Hydraulic Properties of Stratigraphic Units and Geologic Structures in the Walla Walla River Basin, Oregon and Washington

OREGON WATER RESOURCES DEPARTMENT OPEN FILE REPORT NO. 2024-01 VERSION 1.1

OREGON WATER RESOURCES DEPARTMENT

Oregon Water Resources Department

Ivan Gall, Director

Publications produced by Oregon Water Resources Department are available to download from the OWRD website (https://www.oregon.gov/owrd/pages/index.aspx).

Suggested citation:

Woody, J.L, Kemper, J.B., Orr, A.A., Wentworth, A.M., 2024, Hydraulic properties of stratigraphic units and geologic structures in the Walla Walla River Basin, Oregon and Washington, Oregon Water Resources Department Open-File Report 2024-01 Version 1.1, 209 p.

Summary of Changes in Version 1.1

Incorrect figure numbers and minor grammatical errors were noted in Appendix A and Appendix B after publication. These errors were corrected on 10/30/2025. The findings included in the report have not been changed.

HYDRAULIC PROPERTIES OF STRATIGRAPHIC UNITS AND GEOLOGIC STRUCTURES IN THE WALLA WALLA RIVER BASIN, OREGON AND WASHINGTON

JEN WOODY, JOE KEMPER, AARON ORR, ANDREW WENTWORTH

Expires: 12/31/2024

OREGON WATER RESOURCES DEPARTMENT OPEN-FILE REPORT 2024-01 VERSION 1.1

Acknowledgements

The authors wish to thank the many landowners, and the Cities of Milton-Freewater, Athena, Weston, Walla Walla, and College Place who allowed access to their wells and shared water level data. Staff at Washington Department of Ecology, including Scott Tarbutton, Patrick Cabbage and Chris Beard shared data and insight. Staff at the Confederated Tribes of the Umatilla Indian Reservation Natural Resources Department provided invaluable scoping guidance. Many thanks to the Walla Walla River Basin Watershed Council staff who adjusted monitoring schedules, shared data and knowledge rooted in experience. Ben Scandella, Shauna Yeh, Clara Eshaghpour, and Kelsey Cherland provided bistate data entry and management, data analysis tool design and maintenance of those systems. James Hootsmans assisted with stratigraphic coding for hundreds of well logs. Jasmine Loupe, Ross Deardorf, Luke Martin and Shaun Finn collected groundwater data. This report was greatly improved by reviews and collaborative conversations with Josh Hackett, Phil Marcy, Tim Seymour, Wendy Welch, Andy Long, Amanda Garcia, Steve Gingerich and Hank Johnson.

Contents

Abstract

Stratigraphic units and their disruption by geologic structures create a unique environment for groundwater flow in the Walla Walla River Basin. The hydrogeologic system includes coarse unconsolidated sediments at the surface, increasingly consolidated sediments with depth, and finally Columbia River Basalt Group (CRBG). There is vertical and lateral heterogeneity within sedimentary stratigraphic units, and many units are not continuous across the Walla Walla River Basin. Long-term groundwater level data and multiple well pumping test results in Walla Walla Valley CRBG wells indicate regional fault zones significantly compartmentalize the Walla Walla CRBG aquifer system. This study uses the word compartment to mean that there are permeability contrasts that cause step changes in head; however, on the geologic timescale there is likely groundwater flow into and out of compartments.

Analysis of over six hundred fifty wells with specific capacity, single well pumping test, or multiple well pumping test data, in combination with stratigraphic information, resulted in identification of six hydrostratigraphic units. The units are based on an assessment of transmissivity, hydraulic conductivity, storativity, and stratigraphic position. Listed youngest to oldest they are: Upper Alluvium (UA), Missoula Flood Deposits: Rhythmites/Touchet beds (F), Loess (LS), Lower Alluvium Coarse (LAc), Lower Alluvium Fine (LAf), and Columbia River Basalt Group (BA). Mean (geometric) transmissivity in $feet^2$/day, hydraulic conductivity in feet/day and storativity (unitless) values are as follows: Upper Alluvium (1,400, 40, and 0.02), Missoula Flood Deposits: Rhythmites (5, no data, and 0.08), Loess (5, no data, and 0.05), Lower Alluvium Coarse (690, 10, and no data), Lower Alluvium Fine (400, 4, and no data), and Columbia River Basalt Group (1,500, 8, and 0.0003).

Available data indicate that permeability contrasts in the CRBG cause the observed piezometric surface step changes between well groups, particularly evident in the Walla Walla Valley, delineating at least twelve distinct CRBG well groups. We propose the CRBG aquifers are best described as separated on the human time scale by geologic structures into blocks, each block containing a group of wells that are hydraulically interconnected. These aquifer blocks are not correlated to extensive stratigraphic units but rather based on groups of wells with similar location, water level elevation, hydraulic responses to pumping, and water level trends. While well groups are likely hydraulically connected over geological time scales, they respond independently during multiple well pumping tests. Observed exceptions are found in groups of wells located near Athena, Tollgate and the Walla Walla River Canyon, where distinct changes in hydraulic head with interflow zone have been observed, indicating a more typical CRBG aquifer regime.

Introduction

Background

The Walla Walla River Basin, spanning the state line between northeast Oregon and southeast Washington, is a complex hydrologic system. It is a major agricultural center with over forty five thousand residents (US Census Bureau, 2024) and the ancestral homeland of the Walla Walla, Cayuse, and Umatilla tribes (Hunn et al 2015). Settlers began developing the land and diverting river water for agriculture in the early 1800s, with groundwater development intensifying after 1900 due to mechanical well drilling.

Increased groundwater development, declining groundwater levels and declining surface water availability motivated the research team to undertake this study. When groundwater levels are declining year-over-year, potential solutions range from artificially recharging target aquifers to methodically decreasing use. The hydraulic properties of stratigraphic units and geologic structures in the Walla Walla River Basin are unique and any new groundwater management decisions need to be informed by their characterization.

Geologic materials' water-conducting properties are influenced by their depositional environments and subsequent geologic events, such as tectonic displacement and erosion. Long-term mineral deposition by groundwater can also alter these properties. These processes control how geologic units affect groundwater recharge, flow, discharge, storage, and responses to stresses like groundwater pumping and climate cycles.

This report is part of a cooperative hydrologic investigation by the U.S. Geological Survey, Washington Department of Ecology, and Oregon Water Resources Department to characterize the basin's hydrology, water budget, and response to water development.

Purpose and Scope

This report provides a comprehensive summary of the hydraulic properties of stratigraphic units and geologic structures in the Walla Walla River Basin. This detailed assessment is essential for characterizing the groundwater system and conducting predictive modeling for future water management.

The study derives hydraulic properties from approximately sixty-four single-well pumping tests for water rights, approximately twenty-five multiple-well pumping tests, and six hundred fifty specific capacity tests. While maintaining a consistent distribution of data across the basin is a priority, data density varies spatially and with depth. Groundwater development is concentrated in the shallow aquifers of the Walla Walla Valley, while deeper aquifers, the Blue Mountains, Touchet Slope and tributary valleys have sparse and unevenly distributed development and data. Spatial data limitations restrict detailed analysis to the Walla Walla Valley. The spatial distribution of results reflects the locations of greatest groundwater development and also limitations in data availability in Washington compared to Oregon. Groundwater data from wells within three miles of the surface water basin are included where available and relevant.

Study Area

The study area covers the 1,760 square mile Walla Walla River Basin, located at the eastern edge of the Columbia Plateau in northeast Oregon and southeast Washington. This surface water basin spans parts of Umatilla, Wallowa, Columbia, and Walla Walla Counties (Figure 1). Topographic elevations range from approximately 6,000 feet above sea level in the Blue Mountains to about 300 feet at the mouth of the Walla Walla River. The basin is drained by the Walla Walla River, which originates in the Blue Mountains, with tributaries including Mill Creek, Cottonwood Creek, Washington's Dry Creek, Oregon's Dry Creek, Pine Creek, and the Touchet River. The Walla Walla River ultimately discharges into the Columbia River west of Touchet, Washington.

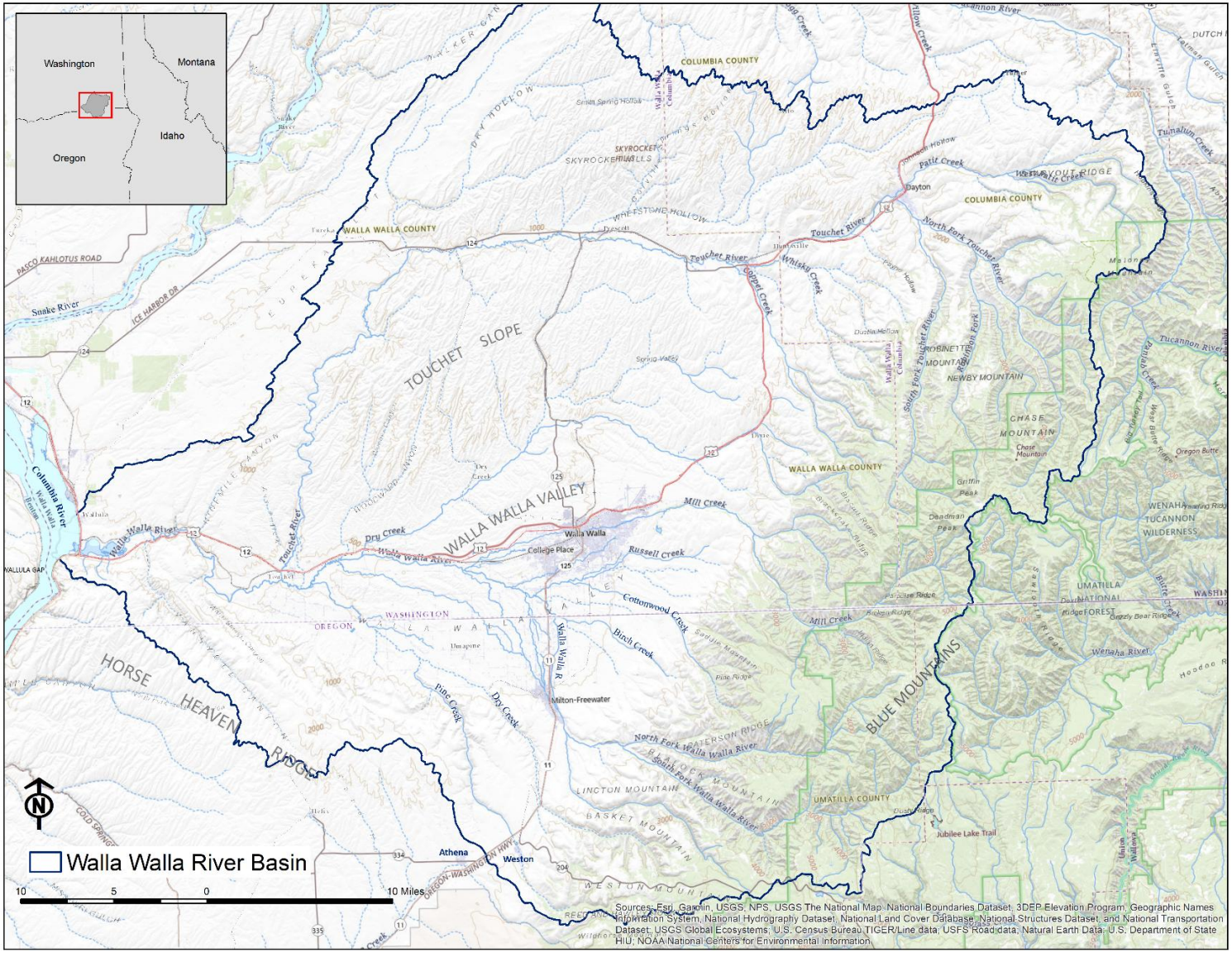


Figure 1: Study Area Location.

Geologic Setting

The Walla Walla River Basin has been shaped by tectonic plate collisions, uplift of the Blue Mountains, extrusive igneous flows, regional fault zone activity, alluvial processes, and catastrophic glacial floods. Notable geologic investigations include work by (Piper et al., 1935; Hogenson, 1964; Newcomb, 1965; Swanson et al., 1981; Kuehn, 1995; Hutter (Harrold), 1997; Derkey et al., 2006; Tolan et al., 2007; Reidel et al., 2013; 2021; Walker, 1973; Ferns et al., 2006; O'Connor et al., 2020; Madin et al., 2023; McClaughry and Azzopardi 2023; Hooper and Conrey, 1989).

The Columbia River Basalt Group (CRBG), which underlies the entire basin and outcrops in the Blue Mountains, erupted between 16 and 6 million years ago, forming over three hundred basalt flows that cover more than 80,000 square miles in Washington, Oregon, and Idaho (Reidel et al. 2013; Figure 2). The deepest wells in the Walla Walla Valley indicate that the CRBG is more than 2,000 feet thick in the study area.

The CRBG is overlain by an up to 800-feet thick sequence of clastic sediments deposited from approximately 5 million years ago and continuing into the present day. The oldest sediments in the valley were deposited by rivers originating from the Blue Mountains. Much of the local topography was shaped by the Missoula Floods around 10,000 years ago, with peak flood elevations in the Walla Walla Valley reaching 1,200 feet above sea level (O'Connor et al. 2020). Recent erosion and alluvial deposition occur along active river channels.

The Walla Walla River Basin is characterized by unique regional tectonics, with two regional lineaments converging near Milton-Freewater. The Olympic-Wallowa Lineament extends from Olympia, Washington through the Walla Walla River Basin and includes the Wallula Fault Zone. The Klamath Blue Mountains Lineament extends from the southwest coast of Oregon through the Walla Walla River Basin and includes the Hite Fault Zone. These large-scale geologic structures and their ancillary folds and faults disrupt stratigraphy and affect groundwater flow systems within the CRBG.

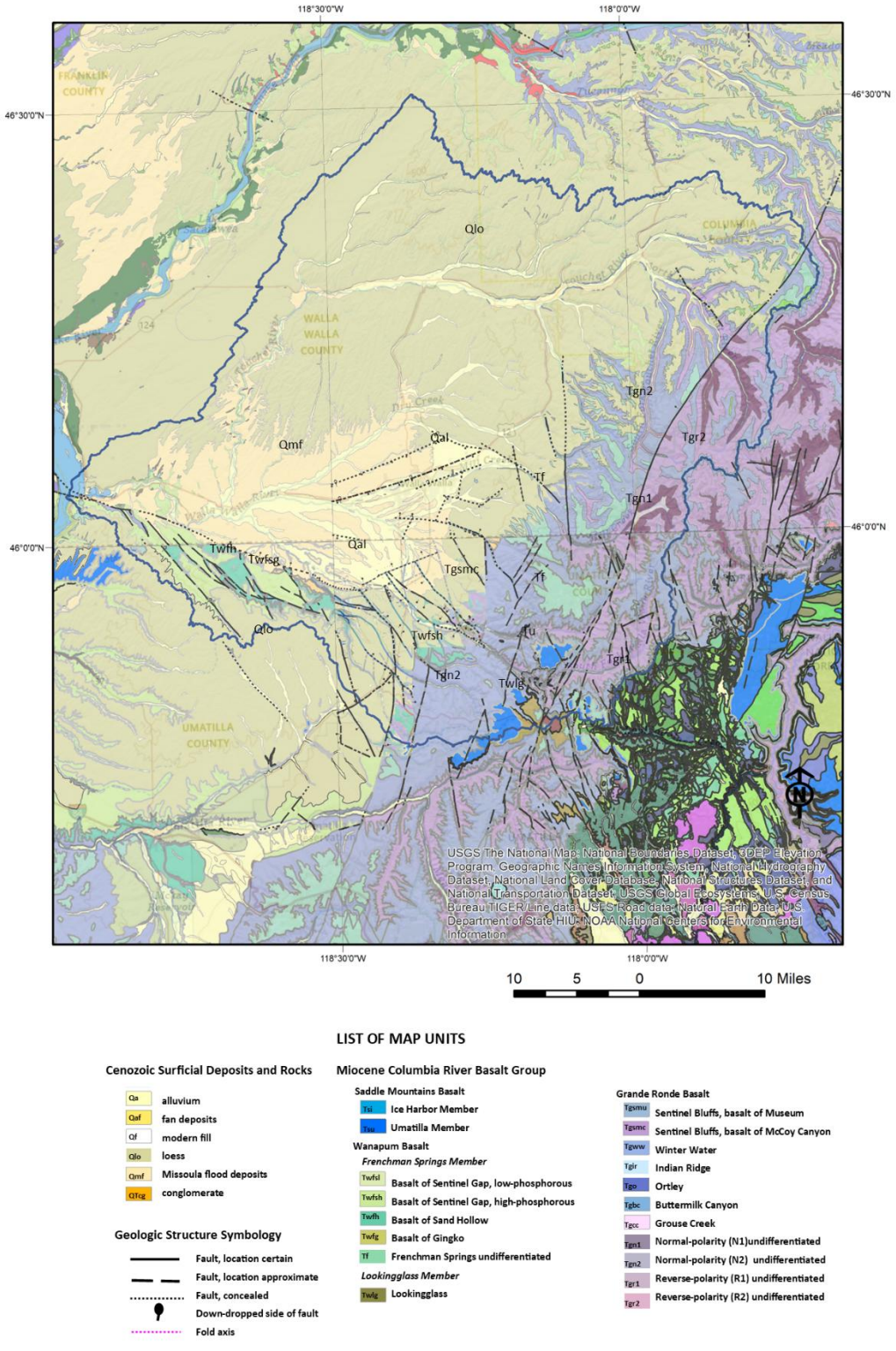


Figure 2: Geology Map. Compiled from Madin and Geitgey (2007); Madin et al. (2023); and McClaughry and Azzopardi (2023), Derkey, et al. (2007) and Washington Division of Geology and Earth Resources (2016).

Stratigraphic Units

Stratigraphy classifies rock layers based on their origin, composition, distribution, and succession. Stratigraphic unit names evolve with ongoing geologic mapping and research. Table 1 details the stratigraphic unit nomenclature used in this study. The following section briefly describes the stratigraphic units of the Walla Walla River Basin from youngest to oldest.

Table 1. Stratigraphic Units of the Walla Walla River Basin. Data compiled from Derkey et al. (2006); Madin and Geitgey (2007); Madin et al. (2023); and McClaughrey and Azzopardi (2023)

ERA	PERIOD	EPOCH	Stratigraphic Unit		Polarity	Thickness (ft)
Cenozoic	Quaternary	Holocene	Quaternary Alluvium			50
		Pleistocene	Missoula Flood Deposits: Rhythmites/Touchet beds			50
			Loess			20
	Tertiary	Pliocene	Quaternary-Late Tertiary Consolidated Sediments Coarse			450
		Miocene	Quaternary-Late Tertiary Consolidated Sediments Fine			300
			CRBG Group			
			Saddle Mountains Basalt Formation	Walla Walla Member		30
				Lower Monumental Member	N	60
				Ice Harbor Member		30
				----Basalt of Martindale	R	
				----Basalt of Basin City	N	
				Umatilla Member	N	30-150
				----Basalt of Sillusi		
				----Basalt of Umatilla		
			Disconformity: Mabton Member of Ellensburg Formation			
			Wanapum Basalt Formation	Frenchman Springs Member	N	
				----Basalt of Sentinel Gap		400
				----Basalt of Sand Hollow		300
				----Basalt of Ginkgo	E	90
				Lookingglass Member	N	60
			Disconformity: Vantage Member of the Ellensburg Formation			
			Grande Ronde Basalt Formation	Sentinel Bluffs Member	N2	390
				----Basalt of Museum		195
				----Basalt of McCoy Canyon		190
				Winter Water Member		150
				Indian Ridge Member		115
				Ortley Member		150
				Buttermilk Canyon Member		125
				Grouse Creek Member	R2	150
				Grande Ronde Undivided		1500
	Pre-Columbia River Basalt Group rocks, undivided					

POST-CRBG SEDIMENTARY UNITS

Quaternary Alluvium

Late Pleistocene to Holocene unconsolidated deposits of boulders, cobbles, gravel, sand, and clay found in and near stream channels. Thickness typically does not exceed 25 feet but varies depending on proximity to modern streams (McClaughry and Azzopardi 2023). Newcomb (1965) termed this unit younger alluvial sand and gravel, while Tolan et al. (2007) referred to it as the Quaternary Coarse Unit.

Coarse Quaternary alluvial materials are concentrated near the mouths of the Walla Walla River near Milton-Freewater and Mill Creek near Walla Walla. For simplicity, this study considers alluvial fan deposits part of the Quaternary Alluvium.

Missoula flood deposits: Rhythmites/Touchet beds

Late Pleistocene unconsolidated and repeating deposits of light grey to white sand, silt, and clay rhythmites, also known in the Walla Walla Valley as Touchet Beds. The laminations record the periodicity and recurrence of catastrophic glacial ice dam outburst events. Each rhythmite records a flood event with a high energy stage depositing coarse facies, grading upwards into finer facies during the lower energy, slackwater portion of the flood. Individual rhythmites range from inches to 3 feet thick, with a cumulative thickness up to 50 feet resulting from over one hundred catastrophic floods (O'Connor et al., 2020). Missoula Flood deposit rhythmites are visible on terraces and as erosional remnants throughout the Walla Walla Valley.

Loess

Holocene to Pleistocene windblown sandy silt deposits occurring both above and below rhythmites. These deposits are massive to poorly stratified, yellow-brown, micaceous, and quartz-feldspathic silt and sand (McClaughry and Azzopardi 2023). Newcomb (1965) identified this unit as the Palouse Formation. Loess reaches thicknesses of up to 50 feet and is primarily located north of the Touchet Slope, and to the south and east of Milton-Freewater.

Quaternary-Late Tertiary Consolidated Sediments Coarse

Late Miocene to early Pleistocene poorly consolidated to cemented conglomerate interbedded with sandstone and claystone. Newcomb (1965) identified this unit as "old gravel", Swanson et al. (1980) refer to it as "gravel and conglomerate", both describe it as the product of coalescing alluvial fan deposits. Lindsey and Tolan (2007) refer to it as Mio-Pliocene Upper Coarse Unit and attribute this unit to braided stream deposition during the uplift of the Blue Mountains. This conglomerate, primarily located in the Walla Walla Valley, consists predominantly of basaltic clasts ranging from sand and gravel to cobbles, and includes lenses of fine-grained sand and clay. Thickness ranges up to 450 feet.

Quaternary-Late Tertiary Consolidated Sediments Fine

Late Miocene to early Pleistocene consolidated sedimentary rocks including sandstone, claystone, siltstone and mudstone (Madin et al., 2023). Directly overlying the CRBG, this fine-grained unit is exclusively found within the Walla Walla Valley. Referred to by Newcomb (1965) as the "old clay", and Lindsey and Tolan (2007) as Mio-Pliocene Fine, this unit does not outcrop at land surface. Thickness ranges up to 500 feet and includes a discontinuous layer of coarse arkosic-micaceous sand and silt at its base, attributed by Lindsey and Tolan (2007) to deposition by the ancestral Salmon-Clearwater River of present-day southwest Idaho and termed Mio-Pliocene Lower Coarse Unit.

COLUMBIA RIVER BASALT GROUP UNITS

Saddle Mountains Formation

The weathered top surface of the Columbia River Basalt Group (CRBG) marks the base of the sedimentary sequence. The Saddle Mountains Basalt erupted between 14 and 6 million years ago (Ma) (Reidel et al., 2013). In the Walla Walla Valley, it consists of four members, from oldest to youngest: Umatilla, Ice Harbor, Lower Monumental, and Walla Walla. Vents of Ice Harbor and Lower Monumental

members are mapped within the Walla Walla River Basin and the extent of these flows appear to be constrained by regional paleotopography. Flows younger than the Umatilla Member have only been mapped under the sediments of the Walla Walla Valley; they do not outcrop. Members range from 30 to 150 feet thick (McClaughry and Azzopardi 2023; Table 1).

Wanapum Formation

This formation erupted between 15.6 and 14 Ma (Reidel et al., 2013). In the Walla Walla Valley, it includes at least two members: Frenchman Springs and Lookingglass. The Frenchman Springs member is further subdivided into the basalt of Sentinel Gap, Sand Hollow, and Ginkgo (Madin et al., 2023; McClaughry and Azzopardi, 2023). Member thicknesses range from 60 to 800 feet (Table 1).

Grande Ronde Formation

Emplaced between 16 and 15.6 Ma (Tolan et al., 1989), this formation includes at least six members in the Walla Walla Valley: Sentinel Bluffs, Winter Water, Indian Ridge, Ortley, Buttermilk Canyon, and Grouse Creek. Additional undifferentiated members likely exist at depth. Member thicknesses range from 115 to 1500 feet .

Geologic Structures

The deformation of Earth's crust after rock emplacement results in geologic structures such as folds and faults. Several examples of complex faulting occur locally, where the same CRBG units exposed in Horse Heaven Ridge and the Blue Mountains have been downdropped and are buried beneath hundreds of feet of sediment in the Walla Walla Valley. The geometry of the Walla Walla River Basin is a result of strike-slip faulting (Derkey et al., 2006). Many faults are concealed beneath sediment in the Walla Walla Valley; their location and magnitude of vertical displacement have been identified by geologic mappers based on top of basalt elevations reported during well drilling.

As illustrated in Figure 3, the Walla Walla River Basin is situated at the convergence of two regional fault systems: the Wallula Fault Zone (WFZ) and the Hite Fault Zone (HFZ) (Madin et al., 2023). The Basin is bounded to the north by the Palouse Slope and to the west by the Divide Anticline (Newcomb, 1965). The Olympic-Wallula Lineament (OWL), which includes the WFZ, extends from Milton-Freewater, OR to Olympia, WA, while the Klamath-Blue Mountain Lineament, which includes the HFZ, stretches from the Washington-Idaho border to Klamath, OR. The Milton-Freewater Fault Zone (MFZ) is described as a transition zone between the HFZ and WFZ (Madin et al., 2023). Seismic activity in the region includes the 1936 magnitude 6 Milton-Freewater Earthquake, which caused ground cracks and increased discharge from springs and wells (Neumann 1940). For a detailed discussion of local and regional structural geology, refer to recent geologic mapping (Madin et al., 2023; McClaughry and Azzopardi, 2023).

The WFZ trends west-northwest as a set of locally active right-lateral strike-slip faults and north-south-striking normal faults, extending 75 miles from Kennewick, WA to Milton-Freewater, OR. The maximum vertical displacement is approximately 800 feet down to the north. The offset predates the emplacement of Saddle Mountains Formation CRBG flows younger than the Umatilla member, which are mapped only north of the Wallula Fault Zone (Madin et al., 2023). Evidence of late Pleistocene surface rupture and liquefaction along the WFZ has been noted by multiple researchers (Swanson et al., 1980; Sherrod et al., 2016).

The MFZ of Madin et al. (2023) consists of north-northwest striking linear, vertical to subvertical normal and right-lateral oblique-slip faults, transferring strain from the WFZ to the HFZ. Faults in the MFZ step down from the southeast and northeast of Milton-Freewater toward the Walla Walla River. Vertical offset in this zone postdates the Umatilla Member of the Saddle Mountains Formation of the CRBG, ranging from tens of feet near Milton-Freewater to hundreds of feet as the MFZ transitions into the WFZ to the west (Madin et al., 2023).

The HFZ is a 15-mile-wide north-northeast striking down-to-the-west left-lateral oblique-slip fault complex, extending 85 miles through the eastern edge of the Walla Walla River Basin and continuing into Washington (McClaughry and Azzopardi, 2023). Near Athena, vertical displacement ranges from 200 to 600 feet down-to-the-northwest, with approximately 500 feet of horizontal displacement (McClaughry and Azzopardi, 2023). Swanson et al. (1980) describe the HFZ as older than the WFZ, formed by a different stress field than that which caused the more recent orientation and motion along the WFZ. Faults. Additionally, no evidence of HFZ post-Pliocene has been reported (Kienle 1979; Swanson et al., 1980).

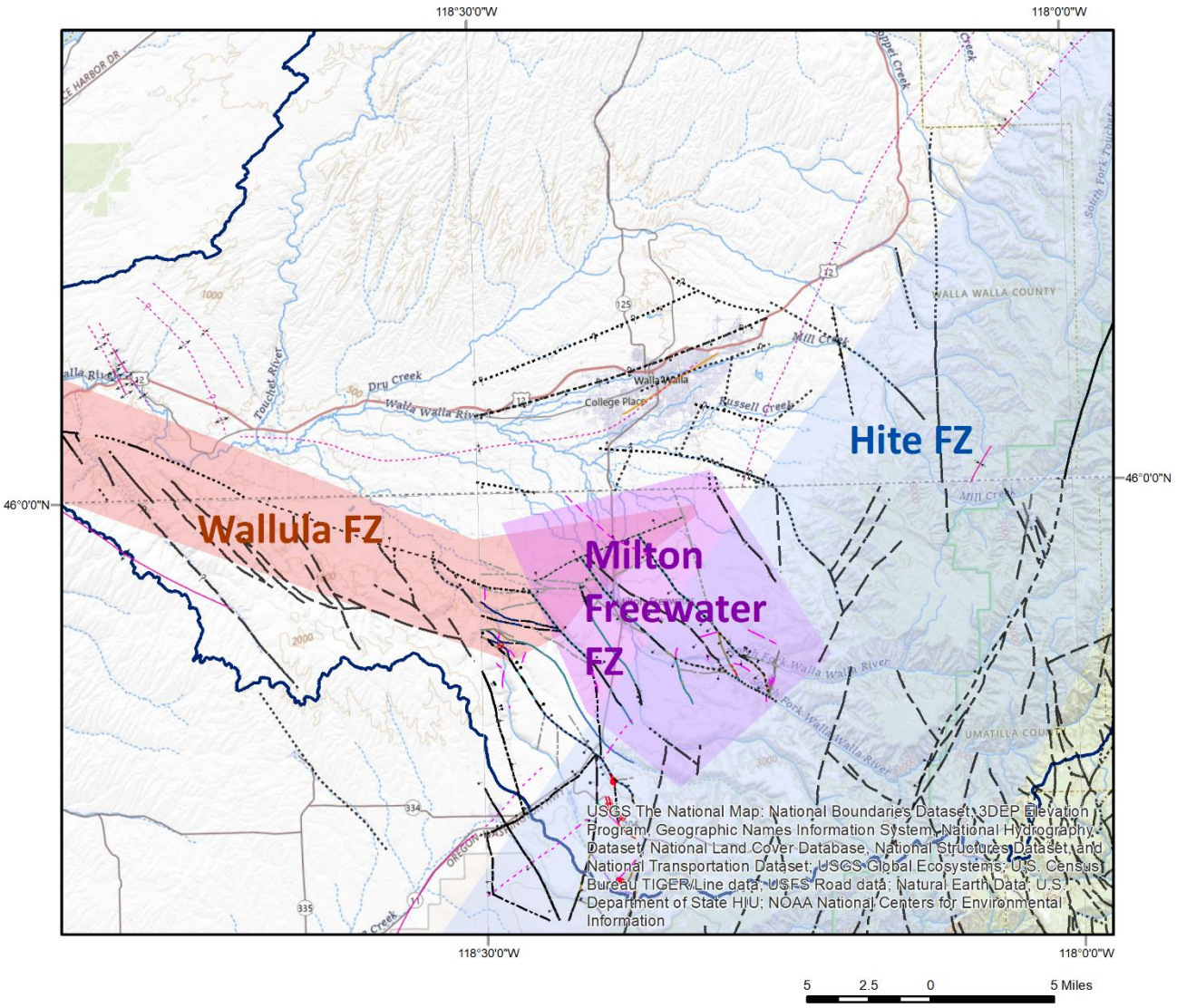


Figure 3: Geologic structure overview. Fault zones (fault zone) as described by Madin et al. (2023) and McClaughry and Azzopardi (2023).

Hydrogeologic Setting

Stratigraphic units and their disruption by geologic structures create a unique environment for groundwater flow. The Walla Walla River Basin hydrogeologic system ranges from coarse unconsolidated sediments at the surface to increasingly consolidated sediments with depth, and finally into the series of basalt units. There is vertical and lateral heterogeneity within stratigraphic units, and many units are not continuous across the Walla Walla River Basin. This heterogeneity results in local

complexity in the hydrogeologic flow system. Despite local heterogeneity, stratigraphic units can be grouped into two types of hydrogeologic systems: sedimentary and basalt aquifer systems.

Sedimentary aquifer system description

The sedimentary aquifer system in the Walla Walla Valley varies in grain size with depth and location, containing an unconfined aquifer. The sediments contain an aquifer system that is generally unconfined, meaning the water level in this aquifer fluctuates within interconnected pore spaces (Figure 4). The sediments have low to high transmissivity, and high storativity (see definitions in Table 2). At the base of the sedimentary units, the Quaternary-Late Tertiary fine-grained consolidated unit extends across the basin and supports very few wells. With thickness ranging up to 500 feet, this fine-grained unit likely acts as a low-permeability resister to flow between the underlying CRBG system and the overlying sediments.

Overlying the fine-grained consolidated unit, the Quaternary-Late Tertiary coarse-grained consolidated unit contains interbedded lenses of gravel and clay, is often described as conglomerate, and supports domestic and irrigation wells. At the surface, the alluvium consists of boulders, cobbles, gravels, sands, and clays, is coarsest where the Walla Walla River and Mill Creek exit their canyons and spread out across the valley and becomes finer to the west. Canal seepage losses (LaMarche, personal communication 2024) reflect these changes in permeability, decreasing from the canyon mouths westward. Multiple spring arcs, described by Newcomb (1965), indicate that as the sedimentary groundwater system flows northwest, it surfaces and reinfiltrates at permeability contrasts. In the finer-grained facies to the west, water levels are approximately 80 feet below the surface in 2024 (OWRD GWIS, 2024). The water table slopes downward to the west, with water levels near the canyon mouths within 30 feet of the surface (OWRD GWIS, 2024). Tracer studies by Crisóstomos Petrides Jiménez (2008) found that water artificially infiltrated into the coarse-grained alluvium southeast of Umapine flow preferentially through shallow, coarse-grained alluvium, largely discharging within days to a month to Johnson Creek.

Some sedimentary materials are rarely saturated year-round. While they may exist, none of the 1,100 well logs reviewed in this study reported saturated zones in loess or Missoula flood deposits.

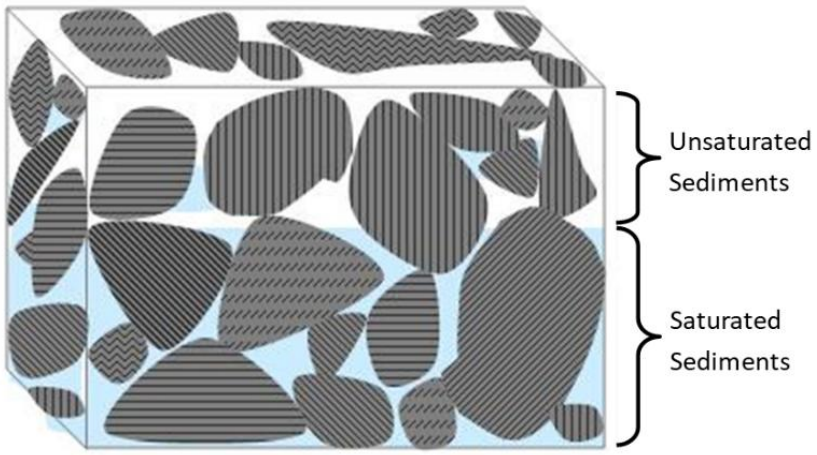


Figure 4: Sedimentary aquifer materials schematic shows the upper unsaturated zone where pore spaces between grains of sand, gravel or other sediments is mostly filled with air, and the saturated zone where pore space is filled with water.

Basalt aquifer system description

CRBG aquifers in the Walla Walla River Basin commonly support domestic, municipal and irrigation wells. The emplacement of lava flows in sheets creates the typical tabular internal structure of CRBG flows aquifers. The observed extent of flows younger than the Umatilla Member of the Saddle Mountains Formation is limited to the Walla Walla Valley, where units are recognized through geochemical analysis of lithologic water well cuttings (Madin et al., 2023). Additionally, geologic structures and erosion in the Walla Walla River Basin have disrupted the typical CRBG flow anatomy post deposition in many places. Before describing how the Walla Walla River Basin CRBG system is atypical, a summary of typical CRBG aquifer characteristics is provided below. The aquifers within the Columbia River Basalt Group (CRBG) units are primarily confined, meaning that changes in storage result from the compression or decompression of water and rock matrix. CRBG aquifers typically have high transmissivity and low storativity.

CRBG units, particularly the Wanapum and Grande Ronde Formations, primarily display sheet flow characteristics. These sheet flows are large-volume and have a characteristic three-part structure: flow top, dense flow interior, and flow bottom (Figure 5).

The flow top is typically fine-grained, glassy, and vesicular (containing gas bubble voids formed during cooling processes). It can range up to 100 feet thick and may be vesicular, brecciated, or both. The dense flow interior consists of basalt with cooling joints, either columnar-blocky or entablature. Columnar-blocky joints are usually vertical polygonal columns, in places intersected by sub-horizontal joints. Entablature contains irregular jointing patterns with small columns (less than 0.5 meters in diameter). Cooling joints are 0.1 to 0.3 mm wide, with 80-100% of the space filled by secondary mineralization (Reidel, 2002). The flow bottom texture depends on the emplacement environment. Many flow bottoms consist of a glassy zone a few inches thick. Lava flowing into water can create complex features such as thick pillow-palagonite sequences.

The combination of flow tops, sedimentary interbeds, and flow bottoms forms interflow zones, often hosting confined aquifers with unique water levels, chemistry, or temperature.

In the Walla Walla River Basin, typical tabular stacked aquifers are indicated by water level head changes with interflow zone near Athena and Weston (OWRD GWIS, 2024). However, the WFZ,

MFZ and HFZ appear to significantly impact the CRBG groundwater flow system in much of the Walla Walla Valley. Vertical displacement of stratigraphic units across faults is evident from geochemical analysis of well cuttings (Madin et al., 2023), and in some cases this displacement correlates with water level elevation changes. Where CRBG flows are offset by faults, dense flow interiors can be juxtaposed against interflow zones. Fault zones also may fracture dense flow interiors, providing vertical hydraulic connection between multiple stratigraphic units. An examination of the hydraulics of local geologic structures follows.

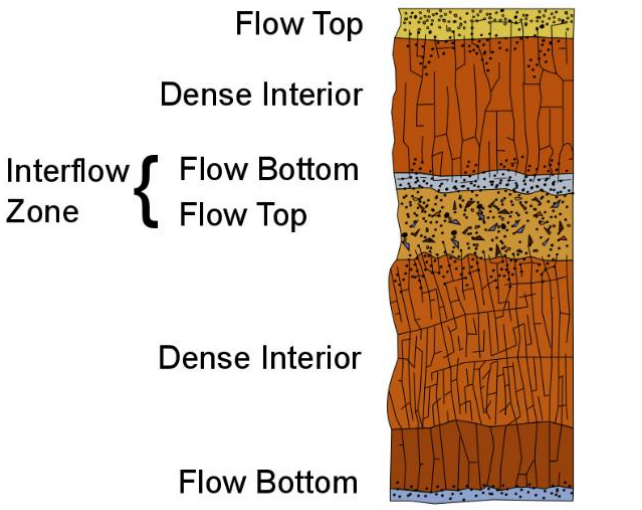


Figure 5: Common three-part flow structures of CRBG. CRBG aquifers typically occur in interflow zones.

Hydraulic Properties of Stratigraphic Units

The potential for a rock unit to provide water to a well is controlled by its capacity to store and transmit water. Methods of quantifying aquifer properties for this study use data from well pumping tests, typically including measurements of pumping rates, drawdown over time at wells, and distances between wells. Commonly used hydraulic properties of geologic units are defined in Table 2.

Table 2. Hydraulic properties that influence groundwater flow. For a comprehensive discussion of groundwater hydraulics, the reader is referred to Freeze and Cherry (1979).

Hydraulic Property	Symbol	Units	Definition
Porosity	φ	Dimensionless	Percentage of rock volume occupied by pore space
Permeability	k	$Length^2$	Ability of rocks to conduct a fluid, controlled by size and connectivity of pore space
Saturated thickness	b	Length	Vertical thickness of geologic material where pores are fully saturated
Hydraulic conductivity	K	Length/time	Rate of groundwater flow per unit area under a unit hydraulic gradient
Transmissivity	T	$Length^2$/time	Rate of groundwater flow per unit width under a unit hydraulic gradient (T = K x b)
Storage coefficient	S	Dimensionless	Volume of water released from or taken into storage per unit surface area of aquifer per unit change in head
Specific Yield	S_y	Dimensionless	Ratio of volume of water drainable by gravity from saturated aquifer material to the total volume of material
Specific Capacity	SC	Volume/length/time	Pumping rate of a well per foot of drawdown

Methods

This study characterizes the hydraulic properties of stratigraphic units using data from single well specific capacity tests from well logs, and single and multiple well pumping tests from wells in Washington and Oregon. Multiple well pumping tests are considered the most reliable data source, while specific capacity tests are considered the least reliable. Quantifying the hydraulic properties of stratigraphic units involves the following process:

1. Selecting representative wells.
2. Transforming lithology into stratigraphic units.
3. Estimating the range of hydraulic properties for each stratigraphic unit using specific capacity tests, single well pumping tests, or multiple well pumping tests.
4. Grouping stratigraphic units into hydrostratigraphic units based on similar hydraulic properties and stratigraphic position.

WELL SELECTION PROCESS AND DATA ENTRY

As shown in Figure 6, Figure 7, and Figure 8, well test data density is uneven across the study area and by test type, with higher data density in areas of intensive groundwater development and decreased data density with depth. Well location information was more readily available in Oregon than in Washington, resulting in a data set skewed to Oregon locations. A total of one thousand one hundred

fifty-five wells from Oregon and Washington were selected based on the following criteria and entered into OWRD's Groundwater Information System (GWIS):

- **Spatial Coverage**: Aimed for a minimum of 3 wells per Section.
- **Location Accuracy**: Field-located wells were prioritized; gaps were filled with wells identified by Township, Range, Section, and Quarter-Quarter by water right documents or well logs.
- **Well Information**: Included only well logs that described lithology and well construction.
- **Quality of Well Tests**: When multiple tests are available for a particular well, only a one test result was included in the final analysis. Priority was given to multiple well pumping tests, followed by single well pumping tests of acceptable quality, and finally specific capacity tests conducted by pumping or bailing methods.

TRANSFORMING LITHOLOGY TO STRATIGRAPHY

Recent mapping by Madin et al. (2023) and McClaughry and Azzopardi (2023) made stratigraphic interpretations of well lithology for approximately two hundred wells in Oregon, which were utilized in this analysis. For wells not assessed in recent DOGAMI mapping, stratigraphy was identified based on well log lithology descriptions, unit position, and surficial geologic mapping. Well log lithology was interpreted using the simplified stratigraphy shown in Table 3. Consequently, the data sets include stratigraphic detail ranging from broad categories to members of formations (see Appendix C).

Table 3. Simplified Walla Walla River Basin stratigraphy used for interpreting lithology from well log descriptions.

Simplified stratigraphy identified from well log lithology
Quaternary Alluvium Fine
Quaternary Alluvium Coarse
Quaternary Missoula Flood Deposits
Quaternary Loess
Quaternary-Late Tertiary Consolidated Coarse Sediments
Quaternary-Late Tertiary Consolidated Fine Sediments
CRBG Undifferentiated

DETERMINING AQUIFER THICKNESS

Aquifer thickness is used to convert transmissivity to hydraulic conductivity, normalizing aquifer properties to thickness. In this study, aquifer thickness is represented by the open intervals in wells as identified in their well logs. Previous work by Grondin et al. (2021) concluded this was the most reliable method for assigning aquifer thickness across a large set of wells because total open interval is easily observed and reported, the open interval doesn't change unless well construction is altered and using total open interval includes the most wells for hydraulic property analysis. However, the resulting range in thickness for a particular stratigraphic unit increases the range of hydraulic conductivity estimates. Two wells in the same aquifer can produces diverging results where a small open interval will result in a high hydraulic conductivity and a large open interval a small hydraulic conductivity. This can be particularly challenging in CRBG, where thickness has been interpreted multiple ways, ranging from using the entire thickness of basalt to only considering the thickness of interflow zones accessed by a well. Therefore, this study emphasizes the mean aquifer properties per stratigraphic unit rather than

the range. Transmissivity estimates are not affected by aquifer thickness decisions; results are presented for both transmissivity and hydraulic conductivity. The reader is advised to consider aquifer thickness determination when examining hydraulic conductivity.

In this study, to assign an aquifer parameter to a stratigraphic unit, a stratigraphic unit must constitute at least 51% of the well's open interval. Only wells meeting the 51% criterion were included, thereby reducing the number of wells considered for assessment of aquifer parameters from over one thousand to approximately six hundred fifty.

SPECIFIC CAPACITY ANALYSIS

Using the methods of Theis (1935) and Vorhis (1979), as adapted by Grondin et al. (2021) specific capacity data analysis provides numerical estimates of transmissivity. When analyzed in bulk, specific capacity data can reveal order-of-magnitude differences in transmissivity and hydraulic conductivity between stratigraphic units. This method, while affected by well efficiency and reliant on reported well log data, allows for extensive spatial coverage due to the abundance of well logs. Well efficiency describes how easily water moves from an aquifer into the well casing. At a given pumping rate, low well efficiency results in larger drawdown in a well than a highly efficiency well in the same aquifer. Low well efficiency contributes to low specific capacity, and specific capacity is directly proportional to resulting estimates of transmissivity. Therefore, low well efficiency can lead to low transmissivity estimates, and well properties affect the aquifer property estimate.

Transmissivity and hydraulic conductivity were estimated from specific capacity for approximately six hundred fifty wells. The selected wells include field-located wells, wells in the current bi-state water level monitoring network, wells with well logs meeting the criteria of reporting a pump or bailer test, lithology, well seal, and location accuracy. Due to limited location information availability in some portions of the study area, data distribution is uneven (Figure 6).

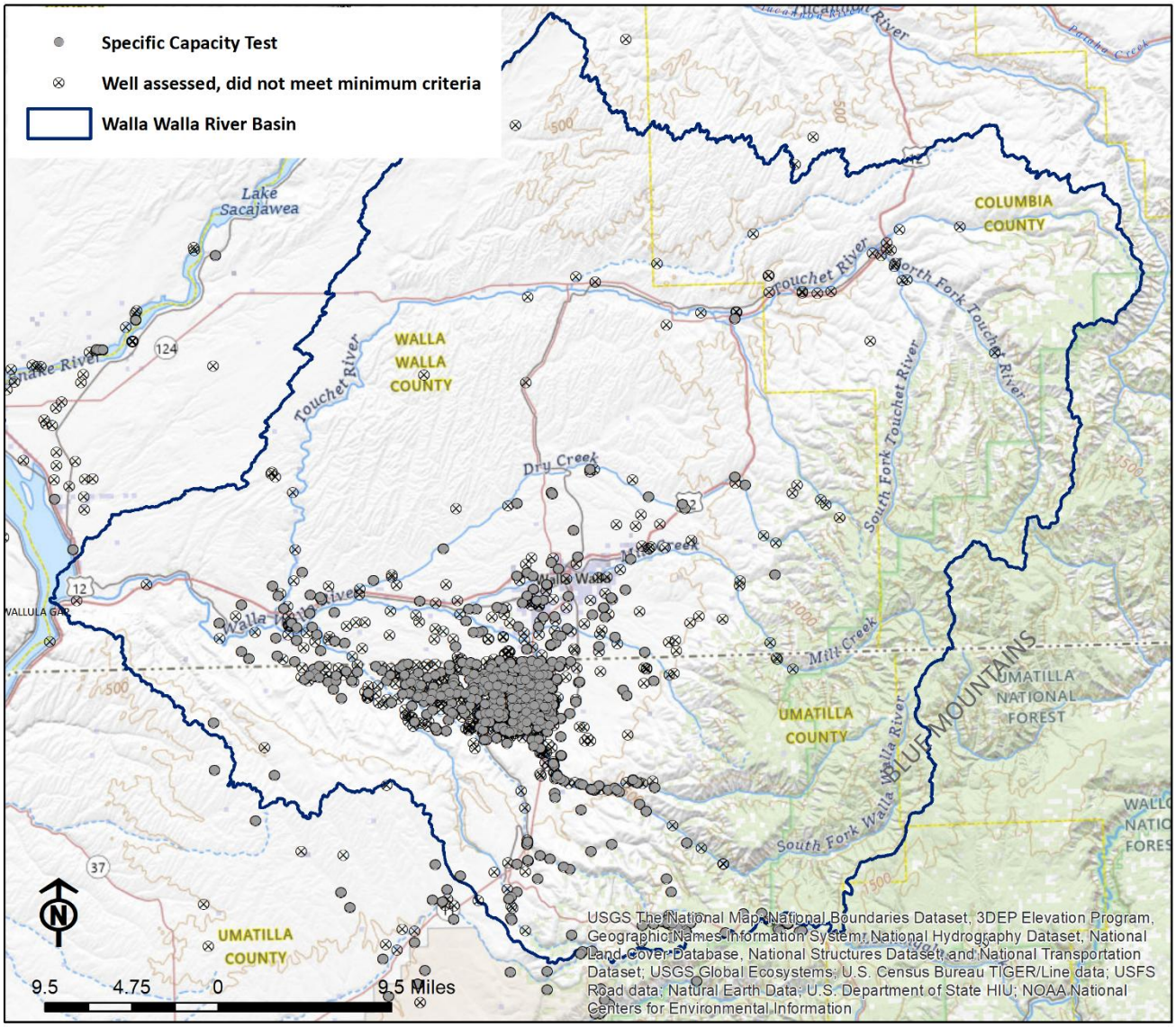


Figure 6: Location of well logs selected to estimate aquifer properties from specific capacity. Wells included in aquifer parameter estimation have an open interval with more than 51% spanning a single stratigraphic unit.

SINGLE WELL PUMPING TEST ANALYSIS

A single well pumping test, when conducted and documented properly, yields time-series water level drawdown and recovery data. Cooper-Jacob (1953) and Theis (1935) methods were applied to analyze these data and estimate transmissivity. These tests are reported to OWRD by water right holders as required by groundwater use permits issued from approximately 1989 onward. OWRD hydrogeologists routinely review and analyze these tests for aquifer parameters. Those deemed of lowest quality have been omitted from this study. Unfortunately, an equivalent dataset for the Washington portion of the Walla Walla River Basin is not currently available.

This study uses sixty-four wells (Figure 7) with single well pumping tests that met the minimum criteria for estimating aquifer parameters by stratigraphic unit and passed quality control measures specific to reported pumping test datasets.

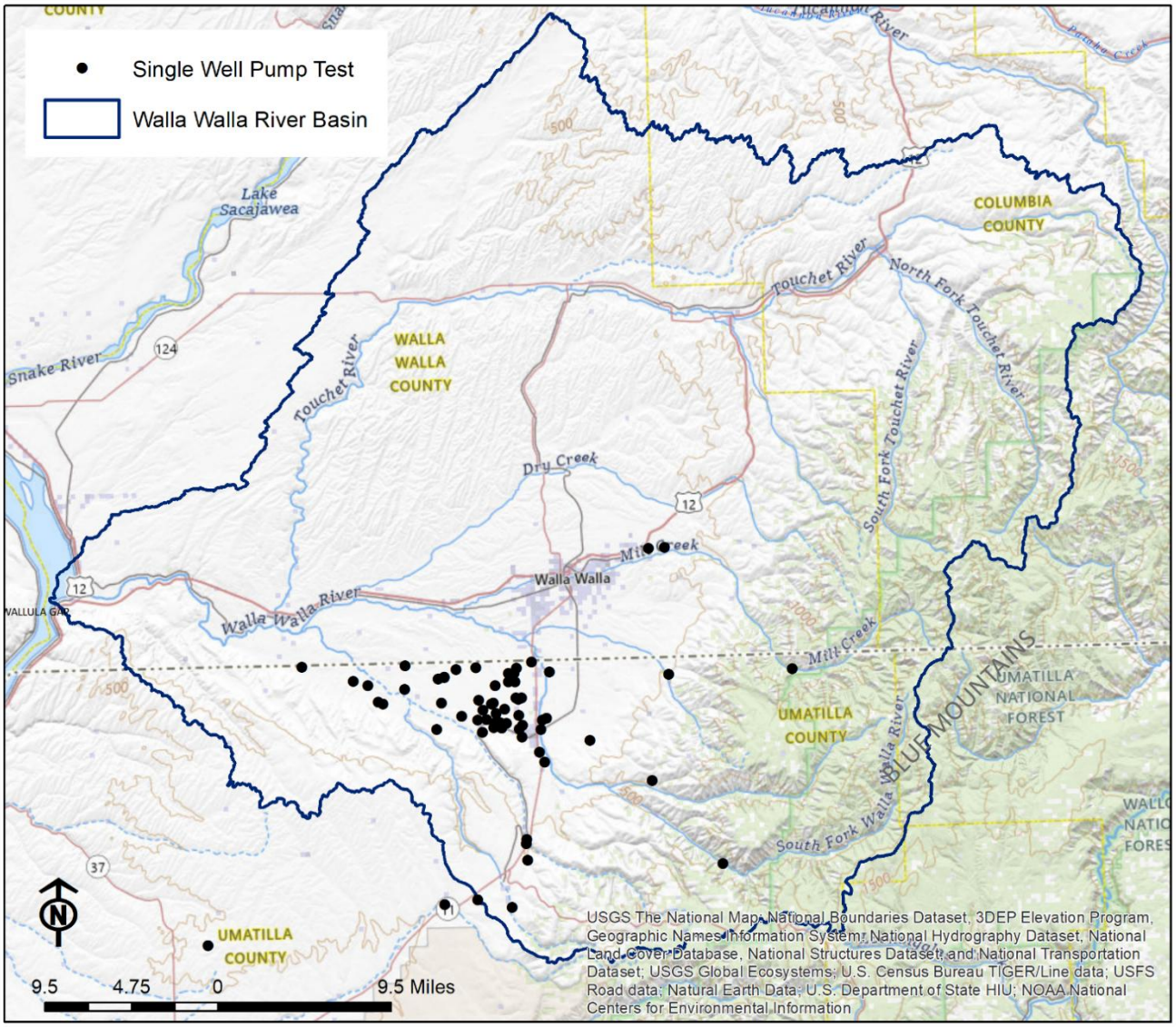


Figure 7: Location of single well pumping tests selected for aquifer property analysis.

MULTIPLE WELL PUMPING TEST ANALYSIS

Multiple well pumping tests involve pumping one well at a constant rate and measuring changes in water levels in one or more observation wells. They provide bulk hydraulic properties of the geologic materials located between pumping and observation wells. Multiple well pumping tests characterize a larger volume of an aquifer than single well tests and allow for estimates of aquifer storativity. Aquifer parameters from multiple well pumping tests are presented here from two main sources.

First, organizations and previous studies within the Walla Walla River Basin conducted groundwater investigations that involved execution and analysis of multiple well pumping tests. Tests analyzed by other authors were not re-analyzed in this report.

The second source is a series of multiple well pumping tests conducted in basalt wells by OWRD staff that were intended to evaluate the effects of geological structure between pumping and observation wells. When an observation well showed a measurable pressure response, the drawdown

data were analyzed to estimate transmissivity and storativity. Data were analyzed using AQTESOLV, a software package built to match analytical solutions for aquifer testing to observed data. The automatic estimation tool within AQTESOLV was used to match all pumping and recovery data at observation wells. If a semi-log plot or derivative data indicated that conditions of infinite-acting radial flow were encountered, either the Cooper-Jacob (1953) or Theis-recovery straight line method was then visually fit to linear segments of the drawdown data. Straight-line methods were applied to pumping wells where appropriate. Data and resulting hydraulic properties from each multiple well pumping test conducted by OWRD staff are available in Appendix B.

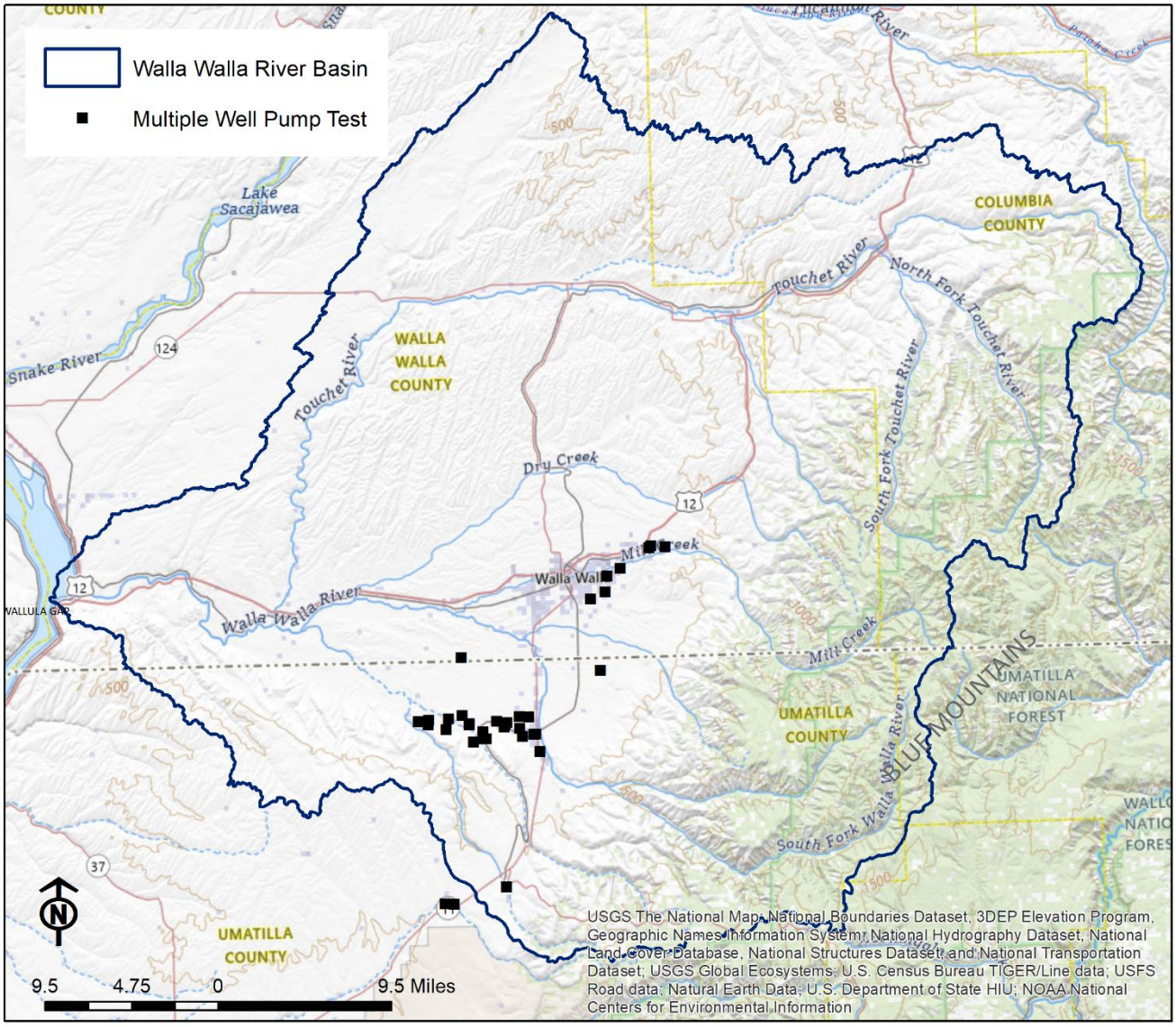


Figure 8: Location of multiple well pumping tests selected for aquifer property analysis.

Results by Stratigraphic Unit

Figure 9 and Figure 10 show transmissivity of simplified stratigraphic units (as identified in Table 3) and transmissivity of detailed CRBG stratigraphic units, respectively. Figure 11 and Figure 12 summarize horizontal hydraulic conductivity of simplified stratigraphic unit and detailed CRBG stratigraphic units, respectively. Additionally, Table 4 summarizes values of transmissivity, hydraulic conductivity, and storativity as detailed in Appendices B and C. There are significantly more data available for Quaternary Alluvium Coarse, Quaternary-Late Tertiary Consolidated Sediments Coarse and undifferentiated CRBG than other stratigraphic units. Parameters span more than two orders of magnitude within a stratigraphic unit. Typically, more data are available from wells installed in high-yield aquifers, because they are targeted for their production capacities.

