He describes layers of sandstone-siltstone underlain by fine-to-medium grained unconsolidated sand which grade into siltstones and sandstones. Aquifers within this sediment interbed are composed of unconsolidated sands and silts. Sieve analysis of the Vantage-equivalent Latah Formation interbed, conducted from well cuttings by Cavin (1964), shows grain-size distributions varying between 0.58 Φ and

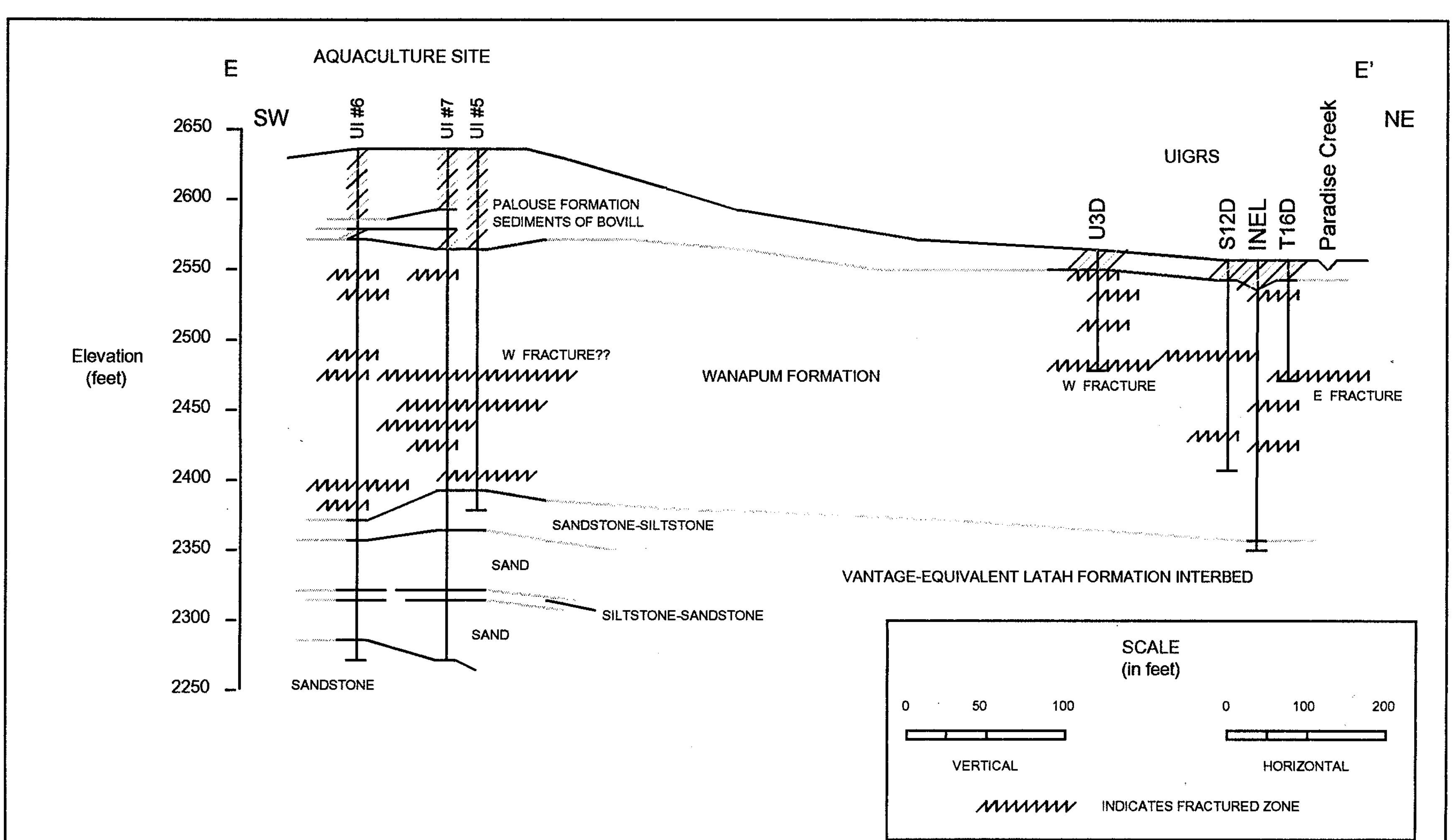


Figure 19. North-South cross-section through Aquaculture site and UIGRS area showing W and E-fracture zones (modified from Kopp, 1994).

0.85 Φ, (coarse grained), at Moscow City Well #7 (39\5 7bad1). Samples from Moscow City Well #6 ranged from 2.22 Φ, (fine sand), to -0.02 Φ, (very coarse sand). Clay and silt fractions were not analyzed, but estimated to be as high as 70 percent of the entire layer (Cavin, 1964). Two distinct aquifers within the upper portion of the Vantage-equivalent interbed were labeled by Kopp (1994) as the upper and lower sand aquifers. The combined transmissivity at University of Idaho well #7 (39/6 12dcd3) for these two aquifers was estimated at 1930 to 2780 ft^2/day. Storativity for the two sand aquifers was calculated as $4x10^{-4}$ (Kopp, 1994). However, different static water levels in University of Idaho wells #6 and #7 (39/5 12dcd2 and 3), indicate that these sand aquifers are not a hydraulically single unit (Kopp, 1994).

Direct extrapolation of the UIGRS data throughout the basin is not justified. However, several drillers' logs mention crevasses and cavities which can be interpreted as fracture zones. These fracture zones, in addition to the sand and clay layers beneath the Priest Rapids Member which correlate stratigraphically with the Vantage-equivalent interbed, create conditions similar to those found at the UIGRS. Thus, the conditions represented at UIGRS appear to exist throughout the basin.

EVALUATION OF RECHARGE POTENTIAL

Analysis of Well Development

Most private wells in the eastern portion of the basin are completed in the shallow sedimentary aquifer or upper aquifer located in the Latah Formation and Priest Rapids Member (Fig. 20). Private wells near Pullman are completed either within the Priest Rapids Member or within the upper Grande Ronde Formation. All municipal wells are completed in the Grande Ronde aquifer, except for Moscow City Wells #2 and #3 (39/5 7dad2&3, Fig. 21), which draw water from the upper aquifer. The University of Idaho, City of Moscow, Washington State University and City of Pullman, by far the largest users of ground-water in the basin, all maintain separate wells and pumping rate schedules.

Water level and pumpage rate data for 18 municipal wells was collected for the thirteen year period, 1980-1993, (Appendix C). Water level measurements were taken from 56 private wells located throughout the study area (Fig. 21), over a two-week period in August of 1994. Follow-up measurements of 20 wells were conducted over two days in January 1995, after increased precipitation the previous November and December. Data from these measurements, as well as measurements from previous studies, are listed in Appendix B.

Comparison of long term water-level change between the August 1994 measurements and those from 1955, 1964, 1972 and 1975, reveals varying water-level trends. Measured private wells in the Wanapum aquifer show long term water-level declines of 0.11 to 16.18 feet, however long-term increases ranging from 4.03 to 58.8 feet were also recorded. These measured wells are distributed throughout the basin (Fig. 22).

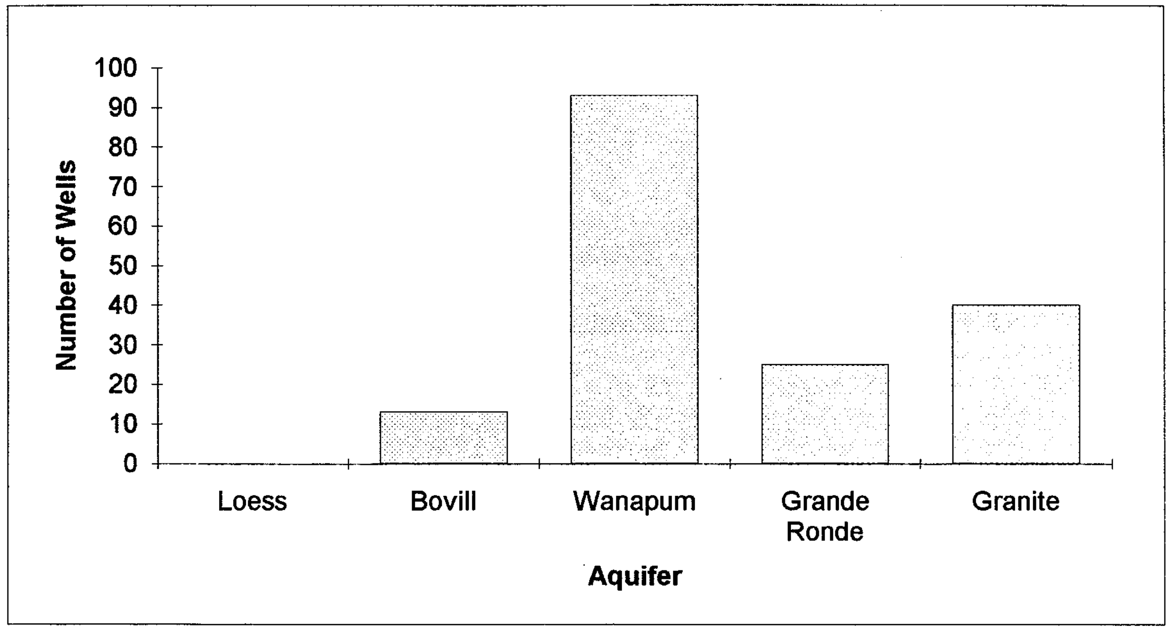


Figure 20-a. Viola and Moscow West quadrangles. 170 out of 500+ wells inventoried.

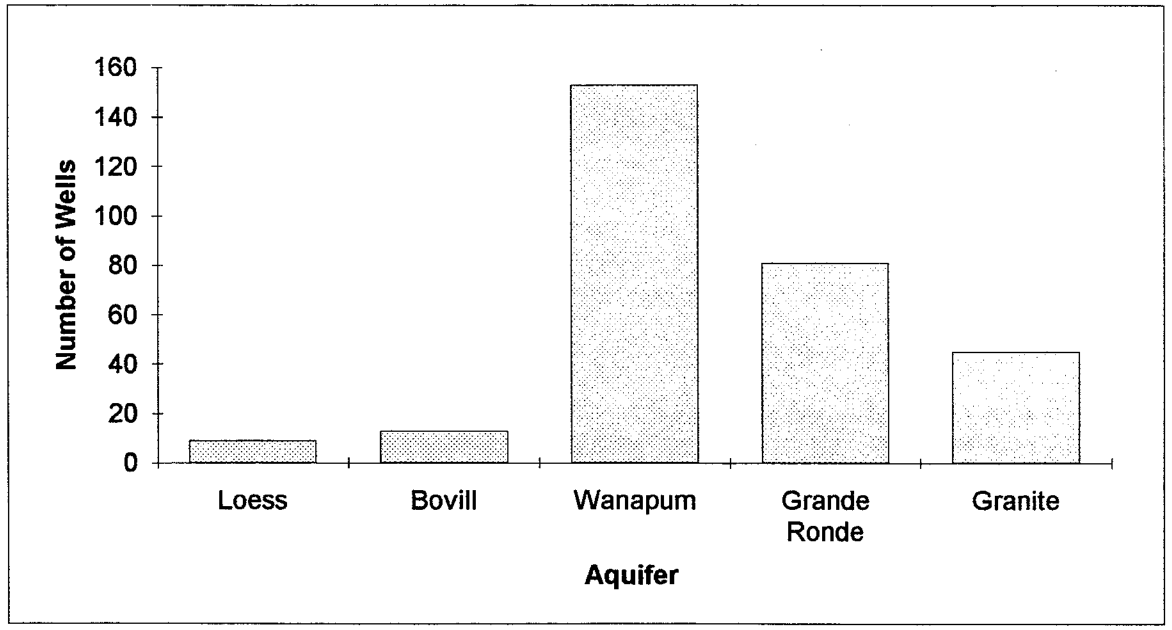


Figure 20-b. Viola, Moscow West and Pullman quadrangles. 301out of 500+ wells inventoried.

Figure 20. Graphs showing number of wells developed within each aquifer for: a) two quadrangle study area and b) three-quadrangle east-central basin.

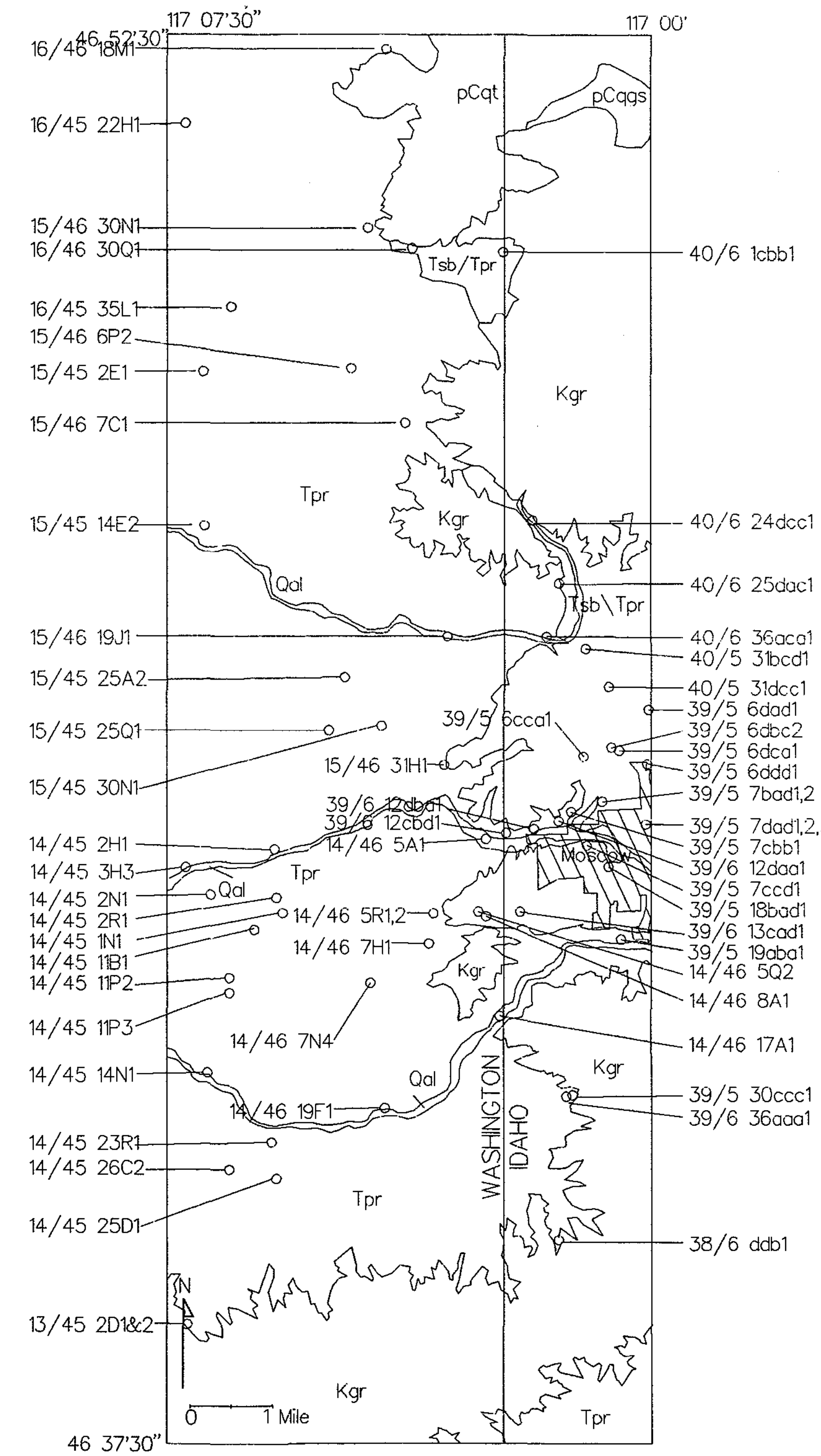


Figure 21. Locations for measured municipal and private wells in the Viola and Moscow West quadrangles.

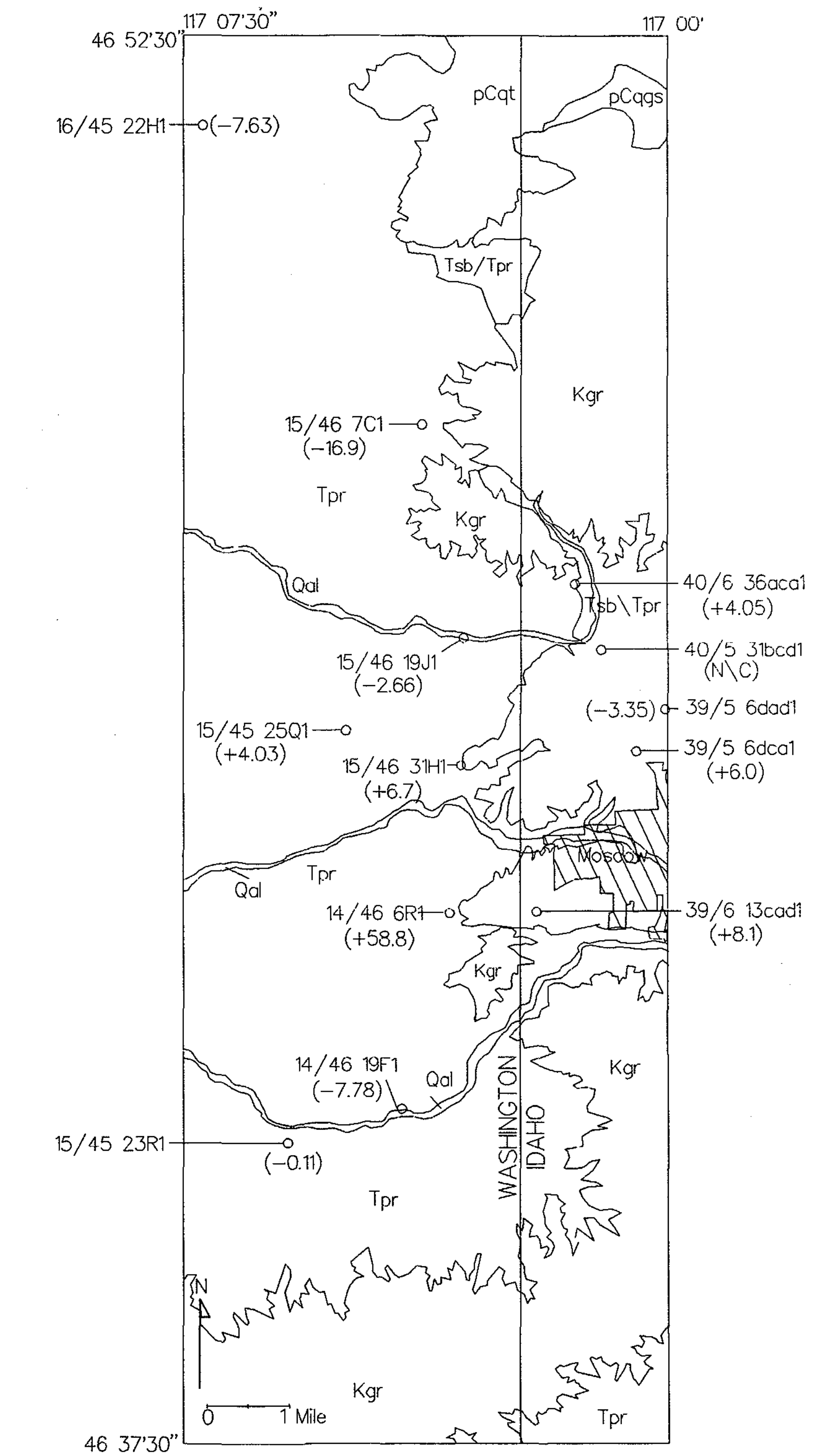


Figure 22. Long-term change in water-level between August 1994 and measurements conducted in 1955, 1964, 1972 and 1975.

Data from the follow-up measurements conducted on private wells in January 1995, show short term increases in water levels from less than one foot to 18 feet in localized areas (Fig. 23, Appendix B). Observations of collected water-level measurements noted that response of the upper aquifer to increased precipitation was fairly rapid in the eastern portion of the basin, while wells located near Pullman showed little change. Wells which showed increases are generally located near basalt-crystalline contacts, within existing stream drainages or in areas of outcropping basalt.

Reasons for the rise in water level may be: 1) water use from private wells decreased from June, July and August levels, allowing the aquifer to recover; 2) the upper aquifer is sensitive to seasonal fluctuations recharged through basalt exposures, stream loss or along paleostream-channel pathways; 3) recharge is being conducted through coarse-grained lenses within the sediments of Bovill to localized basins or permeable zones in the Priest Rapids basalt, where it can then infiltrate or 4) a combination of all three.

The lack of water-level rises in the wells closer to Pullman might indicate that the deeper regional flow system is insensitive to seasonal fluctuations due to the longer pathway water must take to reach the Grande Ronde (Lum and others, 1990).

Methods of Recharge

Recharge to the shallow and Wanapum aquifers occurs either: 1) vertically and horizontally through the overlying Palouse loess, 2) vertically and horizontally through the overlying Palouse loess and sediments of Bovill, 3) from stream loss in reaches where the stream is incised into basalt or shallow sediments, 4) through

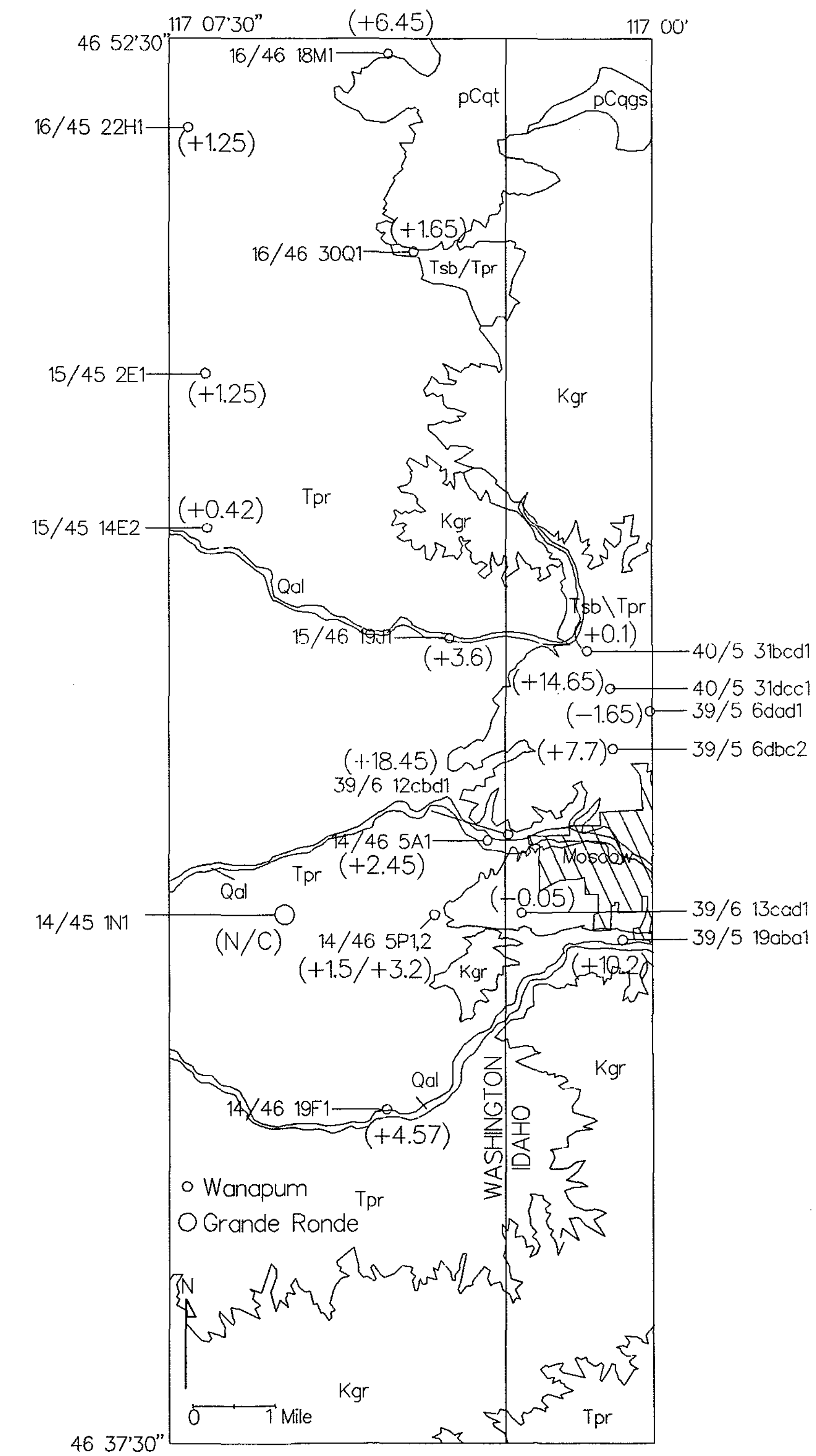


Figure 23. Change in water-level between August 1994 and January 1995 for wells completed in the Wanapum aquifer.

coarse-grained sediment lenses along the crystalline margin of the basin, or 5) from infiltration from localized fracture systems within the crystalline basement rock (Fig. 24).

Deposits of Palouse loess underlain by the sediments of Bovill cover the majority of the eastern basin around Moscow (Fig. 3, Plates 1 and 2). Infiltration of ground water through these clay-rich layers is the primary mechanism for recharge envisioned by Lum and others (1990). Lin (1967) argues however, that ground water may follow preferential pathways provided by pre-Wanapum stream channels formed along the basalt-crystalline rock contact, now filled with coarse-grained Latah sediments and capped by Priest Rapids flows. Kopp (1994), also believes that the bulk of recharge to the aquifers occurs along the basin margins. Analysis of the water-level data tend to show that all of the mechanisms are important to recharge to the basin.

Current data and observations, in addition to examination of well logs which show greater percentages of higher hydraulic conductivity sediments (coarse-grained materials) along the basin margins (Fig. 17), indicate portions of the sediments of Bovill and coarser sandy-silt layers within the Palouse Formation control lateral ground water movement (Fig. 25). These local flow systems discharge at area seeps and springs, but may also direct water into the shallow sedimentary aquifer. Coarser sediments also exist along previous and existing stream channels. The amount of recharge conducted into the aquifers via these zones is unknown. However, previous studies have shown that some recharge to the shallow and Wanapum aquifers occurs at points of incision by surficial streams and rivers eroded into the basalt and sediments (Heinemann, 1995).