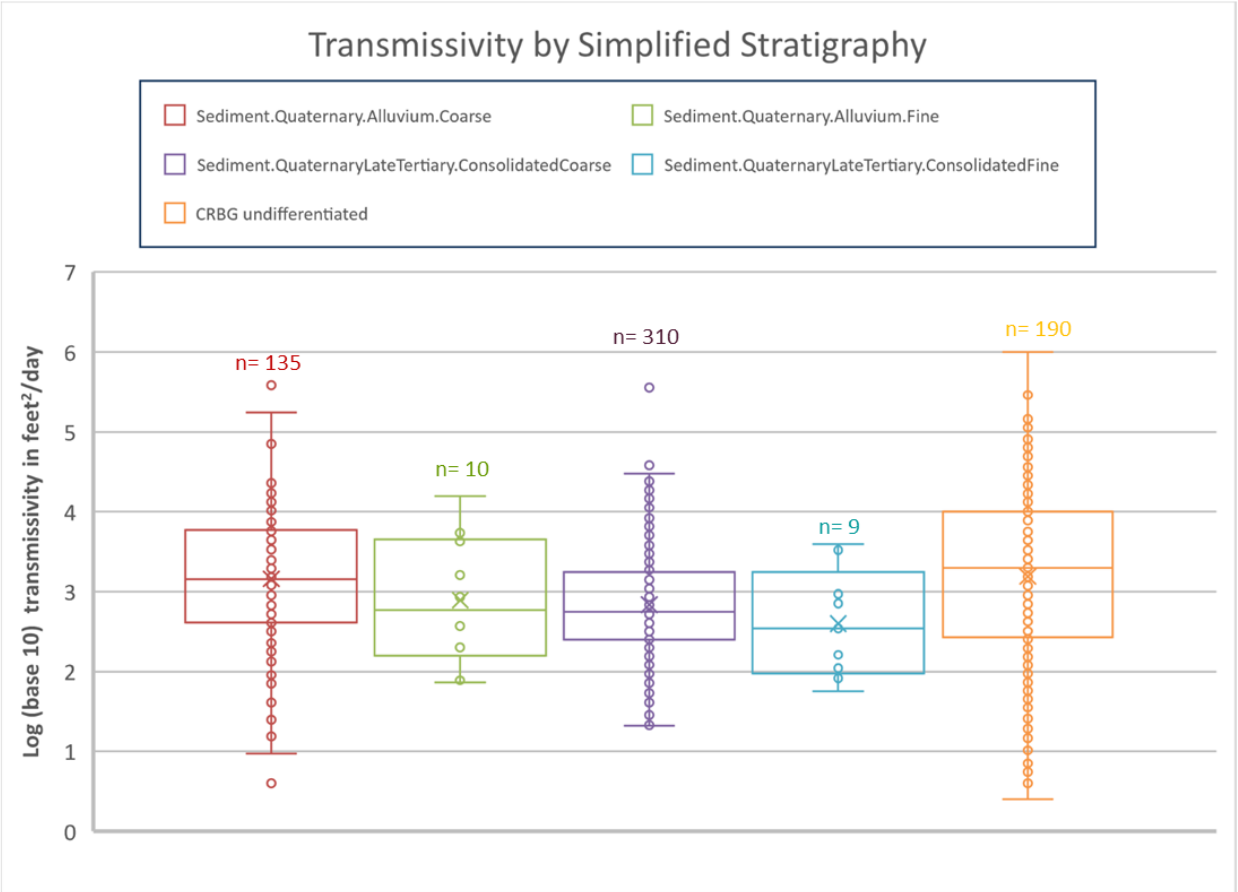


Figure 9: Transmissivity of Simplified Stratigraphy. Box and whisker plot shows exclusive median line, mean as an "x", and 25% quartile markers.

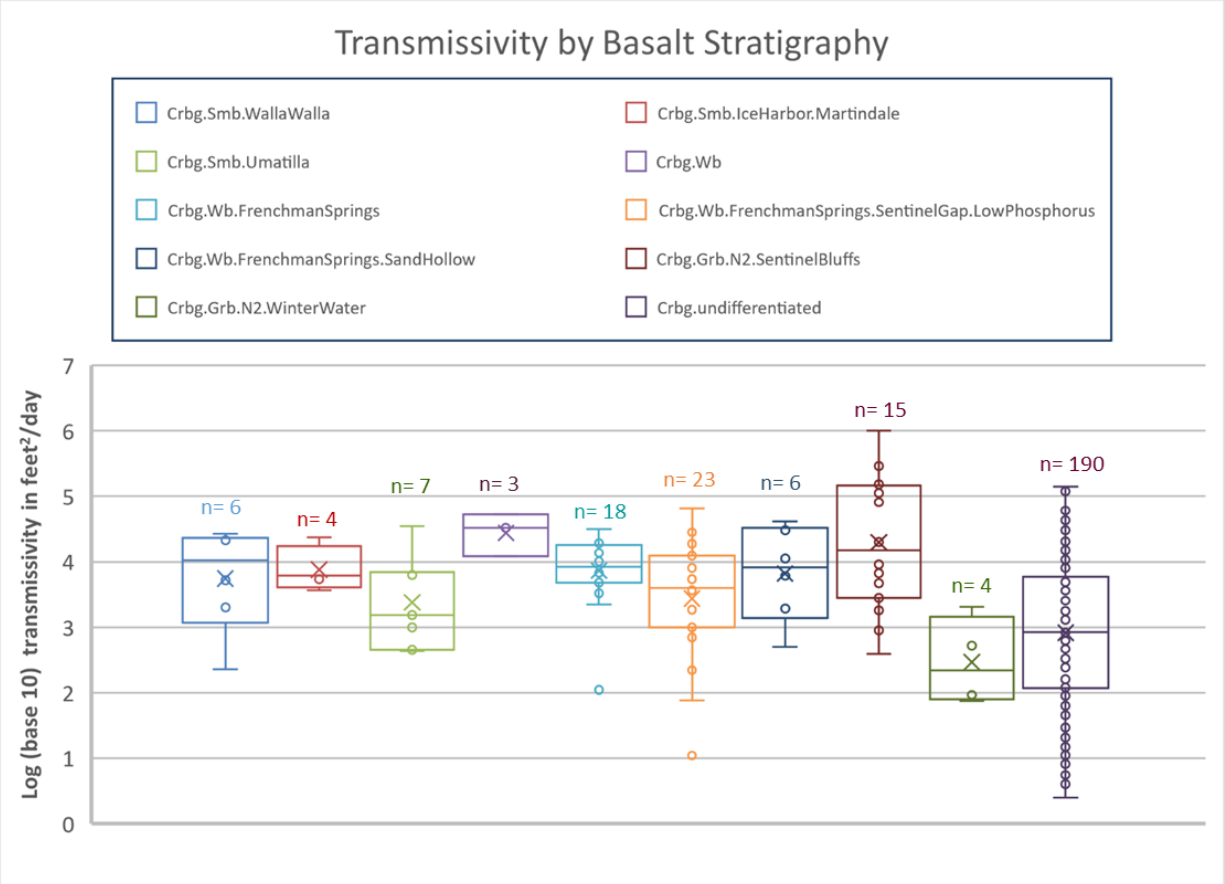


Figure 10: Transmissivity of CRBG Stratigraphy. Box and whisker plot shows exclusive median line, mean as an "x", and 25% quartile markers.

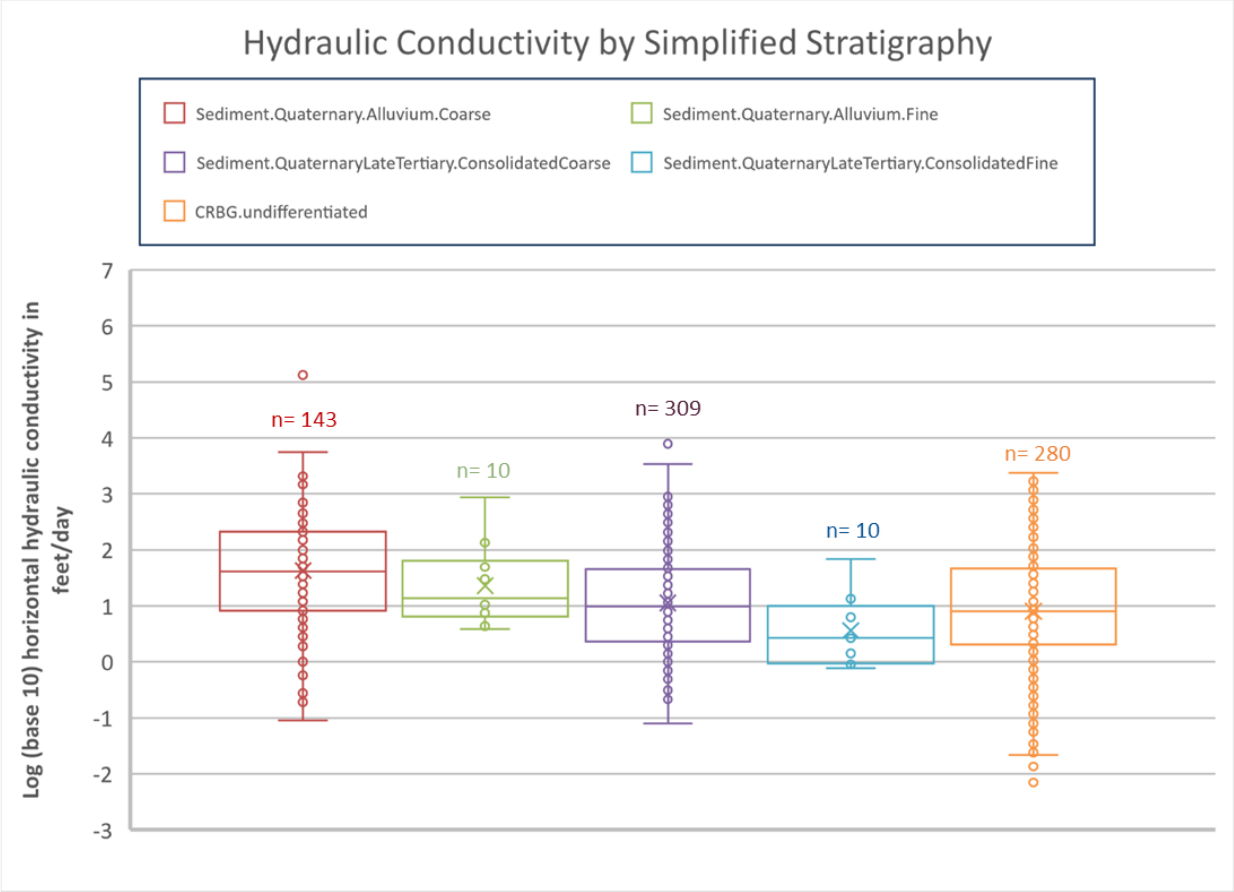


Figure 11: Horizontal hydraulic conductivity of simplified stratigraphic units. Box and whisker plot shows exclusive median line, mean as an "x", and 25% quartile markers.

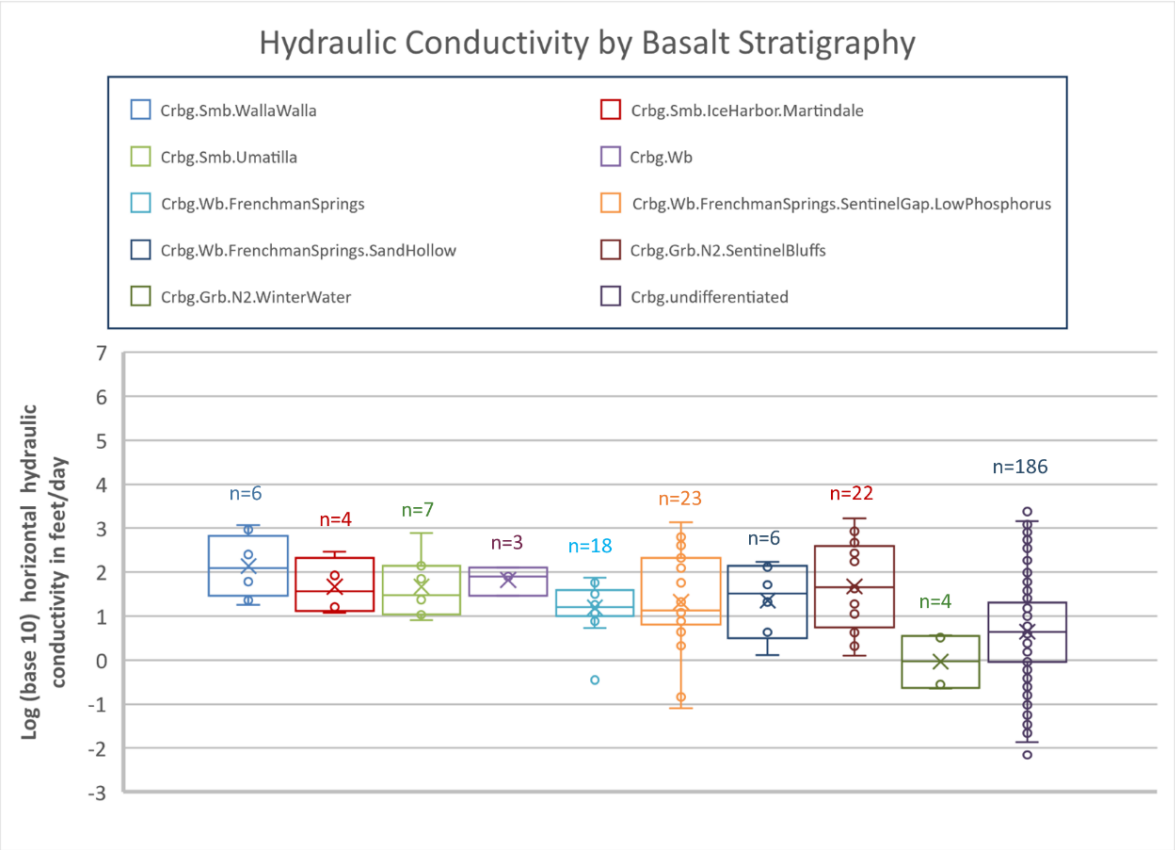


Figure 12: Horizontal hydraulic conductivity of CRBG stratigraphic unit. Box and whisker plot shows exclusive median line, mean as an "x", and 25% quartile markers.

Table 4: Hydraulic Properties of Stratigraphic Units. Geometric mean of hydraulic properties, test types: all= SC, SWT and MWT; SC= specific capacity test; SWT = single well pumping test; MWT= multiple well pumping test. *Data from *Drost et al. (1997)* . **Data from *Smoot and Ralston (1987)* and *Vaccaro et al. (2009)*

Stratigraphic Unit		Test Type	Sample size (# tests)	Mean T (ft^2/d)	Mean K (ft/d)	Mean S (unitless)
Quaternary Alluvial Deposits Coarse		all	135	1,400	40	0.02
		SC	108	890	29	n/a
		SWT	7	4,600	41	n/a
		MWT	20	14,000	182	0.02
Quaternary Alluvial Deposits Fine		All	10	780	30	
		SC	10	780	30	
		SWT	0			
		MWT	0			
Missoula Flood Deposits: Rhythmites/Touchet beds*		unknown			5	0.08
Loess**		unknown			5	0.05
Quaternary-Late Tertiary Consolidated Sediments Coarse		all	310	690	10	
		SC	280	720	13	
		SWT	30	450	4	
		MWT	0			
Quaternary-Late Tertiary Consolidated Sediments Fine		all	9	400	4	
		SC	9	400	4	
		SWT	0			
		MWT	0			
Columbia River Basalt Group						
Saddle Mountains Basalt Formation	Walla Walla Member	all	6	5,600	140	
		SC	0			
		SWT	2	680	20	
		MWT	4	16,000	360	
	Lower Monumental Member		0			
	Ice Harbor Member		0			
	----Basalt of Martindale	all	4	7,600	50	0.001
		SC	1	3,700	16	n/a
		SWT	1	5,400	12	n/a
		MWT	2	13,000	160	0.001
	----Basalt of Basin City		0			
	Umatilla Member	all	7	2,400	50	0.00005
		SC	2	810	16	n/a
		SWT	3	1,500	26	n/a
		MWT	2	15,000	330	0.00005
	----Basalt of Sillusi		0			
	----Basalt of Umatilla		0			
Mabton Member of the Ellensburg Formation						

Stratigraphic Unit		Test Type	Sample size (# tests)	Mean T (ft^2/d)	Mean K (ft/d)	Mean S (unitless)
Wanapum Basalt Formation	Frenchman Springs Member (undifferentiated)	all	18	7,300	20	0.0002
		SC	0			n/a
		SWT	1	1,500	0.4	n/a
		MWT	17	9,400	19	0.0002
	----Basalt of Sentinel Gap	All	23	2,800	20	0.002
		SC	6	2,900	11	n/a
		SWT	6	810	6	n/a
		MWT	11	5,200	56	0.002
	----Basalt of Sand Hollow	all	6	6,600	20	
		SC	4	13,000	50	
		SWT	1	500	1	
		MWT	1	6,100	20	
	----Basalt of Ginkgo		0			
	Lookingglass Member		0			
Vantage member of the Ellensburg Formation						
Grande Ronde Basalt Formation	Sentinel Bluffs Member (undifferentiated)	all	15	41,000	90	0.0004
		SC	5	53,000	130	n/a
		SWT	1	4,700	6	n/a
		MWT	9	45,000	100	0.0004
	----Basalt of Museum	all	6	3,500	10	n/a
		SC	3	14,000	40	n/a
		SWT	3	860	2	
		MWT	0			
	----Basalt of McCoy Canyon	All/SWT	1	11,000	40	
	Winter Water Member	all	4	290	1	
		SC	3	460	1	
		SWT	0			
		MWT	1	75	0.2	
	Indian Ridge Member	No data	0			
	Ortley Member	No data	0			
	Buttermilk Canyon Member	No data	0			
	Grouse Creek Member	No data	0			
CRBG undifferentiated		all	190	800	4	0.0003
		SC	142	400	3	n/a
		SWT	12	2,600	5	n/a
		MWT	36	9,000	20	0.0003

QUATERNARY ALLUVIAL DEPOSITS: COARSE AND FINE

Coarse-grained and fine-grained quaternary alluvium exhibit geometric mean transmissivity of 1,400 and 780 ft^2/d, and mean hydraulic conductivity of 40 and 30 ft/d, respectively. Storativity data are limited but representative of an unconfined aquifer with a value of 0.02. The braided alluvial system consists of sediment with interfingered coarse and fine lenses of limited extent. Well logs report most wells produce water predominantly from coarse-grained zones. Figure 12 and Figure 13 illustrate the spatial distribution of transmissivity, highlighting higher (arithmetic) mean values in the upper alluvial fans of the Walla Walla River and Mill Creek. Mean transmissivity in the middle and western portions of the valley are an order of magnitude lower. This change in where bulk transmissivity outliers are concentrated, indicated by arithmetic mean, roughly correlates with proximity to high energy and large volume river reaches.

MISSOULA FLOOD DEPOSITS: RHYTHMITES/TOUCHET BEDS

No well logs or unprocessed test data associated with saturated rhythmites were found, thus precluding additional estimation of hydraulic properties for these units. Reported hydraulic conductivity and storativity from Drost et al. (1997) are 5 ft/day and 0.08, respectively. These deposits do not appear to constitute significant saturated water-bearing units in the study area, although precipitation likely percolates through them.

LOESS

No well logs or test data were found reporting saturated loess, thus precluding the estimation of additional hydraulic properties for these units. Reported hydraulic conductivity and storativity from Vaccaro et al. (2009) are 5 ft/day and 0.05, respectively. These deposits do not appear to constitute significant saturated water-bearing units in the study area, although precipitation likely percolates through them.

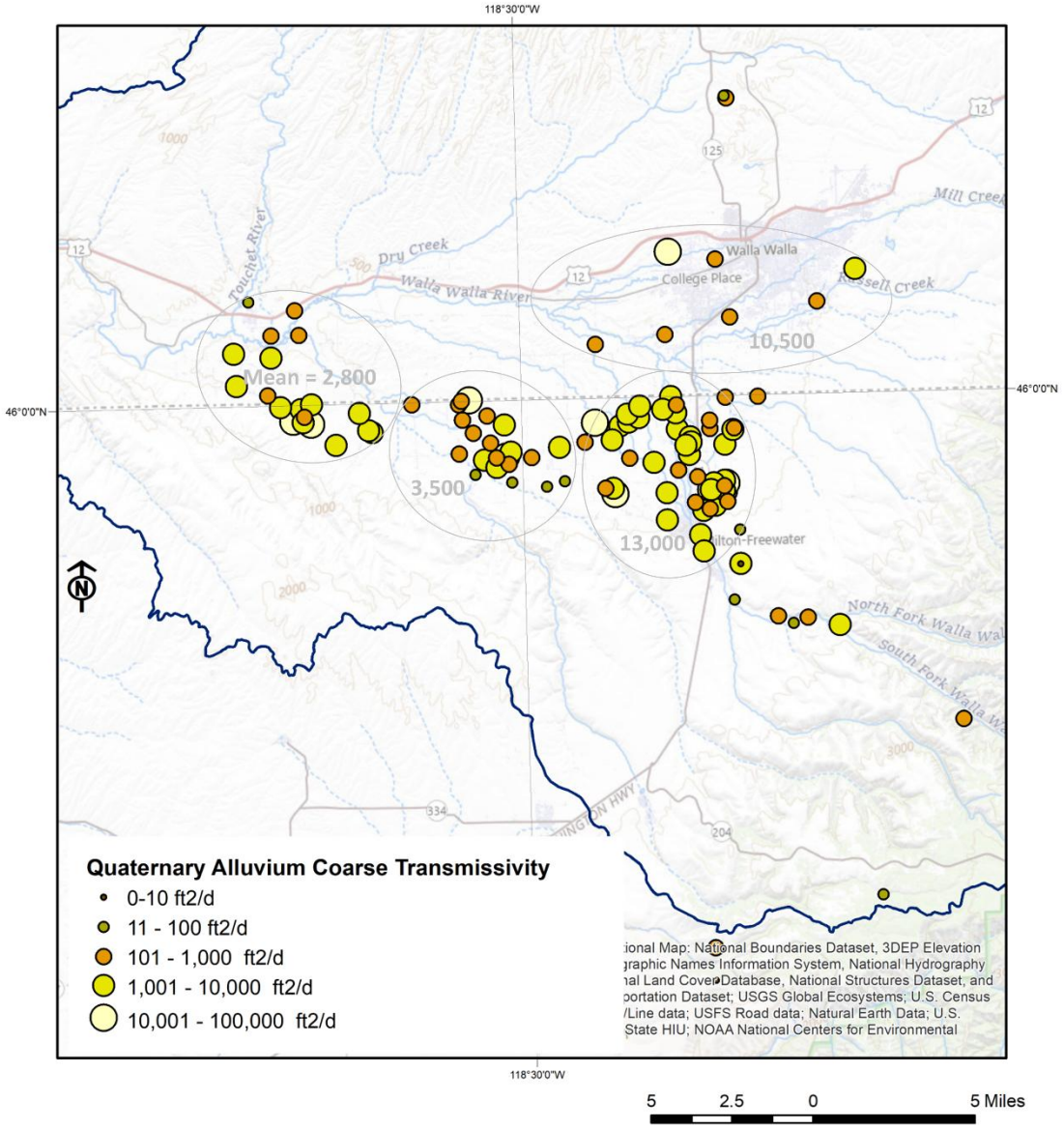


Figure 13: Map view of transmissivity, Quaternary Alluvium Coarse Unit. Arithmetic mean values are shown for subareas on the map, illustrating that high outliers are concentrated in the east, near canyon mouths, while low outliers are concentrated in the western portion of the Walla Walla River Basin. Other sections of this report use the geometric mean to discuss the central tendency for the basin as a whole.

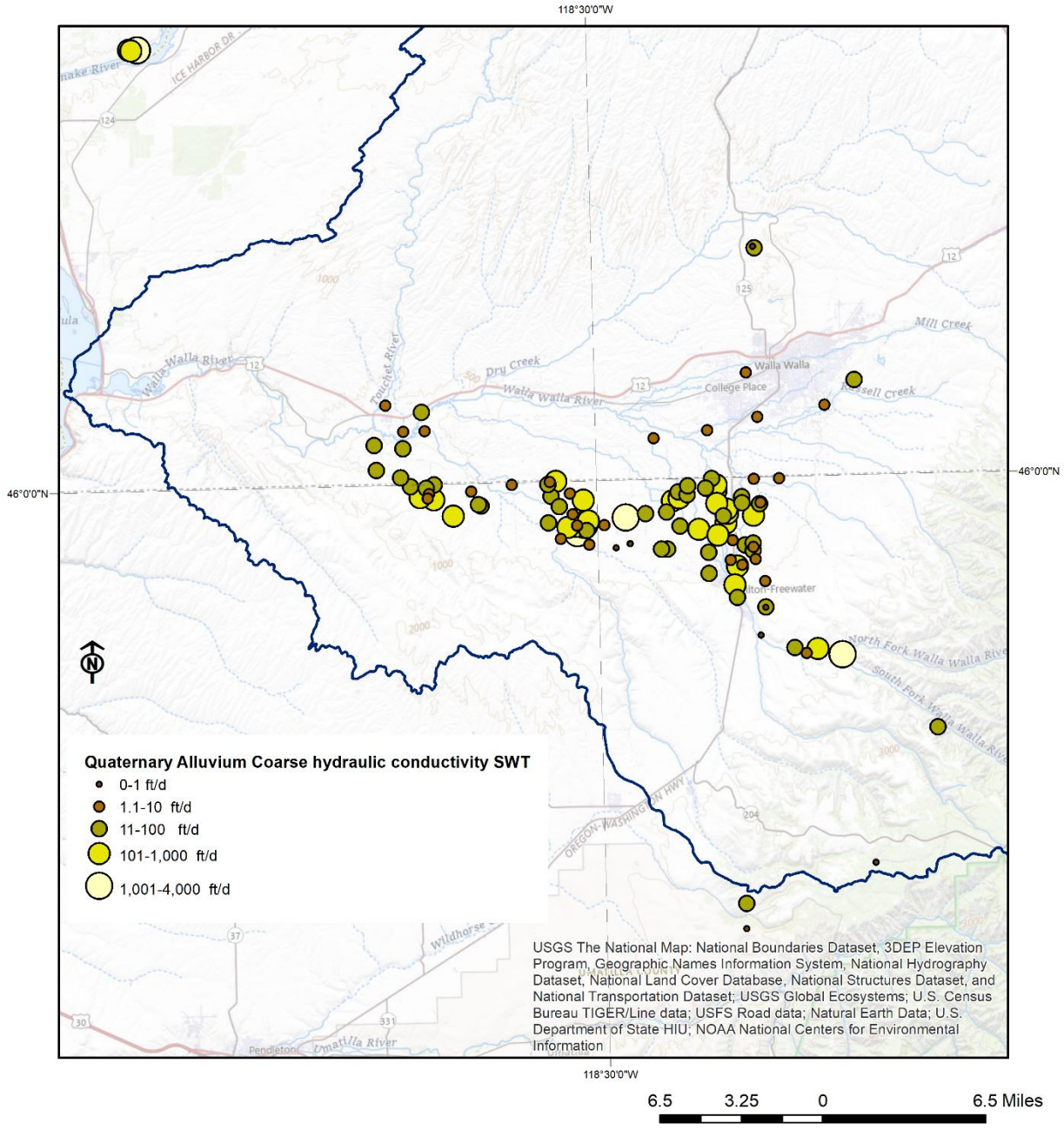


Figure 14: Map view of hydraulic conductivity, Quaternary Alluvium Coarse Unit

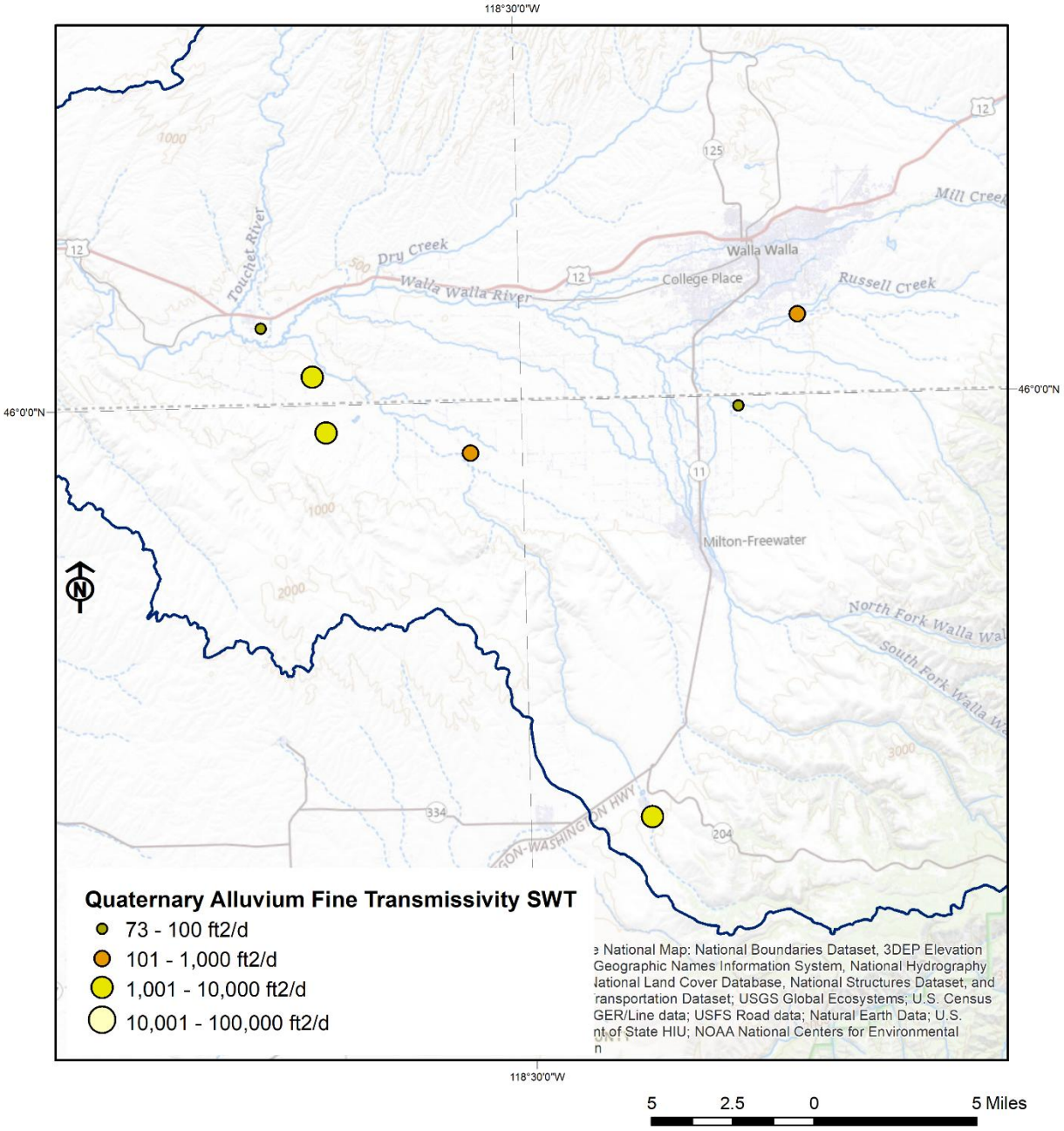


Figure 15: Map view of transmissivity, Quaternary Alluvium Fine Unit

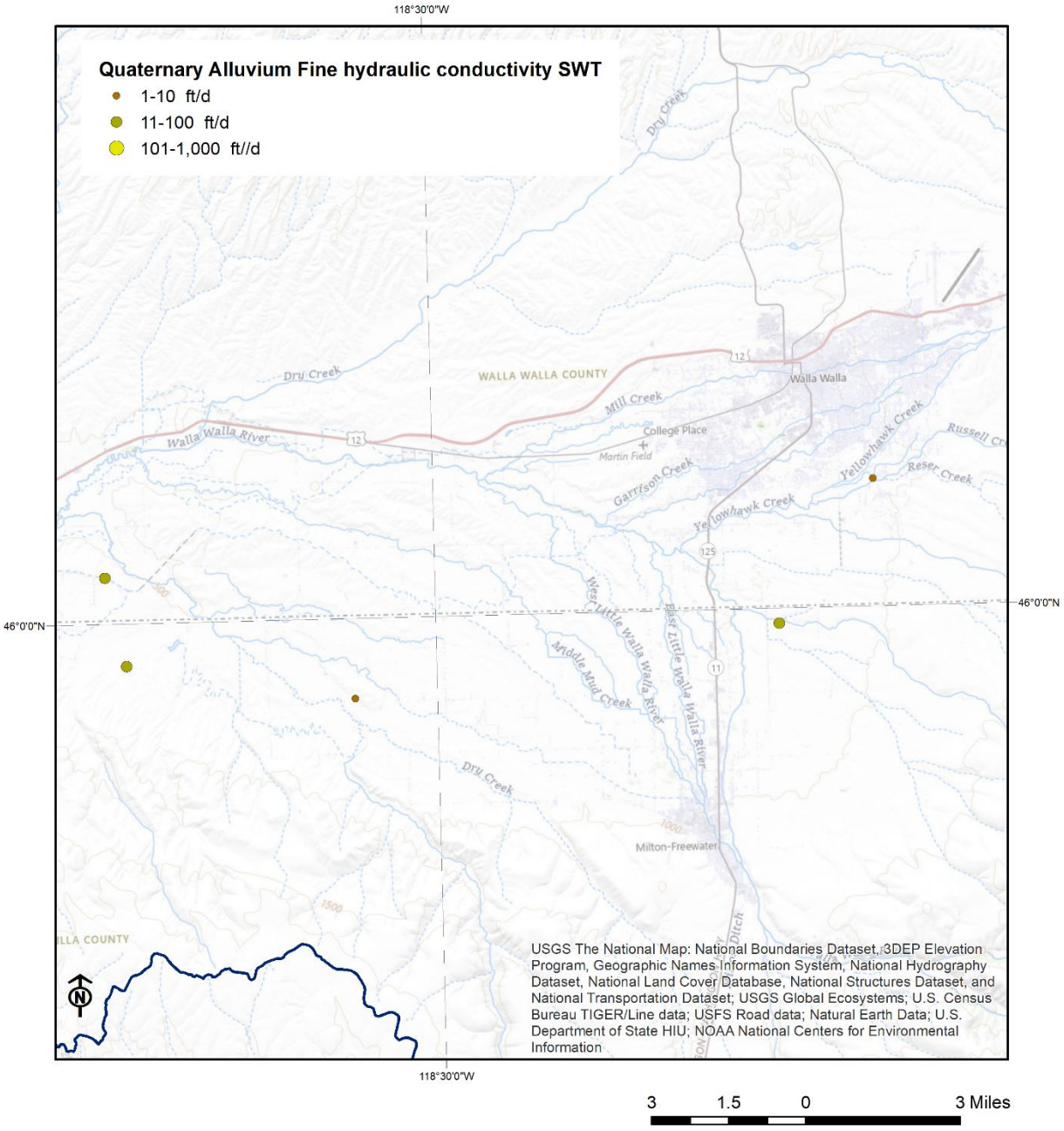


Figure 16: Map view of hydraulic conductivity, Quaternary Alluvium Fine

QUATERNARY-LATE TERTIARY CONSOLIDATED SEDIMENTARY UNITS: COARSE AND FINE

Quaternary-Late Tertiary Consolidated Sedimentary Coarse and Fine units have mean transmissivity of 690 and 400 ft^2/day, respectively. Well logs describe a package of interbedded coarse and fine sediments in this unit, while the fine unit is recognizable in well logs by its blue color, a consistent fine-grained character and little water yield reported. Figure 17 illustrates the spatial distribution of transmissivity, highlighting higher values (1,000-4,000 ft^2/day)

concentrated near the Walla Walla River and its distributaries, and moderate to low values (1-10-1,000 ft^2/day) on the western side of the valley. Only 3% of the data are assigned to the Quaternary-Late Tertiary Consolidated Sedimentary Fine unit.

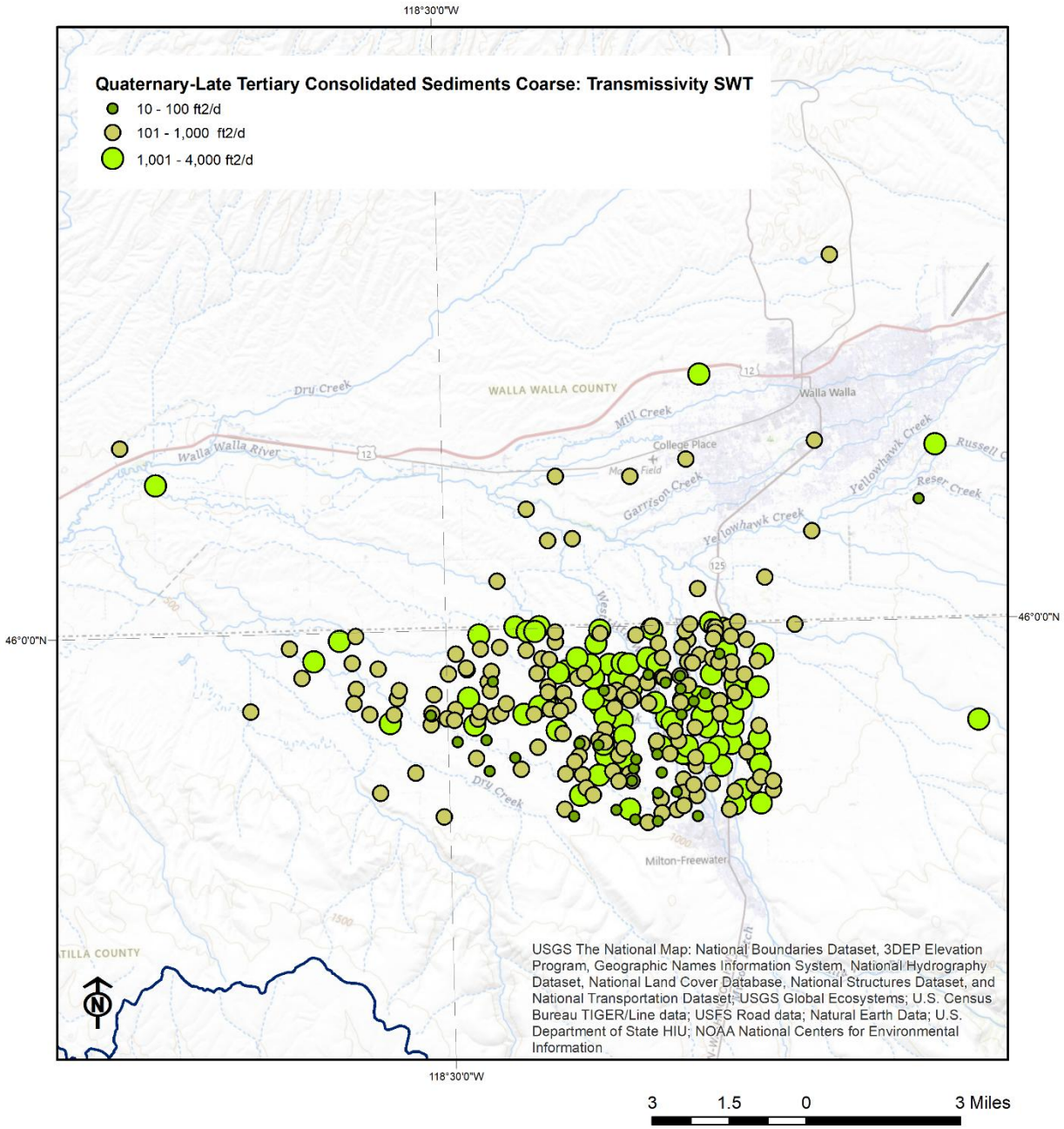


Figure 17: Map view of transmissivity, Quaternary-Late Tertiary Consolidated Coarse Unit

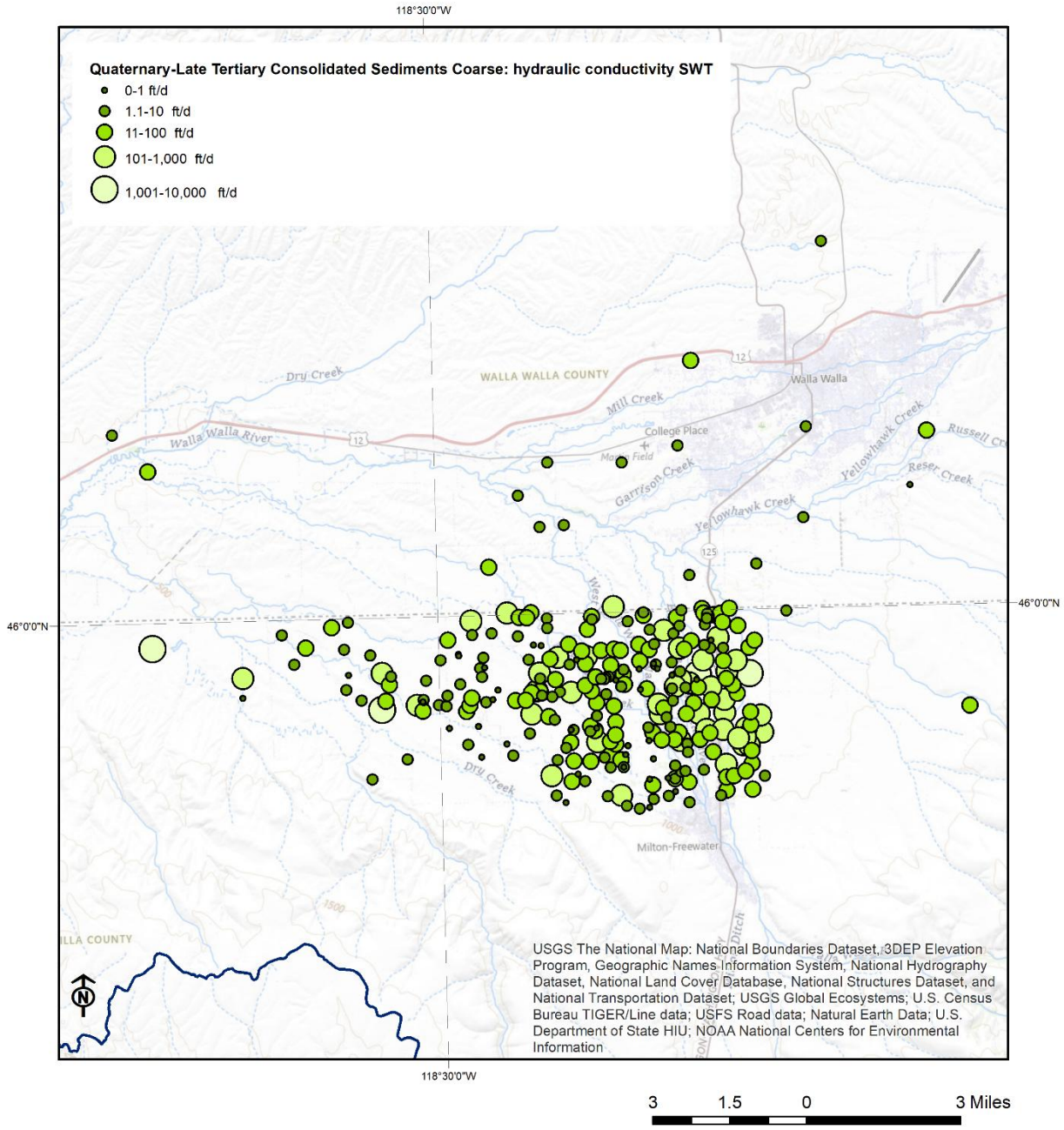


Figure 18: Map view of hydraulic conductivity, Quaternary-Late Tertiary Coarse Unit

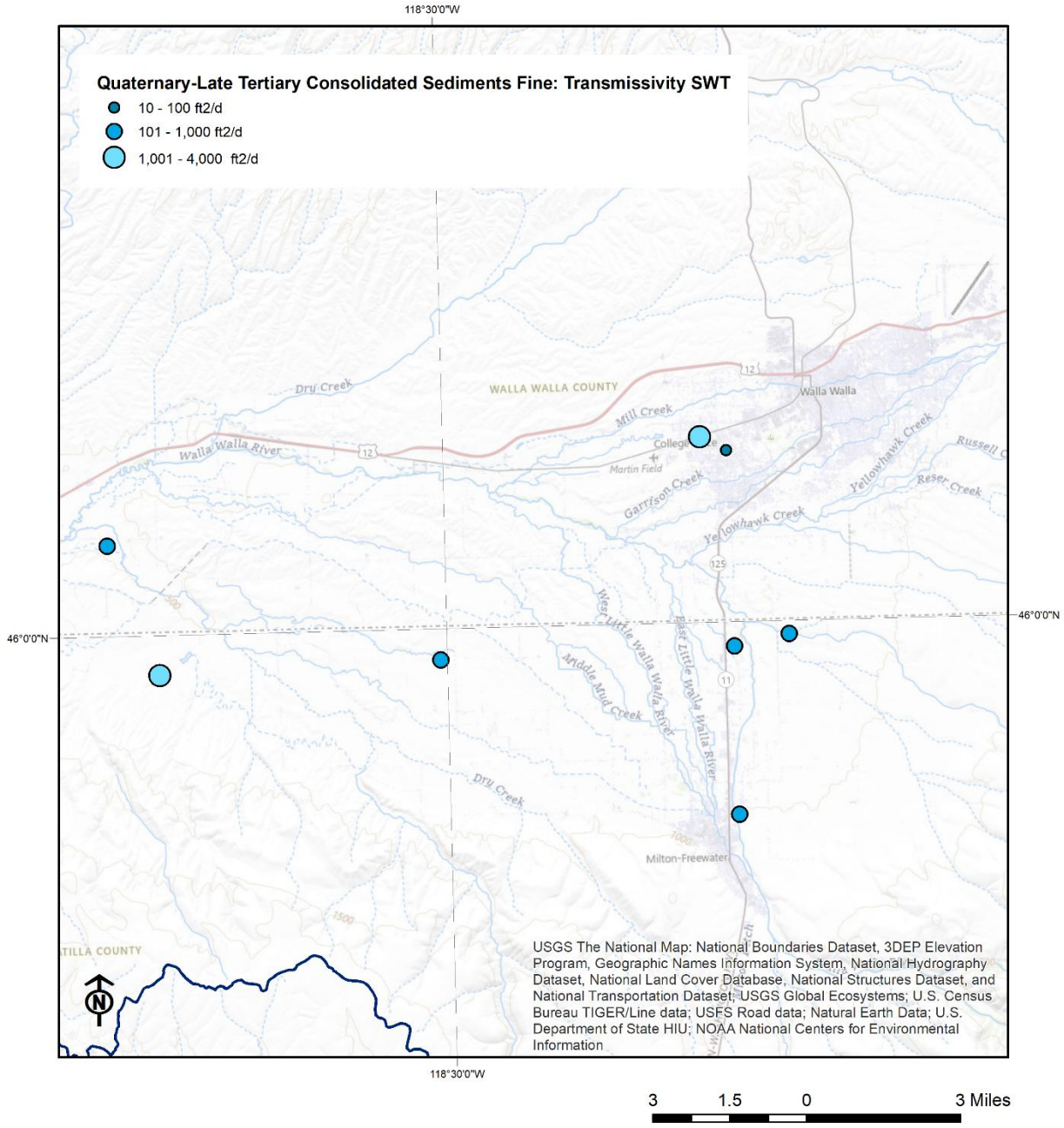


Figure 19: Map view of transmissivity, Quaternary-Late Tertiary Consolidated Sediments Fine Unit

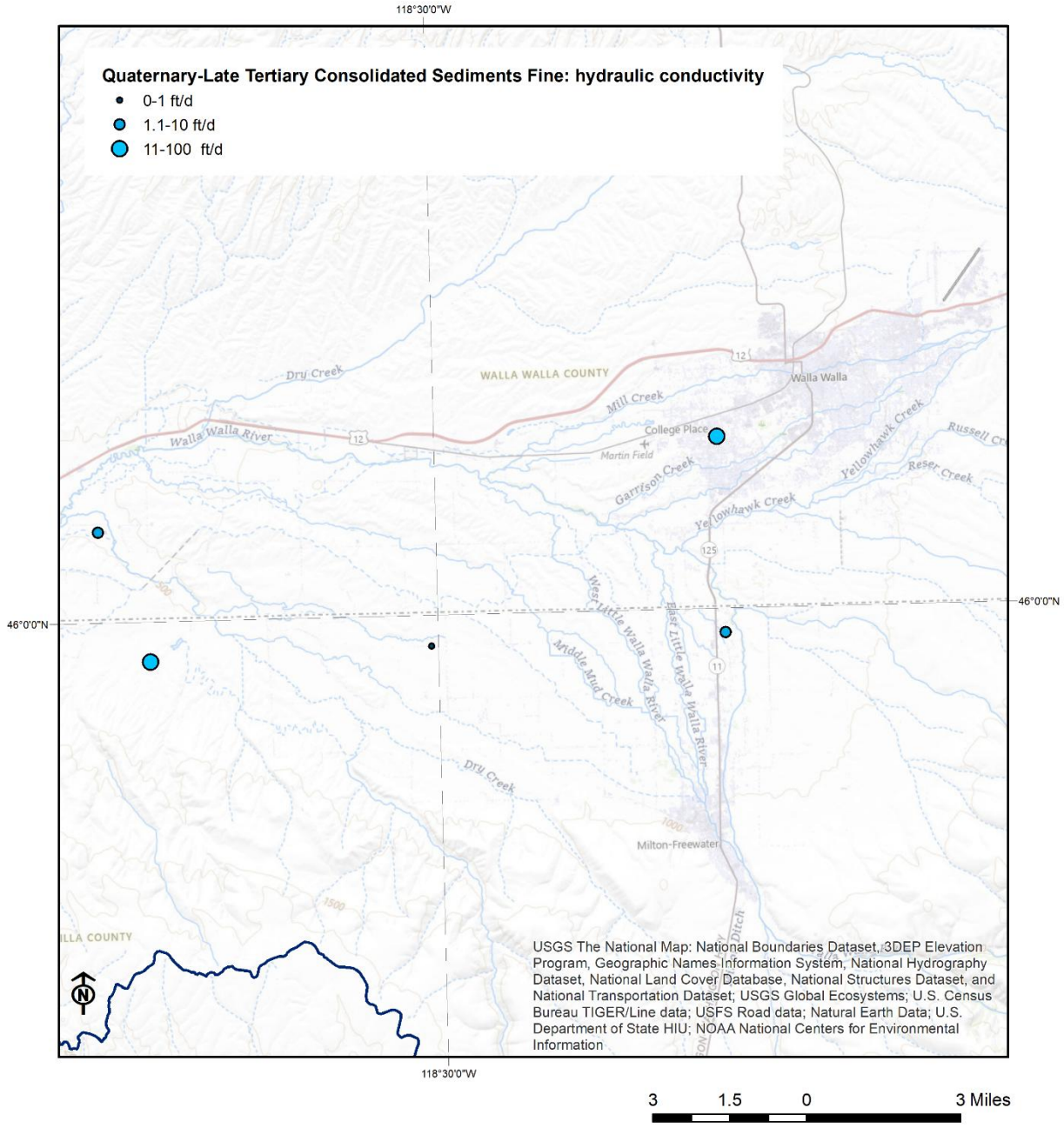


Figure 20: Map view of hydraulic conductivity, Quaternary-Late Tertiary Sediments Fine Unit

LATE TERTIARY COLUMBIA RIVER BASALT GROUP

Where determined, differentiated Columbia River Basalt stratigraphic units exhibit mean transmissivity ranging from 290 to 41,000 ft^2/day. Figure 22 illustrates the spatial distribution of transmissivity of both undifferentiated and differentiated CRBG units (all symbolized the same), highlighting higher values (>10,000 ft^2/day) concentrated near the Wallula Fault Zone and step

changes in the top of the CRBG located between College Place and the City of Walla Walla. Low to moderate values (<1,000 ft^2/day) occur in the Blue Mountains and across the basin. Storativity (0.00001-0.01) distribution is shown in Figure 23.

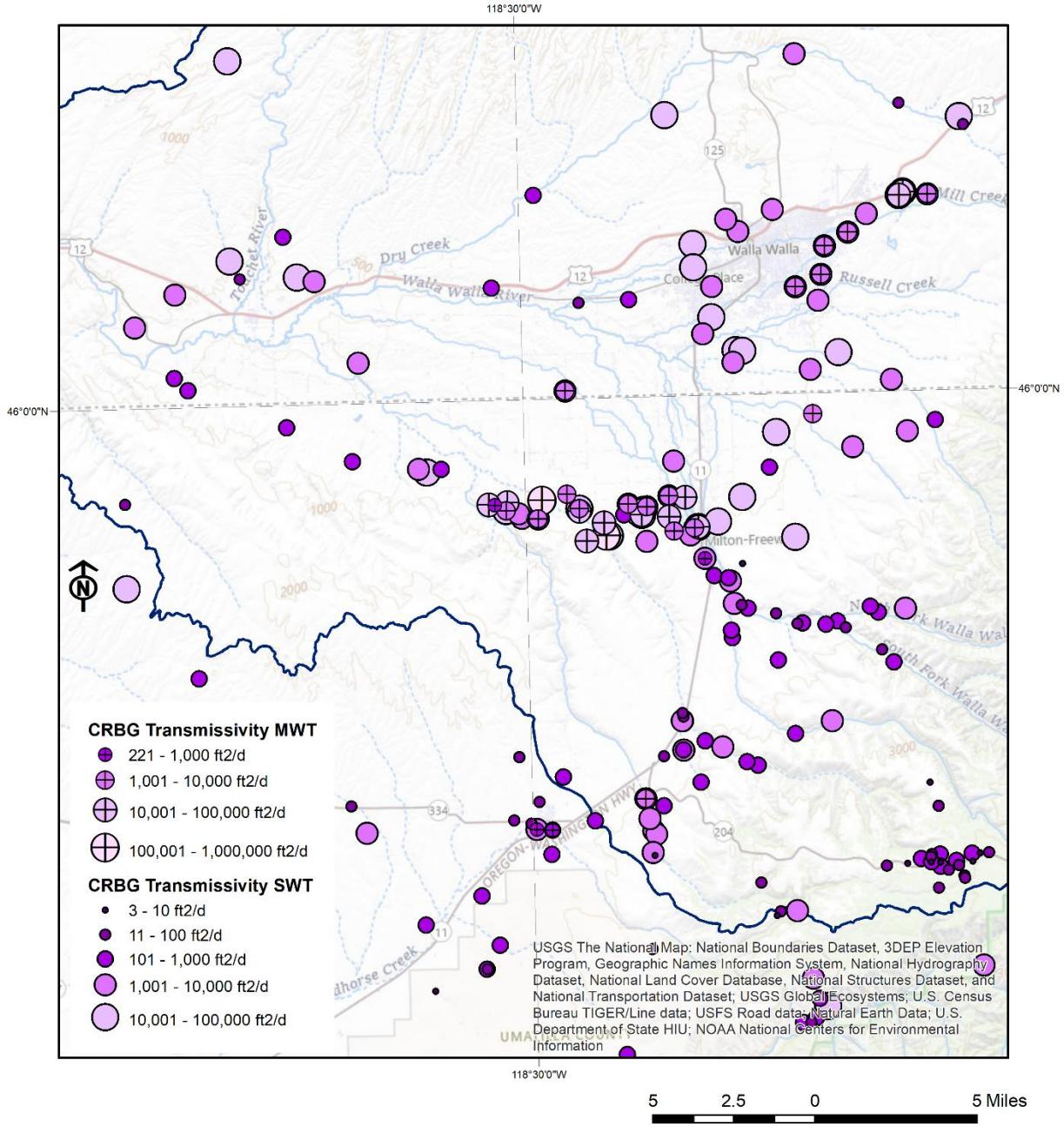


Figure 21: Map view of transmissivity, Late Tertiary Columbia River Basalt Group. MWT indicates data sourced from multiple well pumping test, SWT a single well or specific capacity pumping test.

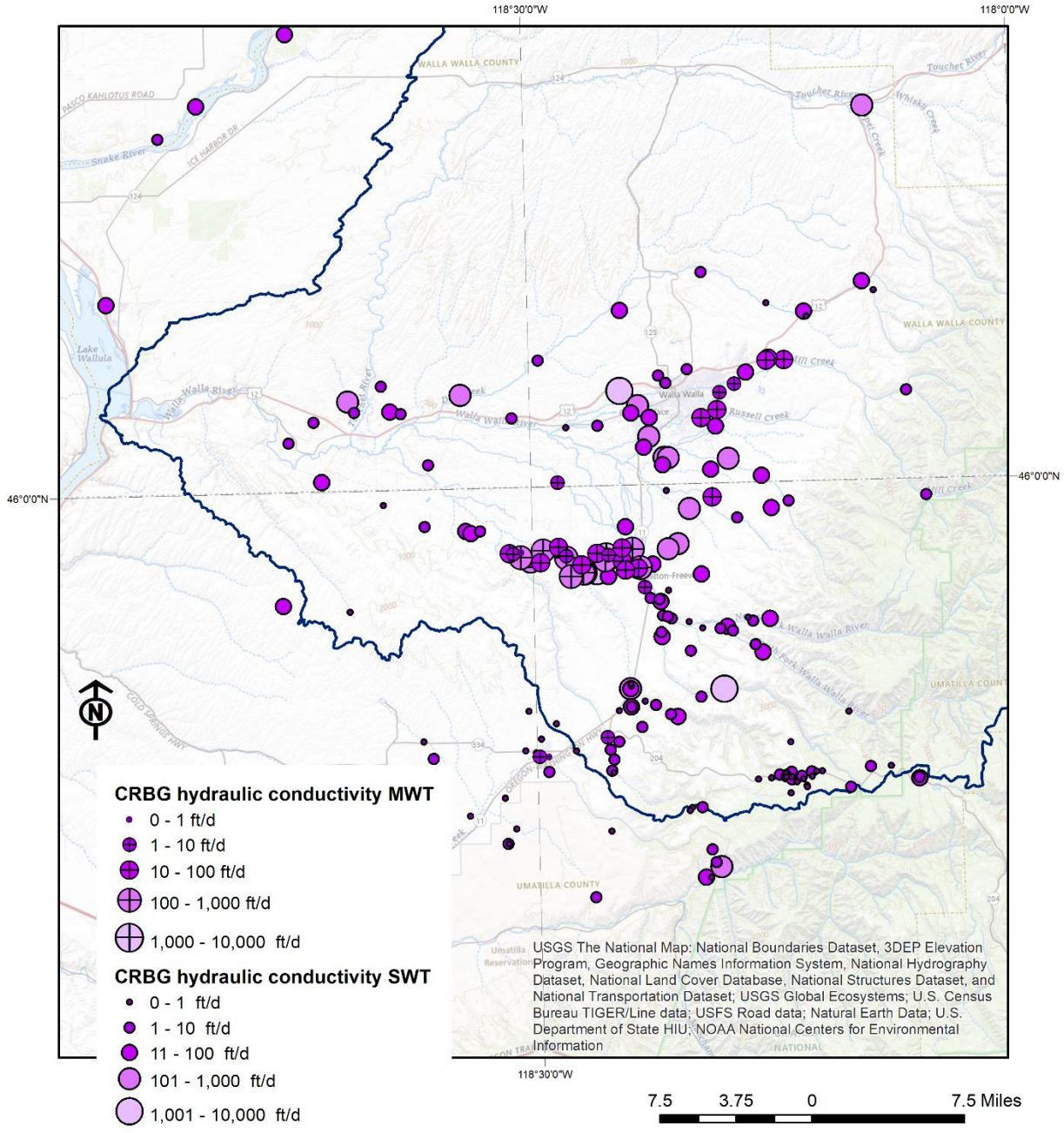


Figure 22: Map view of hydraulic conductivity, Late Tertiary Columbia River Basalt Group. MWT indicates data sourced from multiple well pumping test, SWT a single well or specific capacity pumping test.

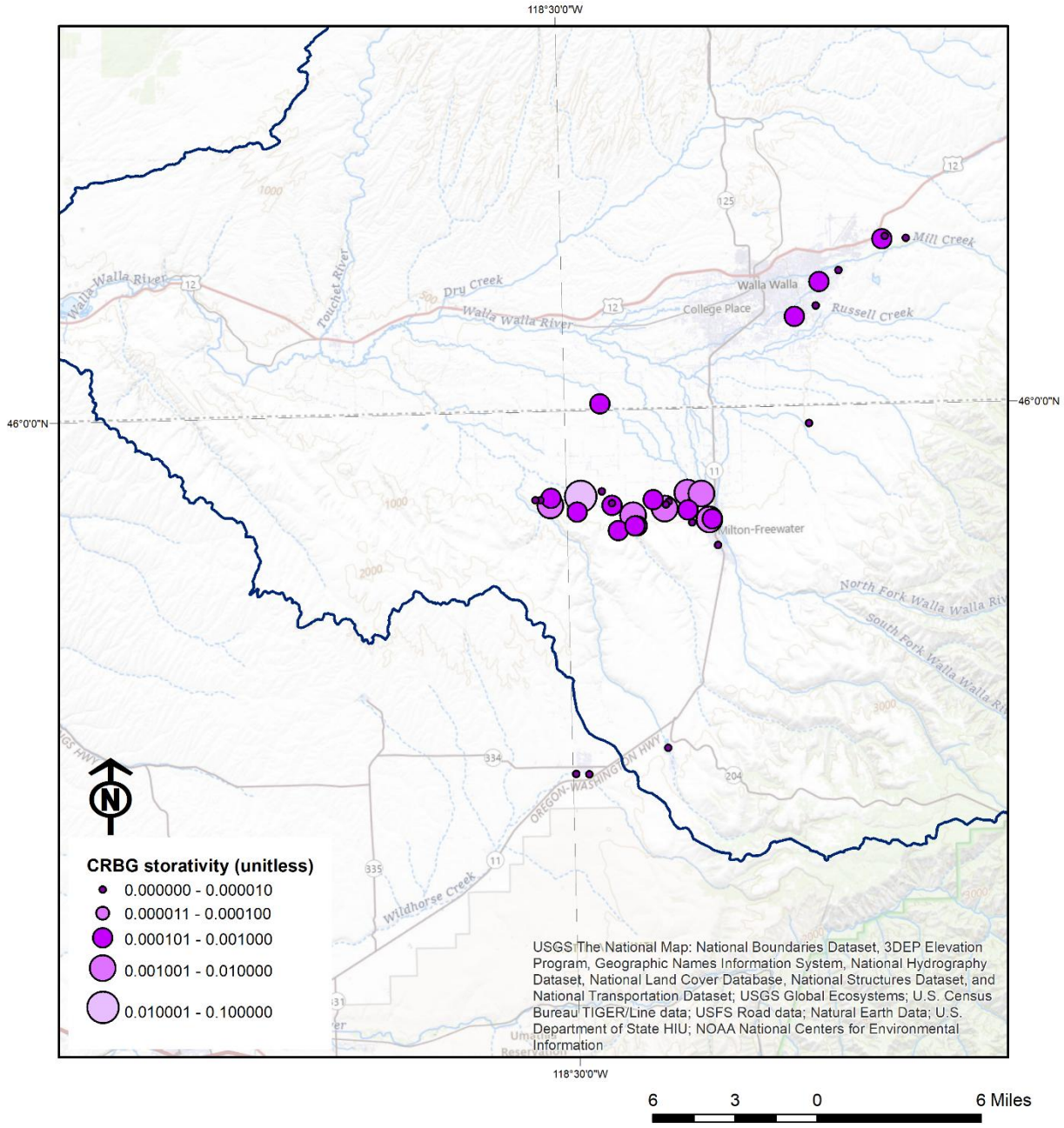


Figure 23: Map view of storativity, Late Tertiary Columbia River Basalt Group

Characterization of Hydrostratigraphic Units and Structures

This study estimated hydraulic properties of stratigraphic units and assessed the results to identify hydrostratigraphic units. Additionally, the investigation evaluated the impact of geologic structures on the groundwater system.

Walla Walla River Basin Hydrostratigraphic Units

Six hydrostratigraphic units are indicated by hydraulic property analysis. This process grouped stratigraphic units into categories based on similar hydraulic properties, stratigraphic positions, and physical properties. They are summarized in Table 5.

Table 5: Hydrostratigraphic units based on stratigraphy and available hydraulic property data. Mean values are geometric means of data compiled for this study. *Data from Drost et al., 1997. **Data from Smoot and Ralston, 1987; and Vaccaro, 2009.

Stratigraphic Unit		Hydro-stratigraphic Unit	Mean transmissivity (feet^2/day)	Mean hydraulic conductivity (feet/day)	Mean Storativity
Quaternary Alluvial Deposits Coarse		Upper Alluvium (UA)	1,400	40	0.02
Quaternary Alluvial Deposits Fine					
Missoula Flood Deposits: Rhythmites /Touchet beds		Missoula flood Deposits (F)		5*	0.05*
Loess		Loess (LS)		5**	0.08**
Mio-Pliocene consolidated sediments Coarse		Lower Alluvium Coarse (LAc)	690	10	n/d
Mio-Pliocene consolidated sediments Fine		Lower Alluvium Fine (LAf)	400	4	n/d
Saddle Mountains Basalt Formation	Walla Walla Member	Columbia River Basalt Group (BA)	1,500	8	0.0003
	Lower Monumental Member				
	Ice Harbor Member				
	----Basalt of Martindale				
	----Basalt of Basin City				
	Umatilla Member				
	----Basalt of Sillusi				
	----Basalt of Umatilla				
Mabton Member of Ellensburg Formation					
Wanapum Basalt Formation	Frenchman Springs Member				
	----Basalt of Sentinel Gap				
	----Basalt of Sand Hollow				
	----Basalt of Ginkgo				
	Lookingglass Member				
Vantage Member of Ellensburg Formation					
Grande Ronde Basalt Formation	Sentinel Bluffs Member				
	----Basalt of Museum				
	----Basalt of McCoy Canyon				
	Winter Water Member				
	Indian Ridge Member				
	Ortley Member				
	Buttermilk Canyon Member				
	Grouse Creek Member				
CRBG undifferentiated					

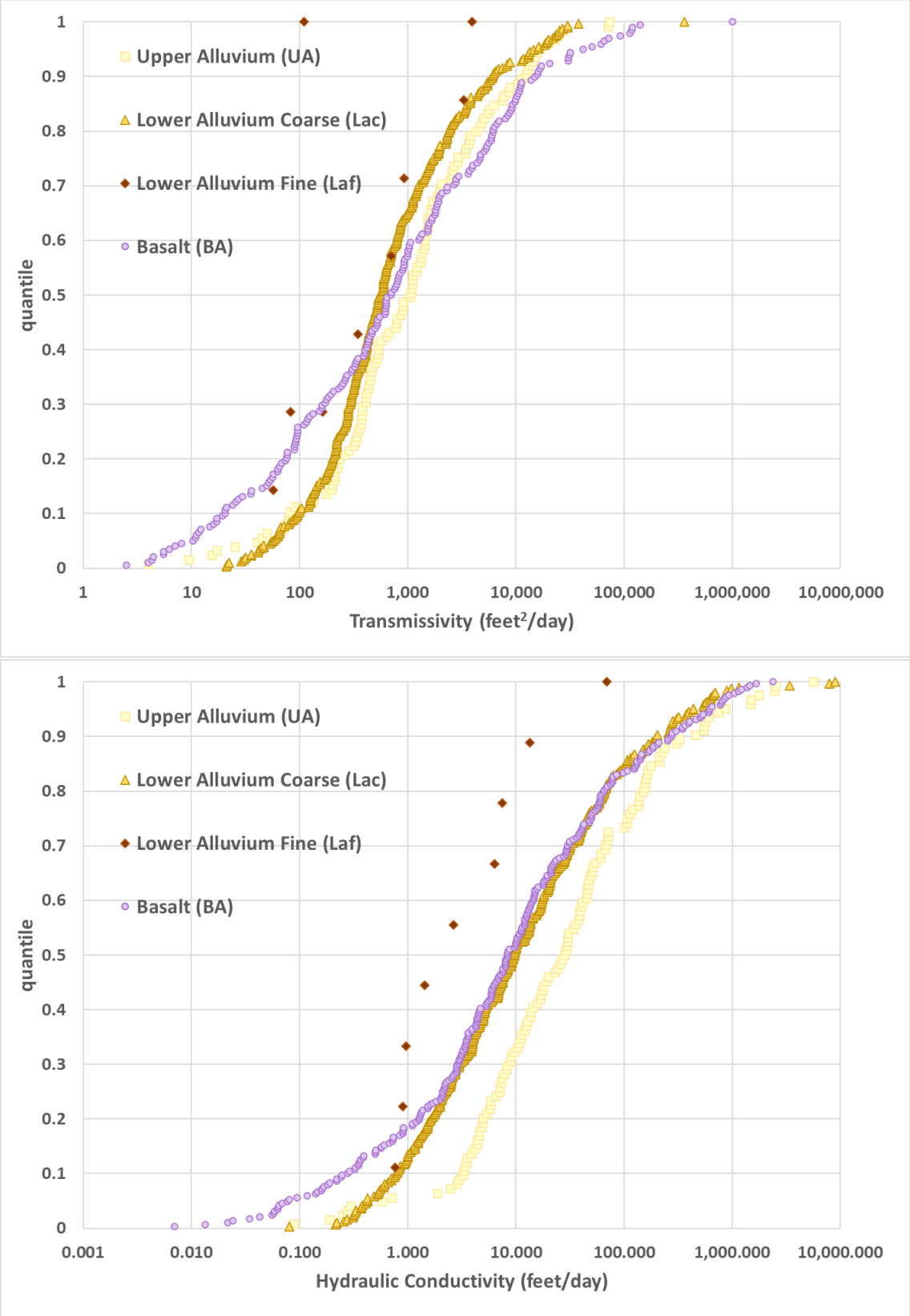


Figure 24: Transmissivity and hydraulic conductivity of hydrostratigraphic units

TEST METHOD EFFECT ON AQUIFER PARAMETER RESULTS

Different well testing methods significantly influence estimates of hydraulic conductivity and transmissivity. While much of this study aims to tie aquifer parameters to stratigraphic units, to examine test method effect on aquifer parameter estimates the data sets are simply divided into basalt versus sedimentary units. Figure 26 illustrates that multiple well pumping tests tend to yield higher estimates, while single well pumping tests typically produce lower estimates. Multiple well pumping tests also result in narrower ranges of parameters compared to single well tests.

Single well tests often underestimate aquifer parameters due to their sensitivity to well efficiency and shorter pumping duration. Multiple well pumping tests, on the other hand, produce higher values for aquifer parameters, because they often involve selecting high-capacity wells for complex aquifer tests and mitigating the influence of well efficiency through the use of observation wells. Aquifer parameter results are presented in Table 4 by stratigraphic unit both in bulk (all test methods) and by test method to allow the reader to interpret appropriately,

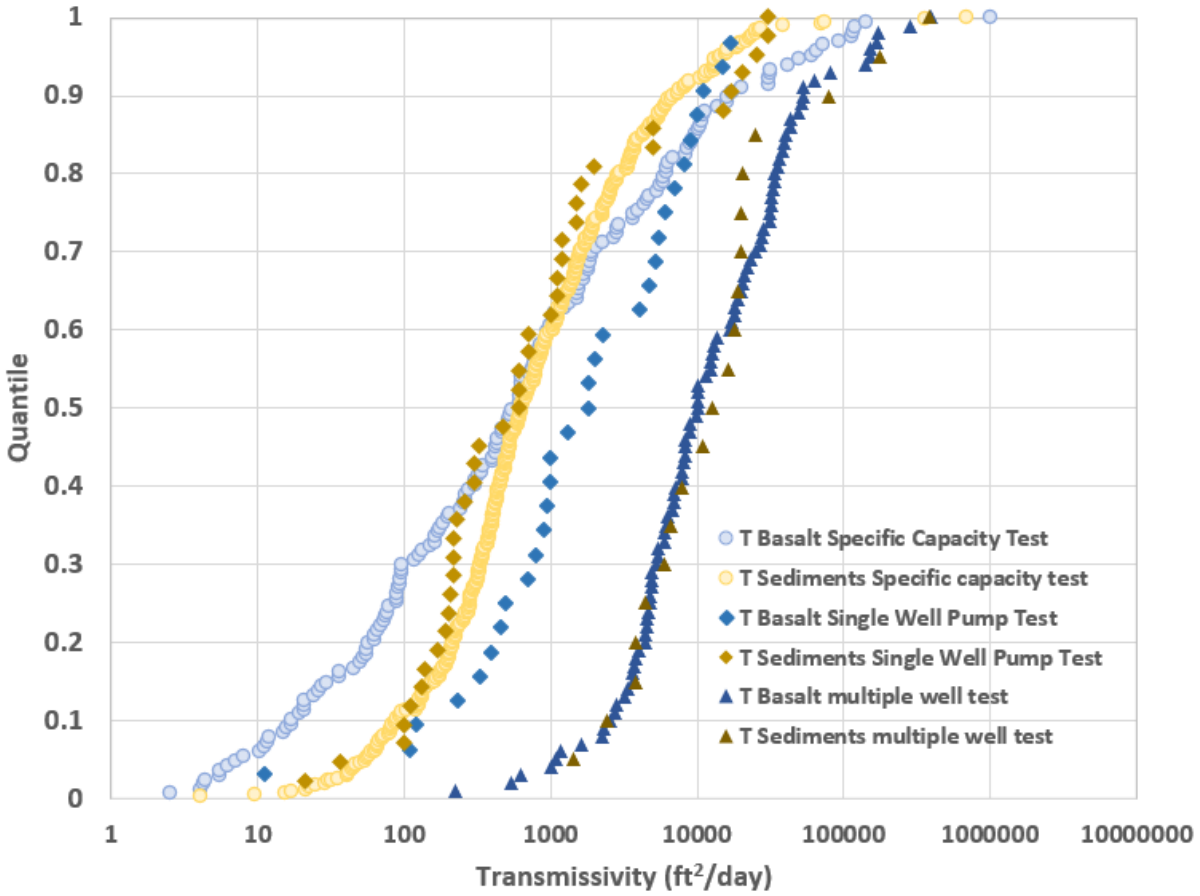


Figure 25: Transmissivity estimates by test method. Data are assigned to only two aquifer categories for the purpose of examining the effect of aquifer test method.

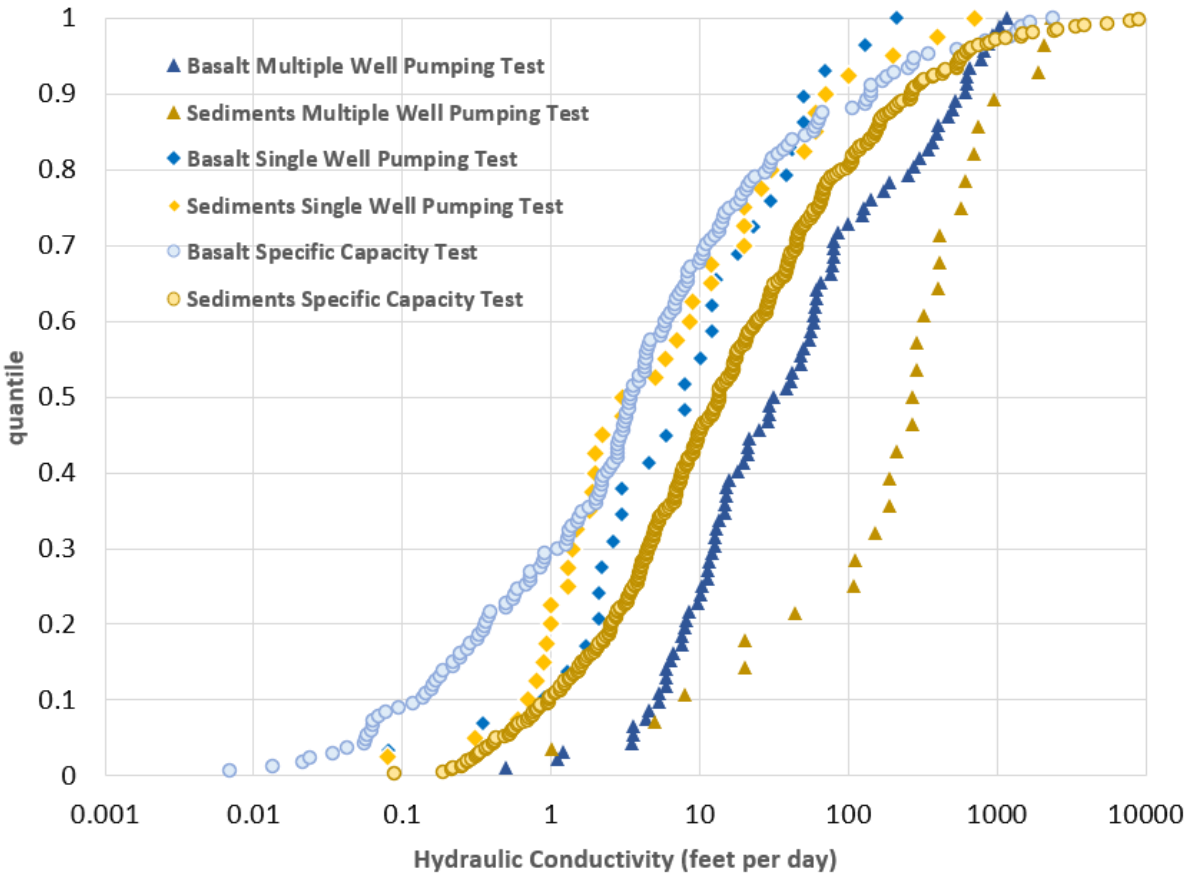


Figure 26: Hydraulic conductivity estimates by test method.

Hydraulics of Walla Walla River Basin Geologic Structures

In CRBG aquifers researchers report geologic structures representing zones with different hydraulic properties than the undeformed stratigraphic units (Newcomb, 1961; 1965; 1969; McCall, 1975; Oberlander and Almy, 1978; Norton and Bartholomew, 1984; Lite and Grondin, 1988; Packard et al., 1996; Steve P. Reidel et al., 2002; Conlon et al., 2005; Lite Jr. 2013; Kahle et al., 2011; Miller and Stachen, 1980). Structures can separate hydrostratigraphic units into different blocks, such as reported in a similar investigation by Mohamed and Worden (2005). Although local seismic activity was observed as recently as 1935 (Sherrod et al., 2016), groundwater level data from the sedimentary system overlying the CRBG does not indicate lasting changes to permeability related to geologic structures. Therefore, this discussion of geologic structures is limited to effects observed within the CRBG.

Groundwater flows preferentially along CRBG interflow zones and those interflow zones can be folded into anticlines (up-warped sections) and synclines (down-warped sections). The deformation and movement of crystalline rock along fault zones also alters the protolith (undeformed rock) into materials ranging from fine-grained fault gouge to blocky shattered rock in the damage zone. The degree of post-faulting secondary mineralization alters the primary

porosity of rocks. Fault zones therefore represent a disruption of the hydraulics within typical CRBG aquifers and can increase (in the damage zone) or decrease (in fault gouge/cataclasite) the permeability of the protolith . The damage zone of a fault can include highly fractured dense flow interiors, facilitating groundwater flow across otherwise low-permeability portions of stratigraphic units (Caine et al., 1996; Caine and Forster 1999). When faults represent a low-permeability contrast within a high permeability aquifer, the effect manifests as a group of wells with similar static water elevations on one side of a fault, a steep change in the piezometric surface, and then another well group with similar water level elevations.

METHODS

CRBG Groundwater Level Elevation Analysis

This study relies primarily on groundwater elevations in observation wells to examine the effects of local geologic structure on groundwater flow. Groundwater level data have been collected from CRBG wells in the Walla Walla River Basin since the 1940s. Between 2007 and 2018, OWRD staff increased the well monitoring network to better characterize groundwater level trends across the area. Additionally, extensive bistate groundwater level collection occurred between 2020 and 2024 as part of the collaborative basin study. Water level measurements in the basalt aquifers include manual measurements collected by OWRD, USGS and ECY using flat or coaxial calibrated electronic tapes (e-tape), airline measurements using calibrated gages, transducer measurements logging hourly and corrected to manual measurements, and reported measurements collected by other parties. Water level data are published and downloadable from OWRD's GWIS database (GWIS, accessed 2024).

Visual inspection and classification of time series water level data from CRBG wells was conducted across the basin. In the early stages of this study, time series data were examined in bulk to determine whether a smooth piezometric surface could be inferred, or whether stacked aquifers within the CRBG were widespread and required depiction. The authors did not find either case, rather a basin where in the Horse Heaven Ridge (see groups I and J) changing head with depth was present in the CRBG, while in the Walla Walla Valley head changes with depth correlating to stratigraphic units were not found. Changes in head were observed over short horizontal distances in the Walla Walla Valley, and do not correlate to changes in depth of CRBG wells. Therefore, the authors examined the data sets for other patterns.

To achieve a meaningful visual comparison of water level data from multiple sources, well metadata were examined to confirm that well construction, lithology, and location supported tying the water levels to CRBG aquifers. Additionally, water level data were reviewed by OWRD hydrogeologists and filtered to include only static measurements. All water level data were normalized to feet above mean sea level, land surface elevations adjusted to the same vertical datum and plots were generated with standardized grid scales.

Once pre-processing was complete, visual comparison proceeded in stages. In initial steps, time series data were visually examined for similar water level elevation, timing and magnitude of seasonal fluctuations. As analysis and data collection progressed, time series data were filtered to only include winter high water levels. Data gaps are common, particularly between 1980 and 2000 in the Walla Walla River Basin, and trailing average water levels within groups were ultimately limited to pre- and post- data gaps exceeding 5 years (Figure 27).

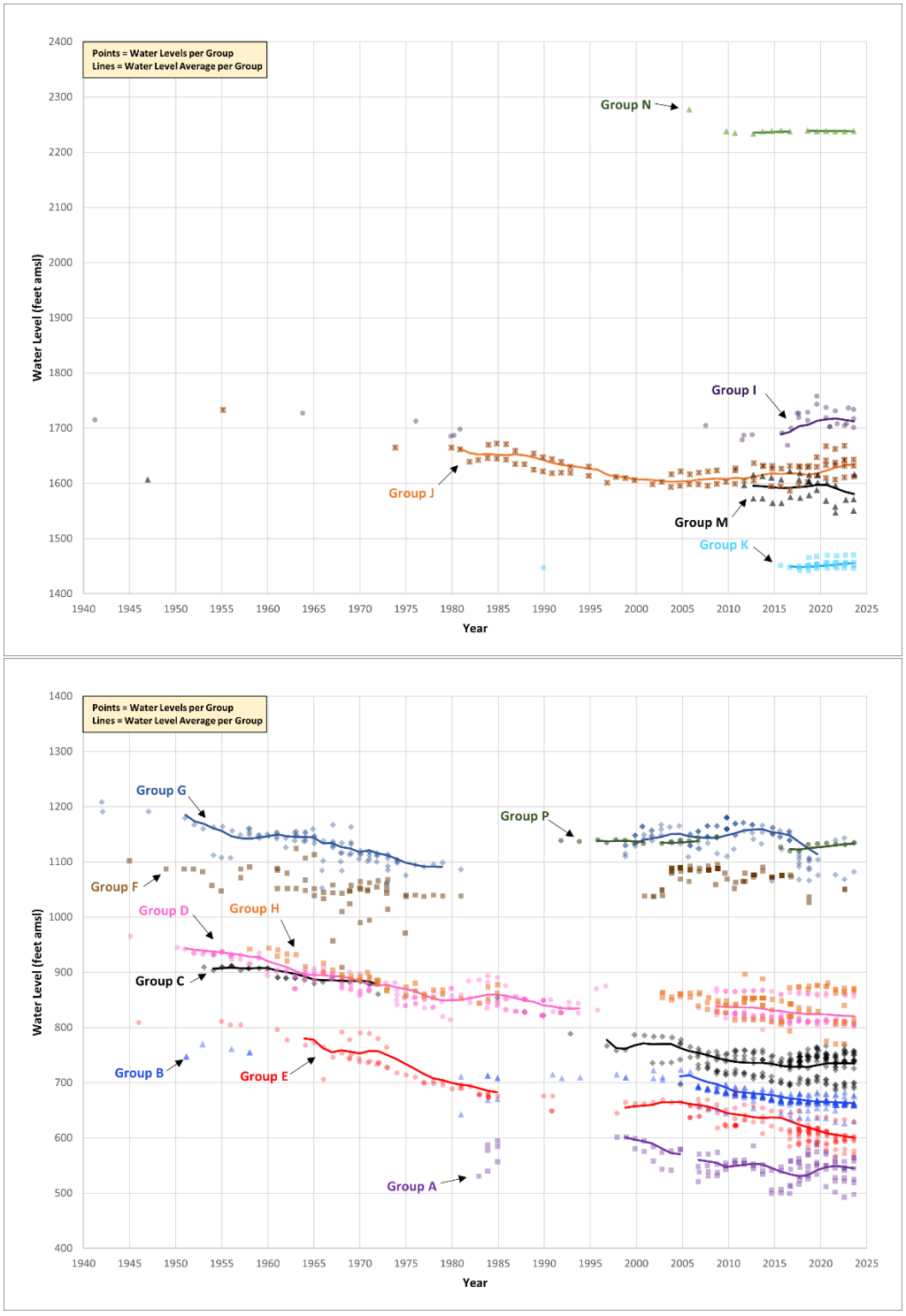


Figure 27: Water level data from CRBG well groups as identified by this study. All wells in a given well group are symbolized the same. The line represents the 5-year trailing average for the well group. The trailing average was not computed over data gaps exceeding five years.

Multiple Well Pumping Tests

Multiple well pumping tests were conducted to assess whether the CRBG units in the Walla Walla River Basin fit the conceptual model of a homogenous aquifer of infinite areal extent. By pumping a single well and observing drawdown in adjacent wells, one can infer the relative location of lower permeability zones from drawdown variations in observation wells. In many of these tests, pumping wells do not produce a symmetrical cone of depression.

To produce data allowing a conclusion about whether observed drawdowns were caused by the pumping well, staff limited the variables by conducting tests when other high-yielding basalt wells were not pumping. For irrigation wells, this typically was at the beginning of an irrigation season when a single user would turn a well on for the first time that year. For municipalities, that was typically during the winter when city water use was low, and irrigation wells were not pumping. When other nearby wells were pumping during a test, they were monitored for changes in rate. The number of observation wells per test depended on permission to access nearby, static, measurable CRBG wells. Where possible, pressure transducers were installed in observation wells to collect high-frequency measurements. Otherwise, e-tapes or airlines were used to measure depth to water. In a few cases, well owners already had verifiable pressure transducers installed in wells, and those data were used for analysis.

All water level data collected from observation wells were plotted and compared with the onset and cessation of pumping to determine whether there was a measurable pressure response. A measurable response to pumping was defined as a well response meeting all the following criteria:

- the drawdown measured in the observation well is greater than 0,
- the timing of observed drawdown coincides with the onset of pumping and/or the cessation of pumping,
- the observed drawdown does not decrease until at least the cessation of pumping, and
- the observed drawdown trend is distinguishable from any pre-test trends and barometric pressure changes.

In some instances, measurements at observation wells indicated a possible pressure response based on the above criteria, but the response was designated as “indeterminate” because:

- water level measurement error was greater than the magnitude of drawdown, AND/OR
- water level measurements were too few to meet the response criteria above.

Each observation well in a test was categorized as responding, not responding or indeterminate (Figure 28). See Appendix B for detailed summaries of each test and how particular wells responded.

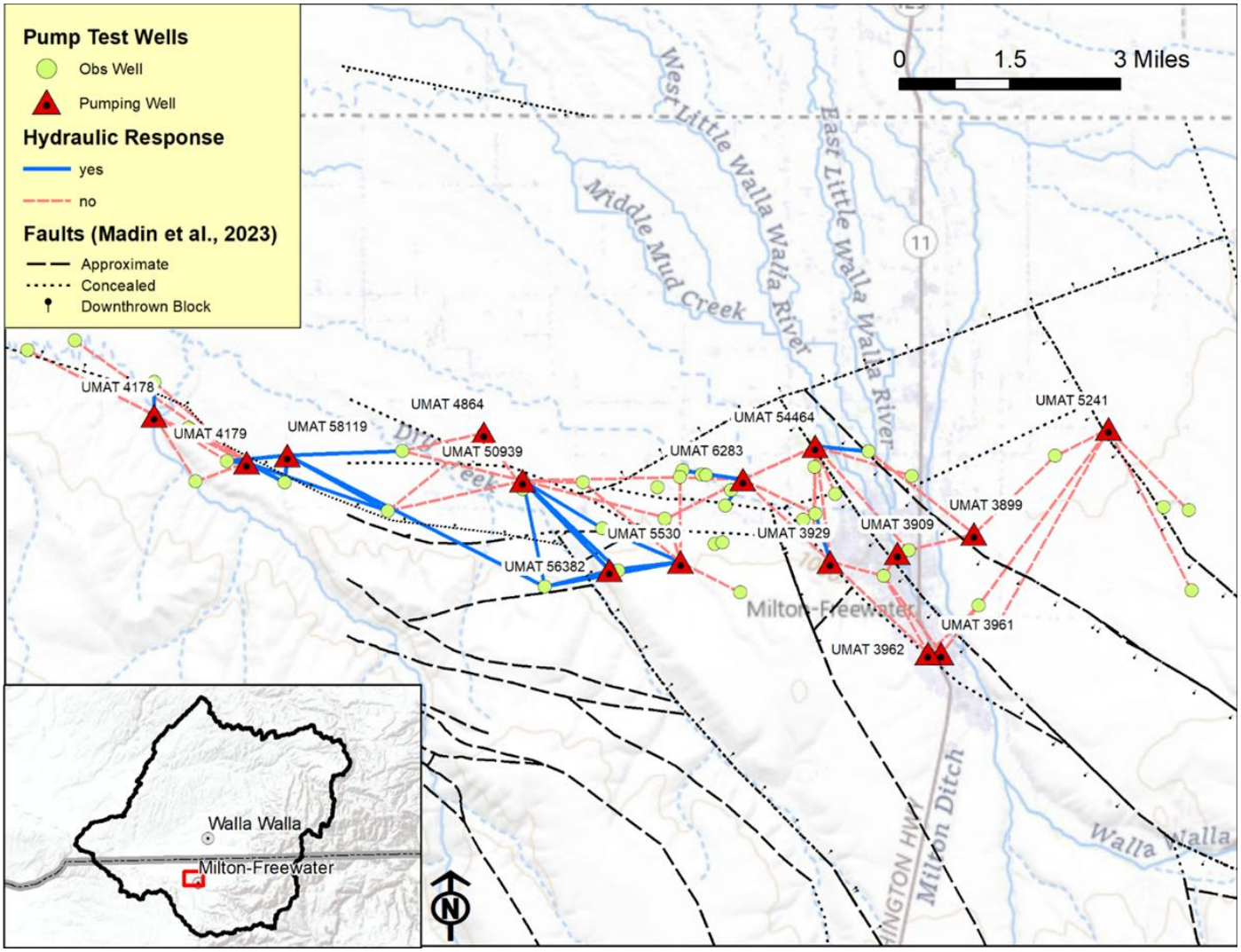


Figure 28: Multiple well pumping test observations, limited to responding (yes) or not responding (no) as defined on page 58.

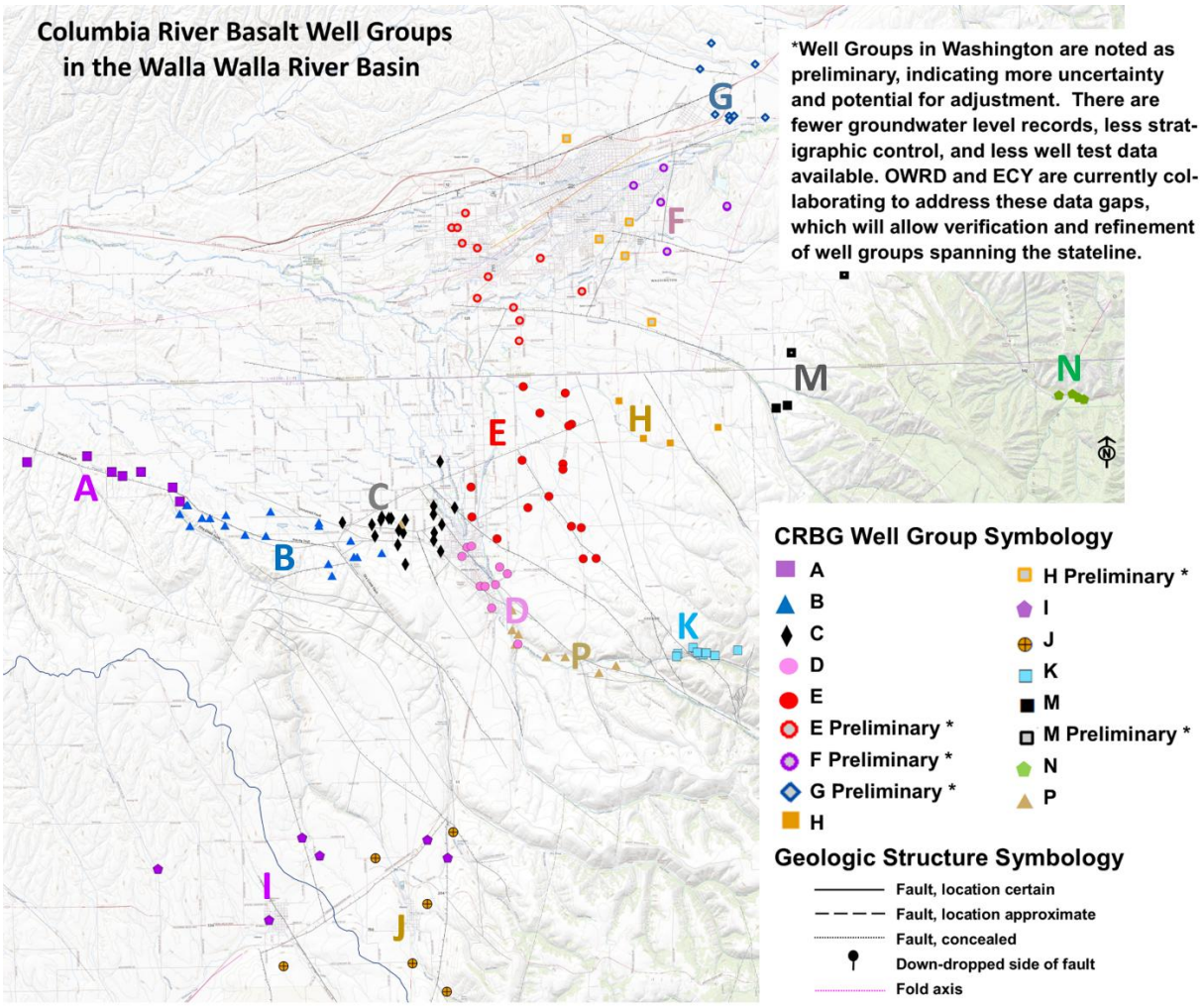


Figure 29: Map of CRBG well groups

RESULTS

The well clusters by water level elevation and the variability of responses between wells during pumping tests indicate that the CRBG aquifers of the Walla Walla River Basin are impacted by geologic structures including a high concentration of faulting. Investigation of these data in bulk over the study area allows a relative assessment of the hydraulic properties of individual geologic structures. While drilling directly into mapped faults and conducting tests of fault gouge or damage zone materials was outside the scope of this study, testing wells located in the vicinity of mapped faults allows an evaluation of where buried geologic structures represent permeability contrasts. The results also indicate that there are permeability contrasts in locations where faults are not mapped. However, by mapping wells that group together by water level elevation, one can infer that within the transition zone between groups, there is a geologic feature with a lower permeability than is observed within the well group. Additionally, when there is a mapped fault and it is possible to measure drawdown response across that fault or the wells on both sides of the fault show the same groundwater elevation, it is reasonable to infer that fault does not represent a lower permeability zone.

When winter high CRBG groundwater levels are plotted in mass (Figure 27), groups of wells with similar water level elevation and trends are evident. Some groups plot with little variance (see group B; Table 7), while others display anomalies where groups split over time (see group D; Table 9) or have a large range in elevation but unique cyclical hydrograph shapes (see group A; Table 6). Appendices A and B provide links to the comprehensive data assessed for each group.

Another way to visualize the step changes in the piezometric surface is with a cross-sectional water level diagram. As shown in Figure 30, the groundwater gradient is very low within a well group, and several orders of magnitude larger in the transition zones between groups. This indicates a permeability contrast separates well groups.

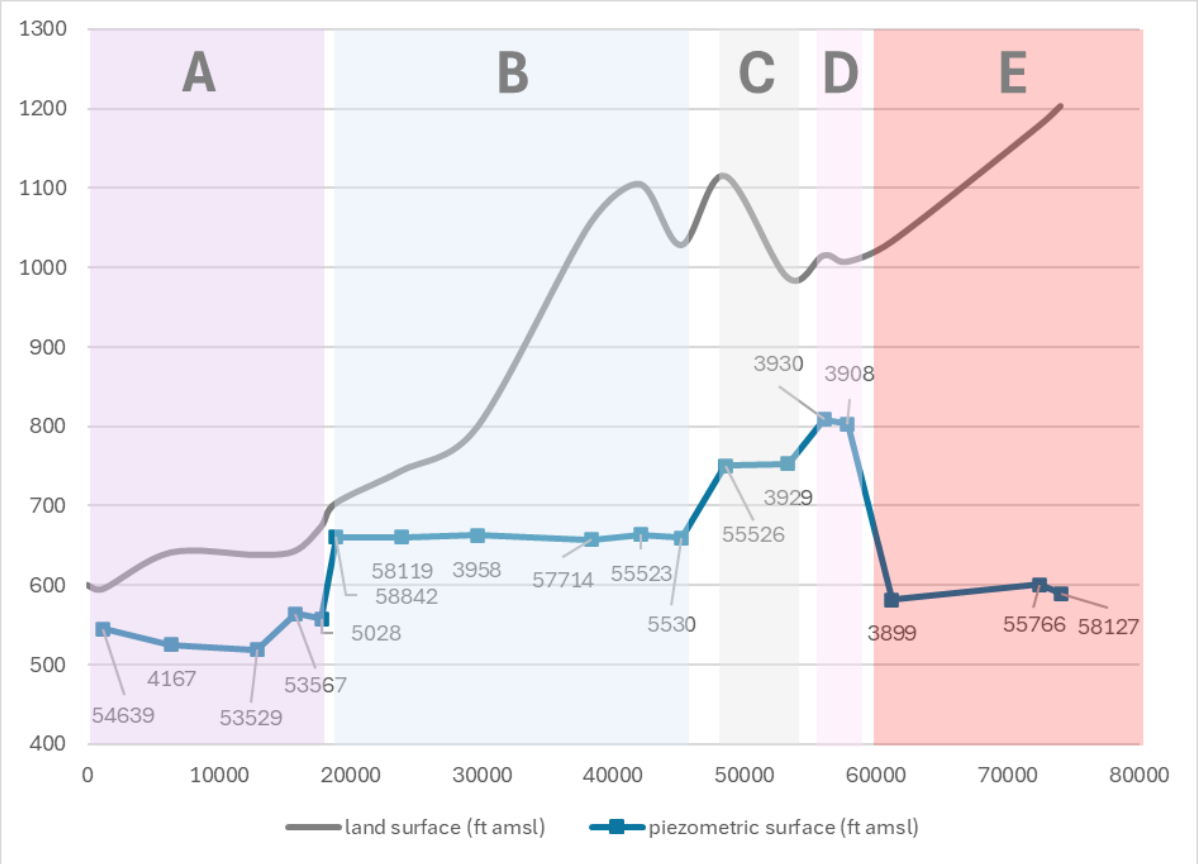


Figure 30: Winter static water level elevation versus land surface elevation in select wells in CRBG well groups. Changes in the CRBG water level elevation do not correspond with land surface elevation changes.

Some examples of water level elevation and pumping test results illustrating the complexities of geologic structures in the CRBG system:

- One well located a short distance from a second well that is open to the same interval doesn't respond to pumping stress and has a significantly different water level elevation (Table 25 and Table 33). There is a mapped fault between the two wells that could explain the lack of response and water level difference. Examples include an unnamed fault mapped between groups B and C, the South Fork Fault between groups C and E,

an unnamed northwest trending fault between groups E and H, and the Forks Fault between groups K and P.

- An observation well located a short distance from a well that is open to the same interval doesn't respond to pumping stress and has a significantly different water level elevation (Table 25, Table 37, and Table 41); however there is no mapped fault to explain the lack of response. Examples include the transition zones between groups C and D, A and B.
- An observation well shows a measurable response to a pumping well and/or two wells have the same water level elevation. There is a mapped fault between the two wells (Table 20, Table 25, and UMAT 58119 Test 3). In this case, the fault appears to conduct groundwater flow. Examples occur within groups B, C, E and H.
- Multiple well pumping Test 2 (Table 22) and Test 4 (Table 25) show large magnitude interference between two wells despite the fact that one is cased and sealed below the open interval of the other. The two wells also have the same water level elevation. This site is located within the Wallula Fault Zone, and it is possible the damage zone allows vertical connection between CRBG interflow zones. It is also possible that an unknown well(s) provides vertical connection.
- Groups overlap in the map view. Groups I and J appear to represent a portion of the Walla Walla Basin where measurable changing head with interflow zone is observed (note the overlap in map view of groups I and J; see Plate 1). Water found in interflow zones appears to be hydraulically separated by dense flow interiors, as indicated by the difference in water level elevation and trend combined with the overlap in the map view of groups I, J and UMAT 57710. UMAT 57710 is cased and sealed below the bottom of wells in groups I and J and had a February 2024 water level 100 feet lower than wells in group J and 200 feet lower than group I. Additionally, Test 11 (Table 39) pumped UMAT 57710 and did not observe response in the shallow CRBG wells located within ½ mile.

Many wells that were grouped together in Appendix A did not show a hydraulic response to pumping in another well in that group during an OWRD test. In other words, the lack of response in a short-term test is not interpreted to mean that those wells are hydraulically separated if their water level elevations are similar. The fact that the wells have similar groundwater elevation is evidence that the wells are connected, even when they didn't respond during an 8- to10-hour pumping test. It is a limitation of these multiple well pumping tests that pumping could not always be conducted long enough to produce drawdown at distance. It is notable that across the fifteen multiple well pumping tests conducted, there were no measurable responses between adjacent wells that have markedly different water level elevations, i.e. between wells in different groups.

RESULTING CONCEPTUAL MODEL OF CRBG WELL GROUPS

Although the exact mechanisms are uncertain, available data indicate that termination of CRBG flow lobes, fault-related interflow zone truncation and juxtaposition with dense flow interiors and fault-related rock shatter are present and likely contribute to permeability contrasts

that either connect or separate water-bearing portions of CRBG stratigraphic units. These permeability contrasts in the CRBG cause the observed piezometric surface step changes particularly evident in the Walla Walla Valley, delineating at least thirteen distinct CRBG well groups (Figure 29). While groundwater must flow between these well groups over geologic time, pumping impacts on the timescales of years to tens of years are most pronounced within the well groups, with little to no measurable impact to neighboring well groups. This means that any water management changes within the CRBG aquifers of the Walla Walla River Basin will need to consider the well groupings to effectively address long-term water level declines.

Well group understanding is less refined in Washington than in Oregon, due to a lack of recent data and fewer measured CRBG wells (on the order of thirty wells in Washington and one hundred twenty in Oregon). Additionally, no multiple well pumping tests were conducted in Washington as part of this study. Appendix A provides available details for each group and represents our understanding at the time of this publication. On-going work in the basin may provide new information that facilitates refining well groups in the future.

FURTHER STUDY

The data distribution causes more detailed study outcomes in the Oregon portion of the Walla Walla Valley. Approximately 80% of the wells analyzed in this study are located in Oregon. As a result, CRBG wells influenced by geological structures are grouped with less certainty in Washington than in Oregon. There is also more investigation needed to describe the CRBG groundwater system near Athena, Tollgate, and Weston. However, available data indicate the CRBG is compartmentalized both north and south of the state line, and that some groups likely span the state line. Future field efforts north of the state line to locate CRBG wells, describe their construction, lithology and stratigraphy, and measure ground water level elevations and trends will improve grouping certainty and facilitate future site-specific groundwater management decisions.

Summary

This study examines hydraulic data to characterize the hydrostratigraphy and hydraulics of geologic structures in the Walla Walla River Basin. It is part of a multi-year collaboration involving USGS, Washington Department of Ecology, and Oregon Water Resources Department, aimed at better understanding the basin's groundwater system, water budget, groundwater-surface water interactions, and aquifer responses to development.

We propose six hydrostratigraphic units based on transmissivity, hydraulic conductivity, storativity, and stratigraphic position, listed youngest to oldest: Upper Alluvium (UA), Missoula Flood Deposits (F), Loess (LS), Lower Alluvium Coarse (LAc), Lower Alluvium Fine (LAf), and Columbia River Basalt Group (BA). Geometric mean transmissivity (ft^2/day), hydraulic conductivity (feet/day) and storativity (unitless) values are as follows: Upper Alluvium (1,400, 40 and 0.02), Missoula Flood Deposits (no data, 5, and 0.05), Loess (no data, 5, 0.08), Lower Alluvium Coarse (690, 10 and no data), Lower Alluvium Fine (400, 4 and no data), and Columbia River Basalt Group (1,500, 1 and 0.0004).

Correlating stratigraphic units within the CRBG to distinct hydrostratigraphic units in the Walla Walla Valley is particularly challenging because most stratigraphic units have similar hydraulic conductivity, transmissivity and storativity. Displacement by geologic structures adds to the complexity. We propose the CRBG aquifers are best described as containing boundaries that divide the system into blocks, each block hosting a well group that is hydraulically connected. These aquifer blocks are not correlated to extensive stratigraphic units but rather based on groups of wells with similar location, water level elevation, hydraulic responses to pumping, and sometimes water level trends. Well groups identified in this study are likely hydraulically connected to each other over geological time scales (thousands of years) but respond independently over human time scales (days to tens of years). Exceptions include areas where faulting has not considerably altered the hydrogeologic framework, such as near Athena and Tollgate where a more typical CRBG stacked aquifer regime occurs.

Further detailed investigation is necessary in Washington, particularly in areas where significant development of CRBG aquifers occurs. While this study has incorporated available Washington data, there is notably less available data to characterize CRBG well groups. Therefore, well group results for the Washington portion of the basin should be considered preliminary and subject to change as Washington Department of Ecology scientists collect more data. Additional well location, well construction, water level elevation, geologic mapping and aqueous geochemistry data are likely to refine CRBG well groups.

References

Caine, Jonathan Saul, James P. Evans, and Craig B. Forster. 1996. “Fault Zone Architecture and Permeability Structure.” *Geology* 24 (11): 1025–28. https://doi.org/10.1130/0091-7613(1996)024<1025:FZAAPS>2.3.CO;2.

Caine, Jonathan Saul, and Craig B. Forster. 1999. “Fault Zone Architecture and Fluid Flow: Insights from Field Data and Numerical Modeling.” In *Geophysical Monograph Series*, edited by William C. Haneberg, Peter S. Mozley, J. Casey Moore, and Laurel B. Goodwin, 113:101–27. Washington, D. C.: American Geophysical Union. https://doi.org/10.1029/GM113p0101.

Conlon, T D, K. C. Wozniak, D. Woodcock, N. B. Herrera, B. J. Fisher, D. S. Morgan, K. K. Lee, and S. R. Hinkle. 2005. “Ground-Water Hydrology of the Willamette Basin, Oregon.” USGS Numbered Series 2005–5168. Scientific Investigations Report. Reston, VA: U. S. Geological Survey. C3. GW Library. https://pubs.usgs.gov/sir/2005/5168/.

Cooper, H. H., and C. E. Jacob. 1953. “A Generalized Graphical Method of Evaluating Formation Constants and Summarizing Well-Field History.” *USGS Ground Water Notes Hydraulics* 7:13.

Crisóstomos Petrides Jiménez, Arístides. 2008. “Modeling Surface Water and Groundwater Interactions near Milton-Freewater, Oregon.” Master's Thesis, Oregon State University.

Derkey, Robert E., Dale F. Stradling, and Terry L. Tolan. 2006. “Geologic Map of the College Place and Walla Walla 7.5-Minute Quadrangles, Walla Walla County, Washington, and Umatilla County, Oregon.” Map. Walla Walla Basin: Washington State Department of Natural Resources.

Drost, B. W., S. E. Cox, and K. M. Schurr. 1997. “Changes in Ground-Water Levels and Ground-Water Budgets, from Predevelopment to 1986, in Parts of the Paco Basin, Washington.” Water Resource Investigations Report 96–4086. U.S. Geological Survey.

Evans, James P., Craig B. Forster, and James V. Goddard. 1997. “Permeability of Fault-Related Rocks, and Implications for Hydraulic Structure of Fault Zones.” *Journal of Structural Geology* 19 (11): 1393–1404. https://doi.org/10.1016/S0191-8141(97)00057-6.

Ferns, M. L., Ronald P Geitgey, M. D. Jenks, Lina Ma, I.P. Madin, V. S. McConnell, and P.E. Staub. 2006. “Pilot Digital Geologic Compilation Map and Database for Northeastern Oregon.” Open-File Report O-06-03. Oregon Department of Geology & Mineral Industries.

Grondin, G. H., Darrick E. Boschmann, Halley J. Schibel, and Benjamin P. Scandella. 2021. “Methods and Results for Estimating the Hydraulic Characteristics of the Subsurface Materials in the Harney Basin, Oregon.” Open-File Report 2021–04. Oregon Water Resources Department.

Hogenson, G.M. 1964. “Geology and Ground Water of the Umatilla River Basin, Oregon.” USGS Numbered Series 1620. Water Supply Paper. Washington D.C.: U. S. Geological Survey. B1. GW Library. https://pubs.er.usgs.gov/publication/wsp1620.

Hooper, P R, and R. M. Conrey. 1989. “A Model for the Tectonic Setting of the Columbia River Basalt Eruptions.” *Geological Society of America Bulletin*, Volcanism and tectonism in the Columbia River flood-basalt province, , no. 239.

Hunn, Eugene S., E. Thomas Morning Owl, Philip E. Cash Cash, and Jennifer Karson Engum, with Daniel B. Haug, Roberta L. Conner, Bruse J. Rigsby, John M. Chess, Modesta J. Minthorn. 2015. *Čáw Pawá Láakni / They Are Not Forgotten: Sahaptian Place Names Atlas of the Cayuse, Umatilla, and Walla Walla*. Tamástslikt Cultural Institute.

Hutter (Harrold), Ingrid L. 1997. “The Wallula Fault Zone: A Study of the Structure and Tectonic History of a Portion of the Olympic-Wallowa Lineament.” Masters Thesis, Western Washington University.

Kahle, S. C., D. S. Morgan, W. B. Welch, D. M. Ely, S. R. Hinkle, J. J. Vaccaro, and L. L. Orzol. 2011. “Hydrogeologic Framework and Hydrologic Budget Components of the Columbia Plateau Regional Aquifer System, Washington, Oregon, and Idaho.” Scientific Investigations Report 2011–5124. USGS.

Kienle. 1979. “Geologic Reconnaissance of the Wallula Gap, Washington - Blue Mountains - Lagrande, Oregon Region.”

Kuehn, Stephen Christopher. 1995. “The Olympic-Wallowa Lineament, Hite Fault System, and Columbia River Basalt Group Stratigraphy in Northeast Umatilla County, Oregon.” Master's Thesis, Washington State University.

Lindsey, Kevin, and Terry Tolan. 2007. “Geologic Setting of the Miocene (?) To Recent Suprabasalt Sediments of the Walla Walla Basin, Southeastern Washington and Northeastern Oregon.” Technical Report. GSI Water Solutions.

Lite Jr., K. E. 2013. “The Influence of Depositional Environment and Landscape Evolution on Groundwater Flow in Columbia River Basalt- Examples from Mosier, Oregon.” *Geological*

Society of America Bulletin, Special papers / the Geological Society of America, , no. 497, 429–40.

Lite, K. E. Jr., and G. H. Grondin. 1988. “Hydrogeology of the Basalt Aquifers near Mosier, Oregon: A Ground Water Resource Assessment.” 33. Ground Water Report. Salem, OR: Oregon Water Resources Department. A5. GW Library.

Madin, Ian P, and Ronald P Geitgey. 2007. “Preliminary Geologic Map of the Umatilla Basin, Morrow and Umatilla Counties, Oregon.” Open-File Report O-07-15. Oregon: Department of Geology and Mineral Industries.

Madin, I.P., J.D. McClaughry, and J. M. Azzopardi. 2023. “Geologic Map of the Milton-Freewater and Bowlus Hill 7.5’ Quadrangles, Umatilla County, Oregon.” Geologic Map Series 130. Department of Geology and Mineral Industries.

McCall, W. B. 1975. “Ground-Water Conditions and Declining Water Levels in the Ordnance Area, Morrow and Umatilla Counties, Oregon.” 23. Ground Water Report. Salem, OR: Oregon Water Resources Department. A3. GW Library.

McClaughry, J.D., and J. M. Azzopardi. 2023. “Geologic Map of the Athena 7.5’ Quadrangle, Umatilla County.” Geologic Map Series 129. Department of Geology and Mineral Industries.

Miller, and Stachen. 1980. “Aquifer Test Report for Lindstrom Well #2, Ella Butte, Morrow County.” Oregon Water Resources Department.

Mohamed, E. A., and R. H. Worden. 2005. “Groundwater Compartmentalisation: A Geochemical Analysis of the Structural Controls on the Subdivision of a Major Aquifer, the Sherwood Sandstone, Merseyside, UK.” *Hydrology and Earth System Sciences* 2:939–70. https://doi.org/10.5194/hessd-2-939-2005.

Neumann, Frank. 1940. “United States Earthquakes, 1938.” 610. U.S. Coast and Geodetic Survey. U.S. Army Engineer Research and Development Center & U.S. Department of Commerce.

Newcomb, R. C. 1961. “Storage of Ground Water Behind Subsurface Dams in the Columbia River Basalt Washington, Oregon, and Idaho.” Geological Survey Professional Paper 383-A. Hydrology of Volcanic-Rock Terranes. U.S. Department of the Interior, Geological Survey.

1965. “Geology and Ground-Water Resources of the Walla Walla River Basin, Washintgon-Oregon.” Water Supply Bulletin 21. U.S. Geological Survey.

1969. “Effect of Tectonic Structure on the Occurrence of Ground Water in the Basalt of the Columbia River Group of The Dalles Area, Oregon and Washington.” USGS Numbered Series 383–C. Professional Paper. Washington, D. C.: U. S. Geological Survey. C2. GW Library. https://pubs.er.usgs.gov/publication/pp383C.

Norton, M. A., and W. S. Bartholomew. 1984. “Update of Ground Water Conditions and Declining Water Levels in the Butter Creek Area, Morrow and Umatilla Counties, Oregon.” 30. Ground Water Report. Salem, OR: Oregon Water Resources Department. A3. GW Library.

Oberlander, P. L., and R. B. Almy. 1978. “Aquifer Test Report for Stage Gulch Ranch Well #3, Stanfield, Oregon.” Oregon Water Resources Department.

O'Connor, Jim E., Victor R. Baker, Richard B. Waitt, Larry N. Smith, Charles M. Cannon, David L. George, and Roger P. Denlinger. 2020. "The Missoula and Bonneville Floods—A Review of Ice-Age Megafloods in the Columbia River Basin." *Earth-Science Reviews* 208 (September):103181. https://doi.org/10.1016/j.earscirev.2020.103181.

Oregon Water Resources Department, Groundwater Information System (GWIS), accessed 2024. https://apps.wrd.state.or.us/apps/gw/gw_info/gw_info_report/Default.aspx

Packard, F. A., A.J. Hansen Jr., and H. H. Bauer. 1996. "Hydrogeology and Simulation of Flow and the Effects of Development Alternatives on the Basalt Aquifers of the Horse Heaven Hills, South-Central Washington." USGS Numbered Series 94–4068. *Water-Resources Investigations Report*. Water-Resources Investigations Report. Portland, OR: U. S. Geological Survey. B5. GW Library. https://doi.org/10.3133/wri944068.

Piper, A.M., T. W. Robinson, and H. E. Thomas. 1935. "Ground Water in the Walla Walla Basin, Oregon-Washington." Washington Exhibit 16. U.S. Department of the Interior, Geological Survey.

Reidel, Stephen P., Victor E. Camp, Terry L. Tolan, John D. Kauffman, and Dean L. Garwood. 2013. "Tectonic Evolution of the Columbia River Flood Basalt Province." In *The Columbia River Flood Basalt Province*, by Stephen P. Reidel, Victor E. Camp, Martin E. Ross, John A. Wolff, Barton S. Martin, Terry L. Tolan, and Ray E. Wells. Geological Society of America. https://doi.org/10.1130/2013.2497(12).

Reidel, Stephen P., Karl R. Fecht, Ingrid L. Hutter (Harrold), Terry L. Tolan, and Mickie A. Chamness. 2021. "The Olympic-Wallowa Lineament: A New Look at an Old Controversy." *GSA Bulletin* 133 (1–2): 115–33. https://doi.org/10.1130/B35454.1.

Reidel, Steve P., Frank A. Spane, and Vernon G. Johnson. 2002. "Natural Gas Storage in Basalt Aquifers of the Columbia Basin, Pacific Northwest USA: A Guide to Site Characterization." PNNL-13962, 15020781. https://doi.org/10.2172/15020781.

Sherrod, B.L., R.J. Blakely, J.P. Lasher, A. Lamb, S.A. Mahan, F.F. Foit, and E.A. Barnett. 2016. "Active Faulting on the Wallula Fault Zone within the Olympic-Wallowa Lineament, Washington State, USA." *Geological Society of America Bulletin* 128 (11–12): 1636–59. https://doi.org/10.1130/B31359.1.

Smoot, John Leach, and Dale R. Ralston. 1987. "Hydrogeology and a Mathematical Model of Ground-Water Flow in the Pullman-Moscow Region, Washington and Idaho." Idaho Water Resources Research Institute, University of Idaho.

Swanson, D. A., J. L. Anderson, V. E. Camp, P. R. Hooper, W. H. Taubeneck, and T. L. Wright. 1981. "Reconnaissance Geologic Map of the Columbia River Basalt Group, Northern Oregon and Western Idaho." USGS Numbered Series 81–797. *Open-File Report*. Open-File Report. U.S. Geological Survey,. Inventoried. GW Library. https://doi.org/10.3133/ofr81797.

Swanson, D. A., T. L. Wright, V. E. Camp, J. N. Gardner, R. T. Helz, S. M. Price, S. P. Reidel, and M. E. Ross. 1980. "Reconnaissance Geologic Map of the Columbia River Basalt Group, Pullman and Walla Walla Quadrangles, Southeast Washington and Adjacent Idaho." USGS Numbered Series. Miscellaneous Investigations Map. U. S. Geological Survey. K1. GW Library. https://doi.org/10.3133/i1139.

Theis, Charles V. 1935. “The Relation between the Lowering of the Piezometric Surface and the Rate and Duration of Discharge of a Well Using Ground-Water Storage.” *Eos, Transactions American Geophysical Union* 16 (2): 519–24. https://doi.org/10.1029/TR016i002p00519.

Tolan, T. L., S. P. Reidel, Marvin H. Beeson, J. L. Anderson, Karl R. Fecht, and D. A. Swanson. 1989. “Revisions to the Estimates of the Areal Extent and Volume of the Columbia River Basalt Group.” *GSA Special Papers*, Volcanism and tectonism in the Columbia River flood-basalt province, . https://doi.org/10.1130/SPE239-p1.

Tolan, Terry, Kevin Lindsey, Mark Nielson, and Susan Loper. 2007. “Geologic Framework of Selected Sediment and Columbia River Basalt Units in the Columbia Basin Ground WAter Management Area of Adams, Franklin, Grant, and Lincoln Counties, Washington.” Technical Report. Columbia Basin Ground Water Management Area of Adams, Franklin, and Lincoln Counties; GSI Water Solutions; Franklin Conservation District.

Vaccaro, J. J., M. A. Jones, D. M. Ely, M. E. Keys, T. D. Olsen, W. B. Welch, and S. E. Cox. 2009. “Hydrogeologic Framework of the Yakima River Basin Aquifer System, Washington.” Scientific Investigations Report 2009–5152. U. S. Geological Survey.

Vorhis, R C. 1979. “Transmissivity from Pumped Well Data.” *National Water Well Association Newsletter* 10 (11): 50–52.

Walker, G. W. 1973. “Reconnaissance Geologic Map of the Pendleton Quadrangle, Oregon and Washington.” USGS Numbered Series. Miscellaneous Investigations Map. U. S. Geological Survey. K1. GW Library. https://doi.org/10.3133/i727.

Washington Division of Geology and Earth Resources, 2016, Surface geology, 1:100,000--GIS data, November 2016: Washington Division of Geology and Earth Resources Digital Data Series DS-18, version 3.1, previously released June 2010. http://www.dnr.wa.gov/publications/ger_portal_surface_geology_100k.zip

Appendix A: CRBG Well Group Summaries

A series of cross sections illustrate the complex stratigraphy, geologic structure, and groundwater level elevations in the CRBG aquifers of the Walla Walla River Basin. The level of detail in stratigraphic control varies by well and by area. Cross sections were not produced for well groups I and J due to lack of stratigraphic control in an area with complex structural geology. For readability, wells included in the cross sections are limited to a few representative wells with high quality stratigraphic control.