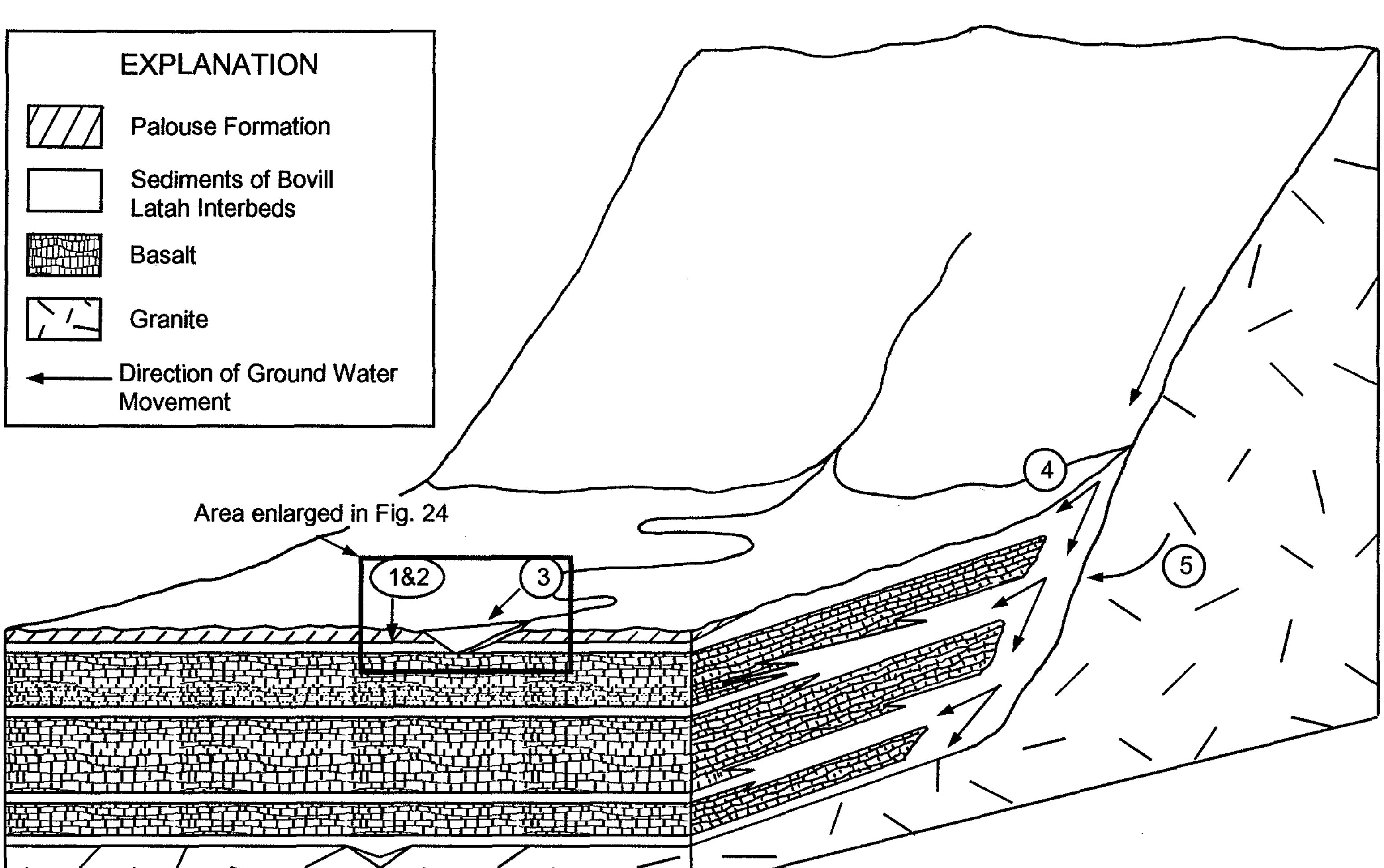


Figure 24. Diagram showing the four hypothetical mechanisms for recharge: 1&2) infiltration of ground water through the Palouse Formation and sediments of Bovill (when present), 3) infiltration from stream loss, 4) infiltration of Latah sediments along the basin margin and 5) infiltration from basement rocks (modified from Lin, 1967).

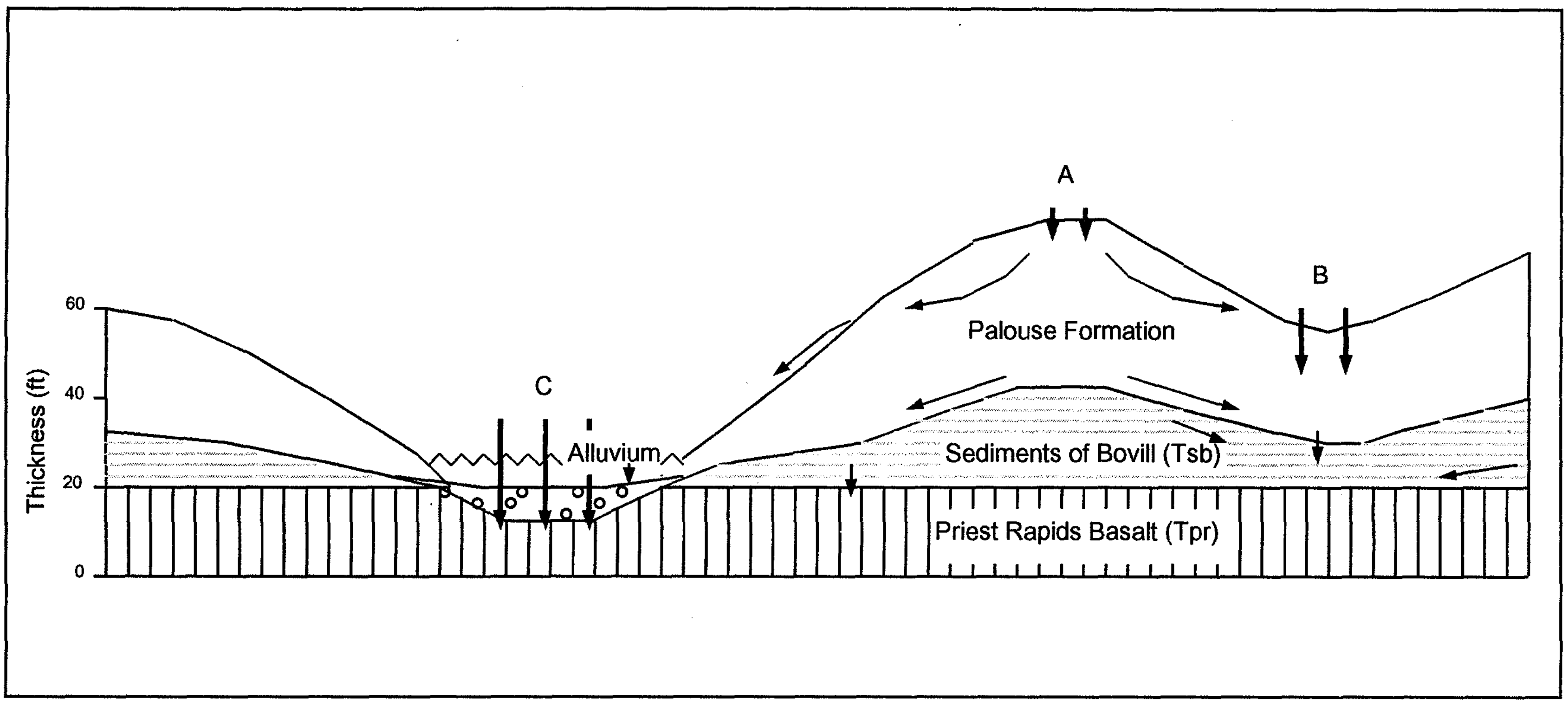


Figure 25. Diagram showing amount of recharge at A) top of Palouse Formation hill, B) local basin within the Palouse Formation and C) stream channel incision into Priest Rapids basalt. Length of arrows indicates relative amount of recharge occuring at each location. Other arrows indicate direction of ground water flow.

Evidence for infiltration via the basin-margin sediments and paleo-stream-channel pathway method includes increased water levels in wells near the basalt-crystalline contacts, as well as within local stream drainages, following a potential recharge event (Fig. 23). Recharge by Paradise Creek to the shallow alluvial aquifer has been documented at the UIGRS by Pardo (1993) and assessed for the other perennial rivers and streams in the basin by Heinemann (1995).

The potential for recharge from precipitation into the shallow sedimentary aquifer and Wanapum aquifer by way of the Palouse loess and sediments of Bovill is high; there is more surface area available for water movement than either of the other recharge methods (Fig. 26). However, the potential is reduced because the Palouse Formation and sediments of Bovill deposits are dominantly fine-grained in the Moscow area. Valleys within the loess are areas where potential recharge could be greatly increased because: 1) the loess is less thick and 2) more water is available for recharge. In addition, deposition of coarse-grained material along valley floors and within the finer-grained sediments controls potential recharge. Thus, areas to which potential recharge might be directed include: depressions where the finer-grained Palouse loess and sediments of Bovill either thin, are not present or contain higher hydraulic conductivity (coarse-grained) material.

Recharge via the basin margin is limited to those sites where: 1) course-grained material is present and 2) significant direct precipitation and run-on water is available for recharge. These criteria eliminate much of the valley margin area. The stream-loss areas are similarily limited. In this case the criteria are: 1) areas where the streams are underlain by permeable sediments and 2) areas where ground water levels are below stream elevation.

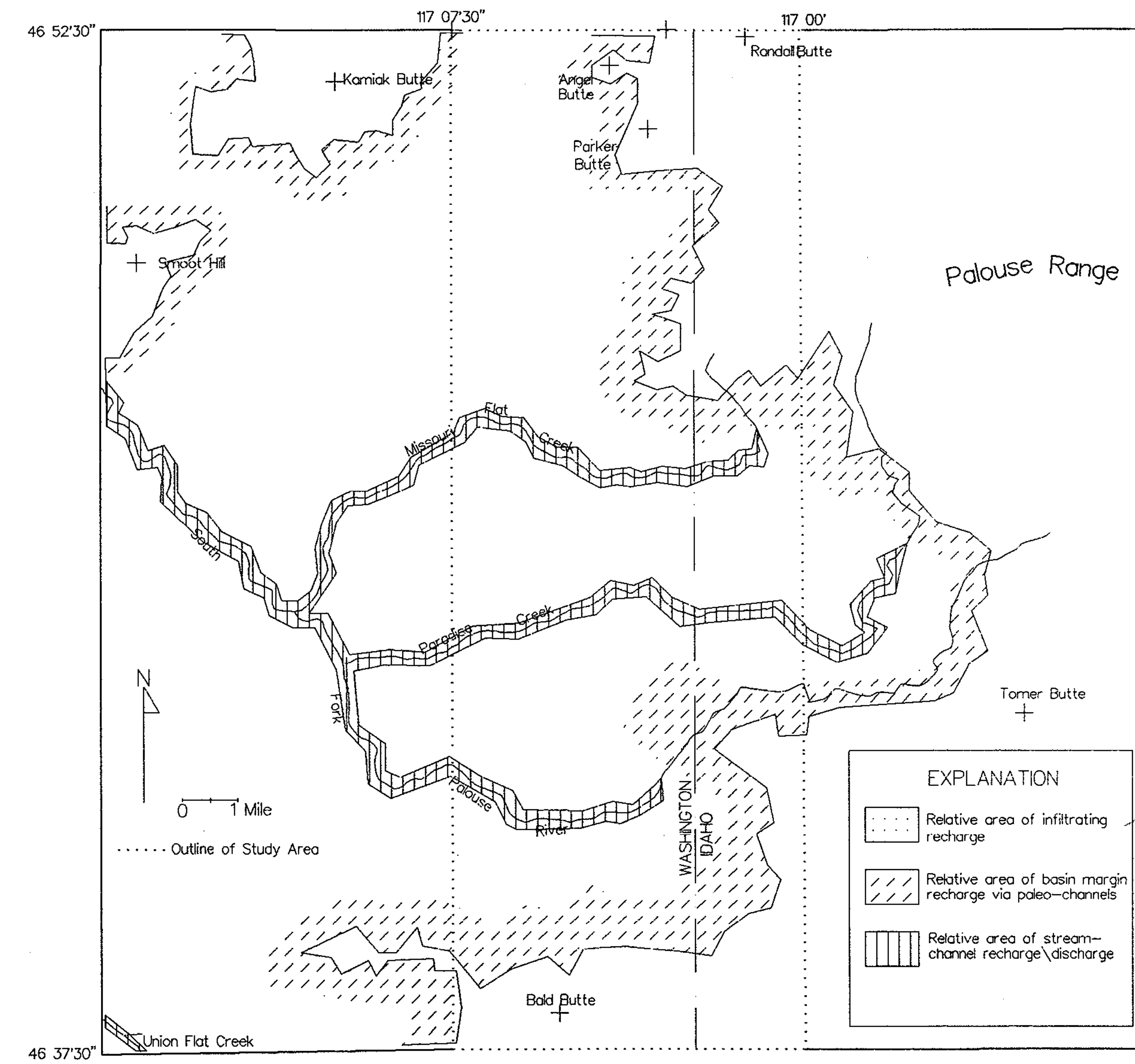


Figure 26. Map showing relative area available for infiltration, surface stream, and basin margin recharge.

Despite this uncertainty about which mechanism contributes the greatest amount of recharge to the aquifers, zones where recharge may be occurring can be identified. These zones where large water-level rises were recorded between August 1994 and January 1995, in addition to areas where coarse-grained sediments are present are likely recharge areas.

Recharge to the Wanapum aquifer is dependent upon the location within the basin. Throughout the eastern basin it is available to recharge along the basin margins and infiltration in areas of thin Palouse Formation and sediments of Bovill deposition, in addition to recharge from stream loss. In the western basin, which lacks both crystalline basement highs and the sediments of Bovill, the Wanapum relies on infiltration through the Palouse loess, and stream loss via the sediments or directly into the basalt.

CONCLUSIONS AND RECOMMENDATIONS

The sediments of Bovill are important in influencing the quantity and locations of ground water recharge in the Eastern portion of the Moscow-Pullman basin. A greater understanding of these deposits has been achieved via the creation of new bedrock geologic maps and an inventory of wells.

Following are specific conclusions resulting from analysis of the collected information and field work:

1) The sediments of Bovill, which have generally not been incorporated into previous studies of the basin, should be considered a distinct unit, separate from the Palouse Formation with which it is often included. These sediments are deposited between the loess and basalt throughout much of the study area.
2) Cross-sections through University of Idaho #3 and Moscow City #8 indicate a paleo-stream channel or faulted section of basalt which could influence ground water movement in the east-central basin. Basalt gradients show less than 0.1 degree of slope between Moscow and Pullman.
3) Fifty-one percent of the wells within the Viola, Moscow West and Pullman quadrangles are completed in the Wanapum aquifer. The remaining wells are completed: 27% in Grande Ronde, 7% in sediments and 15% in granitic basement rocks.
4) Water levels in the eastern portion of the basin show a significant water-level

change from August to January, while little change occurs toward the west.

5) Four methods of recharge were identified: infiltration through Palouse loess, infiltration through Palouse loess and sediments of Bovill, infiltration through coarse-grained sediments along the basin margins, aquifer gain from stream loss and infiltration from the crystalline basement rocks. The first two of these mechanisms probably dominate.

6) Recharge probably is greatest in valleys where the Palouse loess is thin and the sediments of Bovill are coarse-grained. Coarse-grained lenses within the clay-rich deposit provide conduits for ground water flow.

7) Recharge along the basin margin is controlled by the availability of water and by the presence of coarse-grained lenses. About 3% of the valley margin is believed to have both of these conditions and allow surface recharge.

Recommended future work includes water-level data collection, geologic mapping and identification of areas and mechanisms of ground water recharge.

1) A network of about twenty selected private wells should be measured routinely (quarterly) to build a database for future research.
2) Additional 1:24,000 geologic maps should be prepared by integrating new well log data.
3) A program should be designed and implimented focusing on investigating the hydrogeologic characteristics of the sediments of Bovill, specifically the horizontal and vertical hydraulic conductivities.

REFERENCES

Anderson, M.A., 1991, The geology and structural analysis of the Tomer Butte, Middle Potlatch Creek and Little Potlatch Creek Area, Latah County, Idaho, University of Idaho, M.S. thesis, 69 p.

Agee, J.H., Graves, G.W., Mickelwaite, C.B., 1917, Soil survey of Latah County, Idaho: U.S. Dept. of Agriculture, Bureau of Soils, Advance Sheets-Field Operations, 1915, 24 p.

Baines, C.A., 1992, Determination of sustained yield for the shallow basalt aquifer in the Moscow area, Idaho, University of Idaho, M.S. thesis, 60 p.

Baker, V.R., Bjornstad, B.N., Busacca, A.J., Fecht, K.R., Kiver, E.P., Moody, U.L., Rigby, J.G., Stradling, D.F., Tallman, A.M., 1991, The Geology of North America: The Geological Society of America, Quaternary Nonglacial Geology: Conterminous U.S., Vol. K-2, pp. 215-228.

Barker, R.A., 1979, computer simulation and geohydrology of a basalt aquifer system in the Pullman-Moscow Basin, Washington and Idaho: Washington Department of Ecology Water-Supply Bulletin 48, 119 p.

Bauer, H.H., Vaccaro, J.J., 1989, Estimates of ground-water recharge to the Columbia Plateau regional aquifer system, Washington, Oregon, and Idaho, for predevelopment and current land-use conditions: U.S. Geological Survey Water-Resources Investigation Report 88-4108, p.

Bauer, H.H., Vaccaro, J.J., Lane, R.C., 1985, Maps showing ground-water levels in the Columbia River Basalt and overlying materials, spring 1983, southeastern Washington: U.S. Geological Survey Water-Resources Investigations Report 84-4360, scale 1:500,000.

Bingham, J.W.; Grolier, M.J., 1966, The Yakima basalt and Ellensburg Formation of southcentral Washington: U.S. Geological Survey Bulletin 1224-G, 15 p.

Bockius, S.H., 1985, Geophysical mapping of the extent of basaltic rocks in the Moscow groundwater basin: University of Idaho, M.S. thesis, 83 p.

Bond, J.G., 1978, Geologic map of Idaho, 1:500,000: Idaho Department of Lands, Bureau of Mines and Geology.

Bond, J.G., 1963, Geology of the Clearwater Embayment: Idaho Bureau of Mines and Geology, Pamphlet 128, Moscow, Idaho, 82 p.

Brown, W.G., 1991, Sensitivity analysis of a numerical model of ground water flow in the Pullman-Moscow area, Washington and Idaho, University of Idaho, M.S. thesis, 93 p.

Brown, J.C., 1976, Well construction and stratigraphic information: Pullman test and observation well, Pullman, Washington: College of Engineering Research Report 76/15-6, Washington state University, 35 p.

Bush, J.H., 1995, Personal communication, Department of Geology and Geological Engineering, University of Idaho, Moscow, Idaho.

Bush, J.H., Seward, W.P., 1992, Geologic Field Guide to the Columbia River Basalt, Northern Idaho and Southeastern Washington: Idaho Geological Survey Information Circular 49, 35 p.

Bush, J.H., Provant, A.P., Gill, S., 1995, unpub. map

Camp, V.E., 1976, Petrochemical stratigraphy and structure of the Columbia River basalt Lewiston Basin area, Idaho-Washington: Washington State University, Ph.D. thesis, 201 p.

______, 1981, Upper Miocene basalt distribution reflecting source location, tectonism, and drainage history in the Clearwater embayment, Idaho: Geological Society of America Bulletin, Part I, v. 92.

Carmichael, V.M., 1956, The relationship of the soils of the Palouse to the Columbia River Basalt: University of Idaho, M.S. thesis, 65 p.

Cavin, R.E., 1964, Significance of the interbasalt sediments in the Moscow Basin, Idaho: Washington State University, M.S. thesis, 97 p.

Cotton, W.R., Jr., 1982, Hydrochemistry of ground water near Pullman, Washington: M.S. thesis, Washington State University, 89 p.

Crosby, J.W., III, Cavin, R.E., 1960, Geological investigations of the Moscow ground-water basin, employing geophysical studies: Washington State University, Institute of Technology, Bulletin 250, 23 p.

Crosthwaite, E.G., 1975, Basic ground-water data for the Moscow Basin, Idaho: U.S. Geological Survey Open-File Report, Boise, Idaho, 96 p.

DeMotte, H., Miles, W.F., 1933, A study of the Pullman artesian basin: Washington State University, Undergradurate Honors Thesis, 35 p.

Domenico, P.A., Schwartz, F.W., 1990, Physical and Chemical Hydrogeology: John Wiley and Sons, Inc., New York, 824 p.

Drost, B.W., Whiteman, K.J., 1986, Surficial geology, structure and thickness of selected geohydrologic units in the Columbia Plateau, Washington: U.S. Geological Survey Water-Resources Investigations Report 84-4326, scale 1:500,000, 11 sheets.

Eyck, G.T., Warnick, C., 1984, Catalog of water reports pertinent to the municipal water supply of Pullman, Washington and Moscow, Idaho- a summary: Idaho Water and Energy Resources Research Institute, University of Idaho, 56 p.

Foxworthy, B.L., Washburn, R.L., 1963, Ground water in the Pullman area, Whitman County, Washington: U.S. Geological Survey Water-Supply Paper 1655, 71 p.

Freeze, R.A., Cherry, J.A., 1979, Groundwater: Englewood Cliffs, New Jersey, Prentice-Hall, Inc., 604 p.

Fryxell, R., Cook, E.F., 1965, A field guede to the loess deposits and channeled scablands of the Palouse area, eastern Washington: Washington State University, Laboratory of Anthropology, Report of Investigations, no. 27, 32 p.

Heinemann, R.W., 1995, The relation between streams and ground water flow systems within Pullman-Moscow area of Washington and Idaho: University of Idaho, M.S. thesis,

Hoffman, M.G., 1932, The geology of the Bald Butte Ridge, Washington: Journal of Geology, v. 40, p. 634-650.

Hooper, P.R., Rosenberg, P.E., 1970, The petrology of Granite Point, south-eastern Washington: Northwest Science, v.44, no. 2, p. 131-142.

Hooper, P.R., and Webster, G.D., 1982, Geology of the Pullman, Moscow West, Colton and Uniontown 71/2 Minute quadrangles. Washington and Idaho: Geologic Map GM-26, Washington Division of Geology and Earth Resources., scale 1:62,500.

Hooper, P.R., Webster, G.D., and Camp, V.E., 1985, Geologic map of the Clarkston 15 minute quadrangle, Washington and Idaho: Washington Division of Geology and Earth Resources, Geologic Map GM-31, 11p., scale 1:48,000.

Hosterman, J.W., Scheid, V.E., Allen, V.T., and John, I.G., 1960, Investigations of some clay deposits in Washington and Idaho: U.S. Geological Survey Bulletin 1091, 147 p.

Hubbard, C.R., 1956, Clay deposits of north Idaho: Idaho Bureau of Mines and Geology Pamphlet 109, 36 p.

______, 1957, Mineral resources of Latah County: Idaho Bureau of Mines and Geology, County Report, no. 2, 29 p.

Johnson, M.M., Myrene, C.F., 1929, The geology and mineral resources of Latah County, Idaho, in the vicinity of Moscow, Idaho: University of Idaho, unpublished M.S. thesis, 55 p.

Jones, R.W., and Ross, S.H., 1972, Moscow Basin ground water studies, Idaho Bureau of Mines and Geology, Pamphlet No. 153, 95 p.

Kirkham, V.R., Johnson, M.M., 1929, The Latah formation in Idaho: Journal of Geology, v. 13, p. 206-216.

Klein, D.P., Sneddon, R.A, Smoot, J.L., 1987, A magnetotelluric study of the thickness of volcanic and sedimentary rock in the Pullman-Moscow Basin of eastern Washington: U.S. Geological Survey Open-File Report 87-140, 30 p.

Kopp, W.P., 1994, Hydrogeology of the upper aquifer of the Pullman-Moscow basin at the University of Idaho Aquaculture Site: University of Idaho, M.S. thesis, 192 p.

Laney, F.B., Kirkham, V.R.D., Piper, A.M., 1923, Ground water supply at Moscow, Idaho: Idaho Bureau of Mines and Geology Pamphlet 8, 13 p.

Li, T., 1991, Hydrogeologic characterization of a multiple aquifer fractured basalt system, University of Idaho, Ph.D dissertation, 307 p.

Lin, C., 1967, Factors affecting ground water recharge in the Moscow Basin, Latah County, Idaho: Washington State University, M.S. thesis, 86 p.

Lotspeich, F.B., Smith, H.W., 1953, Soils of the Palouse loess: I. The Palouse Catena: Soil Sciences, v. 76, no. 6, p. 467-480.

Lum II, W.E., Smoot, J.L., Ralston, D.R., 1990, Geohydrology and Numerical Model Analysis of Ground-Water Flow in the Pullman-Moscow Area, Washington and Idaho: U.S. Geological Survey Water-Resources Investigations Report 89-4103, 73 p.

Luzier, J.E., Skrivan, J.A., 1973, Digital simulation and projection of water-level declines in basalt aquifers of the Odessa-Lind area, east-central Washington: U.S. Geological Survey Open-File Report, 56 p.

MacNish, R.D., Barker, R.A., 1976, Digital simulation of a basalt aquifer system, Walla Walla River basin, Washington and Oregon: Washington Department of Ecology Water-Supply Bulletin 44, 51 p.

Najjar, I.M., 1972 Distribution of trace elements in the ground-water of the Moscow-Pullman basin, Idaho and Washington, University of Idaho, M.S. thesis, 189 p.

Pardo, B.G., 1993, Relation between groundwater and surface water at the University of Idaho Groundwater Research Site, University of Idaho, M.S. thesis, 125 p.

Patrick, J.A., 1990, relation between Paradise Creek and groundwater levels at the University of Idaho Groundwater Research Site, University of Idaho, Non-thesis project report, 52 p.

Pierce, J.L., 1995, Personal communication, Department of Geology and Geological Engineering, University of Idaho, Moscow, Idaho.

Pierce, J.L., unpub. 1995, Geology and Hydrology of the Moscow East and Robinson Lake Quadrangles, Latah County, Idaho.

Ralston, D.R., 1972, Guide for the location of water wells in Latah County, Idaho: Idaho Bureau of Mines and Geology information Circular 23, 14 p.

Reidel, S.P., Tolan, T.L., Hooper, P.R., Beeson, M.H., Fecht, K.R., Bentley, R.D., Anderson, J.L., 1989, The Grande Ronde Basalt, Columbia River Basalt Group; Stratigraphic descriptions and correlations in Washington, Oregon, and Idaho. In Reidel, S.P., Hooper, P.R., editors, Volcanism and tectonism in the Columbia River flood-basalt province: Geological Society of America Special Paper 239, p. 21- 54.

Rember, W.C., and Bennett, E.H., 1979, Geologic map of the Pullman quadrangle, Idaho, 1:250,000: Idaho Bureau of Mines and Geology.

Ringe, L.D., 1968, Geomorphology of the Palouse Hills, southeastern Washington: Washington State University, M.S. thesis, 73 p.

Ross, S.H., 1965, Contributions to the geohydrology of Moscow Basin, Latah County Idaho: University of Idaho M.S. thesis, 119 p.

Ross, S.H., Jones, R.W., 1969, Detailed ground water investigation of Moscow Basin, Water Resources Research Institute, University of Idaho, 11 p.

Russell, I.C., 1897, A reconnaissance in southeastern Washington: U.S. Geological Survey Water-Supply Paper 4, 96 p.

Scheid, V.E., and Hosterman, J.W., 1951, Canfield-Rogers high-alumina clay deposits of Latah County, Idaho and adjacent areas: U.S. Geological Survey Open-file report, April.

Siems, B.A., Bush, J.H., Crosby, J.W., III, 1974, TiO_2 and Geophysical logging criteria for Yakima Basalt Correlation, Columbia Plateau: Geological Society of America, v. 85, no. 7, p. 1061-1068.

Sokol, D., 1966, Interpretation of short-term water level fluctuations in the Moscow Basin, Latah County, Idaho: Idaho Bureau of Mines and Geology, Pamphlet 137, 27 p.

Stevens, P.R., 1960, Ground water problems in the vicinity of Moscow, Latah County, Idaho: U.S. Geological Survey Water-supply Paper 1460-H, p. 325-357.

Strait, S.R., Spane, F.A., Jr., 1982a, Preliminary results of hydrologic testing the composite middle Sentinel Bluffs Basalt flow bottom at borehole RRL-2, SD-BWI-TI-095, Rockwell Hanford Operations, Richland, Washington, 36 p.

______, 1982b, Preliminary results of testing the composite Umtanum Basalt flow top at borehole RRL-2, (3,568-3,781 feet), SD-BWI-TI-105, Rockwell Hanford Operations, Richland, Washington, 45 p.

Swanson, D.A., Wright, T.L., Camp, V.E., Gardner, J.N., Helz, R.T., Price, S.A., Ross, M.E., 1977, Reconnaissance geological map of the Columbia river Basalt Group, Pullman and Walla quadrangles, southeast Washington and adjacent Idaho: U.S. Geological Survey Open File Report 77-100, scale 1:125,000.