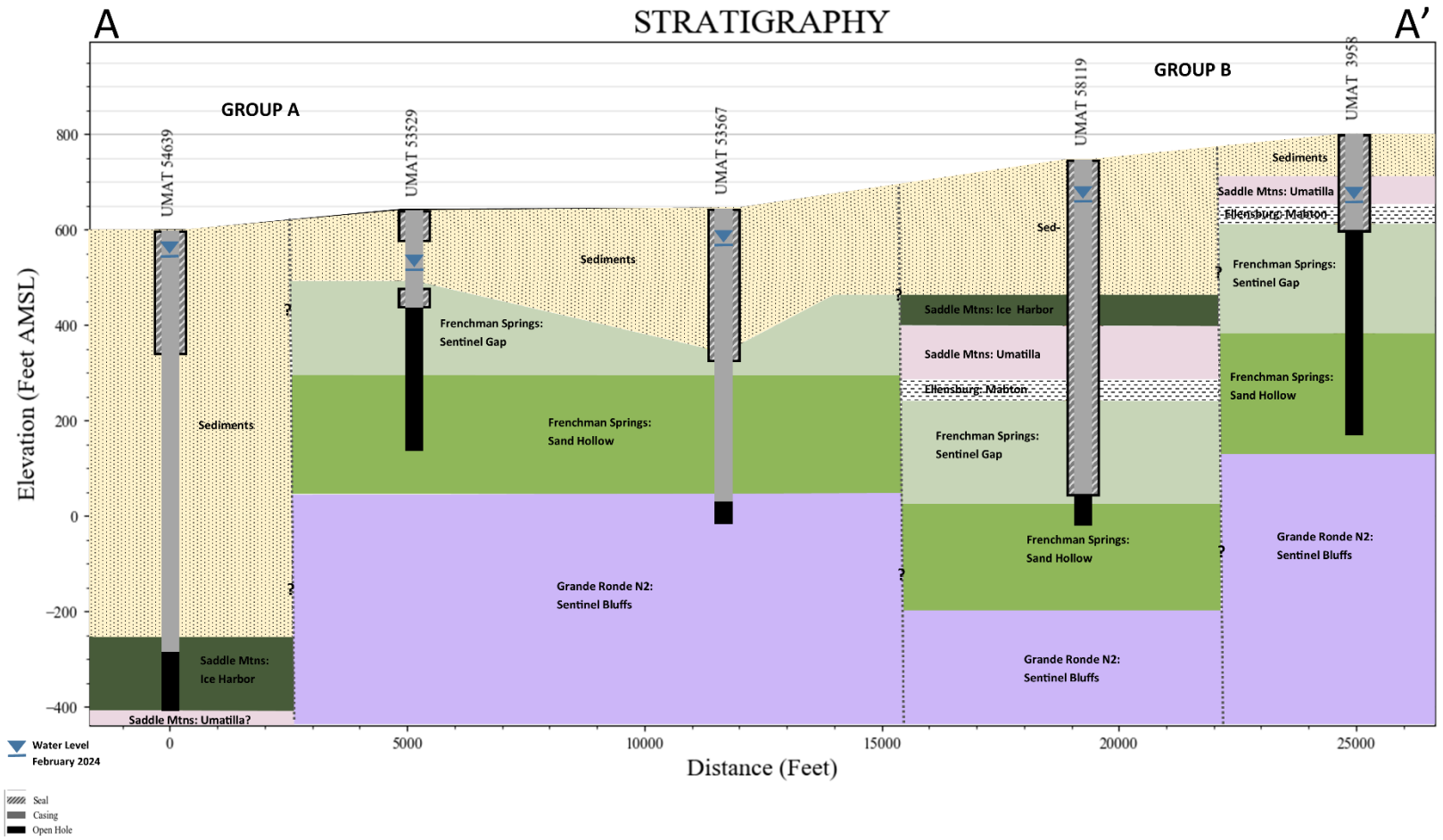


Figure 31: Cross Section A-A'

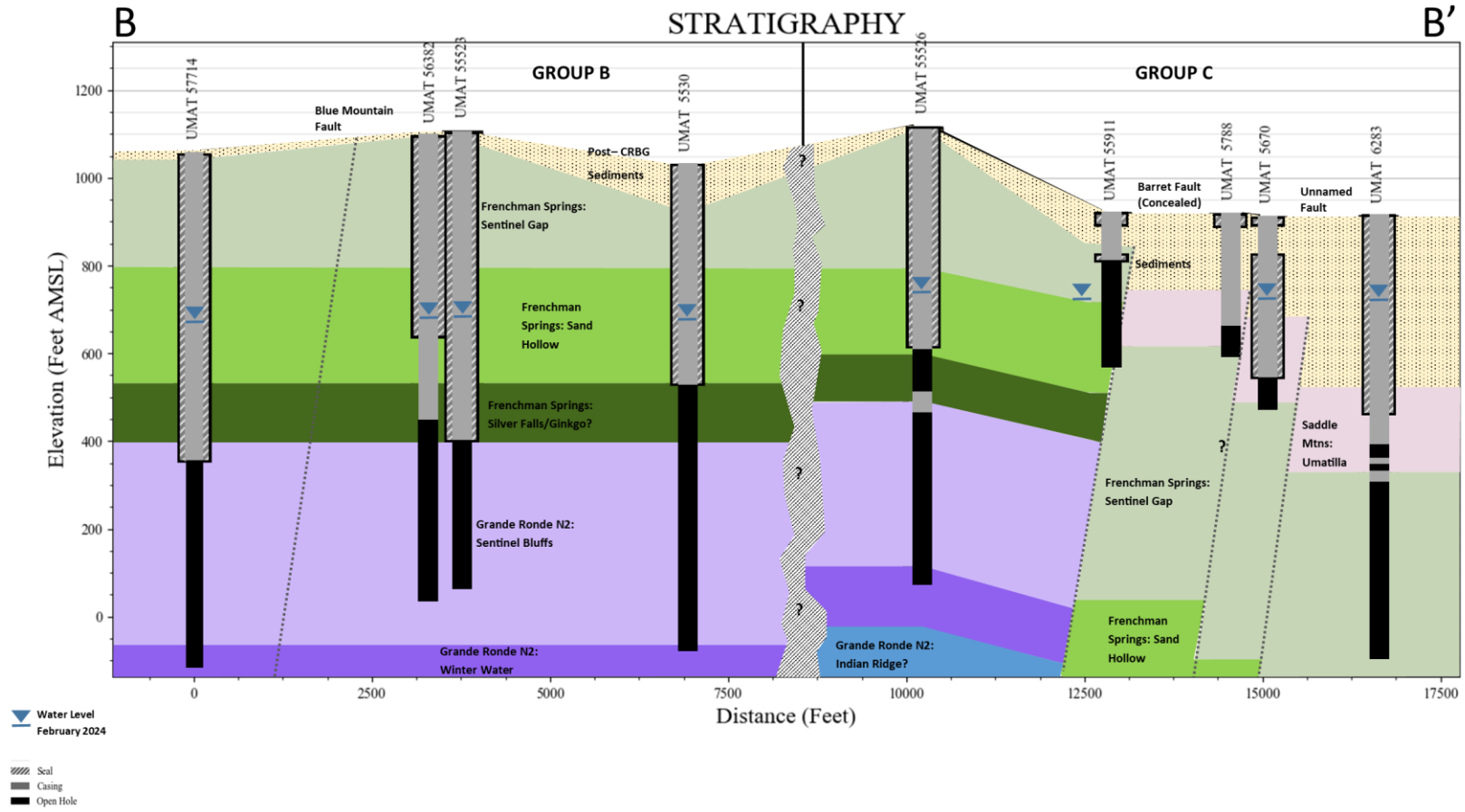


Figure 32: Cross Section B-B'

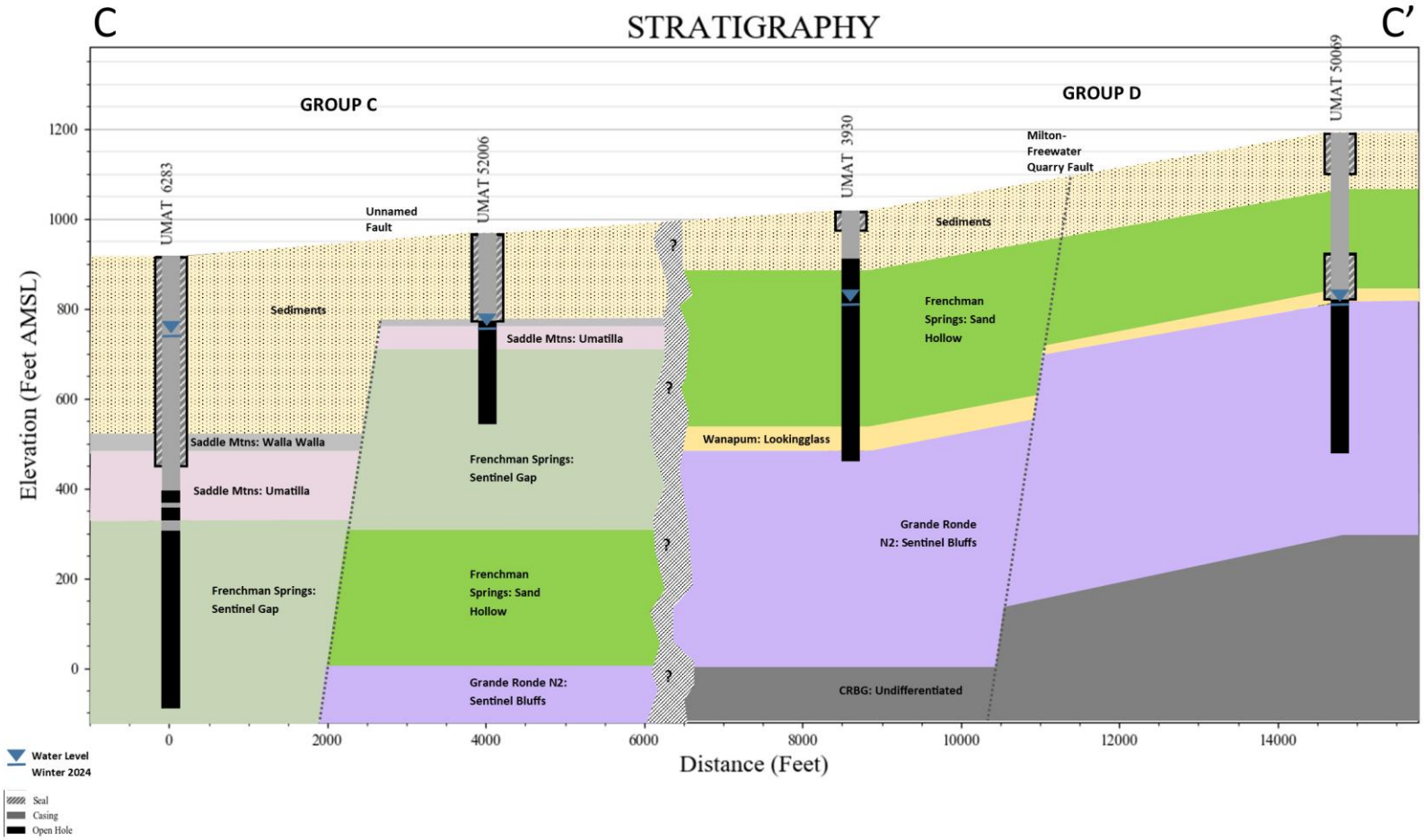


Figure 33: Cross Section C-C'

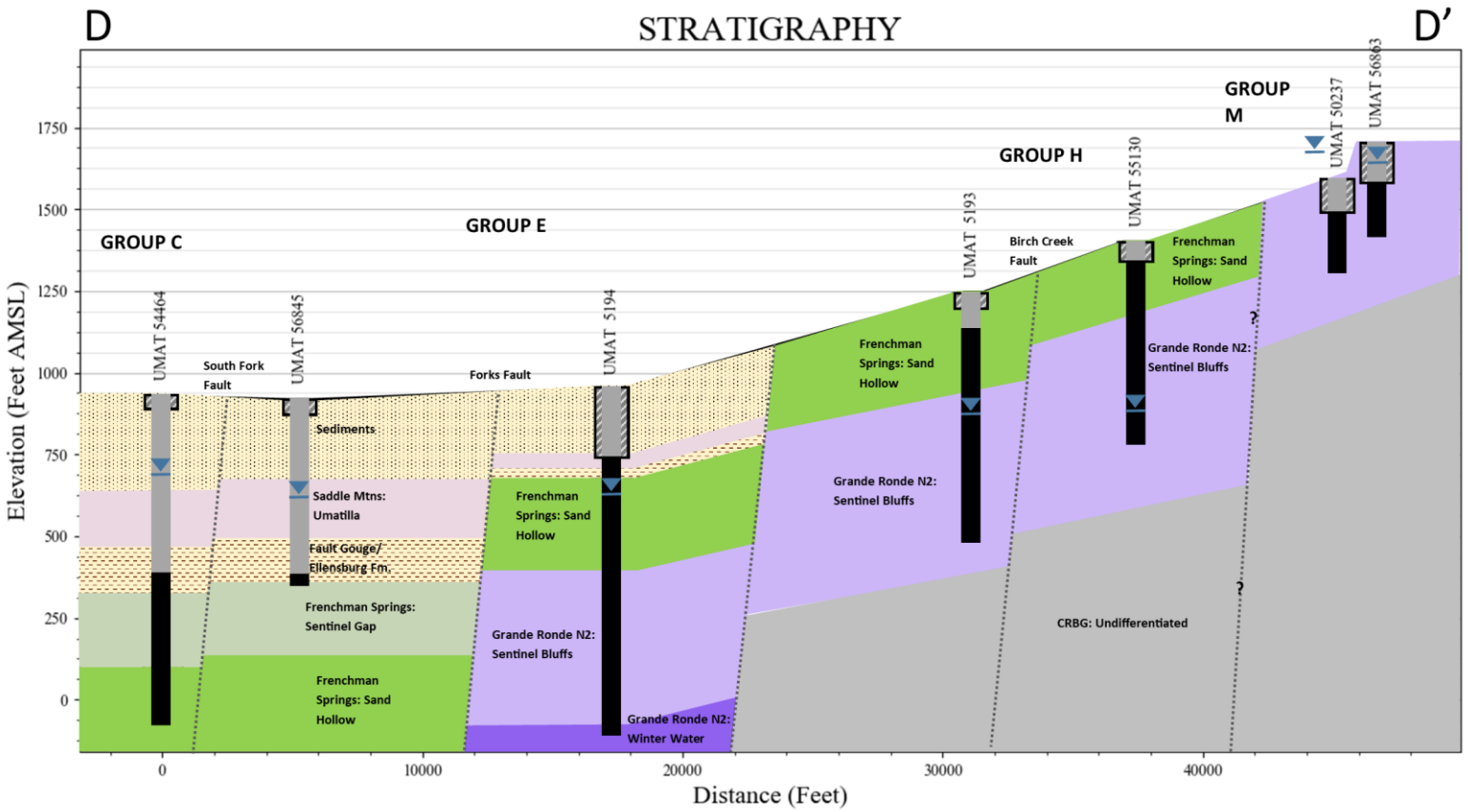


Figure 34: Cross Section D-D'

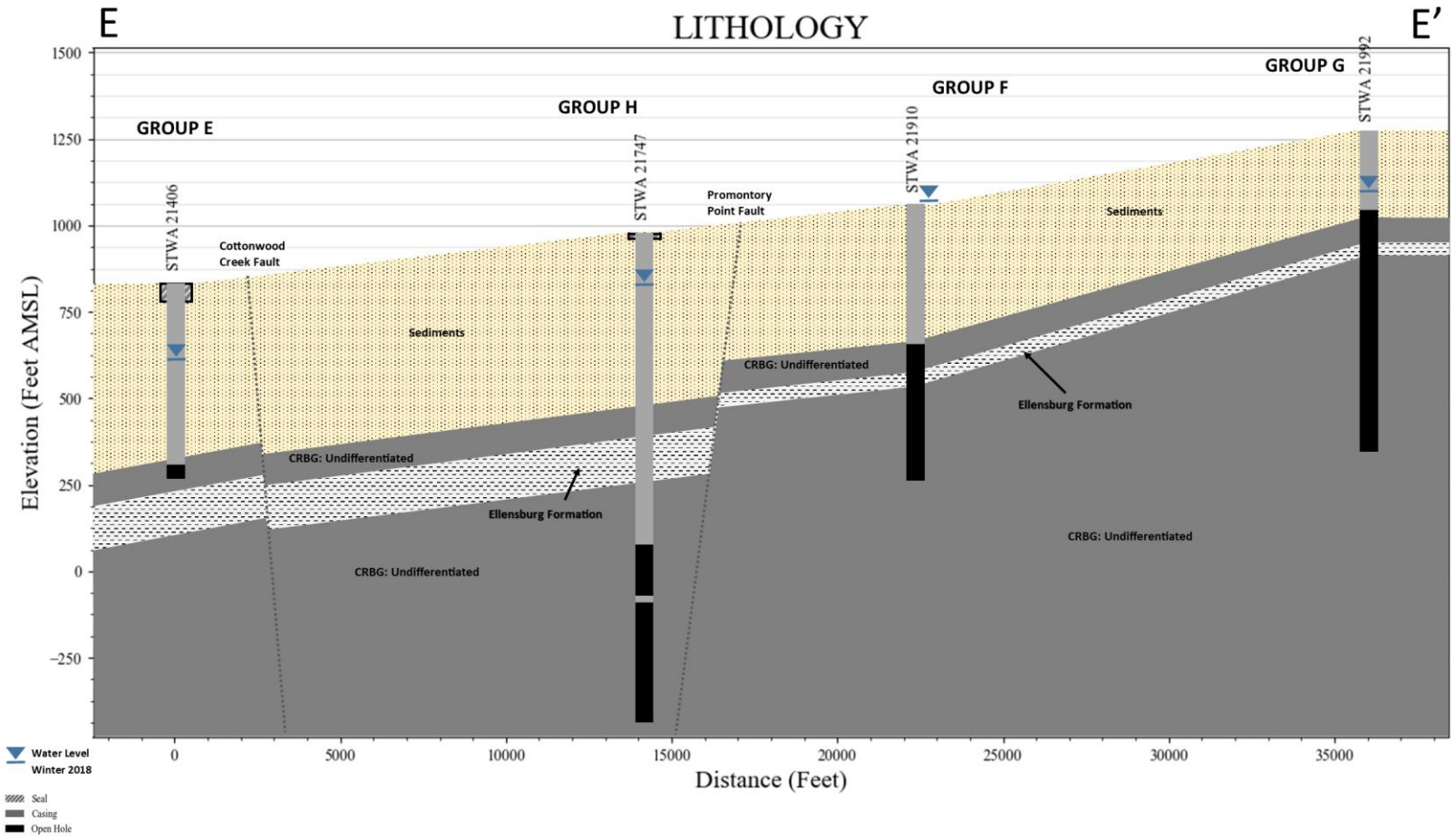


Figure 35: Cross Section E-E'

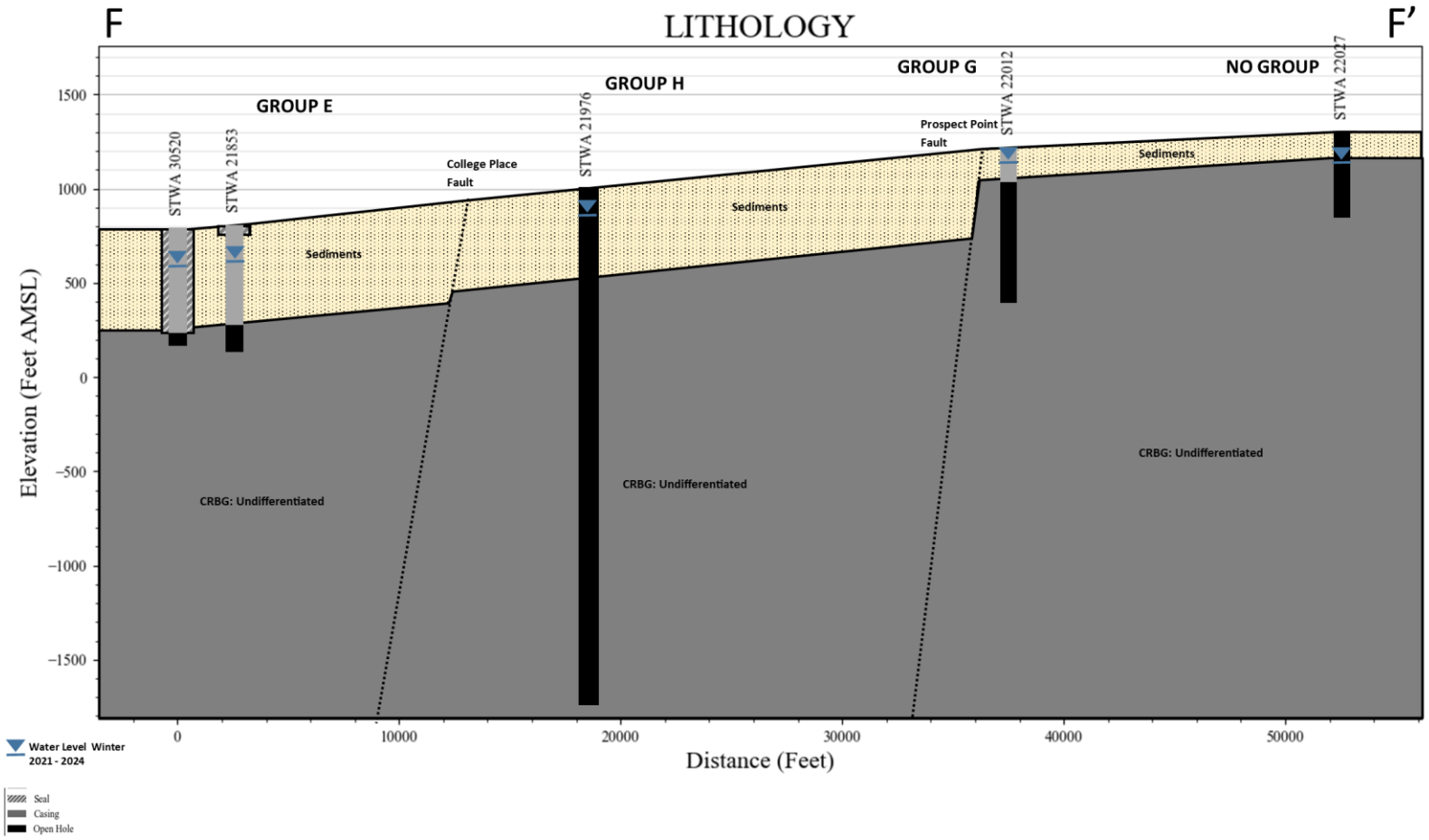


Figure 36: Cross Section F-F'

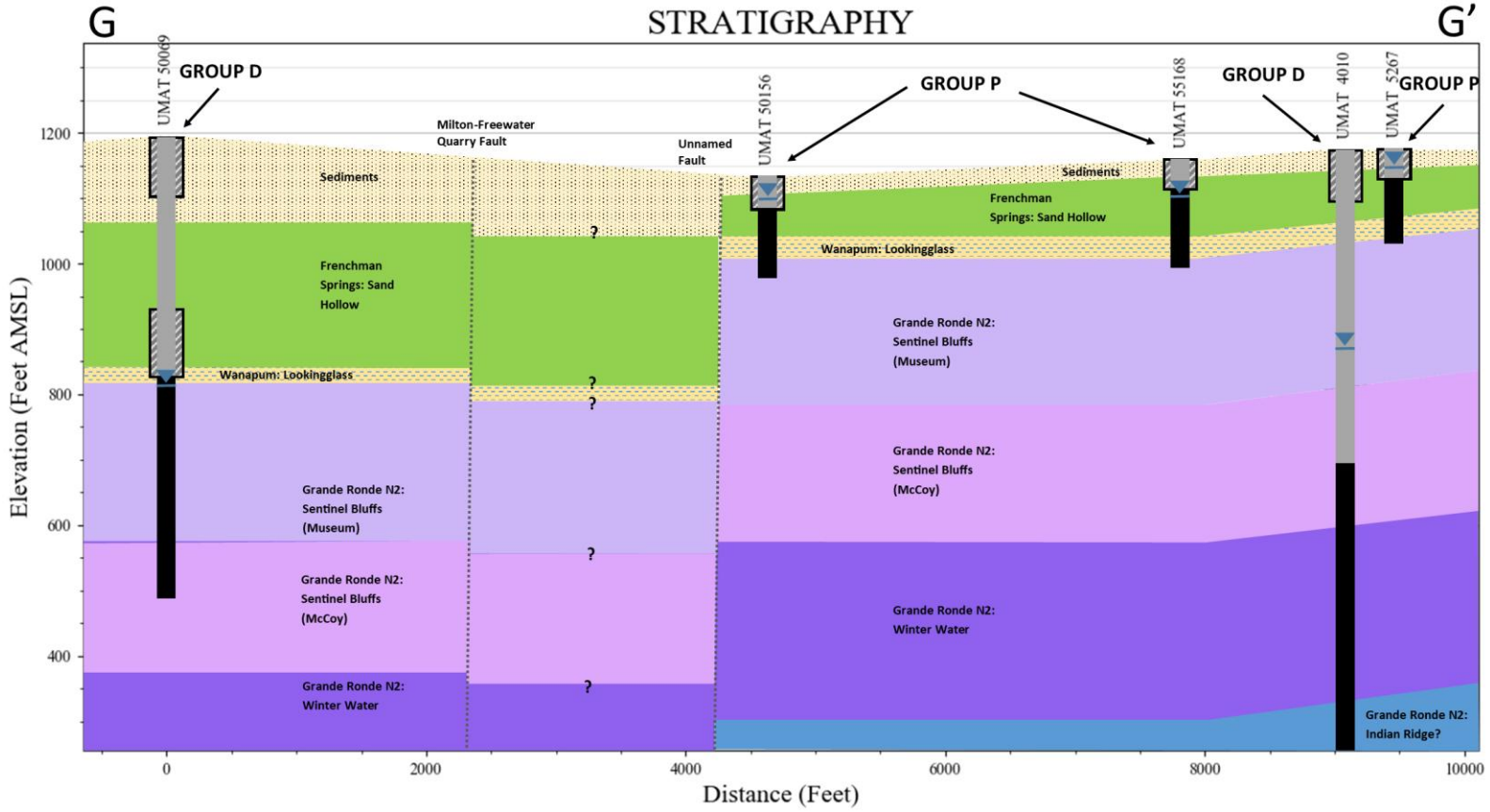


Figure 37: Cross Section G-G'

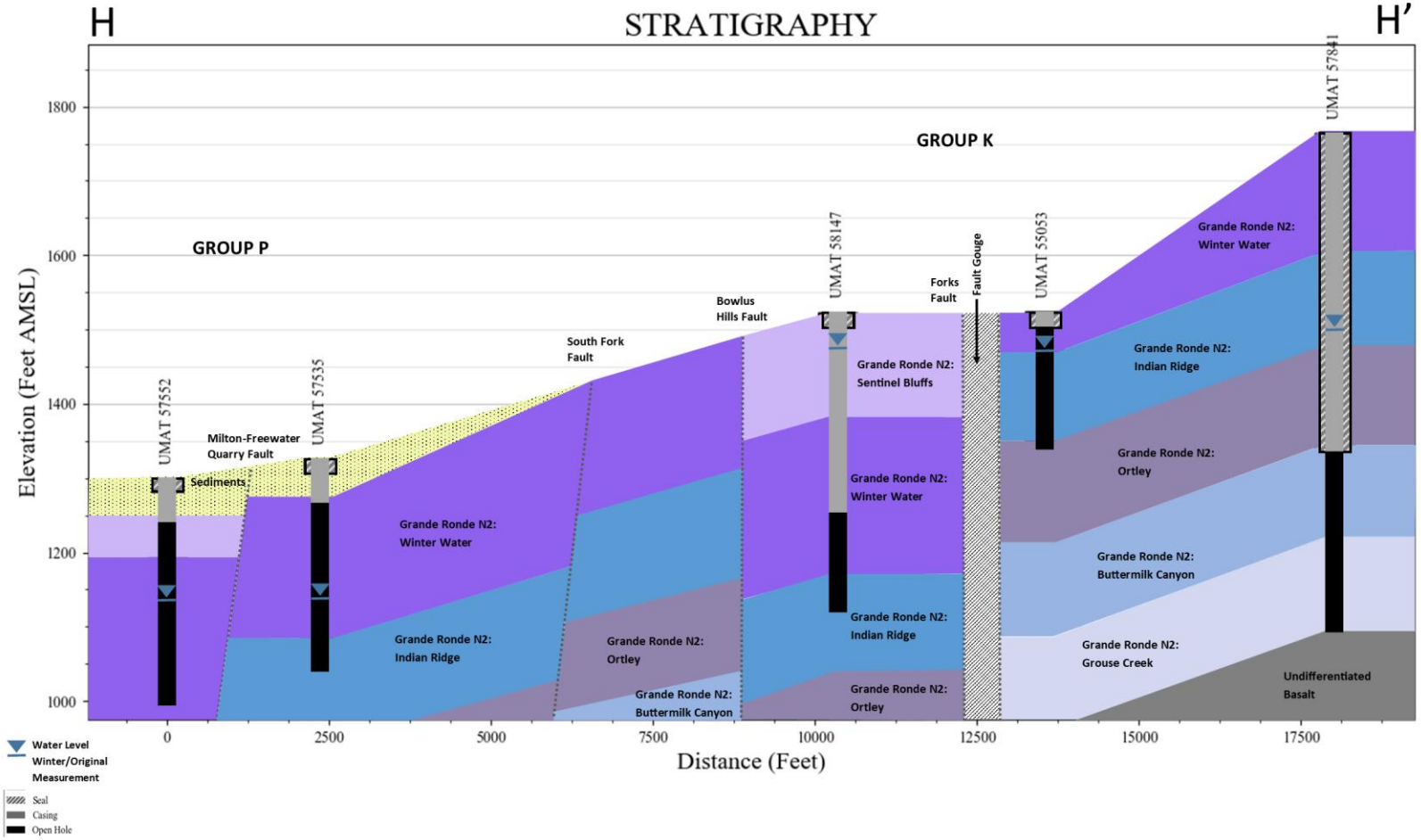


Figure 38: Cross Section H-H'

A/West Valley

Available data indicate Group A wells penetrate flows in the Saddle Mountains and Wanapum Formations (Figure 31: Cross Section A-A'). This group is located within the Wallula Fault Zone, with the depth to the top of the basalt ranging from 20 to 850 feet below the surface. There is more than 200 feet of vertical offset of the top of the Sand Hollow flow of the Frenchman Springs Member of the Wanapum Formation (down to the east) between UMAT 5028 (in Group A) and UMAT 58842 (in Group B) and there is a 50-foot change in head over the 1000 feet between these two wells. While recent mapping of the concealed portion of the Pine Creek Fault doesn't coincide with the step change and water level change observed between Groups A and B, there appears to be hydraulic separation between these well groups. The hydrographs of these wells display decadal cycles (Figure 39), with an overall downward trend since 2000. While the causes of these cycles are outside the scope of this study, it is relevant to the well grouping analysis because no similar decadal trend is evident in Group B wells despite their proximity and similar depth.

Table 6. Group A Summary

Group A Summary	Minimum	Maximum
CRBG Formations	Saddle Mountains	Wanapum
Depth to top of basalt	20	850
Groundwater level elevation, February 2024	500	560
Link to Group Cross Section	Figure 31: Cross Section A-A'	
Horizontal hydraulic gradient within group	0.003	

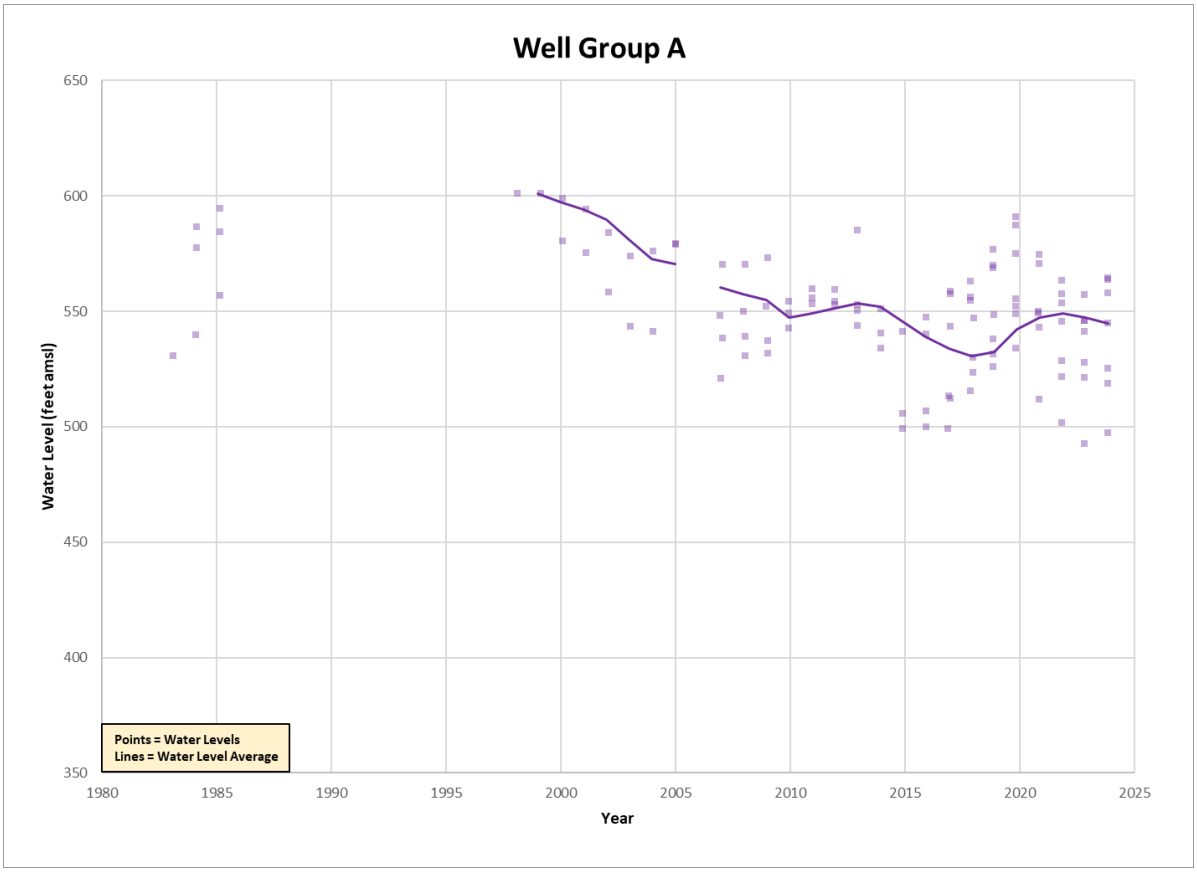


Figure 39: Group A annual high groundwater levels where dots represent a single well measurement, and the line represents the 5-year trailing average.

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 4101
UMAT 4166
UMAT 4167
UMAT 5028
UMAT 53529
UMAT 53567
UMAT 54639

B/ Umapine

Available data indicate Group B wells penetrate members of the Saddle Mountains, Wanapum and upper Grande Ronde Formations (Figure 31: Cross Section A-A', and Figure 32: Cross Section B-B'). This group is located within the Wallula Fault Zone, with the depth to the top of

the basalt ranging from 10 to 280 feet below the surface. The hydrograph of these wells displays water level decline from 1950 to 1980, relative stability but sparse data from 1980 to 2000, followed by approximately 50 feet of decline between 2000 and 2024 (Figure 40). This well grouping was hydraulically tested by OWRD, see Appendix B for multiple well pumping test data.

Table 7. Group B Summary

Group B Summary	Minimum	Maximum
CRBG Formations	Saddle Mountains	Grande Ronde
Depth to top of basalt	10	280
Groundwater level elevation, February 2024	630	675
Link to Group Cross Section	Figure 31, Figure 32	
Horizontal hydraulic Gradient within Group	0.00002	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 3958
UMAT 4173
UMAT 4174
UMAT 4177
UMAT 4179
UMAT 4180
UMAT 4182
UMAT 4184
UMAT 4185
UMAT 4849
UMAT 5530
UMAT 50516
UMAT 50939
UMAT 55523
UMAT 55959
UMAT 56382
UMAT 57000
UMAT 57695
UMAT 57714
UMAT 58119
UMAT 58842

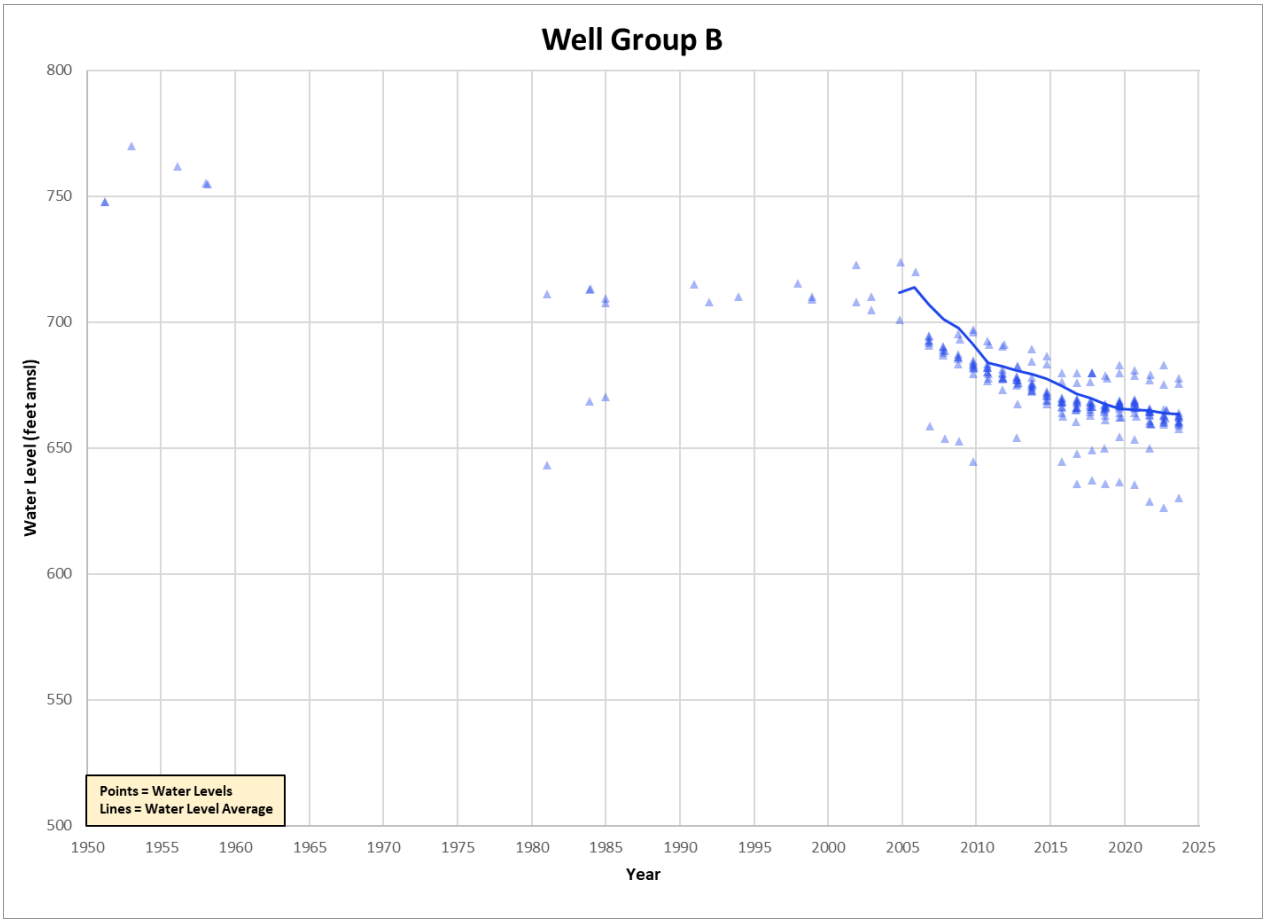


Figure 40: Group B annual high groundwater levels. The line represents the 5-year trailing average for the well group.

C/ Orchards

Available data indicate Group C wells penetrate members of the Saddle Mountains and Wanapum Formations (Figure 32: Cross Section B-B' and Figure 33: Cross Section C-C'). This group is located within the Wallula Fault Zone, with the depth to the top of the basalt ranging from 100 to 450 feet below the surface. The hydrographs of these wells show water level declined over 150 feet from 1950 to 2010, followed by relative stability between 2010 and 2024 (Figure 41). This well grouping was hydraulically tested by OWRD, see Appendix B for multiple well pumping test data.

Table 8. Group C Summary

Group C Summary	Minimum	Maximum
CRBG Formations	Saddle Mountains	Wanapum
Depth to top of basalt	100	450
Groundwater level elevation, February 2024	680	760
Link to Group Cross Section	Figure 32, Figure 33	
Horizontal hydraulic gradient within Group	0.0006	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 3929
UMAT 4899
UMAT 5606
UMAT 5670
UMAT 5788
UMAT 6053
UMAT 6283
UMAT 50478
UMAT 52006
UMAT 54464
UMAT 54524
UMAT 54895
UMAT 55253
UMAT 55526
UMAT 55911
UMAT 55999
UMAT 56287
UMAT 56456
UMAT 56828
UMAT 57860

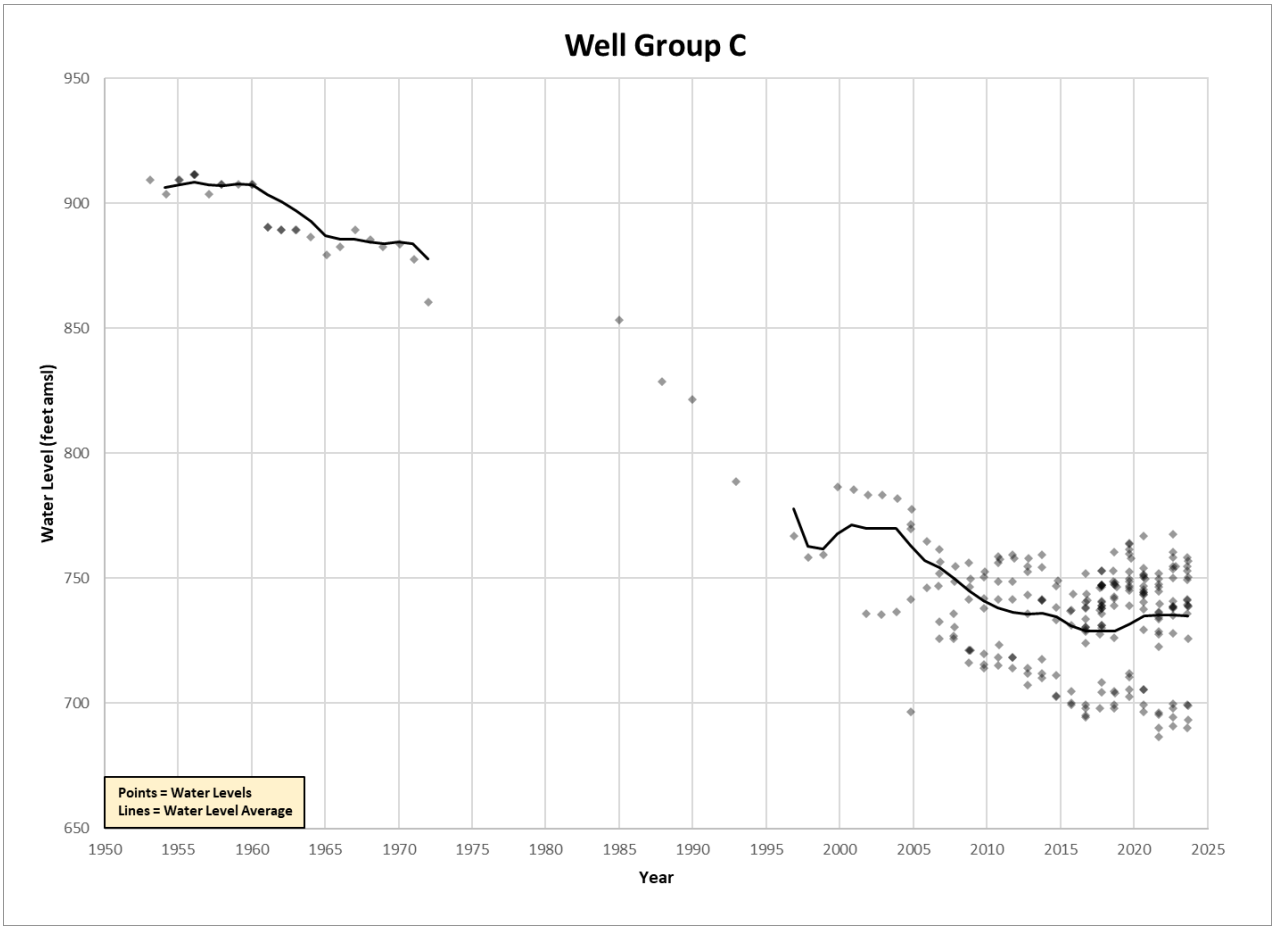


Figure 41: Group C annual high groundwater levels. The line represents the 5-year trailing average for the well group.

D/ City Milton-Freewater

Available data indicate Group D wells penetrate members of the Saddle Mountains and Wanapum Formations (Figure 33: Cross Section C-C' and Figure 37: Cross Section G-G'). This group is located within the Wallula Fault Zone and the Milton-Freewater Fault Zone, with the depth to the top of the basalt ranging from 30 to 125 feet below the surface. The hydrographs of these wells show water level declined over 150 feet from 1950 to 1995, followed by a data gap, then declined another 25 feet between 2010 and 2024 (Figure 42). This well grouping was hydraulically tested by OWRD, see Appendix B for multiple well pumping test data.

Table 9. Group D Summary

Group D Summary	Minimum	Maximum
CRBG Formations	Saddle Mountains	Grande Ronde
Depth to top of basalt	30	125
Groundwater level elevation, February 2024	800	860
Link to Group Cross Section	Figure 33, Figure 37	
Horizontal hydraulic Gradient within Group	0.003	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 3908
UMAT 3909
UMAT 3930
UMAT 3961
UMAT 3962
UMAT 3964
UMAT 3965
UMAT 4010
UMAT 50069
UMAT 57672

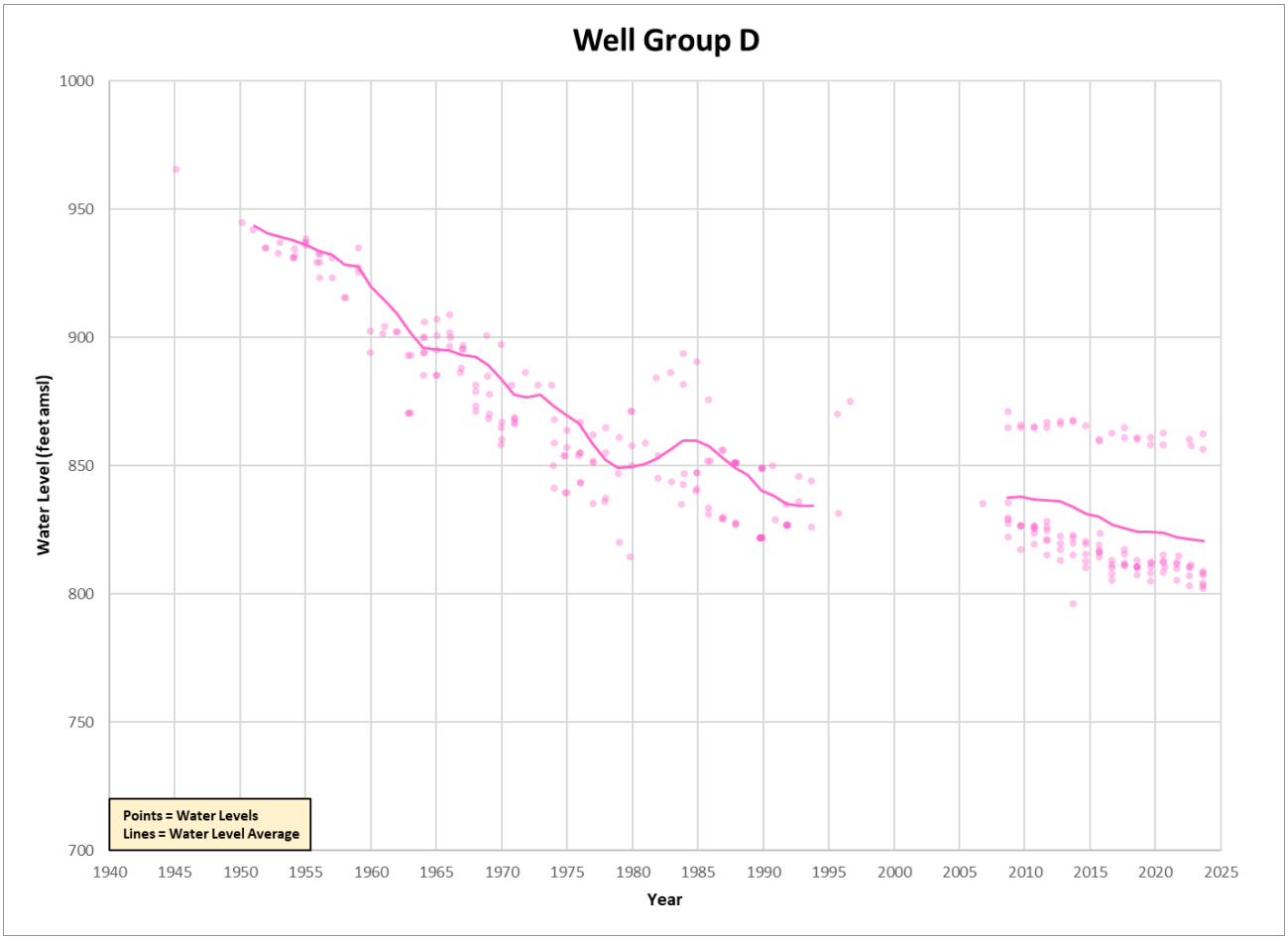


Figure 42: Group D annual high groundwater levels. The line represents the 5-year trailing average for the well group.

E/ East Valley and College Place

Available data indicate Group E wells penetrate members of the Saddle Mountains and Wanapum Formations (Figure 34: Cross Section D-D' and Figure 35: Cross Section E-E'). This group spans the state line, including municipal and irrigation wells. However, data limitations make group findings in the Washington portion of the basin tentative. Further investigation is needed and ongoing to characterize the well groups in Washington and may reveal new or different well group members. Depth to the top of the basalt ranges from 200 to 600 feet below the surface. The hydrographs of these wells show water levels declined over 150 feet from 1950 to 1985, followed by a data gap, then declined another 50 feet between 2005 and 2024 (Figure 43, Figure 42). This group is adjacent to City of Walla Walla Wells used for aquifer storage and recovery, yet the water level response seen in Walla Walla ASR wells is not observed in Group E wells.

Table 10. Group E Summary

Group E Summary	Minimum	Maximum
CRBG Formations	Wanapum	Grande Ronde
Depth to top of basalt	200	600
Groundwater level elevation, February 2024	550	650
Link to Group Cross Section	Figure 34, Figure 35	
Horizontal hydraulic Gradient within Group	0.00008	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

STWA 21406
STWA 21602
STWA 21674
STWA 21723
STWA 21748
STWA 21853
STWA 30520
STWA 30521
STWA 1899579
STWA 1924775
UMAT 3899
UMAT 5241
UMAT 5227
UMAT 50535
UMAT 55248
UMAT 55766
UMAT 56845
UMAT 57235
UMAT 58127

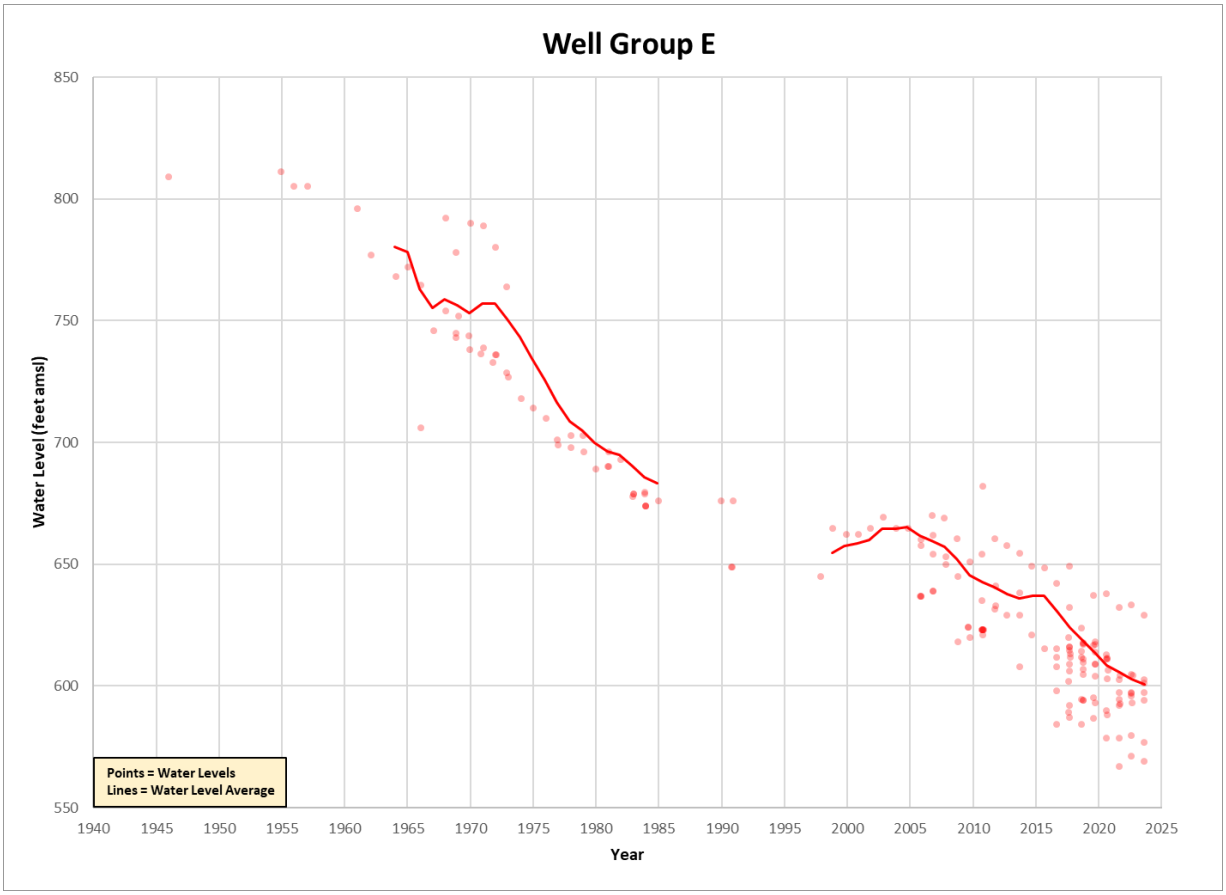


Figure 43: Group E annual high groundwater levels. The line represents the 5-year trailing average for the well group.

F/ Central City of Walla Walla

There is not enough stratigraphic control to identify the units within the CRBG accessed by Group F wells (Figure 35: Cross Section E-E'). Additionally, data limitations make group findings in the Washington portion of the basin tentative. Further investigation is needed and ongoing to characterize the well groups in Washington and may reveal new or different well groups or group members. The hydrographs of these wells show water level declined over 50 feet from 1940 to 1975, followed by a data gap, then declined approximately 40 feet between 2000 and 2024 (Figure 44).

Group F Summary	Minimum	Maximum
CRBG Formations	undifferentiated	undifferentiated
Depth to top of basalt		400
Groundwater level elevation, February 2024		1050
Link to Group Cross Section	Figure 35	
Horizontal hydraulic Gradient within Group	Insufficient data	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

STWA 21683
STWA 21849
STWA 21851
STWA 21862
STWA 21910
STWA 21941

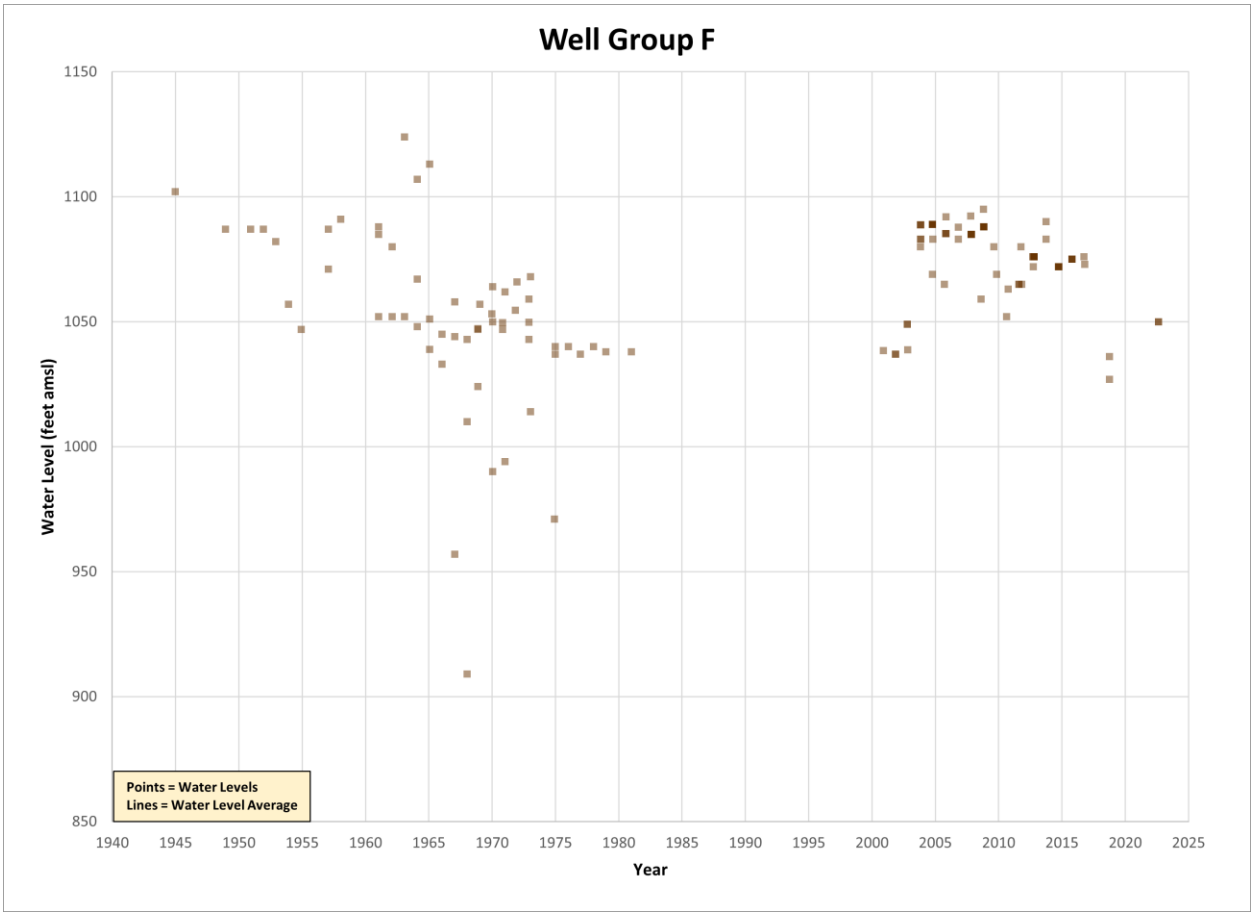


Figure 44. Group F annual high groundwater levels. 5-year trailing average not shown due to uncertainty in static water level conditions.

G/ City of Walla Walla East

There is not enough stratigraphic control to identify the units within the CRBG accessed by Group G wells (Figure 35: Cross Section E-E' and Figure 36: Cross Section F-F'). Additionally, data limitations make group findings in the Washington portion of the basin tentative. Further investigation is needed and ongoing to characterize the well groups in Washington and may reveal new or different well groups or group members. Depth to the top of the basalt ranges from 400 to 500 feet below the surface. The hydrographs of these wells show water level declined over 125 feet from 1940 to 1975, followed by a data gap, then declined another 25 feet

between 2000 and 2024 (Figure 45). This group includes City of Walla Walla wells used for aquifer storage and recovery, and exhibits a different trend after 2000 than Groups E and H.

Table 11. Group G Summary

Group G Summary	Minimum	Maximum
CRBG Formations	undifferentiated	undifferentiated
Depth to top of basalt	200	400
Groundwater level elevation, February 2024	1075	1140
Link to Group Cross Section	Figure 35, Figure 36	
Horizontal hydraulic Gradient within Group	0.004	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

STWA 20292
STWA 21637
STWA 21988
STWA 21989
STWA 21992
STWA 22012
STWA 22020

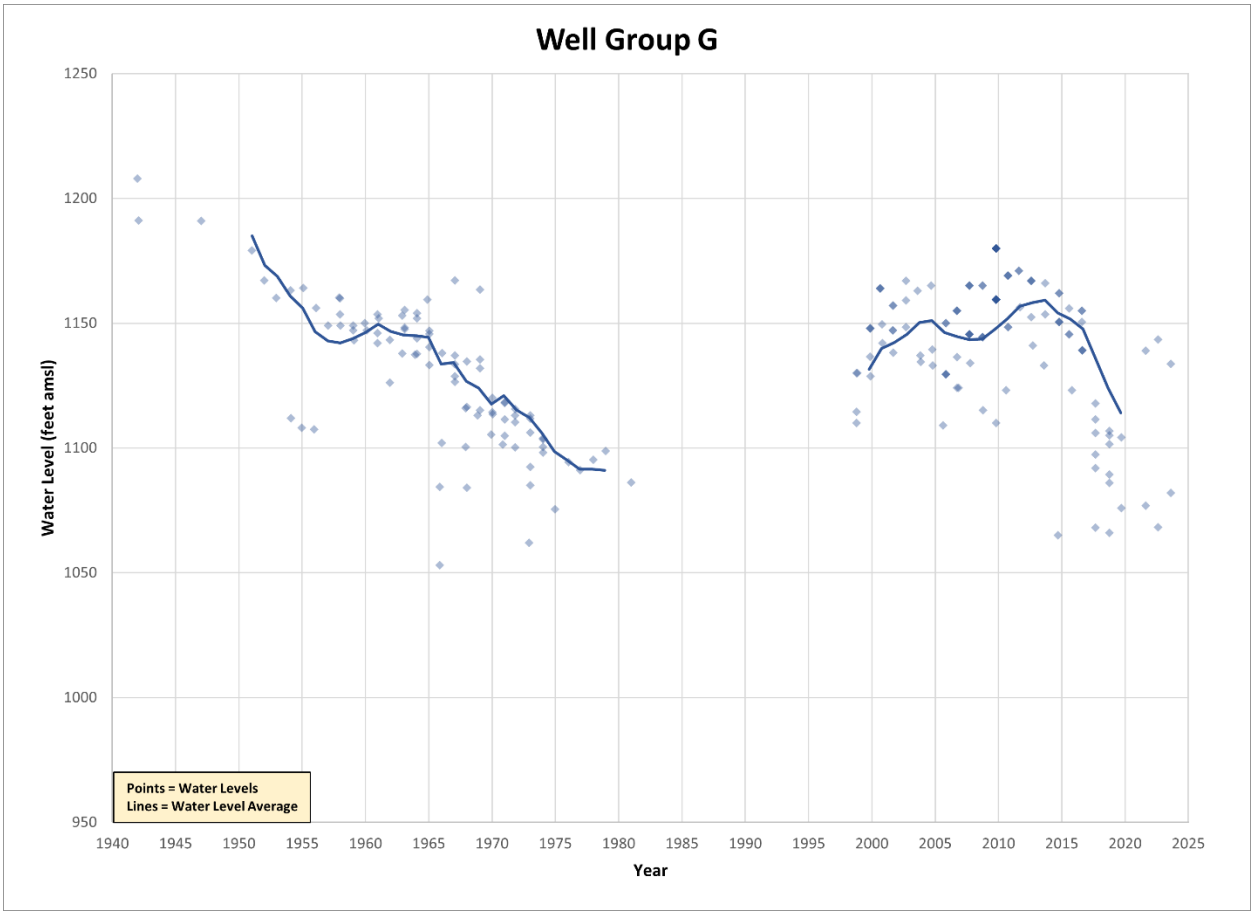


Figure 45: Group G annual high groundwater levels. The line represents the 5-year trailing average for the well group.

H/Stateline East

There is not enough stratigraphic control to identify the units within the CRBG accessed by Group H wells (Figure 35: Cross Section E-E' and Figure 36: Cross Section F-F'). Depth to the top of the basalt ranges from 400 to 500 feet below the surface. The hydrographs of these wells show water level declined approximately 100 feet from 1955 to 1990, followed by a data gap, then declined up to 50 feet more between 2000 and 2024 (Figure 46). Data limitations make group findings in the Washington portion of the basin tentative. Further investigation is needed to characterize the well groups in Washington and may reveal new or different well groups or group members. There is larger uncertainty in well selection for this group than in many other groups because of the temporal data gaps and sparse data available in the last 10 years. The hydrograph diverges into 2 groups after 2005, causes are unknown.

Table 12. Group H Summary

Group H Summary	Minimum	Maximum
CRBG Formations	undifferentiated	undifferentiated
Depth to top of basalt	400	500
Groundwater level elevation, February 2024	825	875
Link to Group Cross Section	Figure 35, Figure 36	
Horizontal hydraulic gradient within Group	Insufficient data	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

STWA 21747
STWA 21816
STWA 21976
STWA 168614
STWA 21382
UMAT 5193
UMAT 55130
UMAT 55891
UMAT 58228

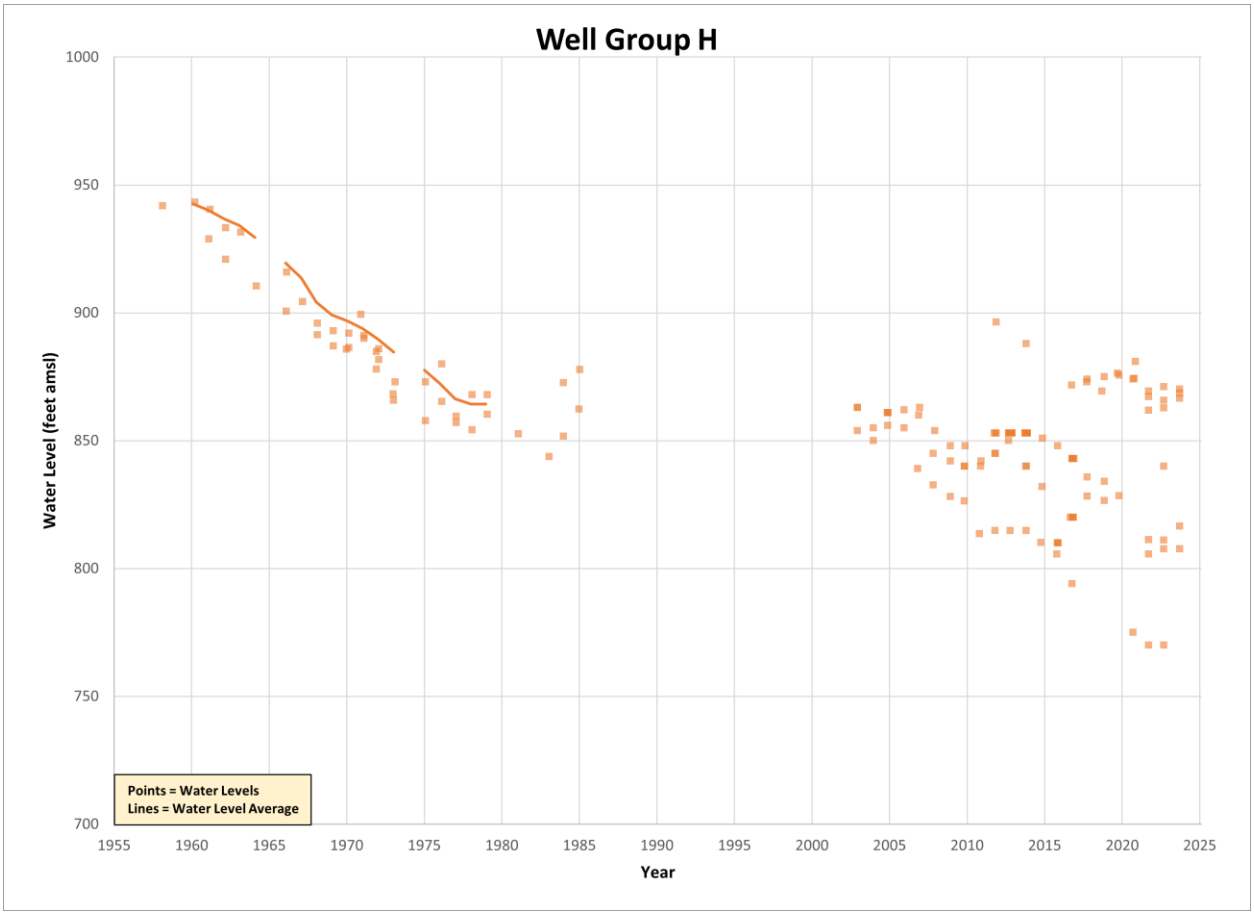


Figure 46: Group H annual high groundwater levels. The line represents the 5-year trailing average for the well group. 5-year trailing average after 2000 not shown due to uncertainty in static water level conditions.

I/ Athena Weston Shallow

Water level and stratigraphic data are limited in this area, lending uncertainty to this well group. Future work may result in changes to this group. Available data indicate Group I wells penetrate members of the Wanapum Formation, but stratigraphic control is inadequate for detailed characterization. Sediment thickness is tens of feet of loess in this area. The hydrographs of these wells show water level measurements were sparse between 1950 to 2015, followed by a rising trend in groundwater levels until 2020 and a downturn between 2020 and 2024 (Figure 47). Groups I and J appear to represent a portion of the Walla Walla Basin where measurable changing head with depth is observed (note the overlap of groups I and J (see Plate 1). There may be more typical CRBG groundwater flow conditions than is found in the Walla Walla Valley. In the vicinity of Athena, water found in interflow zones is hydraulically separated by dense flow interiors, as indicated by the difference in water level elevation and trend between groups I, J and UMAT 57710. UMAT 57710 is cased and sealed below the bottom of wells in groups I and J. Test 11 pumped UMAT 57710 and did not observe response in the shallow CRBG wells located within ½ mile.

Table 13. Group I Summary

Group I Summary	Minimum	Maximum
CRBG Formations	Wanapum	undifferentiated
Depth to top of basalt	0	20
Groundwater level elevation, February 2024	1700	1740
Link to Group Cross Section	n/a	
Horizontal hydraulic gradient within Group	Insufficient data	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 56037
UMAT 55327
UMAT 56982
UMAT 57120
UMAT 3074
UMAT 56204

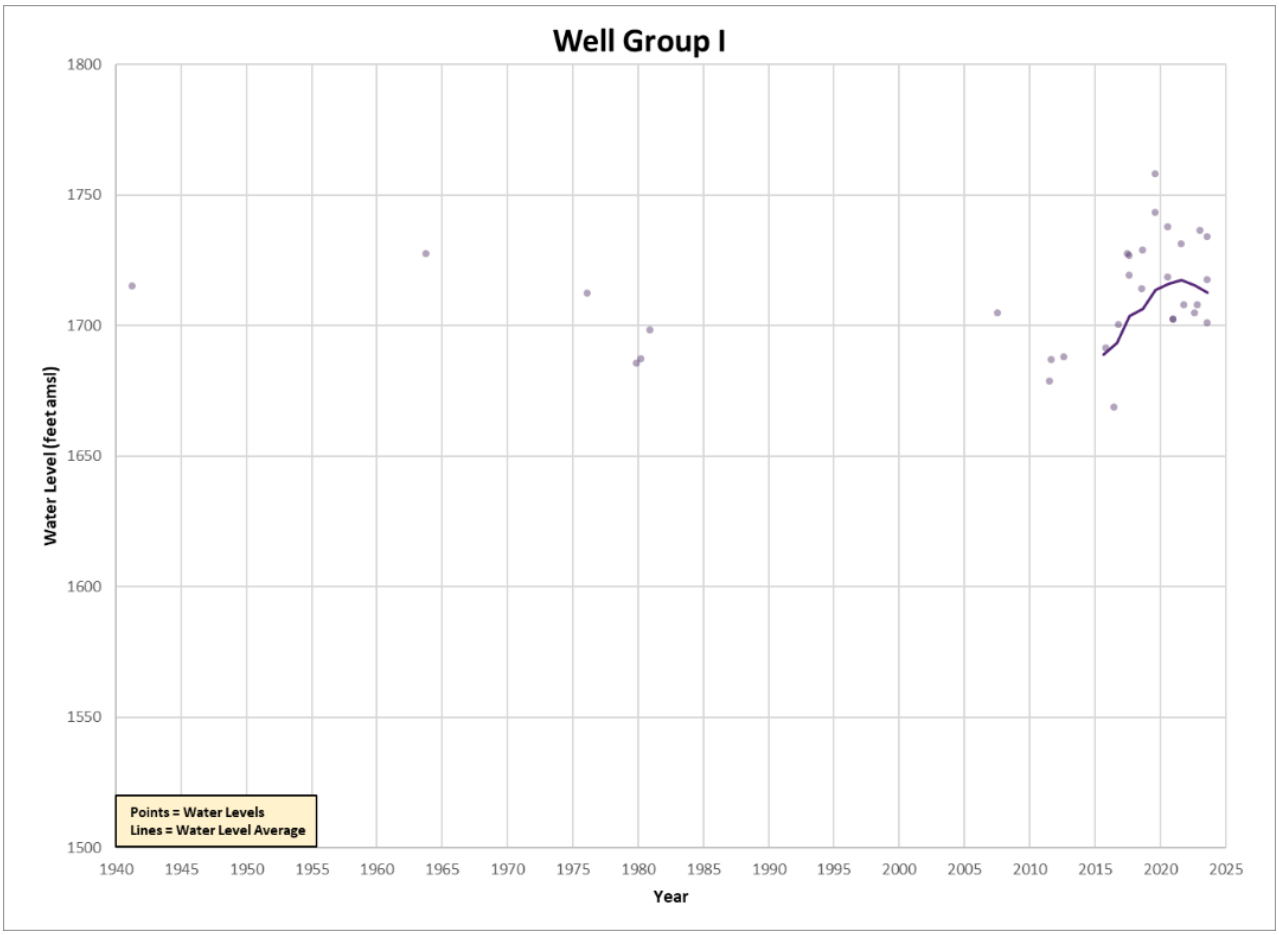


Figure 47: Group I annual high groundwater levels. The line represents the 5-year trailing average for the well group.

J/ Athena Weston Deep

Data are limited in this area, lending uncertainty to this well group. Available data indicate Group I wells penetrate members of the Wanapum Formation, but stratigraphic control is too limited for detailed characterization. Sediments are limited to tens of feet of loess in this area. The hydrographs of these wells show water level declined over 100 feet from 1950 to 2005, then followed a rising trend totaling 30 feet from 2005 to 2024 (Figure 48).

Table 14. Group J Summary

Group J Summary	Minimum	Maximum
CRBG Formations	Wanapum	undifferentiated
Depth to top of basalt	0	20
Groundwater level elevation, February 2024	1610	1640
Link to Group Cross Section	n/a	
Horizontal hydraulic gradient within Group	Insufficient data	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 6151
UMAT 56260
UMAT 54097
UMAT 3092
UMAT 3096
UMAT 3103

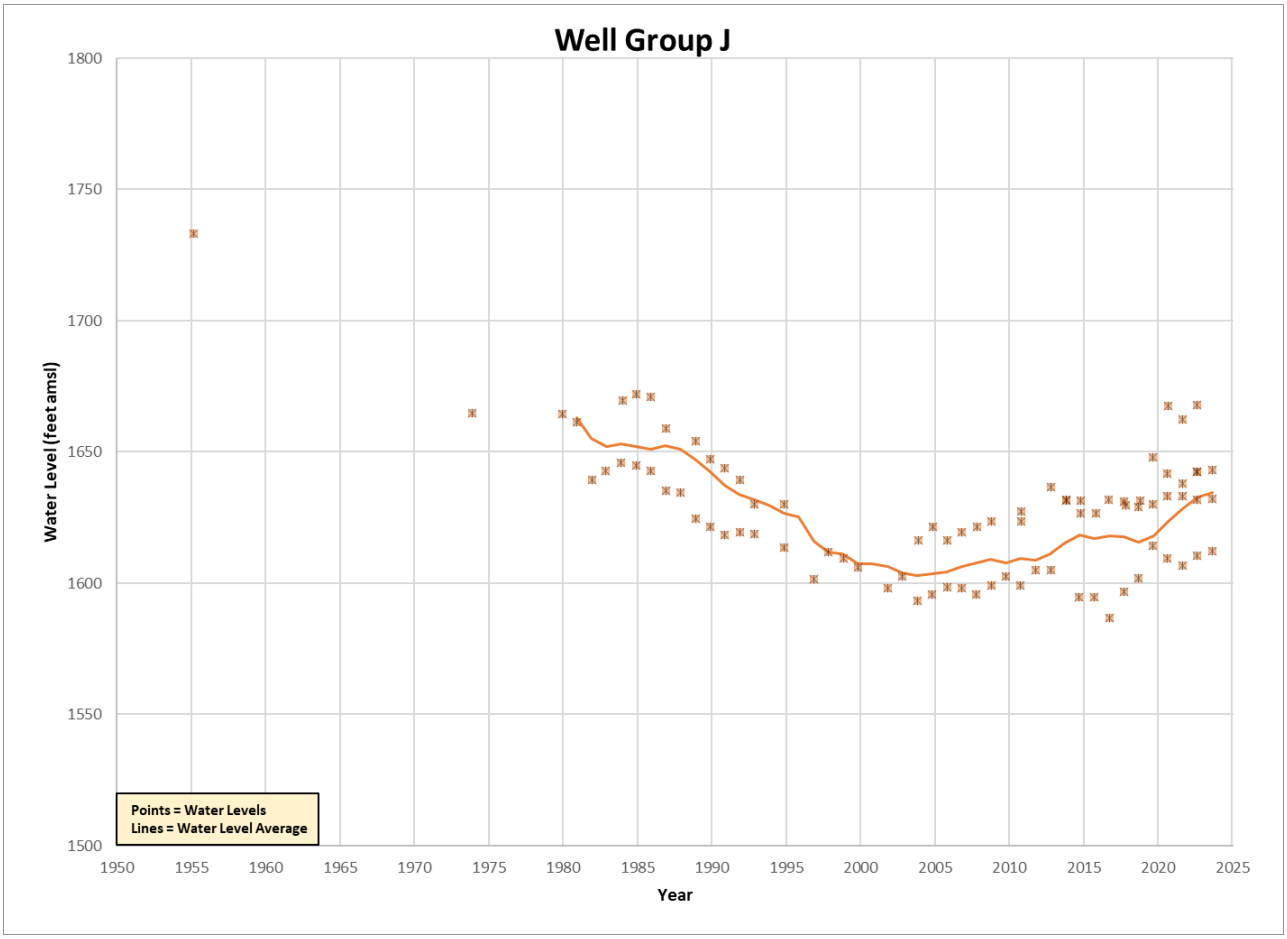


Figure 48: Group J annual high groundwater levels. The line represents the 5-year trailing average for the well group.

K/ North Fork Walla Walla River

Available data indicate Group K wells penetrate members of the Wanapum Formation, but stratigraphic control is too limited for detailed characterization. Sediments are limited to tens of feet of loess in this area. There are less than 10 years of water level data available (Figure 49).

Table 15. Group K Summary

Group K Summary	Minimum	Maximum
CRBG Formations	Grande Ronde	Grande Ronde
Depth to top of basalt	0	10
Groundwater level elevation, February 2024	1445	1470
Link to Group Cross Section	Figure 38	
Horizontal hydraulic gradient within group	0.002	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 5360
UMAT 55053
UMAT 57348
UMAT 57841
UMAT 57946
UMAT 58147
UMAT 58148
UMAT 58161

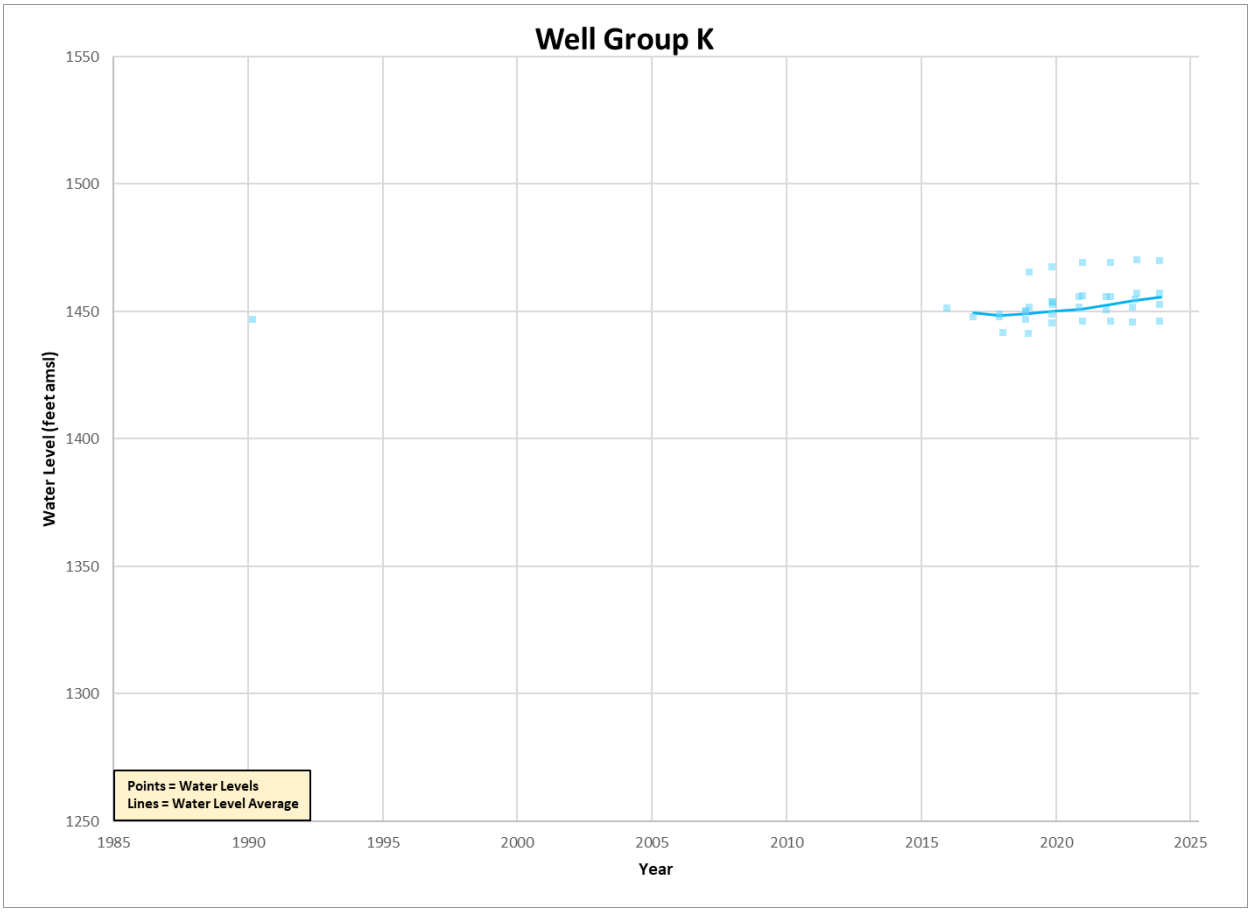


Figure 49: Group K annual high groundwater levels. The line represents the 5-year trailing average for the well group.

M/Cottonwood Creek

Data are limited in this area. Available data indicate Group M wells penetrate members of the Grande Ronde Formation, but stratigraphic control is too limited for detailed characterization. Additionally, data limitations make group findings in the Washington portion of the basin tentative. Further investigation is needed and ongoing to characterize the well groups in Washington, and may reveal new or different well groups or group members. Sediments are

limited to tens of feet of loess in this area. There are less than 15 years of water level data available (Figure 50).

Table 16. Group M Summary

Group M Summary	Minimum	Maximum
CRBG Formations	Grande Ronde	Grande Ronde
Depth to top of basalt	0	20
Groundwater level elevation, February 2024	1550	1625
Link to Group Cross Section	Figure 34	
Horizontal hydraulic gradient within group	0.01	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

STWA 21273
STWA 21551
UMAT 50237
UMAT 56863

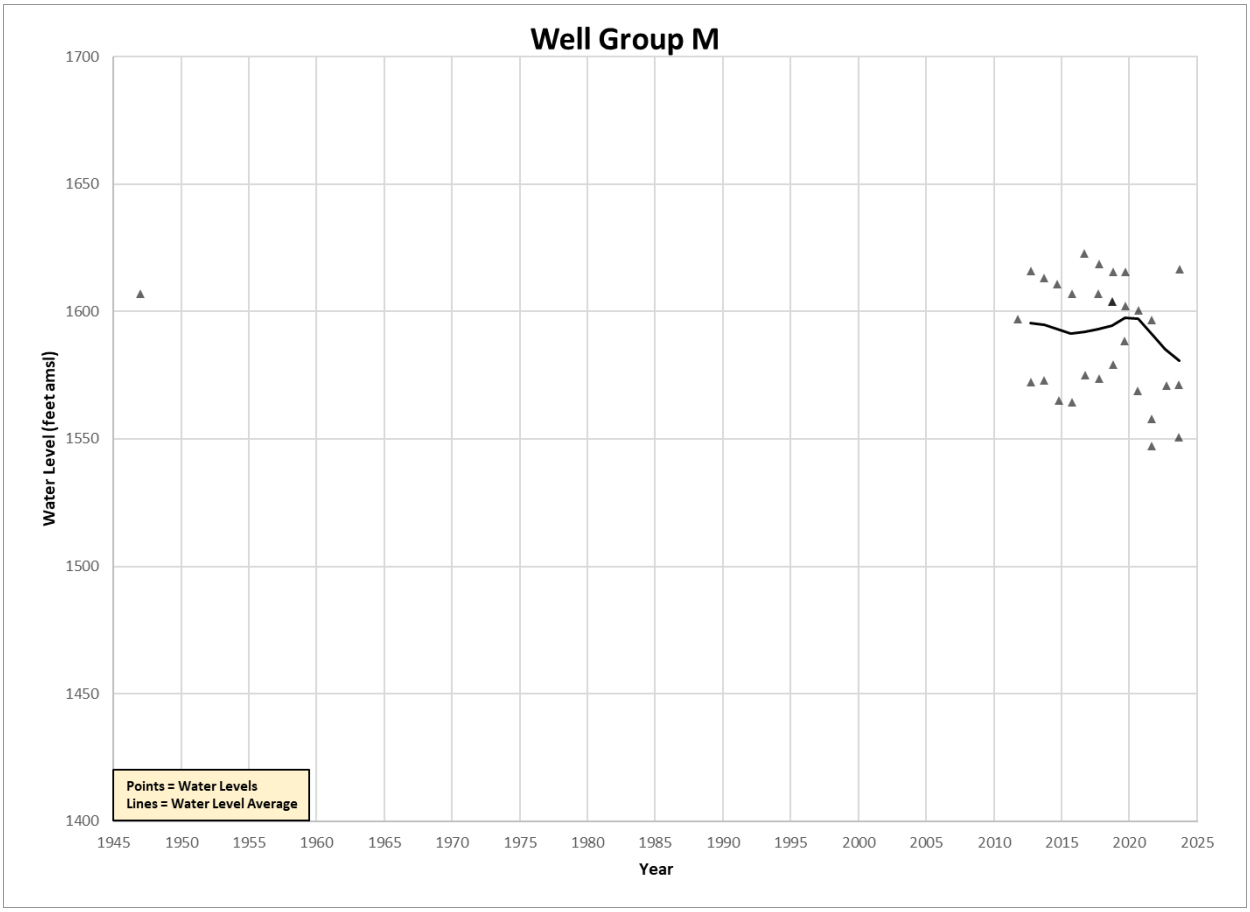


Figure 50: Group M annual high groundwater levels. The line represents the 5-year trailing average for the well group.

N/Mill Creek

Available data indicate Group N wells penetrate members of the Grande Ronde Formation, but stratigraphic control is too limited for detailed characterization. This group is located within or adjacent to the Hite Fault Zone. Wells in this group are located within a narrow portion of the Mill Creek Valley, and flowing artesian as of 2024. Sediments are limited to tens of feet of alluvium in this area. There are approximately 20 years of water level data available, and these data indicate relative stability (Figure 51).

Table 17. Group N Summary

Group N Summary	Minimum	Maximum
CRBG Formations	Grande Ronde	Grande Ronde
Depth to top of basalt	0	50
Groundwater level elevation, February 2024		2240
Link to Group Cross Section	n/a	
Horizontal hydraulic gradient within group	Insufficient data	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 6461
UMAT 55673
UMAT 57843
UMAT 57857

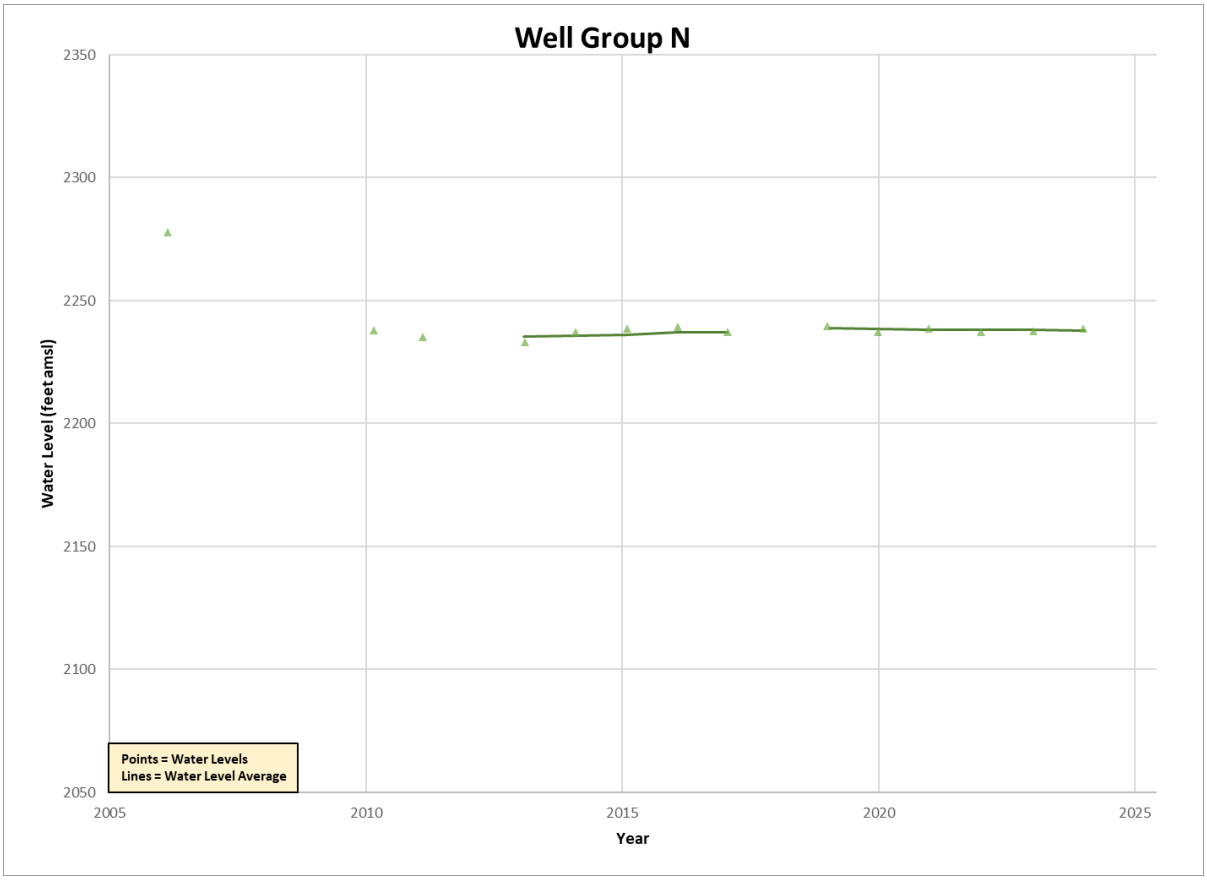


Figure 51: Group N annual high groundwater levels. The line represents the 5-year trailing average for the well group.

P/Walla Walla River Canyon

Available data indicate Group P wells penetrate members of the Wanapum and Grande Ronde Formations (Figure 37: Cross Section G-G' and Figure 38: Cross Section H-H'). This group represents a section of the Walla Walla Valley where CRBG aquifers show water levels changes with depth. Group P lies above a portion of Group D. Depth to the top of the basalt ranges from 25 to 50 feet below the surface. The hydrographs of these wells show water levels have been relatively stable since 1990 (Figure 52).

Table 18. Group P Summary

Group P Summary	Minimum	Maximum
CRBG Formations	Wanapum	Grande Ronde
Depth to top of basalt	25	50
Groundwater level elevation, February 2024		1140
Link to Group Cross Section	Figure 37; Figure 38	
Horizontal hydraulic gradient within group	0.001	

Access well information at the following links to OWRD's Groundwater Information System (GWIS):

UMAT 4021
UMAT 5267
UMAT 50156
UMAT 54285
UMAT 55168
UMAT 57535
UMAT 57552
UMAT 57653

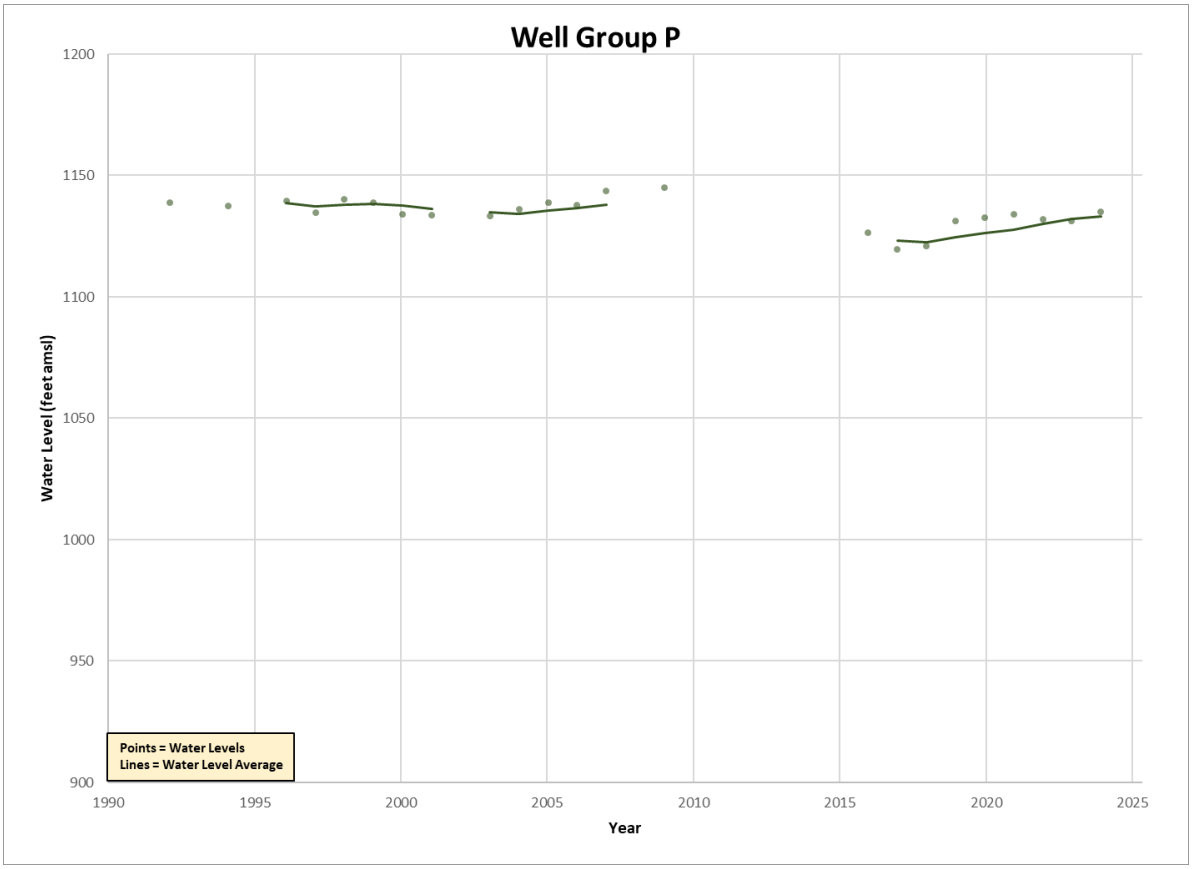


Figure 52: Group P annual high groundwater levels. The line represents the 5-year trailing average for the well group.

Appendix B: Multiple well pumping test summaries

Overview

The following 15 pumping tests were conducted in collaboration with private landowners and municipalities in the Walla Walla River Basin. This appendix provides details for each test including 1) a summary of the wells involved in the test, 2) a map of the test wells indicating which wells responded to pumping, 3) hydrographs showing the water level changes during each test, and 4) a table of the aquifer parameters estimated from drawdown and recovery data. Because each pumping test was designed around the normal operations of well owners, many test variables were less controlled than is traditional in aquifer testing (e.g. pumping rate, length of pumping, access for water level measurements, etc.). Where such variables were appropriately controlled and understood, aquifer parameters were estimated from the drawdown and recovery data collected during these tests. All pumping test data are available for download from OWRD's Groundwater Information System page at https://apps.wrd.state.or.us/apps/gw/gw_info/gw_info_report/gw_search.aspx.

Methods

Water level measurements were recorded by hand in the field and digitized once the test was completed. All water level measurements were entered into OWRD's Pumping test Database within the Groundwater Information System. Those data are available for download. In some instances, water level trends were detected in observation wells prior to the onset of pumping. Those pre-test trends were not removed from drawdown data in this analysis for two reasons. First, pre-test measurement frequency was often too low to make a reliable correction to observed data. Second, detecting interference was the primary purpose of the testing and could still be confirmed without trend correction. (The one exception is the trend removal of UMAT 54034 for Test 12).

PRESSURE RESPONSE IDENTIFICATION

All water level data collected from observation wells were plotted and compared with the onset and cessation of pumping to determine whether there was a measurable pressure response. An observation well was concluded to have measurably responded to the pumping test if it met all of the following criteria:

- the drawdown measured in the observation well is greater than 0,
- the timing of observed drawdown coincides with the onset of pumping and/or the cessation of pumping,
- the observed drawdown does not decrease until at least the cessation of pumping, and
- the observed drawdown trend is distinguishable from any pre-test trends and barometric pressure changes.

In some instances, measurements at observation wells indicated a possible pressure response based on the above criteria, but the response was designated as “indeterminate” because:

- water level measurement(s) error was greater than the magnitude of drawdown, AND/OR
- water level measurement(s) were too few to meet the response criteria above.

AQUIFER PARAMETER ESTIMATION

When an observation well showed a measurable pressure response, the drawdown data were analyzed to estimate transmissivity and storativity. Data were analyzed using AQTESOLV, a software package built to match analytical solutions for aquifer testing to observed data. First, the automatic estimation tool within AQTESOLV was used to match all pumping and recovery data at observation wells. If a semi-log plot or derivative data indicated that conditions of infinite-acting radial flow were encountered, either the Cooper-Jacob (1953) or Theis (1935)-recovery straight line method was visually fit to linear segments of the drawdown data. Straight-line methods were applied to pumping wells where appropriate. For each well with an estimated transmissivity, hydraulic conductivity was calculated using the full open interval value as aquifer thickness. This was done to be consistent with the methods used in the specific capacity and single well testing analyses conducted in this report. Effects of this are discussed in the main body of this report.

Test Result Summaries

Hydraulic results from each individual test are presented in the appendices below. This includes a well summary table, a map of tested wells, an arithmetic-time plot of water level measurements, one or more semi-log plot of drawdowns, and a table of estimated aquifer parameters. The map in Figure 53 shows the determined hydraulic responses with mapped faults in the area. Table 19 summarizes the aquifer parameter ranges estimated from drawdown data in each multiple well pumping test.

There are several important limitations or confounding factors when considering the results presented here. First, the pumping tests presented here were generally shorter than more formal aquifer tests. The median pumping phase here was 9.6 hours, while traditional aquifer tests will pump a well for 1 to10 days to give enough time to characterize boundary conditions or aquifer heterogeneity. Estimated aquifer parameters in this report should be interpreted with the test length in mind, particularly when values of *u* typically do not meet standard values to apply straight line analysis methods. Furthermore, wells that did not show a measurable response may have eventually shown drawdown if the pumping phase had continued long enough.

Table 19. Summary of hydraulic parameter ranges from multiple well pumping tests conducted by OWRD staff.

Pumping Well	Test No.	Date*	Observation Wells	Discharge (GPM)	Duration (hours)	Transmissivity (feet^2/day)	Storativity	Hydraulic Conductivity (feet/day)
UMAT 4179	1	3/14/2017	9	200-350	28	220-6300	0.0001-0.0004	6-140
UMAT 50939	2	3/15/2017	1	1400	1.3	7800-12500	0.0004	10-625
UMAT 3899	3	4/6/2017	4	700	10	NA	NA	NA
UMAT 50939	4	3/8/2018	12	1600	21.2	8080-171600	0.004-0.0003	13-520
UMAT 5530				1250	15.2			
UMAT 4864	5	3/13/2018	4	800	5.4	1100	NA	14
UMAT 54464	6	3/20/2018	9	1100	7.4	3920-23800	0.0015	15-290
UMAT 6283	7	3/22/2018	9	1500	6.3	3670-26660	0.007-0.0005	8-1160
UMAT 3909	8	9/11/2018	4	1000	20.8	6100-53100	0.013-0.009	21-127
UMAT 3962	9	1/8/2019	4	700	9.6	1000	NA	1.0
UMAT 3961				1450	5.9			
UMAT 3929	10	1/9/2019	2	725	21	8900-28200	0.002-0.003	13-124
UMAT 57710	11	12/13/2022	6	275	11	75	NA	0.2
UMAT 50183	12	12/14/2022	6	350	15.8	630	0.0004	0.5-1
UMAT 58119	13	3/1/2018	4	1600	2.3	50-430	0.0002-0.000006	21-780
UMAT 58119	14	3/19/2018	4	400-500	2	4800-31800	0.0001-0.00008	11 to 75
UMAT 58119	15	3/22/2018	4	1000	7.1	2200-24300	0.0004-0.00004	5-600

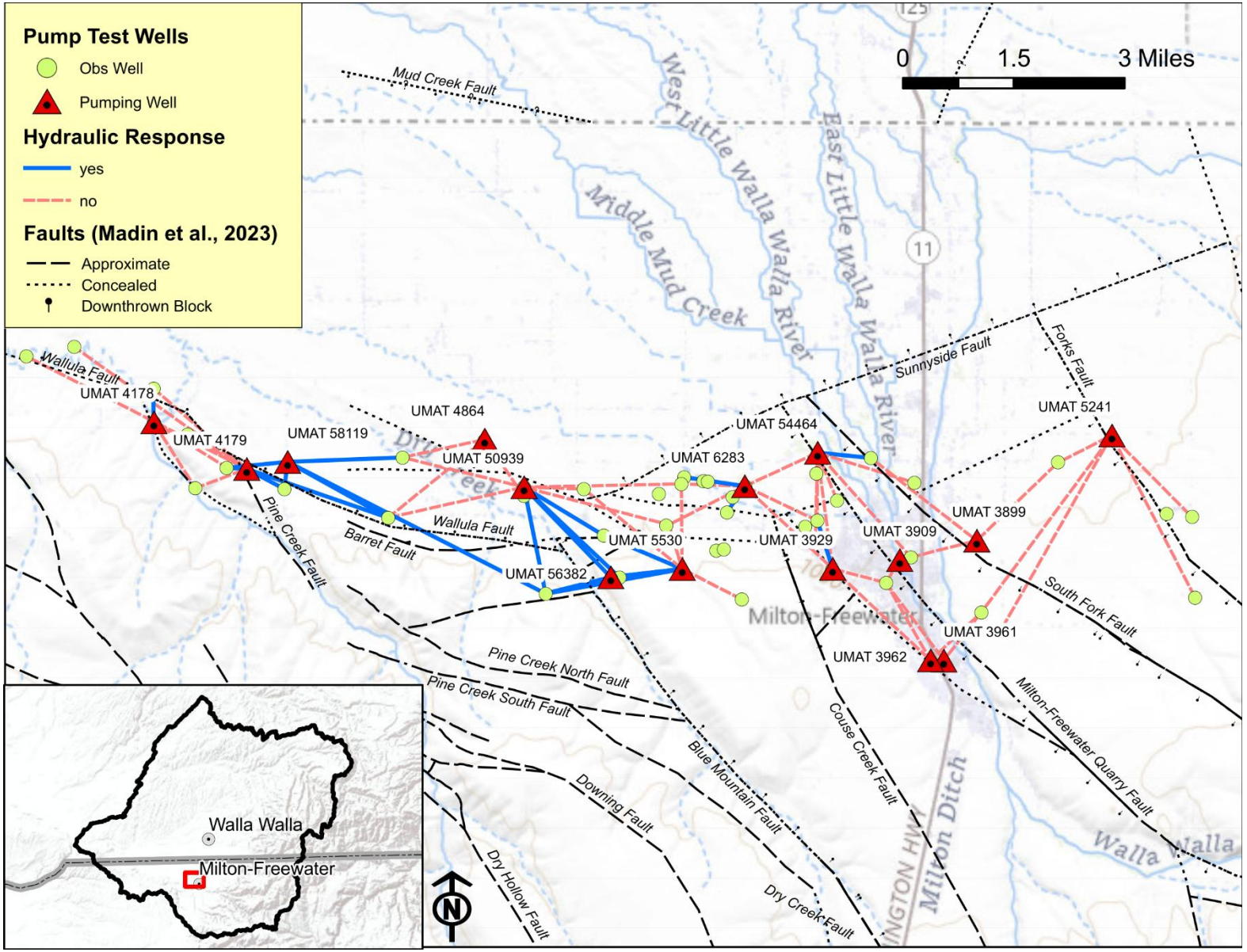


Figure 53. All multiple-well pumping tests conducted by OWRD staff.

OWRD Test 1

Date: 3/14/2017 **Pumping Well**: UMAT 4179
Duration: 28 hours **Pumping Rate**: 200-350 GPM
Note: OWRD staff were unable to be present through the end of the pumping phase, so data is only available during the drawdown phase. Data collection continued for 28 hours but pumping continued after that. The pumping rate was estimated by counting sprinklers.

Table 20. Test 1 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 4179	Pumping	Transducer	0	227	512 to 547	Twfsl	Yes
UMAT 4180	Observation	E-tape	1005	452	332 to 766	QTcg, Twfsl, Twfh, Tgs	Yes
UMAT 4184	Observation	E-tape	2125	300	453 to 498	Tsu	Yes
UMAT 4173	Observation	Transducer	2725	375	338 to 694	Twfh, Twfg, Tgs	No
UMAT 4177	Observation	Transducer	3400	476	228 to 614	Twfh, Tgs	No
UMAT 4178	Observation	Transducer	5165	702	-40 to 602	Tsu, Twfsl, Twfsh, Twfh, Tgs	No
UMAT 53567	Observation	E-tape	6115	660	-17 to 327	Twfsl, Twfh, Tgs	No
UMAT 3958	Observation	Transducer	7450	625	173 to 596	Twfsl, Twfh	Yes
UMAT 4166	Observation	E-tape	10510	1105	-476 to 132	Unknown	No
UMAT 53529	Observation	E-tape	12305	501	137 to 440, 480 to 578	Unknown	No

Abbreviations: **QTcg**: conglomerate; **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfsh**: Basalt of Sentinel Gap, high-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; Twfh: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation

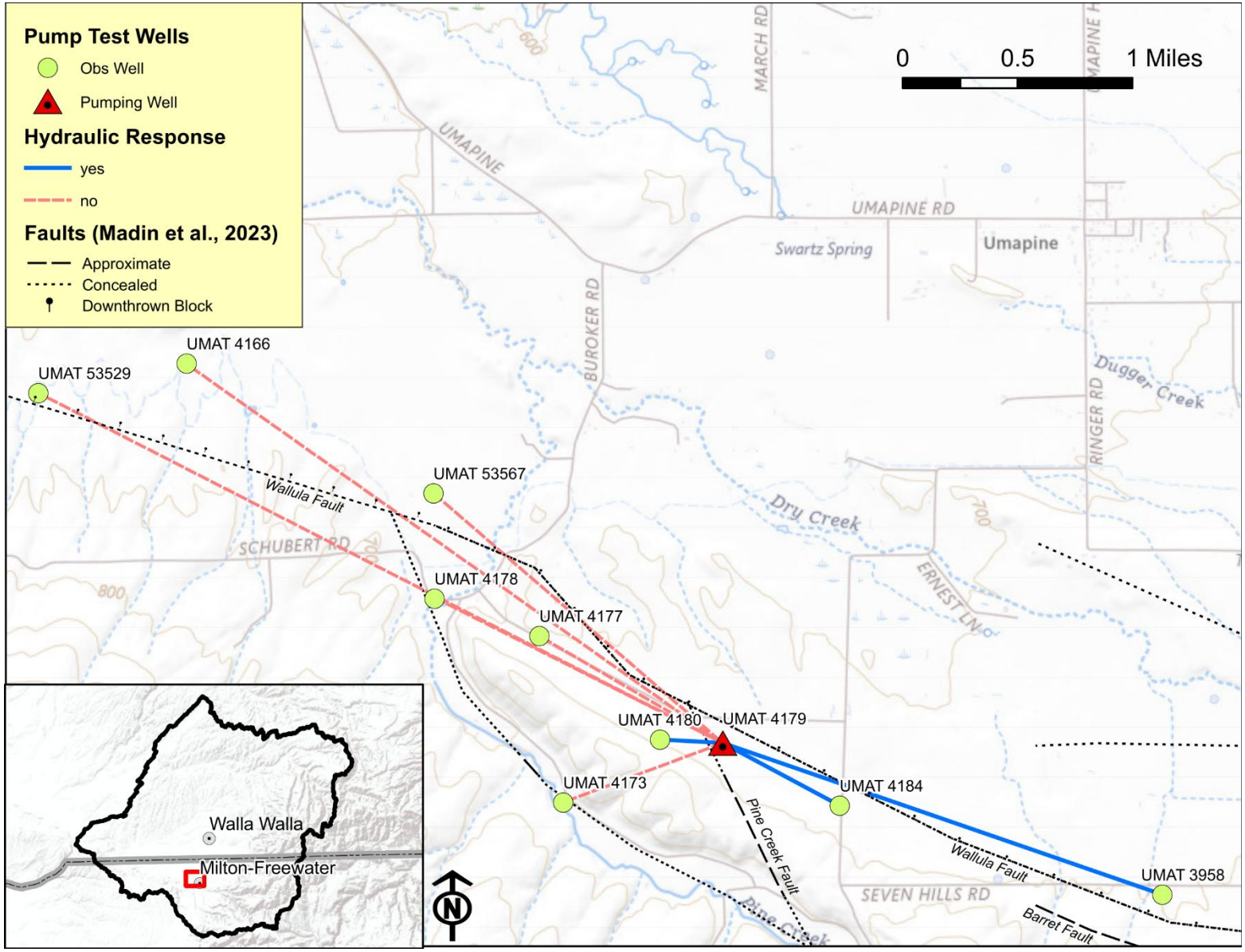


Figure 54: Map of wells Measured During Pumping Test 1

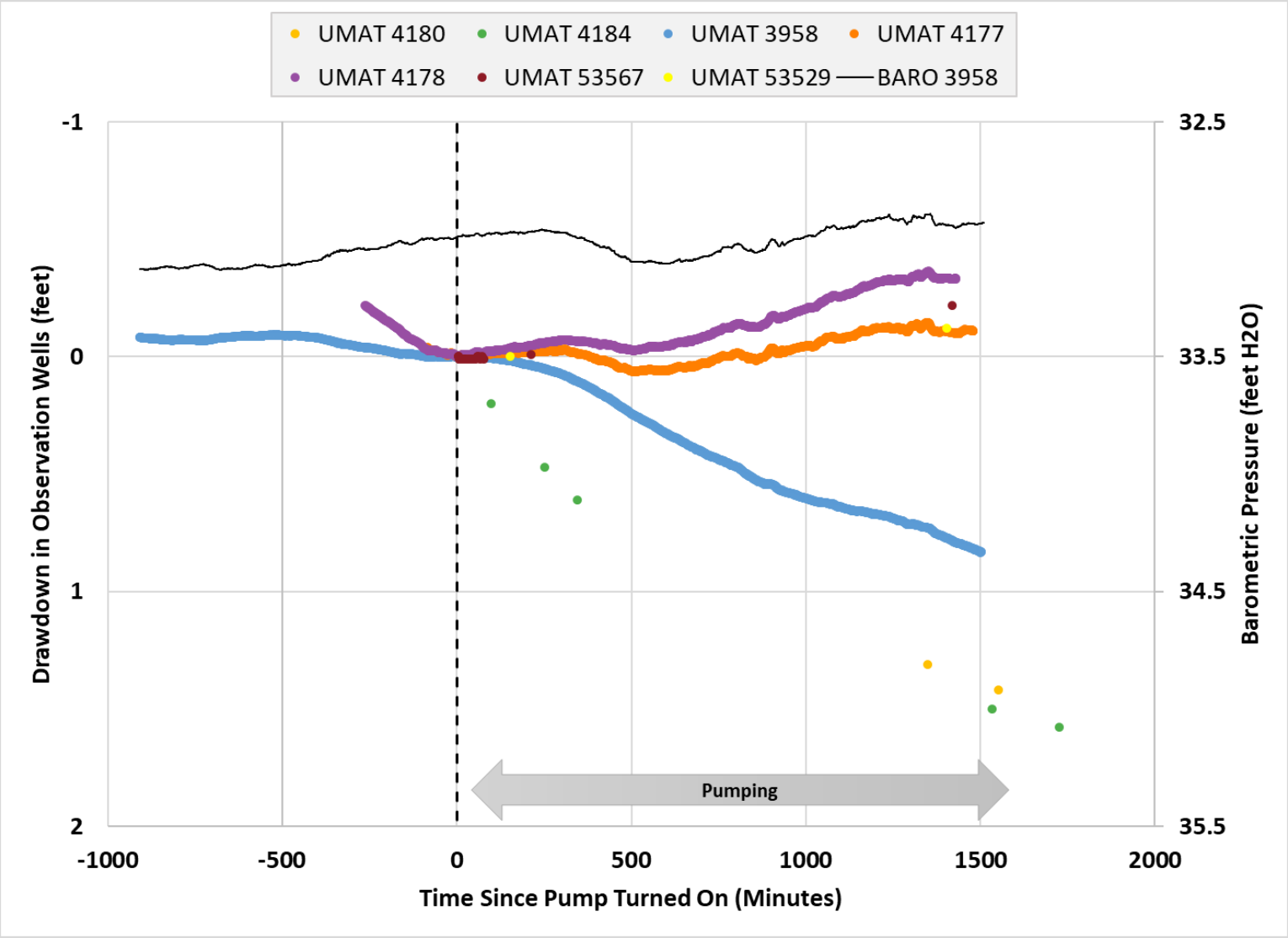


Figure 55: Water level changes at observation wells in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

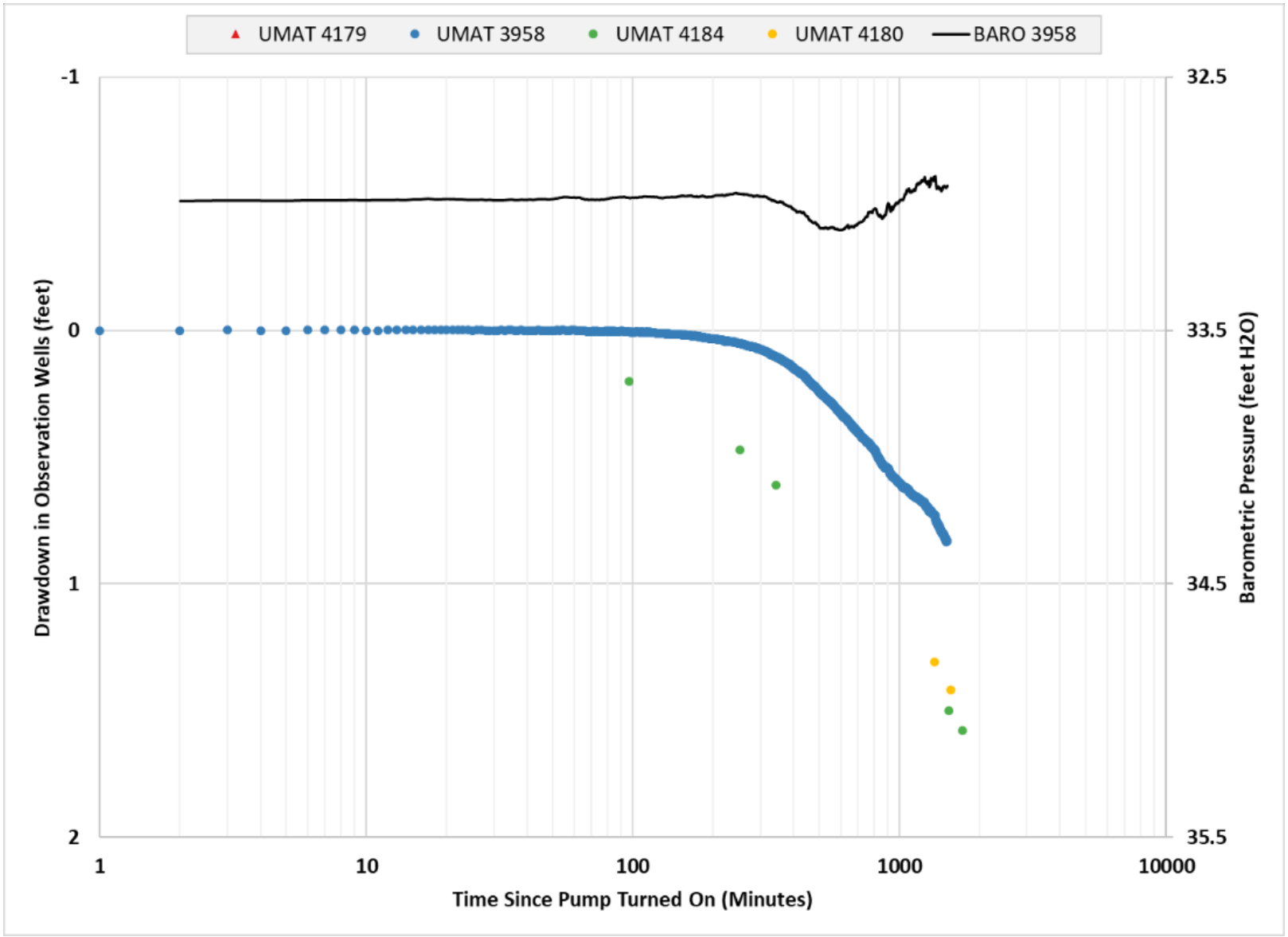


Figure 56: Semi-log plot of observation wells during drawdown phase of Test 1.

Table 21. Test 1 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft)	Hydraulic Conductivity (ft/d)
UMAT 4179	135	Straight Line	Pumping Late	220	-	35	6
UMAT 4184	1.5	Theis	Pumping	6300	0.0004	45	140
UMAT 3958	0.8	Theis	Pumping	4870	0.0001	423	12

OWRD Test 2

Date: 3/15/2017 **Pumping Well**: UMAT 50939
Duration: 1.3 hours **Pumping Rate**: 1400 GPM
Note: OWRD staff were only on site for a limited time. Interference between these wells was documented for a longer interval in 2018. Pumping rate was estimated with the well owner's flowmeter. Interpretation of the estimated aquifer parameters should take the short duration of measurements into consideration.