Swanson, D.A., Wright, T.L., Hooper, P.R., Bentley, R.D., 1979a, Revisions in stratigraphic nomenclature of the Columbia River Basalt Group: U.S. Geological Survey Bulletin 1457-G, 59 p.

Swanson, D.A., Anderson, J.L., Bentley, R.D., Byerly, G.R., Camp, V.E., Gardner, J.N., and Wright, T.L., 1979b, Reconnaissance geologic map of the Columbia River Basalt Group in eastern Washington and northern Idaho: U.S. Geological Survey Open-File Report 79-1363, scale 1:250,000.

Swanson, D.A., Wright, T.L., Camp, V.E., Gardner, J.N., Helz, R.T., Price, S.A., Ross, M.E., 1980, Reconnaissance geologic map of the Columbia River Basalt Group, Pullman and Walla quadrangles, southeast Washington and adjacent Idaho: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-1139, scale 1:250,000.

Tanaka, H.H., Hansen, A.J., Jr., Skrivan, J.A., 1974, Digital-model study of ground-water hydrology, Columbia Basin Irrigation Project area, Washington: Washington Department of Ecology-Supply Bulletin 40, 60 p.

Tolan, T.L., Reidel, S.P., Beeson, M.H., Anderson, J.L., Fecht, K.R., Swanson, D.A., 1989, Revisions to the estimates of the aerial extent and volume of the Columbia River Basalt Group. In Reidel, S.P., Hooper, P.R., editors, Volcanism and tectonism in the Columbia River flood-basalt province: Geological Society of America Special Paper 239, p. 1-20.

Tullis, E.L., 1940, Geology and petrography of Latah County, Idaho: unpublished Ph.D. thesis, University of Chicago, 218 p.

_____, 1944, Contributions to the geology of Latah County, Idaho: Geological Society of America Bulletin, v. 55, p. 131-164.

[U.S.] National Oceanic and Atmospheric Administration, 1987a, Climatological Data, Idaho, Annual Summary 1986: v. 89, 34 p.

_____, 1987b, Climatological Data Washington, Annual Summary 1986: v. 90, 36 p.

Walters, K.L., Glancy, P.A., 1969, Reconnaissance of geology and groud-water occurrence in Whitman County, Washington: U.S. Geological Survey Water Survey Bulletin #26, 169 p.

Whiteman, K.J., 1986, Ground-water levels in three basalt hydrologic units underlying the Columbia Plateau in Washington and Oregon, spring 1984: U.S. Geological Survey Water-Resources Investigations Report 86-4046, scale 1:500,000.

Williams, R.E., Allman, D.W., 1969, Factors affecting infiltration and recharge in a loess covered basin: Journal of Hydrology, v. 8.

Wright, T.L., Grolier, M.J., Swanson, D.A., 1973, Chemical variation related to the stratigraphy of the Columbia River basalt: Geological Society of America Bulletin, v. 84, no. 2, p. 371-385.

APPENDIX A

INVENTORY OF WELLS FOR THE VIOLA, MOSCOW WEST AND PULLMAN QUADRANGLES, LATAH COUNTY, IDAHO AND WHITMAN COUNTY, WASHINGTON

Table 3. Inventory of Wells - Viola and Moscow West quadrangles, Idaho

Well Type Explanation: A=Anode, C=Commercial, D=Domestic, I=Industrial, Irr=Irrigation, M=Monitor, Mu=Municipal, Obs=Observation, S=Stock, T=Test, U=Unused, VE=Vapor Extraction
-- Data not available

Location	Section	Owner on Log	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Reported Open Interval (ft) Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
41N 5W	30cd1	Layell, Glenn	1977	140	140	--	8/6	--	--	D	Drillers Log
	31dd1	Michelson, Carl	1993	104	54	104	8	--	--	D	Drillers Log
40N 6W	1cbb1	Viola Wrt&Swr Disr.	1984	350	336	346	10/8	2695	--	Mu	Drillers Log
	1dd1	Cone, Marvin	1959	120	108	120	6	--	--	D	Drillers Log
	8cc1	Hansen, Jerry	1979	195	23	195	8	--	--	D	Drillers Log
	24aa1	Fleener, Loyal	--	16	--	--	--	2880	3.00	U	Ross (1965)
	24ca1	Hittle, Orville	1968	276	210	276	6	--	--	D	Drillers Log
	24cad1	Gillespie, Allan	1945	60	--	--	6	2740	48.50	D	Crosthwaite (1975)
	24dcc1	Fleener, Loyal	--	25.3	--	--	36	2718	9.50	D	Crosthwaite (1975)
	24cd1	Beck, Bill	1980	125	109	125	8	--	--	D	Drillers Log
	25da1	Clark, D.	--	--	--	--	--	2680	27.74	--	Lum (1990)
	25dac1	O'Donnel, John	1962	130	--	--	6	2665	45.95	D	Ross (1965)
	36aca1	O'Donnel, W. M.	1948	204	--	--	6	2608	77.20	D,S	Crosthwaite (1975)
	36bc1	Latah County	1900	11	--	--	54	2570	2.00	--	Ross (1965)/ Aband.
40N 5W	6bc1	Musick, Howard	1969	120	85	120	8	--	--	D	Drillers Log
	7cd1	Gleason, Robert	1970	365	39	365	6	--	--	D	Drillers Log
	7dc1	Glover, Brent	1992	304	40	304	8	--	--	D	Drillers Log
	7db1	Hill, Merle	1979	80	35	80	8	--	--	D	Drillers Log
	7aa1	Leppelma, John	1980	254	19	254	8	--	--	D	Drillers Log
	7aa2	Mead, John	1984	304	19	304	8	--	--	D	Drillers Log
	7aa3	Stevens, Wayne	1979	304	28	304	8	--	--	D	Drillers Log
	7bd1	Stienhorst, Kirk	1979	379	52	379	8	--	--	D	Drillers Log
	18ad1	Kiblen, Todd	1981	454	29	454	8	--	--	D	Drillers Log
	18acd1	Coomes, Gerald	1971	351	83	351	6	3075	57.50	D	Drillers Log
	18	Roberts, Dick	1978	410	19	410	8	--	--	D	Drillers Log
	18bc1	Spahigil, Peoman	1984	529	66	529	8	--	--	D	Drillers Log
	18cc1	Tenney, William	1968	333	33	333	6	--	--	D	Drillers Log
	18ab1	Tenney, Mrs.	1992	304	60	304	8	--	--	D	Drillers Log
	18db1	Kammeyer, Ray	--	186	--	--	6	3030	75.00	D	Ross (1965)
	18db2	Kammeyer, Ray	1964	16	--	--	4	3010	2.00	I	Ross (1965)
	19aa1	Delmar, Don	1976	310	26	310	6	--	--	D	Drillers Log
	19aa2	Kaymeir, Ray	1976	110	21	110	8	--	--	D	Drillers Log
	19db1	Young, Mel	1977	144	104	144	8/6/4	--	--	D	Drillers Log
	19dc1	Hawley, Rolland	1950	290	--	--	8	2710	--	U	Ross (1965)
	19dc2	Hawley, Rolland	1900	50	--	--	--	2710	20.00	I	Ross (1965)

Drill dates?

Location	Section	Owner on Log	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
40N 5W (cont.)	30cad1	Niehenke, N.	1953	309	94	309	6	2636	132.20	D	Crosthwaite (1975)
	30ca1	Ward, F.	--	--	--	--	--	2638	125.38	--	Lum (1990)
	30ca2	Moser, R. T.	1953	309	--	--	6	2630	88.00	D	Ross (1965)
	30db1	Naylor, John	--	150	--	--	6	2650	--	U	Ross (1965)
	30dd1	Naylor, John	1935	260	--	--	6	2690	--	D	Ross (1965)
	31ac1	Boyd, Everett	1962	325	--	--	8	2700	180.00	U	Ross (1965)
	31bcd1	Carson, A. N.	--	135	--	--	6	2610	0.90	D	Lum (1990)
	31cad1	Carson, N. T.	1940	180	160	180	6	2627	93.50	D	Crosthwaite (1975)
	31cad2	Carson, N. T.	--	20.6	--	--	30	2620	5.00	Obs.	Crosthwaite (1975)
	31da1	Heick, C. A.	--	10	--	--	7	2690	5.00	D	Ross (1965)
	31dbc1	Rogers, K.	--	--	--	--	--	2635	30.00	--	Lum (1990)
	31dbc2	Rodgers, Catherine	--	23	--	--	12	2640	12.00	U	Ross (1965)
	31dbc3	Rodgers, Catherine	--	20	--	--	2.5	2640	--	D	Ross (1965)
	31dcc1	Niehenke, Norbert	1991	128	89	128	8	2620	88.90	D	Drillers Log
	31dd1	Heick, C. A.	1963	80	--	--	6	2710	65.00	D	Ross (1965)
39N 6W	12bdd1	Montgomery, Vic	1963	122	--	--	6	2610	--	D	Crosthwaite (1975)
	12cdb1	App. Horse Club	1983	214	55	241	8	2540	70.00	D	Drillers Log
	12daa1	Univ. of Idaho #4	--	747	671	747	--	2554	--	Mu	Baines (1992)
	12dba1	City of Moscow #9	1982	1253	648/722//	688/742//	24/18/16/12	2538	280.00	Mu	Drillers Log
	12dcd1	Univ. of Idaho #5	1991	245	160/220	180/230	12	2617	83.00	I	Drillers Log/Kopp (1994)
	12dcd2	Univ. of Idaho #6	1993	351	315.75	342	8/6	2619	--	I	Kopp (1994)
	12dcd3	Univ. of Idaho #7	1993	349	290/317	301/338	8/6	2617	183.00	I	Drillers Log/Kopp (1994)
	12dc1	Univ. of Idaho (#1)	1987	20	19	20	6	2580	9.00	T	Drillers Log
	12dc2	Univ. of Idaho (#2)	1987	100	29	100	6	2590	17.00	T	Drillers Log
	12dc3	Univ. of Idaho (#3)	1987	140	19	140	6	2590	--	T	Drillers Log
	12dc4	Univ. of Idaho (#4)	1987	146	22	146	6	2590	--	T	Drillers Log
	12dc5	Univ. of Idaho (#5)	1987	80	21	80	6	2580	--	T	Drillers Log
	12dd1	UI GW Research	1992	196	90/192	100/202	2/2	2544	22.00 & 55.00	M/T	Drillers Log
	12dd2	UI Water Resources	1992	100/204	90/192	100/202	8	2544	51.00	M/T	Drillers Log/Kopp(1994)
	12dd3	Univ. of Idaho VE-2	1992	25	--	--	2	2544	--	VE	Drillers Log
	12dd4	Univ. of Idaho VE-3	1992	28	--	--	2	2544	--	VE	Drillers Log
	12dd5	Univ. of Idaho VE-4	1992	2805	--	--	2	2544	--	VE	Drillers Log
	12dd6	Univ. of Idaho VE-5	1992	30	--	--	1	2544	--	VE	Drillers Log
	12dd7	Univ. of Idaho VE-6	1992	30	--	--	1	2544	--	VE	Drillers Log
	13bd	Callahan, Dr.	1986	329	316	329	8/6	--	192.00	D	Drillers Log
	13cab1	Stadium Mobile Park	1993	405	375	405	8/6	--	181.00	D	Drillers Log
	13cac1	Hartung, Ernest	--	119	--	--	6	2752	--	D	Crosthwaite (1975)
	13cad1	Hattrup, H.	1947	141	--	--	6	2745	--	D	Crosthwaite (1975)
	13cad2	Lew, Mi	1963	114	--	--	6	2680	--	D	Crosthwaite (1975)
	13cad3	Chinn, Lennard	1967	525	--	--	10	2675	--	D	Crosthwaite (1975)
	13ca1	Dohman, H.	--	150	--	--	6	2700	--	D,S	Ross (1965)
	13cca1	Williams, Ray	1961	355	35 feet open to aquifer		6	2748	--	U	Crosthwaite (1975)

Location	Section	Owner on Log	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
39N 6W (cont.)	13cca2	Williams, Ray	1961	200	--	--	6	2700	--	D	Ross (1965)
	13cc	Hill, Otto	1979	366	174	366	8	--	280.00	D	Drillers Log
	13cd1	Hill, Otto	1983	272	96	272	10/8	--	125.00	D	Drillers Log
	24bc	Wood, Randy	1968	155	95	155	8/6	--	80.00	D	Drillers Log
	24cba1	Gooby, Richard	1968	155	95	155	8	2610	--	D	Crosthwaite (1975)
	24ccd1	Canode, Chet	1970	232	26.5	232	6	2520	9.00	D	Drillers Log
	24cdc1	Jennings, Ralph	1970	276	82	276	6	2538	40.00	D	Drillers Log
	30ca	Niehanki, Norbert	1972	345	326	340	5	--	130.00	D	Drillers Log
	36aaa1	Barber, David	1985	175	107	175	6	2630	--	D	Drillers Log/Owner
	36dab1	Snow, Gerald	1982	80	25	80	8	--	30.00	D	Drillers Log
39N 5W	6aa	Randle, Lloyd	1978	116	117	--	8	--	62.00	D	Drillers Log
	6aad1	Franklin, A. E.	--	260	--	--	--	2725	--	D	Crosthwaite (1975)
	6ddd1	Brandt, Steve	1994	279	119	279	8	2630	128.00	D	Drillers Log/Owner
	6cca1	Adams, Kevin	1994	208	193	208	8	2665	150.00	D	Drillers Log
	6ccd1	Buckingham, H.	1948	30	--	--	--	2590	--	D	Ross (1965)/Buried
	6ccd2	Ayers, J. A.	--	376	--	--	6	2680	--	D	Ross (1965)
	6daa1	Randle, W. L.	1961	232	--	--	8	2700	--	D,I	Crosthwaite (1975)
	6daa2	Randle, W. L.	--	100	--	--	--	2670	--	D,S	Ross (1975)
	6dad1	C & L Lockers	--	90	--	--	8	2650	--	C	Crosthwaite (1975)
	6db1	Anderson, V. G.	1940	155	--	--	--	2610	--	D,I	Ross (1975)
	6dca1	Harden, Dick (R. E)	1966	376	190	376	8	2682	--	D	Crosthwaite (1975)
	6dbc1	Harden, R. E.	--	150	--	--	8	2630	--	D	Crosthwaite (1975)
	6dbc2	Harden, Kurt	1988	65	59	65	6	2620	35.00	D	Drillers Log
	6dcd1	Boas, E. L	--	376	40	376	8	2655	--	I	Crosthwaite (1975)
	7bb	Sheets, Gorden	1990	228	168	228	8/6	--	14.00	D	Drillers Log
	7bad1	City of Moscow #7	1962	667	426	667	20	2614	-	Mu, Obs.	Crosthwaite (1975)
	7bad2	City of Moscow #8	1964	1458	1047	1458	20	2617	--	Mu	Crosthwaite (1975)
	7cbb1	Univ. of Idaho #3	1962	1336	660/975//	775/1100/	24/20/16/12	2558	256.00	Mu	Drillers Log
	7cc 1	Univ. of Idaho	--	--	--	--	6	2540	--	--	Crosth.(1975)/ Aband.
	7ccd1	Univ. of Idaho #2	1951	354	60	354	20	2557.4	90.00	Mu	Crosthwaite (1975)
	7dad1	City of Moscow #1	1882	245	--	--	12	2568	--	Mu	Crosth. (1975)/ Unused
	7dad2	City of Moscow #2	1925	320	0	240	20	2568	20.00	Mu	City Docs. /Crosth. (1975)
	7dad3	City of Moscow #3	1928	261.5	40	261.5	18	2569	20.00	Mu	City Docs. /Crosth. (1975)
	7dcd1	Olsen, Louis (BWC)	1972	238	54	238	8	2560	76.00	D	Drillers Log
	7ddc1	Garrett Freight	--	240	--	--	8	2561	--	Obs., A	Crosthwaite (1975)
	18aac1	Bond, John	--	190	40	190	--	2570	--	D	Crosthwaite (1975)
	18aa1	Moscow Steam Lau.	--	--	--	--	--	2565	--	U	Ross (1965)
	18aa2	Miller, Mark	--	90	--	--	6	2565	--	Ind.	Ross (1965)
	18aa3	Caldwell, Delbert	1962	119	--	--	6	2570	--	D	Ross (1965)
	18bad1	Univ. of Idaho #1	1920	330	98	330	8	2601	--	Mu	Crosthwaite (1975)
	19aaa1	Fountain, Pete	1970	140	--	--	8	2547	--	D	Crosthwaite (1975)
	19aac1	Bailey	--	--	--	--	6	2545	--	D	Crosthwaite (1975)

Location	Section	Owner on Log	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
39N 5W (cont.)	19aac2	Bailey, Dexter	--	120	20	120	8	2554	--	C	Crosthwaite (1975)
	19aa1	Deesten, Martin	--	--	--	--	8	2560	--	D,S	Ross (1965)
	19aba1	Terrace Gardens	1984	70	24	70	8	2562	--	U	Drillers Log
	19aba2	George, Lloyd	1960	60	37	60	6	2562	--	D	Crosthwaite (1975)
	19aba3	Anderson, Elmer	1946	198	--	--	--	2575	--	D	Crosthwaite (1975)
	19adc1	Williams, Bill	1972	85	--	--	6	2566	--	C	Crosthwaite (1975)
	19baa1	Nielsen, C. L.	1964	134	58	134	6	2586	--	D	Crosthwaite (1975)
	19baa2	Oller, O. O.	--	84	--	--	6	2575	--	D	Crosthwaite (1975)
	19ba1	Loomis, Al	1967	60	32	60	8	--	10.00	--	Drillers Log
	19ba2	George, Lloyd	1960	60	--	--	--	2540	--	D	Crosthwaite (1975)
	19ba3	Chestnut, Wayne	1964	70	--	--	6	2540	--	D	Ross (1965)
	19ba4	Wren, Jack	1961	45	--	--	6	2575	--	Ind.	Ross (1965)
	19bab1	Kirkland, E. B.	--	106	--	--	6	2570	--	D	Crosthwaite (1975)
	19bbb1	Anderson, C.	--	130	7	130	6	2567	--	D	Crosthwaite (1975)
	19bb1	Praett, John	1964	134	--	--	6	2550	--	U	Ross (1965)
	19dab1	Hobbs, Fred	1961	45	17	45	6	2575	--	D	Crosthwaite (1975)
	19dcd1	Deesten, Martin	1945	--	--	--	6	2640	--	D	Crosthwaite (1975)
	19??	Gulick, Linda	1987	85	--	--	6	--	--	D	Drillers Log
	30aab1	Sinclair, Donald	--	400	--	--	6	2625	--	D,S,Irr	Crosthwaite (1975)
	30ab	Cossairt, Lloyd	1973	64	60	64	8	--	8.00	D	Drillers Log
	30ac	Fleiger, Ernest	1971	155	47	155	8	--	9.00	D	Drillers Log
	30acc1	Murphy Estate	1938	87	--	--	6	2735	--	D,S,Irr	Crosthwaite (1975)
	30acc2	Murphy Estate	1951	185	--	--	--	2770	--	D,S	Ross (1965)
	30acc3	Clyde, Sherman	1951	185	--	--	4	2750	--	S	Crosthwaite (1975)
	30acc4	Clyde, Sherman	1969	210	--	--	8	2718	--	D	Crosthwaite (1975)
	30cac1	Lucas, James	1950	170	--	--	6	2770	--	D	Drillers Log
	30cac2	Lucas, James	1964	380	304	380	8/6	2780	56.00	D	Drillers Log
	30ccc1	Andrews, Duane	1994	176	--	--	6	2650	--	D	Data from Owner
	31ccc1	Snow, Gerald	1981	310	34	310	8	--	--	D	Drillers Log
	31ccc2	Snow, Gerald	1965	262	74	262	6	--	Plugged	D	Drillers Log
	31dd	Benson, Ed	1973	164	60	164	8/6	--	28.00	D	Drillers Log
38N 6W	1ddb1	Redinger	--	--	--	--	6	2610	--	D	Data from owner
	12acb1	Bindl, John	1992	230	94	230	8	2830	27.00	D	Drillers Log
	13cd1	Virgin, Roger	1989	170	--	--	--	--	--	D	Drillers Log\Abandoned
	13cd2	Virgin, Roger	1990	105	--	--	--	--	--	D	Drillers Log\Abandoned
	28ac?	Loomis, Larry	1977	180	24	180	8	--	30.00	D	Drillers Log
	28ac?	Loomis, Larry	1978	400	80	400	8	--	60.00	D	Drillers Log

Table 4. Inventory of Washington Wells - Viola, Moscow West and Pullman quadrangles

Well Type Explanation: A=Anode, C=Commercial, D=Domestic, I=Industrial, Irr=Irrigation, M=Monitor, Mu=Municipal, Obs=Observation, S=Stock, T=Test, U=Unused
-- Data not available

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Reported Open Interval (ft) Bottom	Reported Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
16N 46E	18G1	Bodker, Pete	--	57	48	57	6	2600	--	--	Walters (1969)
	18M1	Main, K	--	225	--	--	6	2570	--	D	Data from Owner
	30N1	Lawson, R. E.	--	130	--	--	8	2555	--	D	Data from Owner
	30Q1	Hill, Brock	--	80	44	80	6	2585	--	D	Data from Owner
	32F1	McCoy	--	Spring	--	--	--	--	--	--	Data from Owner
16N 45E	15P1	Kuehner, M.	--	100	--	--	6	2495	--	D	Lum (1990)
	22H1	Rupp, E.	--	165	28	165	6	2470	--	D	Lum (1990)
	25D1	Stipe, W. M.	1951	240	25	240	6	2520	--	D	Walters (1969)
	27Q1	Thompson, L.	--	--	--	--	--	2460	--	--	Lum (1990)
	34?1	Kimble, Greg	1988	230	64	230	8		113.00	D	Drillers Log
	35K1	Mealhouse, V.	--	Spring	--	--	--	2560	0.00	D	Data from Owner
	35L1	Swan, Roger	1988	155	20	155	8	2510	10.95	D	Drillers Log
15N 46E	6E1	Hall, Lilly	--	100	--	--	6	2590	--	D	Walters (1969)
	6G1	Quist, Theodore	--	65	--	--	6	2615	--	D	Walters (1969)
	6P1	Fleenor, S.	--	100	--	--	--	2625	--	--	Lum (1990)
	6P2	Mader, Paul	1953	78	--	--	6	2620	--	D	Walters (1969)
	7B1	Fleenor, Sam	1953	14	--	--	30	2635	--	--	Walters (1969)
	7C1	Fleenor, Sam	1953	72	--	--	42	2640	--	D	Walters (1969)
	7J1	Doyle, Percy	1942	150	--	--	7	2660	--	D	Walters (1969)
	8G1	Gillespie, Allan	1953	14	--	--	60	2760	--	--	Walters (1969)
	8L1	Fleenor, Frank	1979	280	200	280	8	2700	NR	D	Drillers Log
	8L2	Fleenor, Frank	1979	125	0	125	--		NR	D	Drillers Log
	8Q1	Dahl, Marvin	1947	135	--	--	8	2800	--	D	Walters (1969)
	14R1	Gosset, Jim	1986	278	20	278	8		NR	D	Drillers Log
	17B1	Williams, James	1953	106	--	--	6	2800	--	D	Walters (1969)
	18J1	Boyd, Carl	1953	213	--	--	6	2655	--	--	Walters (1969)
	19J1	O'Donnell, John	1953	59	--	--	8	2575	--	D	Walters (1969)
	19R1	O'Donnell, W. M.	--	41	--	--	6	2570	--	D	Walters (1969)
	20K1	Carson, N. T.	1953	15	--	--	48	2590	--	--	Walters (1969)
	20N1	Nelson, H. (O'Donnell)	--	--	--	--	--	2570	--	--	Lum (1990)
	20P1	Carson, N. T.	1953	250	--	--	6	2590	--	--	Walters (1969)

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
15N 46E (cont.)	29N1	Paul, Charles	1923	120	--	--	5	2670	--	D	Walters (1969)
	30N1	Goughnour, John	1953	23	--	--	48	2620	--	D	Walters (1969)
	31H1	Hagedorn, Gerry	1918	100	--	--	6	2610	--	D	Walters (1969)
	31J1	Metzgar, Ed	1953	117	--	--	6	2520	--	--	Walters (1969)
	31K1	Yarborough, Carrie	1953	18	--	--	36	2515	--	--	Walters (1969)
	32Q1	Guske, Henry	--	180	--	--	6	2540	--	D	Walters (1969)
15N 45E	1H1	Mader, John	1953	26	--	--	36	2575	--	D	Walters (1969)
	1H2	Mader, John	1953	17	--	--	30	2585	--	D	Walters (1969)
	2E1	Kimball	--	325	--	--	8	2620	--	D	Data from Owner
	2M1	Zakarison, Russell	1988	130	112	130	8	--	74.00	D	Drillers Log
	2M2	Ledeman, Harry	--	100	--	--	5	2600	--	D	Walters (1969)
	3J1	Unknown	1953	17	--	--	1.5	2580	--	--	Walters (1969)
	3Q1	Zakarison, I. A.	1953	18	--	--	92x72	2555	--	D	Walters (1969)
	3R1	Unknown	1953	20	--	--	48	2570	--	--	Walters (1969)
	10E1	Steever, E.	1953	263	--	--	6	2555	--	--	Barker (1979)
	10E2	Nelson, A. H.	1953	15	--	--	42	2555	--	D	Walters (1969)
	10F1	Nelson, A. H.	1953	72	--	--	10	2535	--	D	Walters (1969)
	10F2	Nelson, A. H.	1953	17	--	--	42	2535	--	--	Walters (1969)
	11K1	Held, Roy	1953	30	--	--	24	2560	--	--	Walters (1969)
	11N1	Kimzey, Jim	1953	150	--	--	6	2585	--	--	Walters (1969)
	13A1	Pogue, Omer	--	40	--	--	96	2610	--	--	Walters (1969)
	13N1	Cunningham, Earmel	1953	165	--	--	6	2545	--	--	Walters (1969)
	14E1	Gray, Carl	1953	10	--	--	36	2535	--	D	Walters (1969)
	14E2	McGreevy, Daniel	1990	324	246	322	10/6	2535	235.00	D	Drillers Log
	14M1	Pickell, B. I.	1953	10	--	--	48	2505	--	D	Walters (1969)
	14Q1	Stirewalt, Mary	1938	285	--	--	6	2520	--	D	Walters (1969)
	14Q2	Stirewalt, Mary	1953	33	--	--	30	2530	--	--	Walters (1969)
	15H1	Held, Roy	1953	85	--	--	6	2540	--	D	Walters (1969)
	15J1	Meyer, M.	--	Spring	--	--	--	2495	--	D	Data from Owner
	22K1	Wexler, Cliff	--	8	--	--	60x72	2515	--	D	Walters (1969)
	22M1	Pritchard, Tim	1953	20	--	--	96	2480	--	D	Walters (1969)
	23B1	Stirewalt, Mary	1953	50	--	--	6	2500	--	D	Walters (1969)
	24C1	Gray, Jesse	1953	20	--	--	36	2535	--	D	Walters (1969)
	25A1	Boyd, Merrill	1953	137	--	--	6	2645	--	D	Walters (1969)
	25A2	Boyd, Merrill	--	215	--	--	--	2650	--	D	Walters (1969)
	25G1	Driscoll	1953	22	--	--	6	2605	--	--	Walters (1969)
	25G2	Boyd, Robert	1989	120	62	120	8	2605	41.00	D	Drillers Log