Table 22. Test 2 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 50939	Pumping	Airline	0	1160	-315 to 491	Twfsl, Twfh, Tgs	Yes
UMAT 55959	Observation	E-tape	430	370	488 to 508	Twfsl	Yes

Abbreviations: **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation

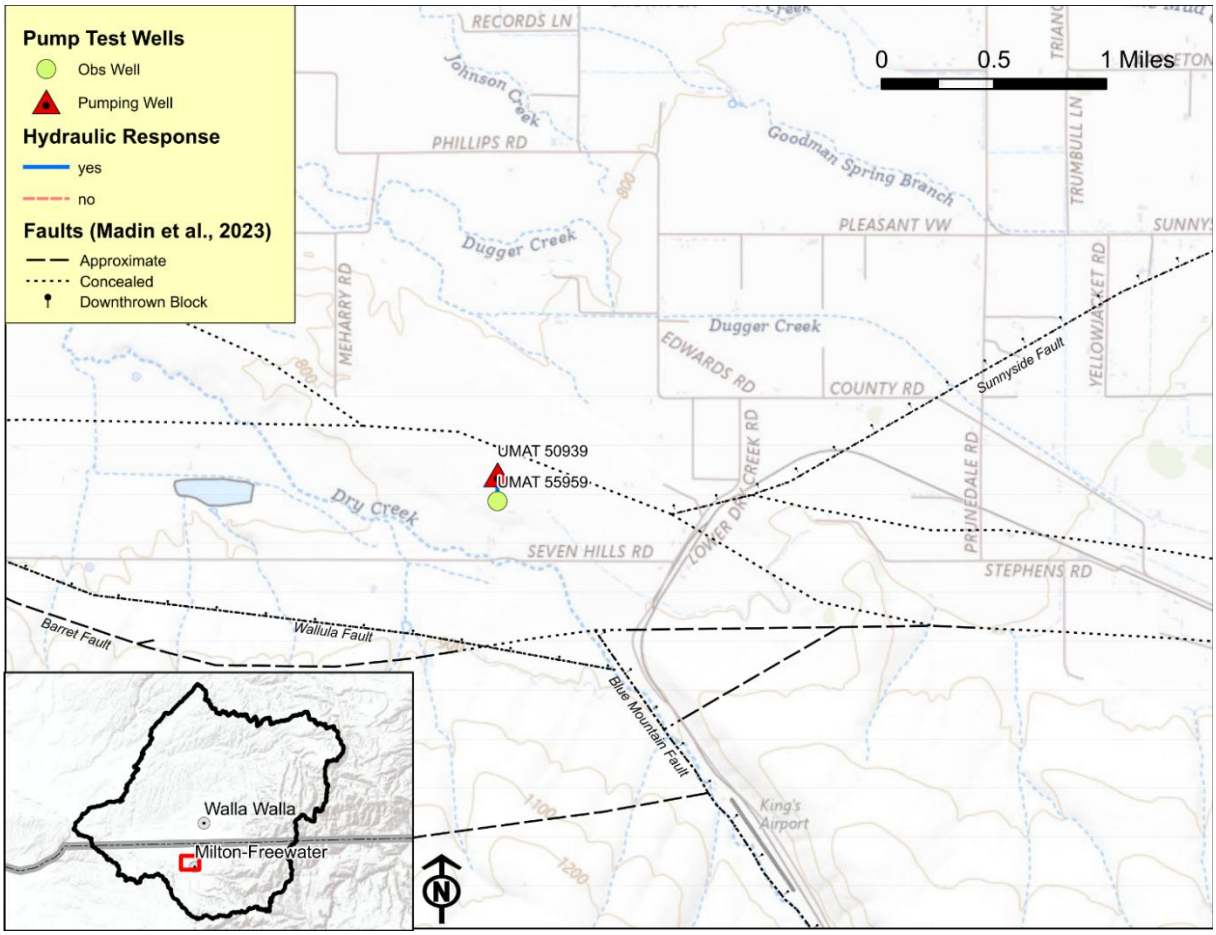


Figure 57: Map of Wells Measured During Pumping Test 2

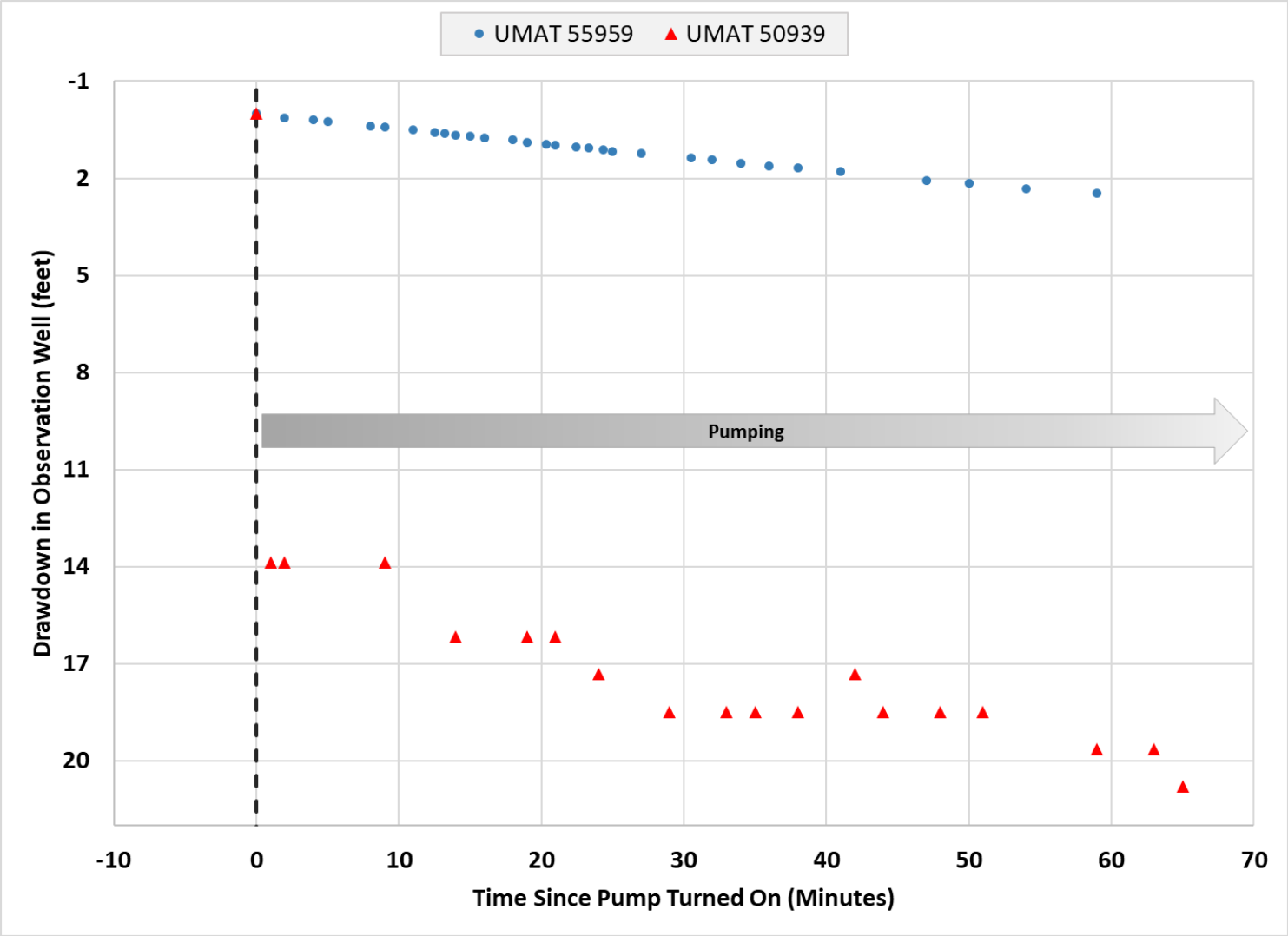


Figure 58: Test 2 water level changes in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

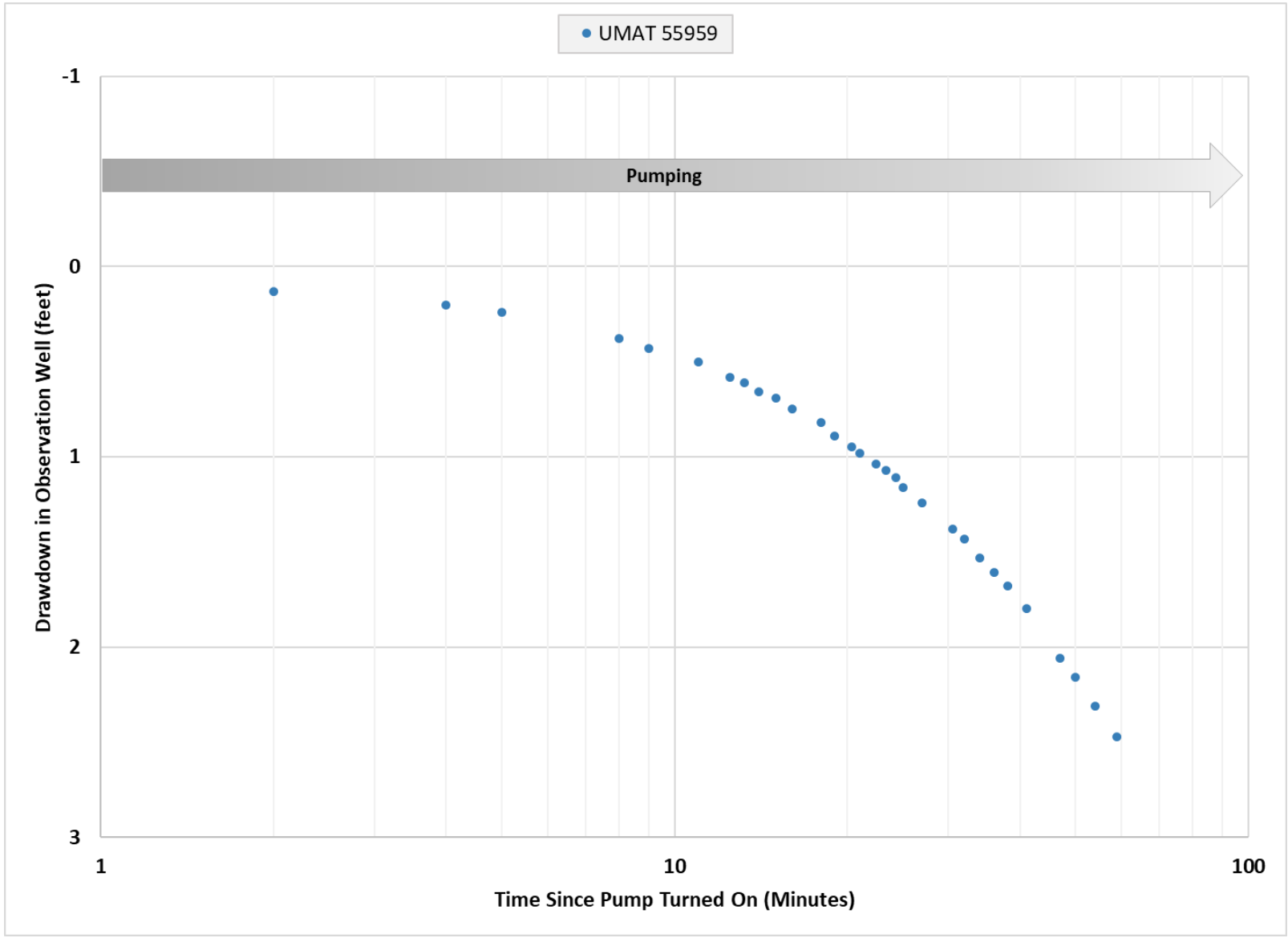


Figure 59: Drawdown in Observation Wells During Pumping Phase of Test 2

Table 23. Test 2 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 50939	135	Straight Line	Early Pumping	7800	-	806	10
UMAT 55959	1.5	Theis	Early Pumping	12500	0.0004	20	625

OWRD Test 3

Date: 4/6/2017
Duration: 10 hours
Pumping Well: UMAT 3899
Pumping Rate: 700 GPM

Notes: The pumping rate for this test was estimated by the farm manager counting sprinklers. There was no measurable pressure response to pumping at UMAT 3899. Aquifer parameters could not be estimated.

Table 24. Test 3 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Feet from Pumped Well	Depth	Open Interval Elevation	Stratigraphic Unit(s)	Measurable Response
UMAT 3899	Pumping	No access	0	660	373 to 677	Tsu, Twsh, Tgsmu	-
UMAT 3908	Observation	E-tape	3375	528	479 to 898	Twfh, Twlg, Tgsmu	No
UMAT 5227	Observation	Transducer	5540	717	248 to 495	Twfh, Tgsmu	No
UMAT 55253	Observation	E-tape	6672	420	526 to 608, 626 to 928	Qa, QTcg, QTsc, Tslm, Tsi	No
UMAT 57672	Observation	E-tape	3590	817	319 to 580	Tgsmu, Tgsmc, Tgww	Indeterminate

Abbreviations: **Qa:** Alluvium; **QTcg**: conglomerate; **QTsc**: sandstone and clay; **Tslm**: Lower Monumental Member of Saddle Mountains Formation; **Tsi**: Ice Harbor Member of Saddle Mountains Formation; **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twsh:** Basalt of Sentinel Gap, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Tgsmu**: Sentinel Bluffs Member, basalt of Museum, Grande Ronde Formation; **Tgsmc**: Sentinel Bluffs Member, basalt of McCoy Canyon, Grande Ronde Formation **Tgww**: Winter Water Member, Grande Ronde Formation

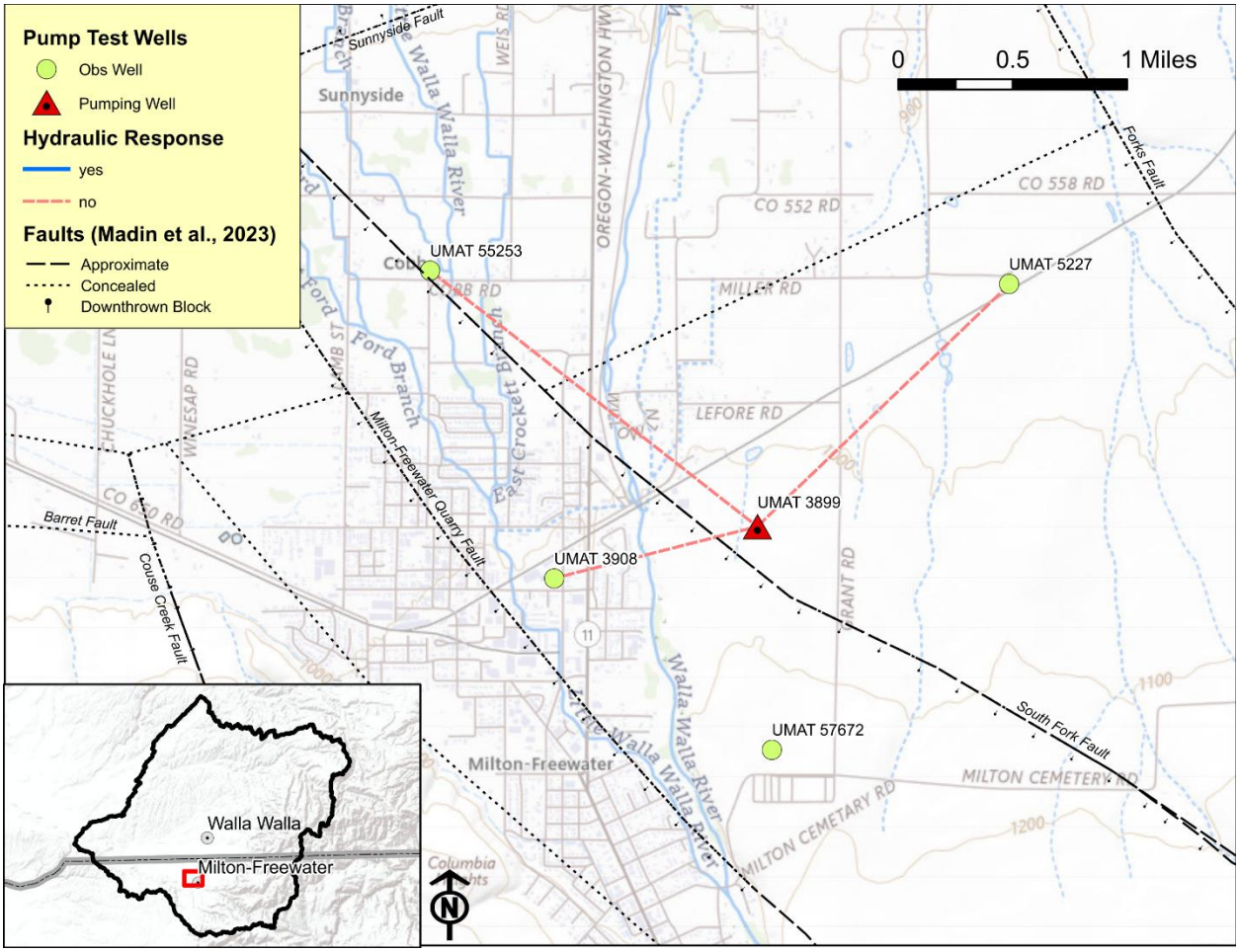


Figure 60: Map of Wells Measured During Pumping Test 3

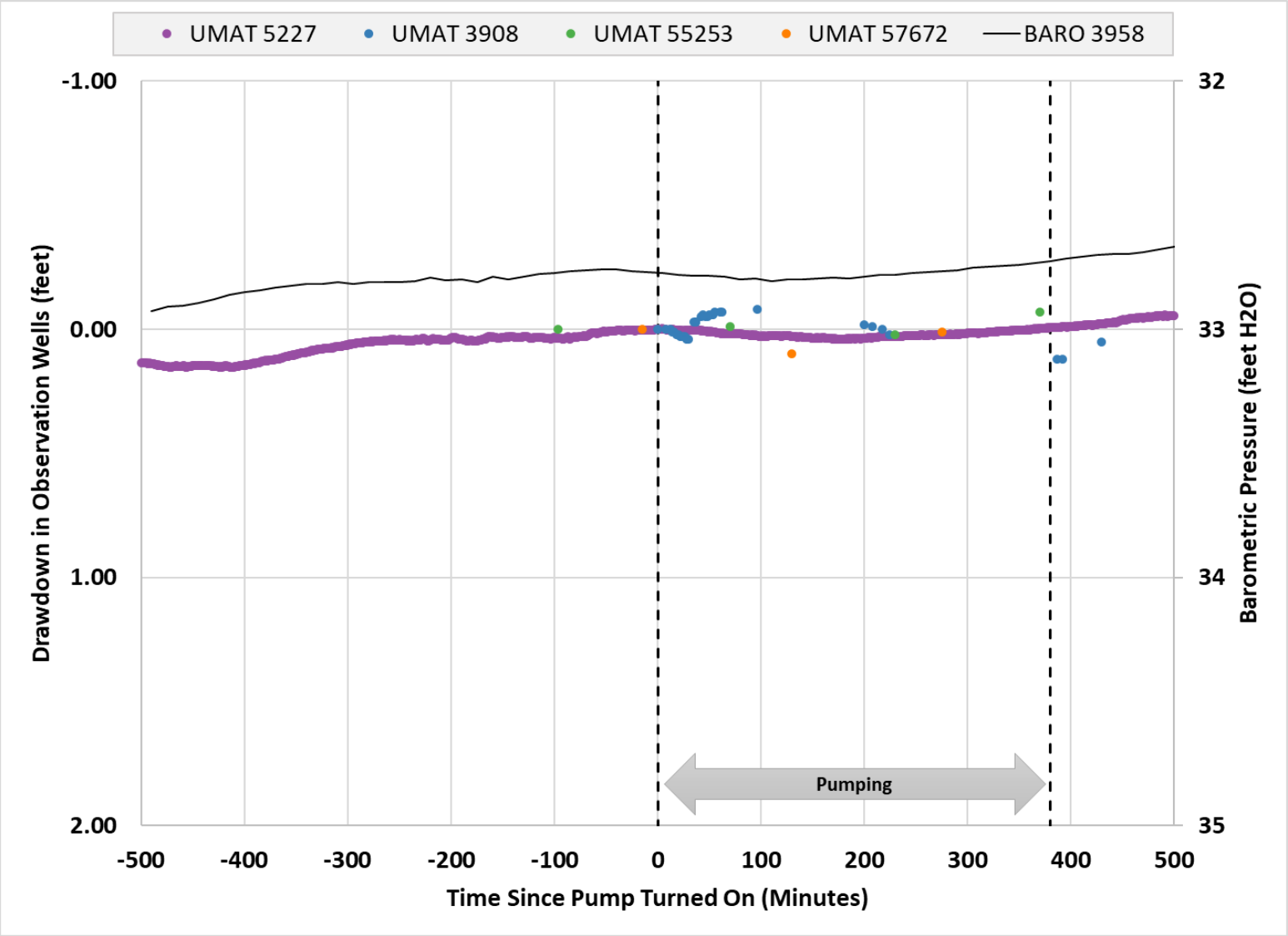


Figure 61: Test 3 water level changes in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

OWRD Test 4

Date: 3/8/2018 **Duration**: 21.2 hours & 15.2 hours
Pumping Wells: UMAT 50939 **Pumping Rate**: 1600 gpm (UMAT 50939)
UMAT 5530 1250 gpm (UMAT 5530)
Notes: UMAT 50939 began pumping at 9:32 AM on 3/8/2018. UMAT 5530 began pumping at 3:22 PM. Both wells pumped until 6:45 AM the following morning when they were stopped simultaneously. Each well was needed for farm operations, but the onset of pumping was staggered so that individual pumping effects could be distinguished.

Table 25. Test 4 Well Summary

OWRD LOGID	Test Roll	Msmt. Type	Feet from UMAT 50939	Feet from UMAT 5530	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 5530	Pumping	Airline	8858	NA	1102	-74 to 526	Twfh, Twfg, Tgs	NA
UMAT 50939	Pumping	Airline	NA	8858	1166	-315 to 491	Twfsl, Twfh, Tgs	NA
UMAT 3958	Observation	Transducer	6923	14910	625	173 to 596	Twfsl, Twfh	No
UMAT 4849	Observation	Transducer	6223	15000	970	-222 to 0, 109 to 378	Twfsl, Twfh	No
UMAT 4864	Observation	Airline	3070	11768	715	98 to 178	Twfsl	Indeterminate
UMAT 4899	Observation	Transducer	7835	4220	442	438 to 862	Unknown	No
UMAT 50516	Observation	Transducer	4630	4250	1109	-201 to 202	Tgsmu, Tgsmc	Indeterminate
UMAT 55523	Observation	Transducer	6536	3150	1035	526 to 608, 626 to 928	Twfsl, Twfsh, Twfh, Twfg, Tgs	Yes
UMAT 55526	Observation	Transducer	12190	3330	1040	75 to 620, 933 to 935	Twfsh, Twfh, Twfg, Twlg, Tgs, Tgww	No
UMAT 55959	Observation	E-Tape	430	8692	370	488 to 508	Twfsl	Yes
UMAT 56382	Observation	Transducer	6213	3580	1056	39 to 635	Twfh, Twfg, Tgs	Yes
UMAT 57714	Observation	Transducer	5393	6906	1160	-113 to 354	Tgs, Tgww	Yes
UMAT 57860	Observation	Transducer	2985	6295	680	148 to 748	Unknown	No
UMAT 56287	Observation	Transducer	7305	2289	340	545 to 884	Unknown	No

Abbreviations: **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfsh**: Basalt of Sentinel Gap, high-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Twfg**: Basalt of Ginkgo, Frenchman Springs Member, Wanapum Formation; **Twlg**: Lookingglass Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation; **Tgsmu**: Sentinel Bluffs Member, basalt of Museum, Grande Ronde Formation; **Tgsmc**: Sentinel Bluffs Member, basalt of McCoy Canyon, Grande Ronde Formation
Tgww: Winter Water Member, Grande Ronde Formation

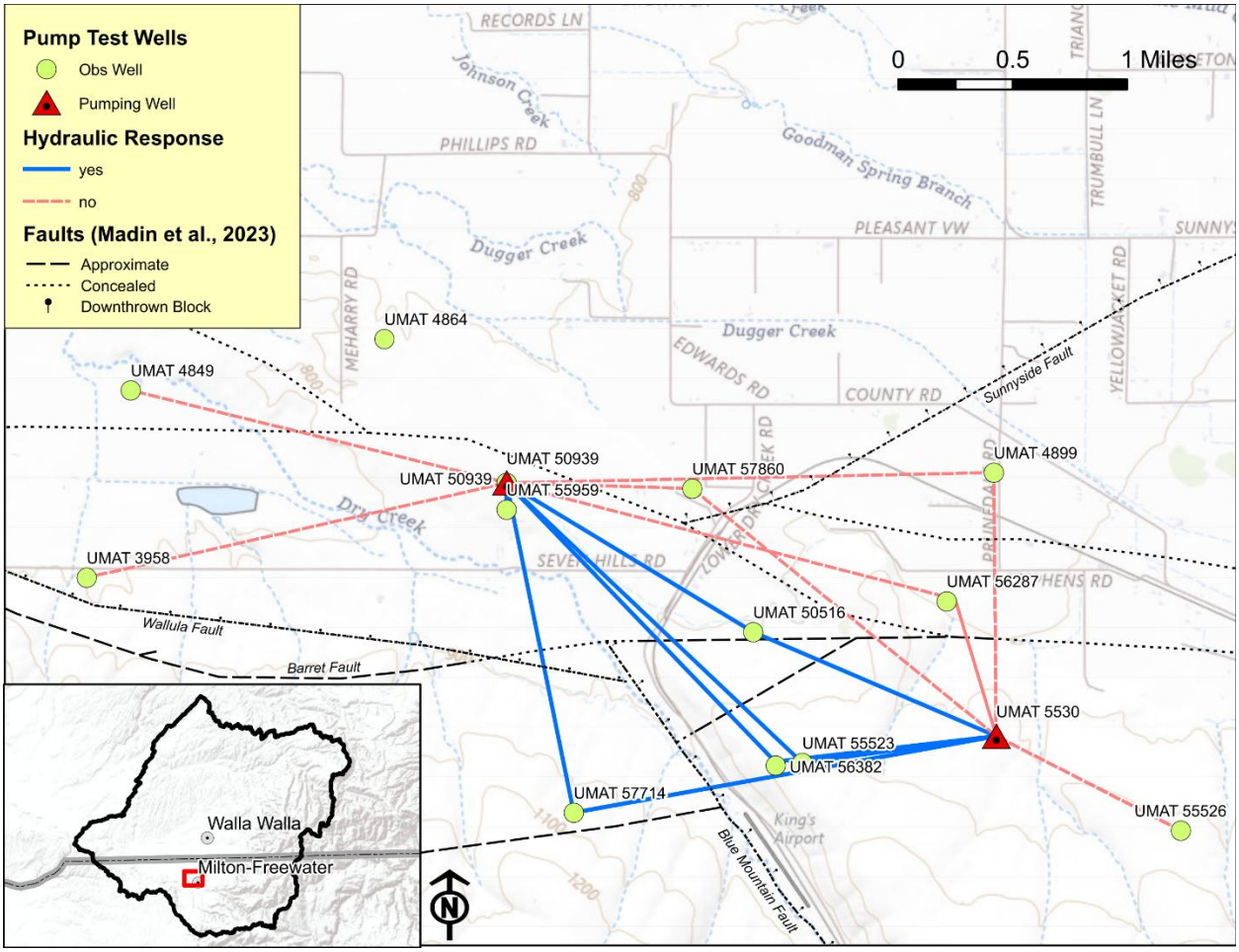


Figure 62: Map of Wells Measured During Pumping Test 4

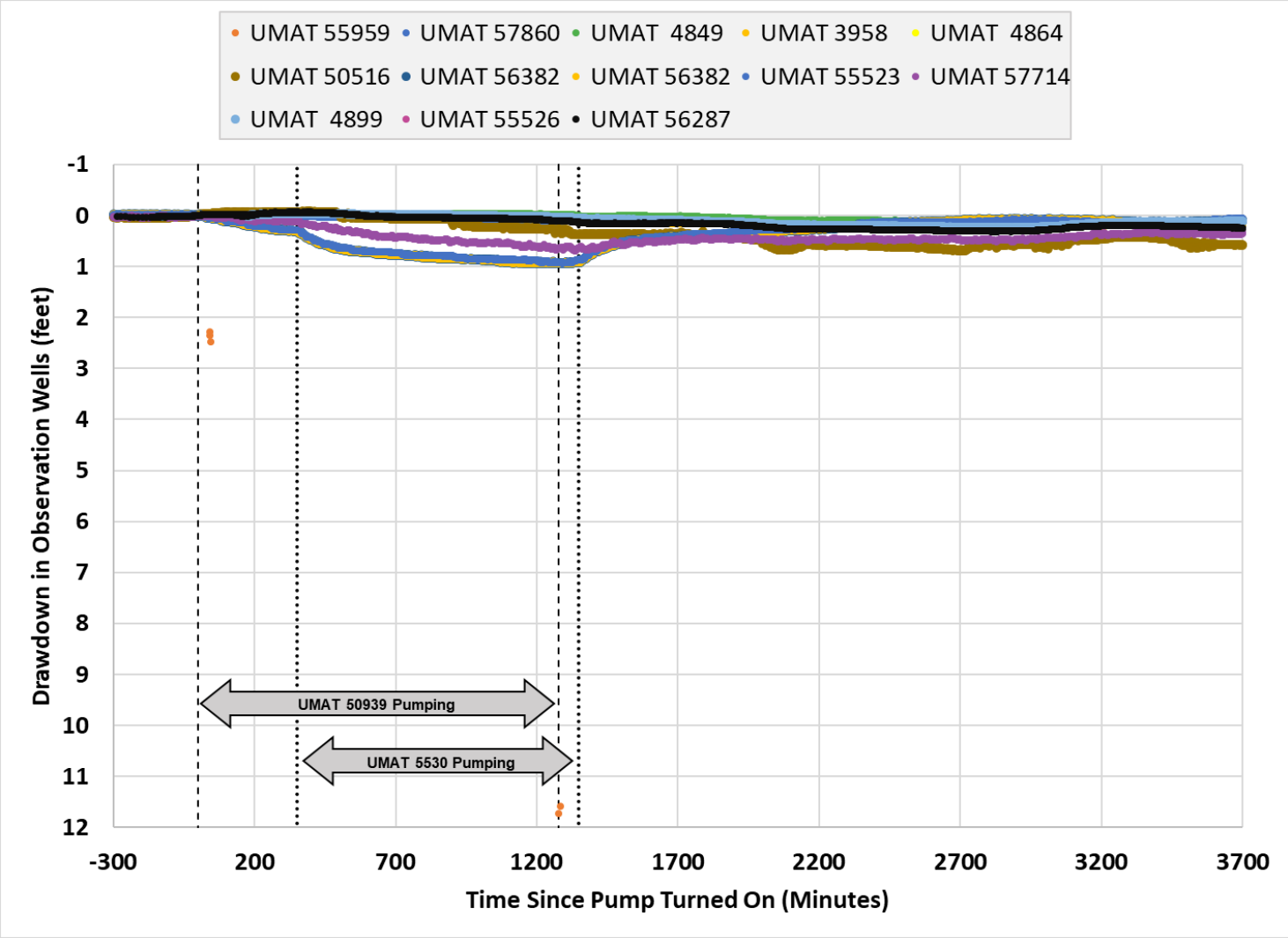
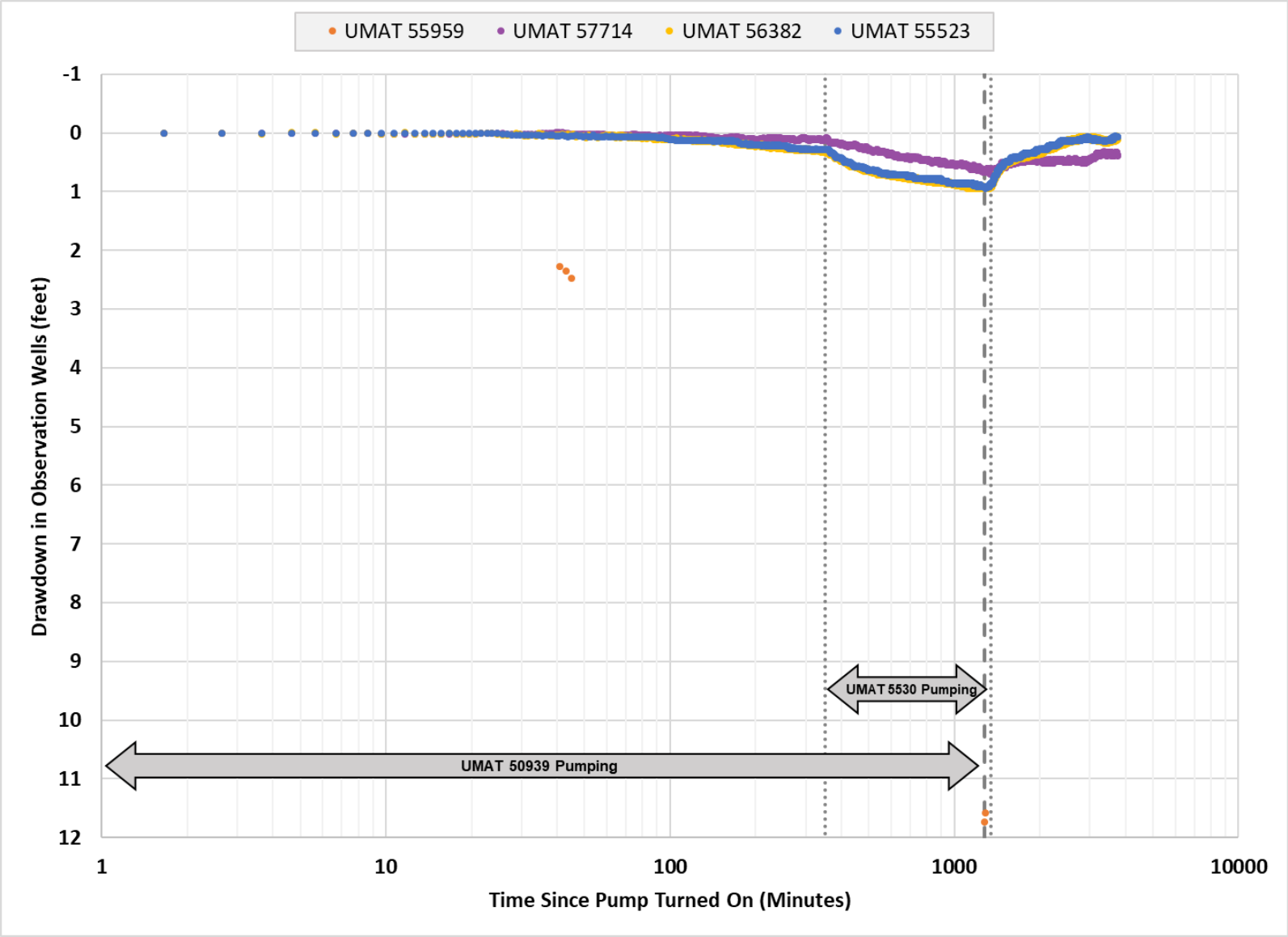


Figure 63: Test 4 water level changes in arithmetic time



Appendix Figure 4.3 Drawdown in Observation Wells During Pumping Phase of Test 4

Table 26. Test 4 Aquifer Parameter Estimation

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 50939	30	Straight Line	Pumping	10080	NA	806	13
UMAT 50516	0.26	Theis	Pumping & Recovery	20050	0.004	403	50
UMAT 55523	0.92	Theis	Pumping & Recovery	153200	0.0004	330	464
UMAT 56382	0.92	Theis	Pumping & Recovery	144000	0.0004	416	346
UMAT 57714	0.68	Theis	Pumping & Recovery	81220	0.001	467	174
UMAT 55959	11.73	Theis	Pumping & Recovery	8080	0.002	20	404
UMAT 56382	0.92	Straight Line	Pumping-Mid	152200	0.0003	416	365
UMAT 55523	0.92	Straight Line	Pumping-Mid	171600	0.0003	330	520

OWRD Test 5:
Date: 3/13/2018 **Pumping Well**: UMAT 4864
Duration: 5.4 hours **Pumping Rate**: 800 gpm
Note: There are manual measurements available for this test. The drawdown observed in UMAT 3958 is interpreted as responding to pumping at another well.

Table 27. Test 5 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 4864	Pumping	Airline	0	715	98 to 178	Twfsl	N/A
UMAT 50939	Observation	Airline	3070	1166	-315 to 491	Twfsl, Twfh, Tgs	Indeterminate
UMAT 55959	Observation	E-Tape	3410	370	134 to 681	Twfsl	No
UMAT 4849	Observation	Transducer	4180	970	-222 to 0, 109 to 378	Twfsl, Twfh	No
UMAT 3958	Observation	Transducer	6170	625	173 to 596	Twfsl, Twfh	No

Abbreviations: **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation

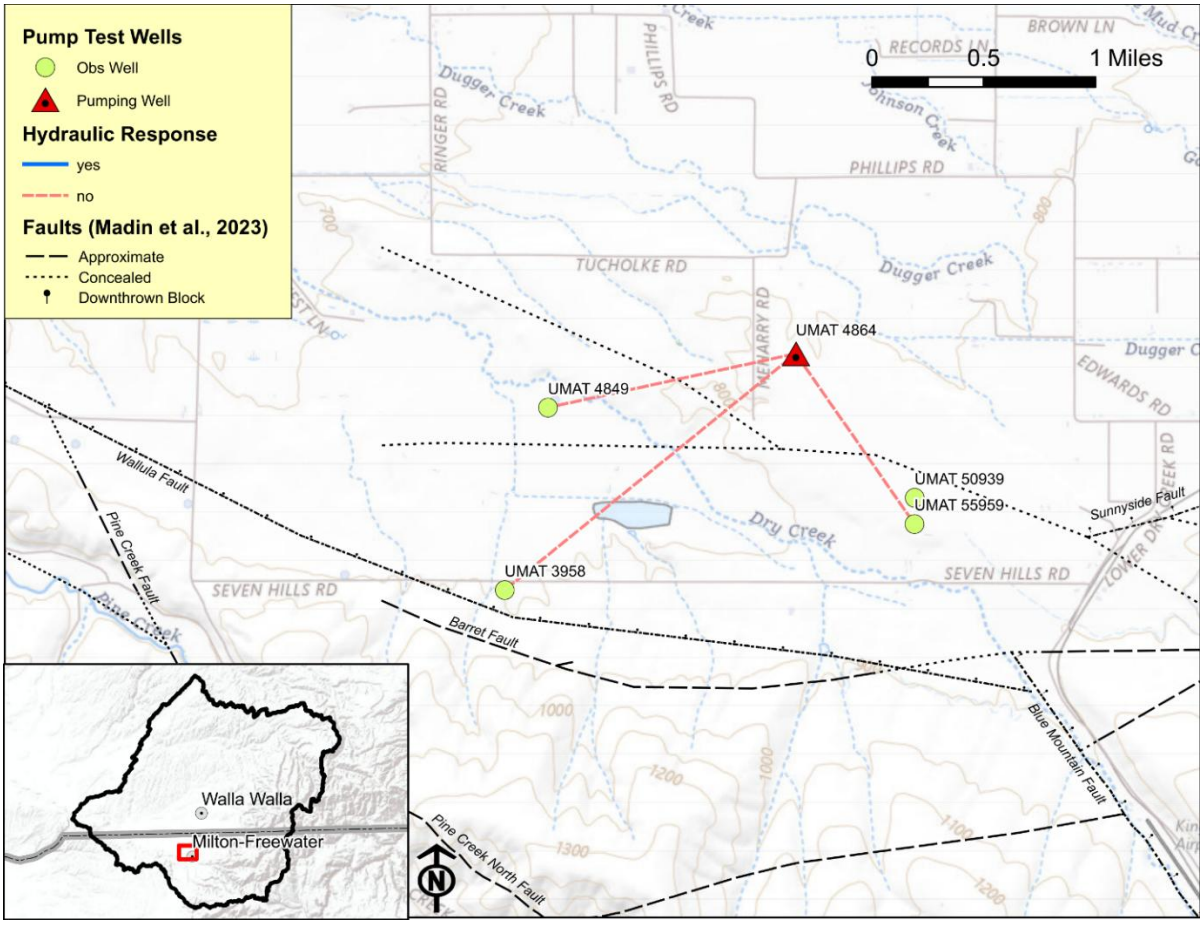


Figure 64: Map of Wells Measured During Pumping Test 5

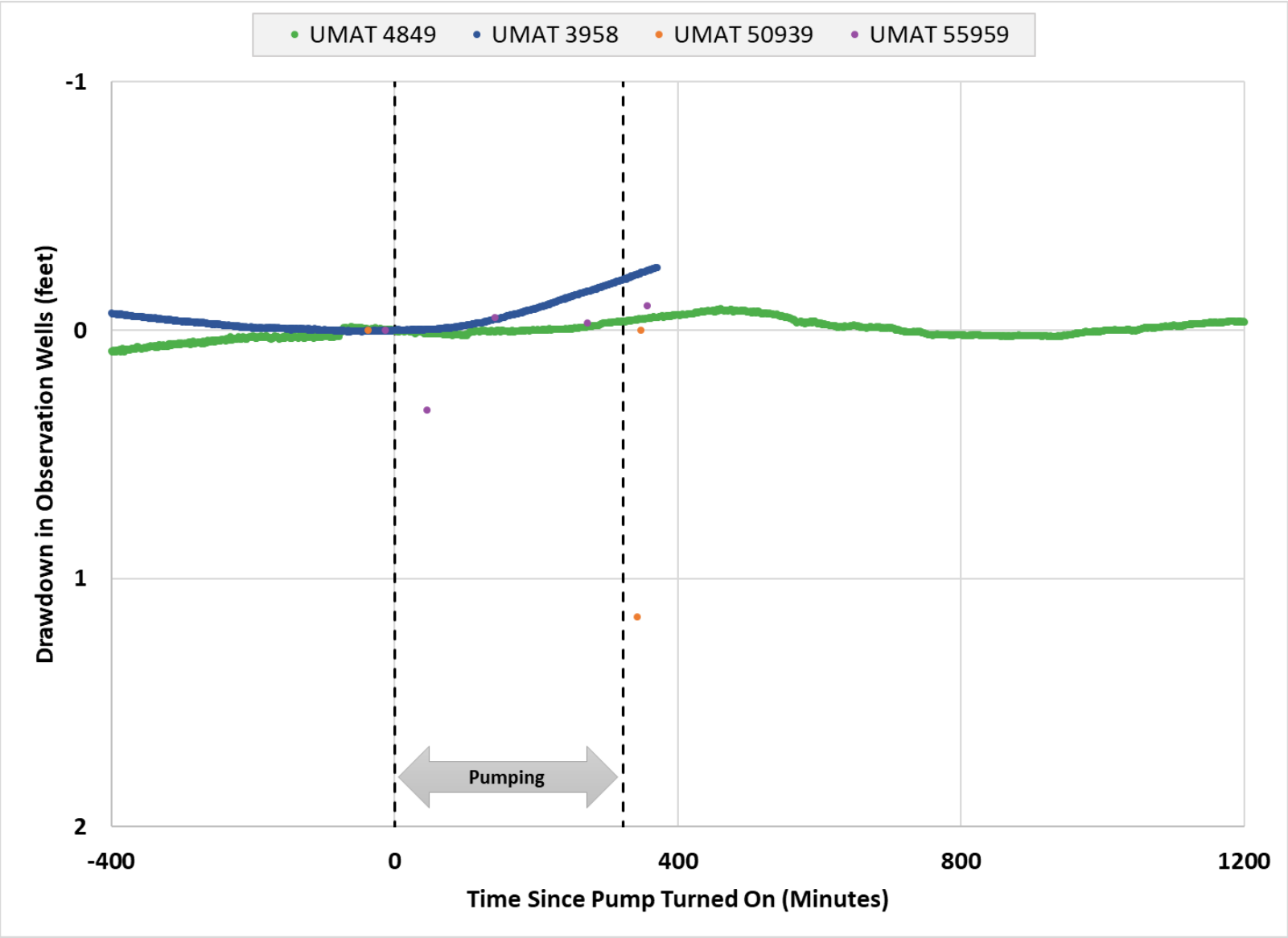


Figure 65: Drawdown in Observation Wells During Pumping Phase of Test 5

Table 28. Test 5 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 4864	69.2	Straight Line	Late Pumping	1080	NA	80	13.5
UMAT 4864	69.2	Straight Line	Recovery	1190	NA	80	14.9

OWRD Test 6

Date: 3/20/2018
Duration: 7.4 hours
Note:

Pumping Well: UMAT 54464
Pumping Rate: 1100 gpm

Table 29. Test 6 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 54464	Pumping	Airline	0	1005	-76 to 389	Twfsl, twfsh, twfh	Yes
UMAT 55999	Observation	Airline	1040	807	134 to 681	Tsu, Twfsl, twfh	Indeterminate
UMAT 5606	Observation	Airline	2565	850	110 to 245, 265 to 285, 375 to 609	Tsu, Tgs	Indeterminate
UMAT 55253	Observation	E-Tape	2670	420	526 to 608, 626 to 928	Tslm, Tsi	Yes
UMAT 52006	Observation	E-Tape	3375	423	537 to 764	Tsww, Tsu, Twfsl	No
UMAT 6283	Observation	Airline	3990	1003	-91 to 227, 232 to 307, 332 to 352, 369 to 392, 772 to 852	Tsu, Twfsl	Indeterminate
UMAT 56828	Observation	Airline	4330	350	618 to 790, 908 to 950	Tsu, Twfsl	No
UMAT 55248	Observation	E-Tape	5040	500	469 to 631, 669 to 951	Tslm, Tsi	No
UMAT 3929	Observation	E-Tape	5810	915	72 to 755	Twfh, gouge(?)	No
UMAT 3908	Observation	E-Tape	6970	528	479 to 898	Twfh, Twlg, Tgsmu	No

Abbreviations: **Tsww**: Walla Walla Member of Saddle Mountains Formation; **Tslm**: Lower Monumental Member of Saddle Mountains Formation; **Tsi**: Ice Harbor Member of Saddle Mountains Formation; **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfsh**: Basalt of Sentinel Gap, high-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Twlg**: Lookingglass Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation; **Tgsmu**: Sentinel Bluffs Member, basalt of Museum, Grande Ronde Formation

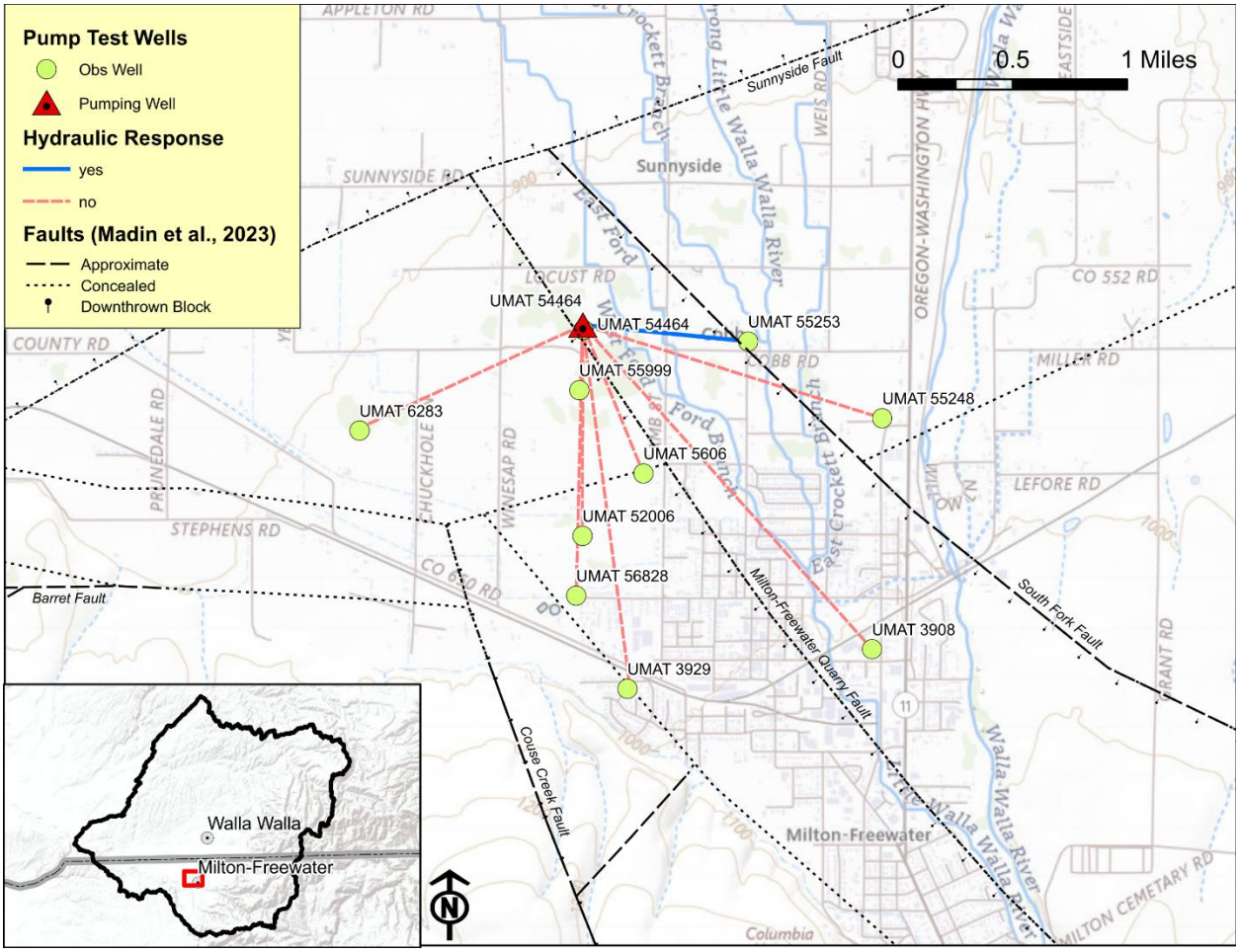


Figure 66: Map of Wells Measured During Pumping Test 6

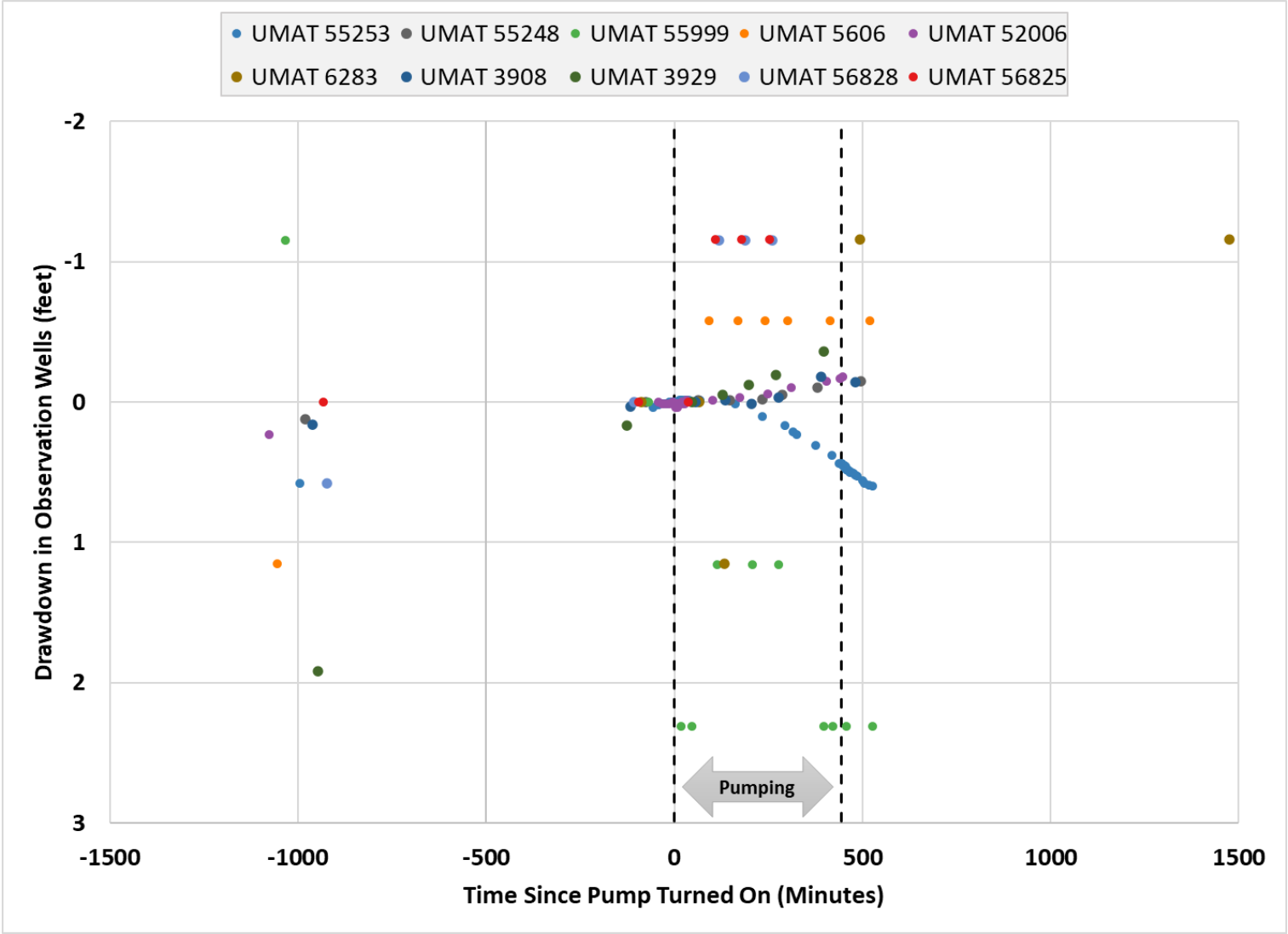


Figure 67: Test 6 water level changes in arithmetic time.

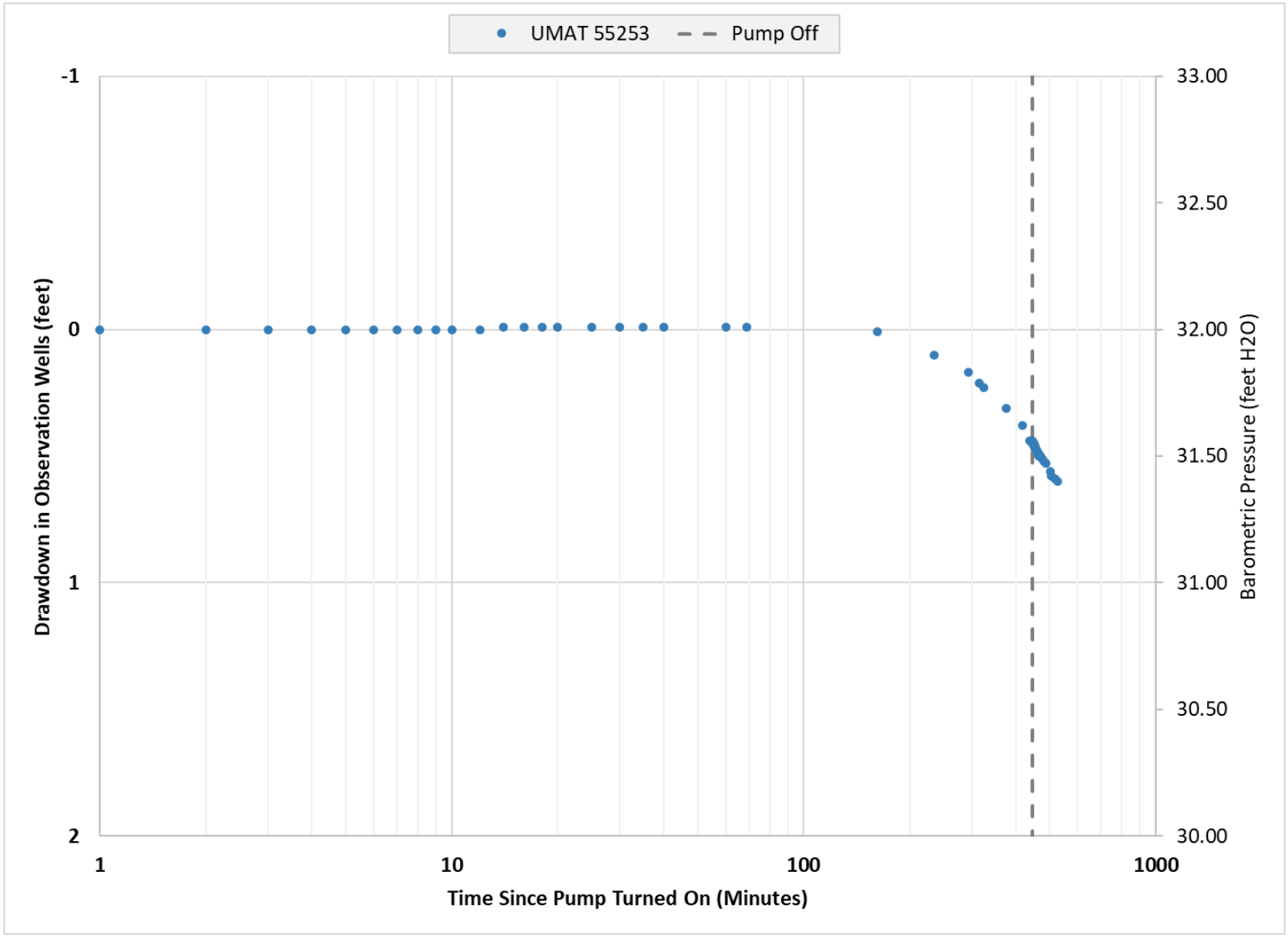


Figure 68: Drawdown in Observation Wells During Pumping Phase of Test 6

Table 30. Test 6 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 54464	13.8	Straight Line	Pumping	6770	NA	465	14.5
UMAT 54464	13.8	Straight Line	Recovery	3920	NA	465	21.7
UMAT 55253	0.44	Theis	Pumping	6950	0.0016	82	84.8
UMAT 55253	0.44	Straight Line	Pumping	23800	0.0014	82	290.5

OWRD Test 7

Date: 3/22/2018
Duration: 6.28 hours
Pumping Well: UMAT 6283
Pumping Rate: 1500 gpm

Note: The magnitude of drawdown in observation wells UMAT 5627, UMAT 5670, and UMAT 50478 largely does not vary with distance from the pumping well as is expected with infinite active radial flow. Potential causes include comingling well construction and complex geologic structural boundary effects.

Table 31. Test 7 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 6283	Pumping	Airline	0	1003	-91 to 227, 232 to 307, 332 to 352, 369 to 392, 772 to 852	Tsu, Twfsl	Yes
UMAT 5627	Observation	E-tape	810	365	545 to 568	Tsww	Yes
UMAT 5670	Observation	E-tape	1565	440	471 to 539	Twfsl	Yes
UMAT 50478	Observation	E-tape	3050	475	402 to 488	Tsww	Yes
UMAT 4899	Observation	Transducer	3155	442	438 to 862	Unknown	No
UMAT 55999	Observation	Airline	3620	807	134 to 681	Tsu, Twfsl, Twfh	Indeterminate
UMAT 54464	Observation	Airline	4000	1005	-76 to 389	Twfsl, twfsh, twfh	Indeterminate
UMAT 52006	Observation	E-tape	4000	423	537 to 764	Tsww, Tsu, Twfsl	No
UMAT 56287	Observation	Transducer	4230	340	545 to 884	Unknown	No
UMAT 3929	Observation	E-tape	5990	952	72 to 755	Twfh	No

Abbreviations: **Tsww**: Walla Walla Member of Saddle Mountains Formation **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfsh**: Basalt of Sentinel Gap, high-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation

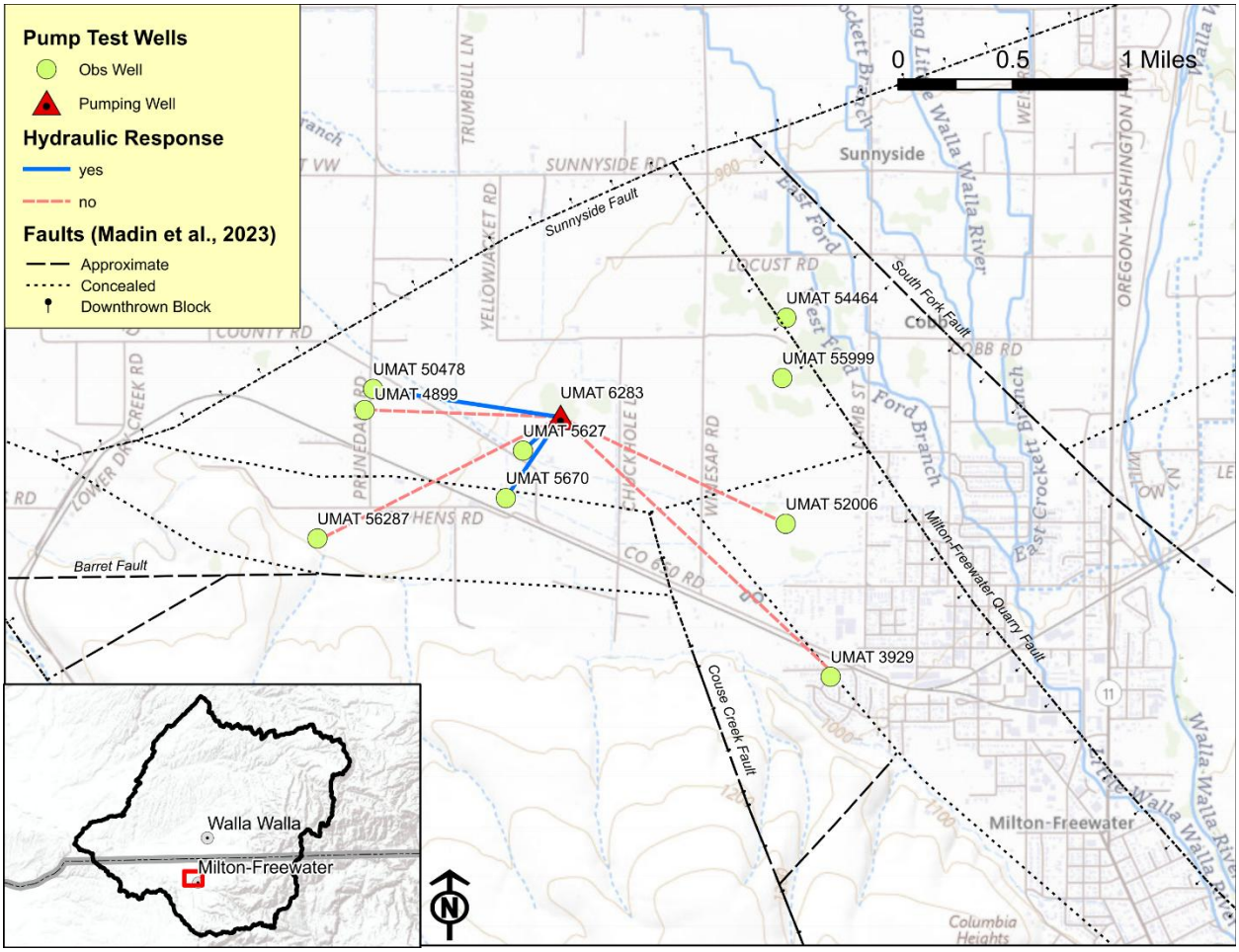


Figure 69: Map of Wells Measured During Pumping Test 7

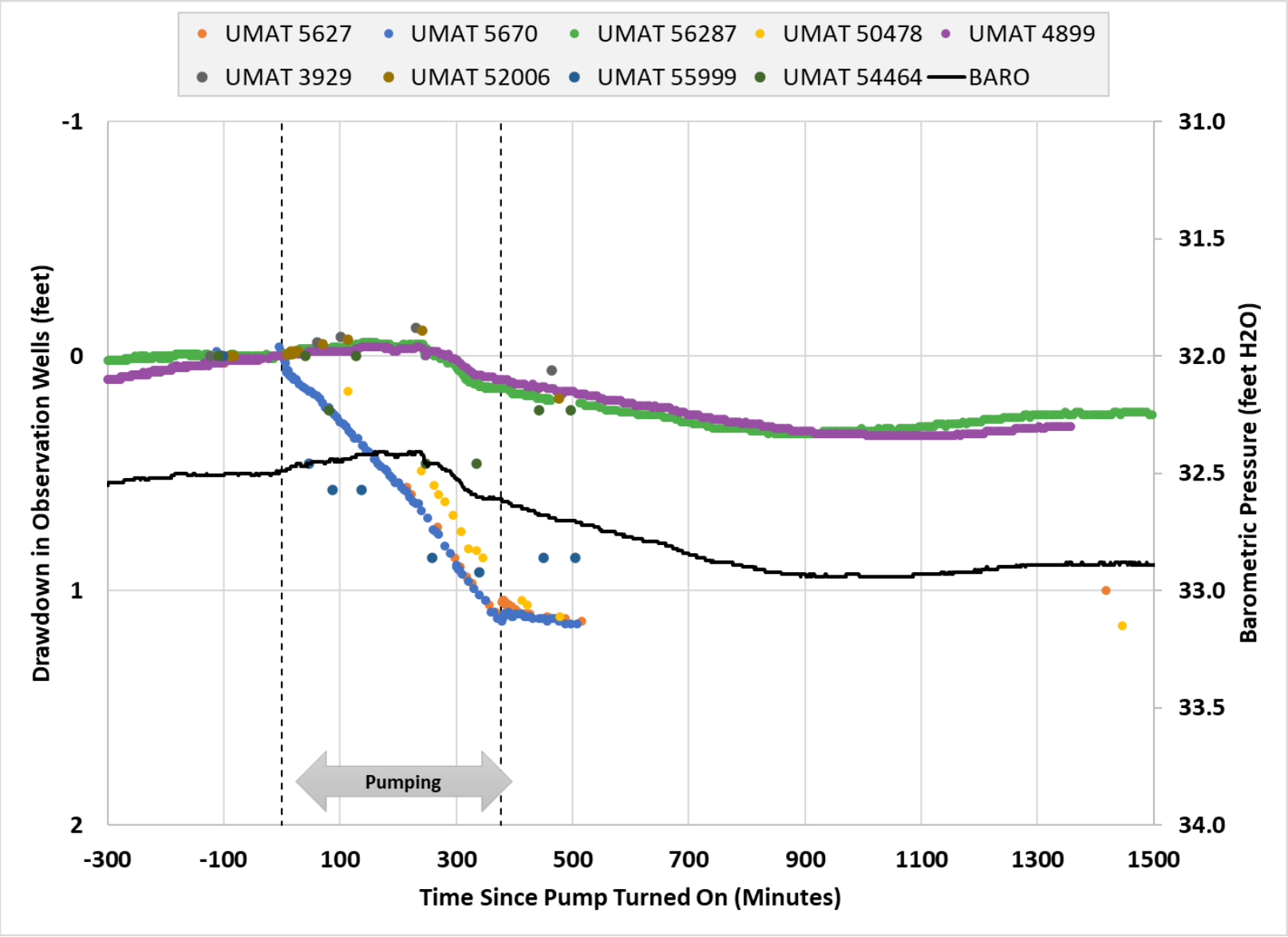


Figure 70: Test 7 water level changes in arithmetic time

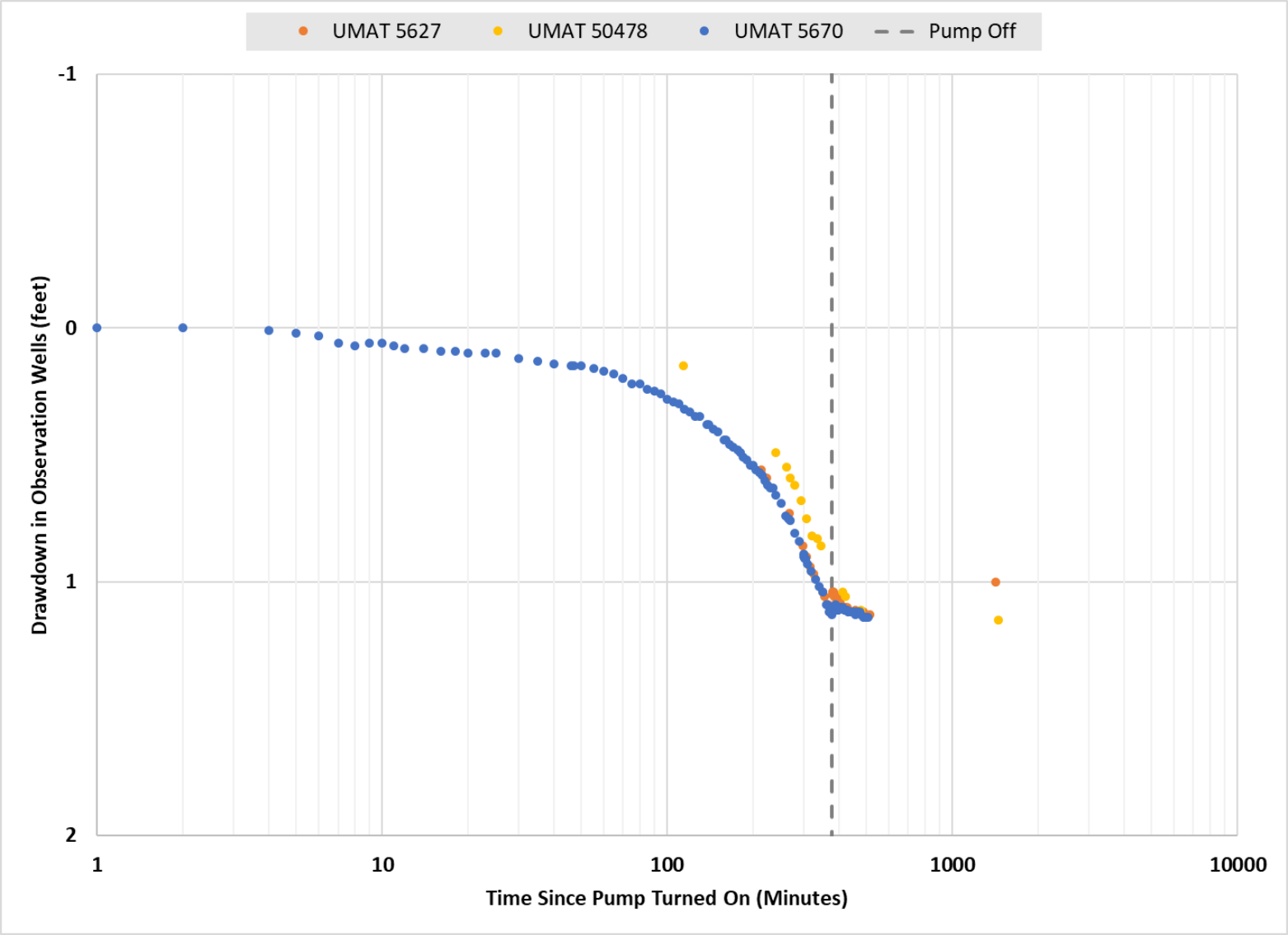


Figure 71: Drawdown in Observation Wells During Pumping Phase of Test 7

Table 32. Test 7 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 6283	83	Straight Line	Late Pumping	5440	-	483	11.2
UMAT 6283	83	Straight Line	Recovery	3670	-	483	7.6
UMAT 5627	1.1	Straight Line	Late Pumping	21250	0.002	23	923.9*
UMAT 5627	1.1	Theis	Pumping	26660	0.007	23	1159.1*
UMAT 5670	1.1	Straight Line	Late Pumping	20630	0.002	68	303.4
UMAT 5670	1.1	Theis	Pumping	18840	0.002	68	277.1
UMAT 50478	1	Straight Line	Late Pumping	21830	0.0005	86	253.8
UMAT 50478	1	Theis	Pumping	5200	0.0006	86	60.5

*UMAT 5627 has the smallest open interval, leading to the largest hydraulic conductivity estimate from this test, while UMAT 6283 has the largest open interval, resulting in the lowest hydraulic conductivity estimate in this well test.

OWRD Test 8

Date: 9/11/2018
Duration: 20.8 hours

Pumping Well: UMAT 3909
Pumping Rate: 1000 gpm

Note: The primary test was conducted by GSI Water Solutions at UMAT 3909 and UMAT 3908. OWRD staff coordinated by measuring additional wells. Wells UMAT 3930, UMAT 3929, and UMAT 3962 had been pumped recently before the test. Water levels recovered several feet during the pumping phase, so pressure response was indeterminate.

Table 33. Test 8 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 3909	Pumping	None	0	502	503 to 793, 793 to 965	Qa, QTcg, Twfh, Twlg	Yes
UMAT 3908	Observation	E-Tape	570	528	479 to 898	Twfh, Twlg, Tgsmu	Yes
UMAT 3930	Observation	E-Tape	1320	575	465 to 915	Tsu, Twfh, Twlg, Tgs	No
UMAT 3929	Observation	E-Tape	3370	952	72 to 755	Twfh	Indeterminate
UMAT 3962	Observation	E-Tape	5210	902	167 to 970	Twfh, Twlg, Tgs, Tgww	Indeterminate

Abbreviations: **Qa:** Alluvium; **QTcg**: conglomerate; **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Twlg**: Lookingglass Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation; **Tgsmu**: Sentinel Bluffs Member, basalt of Museum, Grande Ronde Formation; **Tgww**: Winter Water Member, Grande Ronde Formation

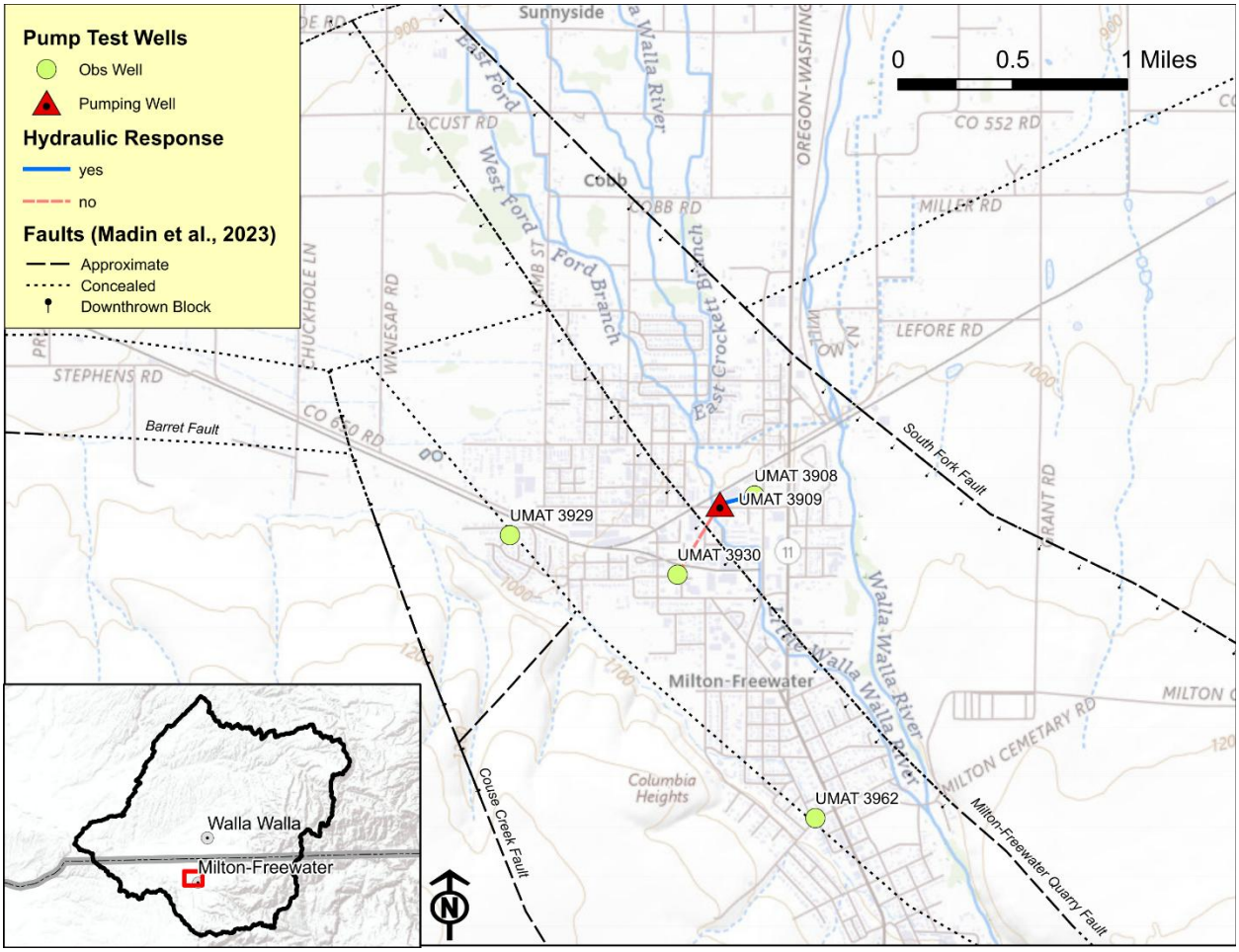


Figure 72: Map of Wells Measured During Pumping Test 8

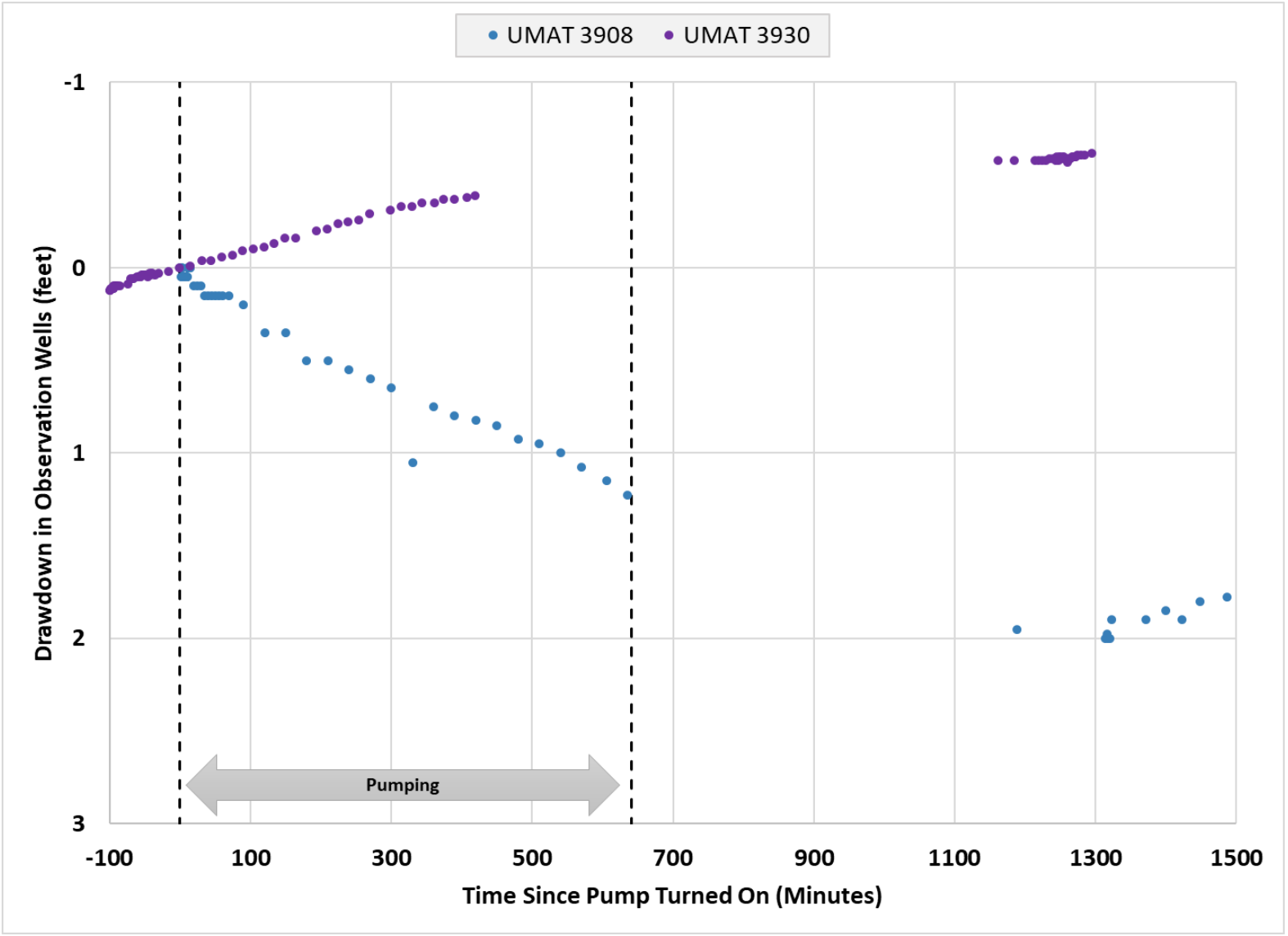


Figure 73: Test 8 water level changes in arithmetic time

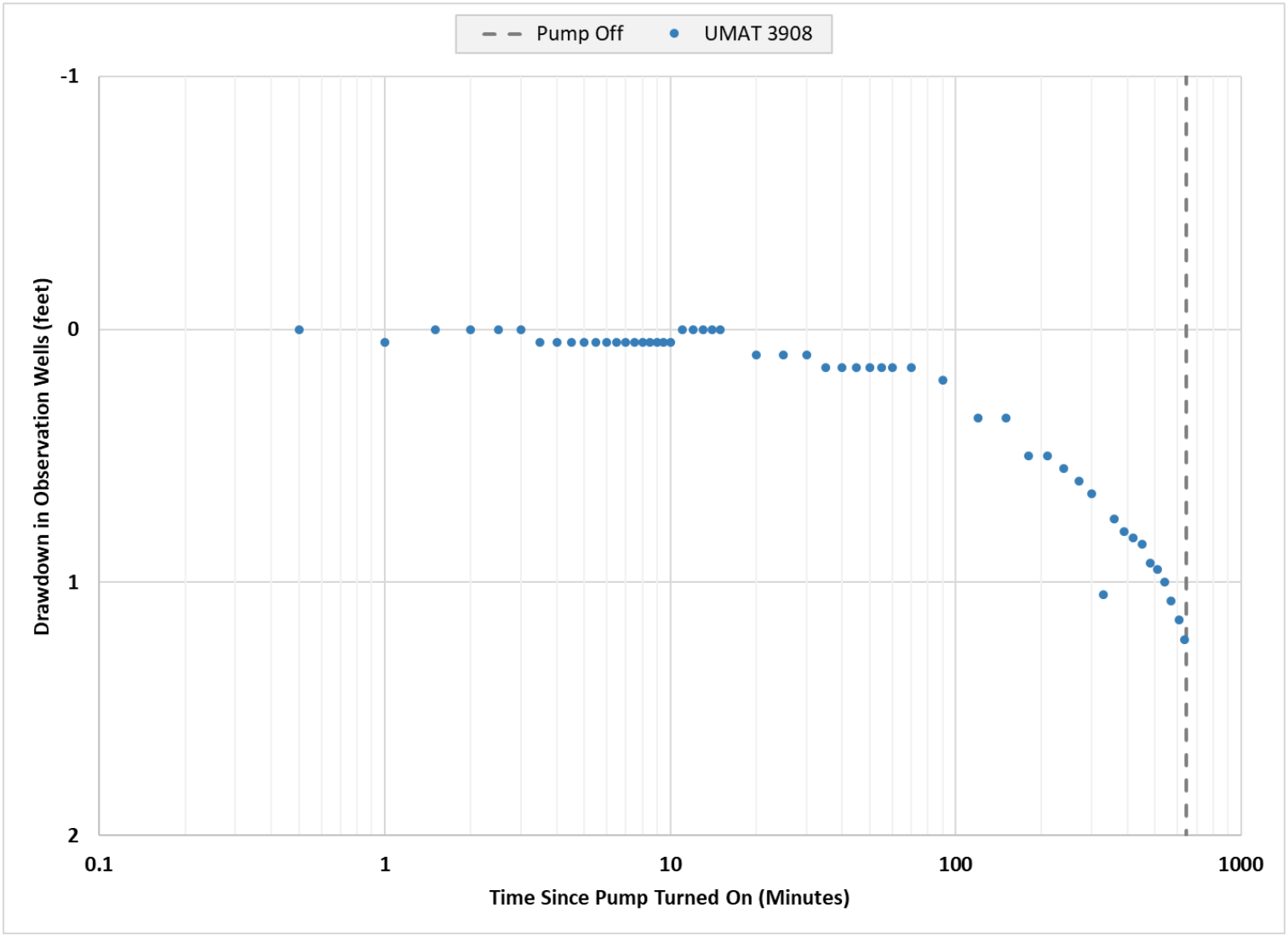


Figure 74: Drawdown in Observation Wells During Pumping Phase of Test 8

Table 34. Test 8 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 3909	20.5	Straight Line	Pumping Late	6090	-	290	21.0
UMAT 3908	2	Straight Line	Pumping Late	12170	0.01	419	29.1
UMAT 3908	2	Straight Line	Pumping Mid	32910	0.01	419	78.6

OWRD Test 9

Date: 1/8/2019
Pumping Well: UMAT 3962
UMAT 3961

Duration: 9.6 hours & 5.9 hours
Pumping Rate: 700 gpm
1400 GPM

Note: OWRD and City of Milton-Freewater staff coordinated municipal water supply well pumping to isolate the pumping signal of 1-2 wells. All wells were shut off for at least 24 hours, then UMAT 3962 started pumping at 8:26 AM. UMAT 3962 began pumping at 12:09 PM (3.5 hours later). Both wells shut off at 6:01 PM when municipal reservoirs had filled.

Table 35. Test 9 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from UMAT 3962 (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 3962	Pumping	E-Tape	0	902	167 to 970	Twfh, Twlg, Tgs, Tgww	Yes
UMAT 3961	Pumping	No Access	660	584	486 to 986	QTsc, Twfh, Twlg, Tgs	NA
UMAT 57672	Observation	Transducer	3468	817	319 to 580	Tgsmu, Tgsmc, Tgww	No
UMAT 3930	Observation	E-Tape	4442	575	465 to 915	Tsu, Twfh, Twlg, Tgs	No
UMAT 3908	Observation	E-Tape	5209	528	479 to 898	Twfh, Twlg, Tgsmu	No
UMAT 3929	Observation	E-Tape	6668	952	72 to 755	Twfh	No

Abbreviations: **QTsc**: sandstone and clay; **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Twlg**: Lookingglass Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation; **Tgsmu**: Sentinel Bluffs Member, basalt of Museum, Grande Ronde Formation; **Tgsmc**: Sentinel Bluffs Member, basalt of McCoy Canyon, Grande Ronde Formation; **Tgww**: Winter Water Member, Grande Ronde Formation

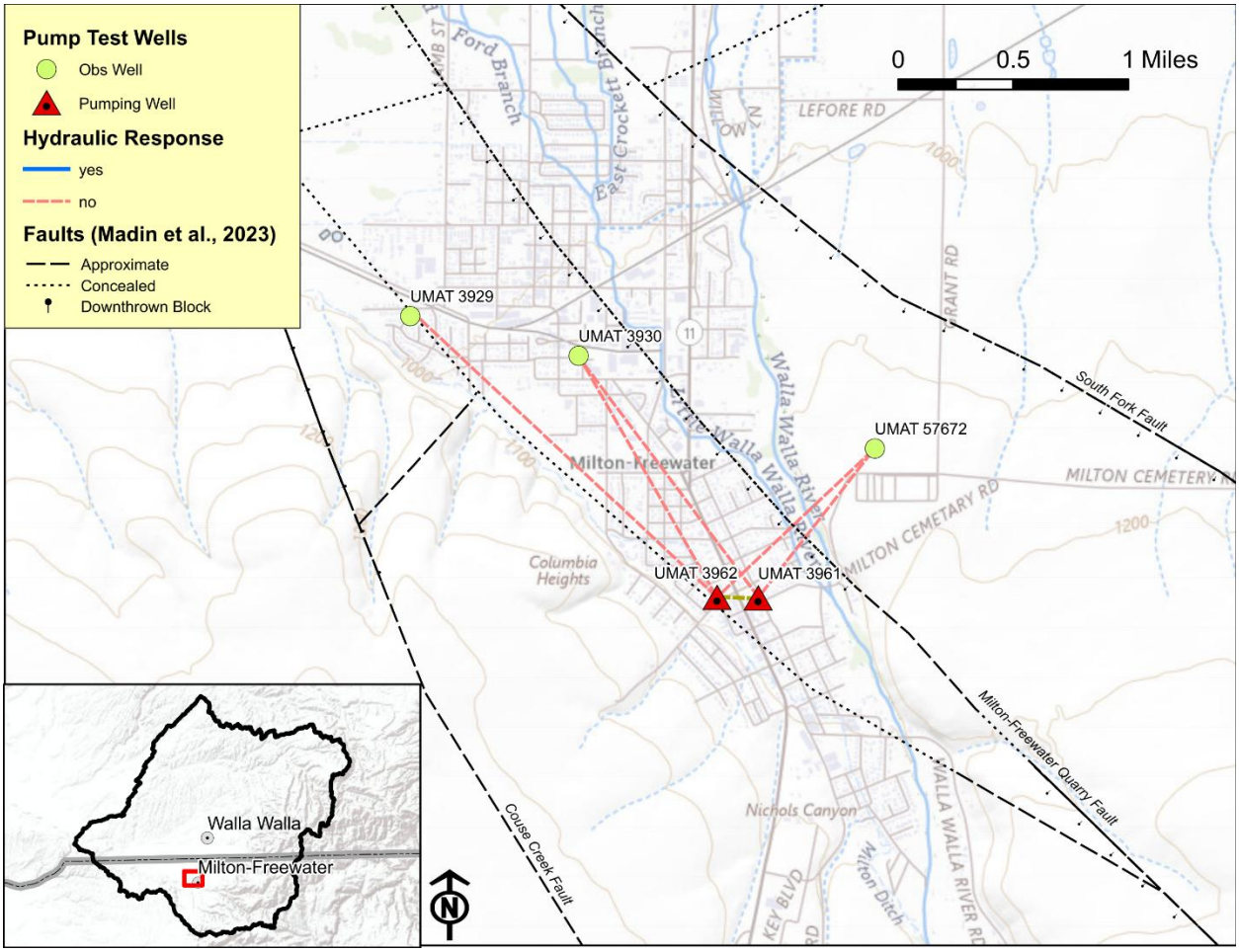


Figure 75: Map of Wells Measured During Pumping Test 9

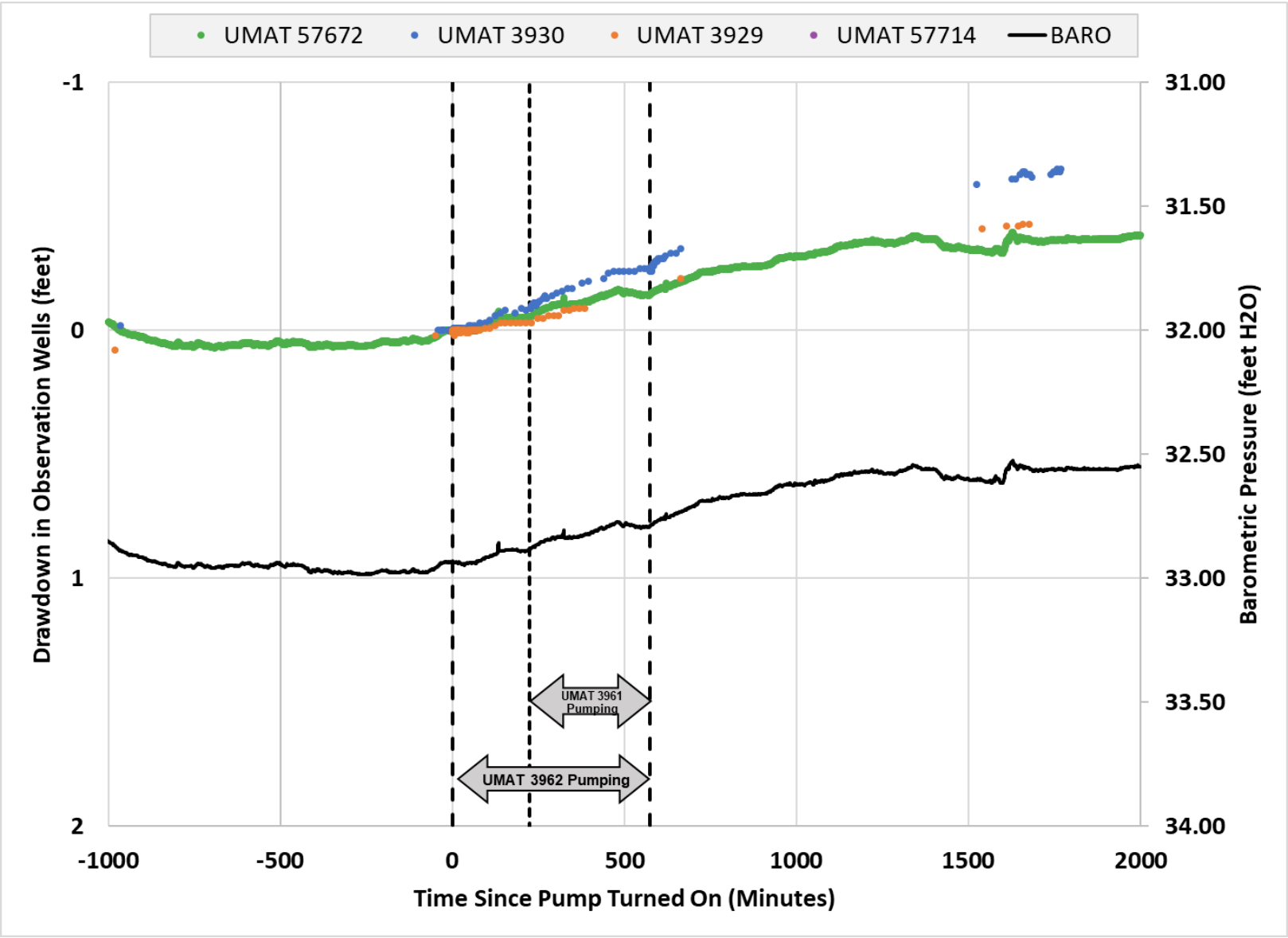


Figure 76: Test 9 water level changes in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

Table 36. Test 9 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 3962	68.3	Straight Line	Pumping	1000	-	803	1.2

OWRD Test 10

Date: 1/9/2019
Duration: 21 hours
Pumping Well: UMAT 3929
Pumping Rate: 725 GP

Comments: An obstruction in the borehole at the pumping well prevented e-tape measurements during the drawdown phase. Recovery was measured once water level rose above the obstruction.

Table 37. Test 10 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 3929	Pumping	E-Tape	0	952	72 to 755	Twfh	Yes
UMAT 52006	Observation	E-Tape	2503	423	537 to 764	Tsww, Tsu, Twfsl	Yes
UMAT 3930	Observation	E-Tape	2752	550	465 to 915	Tsu, Twfh, Twlg, Tgs	No

Abbreviations: **Tsww**: Walla Walla Member of Saddle Mountains Formation; **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Twlg**: Lookingglass Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation

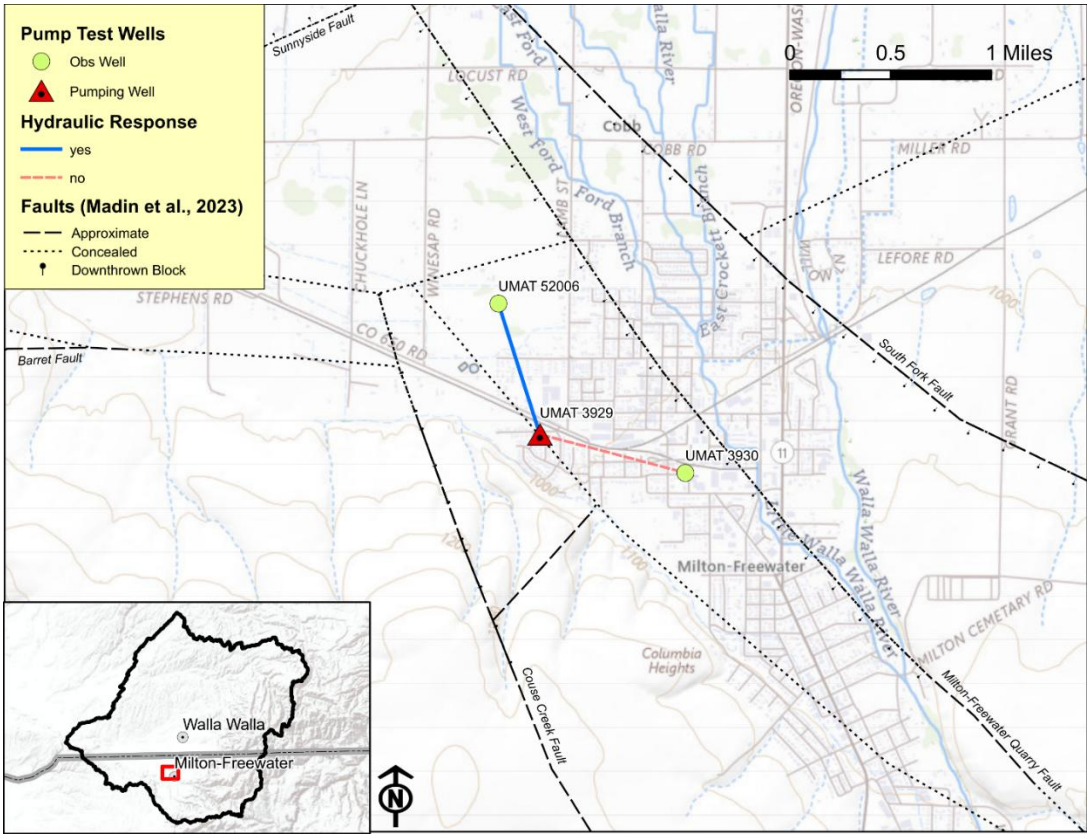


Figure 77: Map of Wells Measured During Pumping Test 10

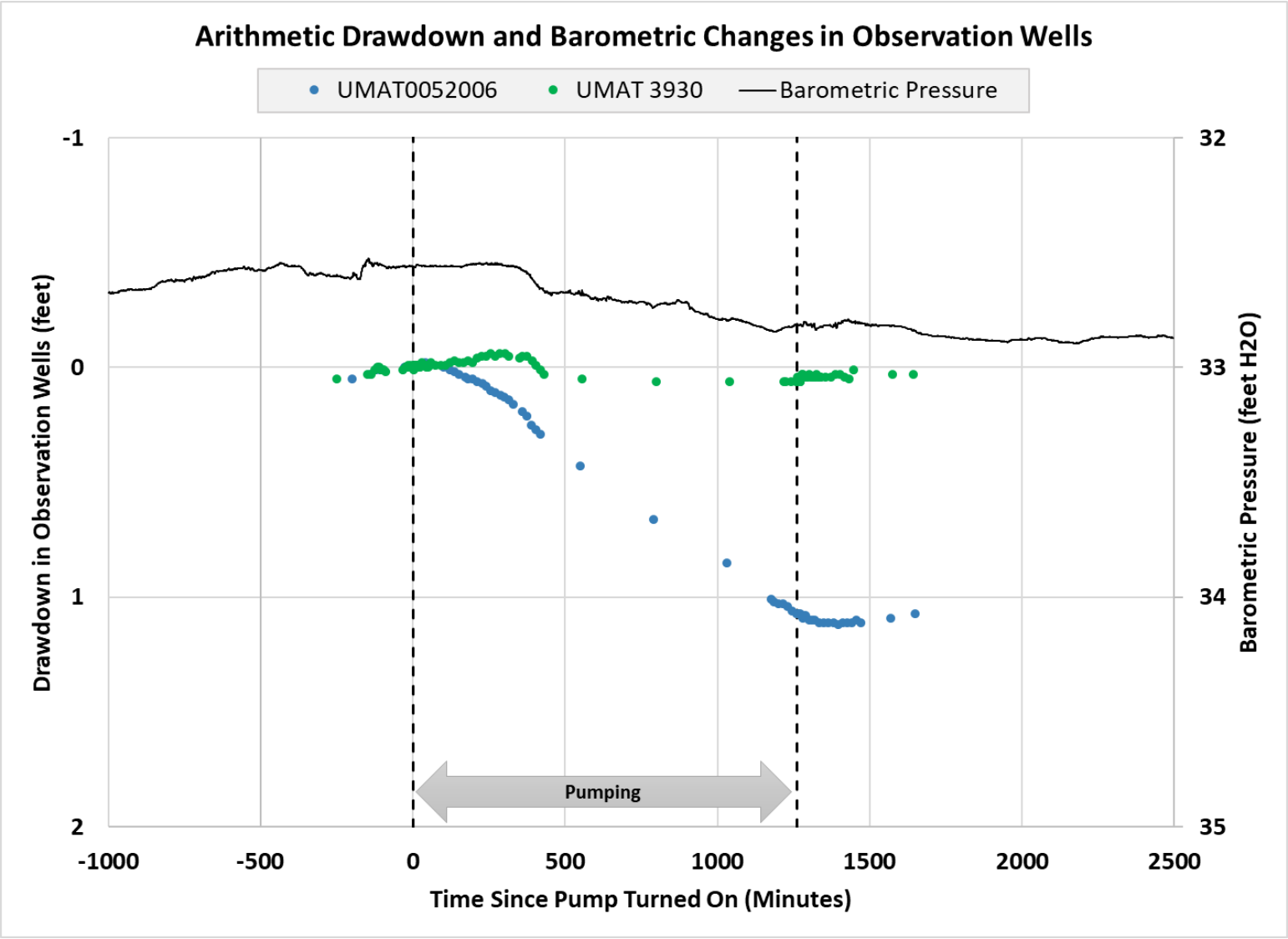


Figure 78: Test 10 water level changes in arithmetic time. Barometric pressure is depicted as absolute change during the test expressed as of feet of water.

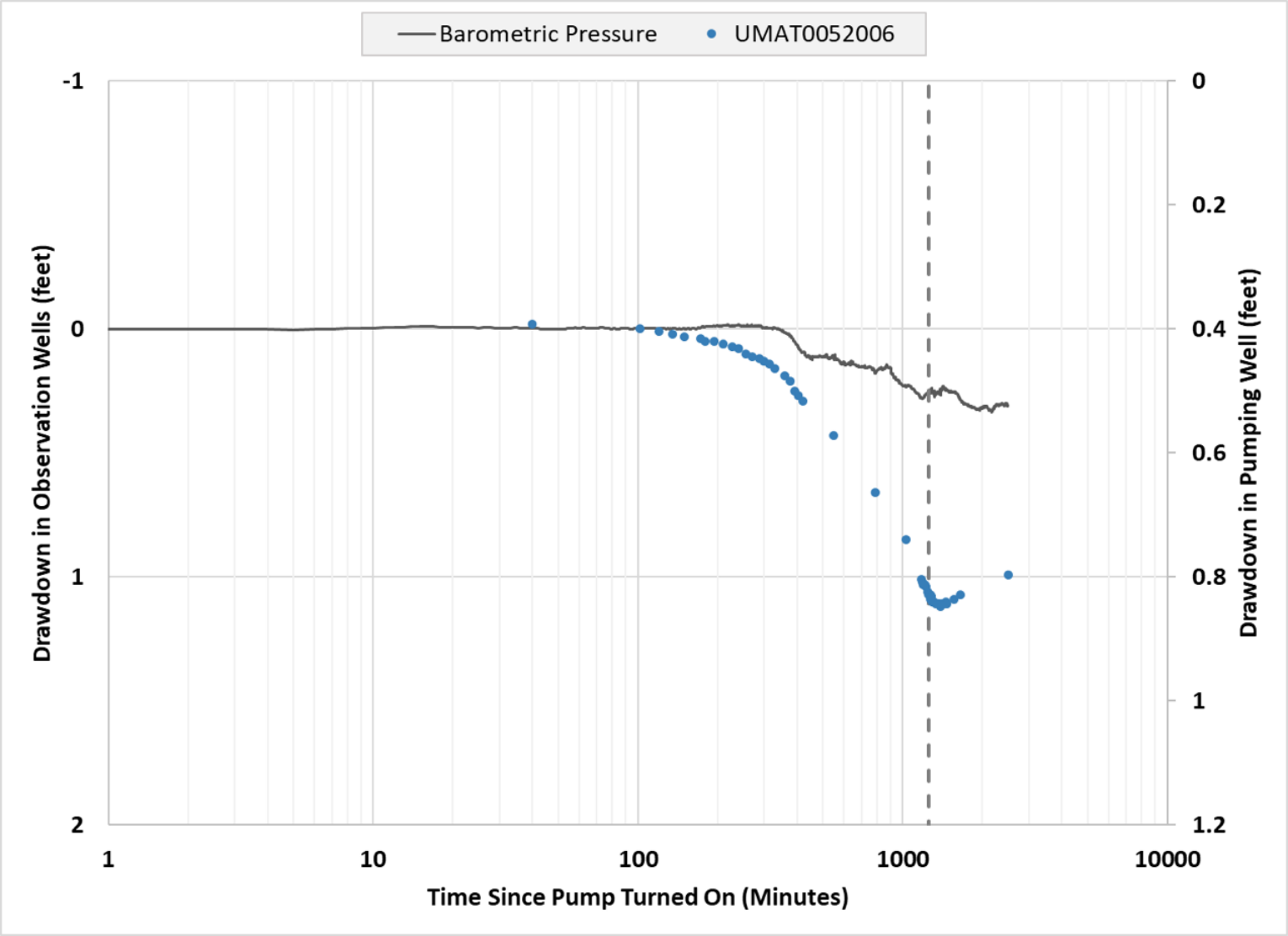


Figure 79: Drawdown in Observation Wells During Pumping Phase of Test 10

Table 38. Test 10 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 3929	> 39	Straight Line	Late Recovery	8900	NA	232 - 915	13
UMAT 52006	1.1	Theis Curve	Pumping & Recovery	13140	0.0028	196 - 423	57.9
UMAT 52006	1.1	Straight Line	Late Pumping	28220	0.0019	196 - 423	124.3

OWRD Test 11

Date: 12/13/2022 **Pumping Well**: UMAT 57710
Duration: 11 hours **Pumping Rate**: 275 GPM
Note: The pumping rate was adjusted one hour into the test to allow for a longer pumping phase. The rate settled at approximately 275 GPM shortly thereafter. Transmissivity was estimated after the pumping rate stabilized, and drawdown began to show a straight-line pattern in semi-log time.

Table 39. Test 11 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 57710	Pumping	Transducer	0	1600	141 to 476	Tgww, Tgo, Tgbc, TgR2	Yes
UMAT 55327	Observation	Transducer	2715	1069	652 to 1720	Unknown	No
UMAT 3053	Observation	E-Tape	3800	358	1380 to 1704	Unknown	No
UMAT 50183	Observation	E-Tape	4540	1148	553 to 1149	Unknown	No
UMAT 56940	Observation	Transducer	4965	776	949 to 1620	Unknown	No
UMAT 54034	Observation	Transducer	5038	1206	516 to 1704	Unknown	No
UMAT 6151	Observation	Airline	8790	746	1133 to 1855	Unknown	No

Abbreviations: **Tgww**: Winter Water Member, Grande Ronde Formation; **Tgo**: Ortley Member, Grande Ronde Formation; **Tgbc**: Buttermilk Canyon Member, Grande Ronde Formation; **TgR2**: Reverse-polarity magnetostratigraphic unit, Grande Ronde Formation

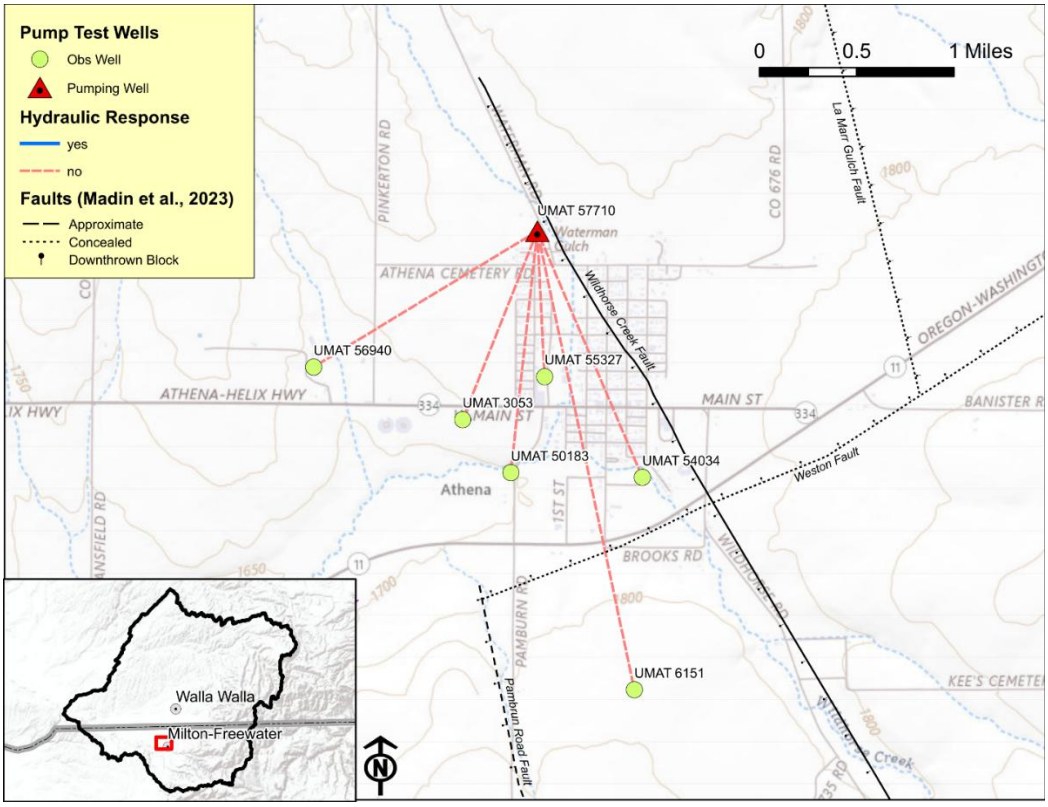


Figure 80: Map of Wells Measured During Pumping Test 11

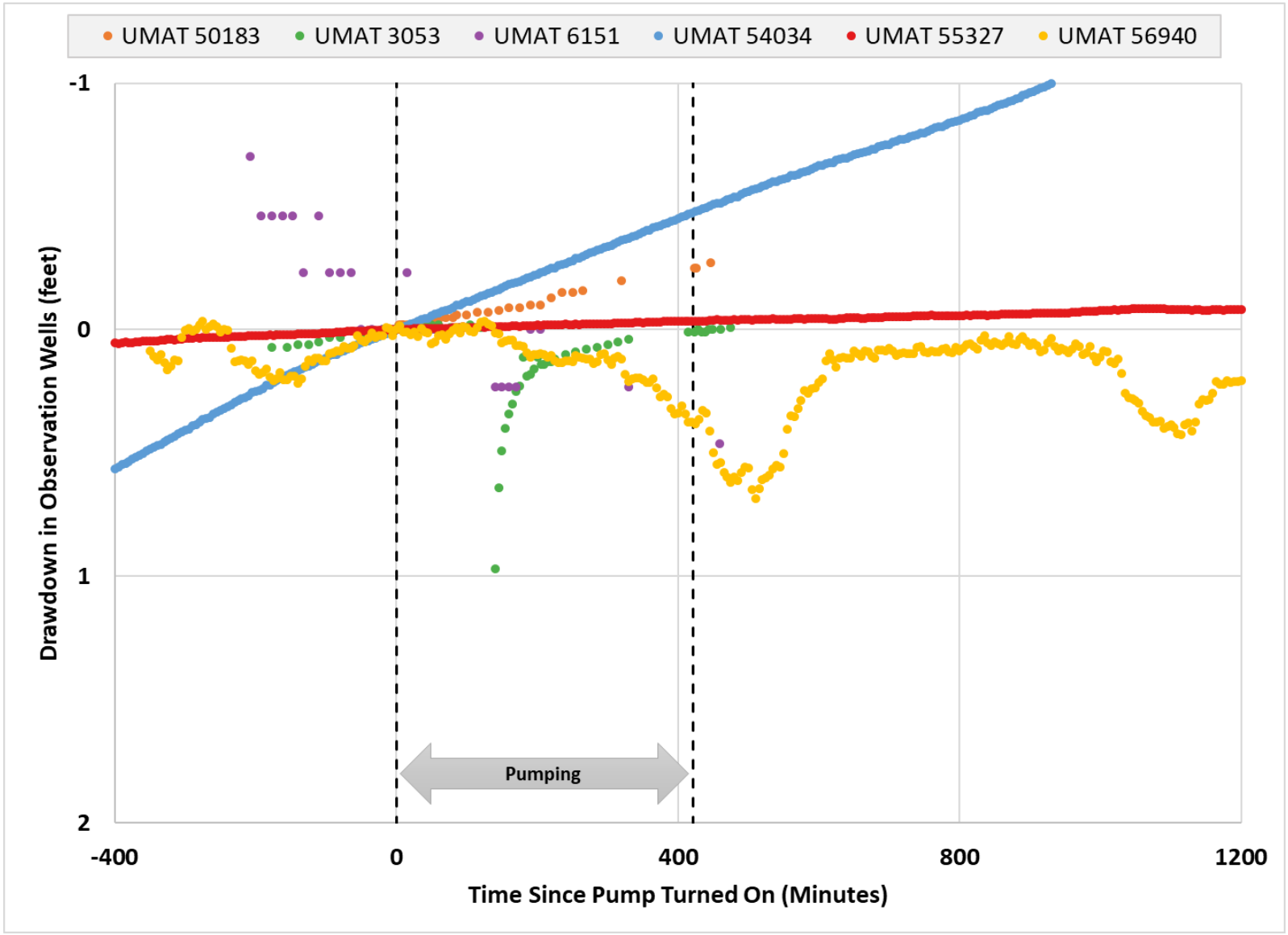


Figure 81: Test 11 water level changes in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

Table 40. Test 11 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 57710	448	Straight Line	Pumping Late	75	-	335	0.2

OWRD Test 12

Date: 12/14/2022 **Pumping Well**: UMAT 50183
Duration: 15.8 hours **Pumping Rate**: 350 gpm
Note: There were too many wells turning on and off during this test to make findings about well responses. Aquifer parameters were calculated from the pumping well data. Water level observations in UMAT 54034 were adjusted for their pre-test trend (recovery from pumping several days prior) because the magnitude of change was high (>1 foot), and the transducer measurements gave sufficient temporal resolution to adjust the measurements. Before estimating aquifer parameters, water levels in UMAT 54034 were corrected from a pumping event in this observation well several days prior to this test.

Table 41. Test 12 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth	Open Interval Elevation (ft amsl)	Stratigraphic Unit(s)	Measurable Response
UMAT 50183	Pumping	E-Tape	0	1148	553 to 1149	Unknown	Yes
UMAT 3053	Observation	E-Tape	1335	358	1380 to 1704	Unknown	unknown
UMAT 55327	Observation	Transducer	1915	1069	652 to 1720	Unknown	unknown
UMAT 54034	Observation	Transducer	2515	1206	516 to 1704	Unknown	unknown
UMAT 56940	Observation	Transducer	4215	776	949 to 1620	Unknown	unknown
UMAT 57710	Observation	E-Tape	4540	1600	141 to 476	Tgww, Tgo, Tgbc, TgR2	unknown
UMAT 6151	Observation	Airline	4720	746	1133 to 1855	Unknown	unknown

Abbreviations: **Tgww**: Winter Water Member, Grande Ronde Formation; **Tgo**: Ortley Member, Grande Ronde Formation; **Tgbc**: Buttermilk Canyon Member, Grande Ronde Formation; **TgR2**: Reverse-polarity magnetostratigraphic unit, Grande Ronde Formation

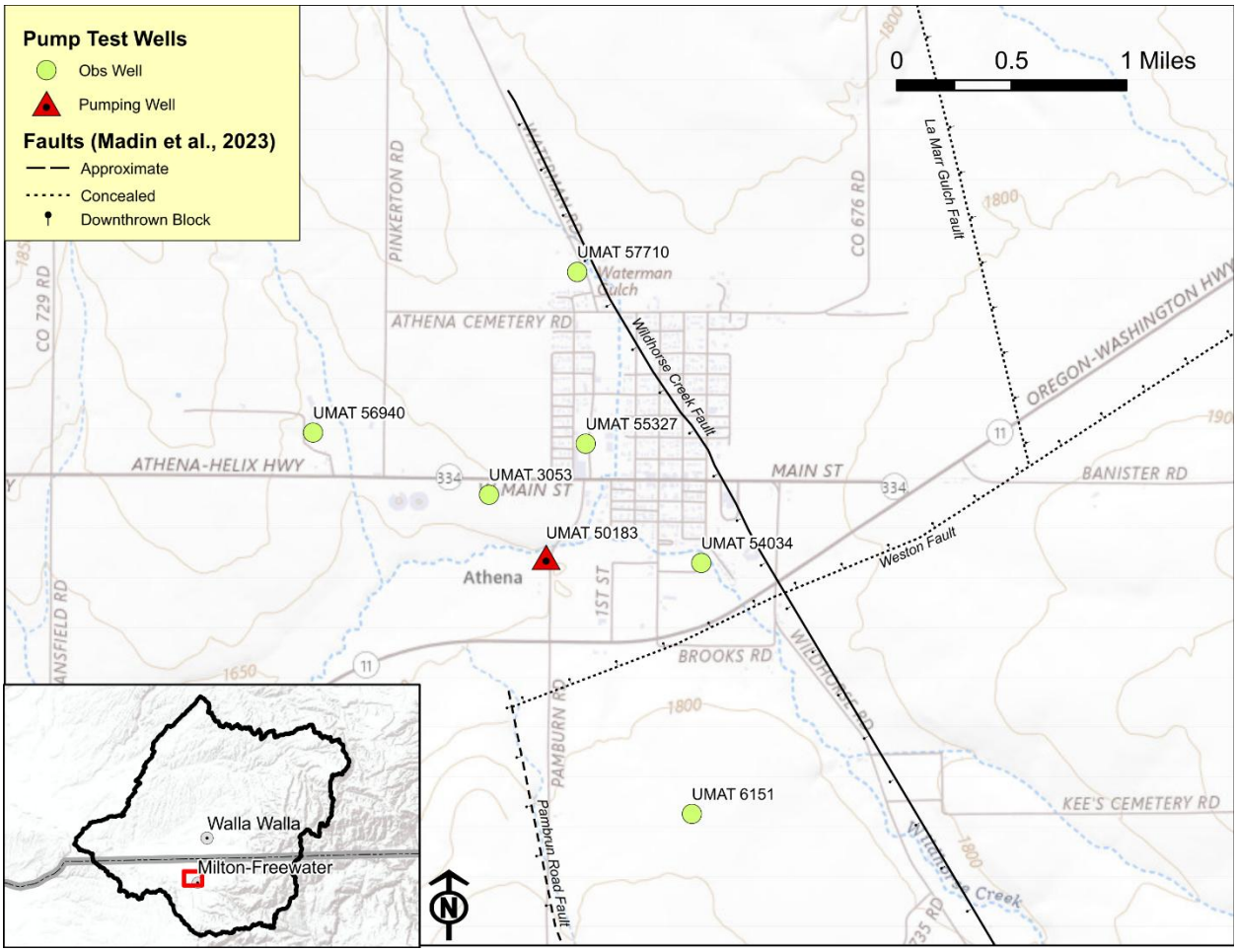


Figure 82: Map of Wells Measured During Pumping Test 12

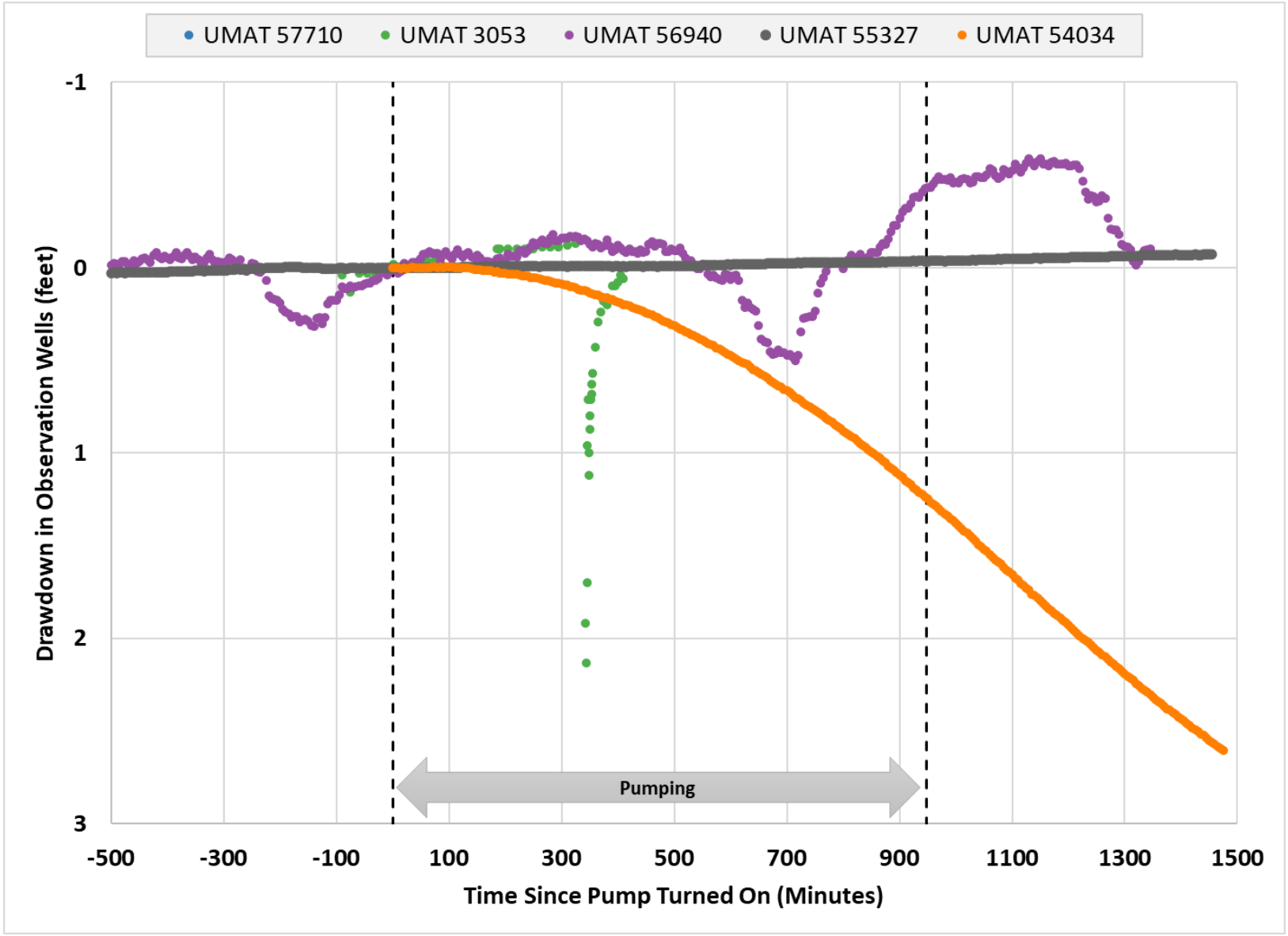


Figure 83: Test 12 water level changes in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

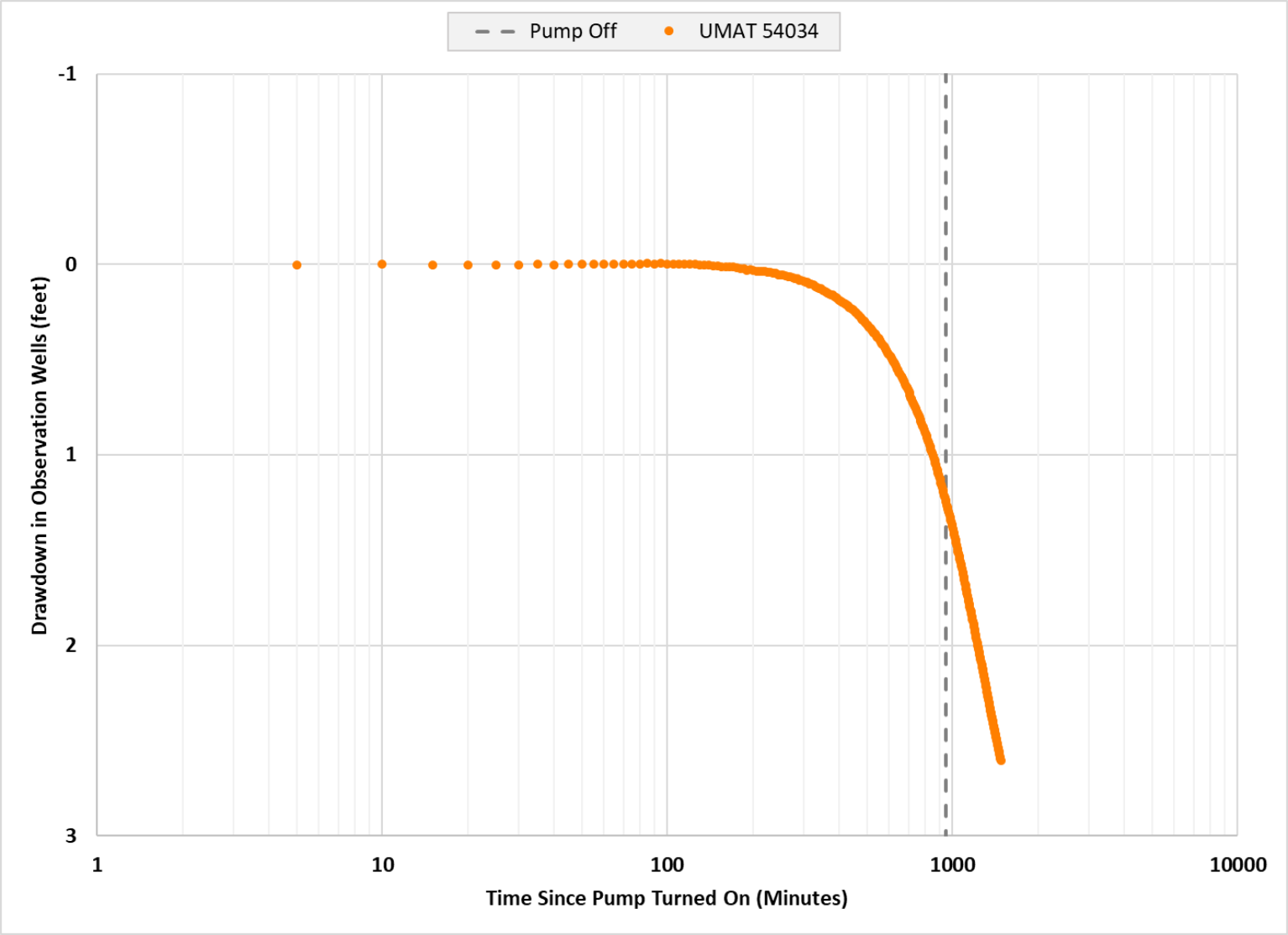


Figure 84: Drawdown in Observation Wells During Pumping Phase of Test 12

Table 42. Test 12 Aquifer Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 50183	313.2	Straight Line	Pumping Late	630	-	596	1.1

Appendix B.1: UMAT 58119 Pumping tests

OWRD UMAT 58119 Test 1:
Date: 3/5/2018 **Pumping Well**: UMAT 58119
Duration: 2.3 hours **Pumping Rate**: 1600 gpm
Note: This test occurred during the drilling process for UMAT 58119. The well was open from 300-510 feet BLS during this test. The drill rig used the airlift method to pump the well. Flow was estimated at 1600 gpm. UMAT 4179 began pumping during the day of March 4th and continued at a constant rate through this multiple well pumping test. Those pumping impacts are assumed to be constant throughout this test.