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
15N 45E (cont.)	25Q1	Boyd, L. (W. M.)	1941	264	65	264	6	2609	--	D	Lum (1990)
	26K1	Boyd, Orval	1953	302	74	302	6	2620	--	D	Walters (1969)
	26K2	Boyd, Orval	--	120	--	--	6	2620	--	D	Walters (1969)
	27M1	Boyd, Frank	--	150	--	--	8	2520	--	D	Walters (1969)
	30N1	Motley	1994	230	230	--	8	2615	--	D	Data from Owner
	31G1	Beuche, Mrs.	--	190	--	--	6	2500	--	--	Walters (1969)
	31M1	WSU ?	1957	172	52	172	--	2345	23.40	D	Drillers Log
	31M2	Pullman Disposal	1988	111	29	111	8		55.00	D	Drillers Log
	32C1	Turner, O. O.	--	105	--	--	8	2400	--	D	Walters (1969)
	32C2	City of Pullman #6	1968	518	235	518	30/18	2430	132.00	Mu	Drillers Log
	32G1	Berry, D. R.	1953	26	--	--	30	2380	--	--	Walters (1969)
	32N1	City of Pullman #2	1946\64	231	24.3	231	16	2355	9.00	Mu	Drillers Log
	32N2	City of Pullman #4	1956	954	399	954	12	2356	--	Mu	Lum (1990)
	33E1	WWP	1982	440	8	200	10		180.00	Other	Drillers Log
	33J1	WSU	1933	438	--	--	6	2610	--	Buried	Walters (1969)
	34G1	Christian, Bill	1990	315	42	315	8		187.00	D	Drillers Log
	34L1	WSU #5	1964	396	300	396	10	2505.36	NR	Mu	Drillers Log
	34N1	Whitlow, Earl	--	52	--	--	6	2485	--	D	Walters (1969)
	35F1	Mos-Pul Airport	1933	172	--	--	8	2531	--	Mu	Lum (1990)
	35F1	City of Pullman	1935	--	--	--	--		NR	--	Drillers Log
	36A1	Rodeen, Raymond	1993	103	80	100	8/6		23.00	D	Drillers Log
	36Q1	Hagedorn, H. E.	1953	10	--	--	60	2585	--	D	Walters (1969)
	36Q2	Hagedorn, H. E.	--	200	--	--	6	2580	--	Dry	Walters (1969)
15N 44E	35E1	Michaelson, V.	--	300	39	300	--	2412	--	--	Lum (1990)
	35F1	Michaelson, V.	--	96	--	--	--	2435	--	--	Lum (1990)
14N 46 E	5A1	Palouse Prod. Inc.	1977	338	195	338	10/8	2600	182.00	I	Drillers Log
	5Q1	Anderson, Edgar	--	123	--	--	--	2760	--	Unused	Walters (1969)
	5Q2	Williams, Guy	1987	380	340	380	8/6	2660	186.00	D	Drillers Log
	6R1	Anderson, Edgar	1940	212	90	212	7	2650	--	D	Walters (1969)
	6R2	Anderson, Edgar	--	350	50	350	6	2650	--	Unused	Walters (1969)
	7G1	Reid, Harold	--	180	--	--	6	2615	--	D	Walters (1969)
	7H1	Boone, Mike	--	175 A.	--	--	8	2645	--	D	Data from Owner
	7L1	Kent, Darrell	--	Spring	--	--		2580	0.00	D,S	Data from Owner
	7N1	Bowers, C. J.	--	100	--	--	6	2560	--	Unused	Walters (1969)
	7N2	Shriver, Harold	1937	242	--	--	6	2575	--	D	Walters (1969)
	7N3	Braden, J.	--	100	--	--	--	2570	--	--	Lum (1990)

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
14N 46E (cont.)	7N4	Braden, J.	--	353	65	353	--	2570	--	--	Lum (1990)
	7P2	Anderson, Edgar	--	140	--	--	6	2580	--	D	Walters (1969)
	7Q1	Robertson, Jack	1972	228	203	228	8/6	2610	26.00	D	Drillers Log
	8A1	Wickard, Bruce	--	155	--	--	6	2720	--	D	Data from Owner
	8K1	Anderson, Arnold	--	125	--	--	6	2620	--	D	Walters (1969)
	8K2	Anderson, Arnold	--	240	--	--	6	2600	--	Destroyed	Walters (1969)
	17A1	Lyon, Glen	1992	155	139	155	8/6	2580	84.00	D	Drillers Log
	17B1	Peterson, H. M.	--	120	--	--	6	2530	--	D	Walters (1969)
	17B2	Smith, Don	1992	178	38	178	8	--	20.00	D	Drillers Log
	19F1	Brown, L.	--	180	--	--	6	2485	--	D	Lum (1990)
	19F2	Brown, L.	--	Spring	--	--	--	2485	--	--	Data from Owner
	19M1	Haynes, Elmer	1951	80	30	80	6	2480	--	D	Walters (1969)
	20E1	Tomson, S.	--	Spring	--	--	--	2520	--	D,S	Data from Owner
	20K1	Cameron, --	--	13	--	--	6	2545	--	D	Walters (1969)
	20P1	Flack, Jack	--	Spring	--	--	--	2520	--	D	Data from Owner
	29L1	Strohm, C. V.	--	278	278	--	60/6	2555	--	D	Walters (1969)
	29P1	Hawley, Jesse	--	42	--	--	54	2625	--	D	Walters (1969)
	29Q1	Hawley, Jesse	--	13	--	--	48	2615	--	Unused	Walters (1969)
	30L1	Snow, Harold	--	15	--	--	48	2560	--	--	Walters (1969)
	31F1	Steiner, --	--	33	--	--	48	2660	--	Unused	Walters (1969)
	32C1	Strohm, C. V.	--	20	--	--	36	2655	--	Unused	Walters (1969)
14N 45E	1F1	Pullman Test W. #11	1976	982	980	982	10/8/6	2470	200.00	T	Drillers Log
	1F2	Emerson, --	--	--	--	--	6	2485	--	D	Walters (1969)
	1N1	Paulson, Bill	1991	405	245	405	8/6	2590	257.00	D	Drillers Log
	2	Pac West #2	1993	379	319	379	8/6	--	250.00	--	Drillers Log
	2F1	Thonney, Larry	--	35	--	--	6	2530	--	D	Walters (1969)
	2F2	Thonney, Larry	1947	125	6	125	6	2485	--	Unused	Walters (1969)
	2F3	Thonney, Larry	1993	315	20	315	8	2485	179.00	D	Drillers Log
	2H1	Kopf, Keith	1979	270	--	--	8	2490	130.00	D	Data from Owner
	2H2	Poe Asphalt	1991	330	250	330	8/6	--	217.00	I	Drillers Log
	2N1	Kopf, Roy	1993	330	--	--	6	2560	300+	D	Data from Owner
	2R1	Felsted, Harold	1974	394	353	394	8/6	2630	354.00	D	Drillers Log
	3B1	Wesson, Rich	1987	340	125	340	8/6	--	206.00	D	Drillers Log
	3H1	Thonney, R. L.	--	238	--	--	6	2460	--	D,S	Walters (1969)
	3H2	Thonney, R. L.	--	34	--	--	48	2495	--	Unused	Walters (1969)
	3H3	WWP	1957	259	178	259	8	2470	152.00	D	Drillers Log
	3K1	Rolling Hills Dev. Co.	--	230	--	--	6	2455	--	D	Barker (1979)

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
14N 45E (cont.)	3P1	Jorstad, S.	--	60	--	--	6	2460	--	Irr	Walters (1969)
	4D1	WSU #6	1975	702	392	702	24/20/16	2534.5	255.00	Mu	Drillers Log
	4H1	Buchanan, M. (WSU)	1935	265	175	265	6	2440	125.00	D,S,Irr	Barker (1979)
	4N1	WSU Turkey Farm	1967	100	--	--	--	2390	--	Dry	Barker (1979)
	4Q1	Evers and Cole	1953	205	--	--	6	2560	--	D	Walters (1969)
	4Q2	WSU	1938	65	--	--	6	2410	--	Destroyed	Walters (1969)
	4Q3	Poe Asphalt	1990	191	75	191	8/6	2400	152.00	D	Drillers Log
	4Q4	Carbon, Carl Jr.	1985	180	19	155	6	2420	40.00	D	Drillers Log
	4R1	Buckley, Stanley	--	125	--	--	6	2440	--	D	Walters (1969)
	5D1	City of Pullman #1	1913/45/70	155	135	155	16	2338.8	42.00	Mu	Drillers Log
	5D2	Standard Lumber	--	162	--	--	--	2340	--	--	Barker (1979)
	5D3	City of Pullman #3	1962	167	40	167	16	2340.3	26.50	Mu	Drillers Log
	5D4	Northern Pacific RR.	1940	164	19.5	164	6	2360	6.00	Unused	Drillers Log
	5E1	City Ice Co.	1926	95	19	95	6	2335	--	Ind.	Walters (1969)
	5E2	Rupley, J. R.	1889	73	--	--	6	2345	--	--	Walters (1969)
	5E3	True, M. C.	1894	77	--	--	6	2345	--	Unused	Walters (1969)
	5E4	City of Pullman	1890	84	--	--	6	2340	--	Unused	Walters (1969)
	5E5	Chevron, USA	1990	11	1	11	4	--	4.50	T	Drillers Log
	5F1	WSU Obs. Well	1910	145	60	145	4	2364	--	--	Lum (1990)
	5F2	WSU #1	--	237	--	--	8	2364.43	--	Mu	Barker (1979)
	5F3	WSU #3	1946	223	--	--	16/12	2364.94	--	--	Barker (1979)
	5F4	WSU #4	1962	275	65/206	102/261	20/16/12	2363.46	50.88	Mu	Drillers Log
	5G1	WSU #2	--	213	--	--	10	2358.45	--	Mu	Barker (1979)
	5G2	WSU #7	1987	2224	1000	1814	20/16/12	2415.6	154.00	T	Drillers Log
	6B1	Pull. Bypass Hole	1971	190	--	--	--	--	--	--	Lith. Log only
	6C1	Murray, Nora	--	200	--	--	6	2480	--	Destroyed	Walters (1969)
	6D1	Hodge, J. C.	1951	190	10	190	6	2520	--	D	Walters (1969)
	6D2	Hodge, J. C.	1949	236	12	236	6	2540	--	D	Walters (1969)
	6D3	Utzman, George	--	190	--	--	6	2500	--	D	Walters (1969)
	6D4	Anderson, J. (Woo)	1955	220	40	220	6	2515	168.21	D	Walters (1969)
	6E1	Weskel and Gray	--	180	--	--	6	2500	--	D, Ind.	Walters (1969)
	6E2	Samuelson, A. A.	1948	142	--	--	62 ?	2465	--	D	Walters (1969)
	7E1	Cole, H.	1954	82	8	82	6	2530	--	D	Walters (1969)
	7F1	Spencer, G. R.	1952	70	27	70	6	2495	--	D	Walters (1969)
	7F2	Spencer, G. R.	1983	54	39	54	8	--	20.00	D	Drillers Log
	7F3	Evergreen Blders #1	1954	274	31/135	135/274	8/6	2510	--	Mu	Barker (1979)
	7F4	Evergreen Blders #2	1970	438	--	--	--	2560	--	--	Barker (1979)
	7F5	Baldwin, Mrs.	1940	65	20	65	6	2490	--	D	Walters (1969)
	7F6	Lee & Snell Jr.	1954	270	223	270	8	2508	149.50		Drillers Log

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
14N 45E (cont.)	7H1	City of Pullman #6	1969	712	672	712	12	2445	--	Mu	Barker (1979)
	7K1	Baldwin, Mrs.	--	29	--	--	6	2470	--	Unused	Walters (1969)
	7M1	Adams, Don	1954	68	30	68	6	2520	--	D	Walters (1969)
	7M2	Blosser & Loughrey	1954	90	62	90	6	2525	--	D	Walters (1969)
	7M3	Tomlinson & Baldwin	1954	87	--	--	6	2500	--	D	Walters (1969)
	7N1	Hinrichs, Max	--	50	--	--	6	2505	--	D,S	Walters (1969)
	8A1	Cook, James	--	85	--	--	6	2380	--	D	Walters (1969)
	8A2	Wise, M.	--	105	--	--	6	2385	--	D	Barker (1979)
	8A3	Gormsen, M.	--	200	--	--	--	2445	--	--	Barker (1979)
	8E1	City of Pullman #5	--	712	--	--	--	2446.7	--	--	Barker (1979)
	8G1	Woolliscroft, Ben	--	11	--	--	42	2380	--	Unused	Walters (1969)
	8G2	Woolliscroft, Ben	--	110	--	--	8	2400	--	D,S	Walters (1969)
	8G3	Brown, D.	--	200	--	--	--	2400	--	--	Data from Owner
	8H1	Neil, Herbert	--	136	--	--	6	2414	--	D	Walters (1969)
	8H2	Weller, H. C.	--	140	--	--	6	2425	--	D,S	Walters (1969)
	8J1	Askins, James	--	85	--	--	6	2420	--	D,S	Walters (1969)
	8J2	Tweet, Ernest	1989	230	--	--	no casing	--	67.00	D	Drillers Log
	8J3	West Wynn Apts.	1975	252	--	--	--	2440	--	--	WSU Data
	8J4	Askins, J.	--	223	--	--	--	2420	--	--	Lum (1990)
	8J5	Askins, J.	--	164	--	--	--	2445	--	--	Barker (1979)
	8L1	Pullman Cemetery	1931	365	46	365	6	2565	235.50	Irr	Drillers Log
	8R1	Hickman, Vern	--	145	--	--	6	2430	--	D,S	Walters (1969)
	9E1	Hinchliff, C. (M. Wise)	--	67	20	67	6	2415	9.05	D	Walters (1969)
	9E2	Neil, H.	1968	240	22	240	6	2420	125.70	D	Drill. Log/No Lith.
	9J1	Bienz, Darrel	1990	390	307	367	8/6/4	2560	295.00	D	Drillers Log
	9N1	Meadowlark Sub.	1990	351	300	351	8/6	2500	200.00	D	Drillers Log
	10M1	Bloomfield, G.	--	250	--	--	--	2530	--	--	Barker (1979)
	10P1	Stratton, H.	--	200	--	--	6	2540	--	D,S	Lum (1990)
	11B1	Helm, Boone	--	126 A.	--	--	8	2570	--	D	Data from Owner
	11B2	Helm, Boone	--	350 A.	--	--	--	2585	--	--	Data from Owner
	11F1	Vosburgh, R. N.	--	6	--	--	96x120	2560	--	D	Walters (1969)
	11N1	Unknown	--	15	--	--	1.5	2540	--	Unused	Walters (1969)
	11P1	Baud, Eathel	--	82	--	--	6	2560	--	D	Walters (1969)
	11P2	Pinzino, Dean	--	400+	--	--	6	2570	--	D,S	Data from Owner
	11P3	Ostrom, Dave	--	120	--	--	6	2600	--	D	Data from Owner
	12M1	Wiley, T. E.	--	11	--	--	48	2605	--	D	Walters (1969)
	13F1	Brown, Howard	--	16	--	--	60	2545	--	D	Walters (1969)
	13F2	Brown, Howard	--	20	--	--	72	2545	--	D	Walters (1969)

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
14N 45E (cont.)	13G1	Brown, Kenneth	--	11	--	--	54x100	2550	--	D	Walters (1969)
	14N1	Druffel, Craig	1990	208	188	208	8/6	2470	80.00	D	Drillers Log
	14R1	Unknown	--	6	--	--	36x72	2495	--	Unused	Walters (1969)
	15B1	Leonard, George	--	213	--	--	6	2620	--	D	Walters (1969)
	15B2	Leonard, George	1963	330	290	330	8/6	2600	NR	D	Drillers Log
	16	Irwin & Wise	1966	195	175	195	8/6	2410	110.00	D	Drillers Log
	16	Long, James	1968	273	263	273	8/6/5	2420	145.00	D	Drillers Log
	16E1	Stratton, C. A.	--	80	--	--	6	2400	--	S	Walter (1969)
	16E2	Stratton,W.	--	110	40	110	--	2400	--	--	Barker (1979)/Dry
	16E3	Stratton,W.	--	230	--	--	--	2455	--	--	Barker (1979)
	16F1	Stratton, C. A.	--	6	--	--	72	2410	--	S	Walter (1969)
	16G1	WSU Spillman Farm	1956	400	32	400	10	2480	--	Irr	Barker (1979)
	16J1	Cornelius, Scott	1993	250	20	250	8		67.00	D	Drillers Log
	16K1	WSU	1956	335?	--	--	--		NR	D	Drillers Log
	16N1	Boyd, Bill	1986	122	102	122	6	2410	40.00	D	Drillers Log
	16P1	Haynes, Ronald	--	7	--	--	72	2420	--	D	Walters (1969)
	16Q1	Wagner, Bill	1979	308	208	308	8/6	2460	230.00	D	Drillers Log
	16R1	Long, James	1993	105	34	105	8	--	21.00	D	Drillers Log
	16R2	Davis, Rex	1967	368	--	--	--	--	--	--	WSU Data
	16R3	Wise, G.	--	195	175	195	--	2418	--	--	Barker (1979)
	17A1	Jacobson, H.	--	175	--	--	6	2420	--	D	Lum (1990)
	18M1	Griffen, T.	--	18	--	--	48	2535	--	Unused	Walters (1969)
	19D1	Kienholz, A. W.	--	74	--	--	6	2560	--	D	Walters (1969)
	19G1	Benscoter, J.	--	198	--	--	--	2575	--	--	Lum (1990)
	19M1	Haynes	1967	67	--	--	--	--	--	--	WSU Data
	19P1	Jorstad, S.	--	38	--	--	48	2590	--	--	Walters (1969)
	20E1	Kirkendall, Claude	--	16	--	--	60/36	2635	--	D	Walters (1969)
	20F1	Jacobson, Ed	1985	63	25	63	8	2550	35.00	D	Drillers Log
	21D1	Boyd, Bill	1988	280	150	280	8/6	2480	78.00	D	Drillers Log
	21H1	Staley, L. C.	--	206	--	--	8/6	2435	--	D	Walters (1969)
	21H2	Barnes, A.	--	--	--	--	--	--	--	--	Barker (1979)
	21H3	Sears	--	--	--	--	--	2440	--	--	Lum (1990)
	22P1	Staley, John	--	100	--	--	6	2465	--	D	Walters (1969)
	22P2	Fairbanks, Alfred	1990	200	70	200	8/6	2464	35.00	D	Drillers Log
	22Q1	Jennings, F. A.	--	37	--	--	6	2475	--	D	Walters (1969)
	23A1	Druffel, Dick	--	Spring	--	--	--	2485	0.00	D	Data from Owner
	23J1	Mathison, M.(Rehberg)	--	12	--	--	48	2485	--	D	Walters (1969)
	23K1	Druffel, Norm	--	Spring	--	--	--	2465	0.00	D	Data from Owner

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Reported Open Interval (ft) Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
14N 45E (cont.)	23R1	Meyer, Raymond	1965	80	46	80	8	2515	50.00	D	Drillers Log
	23Q1	Druffel, Ken	1992	159	29	159	8	2515	11.00	D	Drillers Log
	24G1	Hood, Alan	1972	202	18	202	6	2500	18.00	D	Drillers Log
	24H1	Haley, R. B.	--	10	--	--	24	2495	--	D	Walters (1969)
	24H2	Smolinski	1967	162	--	--	--	--	--	--	WSU Data
	24Q1	Benedict, W.	--	26	--	--	48	2530	--	Unused	Walters (1969)
	24R1	Benedict, W.	--	12	--	--	48	2510	--	Unused	Walters (1969)
	25D1	Lyon, Robert	--	55	--	--	6	2520	--	D	Walters (1969)
	25G1	Boyd	1973	380	--	--	--	--	--	--	WSU Data
	25M1	Webber, Albert	--	18	--	--	96	2540	--	D	Walters (1969)
	25Q1	Whitman, Don	--	140	--	--	6	2620	--	Unused	Walters (1969)
	26C1	Bursch, Stanton	--	60	--	--	6	2535	--	D	Walters (1969)
	26C2	Jennings, R.	--	260	--	--	6	2540	--	D	Data from Owner
	26J1	Weber Farm	--	26	--	--	96	2545	--	--	Lum (1990)
	26J2	Weber Farm	--	223	62	223	--	2545	--	--	Lum (1990)
	26M1	Hood (Day Care)	--	Spring	--	--	--	2510	0.00	D	Data from Owner
	28H1	Staley, L. C.	1941	150	20	150	8/6	2515	--	D	Walters (1969)
	28H2	Staley, L. C.	1989	155	18	155	8	2510	7.00	D	Drillers Log
	28H3	Boyd, Harold	--	100	--	--	8	2520	--	D	Walters (1969)
	28K2	Staley, L. C.	--	80	--	--	8	2505	--	D	Walters (1969)
	28L1	Lacey, Harold	--	86	--	--	6	2510	--	D	Walters (1969)
	29D1	Gimlen, Howard	--	90	--	--	6	2620	--	D	Walters (1969)
	29H1	Gimlen, Howard	--	92	--	--	6	2575	--	D	Walters (1969)
	31J1	Jennings, F. A.	--	37	--	--	6	2555	--	D	Walters (1969)
	31R1	Glover, Glen	--	20	--	--	36	2555	--	D	Walters (1969)
	31R2	Glover, Glen	--	12	--	--	30	2550	--	S	Walters (1969)
	32F1	City of Pullman #7	1969	708	--	--	--	--	--	Destroyed	WSU Data
	35E1	Gray, Kenneth	--	148	--	--	6	2560	--	D	Walters (1969)
	35M1	Harper, Earl	--	18	--	--	54	2580	--	D	Walters (1969)
	35N1	Swales, G. O.	--	117	--	--	6	2620	--	D	Walters (1969)
	36Q1	Johnson, Harry	--	190	--	--	6	2735	--	Unused	Walters (1969)
	36Q2	Whitman, J.	--	127	57	127	--	2680	--	--	Lum (1990)
14N 44E	1E1	Harlow, Ray	1975	375	--	--	--	2560	--	--	Lum (1990)
	1J1	Hendricks	--	200	--	--	--	2660	--	--	Lum (1990)
	1J2	Barclay, Ellen	--	210	--	--	6	2520	--	D,S	Walters (1969)
	1J3	Gray, Floris	--	30	--	--	42	2545	--	D	Walters (1969)
	1L1	Bell, B. (Daubenmire)	--	275	--	--	6	2620	--	D	Lum (1990)

Location	Section	Owner	Year Drilled	Well Depth (ft)	Reported Open Interval (ft) Top	Bottom	Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
14N 44E (cont.)	1M1	195 & WWPul	--	--	--	--	--	2535	--	--	Lum (1990)
	1M2	Snyder, Jay	--	87	--	--	6	2540	--	D,S	Walters (1969)
	2A1	Okazaki, Shiro	--	50	--	--	6	2495	--	D	Walters (1969)
	2F1	Larson, Herman	1975	203	--	--	--	2490	--	--	WSU Data
	2K1	Hinrichs, Max	1952	79	79	--	6	2500	--	D,S	Walters (1969)
	2J1	Harlow, R.	--	241	--	--	6	2530	--	D,S	Lum (1990)
	2M1	Bloomfield, D. (F.)	--	102	30	102	8	2498	--	D,S	Lum (1990)
	12J1	Harms, E. L.	--	100	--	--	6	2530	--	D,S	Walters (1969)
	12P1	Pullman Country Club	--	100	--	--	6	2630	--	D	Walters (1969)
	13H1	Greenwell, Arnold	--	90	--	--	6	2530	--	D,S	Walters (1969)
	14J1	Greenwell, Arnold	1954	62	39	62	6	2545	--	D	Walters (1969)
	14P1	WSU Dairy #2	1980/93	600	350	430	10/8	2550	285.60	D&Ind	Drillers Log
	14P2	WSU Dairy #1	1959	600	400	600	10/8	2520	300.00	S,Ind	Drillers Log
	16F1	Broch, E.	--	160	--	--	--	2405	--	--	Lum (1990)
	16P1	Hinderer, K.	--	140	--	--	--	2318	--	--	
	23B1	Ledeman, Paul	--	20	--	--	72x54	2580	--	D	Walters (1969)
	24J1	Barbee, Bob	--	162	--	--	6	2625	--	D,S	Walters (1969)
	35H1	Dunning, A. L.	--	Horizontal	--	--	2	2570	--	D,S	Walters (1969)
	36J1	Swofford, Ada	--	60	--	--	6	2635	--	D	Walters (1969)
13N 46E	5N1	Kopf, August	--	125	--	--	6	3005	--	D	Walters (1969)
	7A1	Becker, Frank	--	75	--	--	8	2960	--	D,S	Walters (1969)
	7D1	Semler, Walter	--	10	--	--	54	2920	--	D,S	Walters (1969)
13N 45E	1B1	Hood, R.	--	--	--	--	--	2740	--	--	Lum (1990)
	2D1	Scarnecchia, D.	--	125	--	--	--	2660	0.00	D	Data from Owner
	2D2	Scarnecchia, D.	--	200	--	--	--	2660	0.00	D	Data from Owner
	3E1	Harper, Earl	--	86	--	--	6	2660	--	D,S	Walters (1969)
	3E2	Harper, Earl	--	65	--	--	6	2640	--	Unused	Walters (1969)
	3L1	Druffel, B. F.	--	90	--	--	6	2635	--	D,S	Walters (1969)
	3M1	Druffel, B. F.	--	15	--	--	30	2615	--	--	Walters (1969)
	3M2	Druffel, E.	--	100	--	--	6	2618	--	D,S	Lum (1990)
	3	Stuner, Pete	1989	141	110	140	6	2620	34.00	D	Drillers Log
	3Q1	Carson, Z. A.	1969	120	80	120	5		30.00	D	Drillers Log
	3N1	Simpson, Irene	1988	141	120	141	6	2630	57.00	D	Drillers Log
	4E1	Druffel, Franz	--	20	--	--	36	2610	--	Unused	Walters (1969)
	5D1	Senter, G.	--	190	20	190	--	2558	4.04	--	Lum (1990)
	5D2	Johnson Union Wrhs.	1974	355	50	203	6/4	2557	12.00	D	Drillers Log

Location	Section	Owner	Year Drilled	Reported Well Depth (ft)	Reported Open Interval (ft) Top	Reported Open Interval (ft) Bottom	Reported Casing Diameter (in)	Land Surface Elev. (ft)	Reported Depth to Water (ft)	Well Type	Remarks
13N 45E (cont.)	5H1	Druffel, Franz	--	61	--	--	6	2605	--	Unused	Walters (1969)
	6A1	Markham, M. L.	--	15	--	--	48	2560	--	D,S	Walters (1969)
	6C1	Gregerson, Joe	--	9	--	--	60	2625	--	D	Walters (1969)
	6	Riesen, Albert	1967	210	--	--	8/6	--	50.00	D,Irr	Drillers Log
	7Q1	Druffel, Martin	--	78	--	--	6	2670	--	D	Walters (1969)
	8B1	Maxwell, J. W.	--	304	40	304	6	2640	--	D,S	Walters (1969)
	8	Ellerson, Lillian	1990	90	44	90	8	--	22.00	D	Drillers Log
	10C1	Frei, Tony	--	125	--	--	6	2640	--	D,S	Walters (1969)
	10C2	Hoffman, Alfred	1945	133	44	133	6	2640	--	D	Walters (1969)
	10C3	Ellerson, John	1955	145	45/125	85/145	72x60	2630	--	D	Walters (1969)
	10D1	Druffel, Alfred	1952	175	60	175	6	2640	--	D	Walters (1969)
	10D2	Druffel, Alfred	1948	100	25	100	6	2630	--	Unused	Walters (1969)
	10E1	Busch, Frank	--	65	--	--	6	2635	--	D	Walters (1969)
	11G1	Cooper, Wilmar	--	12	--	--	96	2760	--	D	Walters (1969)
	12E1	Broemmeling, Leo	--	25	--	--	48x30	2865	--	D	Walters (1969)

APPENDIX B

MEASURED WATER LEVELS FOR WELLS LOCATED IN THE VIOLA, MOSCOW WEST AND PULLMAN QUADRANGLES, LATAH COUNTY, IDAHO AND WHITMAN COUNTY, WASHINGTON

Table 5. Water Level Measurements for Private Wells - Viola and Moscow West Quadrangles, Idaho

-- Data not available * Data found in Appendix C

Bovill=sediments of Bovill, W=Wanapum, GR=Grande Ronde

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
41N 5W	30cd1	Layell, Glenn	1977	--	26.00	--	--	--	--	--	--	--	--	--	--	Granite	
	31dd1	Michelson, Carl	1993	--	51.00	--	--	--	--	--	--	--	--	--	--	Granite	
40N 6W	1cbb1	Viola Wrt&Swr Disr.	1984	2695	140.00	--	--	--	--	--	--	--	--	--	--	W	
	1dd1	Cone, Marvin	1959	--	16.00	--	--	--	--	--	--	--	--	--	--	Granite	
	8cc1	Hansen, Jerry	1979	--	10.00	--	--	--	--	--	--	--	--	--	--	Granite	
	24aa1	Fleener, Loyal	--	2880	--	3.00	Aug-64	--	--	--	--	9.50	Aug-94	--	--	Bovill	
	24ca1	Hittle, Orville	1968	--	50.00	--	--	--	--	--	--	--	--	--	--	Granite	
	24cad1	Gillespie, Allan	1945	2740	--	3.00	Aug-64	48.50	Jun-72	--	--	--	--	--	--	Granite	
	24dcc1	Fleener, Loyal	--	2718	--	15.00	Aug-64	5.60	Jun-72	--	--	--	--	--	--	Bovill/Granite	
	25da1	Clark, D.	--	2680	--	--	--	--	--	27.74	1974-75	--	--	--	--	--	
	25dac1	O'Donnel, John	1962	2665	--	50.00	Nov-64	50.60	Nov-72	--	--	45.95	Aug-94	88.85	Jan-95	W	
	36aca1	O'Donnel, W. M.	1948	2608	--	80.00	1962	--	--	--	--	77.20	Aug-94	--	--	W	
	36bc1	Latah County	1900	2570	--	2.00	Apr-42	--	--	--	--	--	--	--	--	--	
40N 5W	6bc1	Musick, Howard	1969	--	50.00	--	--	--	--	--	--	--	--	--	--	Granite	
	7cd1	Gleason, Robert	1970	--	50.00	--	--	--	--	--	--	--	--	--	--	Granite	
	7dc1	Glover, Brent	1992	--	15.00	--	--	--	--	--	--	--	--	--	--	Granite	
	7db1	Hill, Merle	1979	--	15.00	--	--	--	--	--	--	--	--	--	--	Bovill	
	7aa2	Mead, John	1984	--	15.00	--	--	--	--	--	--	--	--	--	--	Granite	
	7aa3	Stevens, Wayne	1979	--	125.00	--	--	--	--	--	--	--	--	--	--	Granite	
	18acd1	Coomes, Gerald	1971	3075	170.00	--	--	57.50	Jun-72	--	--	--	--	--	--	Granite	
	18	Roberts, Dick	1978	--	225.00	--	--	--	--	--	--	--	--	--	--	Granite	
	18ab1	Tenney, Mrs.	1992	--	43.00	--	--	--	--	--	--	--	--	--	--	Granite	
	18db1	Kammeyer, Ray	--	3030	--	75.00	--	--	--	--	--	--	--	--	--	Granite	
	18db2	Kammeyer, Ray	1964	3010	--	2.00	Aug-64	--	--	--	--	--	--	--	--	Granite	
	19aa1	Delmar, Don	1976	--	50.00	--	--	--	--	--	--	--	--	--	--	Granite	
	19aa2	Kaymeir, Ray	1976	--	3.00	--	--	--	--	--	--	--	--	--	--	Granite	
	19db1	Young, Mel	1977	--	40.00	--	--	--	--	--	--	--	--	--	--	Granite	
	19dc2	Hawley, Rolland	1900	2710	--	20.00	--	--	--	--	--	--	--	--	--	Granite	
	30cad1	Niehenke, N.	1953	2636	--	--	--	132.20	Jun-72	--	--	--	--	--	--	W	
	30ca1	Ward, F.	--	2638	--	--	--	--	--	125.38	1974-75	--	--	--	--	W	
	30ca2	Moser, R. T.	1953	2630	--	88.00	Oct-53	--	--	--	--	--	--	--	--	W	
	31ac1	Boyd, Everett	1962	2700	--	180.00	1962	--	--	--	--	--	--	--	--	W	
	31bcd1	Carson, A. N.	--	2610	--	--	--	--	--	0.00	1974-75	0.90	Aug-94	0.00	Jan-95	W	
	31cad1	Carson, N. T.	1940	2627	--	65.00	Aug-64	93.50	Jun-72	--	--	--	--	--	--	Bovill	
	31cad2	Carson, N. T.	--	2620	--	5.00	Aug-64	--	--	--	--	--	--	--	--	W	
	31da1	Heick, C. A.	--	2690	--	5.00	Aug-64	--	--	--	--	--	--	--	--	Loess/Bovill	
	31dbc1	Rogers, K.	--	2635	--	--	--	--	--	30.00	1974-75	--	--	--	--	W	
	31dbc2	Rodgers, Catherine	--	2640	--	12.00	Aug-64	--	--	--	--	--	--	--	--	Bovill	
	31dcc1	Niehenke, Norbert	1991	2620	--	--	--	--	--	--	--	88.90	Aug-94	74.25	Jan-95	W	
	31dd1	Heick, C. A.	1963	2710	--	65.00	1963	--	--	--	--	--	--	--	--	Bovill/W	
39N 6W	12bdd1	Montgomery, Vic	1963	2610	--	--	--	73.10	Jun-72	--	--	--	--	--	--	W	
	12cdb1	App. Horse Club	1983	2540	70.00	--	--	--	--	--	--	90.70	Aug-94	72.25	Jan-95	W	
	12daa1	Univ. of Idaho #4	--	2554	--	--	--	--	--	284.66	1974-75	--	--	*	*	GR	
	12dba1	City of Moscow #9	1982	2538	280.00	--	--	--	--	287.00	1974-76	--	--	*	*	GR	
	12dcd1	Univ. of Idaho #5	1991	2580	83.00	--	--	--	--	--	--	--	--	--	--	W	
	12dcd3	Univ. of Idaho #7	1993	2580	183.00	--	--	--	--	--	--	--	--	--	--	W	
	12dc1	Univ. of Idaho (#1)	1987	2580	9.00	--	--	--	--	--	--	--	--	--	--	W	
	12dc2	Univ. of Idaho (#2)	1987	2590	17.00	--	--	--	--	--	--	--	--	--	--	W	

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data										Formation Completed in	Remarks
						Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date		
39N 6W (cont.)	12dd1	UI GW Research	1992	2544	22.00 & 55.00	--	--	--	--	--	--	--	--	--	--	W	
	12dd2	UI Water Resources	1992	2544	51.00	--	--	--	--	--	--	--	--	--	--	W	
	12dd3	Univ. of Idaho VE-2	1992	2544	0.00	--	--	--	--	--	--	--	--	--	--	Loam	
	12dd4	Univ. of Idaho VE-3	1992	2544	0.00	--	--	--	--	--	--	--	--	--	--	Loam	
	12dd5	Univ. of Idaho VE-4	1992	2544	0.00	--	--	--	--	--	--	--	--	--	--	Loam	
	12dd6	Univ. of Idaho VE-5	1992	2544	0.00	--	--	--	--	--	--	--	--	--	--	Loam	
	12dd7	Univ. of Idaho VE-6	1992	2544	0.00	--	--	--	--	--	--	--	--	--	--	Loam	
	13bd	Callahan, Dr.	1986	--	192.00	--	--	--	--	--	--	--	--	--	--	W	
	13cac1	Hartung, Ernest	--	2752	--	--	--	92.80	Jul-72	--	--	--	--	--	--	W	
	13cad1	Hattrup, H.	1947	2745	--	104.80	May-54	--	--	--	--	96.70	Aug-94	96.75	Jan-95	W	
	13cad3	Chinn, Lennard	1967	2700	--	--	--	243.20	Mar-72	--	--	--	--	--	--	GR	
	13ca1	Dohman, H.	--	2700	--	109.00	May-54	--	--	--	--	--	--	--	--	W	
	13cca1	Williams, Ray	1961	2748	--	90.00	--	--	--	--	--	--	--	--	--	--	
	13cca2	Williams, Ray	1961	2700	--	200.00	--	--	--	--	--	--	--	--	--	--	
	13cc	Hill, Otto	1979	--	280.00	--	--	--	--	--	--	--	--	--	--	W	
	13cd1	Hill, Otto	1983	--	125.00	--	--	--	--	--	--	--	--	--	--	W	
	13cd2	Stadium Mobile Park	1993	--	181.00	--	--	--	--	--	--	--	--	--	--	W	
	24bc	Wood, Randy	1968	--	80.00	--	--	--	--	--	--	--	--	--	--	W	
	24cba1	Gooby, Richard	1968	2610	--	--	--	76.50	Mar-72	--	--	--	--	--	--	W	
	24ccd1	Canode, Chet	1970	2520	9.00	--	--	8.80	Jun-72	--	--	--	--	--	--	Bovill	
	24cdc1	Jennings, Ralph	1970	2538	40.00	--	--	--	--	--	--	--	--	--	--	Bovill	
	30ca	Niehanki, Norbert	1972	--	130.00	--	--	--	--	--	--	--	--	--	--	W	
	36aaa1	Barber, David	1985	2630	--	--	--	--	--	--	--	>98.1	Aug-94	--	--	W	
	36dab1	Snow, Gerald	1982	--	30.00	--	--	--	--	--	--	--	--	--	--	Granite	
39N 5W	6aa	Randle, Lloyd	1978	--	62.00	--	--	--	--	--	--	--	--	--	--	Bovill	
	6aad1	Franklin, A. E.	--	2725	--	240.00	--	--	--	--	--	--	--	--	--	GR	
	6ddd1	Brandt, Steve	1994	2630	128.00	--	--	--	--	--	--	135.00	Aug-94	--	--	W	Owner/Log Data
	6cca1	Adams, Kevin	1994	2665	150.00	--	--	--	--	--	--	80.00	Aug-94	--	--	W	Owner/Log Data
	6ccd1	Buckingham, H.	1948	2590	--	3.00	--	--	--	--	--	--	--	--	--	W	
	6ccd2	Ayers, J. A.	--	2680		120.00	1951	--	--	--	--	--	--	--	--	W	
	6daa1	Randle, W. L.	1961	2700	--	100.00	--	203.00	Jun-72	--	--	--	--	--	--	W	
	6dad1	C & L Lockers	--	2650		--	--	61.00	Jun-72	--	--	64.35	Aug-94	66.00	Jan-95	Bovill	
	6db1	Anderson, V. G.	1940	2610		145.00	1964	--	--	--	--	--	--	--	--	--	
	6dca1	Harden, Dick (R. E)	1966	2682		--	--	180.00	Jun-72	--	--	174.00	Aug-94	--	--	W	
	6dbc1	Harden, R. E.	--	2630		--	--	127.80	Jun-72	--	--	--	--	--	--	W	
	6dbc2	Harden, Kurt	1988	2620	35.00	--	--	--	--	--	--	136.00	Aug-94	128.30	Jan-95	Bovill	
	6dcd1	Boas, E. L		2655	--	--	--	147.10	Jun-72	--	--	--	--	--	--	W	
	7bb	Sheets, Gorden	1990	--	14.00	--	--	--	--	--	--	--	--	--	--	Decom. Gr/cly	
	7bad1	City of Moscow #7	1962	2614	--	219.00	Jul-64	--	--	--	--	--	--	--	--	GR	
	7bad2	City of Moscow #8	1964	2617	--	212.00	1965	--	--	346.00	Jun-75	--	--	*	*	GR	
	7cbb1	Univ. of Idaho #3	1962	2558	256.00	256.00	May-64	--	--	276.00	Jun-75	--	--	*	*	GR	
	7cc 1	Univ. of Idaho	--	2540	--	47.00	Nov-55	--	--	--	--	--	--	--	--	--	
	7ccd1	Univ. of Idaho #2	1951	2552	--	100.00	Oct-55	--	--	--	--	--	--	--	--	W	
	7dad1	City of Moscow #1	1882	2568	--	95.00	Oct-55	--	--	--	--	--	--	--	--	--	
	7dad2	City of Moscow #2	1925	2568	20.00	94.00	1954	--	--	49.00	1974-75	--	--	*	*	W	
	7dad3	City of Moscow #3	1928	2569	20.00	101.00	Sep-55	--	--	58.00	1974-76	--	--	*	*	W	
	7dcd1	Olsen, Louis	1972	2560	76.00	--	--	56.80	Nov-72	--	--	--	--	--	--	W	
	7ddc1	Garrett Freight	--	2561	--	85.00	Oct-55	--	--	--	--	--	--	--	--	W	
	18aac1	Bond, John	--	2570	--	--	--	80.00	--	--	--	--	--	--	--	W	
	18aa2	Miller, Mark	--	2565	--	7.00	Nov-55	--	--	--	--	--	--	--	--	W	
	18aa3	Caldwell, Delbert	1962	2570	--	80.00	1962	--	--	--	--	--	--	--	--	W	
	18bad1	Univ. of Idaho #1	1920	2601	--	109.00	Oct-55	--	--	--	--	--	--	--	--	W	
	19aaa1	Fountain, Pete	1970	2547	--	--	--	16.30	Jul-72	--	--	--	--	--	--	W	

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
39N 5W (cont.)	19aac2	Bailey, Dexter	--	2554	--	--	--	20.00	Nov-72	--	--	--	--	--	--	--	
	19aba1	Terrace Gardens	1984	2562	--	--	--	38.20	Jul-72	--	--	37.40	Aug-94	27.20	Jan-95	W	
	19aba2	George, Lloyd	1960	2562	--	32.00	1960	--	--	--	--	--	--	--	--	W	
	19aba3	Anderson, Elmer	1946	2575	--	158.00	1946	--	--	--	--	--	--	--	--	W	
	19adc1	Williams, Bill	1972	2566	--	--	--	13.60	Jul-72	--	--	--	--	--	--	W	
	19baa1	Nielsen, C. L.	1964	2586	--	--	--	52.90	Jun-72	--	--	--	--	--	--	Granite	
	19baa2	Oller, O. O.	--	2575	--	25.00	--	52.70	Jun-72	--	--	--	--	--	--	W	
	19ba1	Loomis, Al	1967	--	10.00	--	--	--	--	--	--	--	--	--	--	Bovill	
	19ba3	Chestnut, Wayne	1964	2540	--	30.00	1964	--	--	--	--	--	--	--	--	W	
	19bab1	Kirkland, E. B.	--	2570	--	37.00	Mar-65	--	--	--	--	--	--	--	--	W	
	19bbb1	Anderson, C.	--	2567	--	50.00	1928	35.70	Jun-72	--	--	--	--	--	--	Bovill	
	19bb1	Praett, John	1964	2550	--	43.00	Mar-65	--	--	--	--	--	--	--	--	W	
	19dab1	Hobbs, Fred	1961	2575	--	--	--	5.30	Jun-72	--	--	--	--	--	--	Granite	
	19dcd1	Deesten, Martin	1945	2640	--	--	--	49.60	Jul-72	--	--	--	--	--	--	Granite	
	30aab1	Sinclair, Donald	--	2625	--	3.00	1963	--	--	3.00	1974-75	--	--	--	--	--	
	30ab	Cossairt, Lloyd	1973	--	8.00	--	--	--	--	--	--	--	--	--	--	Granite	
	30ac	Fleiger, Ernest	1971	--	9.00	--	--	--	--	--	--	--	--	--	--	Granite	
	30acc1	Murphy Estate	1938	2735	--	4.00	1964	18.30	Jun-72	--	--	--	--	--	--	Granite	
	30acc2	Murphy Estate	1951	2770	--	12.00	1964	--	--	--	--	--	--	--	--	--	
	30acc3	Clyde, Sherman	1951	2750	--	--	--	41.80	Jun-72	--	--	--	--	--	--	Granite	
	30acc4	Clyde, Sherman	1969	2718	--	--	--	7.20	Jun-72	--	--	--	--	--	--	Granite	
	30cac1	Lucas, James	1950	2770	--	38.00	1964	--	--	--	--	--	--	--	--	Granite	
	30cac2	Lucas, James	1964	2780	56.00	48.00	1964	--	--	--	--	--	--	--	--	Granite	
	30ccc1	Andrews, Duane	1994	2650	--	--	--	--	--	--	--	93.65	Aug-94	--	--	W	
	31ccc2	Snow, Gerald	1965	--	Plugged	--	--	--	--	--	--	--	--	--	--	W	
	31dd	Benson, Ed	1973	--	28.00	--	--	--	--	--	--	--	--	--	--	Decom. Gran.	
38N 6W	1ddb1	Redinger	--	2610	--	--	--	--	--	--	--	85.60	Aug-94	--	--	W	Data from Owner
	12acb1	Bindl, John	1992	2830	27.00	--	--	--	--	--	--	--	--	--	--	Granite	
	28ac?	Loomis, Larry	1977	--	30.00	--	--	--	--	--	--	--	--	--	--	Decom. Gran.	
	28ac?	Loomis, Larry	1978	--	60.00	--	--	--	--	--	--	--	--	--	--	Granite	

Table 6. Water Level Measurements for Private Wells - Viola, Moscow West and Pullman Quadrangles, Washington

-- Data not available * Data found in Appendix C

Bovill=sediments of Bovill, W=Wanapum, GR=Grande Ronde

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
16N 46E	18M1	Main, K	--	2570	--	--	--	--	--	14.60	Aug-94	8.15	Jan-95	W	Data from Owner
	30N1	Lawson, R. E.	--	2555	--	--	--	--	--	27.40	Aug-94	--	--	W	Data from Owner
	30Q1	Hill, Brock	--	2585	--	--	--	--	--	26.45	Aug-94	24.80	Jan-95	W	Data from Owner
16N 45E	15P1	Kuehner, M.	--	2495	--	--	--	7.99	Jun-75	15.75	Aug-94	--	--	Quartzite	
	22H1	Rupp, E.	--	2470	--	--	--	42.02	Jun-75	49.65	Aug-94	48.40	Jan-95	W	
	27Q1	Thompson, L.	--	2460	--	--	--	12.98	Jun-75	--	--	--	--	W	
	34?1	Rimble, Greg	1988	--	113.00	--	--	--	--	--	--	--	--	W	
	35K1	Mealhouse, V.	--	2560	0.00	--	--	--	--	--	--	--	--	--	
	35L1	Swan, Roger	1988	2510	10.95	--	--	--	--	10.95	Aug-94	--	--	W	
15N 46E	6E1	Hall, Lilly	--	2590	--	50.00	--	--	--	--	--	--	--	--	
	6G1	Quist, Theodore	--	2615	--	24.00	Oct-52	29.20	Jun-75	--	--	--	--	W	
	6P2	Mader, Paul	--	2620	--	24.89	Nov-53	--	--	--	--	--	--	--	
	7B1	Fleener, Sam	--	2635	--	5.15	Nov-53	--	--	--	--	--	--	--	
	7C1	Fleener, Sam	--	2640	--	47.12	Nov-53	53.02	Jun-75	63.30	Aug-94	--	--	W	
	7J1	Doyle, Percy	--	2660	--	20.00	Oct-42	--	--	--	--	--	--	--	
	8G1	Gillespie, Allan	--	2760	--	3.17	Nov-53	--	--	--	--	--	--	--	
	8L1	Fleener, Frank	1979	2700	NR	--	--	13.99	--	--	--	--	--	Bovill	
	8Q1	Dahl, Marvin	--	2800	--	95.00	1947	--	--	--	--	--	--	Granite	
	17B1	Williams, James	--	2800	--	36.45	Nov-53	--	--	--	--	--	--	--	
	18J1	Boyd, Carl	--	2655	--	23.43	Oct-53	--	--	--	--	--	--	--	
	19J1	O'Donnell, John	--	2575	--	16.34	Oct-53	--	--	19.00	Aug-94	15.40	Jan-95	--	
	19R1	O'Donnell, W. M.	--	2570	--	6.00	--	--	--	--	--	--	--	--	
	20K1	Carson, N. T.	1953	2590	--	6.38	Oct-53	--	--	--	--	--	--	--	
	20N1	Nelson, H. (O'Donnell)	--	2570	--	--	--	5.87	Jun-75	--	--	--	--	W	
	20P1	Carson, N. T.	--	2590	--	101.55	Oct-53	--	--	--	--	--	--	W	
	29N1	Paul, Charles	--	2670	--	65.00	1923	--	--	--	--	--	--	--	
	30N1	Goughnour, John	--	2620	--	7.93	Oct-53	--	--	--	--	--	--	--	
	31H1	Hagedorn, Gerry	1918	2610	--	70.10	Oct-53	--	--	63.40	Aug-94	--	--	W	Data from Owner
	31J1	Metzgar, Ed	--	2520	--	8.22	Oct-53	--	--	--	--	--	--	W	
	31K1	Yarborough, Carrie	--	2515	--	11.01	Oct-53	--	--	--	--	--	--	--	
15N 45E	1H1	Mader, John	--	2575	--	17.61	Nov-53	--	--	--	--	--	--	--	
	1H2	Mader, John	--	2585	--	4.34	Nov-53	--	--	--	--	--	--	--	
	2E1	Kimball	--	2620	--	--	--	--	--	85.85	Aug-94	84.60	Jan-95		
	2M1	Zakarison, Russell	--	--	74.00	--	--	--	--	--	--	--	--	W	
	3J1	Unknown	--	2580	--	4.66	Nov-53	--	--	--	--	--	--	--	
	3Q1	Zakarison, I. A.	--	2555	--	1.67	Nov-53	--	--	--	--	--	--	--	
	3R1	Unknown	--	2570	--	6.33	Nov-53	--	--	--	--	--	--	--	
	10E1	Steever, E.	--	2555	--	229.65	Nov-53	--	--	--	--	--	--	--	Destroyed
	10E2	Nelson, A. H.	--	2555	--	7.68	Nov-53	--	--	--	--	--	--	--	
	10F1	Nelson, A. H.	--	2535	--	42.78	Nov-53	--	--	--	--	--	--	--	
	10F2	Nelson, A. H.	--	2535	--	14.20	Nov-53	--	--	--	--	--	--	--	
	11K1	Held, Roy	--	2560	--	20.47	Nov-53	--	--	--	--	--	--	--	
	11N1	Kimzey, Jim	--	2585	--	79.82	Nov-53	--	--	--	--	--	--	--	

			Year	Land Surface	Drill Log	Water Level Data								Formation	
Location	Section	Owner on Log	Drilled	Elev. (ft)	Depth to Water (ft)	Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Completed in	Remarks
15N 45E (cont.)	13A1	Pogue, Omer	--	2610	--	30.00	--	--	--	--	--	--	--	--	
	13N1	Cunningham, Earmel	--	2545	--	19.83	Oct-53	--	--	--	--	--	--	--	
	14E1	Gray, Carl	--	2535	--	0.77	Nov-53	--	--	--	--	--	--	--	
	14E2	McGreevy, Daniel	1990	2535	235.00	--	--	--	--	145.72	Aug-94	145.30	Jan-95	GR	
	14M1	Pickell, B. I.	--	2505	--	2.56	Nov-53	--	--	--	--	--	--	--	
	14Q1	Stirewalt, Mary	1938	2520	--	146.00	Oct-49	--	--	--	--	--	--	GR	
	14Q2	Stirewalt, Mary	--	2530	--	25.28	Oct-53	--	--	--	--	--	--	--	
	15H1	Held, Roy	--	2540	--	27.13	Nov-53	--	--	--	--	--	--	--	
	22K1	Wexler, Cliff	--	2515	--	5.00	--	--	--	--	--	--	--	--	
	22M1	Pritchard, Tim	--	2480	--	6.59	Oct-53	--	--	--	--	--	--	--	
	23B1	Stirewalt, Mary	--	2500	--	31.43	Oct-53	--	--	--	--	--	--	--	
	24C1	Gray, Jesse	--	2535	--	17.12	Oct-53	--	--	--	--	--	--	--	
	25A1	Boyd, Merrill	--	2645	--	112.13	Oct-53	--	--	--	--	--	--	--	
	25A2	Boyd, Merrill	--	2650	--	--	--	114.10	Jun-75	118.10	Aug-94	--	--	W	
	25G1	Driscoll	--	2605	--	17.53	Oct-53	--	--	--	--	--	--	--	
	25G2	Boyd, Robèrt	1989	2605	41.00	--	--	--	--	--	--	--	--	W	
	25Q1	Boyd, L. (W. M.)	--	2609	--	59.53	Oct-53	50.00	reprted-75	55.50	Aug-94	--	--	W	
	26K1	Boyd, Orval	--	2620	--	281.05	Oct-53	--	--	--	--	--	--	GR	
	26K2	Boyd, Orval	--	2620	--	60.00	--	--	--	--	--	--	--	--	
	27M1	Boyd, Frank	--	2520	--	30.00	--	--	--	--	--	--	--	--	
	30N1	Motley	1994	2615	--	--	--	--	--	77.40	Aug-94	--	--	--	
	31M1	WSU ?	--	2345	23.40	23.00	May-57	--	--	--	--	--	--	GR	
	31M2	Pullman Disposal	1988	--	55.00	--	--	--	--	--	--	--	--	W	
	32C1	City of Pullman #6	1968	2430	132.00	--	--	152.10	Jun-75	*	*	*	*	GR	
	32C2	Turner, O. O.	--	2400	--	60.00	--	--	--	--	--	--	--	--	
	32G1	Berry, D. R.	--	2380	--	11.54	Nov-53	--	--	--	--	--	--	--	
	32N1	City of Pullman #2	1946\64	2355	9.00	36.00	Oct-64	*	*	*	*	*	*	GR	
	32N2	City of Pullman #4	--	2356	--	--	--	73.22	Jun-75	*	*	*	*	GR	
	33E1	WWP	1982	--	180.00	--	--	--	--	--	--	--	--	GR	
	33J1	WSU	--	2610	--	271.00	Sep-33	--	--	--	--	--	--	GR	
	34G1	Christian, Bill	1990	--	187.00	--	--	--	--	--	--	--	--	GR	
	34L1	WSU #5	1964	2505.36	NR	196.00	1964	238.00	Jun-75	*	*	*	*	GR	
	34N1	Whitlow, Earl	--	2485	--	6.00	--	--	--	--	--	--	--	--	
	35F1	Mos-Pul Airport	--	2531	--	--	--	7.00	Jun-75	--	--	--	--	W	
	36A1	Rodeen, Raymond	1993	--	23.00	--	--	--	--	--	--	--	--	GR	
	36Q1	Hagedorn, H. E.	--	2585	--	1.52	Oct-53	--	--	--	--	--	--	--	
15N 44E	35E1	Michaelson, V.	--	2412	--	--		130.15	Jun-75	--	--	--	--	GR	
	35F1	Michaelson, V.	--	2435	--	--	--	14.86	Jun-75	--	--	--	--	W	
14N 46E	5A1	Palouse Prod. Inc.	1977	2600	182.00	--	--	--	--	223.70	Aug-94	221.25	Jan-95	GR	
	5Q1	Anderson, Edgar	--	2760	--	106.23	May-54	--	--	--	--	--	--	--	
	5Q2	Williams, Guy	1987	2660	186.00	--	--	--	--	>301.6	Aug-94	--	--	W	
	6R1	Anderson, Edgar	1940	2650	--	90.00	1945	--	--	31.20	Aug-94	29.70	Jan-95	W	
	6R2	Anderson, Edgar	--	2650	--	--	--	--	--	123.70	Aug-94	120.50	Jan-95	W	
	7G1	Reid, Harold	--	2615	--	40.00	--	--	--	--	--	--	--	--	
	7H1	Boone, Mike	--	2645	--	--	--	--	--	40.00	Aug-94	--	--	--	
	7L1	Kent, Darrell	--	2580	0.00	--	--	--	--	--	Aug-94	--	--	--	
	7N1	Bowers, C. J.	--	2560	--	9.04	May-54	--	--	--	--	--	--	--	

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
14N 46E (cont.)	7N2	Shriver, Harold	1937	2575	--	40.00	1954	--	--	--	--	--	--	W	
	7N3	Braden, J.	--	2570	--	--	--	16.41	Jun-75	--	Aug-94	--	--	W	
	7N4	Braden, J.	--	2570	--	--	--	306.62	Jun-75	--	Aug-94	--	--	GR	
	7P2	Anderson, Edgar	--	2580	--	101.58	May-54	--	--	--	--	--	--	--	
	7Q1	Robertson, Jack	1972	2610	26.00	--	--	--	--	--	--	--	--	GR	
	8A1	Wickard, Bruce	--	2720	--	--	--	--	--	106.95	Aug-94	--	--	--	
	8K1	Anderson, Arnold	--	2620	--	35.00	1947	--	--	--	--	--	--	--	
	17A1	Lyon, Glen	1992	2580	84.00	--	--	--	--	56.65	Aug-94	--	--	W	
	17B1	Peterson, H. M.	--	2530	--	65.00	1945	--	--	--	--	--	--	--	
	17B2	Smith, Don	1992	--	20.00	--	--	--	--	--	--	--	--	W	
	19F1	Brown, L.	--	2485	--	--	--	11.52	Jun-75	23.87	Aug-94	19.30	Jan-95	Basalt	Data from Owner
	19M1	Haynes, Elmer	1951	2480	--	9.63	May-54	--	--	--	--	--	--	W	
	20K1	Cameron, --	--	2545	--	7.54	May-54	--	--	--	--	--	--	--	
	29P1	Hawley, Jesse	--	2625	--	38.00	--	--	--	--	--	--	--	--	
	29Q1	Hawley, Jesse	--	2615	--	1.32	May-54	--	--	--	--	--	--	--	
	30L1	Snow, Harold	--	2560	--	3.44	May-54	--	--	--	--	--	--	--	
	31F1	Steiner, --	--	2660	--	3.87	May-54	--	--	--	--	--	--	--	
	32C1	Strohm, C. V.	--	2655	--	5.48	May-54	--	--	--	--	--	--	W	
14N 45E	1F1	Pullman Test W. #11	1976	2470	200.00		--	213.61	Jun-75	--	--	--	--	GR	
	1N1	Paulson, Bill	1991	2590	257.00		--	--	--	75.00	Aug-94	75.00	Jan-95	GR	
	2	Pac West #2	1993	--	250.00		--	--	--	--	--	--	--	GR	
	2F1	Thonney, Larry	--	2530	--	6.29	Oct-53	--	--	--	--	--	--	W	
	2F2	Thonney, Larry	1947	2485	--	53.80	Oct-53	--	--	--	--	--	--	W	
	2F3	Thonney, Larry	1993	2485	179.00	--	--	--	--	--	--	--	--	GR	
	2H1	Kopf, Keith	1979	2490	130.00		--	--	--	130.00	Aug-94	--	--	GR	
	2H2	Poe Asphalt	1991	--	217.00		--	--	--	--	--	--	--	GR	
	2N1	Kopf, Roy	1993	2560	300+		--	--	--	>301.6	Aug-94	--	--	GR	
	2R1	Felsted, Harold	1974	2630	354.00		--	--	--	>301.6	Aug-94	--	--	GR	
	3B1	Wesson, Rich	1987	--	206.00		--	--	--	--	--	--	--	GR	
	3H1	Thonney, R. L.	--	2460	--	155.00	1940	--	--	--	--	--	--	W	
	3H2	Thonney, R. L.	--	2495	--	9.39	Oct-53	--	--	--	--	--	--	W	
	3H3	WWP	1957	2470	152.00	152.00	Aug-57	185.70	Jun-75	196.00	Aug-94	--	--	GR	
	3K1	Rolling Hills Dev. Co.	--	2455		108.00	1940	167.30	Jun-75	--	--	--	--	GR	
	3P1	Jorstad, S.	--	2460	--	22.26	Oct-53	19.65	Jun-75	--	--	--	--	W	
	4D1	WSU #6	1975	2534.5	255.00	--	--	267.00	Jun-75	*	*	*	*	GR	
	4H1	Buchanan, M. (WSU)	1935	2440	125.00	116.70	Feb-55	--	--	--	--	--	--	GR	
	4N1	WSU Turkey Farm	1967	2390	--	58.30	Oct-53	Dry	Jun-75	--	--	--	--	W	
	4Q1	Evers and Cole	1953	2560	--	95.65	Oct-53	--	--	--	--	--	--	W	
	4Q2	WSU	1938	2410	--	11.00	1932	--	--	--	--	--	--	--	Destroyed
	4Q3	Poe Asphalt	1990	2400	152.00	--	--	--	--	--	--	--	--	GR	
	4Q4	Carbon, Carl Jr.	1985	2420	40.00	--	--	--	--	--	--	--	--	GR	
	4R1	Buckley, Stanley	--	2440	--	35.00	1946	--	--	--	--	--	--	--	
	5D1	City of Pullman #1	1913/70	2338.8	42.00	Flows	1938	67.22	Jun-75	--	--	--	--	GR	
	5D2	Standard Lumber	--	2340	--	11.72	Feb-52	--	--	--	--	--	--	GR	
	5D3	City of Pullman #3	1962	2340.3	26.50	26.50	Jun-62	69.37	Jun-75	--	--	--	--	GR	
	5D4	Northern Pacific RR.	1940	2360	6.00	10.03	Jul-55	--	--	--	--	--	--	GR	
	5E1	City Ice Co.	1926	2335	--	18.86	Oct-53	--	--	--	--	--	--	W	
	5E3	True, M. C.	1894	2345	--	Flows	1894	--	--	--	--	--	--	W	

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
14N 45E (cont.)	5E5	Chevron, USA	1990	--	4.50	--	--	--	--	--	--	--	--	Alluvium	
	5F1	WSU Obs. Well	1910	2364	--	43.16	Jan-63	78.40	Jun-75	*	*	*	*	GR	
	5F2	WSU #1	--	2364.43	--	41.24	Oct-53	92.87	Jun-75	*	*	*	*	GR	
	5F3	WSU #3	1946	2364.94	--	44.69	Jul-57	--	--	*	*	*	*	GR	
	5F4	WSU #4	1962	2363.46	50.88	57.00	Nov-63	95.00	Jun-75	*	*	*	*	GR	
	5G1	WSU #2	--	2358.45	--	24.30	Oct-38	62.00	Mar-69	*	*	*	*	GR	
	5G2	WSU #7	1987	2415.6	154.00	--	--	--	--	*	*	*	*	GR	
	6D1	Hodge, J. C.	1951	2520	--	126.20	Oct-54	--	--	--	--	--	--	W	
	6D2	Hodge, J. C.	1949	2540	--	40.00	--	--	--	--	--	--	--	W	
	6D3	Utzman, George	--	2500	--	130.20	Jul-54	--	--	--	--	--	--	--	
	6D4	Anderson, J. (Woo)	1955	2515	--	146.98	Mar-56	168.21	Jun-75	--	--	--	--	GR	
	6E1	Weskel and Gray	--	2500	--	6.00	Jun-53	--	--	--	--	--	--	--	
	6E2	Samuelson, A. A.	1948	2465	--	62.00	--	--	--	--	--	--	--	W	
	7E1	Cole, H.	1954	2530	--	36.32	Jun-54	--	--	--	--	--	--	W	
	7F1	Spencer, G. R.	1952	2495	--	32.87	Dec-53	--	--	--	--	--	--	W	
	7F2	Spencer, G. R.	1983	--	20.00	--	--	--	--	--	--	--	--	W	
	7F3	Evergreen Blders #1	1967	2510	--	129.77	10.54	149.40	pre-1973	--	--	--	--	GR	
	7F4	Evergreen Blders #2	1970	2560	--	--	--	268.40	Jun-75	--	--	--	--	GR	
	7F5	Baldwin, Mrs.	1940	2490	--	25.00	1940	--	--	--	--	--	--	Basalt	
	7F6	Lee & Snell Jr.	1954	2508	149.50	--	--	--	--	--	--	--	--	GR	
	7H1	City of Pullman #6	1969	2445	--	--	--	--	--	*	*	*	*	GR	
	7K1	Baldwin, Mrs.	--	2470	--	2.79	May-54	--	--	--	--	--	--	W	
	7M1	Adams, Don	1954	2520	--	33.63	May-54	--	--	--	--	--	--	W	
	7M2	Blosser & Loughrey	1954	2525	--	43.24	Jun-54	--	--	--	--	--	--	W	
	7M3	Tomlinson & Baldwin	1954	2500	--	34.08	Jul-54	--	--	--	--	--	--	W	
	7N1	Hinrichs, Max	--	2505	--	12.00	--	--	--	--	--	--	--	--	
	8A1	Cook, James	--	2380	--	43.59	May-54	--	--	--	--	--	--	--	
	8A2	Wise, M.	--	2385	--	46.53	May-54	--	--	--	--	--	--	W	
	8E1	City of Pullman #5	--	2446.7	--	--	--	--	--	*	*	*	*	--	
	8G1	Woolliscroft, Ben	--	2380	--	5.21	May-54	--	--	--	--	--	--	GR	
	8G2	Woolliscroft, Ben	--	2400	--	72.96	Oct-54	--	--	--	--	--	--	--	
	8G3	Brown, D.	--	2400	--	--	--	112.67	Jun-75	--	--	--	--	GR	
	8H1	Neil, Herbert	--	2414	--	86.00	1948	--	--	--	--	--	--	--	
	8H2	Weller, H. C.	--	2425	--	119.40	Oct-54	--	--	--	--	--	--	--	
	8J2	Askins, James	--	2420	--	55.00	--	--	--	--	--	--	--	GR	
	8J4	Tweet, Ernest	1989	--	67.00	--	--	--	--	--	--	--	--	GR	
	8J3	Askins, J.	--	2420	--	--	--	147.65	Jun-75	--	--	--	--	GR	
	8L1	Pullman Cemetery	1931	2565	235.50	100.00	--	--	--	--	--	--	--	GR	Cem. Irr. Well
	8R1	Hickman, Vern	--	2430	--	55.00	1947	--	--	--	--	--	--	--	
	9E1	Hinchliff, C. (M. Wise)	--	2415	9.05	5.00	--	9.05	Jun-75	--	--	--	--	W	
	9E2	Neil, H.	1968	2420	125.70	--	--	142.97	Jun-75	--	--	--	--	--	
	9J1	Bienz, Darrel	1990	2560	295.00	--	--	--	--	--	--	--	--	GR	
	9N1	Meadowlark Sub.	1990	2500	200.00	--	--	--	--	--	--	--	--	GR	
	10P1	Stratton, H.	--	2540	--	40.00	--	31.45	Jun-75	--	--	--	--	W	
	11B1	Helm, Boone	--	2570	--	--	--	--	--	31.75	Aug-94	--	--	Basalt	Data from Owner
	11B2	Helm, Boone	--	2585	--	--	--	--	--	Dry	Aug-94	--	--	Basalt	Data from Owner
	11F1	Vosburgh, R. N.	--	2560	--	3.00	--	--	--	--	--	--	--	--	
	11N1	Unknown	--	2540	--	6.53	Nov-63	--	--	--	--	--	--	--	
	11P1	Baud, Eathel	--	2560	--	9.70	May-54	--	--	--	--	--	--	--	

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
14N 45E (cont.)	11P2	Pinzino, Dean	--	2570	--	--	--	--	--	144.30	Aug-94	--	--	Basalt	Data from Owner
	11P3	Ostrom, Dave	--	2600	--	--	--	--	--	37.50	Aug-94	--	--	Basalt	Data from Owner
	12M1	Wiley, T. E.	--	2605	--	0.25	May-54	--	--	--	--	--	--	--	
	13F1	Brown, Howard	--	2545	--	12.00	--	--	--	--	--	--	--	--	
	13F2	Brown, Howard	--	2545	--	2.06	May-54	--	--	--	--	--	--	--	
	13G1	Brown, Kenneth	--	2550	--	2.28	May-54	--	--	--	--	--	--	--	
	14N1	Druffel, Craig	1990	2470	80.00	--	--	--	--	184.30	Aug-94	--	--	GR	
	14R1	Unknown	--	2495	--	2.08	May-54	--	--	--	--	--	--	--	
	15B1	Leonard, George	--	2620	--	140.42	May-54	--	--	--	--	--	--	--	
	15B2	Leonard, George	1963	2600	NR	--	--	147.62	Jun-75	--	--	--	--	GR	
	16	Irwin & Wise	1966	2410	110.00	--	--	--	--	--	--	--	--	GR	
	16	Long, James S.	1968	2420	145.00	--	--	--	--	--	--	--	--	GR	
	16E1	Stratton, C. A.	--	2400	--	65.69	May-54	--	--	--	--	--	--	--	
	16E2	Stratton,W.	--	2400	--	--	--	Dry	Mar-73	--	--	--	--	W	
	16E3	Stratton,W.	--	2455	--	--	--	173.80	Jun-75	--	--	--	--	W	
	16F1	Stratton, C. A.	--	2410	--	2.31	May-54	--	--	--	--	--	--	--	
	16G1	WSU Spillman Farm	--	2480	--	179.50	Jul-57	215.00	Jun-75	--	--	--	--	GR	
	16J1	Cornelius, Scott	1993	--	67.00	--	--	--	--	--	--	--	--	GR	
	16N1	Boyd, Bill	1986	2410	40.00	--	--	--	--	--	--	--	--	W	
	16P1	Haynes, Ronald	--	2420	--	2.26	May-54	--	--	--	--	--	--	--	
	16Q1	Wagner, Bill	1979	2460	230.00	--	--	--	--	--	--	--	--	GR	
	16R1	Long, James	1993	--	21.00	--	--	--	--	--	--	--	--	W	
	16R3	Wise, G.	--	2418	--	--	--	142.87	Jun-75	--	--	--	--	GR	
	17A1	Jacobson, H.	--	2420	--	90.00	1950	--	--	--	--	--	--	GR	
	18M1	Griffen, T.	--	2535	--	7.50	1934	--	--	--	--	--	--	--	
	19D1	Kienholz, A. W.	--	2560	--	2.00	1943	--	--	--	--	--	--	--	
	19G1	Benscoter, J.	--	2575	--	--	--	13.50	Jun-75	--	--	--	--	W	
	19P1	Jorstad, S.	--	2590	--	12.97	May-54	--	--	--	--	--	--	--	
	20E1	Kirkendall, Claude	--	2635	--	10.14	May-54	--	--	--	--	--	--	--	
	20F1	Jacobson, Ed	1985	2550	35.00	--	--	37.77	Jun-75	--	--	--	--	W	
	21D1	Boyd, Bill	1988	2480	78.00	--	--	180.50	Mar-73	--	--	--	--	GR	
	21H1	Staley, L. C.	--	2435	--	130.00	--	--	--	--	--	--	--	--	
	21H2	Barnes, A.	--	--	--	--	--	152.60	Mar-74	--	--	--	--	--	
	21H3	Sears	--	2440	--	--	--	166.86	Jun-75	--	--	--	--	GR	
	22P1	Staley, John	--	2465	--	20.00	1950	--	--	--	--	--	--	--	
	22P2	Fairbanks, Alfred	1990	2464	35.00	--	--	185.67	Jun-75	--	--	--	--	GR	
	22Q1	Jennings, F. A.	--	2475	--	1.00	--	--	--	--	--	--	--	--	
	23R1	Meyer, Raymond	1965	2515	50.00		--	38.74	Jun-75	38.85	Aug-94	--	--	W	
	23Q1	Druffel, Ken	1992	2515	11.00		--	--	--	--	--	--	--	W	
	24G1	Hood, Alan	1972	2500	18.00		--	--	--	--	--	--	--	W	
	24H1	Haley, R. B.	--	2495	--	0.17	May-54	--	--	--	--	--	--	--	
	24Q1	Benedict, W.	--	2530	--	12.00	May-34	--	--	--	--	--	--	--	
	24R1	Benedict, W.	--	2510	--	13.00	Jul-34	--	--	--	--	--	--	--	
	25D1	Lyon, Robert	--	2520	--	13.55	May-54	--	--	17.70	Aug-94	--	--	--	
	25M1	Webber, Albert	--	2540	--	4.72	May-54	--	--	--	--	--	--	--	
	25Q1	Whitman, Don	--	2620	--	112.29	May-54	--	--	--	--	--	--	--	
	26C1	Bursch, Stanton	--	2535	--	21.95	May-54	--	--	--	--	--	--	--	
	26C2	Jennings, R.	--	2540	--	--	--	--	--	19.90	Aug-94	--	--	Basalt	Data from Owner
	26J1	Weber Farm	--	2545	--	11.03	May-54	42.99	Jun-75	--	--	--	--	W	

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
14N 45E (cont.)	26J2	Weber Farm	--	2545	--	--	--	9.34	Jun-75	--	--	--	--	W	
	28H1	Staley, L. C.	1941	2515	--	10.00	1941	--	--	--	--	--	--	W	
	28H2	Staley, L. C.	1989	2510	7.00	--	--	--	--	--	--	--	--	W	
	28H3	Boyd, Harold	--	2520	--	15.00	--	--	--	--	--	--	--	--	
	28K2	Staley, L. C.	--	2505	--	7.90	Jul-54	--	--	--	--	--	--	--	
	28L1	Lacey, Harold	--	2510	--	11.00	Jun-53	--	--	--	--	--	--	--	
	29D1	Gimlen, Howard	--	2620	--	35.00	1948	--	--	--	--	--	--	--	
	29H1	Gimlen, Howard	--	2575	--	33.13	May-54	--	--	--	--	--	--	--	
	31J1	Jennings, F. A.	--	2555	--	8.12	May-54	--	--	--	--	--	--	--	
	31R1	Glover, Glen	--	2555	--	9.36	May-54	--	--	--	--	--	--	--	
	31R2	Glover, Glen	--	2550	--	4.80	May-54	--	--	--	--	--	--	--	
	35E1	Gray, Kenneth	--	2560	--	18.57	May-54	--	--	--	--	--	--	--	
	35M1	Harper, Earl	--	2580	--	4.17	May-54	--	--	--	--	--	--	--	
	35N1	Swales, G. O.	--	2620	--	Flows	May-54	--	--	--	--	--	--	--	
	36Q1	Johnson, Harry	--	2735	--	14.19	May-54	--	--	--	--	--	--	--	
	36Q2	Whitman, J.	--	2680	--	--	--	4.44	Jun-75	--	--	--	--	W	
14N 44E	1E1	Harlow, Ray	1975	2560	--	--	--	108.22	Jun-75	--	--	--	--	GR	
	1J1	Hendricks	--	2660	--	--	--	0.00	Jun-75	--	--	--	--	W	
	1J2	Barclay, Ellen	--	2520	--	120.00	--	--	--	--	--	--	--	W	
	1J3	Gray, Floris	--	2545	--	23.03	Aug-54	--	--	--	--	--	--	Loess	
	1L1	Bell, B. (Daubenmire)	--	2620	--	205.00	--	221.18	Jun-75	--	--	--	--	W	
	1M1	195 & WWPul	--	2535	--	--	--	46.40	Jun-75	--	--	--	--	W	
	1M2	Snyder, Jay	--	2540	--	17.00	--	--	--	--	--	--	--	W	
	2A1	Okazaki, Shiro	--	2495	--	13.18	Jul-54	--	--	--	--	--	--	W	
	2K1	Hinrichs, Max	1952	2500	--	15.00	--	--	--	--	--	--	--	GR	
	2J1	Harlow, R.	--	2530	--	--	--	11.64	Jun-75	--	--	--	--	GR	
	2M1	Bloomfield, D. (F.)	--	2498	--	48.00	1950	34.26	Jun-75	--	--	--	--	W	
	12J1	Harms, E. L.	--	2530	--	87.00	1952	--	--	--	--	--	--	W	
	13H1	Greenwell, Arnold	--	2530	--	46.00	--	--	--	--	--	--	--	W	
	14J1	Greenwell, Arnold	1954	2545	--	14.00	--	--	--	--	--	--	--	W	
	14P1	WSU Dairy #2	1980/93	2550	285.60	--	--	286.00	Jun-75	--	--	--	--	GR	
	14P2	WSU Dairy #1	1959	2520	300.00	236.00	Feb-59	--	--	--	--	--	--	GR	
	16F1	Broch, E.	--	2405	--	--	--	120.02	Jun-75	--	--	--	--	GR	
	23B1	Ledeman, Paul	--	2580	--	11.24	Aug-54	--	--	--	--	--	--	Loess	
	24J1	Barbee, Bob	--	2625	--	60.00	1951	--	--	--	--	--	--	W	
	36J1	Swofford, Ada	--	2635	--	23.72	Aug-54	--	--	--	--	--	--	W	
13N 46E	5N1	Kopf, August	--	3005	--	19.53	Jun-54	--	--	--	--	--	--	Granite	
	7A1	Becker, Frank	--	2960	--	10.00	1944	--	--	--	--	--	--	Granite	
	7D1	Semler, Walter	--	2920	--	2.84	Jun-54	--	--	--	--	--	--	Loess\Gran.	
13N 45E	2D1	Scarnecchia, D.	--	2660	0.00	--	--	--	--	0.00	Aug-94	--	--	--	
	2D2	Scarnecchia, D.	--	2660	0.00	--	--	--	--	0.00	Aug-94	--	--	--	
	3E1	Harper, Earl	--	2660	--	50.00	--	--	--	--	--	--	--	W	
	3E2	Harper, Earl	--	2640	--	35.13	Jun-54	--	--	--	--	--	--	W	
	3L1	Druffel, B. F.	--	2635	--	12.00	--	--	--	--	--	--	--	W	
	3M1	Druffel, B. F.	--	2615	--	7.80	Jul-34	--	--	--	--	--	--	Loess	
	3M2	Druffel, E.	--	2618	--	4.85	Jun-54	--	--	--	--	--	--	W	

Location	Section	Owner on Log	Year Drilled	Land Surface Elev. (ft)	Drill Log Depth to Water (ft)	Water Level Data Meas.	Date	Meas.	Date	Meas.	Date	Meas.	Date	Formation Completed in	Remarks
13N 45E (cont.)	3	Stuner, Pete	1989	2620	34.00	--	--	--	--	--	--	--	--	GR	
	3Q1	Carson, Z. A.	1969	--	30.00	--	--	--	--	--	--	--	--	W	
	3N1	Simpson, Irene	1988	2630	57.00	--	--	--	--	--	--	--	--	GR	
	4E1	Druffel, Franz	--	2610	--	10.13	Jun-54	--	--	--	--	--	--	Loess	
	5D1	Senter, G.	--	2558	4.04	--	--	--	--	--	--	--	--	W	
	5D2	Johnson Union Wrhs.	1974	2557	12.00	--	--	--	--	--	--	--	--	Granite	
	5H1	Druffel, Franz	--	2605	--	31.64	Jun-54	--	--	--	--	--	--	W	
	6A1	Markham, M. L.	--	2560	--	3.89	May-54	--	--	--	--	--	--	Loess	
	6C1	Gregerson, Joe	--	2625	--	3.00	--	--	--	--	--	--	--	Loess	
	6	Riesen, Albert	1967	--	50.00	--	--	--	--	--	--	--	--	Granite	
	7Q1	Druffel, Martin	--	2670	--	18.40	Dec-53	--	--	--	--	--	--	W	
	8B1	Maxwell, J. W.	--	2640	--	60.00	1948	--	--	--	--	--	--	W	
	8	Ellerson, Lillian	1990	--	12.00	--	--	--	--	--	--	--	--	W	
	10C1	Frei, Tony	--	2640	--	60.00	1953	--	--	--	--	--	--	W	
	10C2	Hoffman, Alfred	1945	2640	--	20.00	1945	--	--	--	--	--	--	W	
	10C3	Ellerson, John	1955	2630	--	25.00	--	--	--	--	--	--	--	GR	
	10D1	Druffel, Alfred	1952	2640	--	100.00	--	--	--	--	--	--	--	W	
	10D2	Druffel, Alfred	1948	2630	--	9.78	Dec-53	--	--	--	--	--	--	W	
	10E1	Busch, Frank	--	2635	--	22.20	Sep-55	--	--	--	--	--	--	W	
	11G1	Cooper, Wilmar	--	2760	--	4.00	--	--	--	--	--	--	--	Loess	
	12E1	Broemmeling, Leo	--	2865	--	6.00	--	--	--	--	--	--	--	Loess	

APPENDIX C

WATER LEVEL MEASUREMENTS FOR MUNICIPAL WELLS MOSCOW, IDAHO, UNIVERSITY OF IDAHO, PULLMAN, WASHINGTON, WASHINGTON STATE UNIVERSITY

Table 7. Moscow Well #2 (39N 5W 7dad2) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	1	4.1	3.6	7.9	25.2	5.9	18.7	21.9	8.1	7.6	6.2	22.1	11.03
1981	8.5	8.5	4.2	0.52	0.078	0.08	13.7	27.9	16.7	2.4	1.8	0.46	7.07
1982	0.78	0.31	0.45	0.95	1.4	16.1	15.2	25.4	10.9	0.83	0.35	0.6	6.11
1983	4.6	4.9	0.21	0.5	2.8	3.3	3	9.3	0.39	0.37	0.17	0.36	2.49
1984	0.16	0.37	0.21	0.51	7.7	6.5	5.3	4.6	3.5	3.2	0.71	1.2	2.83
1985	2.5	0.31	0.4	0.58	0.24	1.3	17.1	1.8	13.5	6.9	7.7	5.4	4.81
1986	0.025	0.1	0.25	0.11	0.18	0.67	3.8	11.1	0.28	0.11	0.043	0.52	1.43
1987	0.32	0.11	0.15	0.28	0.32	0.69	1.2	1.6	0.54	0.073	0.17	0.43	0.49
1988	0.31	0.59	0.66	9.5	1.5	1.1	5.1	11.9	2.1	0.44	0.76	0.41	2.86
1989	0.31	0.15	0.6	1.6	2.2	6.3	15.8	12.2	5.2	1.4	3.5	1.4	4.22
1990	11.8	11.7	10.1	5.1	10.7	13.4	22.1	20.3	18.8	18.4	12.6	16	14.25
1991	2.1	0	8.8	19.8	19.1	12.6	20.9	23.6	23	9.5	12.7	13.7	15.07
1992	22.7	24.2	24.7	11.1	13.6	20.3	19.4	21.1	12.9	11.9	9.8	10.2	16.83
1993	12.8	6.5	10.2	11.1	12.6	16.5	15.7	18.1	17.8	12.5	2.4	10.1	12.19
1994	8.4	11.6	11.7	11.2	--	--	--	--	--	--	--	--	10.73

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	2508	2508	2509	2509	2510	2510	2510	2509	2514	2512	2511	2510	2510.00
1984	2507	2511	2512	2512	2512	2511	2512	2512	2512	2512	2513	2513	2511.58
1985	2513	2513	2513	2513	2514	2514	2512	2512	2512	2513	2513	2513	2512.92
1986	2514	2514	2514	2511	2511	2511	2511	2511	2510	2510	2511	2513	2511.75
1987	2514	2510	2511	2512	2510	2510	2510	2510	2510	2510	2510	2510	2510.58
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	2494	2498	2497	2496	2496	2497	2495	2495	2496	2497.5	2498	2498	2496.46
1990	2514	2516	2518	2511	2506	2504	2502	2503	2502	2503	2504	2504	2507.25
1991	2503.6		2506.9	2504.7	2503.7	2505.2	2502.5	2500.6	2500.4	2500.4	2502.4	2503.5	2503.08
1992	2502.2	2502.8	2501.9	2503.4	2503.3	2502	2502.4	2501.6	2499.8	2499.9	2499.7	2499.8	2501.57
1993	2499.7	2503	2501.1	2500.8	2501.1	2500.3	2499.8	2499.3	2499.4	2499.9	2501.5	2501.3	2500.60
1994	2471.1	2470.8	2471.9	2471.7	--	--	--	--	--	--	--	--	2471.38

Table 8. Moscow Well #3 (39N 5W 7dad3) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	0	0	0	0	8.7	0.04	5.4	3.5	0.032	0	0	0.065	17.74
1981	0	0	1	1.3	1.7	1.5	11.8	26.8	3.2	0.012	0.007	0	47.32
1982	0	0	0	0	0.052	6.2	6.4	10.2	0.15	0	0	0	23.00
1983	0	0	0	0	0	0.066	0	0	0	0	0	0	0.07
1984	0	0	0	0.21	0.006	0	0	0.035	0	0	0	0	0.25
1985	0	0	0	0	0	0.001	0.77	0	0	0	0	0	0.77
1986	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0.025	0	0	0	0	0	0	0	0	0.03
1990	0	0	0	1.6	2.2	0.37	0	0	0	0	0	1.1	5.27
1991	1.2	0	0	0	0	0	0	0	0	0	0	0	1.20
1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	1.4	0.84	0	0	0	0	2.24
1994	0	0	0	0	--	--	--	--	--	--	--	--	0

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Average
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	--	--	--	2490	2488	--	--	2487	--	--	--	--	2488
1985	--	--	--	--	--	--	--	--	--	--	--	--	--
1986	--	--	--	--	--	--	--	--	--	--	--	--	--
1987	--	--	--	--	--	--	--	--	--	--	--	--	--
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	--	--	--	--	--	--	--	--	--	--	--	--	--
1990	--	--	--	2487	2515	2515	--	--	--	--	--	2514	2508
1991	2512.7	--	--	--	--	--	--	--	--	--	--	--	2513
1992	--	--	--	--	--	--	--	--	--	--	--	--	--
1993	--	--	--	--	--	--	--	--	--	--	--	--	--
1994	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 9. Moscow Well #6 (39N 5W 8bdb1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Total
1980	22.1	17	16.8	28.9	28.1	25.3	31.9	34.2	22.1	22.2	20.5	15.8	23.74
1981	10	19.8	16.3	20.3	21.7	23.2	31.3	26.1	29.5	22.9	22.4	24.9	22.37
1982	24.8	21.1	22.3	22.8	27.2	32.2	32.6	32.6	27.6	24.3	23.4	23	26.16
1983	24.8	25.8	23.6	26.5	28.1	23.8	25.5	27.9	22.1	23.3	23.5	26.5	25.12
1984	27.2	22.9	24.8	9.9	22.6	14.5	23.7	20.3	15.2	26.7	24.5	24.9	21.43
1985	23.4	23.4	21	13.4	12.3	16.5	29.5	17.5	21.7	27.7	23.4	24.1	21.16
1986	9.6	11.8	13.9	15.8	17.7	24.5	25.8	30.5	20.8	20.7	19.1	17.7	18.99
1987	18.3	15.6	16.2	17.4	20.3	22	22.1	28.2	24.1	17.7	14.7	15.1	19.31
1988	15.4	15	15	17.7	20.1	21.7	15.4	25.1	20.4	16.7	13.1	13.5	17.43
1989	13.5	13.7	15	14.9	15.6	22.9	31.8	25.8	19.6	19.3	17.2	18.2	18.96
1990	20.5	20.8	22.1	19.9	14.7	17.3	28.5	24.2	23.7	22.3	16.1	20.6	20.89
1991	16.9	15.5	18.4	19.1	18.8	13.5	22.1	23.5	12.4	7.6	9.7	--	14.79
1992	--	--	3.9	15.4	19.8	24.5	22.7	24.6	16.1	14.2	11.6	6.9	13.31
1993	1.7	11.7	11.1	12.4	14.3	14.1	14.5	22.9	20.6	14.6	14.9	12.1	13.74
1994	13.8	12.2	12.8	13.8	--	--	--	--	--	--	--	--	13.15

Water Level elevation (ft)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	2241	2231	2236	2230	2231	2237	2235	2229	2239	2241	2252	2244	2237
1984	2237	2243	2242	2263	2250	2256	2246	2249	2253	2209	2210	2216	2240
1985	2239	2254	2227	2251	2256	2247	2232	2250	2244	2232	2238	2239	2242
1986	2265	2261	2262	2257	2253	2241	2247	2234	2244	2246	2248	2251	2251
1987	2248	2245	2251	2247	2245	2234	2236	2232	2229	2244	2251	2250	2243
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	2250	2246	2244	2244	2244	2231	2218	2220	2238	2240	2239	2244	2238
1990	2227	2227	2232	2239	2249	2228	2210	2220	2224	2232	2241	2235	2230
1991	2239.7	2239.5	2240.1	2235.4	2235	2244.5	2227.4	2218.1	2215.2	2229.1	2229.4	--	2046
1992	--	--	2235.1	2236.8	2226.1	2202.8	2219.5	2211.1	2234.9	2240.6	2243.6	2244.7	1858
1993	2242	2244.4	2241.7	2241.7	2239.3	2231.8	2232.6	2219.7	2224	2234.3	2239	2241.2	2236
1994	2241.3	2240.3	2241.2	2238.5	--	--	--	--	--	--	--	--	2240

Table 10. Moscow Well #8 (39N 5W 7bad2) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	17.4	20.5	23.4	15.1	0.45	24.9	31.6	32.1	21.6	23.6	74.3	9.8	294.75
1981	24.7	13.2	21.6	22	22.5	24.3	30.7	33.6	24.7	19.8	18.3	14.8	270.2
1982	16.6	18.9	20.6	20.6	22.6	25.5	25.5	26.4	22.2	23.7	20.6	18.5	261.7
1983	19.3	21.5	20.2	20.8	21.4	18.7	21.9	22.7	16.5	15.3	23.8	19.5	241.6
1984	19.9	18.2	18.1	4.5	17.9	13.6	23.1	22.3	18.9	20.9	18.9	19.5	215.8
1985	18.5	21.8	26.5	16.9	15.2	17.9	20.4	9.1	13.5	17.7	15.6	15.7	208.8
1986	10.4	7.9	2.7	6.2	10.1	20.5	5.4	8.5	12.5	14.4	6.6	12.1	117.3
1987	14.2	14.8	14.3	13.8	14.7	18.2	18.2	20.2	18.2	13.8	14.3	13.8	188.5
1988	13.4	13.4	10.9	2.4	0.27	11.6	21.8	20.3	17.3	13.1	11.4	8.7	144.57
1989	10.8	11.6	11.9	13.9	14.3	15.9	20.1	20.4	15.8	14.8	12.8	12.8	175.1
1990	13.9	15.1	15.7	14.3	11.5	12.1	18.2	17.6	16.1	19.1	13.5	18.3	185.4
1991	14.5	13.7	15.8	16.5	16.4	10.5	17.1	17.8	14.9	12.7	11.1	8.9	169.9
1992	17.4	19.6	20.6	11.1	15.1	18.8	16.2	16.8	13.6	11.2	9.3	12.8	182.5
1993	14.2	10.7	12.1	11.8	12.4	15.9	15.7	22.4	18.1	14.3	11.2	10.9	169.7
1994	11.3	10.2	10.6	11.4	--	--	--	--	--	--	--	--	43.5

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	2242	2236	2241	2237	2237	2240	2239	2236	2242	2243	2246	2245	2240.33
1984	2242	2244	2241	2245	2245	2246	2244	2243	2244	2240	2241	2247	2243.50
1985	2253	2248	2249	2252	2253	2249	2246	2252	2251	2251	2249	2250	2250.25
1986	2253	2251	2251	2241	2256	2244	2265	2249	2255	2256	2257	2258	2253.00
1987	2256	2254	2257	2258	2245	2236	2242	2243	2247	2257	2254	2247	2249.67
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	2246	2254	2254	2251	2249	2247	2240	2239	2240	2247	2251	2251	2247.42
1990	2249	2247	2245	2248	2252	2245	2238	2239	2242	2239	2242	2239	2243.75
1991	2246.7	2246.4	2247.1	2245	2245.7	2249.7	2242.4	2239.9	2246.1	2252.6	2252	2256.8	2247.53
1992	2255.5	2254	2249	2249.5	2244.6	2239.5	2243.1	2241	2245	2248	2249	2251	2247.43
1993	2253	2249	2249	2248	2247	2245	2244.8	2238.4	2240	2243.5	2247.3	2248	2246.08
1994	2248.1	2248	2248.2	2247.1	--	--	--	--	--	--	--	--	2247.85

Table 11. Moscow Well #9 (39N 6W 12dba1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	0.099	1.1	0.41	0.96	2.7	0.15	4.5	6.8	0.057	0.067	0.29	0.081	17.21
1981	0.057	0.039	0.17	0.079	0.078	0.26	3	7.1	3.2	0.012	0.007	0.014	14.02
1982	0	0	0.023	0	0.16	2.1	3.4	3.9	0.72	0	0	0	10.30
1983	0	0	0	0	0	9.1	19.5	21.9	41.8	20.6	14.2	1.9	129.00
1984	0	2.8	3.1	29.1	0.35	19.1	55.6	52.7	17.8	0	0	0	180.55
1985	1.4	0	0	18.3	29.2	35.7	57.8	40.6	4.8	0	0	0.61	188.41
1986	24.7	22.3	25.4	22.9	23.6	10.5	46.5	55.5	15.1	12.5	17.7	12.3	289.00
1987	10.6	12.6	14.8	17.7	24.8	28.7	32	46.6	35.5	28.1	17.8	14.9	284.10
1988	17.1	16.5	21.1	25.8	31.1	33.1	48.4	54.9	32.5	25.3	19.9	21.3	347.00
1989	21.5	22.2	19.3	20.4	24.1	29.4	43.7	31.2	21.8	23.9	18.4	19.7	295.60
1990	7.8	8.9	18.5	26	14.9	18.1	43.3	36.2	27.7	0.95	8.5	0.48	211.33
1991	17.1	17.5	7.6	0	1.2	15.1	38.2	46.6	37.9	35.4	15.1	25.9	257.60
1992	11.5	8.1	6.1	19.2	31.1	39.8	37.1	41.3	24.8	22.8	18.8	19.8	280.40
1993	23.7	18.8	20.1	19.6	22.5	29.3	25.5	35.5	31.3	22.5	23.1	18.6	290.50
1994	20.8	18.5	19.2	20.8	--	--	--	--	--	--	--	--	79.30

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	2246	2248	2246	2246	2245	--	2246
1984	--	2244	2258	2247	2248	2253	2249	2248	2253	--	--	--	2250
1985	2250	--	2252	2249	2249	2252	2249	2249	2250	--	--	2253	2250
1986	2250	2249	2251	2251	2249	2250	2251	2251	2249	2252	2252	2249	2250
1987	2250	2249	2250	2251	2251	2249	2249	2249	2248	2249	2248	2249	2249
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	2251	2246	2248	--	--	2256	2253	2253	2252	2252	2252	2253	2252
1990	2253	2252	2253	2253	2253	2252	2252	2251	2251	2252	2251	2252	2252
1991	2251.5	2251.9	2252.3	--	2255.5	2257.7	2257.5	2256.6	2256.6	2256.7	2256.1	2256.4	2255
1992	2257.3	2258	2258	2257.9	2259	2258.5	2258.1	2258	2256	2257	2258	2256	2258
1993	2253	2254	2255	2254	2254	2254	2254	2253.6	2253.1	2253.2	2253.1	2253.8	2254
1994	2253.9	2253.8	2254.5	2253.9	--	--	--	--	--	--	--	--	2254

Table 12. Moscow Cemetary Well Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Total
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	3.1	2.5	1.4	0.72	1.3	0.75
1985	1.8	1.8	2.1	1.3	0.61	0.77	4.8	0.29	0.91	0.48	0.37	0.45	1.31
1986	0.34	0.26	0.23	0.28	0.06	0.4	1.4	2	0.2	0.054	--	0.27	0.46
1987	0.14	0.14	0.21	0.26	0.15	0.26	0.08	0.21	0.26	0.028	0.11	0.14	0.17
1988	0.43	--	0.19	2	0.44	1.1	0.46	2.5	0.82	0.38	0.51	0.23	0.76
1989	--	--	--	--	--	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--	--	--	--	--	--
1993	--	--	--	--	--	--	--	--	--	--	--	--	--
1994	--	--	--	--	--	--	--	--	--	--	--	--	--

Water Level Elevation (ft)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	2469	2474	2475	2475	2475	2474
1985	2476	2479	2481	2480	2479	2468	2487	2482	2483	2481	2479	2478	2479
1986	2476	2476	2475	2474	2478	--	2474	2478	2482	2474	--	--	2476
1987	2529	2529	2530	2531	2531	2434	2532	2530	2534	2534	2534	2534	2524
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	2484	2482	2479	2476	2469	2462	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--	--	--	--	--	--
1993	--	--	--	--	--	--	--	--	--	--	--	--	--
1994	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 13. U of I Well #3 (39N 5W 7cbb1) Pumpage Rates and Water Level Elevations

– Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	5.06	5.71	4.79	5.39	2.90	8.99	12.48	3.90	10.32	0	0	0	59.54
1981	0	21.02	24.48	25.70	23.64	19.98	32.63	28.95	0	0	0	0	176.40
1982	0	0	10.04	0	0	0	0	0	2.29	5.86	7.28	8.89	34.36
1983	8.93	0	10.28	7.78	1.37	0	0	0	0	4.05	3.29	5.09	40.79
1984	5.60	2.60	19.07	3.82	16.45	11.95	33.80	7.82	0	17.41	2.33	17.85	138.70
1985	2.02	15.31	7.69	20.45	0	19.45	0	0	0	20.83	0	0	85.75
1986	2.41	19.48	3.28	21.26	4.09	24.76	5.62	30.25	0	20.75	3.11	20.38	155.39
1987	7.77	25.18	3.20	24.29	2.74	21.80	8.24	33.90	11.53	28.04	3.93	18.56	189.18
1988	0	0	7.04	24.65	5.42	23.53	5.53	31.19	7.69	23.60	5.76	15.38	149.79
1989	4.98	0	24.87	3.74	17.14	4.23	0	0	24.35	28.41	25.07	23.40	156.19
1990	23.45	5.03	20.55	4.55	18.36	4.09	32.58	7.89	0	0	0	1.03	117.53
1991	2.19	0	1.01	0.78	0	19.95	34.11	22.17	0	0	1.45	0	81.66
1992	0	0	0	0	0	29.13	34.50	2.68	0	23.82	25.12	26.75	142.00
1993	27.25	27.39	28.03	28.85	12.85	0	21.20	3.12	0	0	16.45	4.94	170.08
1994	14.94	23.57	15.78	–	–	–	–	–	–	–	–	–	54.29

Water Level Elevations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Average
1980	2285.00	2285.00	2285.00	2285.00	2285.00	2285.00	2283.00	2284.00	2284.00	–	–	–	2284.56
1981	2284.00	2284.00	2284.00	2284.00	2284.00	2284.00	2287.00	2293.00	–	–	–	–	2285.50
1982	–	–	2283.00	–	–	–	–	–	2297.00	2297.00	2300.00	2298.00	2295.00
1983	2296.00	–	2300.00	2298.00	2298.00	–	–	–	–	2288.00	2294.00	2292.00	2295.14
1984	2291.00	2291.00	2285.00	2274.00	2274.00	2273.00	2273.00	2272.00	–	2272.00	2273.00	2272.00	2277.27
1985	2272.00	2272.00	2271.00	2271.00	–	2271.00	–	–	–	2271.00	–	–	2271.33
1986	2270.00	2270.00	2270.00	2270.00	2270.00	2270.00	2268.00	2267.00	–	2268.00	2269.00	2269.00	2269.18
1987	2268.00	2269.00	2269.00	2268.00	2269.00	2267.00	2268.00	2266.00	2266.00	2266.00	2266.00	2267.00	2267.42
1988	2269.00	2269.00	2269.00	2269.00	2269.00	2269.00	2269.00	2267.00	2269.00	2268.00	2267.00	2269.00	2268.58
1989	2269.00		2269.00	2269.00	2269.00	2266.00	–	–	2268.00	2269.00	2269.00	2269.00	2268.56
1990	2269.00	2269.00	2269.00	2269.00	2269.00	2269.00	2268.00	2269.00	–	–	–	2269.00	2268.89
1991	2269.00	–	–	–	–	–	–	–	–	–	–	–	2269.00
1992	2269.00	–	–	–	–	–	–	–	–	2253.00	2252.00	2251.00	2256.25
1993	2251.00	2253.00	2256.00	2255.00	2255.00	2255.00	2255.00	2254.00	2253.00	2253.00	–	2254.00	2254.00
1994	2253.00	2253.00	2254.00	–	–	–	–	–	–	–	–	–	2253.33

Table 14. U of I Well #4 (39N 6W 12daa1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	15.01	16.63	19.37	20.34	29.54	12.74	20.25	33.27	19.85	33.09	26.44	22.89	269.42
1981	24.47	1.82	0	0	0	0	0	9.67	39.66	30.31	25.32	20.25	151.50
1982	20.64	24.53	27.58	25.58	21.75	27.71	29.61	35.88	27.64	17.26	14.39	12.71	285.28
1983	11.00	14.16	17.74	18.64	16.67	23.49	23.23	29.94	23.48	17.46	14.12	6.94	216.87
1984	16.55	18.16	3.37	16.31	2.68	7.34	0	26.29	28.12	5.38	17.07	2.62	143.89
1985	15.57	2.92	20.08	3.15	0	0	26.92	26.84	25.59	4.86	20.59	0	146.52
1986	19.33	2.08	21.70	2.91	18.14	3.11	28.60	7.60	26.24	4.94	20.66	2.73	158.04
1987	20.81	4.23	22.01	4.64	28.31	7.78	27.05	7.37	34.69	8.37	27.73	8.17	201.16
1988	0	0	25.44	7.37	25.79	4.45	30.23	9.06	28.55	5.18	17.22	4.79	158.08
1989	20.11	26.19	1.06	22.47	6.09	21.17	36.00	32.43	6.85	0	0	0	172.37
1990	0	20.31	5.63	23.22	5.40	21.70	3.81	31.51	38.82	31.27	26.52	24.34	232.53
1991	23.94	27.79	27.07	29.94	26.09	4.06	0	20.08	36.42	29.07	22.59	25.04	272.09
1992	26.32	30.12	27.33	26.86	36.35	8.70	0	34.09	30.36	8.00	0	0	228.13
1993	0	0	0	0	12.39	24.90	5.66	29.20	29.53	24.23	5.85	13.54	145.30
1994	6.88	0	6.98	23.93	--	--	--	--	--	--	--	--	37.79

Water Level Elevation (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	2283.70	2283.70	2283.70	2283.70	2283.70	2283.70	2281.70	2281.70	2280.70	2280.70	2279.70	2280.70	2282.28
1981	2280.70	2280.70	--	--	--	--	2287.70	2288.70	2287.70	2287.70	2287.70	2287.70	2286.08
1982	2287.70	2287.70	2288.70	2288.70	2286.70	2286.70	2286.70	2286.70	2286.70	2286.70	2286.70	2287.70	2287.28
1983	2286.70	2286.70	2286.70	2286.70	2284.70	2284.70	2285.70	2285.70	2286.70	2292.70	2292.70	2292.70	2287.70
1984	2292.70	2292.70	2292.70	2271.70	2272.70	2272.70	--	2271.70	2269.70	2271.70	2271.70	2271.70	2277.43
1985	2271.70	2271.70	2271.70	2271.70	--	--	2267.70	2268.70	2269.70	2270.70	2270.70	--	2270.48
1986	2270.70	2270.70	2270.70	2267.70	2267.70	2269.70	2267.70	2265.70	2265.70	2267.70	2267.70	2265.70	2268.12
1987	2265.70	2265.70	2265.70	2267.70	2266.70	2265.70	2264.70	2265.70	2263.70	2264.70	2265.70	2266.70	2265.70
1988	--	--	2265.70	2265.70	2265.70	2264.70	2264.70	2263.70	2263.70	2264.70	2264.70	2264.70	2264.80
1989	2265.70	2265.70	2265.70	2265.70	2265.70	2265.70	2264.70	2263.70	2264.70	--	--	--	2265.26
1990	--	2263.70	2263.70	2263.70	2264.70	2262.70	2262.70	2262.70	2261.70	2261.70	2259.70	2259.70	2262.43
1991	2259.70	2256.70	--	--	--	--	--	--	--	--	--	--	2258.20
1992	2259.70	2256.70	2251.70	2250.70	--				2246.70	2246.70	2247.70	2249.70	2251.20
1993	2250.70	2250.70	2251.70	2251.70	2246.70	2245.70	2245.70	2245.70	2243.70	2243.70	--	2242.70	2247.15
1994	2243.70	2244.70	2244.70	2242.70	--	--	--	--	--	--	--	--	2243.95

Table 15. Pullman Well #1 (14N 45E 5D1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1986	2.6	4.9	0.016	0.046	0.04	0	0	0	0.039	0.018	0.06	0.12	7.839
1987	0.09	0.083	0.086	0.19	0.16	0.036	0	0.039	0.056	0.1	0.09	0.14	1.07
1988	0.067	0	0.19	0.12	0	0	0	0	0.002	0	0	0	0.379
1989	0	0	0	0	0	0	0	0.027	0	0	0	0	0.027
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0.022	0	0	0	0	0	0	0	0	0	0	0.022
1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	--	--	--	--	--	--	0

Water Level Elevations

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1985	2265.8	2265.8	2265.8	2265.8	2266.8	2266.8	2265.8	2265.8	2264.8	2263.8	2263.8	2263.8	2265.38
1986	2264.8	2264.8	2264.8	2263.8	2263.8	2262.8	2262.8	2261.8	2261.8	2261.8	2262.8	2261.8	2263.13
1987	2261.8	2262.8	2261.8	2262.8	2261.8	2261.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2261.47
1988	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2259.8	2259.8	2258.8	2258.8	2258.8	2259.8	2260.05
1989	2259.8	2259.8	2259.8	2258.8	2258.8	2258.8	2259.8	2259.8	2257.8	2259.8	2259.8	2259.8	2259.38
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.80
1992	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.8	2260.80
1993	2260.8	2260.8	2259.8	2259.8	2259.8	2259.8	2259.8	2259.8	2259.8	2259.8	2259.8	2259.8	2259.97

Table 16. Pullman Well #2 (15N 45E 32N1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1986	0.06	0.58	0.03	0.05	0.05	0	0	0.13	0.086	0.08	0.093	0.088	1.247
1987	0.19	0.14	0.12	0.08	0.12	0.13	0.14	0.06	0.085	0.076	0.066	0.016	1.223
1988	0.034	0.009	0.12	0.07	0.001	0.62	0	0	0	0	0	0	0.854
1989	0	0	0	0	0	0	0	0.006	0	0	0	0	0.006
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	--	--	--	--	--	--	0

Water Level Elevation

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1985	2270.8	2270.8	2270.8	2270.8	2271.8	2270.8	2268.8	2271.8	2267.8	2267.8	2267.8	2266.8	2269.72
1986	2267.8	2268.8	2268.8	2267.8	2266.8	2266.8	2265.8	2264.8	2265.3	2265.8	2265.8	2265.8	2266.68
1987	2264.8	2265.8	2264.8	2265.8	2265.8	2264.8	2263.8	2263.8	2263.8	2264.8	2263.8	2264.8	2264.72
1988	2263.8	2263.8	2264.8	2264.8	2265.8	2265.8	2267.8	2264.8	2267.8	2266.8	2266.8	2266.8	2265.80
1989	2261.8	2261.8	2261.8	2261.8	2261.8	2261.8	2262.8	2262.8	2262.8	2262.8	2263.8	2262.8	2262.38
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.80
1992	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.80
1993	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.8	2258.80

Table 17. Pullman Well #3 (14N 45E 5D3) Pumpage Rates and Water Level Elevations

-- Data not available

Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1986	10.1	5.2	10.6	11.2	12.5	17.3	15.9	20.5	12.4	10.9	9.7	8.9	145.2
1987	9.7	9.2	9.7	10.9	12.8	13.9	15.3	17.5	16.2	12.4	9.2	9.1	145.9
1988	9.9	9.7	11.1	13.6	28	28.1	32.5	34.4	31.5	26.5	20.1	19.9	265.3
1989	19.9	13.3	11.7	11.7	14.1	37.2	30.3	19.9	13.5	12.7	10.8	16.4	211.5
1990	20.5	15.3	19.9	20.5	17.6	18.2	20.4	18.8	16.2	19.7	21	22.9	231
1991	23.5	19.8	20.7	22.3	21.8	21.7	24.8	21.7	21.9	18.7	20	19.1	256
1992	20.2	8.9	0	11.8	16.1	21.2	14.5	22.4	24.1	21.6	20.1	20	200.9
1993	24	22.1	23.3	24.4	27.6	19.8	17.5	19.1	17.2	19.2	20.4	18.4	253
1994	20.1	18.2	21.6	20.1	22.2	18.5	--	--	--	--	--	--	120.7

Water Level Elevation

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1985	2266.3	2266.3	2266.3	2266.3	2266.3	2265.3	2265.3	2265.3	2265.3	2265.3	2265.3	2265.3	2265.72
1986	2269.3	2269.3	2269.3	2269.3	2269.3	2268.3	2268.3	2268.3	2267.3	2267.3	2267.3	2267.3	2268.38
1987	2268.3	2267.8	2268.3	2267.5	2267.3	2266.9	2266.8	2265.8	2265.4	2265.6	2265.5	2266.3	2266.79
1988	2266.1	2266.3	2265.4	2265.3	2265.7	2265.1	2264.7	2264.3	2263.8	2264.4	2264.7	2264.7	2265.04
1989	2264.5	2264.3	2264.5	2264.4	2265.3	2264.3	2263.6	2263.4	2262.6	2263	2263	2264	2263.91
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	2261.5	2260.8	2260.4	2260.5	2260.4	2262.3	2261.3	2261	2260.4	2260.7	2261.1	2261.2	2260.97
1992	2260.9	2260.7	2262.2	2260.7	2260.8	2260.2	2260	2259.4	2259.4	2259.4	2259.5	2258.5	2260.14
1993	2259.7	2259.6	2259.8	2259.3	2258.7	2259.4	2259.2	2258.7	2258.4	2258.1	2258.1	2258.4	2258.95

Table 18. Pullman Well #4 (15N 45E 32N2) Pumpage Rates and Water Level Elevations

-- Data not available

Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1986	6.6	13.1	12.4	8.5	2.3	8.8	8.4	22	12.9	3.3	8.4	6.1	112.8
1987	2.9	2.2	3.6	2.3	4.9	5.6	10.9	10.1	12.6	4.9	1.6	0.8	62.4
1988	1.6	1.7	2	5.7	12.7	14.8	6.5	11.8	16.7	30.2	22.9	20.8	147.4
1989	23.5	20.2	4.8	13.7	0.07	0.8	3.2	3.3	3.5	1.4	0.4	25.1	99.97
1990	20.5	15.9	18.8	7.9	5.9	1.9	8.9	6.1	7.8	9.5	23.8	15.1	142.1
1991	23.5	4.4	0	0	0	3.3	9.5	18.1	11.3	9.1	7.6	2.2	89
1992	3.6	5.7	10.7	0.5	2.4	10.9	18.5	24.7	6.9	3.7	1.8	1.8	91.2
1993	2.1	0.4	2.2	2.5	3.4	7.8	8.7	14.8	12.1	10.7	7.3	12.9	84.9
1994	4.8	5.5	5.5	6.6	7.6	9.3	--	--	--	--	--	--	39.3

Water Level Elevation

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly. Ave.
1985	2269.2	2269.2	2269.2	2269.2	2269.2	2267.2	2266.2	2266.2	2266.2	2265.2	2265.2	2265.2	2267.28
1986	2266.2	2266.2	2266.2	2267.2	2267.2	2265.2	2265.2	2264.2	2264.2	2264.2	2265.2	2264.3	2265.46
1987	2265.2	2264.8	2264.5	2264.6	2264.4	2264.1	2264.2	2263.2	2262.7	2263.2	2262.5	2263.3	2263.89
1988	2263.2	2263.2	2263.1	2263.2	2263.2	2262.7	2262.2	2261.6	2261.4	2261.7	2261.4	2262.2	2262.43
1989	2263.2	2262	2262	2262.1	2261.4	2261.4	2261	2260.6	2261.1	2261.1	2260.3	2260.3	2261.38
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	2259.2	2259.2	2259.2	2259.2	2259.2	2259.3	2258.8	2258.4	2257.7	2257.8	2258.2	2259.1	2258.78
1992	2258.2	2258.1	2258.2	2258	2257.6	2257.6	2257.2	2256.7	2256.6	2255.7	2256.6	2255.8	2257.19
1993	2256.7	2257	2257	2256.9	2257.1	2257	2256.8	2256.2	2255.7	2255.6	2255.7	2256.1	2256.48

Table 19. Pullman Well #5 (14N 45E 8E1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1986	10.1	10.7	12.4	12.4	18.4	35	36.4	49.9	17.3	12.6	11.2	10.7	237.1
1987	10.9	10	11.1	13.5	22.1	27.4	32.5	42.6	33.8	21	11.6	11.5	248
1988	12.2	11.7	11.3	11.8	1.7	6.2	20.7	34.5	9.5	1.8	0.03	0.5	121.93
1989	0.4	8.8	10.2	12.6	14.8	8.1	32.7	29.4	19.9	17	11.8	4.4	170.1
1990	0.5	5.2	1.5	5.5	9.6	13.3	46.8	41.6	34.5	7.8	1	1.1	168.4
1991	0.7	0.53	1	1.3	2.1	5	32.6	42.2	26.4	16.1	0.6	0.6	129.13
1992	0.17	12.9	25.2	14.3	24.2	33.8	38.2	38.2	12.7	7.4	3.6	3.7	214.37
1993	0.58	2.8	1.2	0	4.8	20.5	28.8	38.2	29.7	12.6	2.1	1.9	143.18
1994	1.3	1.3	1.1	4.3	11.7	23.9	--	--	--	--	--	--	43.6

Water Level Elevation

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly. Ave.
1985	2272.7	2272.7	2272.7	2272.7	2272.7	2272.7	2271.7	2271.7	2271.7	2271.7	2270.7	2270.7	2272.03
1986	2269.7	2269.7	2269.7	2269.7	2268.7	2268.7	2268.7	2267.7	2267.7	2267.7	2267.7	2267.3	2268.58
1987	2267.7	2267.8	2266.8	2267.7	2267.5	2266.8	2266.7	2266	2265.7	2265.7	2265.7	2266.2	2266.69
1988	2265.8	2265.7	2265.8	2265.7	2265.9	2265.4	2264.8	2264.7	2264	2264.7	2264.2	2264.7	2265.12
1989	2264.9	2265.2	2265.7	2264.6	2264.2	2265.8	2263.6	2263.4	2262.9	2263.2	2263	2263.1	2264.13
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	2261.9	2261.6	2262.6	2262.3	2262.1	2262.3	2261.4	2261.1	2261	2260.7	2261	2261.3	2261.61
1992	2260.9	2260.6	2261.1	2261.1	2260.4	2260.4	2260.1	2260.6	2259.7	2259.2	2259.7	2259.5	2260.28
1993	2259.6	2259.5	2258.8	2259.7	2258.8	2259.6	2259.4	2258.8	2258.6	2258.3	2258.2	2258.7	2259.00

Table 20. Pullman Well #6 (14N 45E 7H1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1986	23.3	15.7	16.1	23.1	28.8	37.4	35.9	42	24.4	29.5	22.4	20.9	319.5
1987	26.6	27.1	25.7	32	28.1	31	30.5	44.4	41.1	35.4	26.7	27.1	375.7
1988	28.1	29.3	26.8	28.5	17.8	15.4	41.3	52.4	30.7	9.46	6.16	5.56	291.48
1989	7.11	10.9	24.2	19.9	30.4	36.4	49	41.1	36	36.3	28.2	4.71	324.22
1990	7.77	14.2	10.9	27.2	23.4	26.2	41.9	43.3	44	26.2	6.68	19.1	290.85
1991	9.28	26.8	29.3	33.7	27.1	20.3	35.7	34.9	38.7	31.9	21.9	26.1	335.68
1992	25.9	25.3	19.7	34.9	36.8	35.9	21.6	27.7	33.5	33.5	29.1	26.5	350.4
1993	29.1	28.4	28.9	32.5	29.6	26.1	28.2	35.6	37.5	29.6	22.8	14.4	342.7
1994	26	24.7	24.6	28	26.2	29.2	--	--	--	--	--	--	158.7

Water Level Elevation

	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly. Ave.
1985	2274.1	2274.1	2273.1	2273.1	2272.1	2272.1	2271.1	2270.1	2269.1	2424.1	2424.1	2267.1	2297.02
1986	2269.1	2269.1	2269.1	2268.1	2268.1	2268.1	2268.1	2267.1	2268.1	2267.1	2267.2	2268	2268.10
1987	2268.1	2267.3	2267.1	2267.1	2268	2266.3	2266.3	2265.1	2265.2	2265.5	2265.5	2266.1	2266.47
1988	2265.6	2264.2	2265.6	2266	2265.6	2264.5	2264.6	2263.9	2263.1	2264.5	2264.1	2264.8	2264.71
1989	2264.9	2264.2	2264.5	2264.6	2264.6	2264	2263.6	2263.1	2263	2263	2262.7	2264	2263.85
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	2263	2262.3	2261.4	2261.2	2263	2261.7	2260.9	2262	2260.5	2259.8	2260	2260.8	2261.38
1992	2260.9	2261.1	2261	2258.8	2260.3	2260.5	2259.8	2260	2260	2259.8	2263.6	2258.2	2260.33
1993	2259.6	2259.7	2259.7	2259.2	2259.2	2259.5	2259.4	2258.7	2258.4	2258.4	2258	2258.9	2259.06

Table 21. WSU Well #1 (14N 45E 5F2) Pumpage Rates and Water Level Elevations

-- Data not available

Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	4.2	4.1	3.8	3.5	4.6	2.2	3.8	2.7	2.3	2.8	2.1	3.9	40
1981	3.5	3.5	5.2	5.8	8.8	2.9	5.9	4.3	5.8	2.5	2.6	1.9	52.7
1982	1.4	2.7	4.3	2.8	4.3	2.6	4.1	3.4	3.4	4	2.9	2.7	38.6
1983	2.5	3.7	5.1	6.2	6.2	8.4	5.1	6.8	4	3.7	3.3	3.3	58.3
1984	4.3	3.4	5.2	6.8	11.4	4.8	8.1	8.4	6.6	7.3	7.1	2.8	76.2
1985	5.5	5	7	5.5	8.4	8.2	10.4	8.8	6.6	1.9	1.4	3.1	71.8
1986	0.96	3.1	3.3	4.7	5	7.4	6.6	8.2	6.6	7.1	5.6	3.4	61.96
1987	5.6	6.1	5.9	7.8	7.1	8.1	6.8	7.5	10.8	9.6	7.3	6.8	89.4
1988	12.9	7.1	7.5	6.3	8.6	7.5	8.4	8.6	8.4	6.8	7	5.8	94.9
1989	6.6	6.1	9.7	11.3	8.6	6.6	5.4	6.4	6.7	6.8	4.1	6.1	84.4
1990	5.8	6.3	5.8	5.1	5.3	7.9	8.3	8.2	3.5	5.6	6.7	7	75.5
1991	8.8	7.8	8.3	8.3	8.8	7.8	12.4	10.2	9.7	9.2	8.2	6.9	106.4
1992	8	5.6	6.4	8.8	5.6	5.6	2.1	3.3	5.5	4.2	3.1	4.1	62.3
1993	3.1	4.8	8.3	7.7	8.6	9.1	7.7	8.9	7.6	8.6	6.4	8.3	89.1
1994	2.8	6.7	7.5	7.6	8.3	8.5	10.3	--	--	--	--	--	51.7

Water Level Elevations

No Data Available

Table 22. WSU Well #3 (14N 45E 5F3) Pumpage Rates and Water Level Elevations

-- Data not available

Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	9.4	8.2	10.4	5.1	9.9	5.2	14	13.6	11.7	6.3	8.4	9.6	111.8
1981	14.3	10.3	16.5	14.5	27.9	9.2	18.4	1.7	16.1	15.8	9.8	13.2	167.7
1982	8.8	9.1	10.6	11.3	9.8	13.8	14.2	13.1	11.8	11.6	13.7	11.9	139.7
1983	8	7.8	8.8	14.6	17.5	18.3	13	13.7	12.5	11.9	8.2	12.3	146.6
1984	7.7	9.1	12.1	21.1	23.6	6.4	15.7	18.5	16.5	14.4	6.9	8.2	160.2
1985	6.2	13.6	12	10.6	14	12.2	24.4	12.5	10.7	1.3	1.6	3.1	122.2
1986	0.11	2.4	3	2.8	3	8.9	8.3	16.6	11.5	8.7	4.1	11.3	80.71
1987	5.6	0.47	5.5	3.7	5.8	5.5	9.3	14.1	16.4	10.3	6.8	1.8	85.27
1988	3.5	8.2	9.9	15.5	4.5	11.4	10.7	17.2	17.7	13.4	6.6	8.3	126.9
1989	7.1	11.2	21.3	23.7	17.2	8.5	7.6	4.2	10.6	15.1	13.9	5.2	145.6
1990	5.7	0	0	6	12.1	10.3	10.6	10.1	14.7	6.6	2.3	6.8	85.2
1991	15.9	11	10.8	13.5	13.7	9.7	18.9	14.8	16.9	14.1	11.2	9.1	159.6
1992	10.5	5.1	3.2	8.2	6.2	4.6	3.1	5.9	5.5	6.4	1.6	2.1	62.4
1993	3.7	8.5	10	11.1	9.7	10	11.8	12.8	16.6	12.2	8.1	11.8	126.3
1994	2.4	5.5	6.4	7.9	8.8	15.6	13.6	--	--	--	--	--	60.2

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	--	--	--	--	--	--
1985	--	--	--	--	--	--	--	--	--	--	--	--	--
1986	--	--	--	--	--	--	--	--	--	--	--	--	--
1987	--	2268.94	--	--	--	--	--	--	--	2262.94	2263.94	2263.94	2264.94
1988	2261.94	2263.94	2262.94	2262.94	2263.94	2262.94	2262.94	2261.94	2261.94	2262.94	2260.94	2261.94	2262.61
1989	2261.94	2261.94	2262.94	2261.94	2260.94	2261.94	2260.94	2260.94	2260.94	2260.94	2260.94	2261.94	2261.52
1990	2261.94	2260.94	2260.94	2260.94	2260.94	2260.94	2260.94	2259.94	2259.94	2259.94	2259.94	2259.94	2260.61
1991	2259.94	2260.94	2260.94	2260.94	2260.94	2260.94	2259.94	2258.94	2259.94	2257.94	2259.94	2259.94	2260.11
1992	2259.94	2259.94	2259.94	2259.94	2259.94	2259.94	2259.94	2258.94	2258.94	2257.94	2259.94	2258.94	2259.52
1993	--	--	2259.94	2258.94	2258.94	2258.94	2257.94	2257.94	2257.94	2257.94	2257.94	2257.94	2258.44
1994	2257.94	2257.94	2257.94	2257.94	2257.94	2257.94	2255.94	--	--	--	--	--	2257.65

Table 23. WSU Well #4 (14N 45E 5F4) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	26.7	2.3	2.7	26.9	24.1	19.6	22.3	19.2	19.2	30.7	18.4	13.4	198.8
1981	16.9	13	19.9	15.9	5.7	20.7	27.5	38.3	32	31.9	19.2	15.8	239.9
1982	2.5	21.5	23.9	18.6	27.2	26.1	28.8	29	27.5	27.7	15.9	13.2	261.9
1983	23	18.3	23.4	14.4	29.4	17.1	22	29.1	27.2	26.4	18.9	13.7	262.9
1984	24.5	25.2	22.2	3.7	2.1	23.1	32.1	32.5	27.4	22.1	20.6	27.2	262.7
1985	27.2	20	17.5	24.4	28.1	26.2	27.1	35.2	32.4	42.6	34.2	29.3	344.2
1986	34.2	30.4	29.9	32.8	32.1	30.9	32.6	34.7	29.2	27.2	24	15.1	353.1
1987	18.8	24.3	18.4	25.5	23.3	22.5	25.1	28.6	33.1	29.9	22.7	25.7	297.9
1988	25.6	22.1	19.1	18.6	20	16.4	26.9	27.2	24.2	21.9	21.9	22.1	266
1989	24.7	24.2	5.5	0	4.9	15.4	17.3	26.8	24.7	25.7	21.3	17.2	207.7
1990	13.7	18.8	19	21.8	5.5	6.4	20.4	22.3	28.1	20.3	19.5	13.5	209.3
1991	6.1	21.1	20.2	21.3	11.7	16.7	19.8	30.3	28.1	26.1	18.2	18	237.6
1992	15.7	21.1	15.6	17.2	10.9	17.1	7	7.2	6.2	6.8	1.5	1.9	128.2
1993	4.9	8.3	23.8	24.6	22.5	19.6	25.2	28.8	24.6	22.2	20.9	11.1	236.5
1994	9.5	19.1	22.1	22.9	16.8	10.9	24.5	--	--	--	--	--	125.8

Water Level Elevation (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	2273.46	2273.46
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	--	--	2270.46	--	--	--	--	--	--	--	--	--	2270.46
1985	--	--	--	--	--	--	--	--	--	--	--	--	--
1986	--	2271.86	--	2267.46	2266.46	--	2265.46	2265.46	2265.46	2265.46	2265.46	2265.46	2266.50
1987	2265.46	2265.46	2265.46	2265.46	2265.46	2264.46	2264.46	2263.46	--	--	--	--	2264.96
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	--	--	--	2262.46	2263.46	2261.46	--	--	--	--	--	--	2262.46
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--	--	--	--	--	--
1993	--	--	--	--	--	--	--	--	--	--	--	--	--
1994	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 24. WSU Well #5 (15N 45E 34L1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	0	0	0	0	0	0.54	2.1	2.4	0.06	0	0	0	5.1
1981	0	0	0	0	0	0	1.8	2.7	1.9	0	0	0	6.4
1982	0	0	0	0	3.1	0.21	0.69	0.23	0	0	0	0	4.23
1983	0	0	0	4.5	0	0	0	0.63	0	0	0	0	5.13
1984	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0.22	0	0	0	0	0	0	0	0.22
1986	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	--	--	--	--	--	0

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	2273.36	--	--	--	--	--	--	--	--	2273.36
1981	--	--	--	--	--	--	--	--	2271.36	--	--	--	2271.36
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	--	--	--	--	--	--
1985	2251.36	--	--	--	2267.36	--	2269.36	--	2271.36	--	--	2269.36	2265.76
1986	--	--	2269.86	2270.36	2270.2	--	2269.2	2268.86	2268.86	--	--	--	2269.56
1987	--	--	--	2266.53	--	--	--	--	2265.36	--	--	--	2265.95
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	--	--	--	--	--	--	2262.86	--	--	--	--	--	2262.86
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--	--	--	--	--	--
1993	--	--	--	--	--	--	--	--	--	--	--	--	--
1994	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 25. WSU Well #6 (14N 45E 4D1) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	8.4	9	9.5	9.2	22.4	19.4	26.8	32.8	21.6	21.9	17.3	16.9	206.8
1981	13.1	17.6	14.2	11.3	10.7	10.6	20.2	24.4	16.2	7.5	14.1	14.2	161
1982	16	14	15.1	12.9	14.4	25.4	29.5	35.2	20.5	16	14.8	14.6	228.4
1983	14.9	14.2	15.1	10.3	11.6	18.8	18.1	29.1	19.9	13.8	15.1	16.4	197.3
1984	17.8	15.1	15.3	16.1	19.3	19.7	37.8	33.9	23.5	19.6	14.7	9.8	242.6
1985	9.1	10.5	10.8	14.5	12.5	20.2	40.5	24.1	13.4	10.2	7.9	7.6	181.3
1986	8.3	9.1	8.5	10.6	14.2	26.8	26.9	35.9	13.5	10.3	9.5	9.9	183.5
1987	10.4	10.4	11.2	14.2	22.4	24.2	28.4	32	24.1	12.3	6.9	6.1	202.6
1988	6.3	5.9	6.5	6.8	9.6	12.7	26.3	32	22.1	15.8	4.6	0	148.6
1989	0	0	1.1	7.2	14.1	27.6	42.3	31.8	23.2	5.2	0	10.9	163.4
1990	11.3	15.8	16.2	13.3	14.5	16.4	36.8	37.4	32.9	17.4	12.1	11.6	235.7
1991	7.1	0	0	0	2.7	3.1	24.1	29.5	20	9.7	0	0	96.2
1992	0	0.31	0.08	0.23	3.1	16.1	22.7	32.8	15.1	7.6	6	3.8	107.82
1993	0.51	0	0.92	0.6	8.7	14.3	13.6	23.9	22.1	15.6	5.7	4.1	110.03
1994	25.3	8.6	4.4	8.1	16.7	22.2	32.3	--	--	--	--	--	117.6

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	2271.5	--	--	--	--	--	--	--	--	2271.5
1981	--	--	2269.5	--	--	--	--	--	--	--	--	--	2269.5
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	2268.5	--	--	--	--	--	--	--	--	--	2268.5
1984	--	--	--	--	--	2261.5	--	--	--	--	--	--	2261.5
1985	2241	--	--	--	2268	--	2271.5	--	--	--	--	--	2260.17
1986	--	--	--	--	2246.5	--	2265.5	2267.5	2265.5	--	2266.5	2266.5	2263.00
1987	--	2265.5	2266.5	2266.5	2264.5	2265.5	2264.5	2264.5	2264.5	2264.5	2264.5	2269.5	2265.50
1988	2264.5	2265.5	2264.5	2264.5	2264.5	2264.5	2263.5	2262.5	2262.5	2262.5	--	2262.5	2263.77
1989	--	--	2263.5	2263.5	2263.5	--	2261.5	2263.5	2262.5	2260.5	2261.5	2261.5	2262.39
1990	2261.5	2256.5	2262.5	2262.5	2262.5	2261.5	--	2260.5	2262.5	2262.5	2263.5	2263.5	2261.77
1991	2262.5	2263.5	2263.5	2263.5	2263.5	2263.5	2263.5	2262.5	2262.5	2263.5	2262.5	2262.5	2263.08
1992	2262.5	2262.5	2262.5	2262.5	2258.5	2262.5	2261.5	2261.5	2261.5	2261.5	--	2261.5	2261.68
1993	2261.5	--	2261.5	2261.5	2262.5	2261.5	2260.5	2260.5	2260.5	2259.5	2260.5	2260.5	2260.95
1994	2259.5	2260.5	2260.5	2260.5	2259.5	2260.5	2260.5	--	--	--	--	--	2260.21

Table 26. WSU Well #7 (14N 45E 5G2) Pumpage Rates and Water Level Elevations

-- Data not available

Millions of Gallons Per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
1980	0	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0	0	0	0	0
1984	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	4.7	15.6	9.4	27.8	26.1	28.2	23.4	29.9	24.7	26.4	25.2	241.4
1993	24.4	16.7	0.83	0	0	0	0	0	0	0	0	0	41.93
1994	0	0	0	0	0	0	0	--	--	--	--	--	0

Water Level Elevations (ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Ave.
1980	--	--	--	--	--	--	--	--	--	--	--	--	--
1981	--	--	--	--	--	--	--	--	--	--	--	--	--
1982	--	--	--	--	--	--	--	--	--	--	--	--	--
1983	--	--	--	--	--	--	--	--	--	--	--	--	--
1984	--	--	--	--	--	--	--	--	--	--	--	--	--
1985	--	--	--	--	--	--	--	--	--	--	--	--	--
1986	--	--	--	--	--	--	--	--	--	--	--	--	--
1987	--	--	--	--	--	--	--	--	--	--	--	--	--
1988	--	--	--	--	--	--	--	--	--	--	--	--	--
1989	--	--	--	--	--	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--	--	--	--	--	--
1992	--	--	--	--	--	--	--	--	--	--	--	--	--
1993	2260.6	--	2263.6	2264.6	2263.6	2265.6	2265.6	2265.6	2264.6	2265.6	2265.6	2263.6	2264.42
1994	2264.6	2265.6	2265.6	2265.6	2264.6	2265.6	2264.6	--	--	--	--	--	2265.17

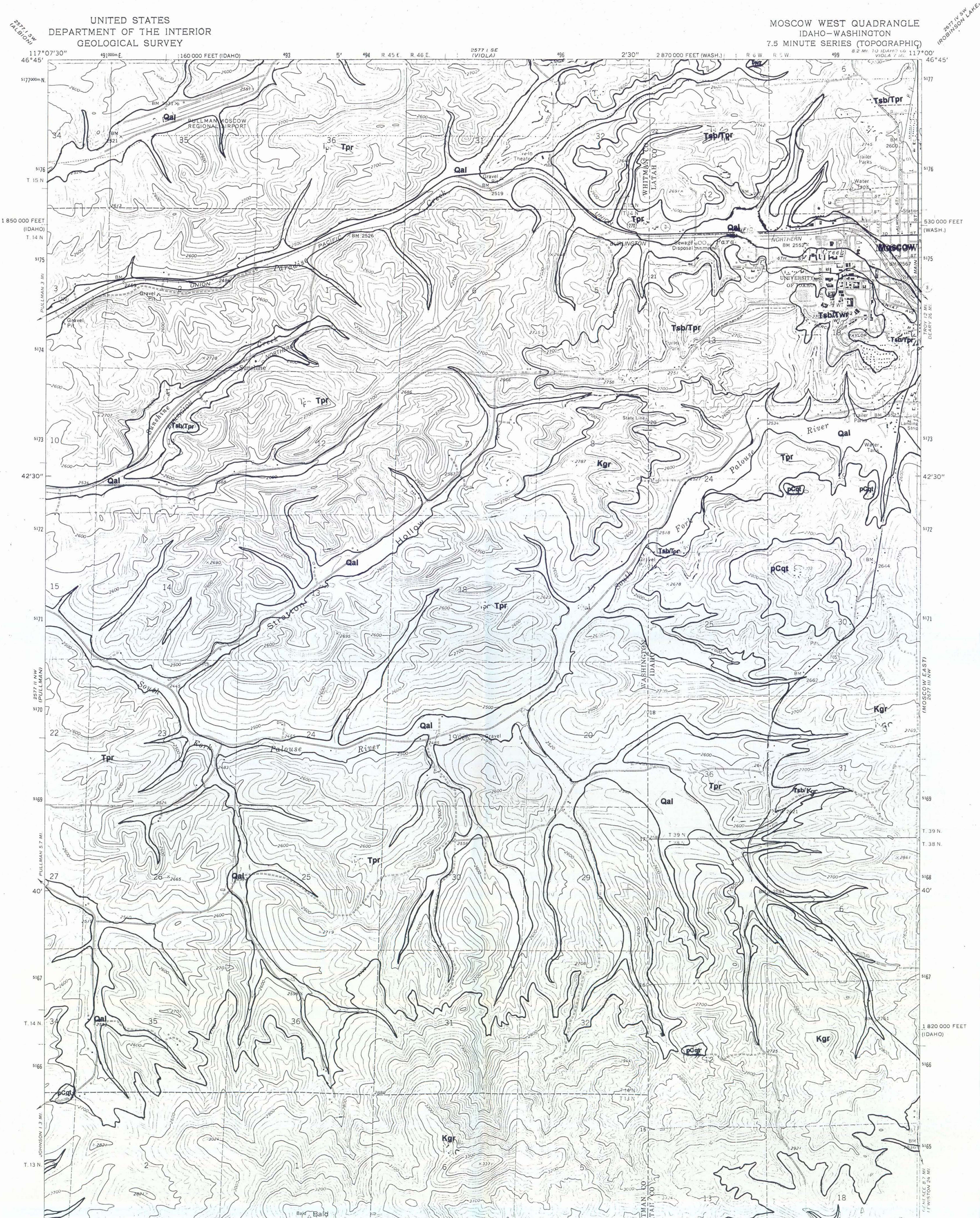


Plate 1. Interpretive Geologic Map of the Moscow West Quadrangle, Latah County, Idaho and Whitman County, Washington

Moscow West topographic base map produced by U.S. Geological Survey (1964).

GN
MN
20
Declination

EXPLANATION

Qal	Loess, basalt and granite fragments. Quaternary alluvial deposits
Tsb\Twr	Sand, clay and gravel deposits. Tertiary Sediments of Bovill of the Latah Formation overlying Weissenfels Ridge Member
Tsb\Tpr	Sand, clay and gravel deposits. Tertiary Sediments of Bovill of the Latah Formation overlying Priest Rapids Member
Tsb\Kgr	Sand, clay and gravel deposits. Tertiary Sediments of Bovill of the Latah Formation overlying granitic basement rock
Twr	Basalt. Tertiary basalt of Lewiston Orchards-Weissenfels Ridge Member of the Saddle Mountains Formation
Tpr	Basalt. Tertiary Priest Rapids Member of the Wanapum Formation
Kgr	Granite. Cretaceous basement complex
pCqt	Quartzite. Precambrian metamorphic rocks

Scale 1:24,000

Contour Interval=20 feet

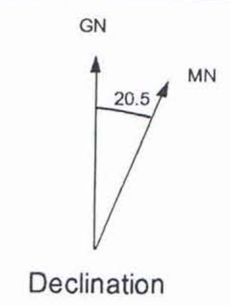
0 5 1 Mile

0 1000 2000 3000 4000 5000 6000 7000 feet

0 5 1 Kilometer

Plate 2. Interpretive Geologic Map of the Viola Quadrangle, Latah County, Idaho and Whitman County, Washington

Viola topographic base map produced by U.S. Geological Survey (1964).



Declination

EXPLANATION

Qal	Loess, basalt and granite fragments Quarternary alluvial deposits	Tpr	Basalt Tertiary Priest Rapids Member of the Wanapum Formation
Tsb\Tpr	Sand, clay and gravel deposits Tertiary Sediments of Bovill of the Latah Formation overlying Priest Rapids Member	Kgr	Granite Cretaceous basement complex
Tsb\Kgr	Sand, clay and gravel deposits Tertiary Sediments of Bovill of the Latah Formation overlying granitic basement rock	pCqsg	Quartzite, schist and gneiss Precambrian metamorphic rocks
Twr	Basalt Tertiary basalt of Lewiston Orchards-Weissenfels Ridge Member of the Saddle Mountains Formation	pCqt	Quartzite Precambrian metamorphic rocks

Scale 1:24 000

Contour Interval=20 feet

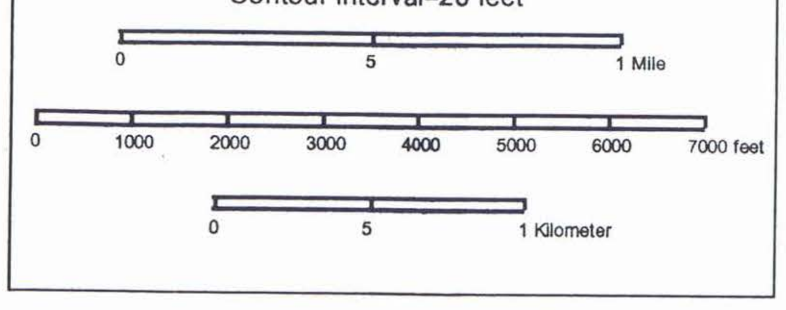


Plate 3. Cross-sections through the Moscow-Pullman basin along North-South (A-A') and West-East (B-B') Lines