Table 43. UMAT 58119 Test 1 Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth		Stratigraphic Unit(s)	Measurable Response
UMAT 58119	Pumping	NA	0	510	234 to 444	Tsi, Tsu, Twfsl	Yes
UMAT 4179	Pumping	NA	2060	227	512 to 547	Twfsl	NA
UMAT 4184	Observation	E-Tape	1362	300	453 to 498	Tsu	Yes
UMAT 4180	Observation	Transducer	3065	452	332 to 766	QTcg, Twfsl, Twfh, Tgs	Yes
UMAT 3958	Observation	Transducer	5745	625	173 to 596	Twfsl, Twfh	Yes
UMAT 57714	Observation	Transducer	14420	1169	-113 to 354	Tgs, Tgww	No

Abbreviations: **QTsc**: sandstone and clay; **Tsi**: Ice Harbor Member of Saddle Mountains Formation; **Tsu**: Umatilla Member of Saddle Mountains Formation; **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation; **Tgww**: Winter Water Member, Grande Ronde Formation

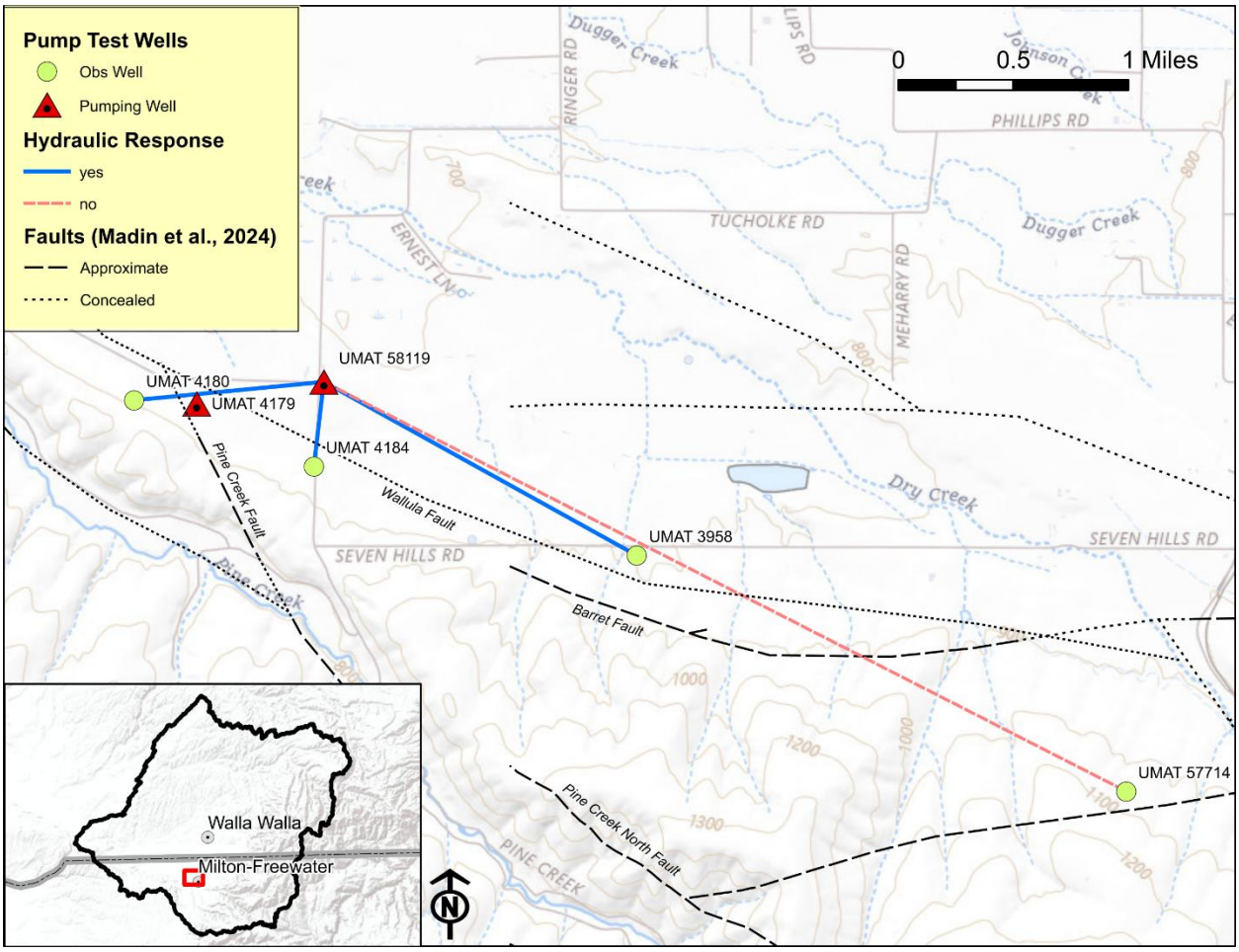


Figure 85: Map of Wells Measured During UMAT 58119 Pumping Test 1

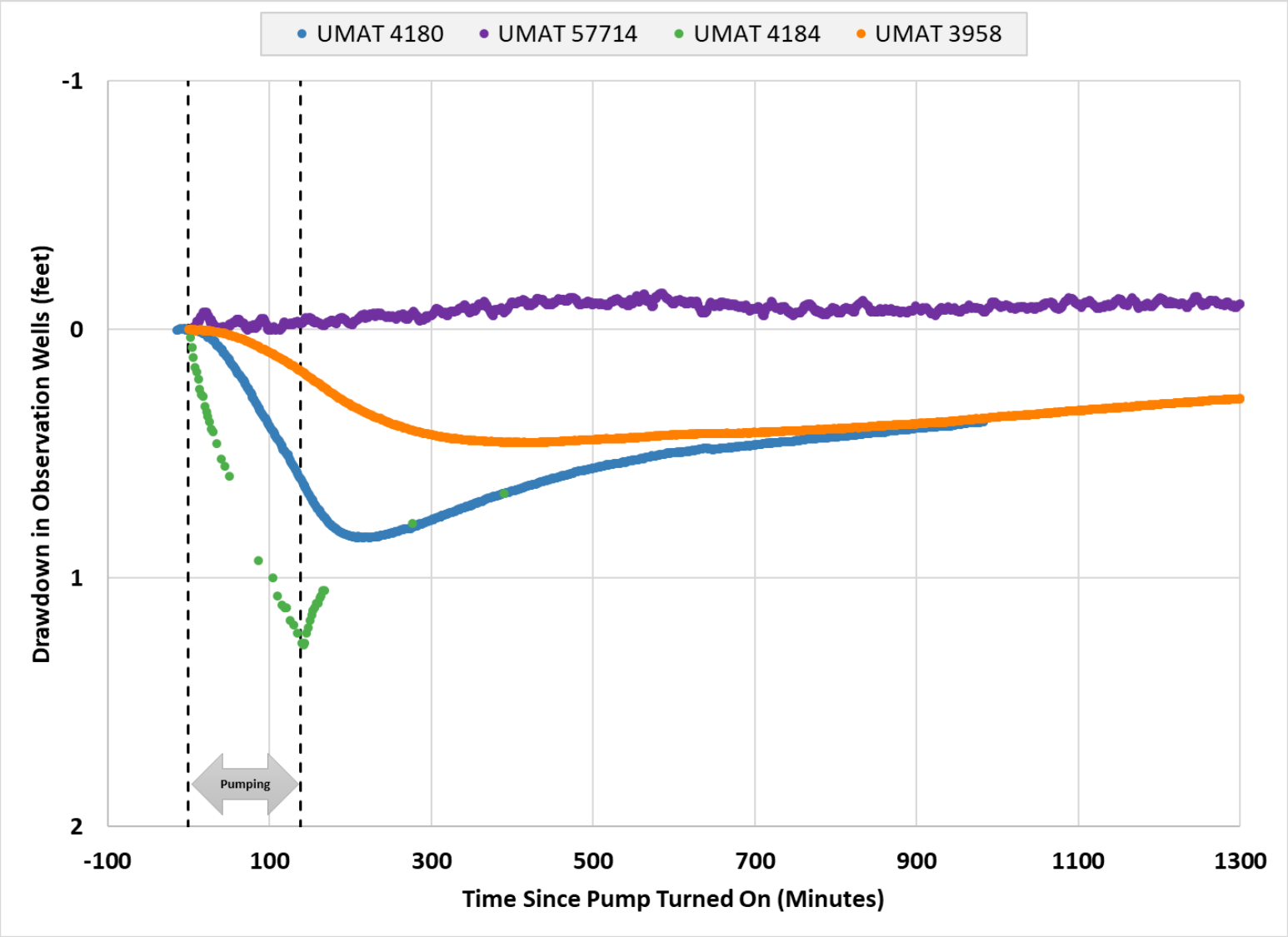


Figure 86: UMAT 58119 Test 1 water level changes in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

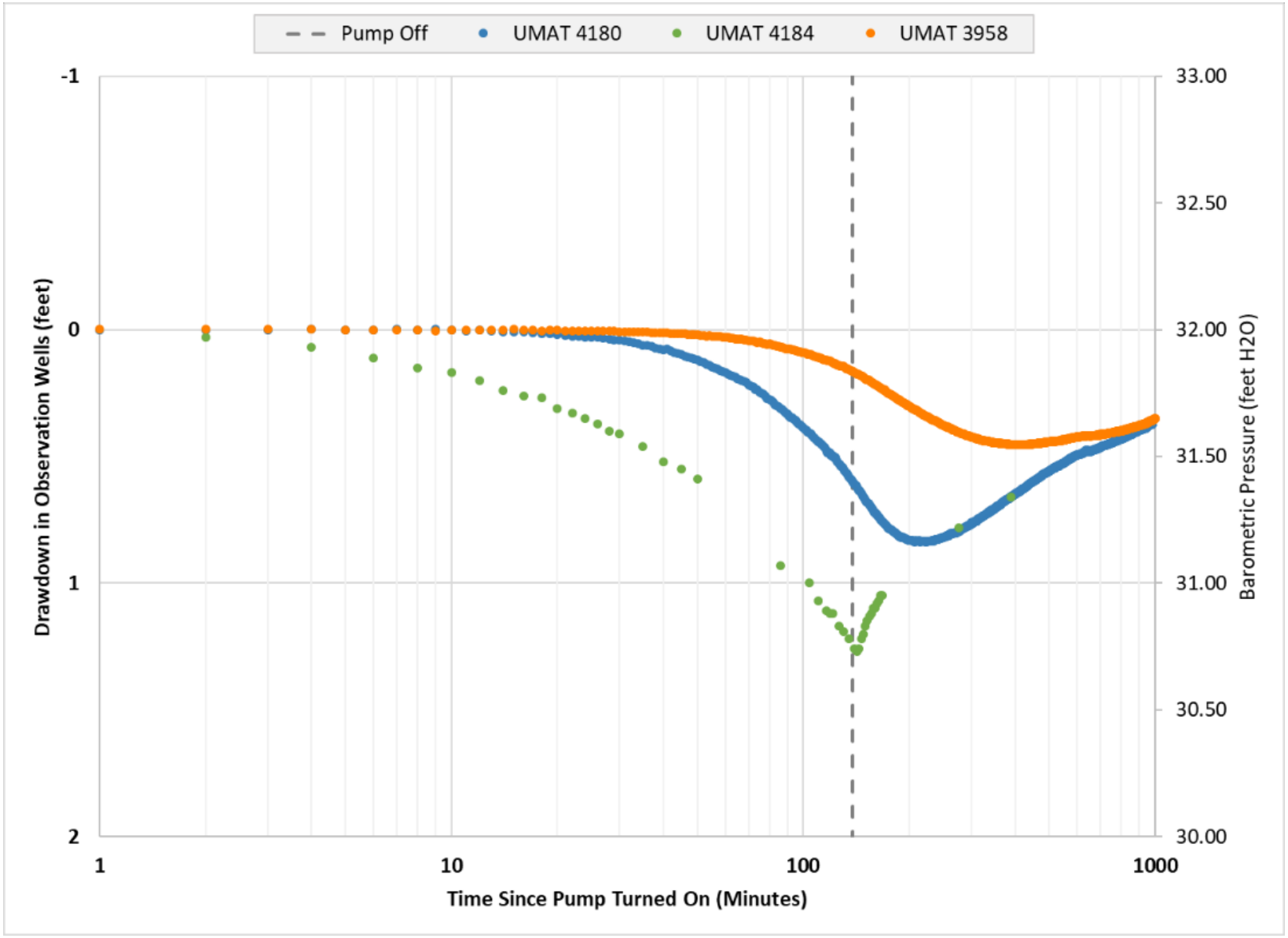


Figure 87: Drawdown in Observation Wells During Pumping Phase of UMAT 58119 Test 1

Table 44. UMAT 58119 Test 1 Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 4184	1.31	Theis	Pumping & Recovery	35100	0.000006	45	780.0
UMAT 4180	0.84	Theis	Pumping & Recovery	17910	0.0006	434	41.3
UMAT 3958	0.46	Theis	Pumping & Recovery	8975	0.0002	423	21.2

OWRD UMAT 58119 Test 2:
Date: 3/19/2018 **Pumping Well**: UMAT 58119
Duration: 2 hours **Pumping Rate**: 400-500 gpm
Note: UMAT 58119 was partially constructed at the time of this test. The well was sealed to 500 feet BLS and had an open interval from 500-580 feet BLS.

Table 45. UMAT 58119 Test 2 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth		Stratigraphic Unit(s)	Measurable Response
UMAT 58119	Pumping	No Access	0	580	164 to 244	Twfsl	NA
UMAT 4180	Observation	Transducer	3076	452	332 to 766	QTcg, Twfsl, Twfh, Tgs	Yes
UMAT 4849	Observation	Transducer	5720	970	-222 to 0, 109 to 378	Twfsl, Twfh	No
UMAT 3958	Observation	Transducer	5726	625	173 to 596	Twfsl, Twfh	Yes
UMAT 57714	Observation	Transducer	14420	1169	-113 to 354	Tgs, Tgww	No

Abbreviations: **QTsc**: sandstone and clay; **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation; **Tgww**: Winter Water Member, Grande Ronde Formation

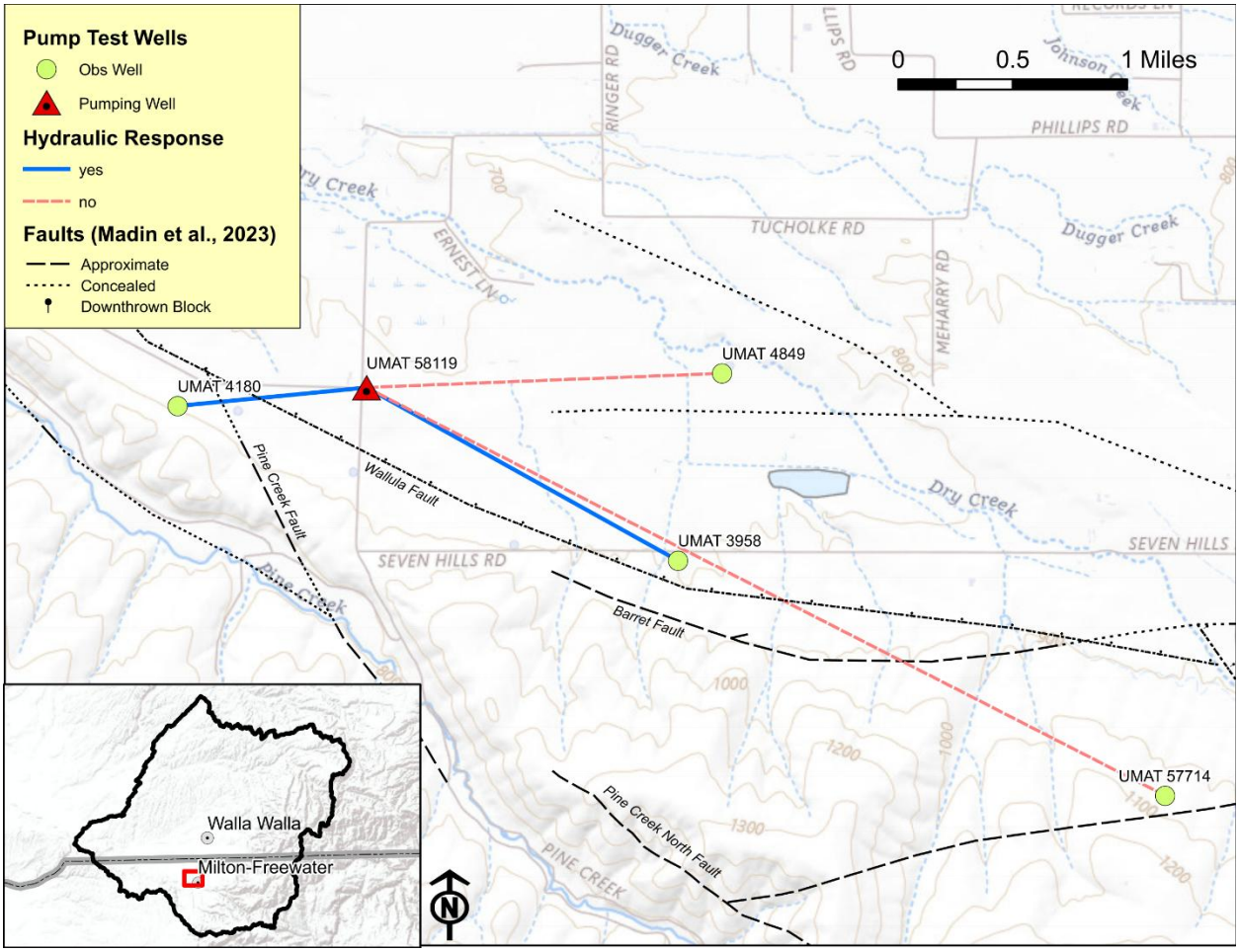


Figure 88: Map of Wells Measured During Pumping UMAT 58119 Test 2

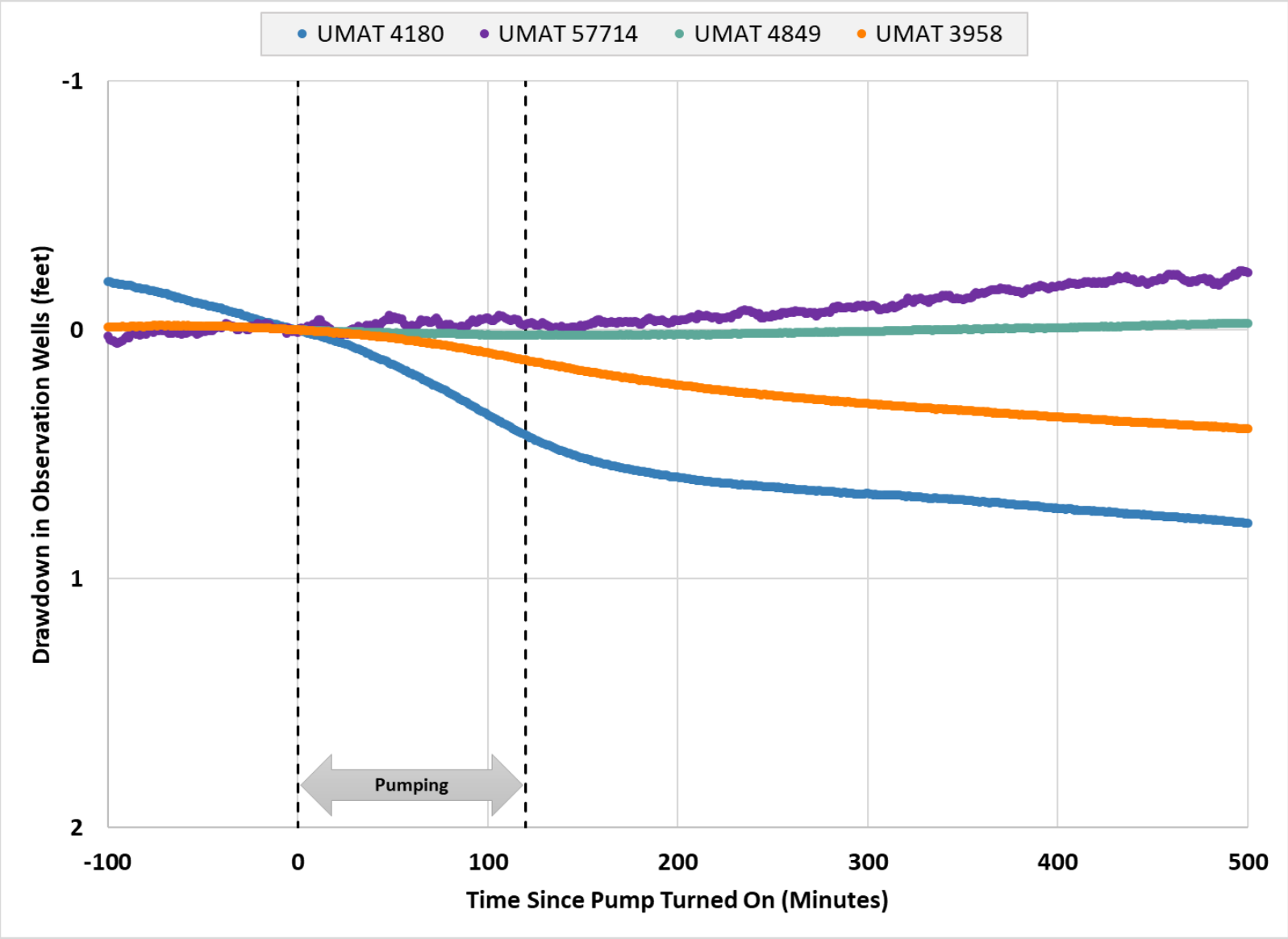


Figure 89: UMAT 58119 Test 2 water level changes in arithmetic time. Barometric pressure is plotted as equivalent feet of water.

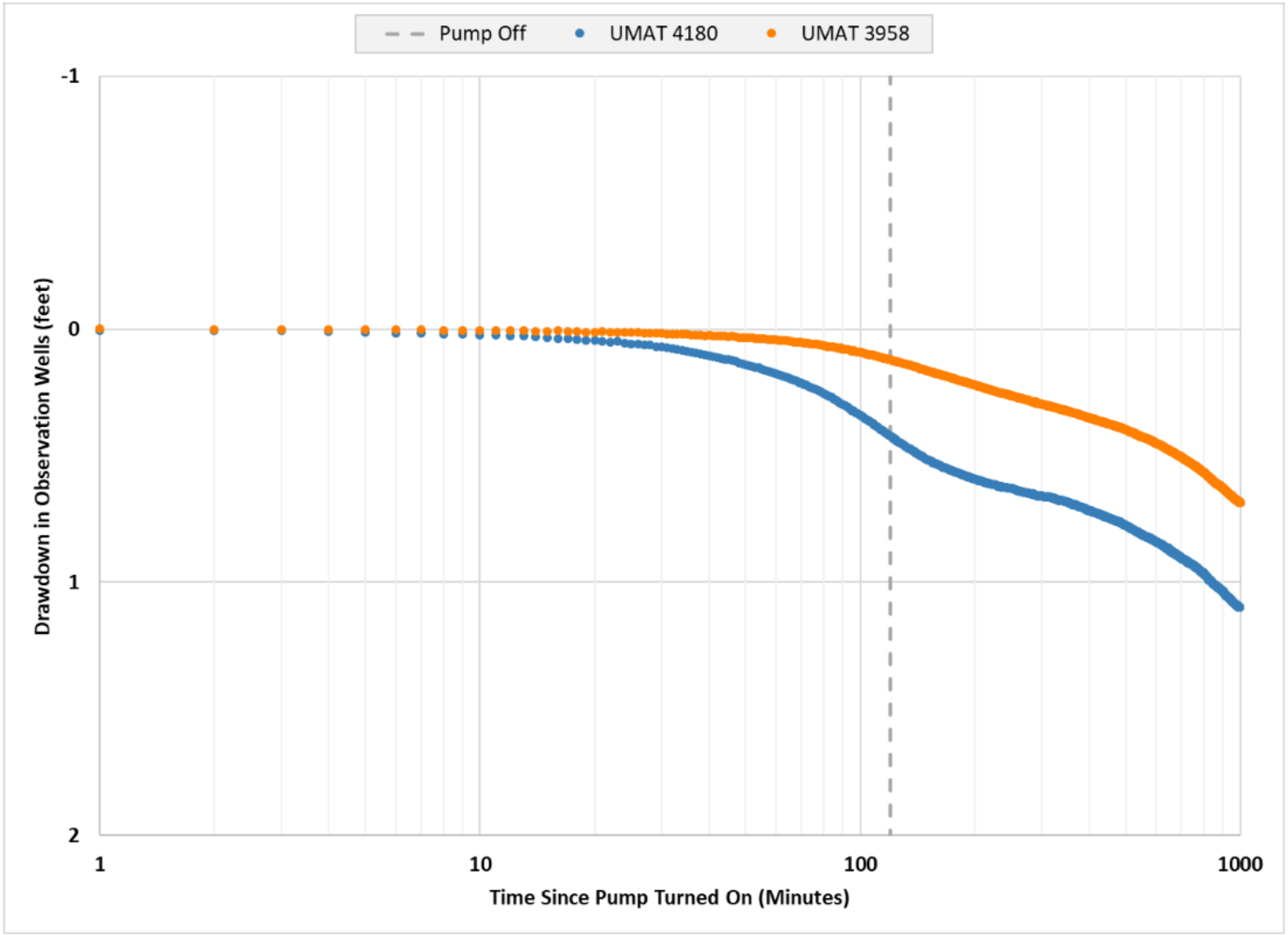


Figure 90: Drawdown in Observation Wells During Pumping Phase of UMAT 58119 Test 2

Table 46. UMAT 58119 Test 2 Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 4180	1.1	Theis	Pumping & Recovery	7850	0.0001	434	18.1
UMAT 4180	1.1	Straight Line	Pumping Late	13660	0.00010	434	31.5
UMAT 3958	0.7	Theis	Pumping & Recovery	4790	0.00008	423	11.30
UMAT 3958	0.7	Straight Line	Pumping Late	31830	0.00009	423	75.2

OWRD UMAT 58119 Test 3:
Date: 3/22/2018 **Pumping Well**: UMAT 58119
Duration: 7.1 hours **Pumping Rate**: 1000 gpm
Note: UMAT 58119 was partially constructed at the time of this test. The well was sealed to 580 feet BLS and had an open interval from 580-680 feet BLS.

Table 47. UMAT 58119 Test 3 Well Summary

OWRD LOGID	Test Roll	Measurement Type	Distance from Pumped Well (ft)	Depth		Stratigraphic Unit(s)	Measurable Response
UMAT 58119	Pumping	None	0	680	164 to 64	Twfsl	NA
UMAT 3958	Observation	Transducer	5725	625	173 to 596	Twfsl, Twfh	Yes
UMAT 4849	Observation	Transducer	5723	970	-222 to 0, 109 to 378	Twfsl, Twfh	Yes
UMAT 4180	Observation	Transducer	3050	452	332 to 766	QTcg, Twfsl, Twfh, Tgs	Yes
UMAT 57714	Observation	Transducer	14415	1160	-113 to 354	Tgs, Tgww	Yes

Abbreviations: **QTsc**: sandstone and clay; **Twfsl**: Basalt of Sentinel Gap, low-phosphorous lava flows of Frenchman Springs Member, Wanapum Formation; **Twfh**: Basalt of Sand Hollow, Frenchman Springs Member, Wanapum Formation; **Tgs**: Sentinel Bluffs Member, Grande Ronde Formation; **Tgww**: Winter Water Member, Grande Ronde Formation

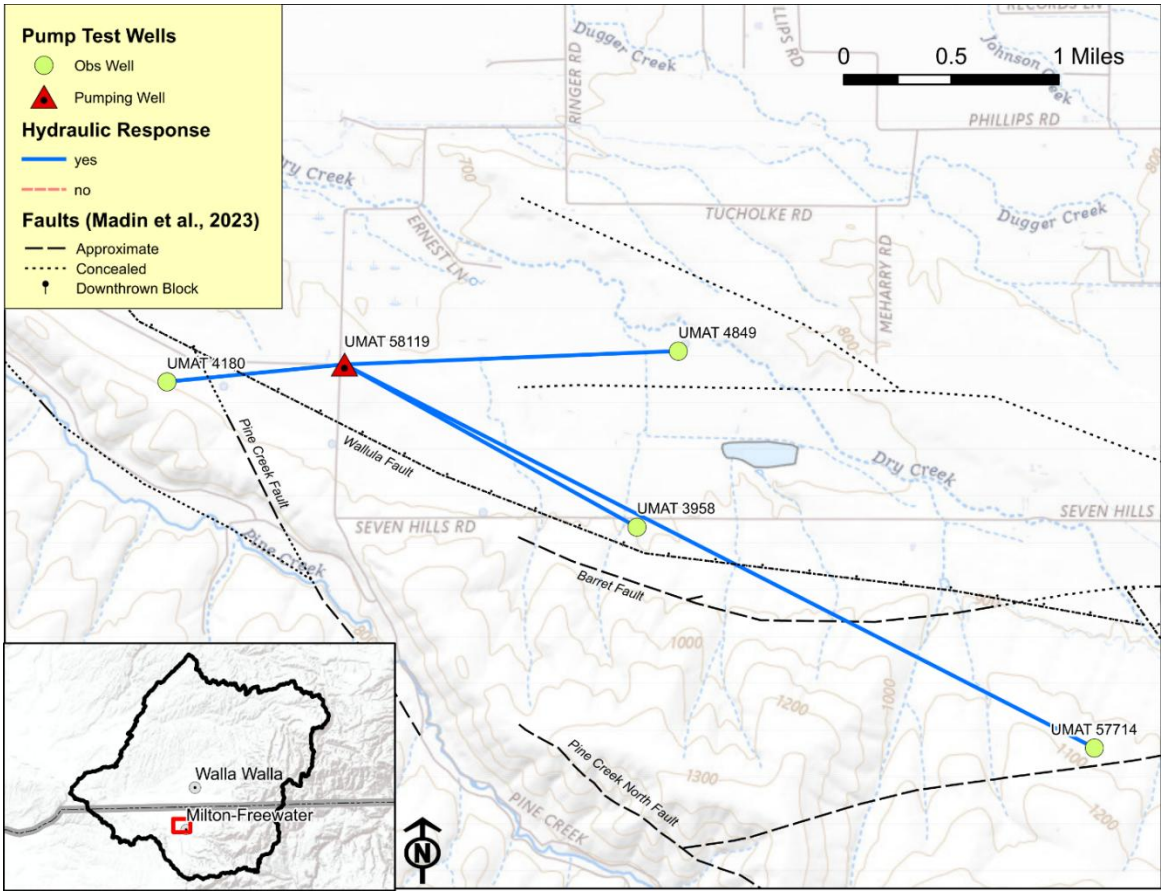


Figure 91: Map of Wells Measured During Pumping UMAT 58119 Test 3

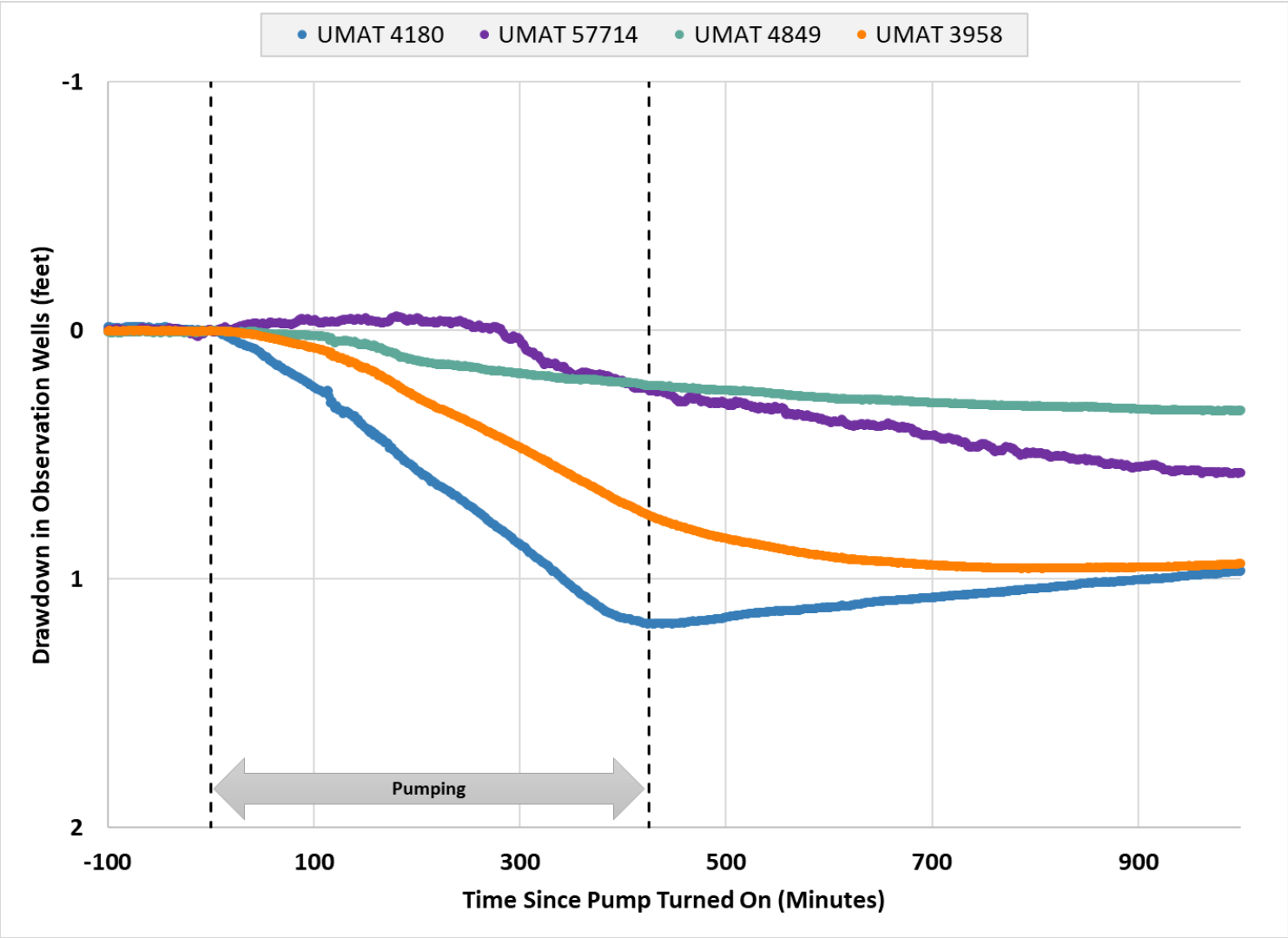


Figure 92: UMAT 58119 Test 3 water level changes in arithmetic time

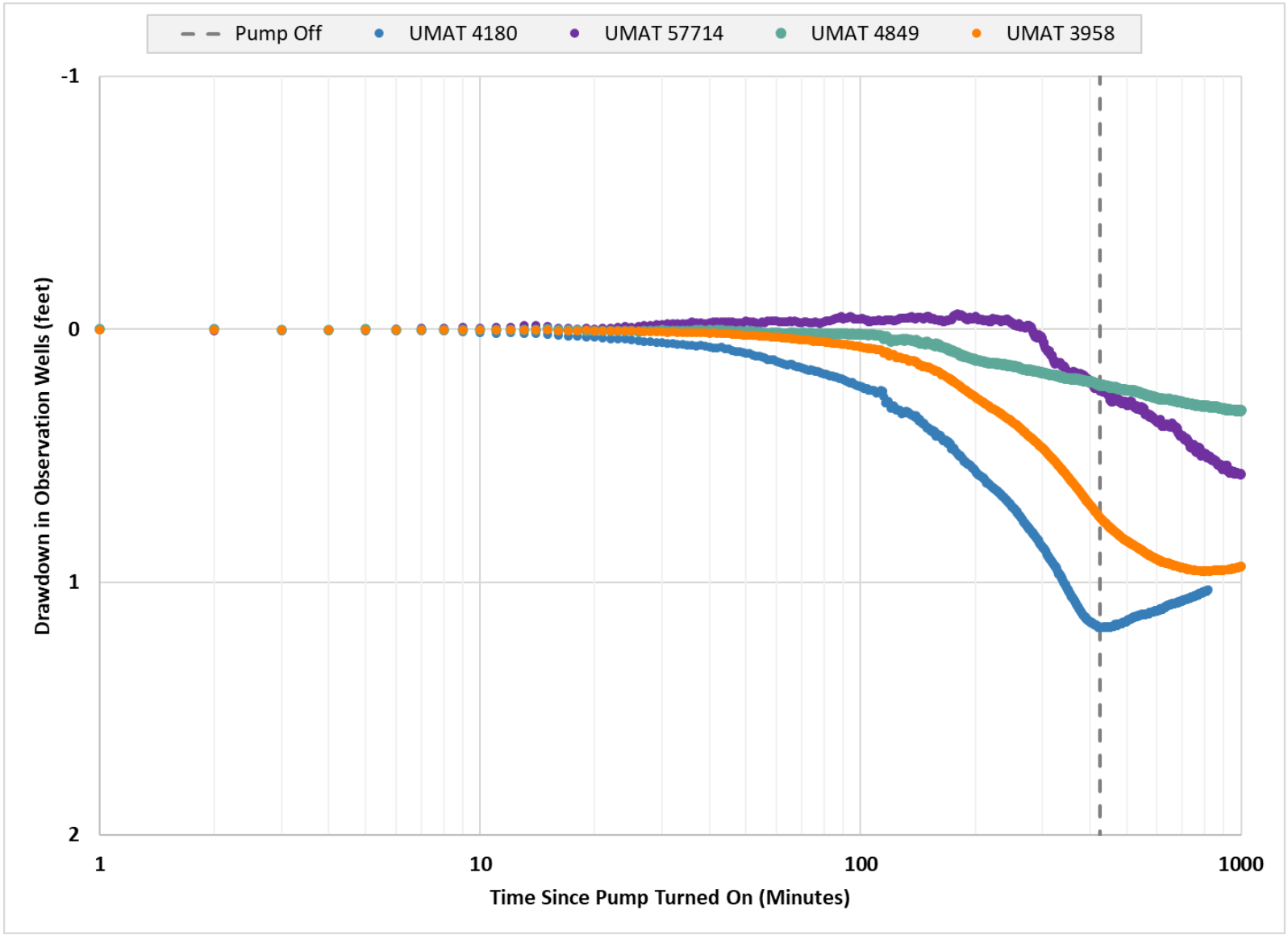


Figure 93: Drawdown in Observation Wells During Pumping Phase of UMAT 58119 Test 3

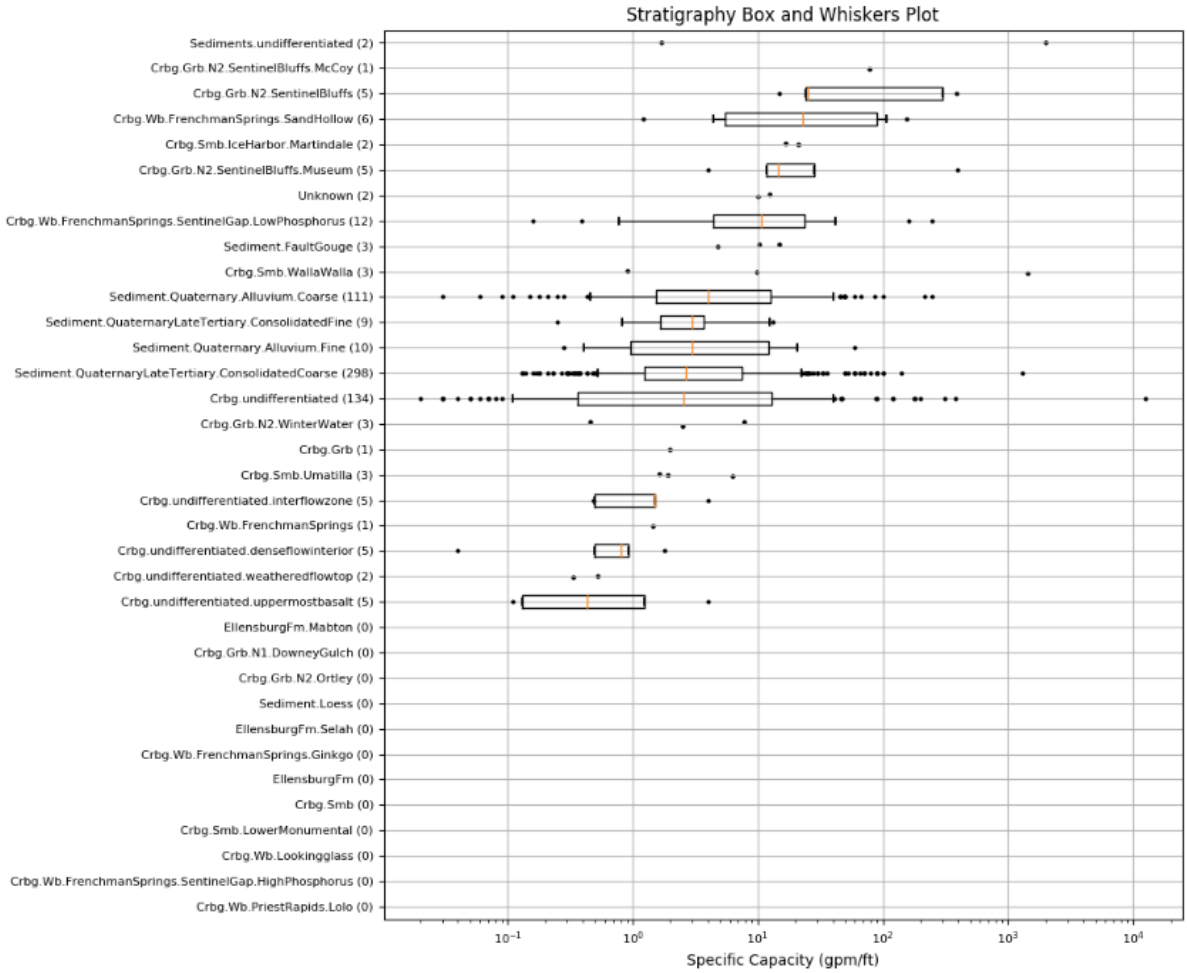
Table 48. UMAT 58119 Test 3 Parameter Estimates

LOGID	Drawdown (ft)	Analysis Method	Test Time	Transmissivity (ft^2/d)	Storativity	Open Interval (ft bls)	Hydraulic Conductivity (ft/d)
UMAT 3958	0.95	Theis	Pumping & Recovery	2250	0.00013	423	5.3
UMAT 3958	0.95	Straight Line	Late Pumping	24350	0.00020	423	57.6
UMAT 4849	0.34	Theis	Pumping & Recovery	6020	0.00038	600	10.0
UMAT 4849	0.34	Straight Line	Late Pumping	22970	0.00023	600	38.3
UMAT 4180	1.2	Theis	Pumping & Recovery	3310	0.00036	434	7.6
UMAT 4180	1.2	Straight Line	Late Pumping	19210	0.00042	434	44.3
UMAT 57714	0.55	Theis	Pumping & Recovery	2820	0.00004	467	6.0

Appendix C: Single Well Test Data

Hydraulic properties generated by this study from single well tests are listed by well log in the tables below. Calculations incorporated well log lithology, well construction features, stratigraphy, reported single well pumping tests and well log specific capacity tests. Raw data sets from reported single well pumping tests (referred to as pump tests in the following tables) and well log specific capacity tests (well tests) are published in OWRD's GWIS; they are accessible through a well logid search here: https://apps.wrd.state.or.us/apps/gw/gw_info/gw_info_report/gw_search.aspx .

Specific Capacity by Stratigraphic unit



Wells are sorted by well logid in the following tables.

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
STWA0000026	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.18	Well Test
STWA0000074	Sediment.Quaternary.Alluvium.Coarse	1.07	Well Test
STWA0000141	Crbg.undifferentiated	17.50	Well Test
STWA0021266	Crbg.undifferentiated	24.34	Well Test
STWA0021290	Crbg.undifferentiated.interflowzone	1.51	Well Test
STWA0021310	Crbg.Grb.N2.SentinelBluffs.Museum	28.41	Well Test
STWA0021333	Sediment.Quaternary.Alluvium.Fine	12.98	Well Test
STWA0021337	Crbg.undifferentiated	2.78	Well Test
STWA0021357	Crbg.undifferentiated	13.33	Well Test
STWA0021381	Crbg.undifferentiated	8.31	Well Test
STWA0021382	Crbg.undifferentiated	200.00	Well Test
STWA0021406	Crbg.undifferentiated	88.50	Well Test
STWA0021409	Unknown	12.50	Well Test
STWA0021426	Sediment.Quaternary.Alluvium.Coarse	4.29	Well Test
STWA0021474	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.43	Well Test
STWA0021482	Sediment.QuaternaryLateTertiary.ConsolidatedFine	2.76	Well Test
STWA0021496	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Well Test
STWA0021576	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.36	Well Test
STWA0021602	Crbg.undifferentiated	176.15	Well Test
STWA0021613	Crbg.undifferentiated	26.67	Well Test
STWA0021687	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.07	Well Test
STWA0021693	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.00	Well Test
STWA0021694	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.10	Well Test
STWA0021700	Crbg.undifferentiated	0.23	Well Test
STWA0021703	Sediment.Quaternary.Alluvium.Coarse	3.00	Well Test
STWA0021720	Crbg.undifferentiated	2.38	Well Test
STWA0021743	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.23	Well Test
STWA0021794	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.57	Well Test
STWA0021797	Crbg.undifferentiated	3.12	Well Test
STWA0021806	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.62	Well Test
STWA0021810	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.47	Well Test
STWA0021820	Crbg.undifferentiated	5.58	Well Test
STWA0021823	Crbg.undifferentiated	3.14	Well Test
STWA0021847	Crbg.undifferentiated	0.25	Well Test
STWA0021850	Crbg.undifferentiated	40.91	Well Test
STWA0021853	Crbg.undifferentiated	46.88	Well Test
STWA0021901	Crbg.undifferentiated	18.05	Well Test
STWA0021914	Crbg.undifferentiated	88.92	Well Test
STWA0021922	Crbg.undifferentiated	314.00	Well Test
STWA0021929	Crbg.undifferentiated	380.00	Well Test
STWA0021934	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.61	Well Test
STWA0021944	Crbg.undifferentiated	16.13	Well Test
STWA0021964	Crbg.undifferentiated	8.87	Well Test
STWA0021976	Crbg.undifferentiated	23.33	Well Test
STWA0021996	Crbg.undifferentiated	3.11	Well Test
STWA0022000	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	33.33	Well Test
STWA0022010	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.82	Well Test
STWA0022027	Crbg.undifferentiated	0.26	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
STWA0022032	Crbg.undifferentiated	35.00	Well Test
STWA0022038	Crbg.undifferentiated	31.56	Well Test
STWA0022047	Crbg.undifferentiated	1.50	Well Test
STWA0022063	Crbg.undifferentiated	12.51	Well Test
STWA0022067	Crbg.undifferentiated	180.00	Well Test
STWA0022116	Crbg.undifferentiated	47.20	Well Test
STWA0022140	Crbg.undifferentiated	10.86	Well Test
STWA0030520	Sediment.QuaternaryLateTertiary.ConsolidatedFine	12.50	Well Test
STWA0154220	Sediment.Quaternary.Alluvium.Coarse	214.29	Well Test
STWA0154223	Sediment.Quaternary.Alluvium.Coarse	66.67	Well Test
STWA0154225	Sediment.Quaternary.Alluvium.Coarse	85.71	Well Test
STWA0154679	Crbg.undifferentiated	2.00	Well Test
STWA0165633	Crbg.undifferentiated	24.22	Well Test
STWA0168614	Crbg.undifferentiated	3.34	Well Test
STWA0174032	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.67	Well Test
STWA0175031	Sediment.Quaternary.Alluvium.Fine	0.67	Well Test
STWA0176902	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.36	Well Test
STWA0293368	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	33.33	Well Test
STWA0322677	Crbg.undifferentiated.weatheredflowtop	0.33	Well Test
STWA0347030	Crbg.undifferentiated	120.97	Well Test
STWA0347044	Sediment.Quaternary.Alluvium.Coarse	2.19	Well Test
STWA0376602	Sediment.Quaternary.Alluvium.Coarse	1.58	Well Test
STWA0384906	Crbg.undifferentiated	45.83	Well Test
STWA0408381	Sediment.Quaternary.Alluvium.Coarse	4.29	Well Test
STWA0408445	Sediment.Quaternary.Alluvium.Coarse	14.42	Well Test
STWA0410849	Sediment.Quaternary.Alluvium.Coarse	1.30	Well Test
STWA0429182	Crbg.undifferentiated	4.63	Well Test
STWA0430368	Sediment.Quaternary.Alluvium.Coarse	4.00	Well Test
STWA0472609	Sediment.Quaternary.Alluvium.Coarse	0.46	Well Test
STWA0472613	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.89	Well Test
STWA0472776	Sediment.Quaternary.Alluvium.Coarse	250.00	Well Test
STWA0501155	Crbg.undifferentiated	2.50	Well Test
STWA0511923	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.59	Well Test
STWA0559951	Sediment.Quaternary.Alluvium.Coarse	1.43	Well Test
STWA0663515	Crbg.undifferentiated	0.20	Well Test
STWA1591751	Sediment.Quaternary.Alluvium.Coarse	0.25	Well Test
STWA1634725	Sediment.QuaternaryLateTertiary.ConsolidatedFine	3.70	Well Test
STWA1691570	Sediment.Quaternary.Alluvium.Coarse	1.25	Well Test
STWA1711720	Sediment.Quaternary.Alluvium.Coarse	0.45	Well Test
STWA1874663	Sediment.Quaternary.Alluvium.Coarse	2.50	Well Test
STWA1894037	Sediment.Quaternary.Alluvium.Fine	0.28	Well Test
STWA1900319	Sediment.Quaternary.Alluvium.Coarse	0.18	Well Test
STWA1924775	Crbg.undifferentiated	6.09	Well Test
STWA1970319	Crbg.undifferentiated	18.89	Well Test
UMAT0001441	Crbg.undifferentiated	0.87	Well Test
UMAT0001443	Crbg.undifferentiated	0.33	Well Test
UMAT0001444	Crbg.undifferentiated	1.29	Well Test
UMAT0001448	Crbg.undifferentiated	0.06	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0001465	Crbg.undifferentiated	0.13	Well Test
UMAT0001466	Sediment.Quaternary.Alluvium.Coarse	3.60	Well Test
UMAT0001467	Sediment.Quaternary.Alluvium.Coarse	0.03	Well Test
UMAT0001471	Crbg.undifferentiated	0.83	Well Test
UMAT0001487	Crbg.undifferentiated	18.00	Well Test
UMAT0001489	Crbg.undifferentiated	0.14	Well Test
UMAT0001490	Crbg.undifferentiated	0.02	Well Test
UMAT0001494	Crbg.undifferentiated	8.00	Well Test
UMAT0001496	Crbg.undifferentiated	0.15	Well Test
UMAT0001499	Crbg.undifferentiated	1.43	Well Test
UMAT0001500	Crbg.undifferentiated	2.86	Well Test
UMAT0001501	Crbg.undifferentiated	120.00	Well Test
UMAT0001502	Crbg.undifferentiated	1.28	Well Test
UMAT0001517	Crbg.undifferentiated	33.33	Well Test
UMAT0003042	Crbg.undifferentiated	0.52	Well Test
UMAT0003046	Crbg.undifferentiated	0.22	Well Test
UMAT0003047	Crbg.undifferentiated	6.96	Well Test
UMAT0003053	Crbg.undifferentiated	0.28	Well Test
UMAT0003054	Crbg.undifferentiated	0.38	Well Test
UMAT0003063	Crbg.undifferentiated	2.69	Well Test
UMAT0003065	Crbg.undifferentiated	0.29	Well Test
UMAT0003066	Crbg.undifferentiated	3.54	Pump Test
UMAT0003067	Crbg.undifferentiated	12.50	Well Test
UMAT0003073	Crbg.undifferentiated	3.60	Well Test
UMAT0003074	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	0.39	Well Test
UMAT0003075	Crbg.undifferentiated	1.08	Well Test
UMAT0003076	Crbg.undifferentiated	7.11	Well Test
UMAT0003079	Crbg.undifferentiated	1.96	Well Test
UMAT0003084	Crbg.undifferentiated	0.65	Well Test
UMAT0003089	Crbg.undifferentiated	20.49	Pump Test
UMAT0003091	Crbg.undifferentiated	4.40	Well Test
UMAT0003092	Crbg.undifferentiated	1.58	Well Test
UMAT0003093	Crbg.undifferentiated	21.43	Well Test
UMAT0003096	Crbg.undifferentiated	6.69	Well Test
UMAT0003097	Crbg.undifferentiated	0.03	Well Test
UMAT0003104	Crbg.undifferentiated	40.00	Well Test
UMAT0003106	Crbg.undifferentiated	3.33	Well Test
UMAT0003108	Crbg.undifferentiated	0.83	Well Test
UMAT0003109	Crbg.undifferentiated	2.14	Well Test
UMAT0003124	Crbg.undifferentiated	0.03	Well Test
UMAT0003127	Crbg.undifferentiated	0.11	Well Test
UMAT0003138	Sediment.Quaternary.Alluvium.Coarse	0.11	Well Test
UMAT0003143	Sediment.Quaternary.Alluvium.Coarse	1.09	Well Test
UMAT0003148	Crbg.undifferentiated.denseflowinterior	0.04	Well Test
UMAT0003149	Crbg.undifferentiated	0.13	Well Test
UMAT0003152	Crbg.undifferentiated	0.13	Well Test
UMAT0003166	Crbg.undifferentiated	0.67	Well Test
UMAT0003174	Crbg.undifferentiated	0.07	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0003191	Crbg.undifferentiated	0.04	Well Test
UMAT0003192	Crbg.undifferentiated	0.07	Well Test
UMAT0003196	Crbg.undifferentiated	0.63	Well Test
UMAT0003197	Crbg.undifferentiated	2.20	Well Test
UMAT0003211	Crbg.undifferentiated.denseflowinterior	0.50	Well Test
UMAT0003214	Crbg.undifferentiated	0.03	Well Test
UMAT0003217	Crbg.undifferentiated	0.05	Well Test
UMAT0003218	Crbg.undifferentiated	0.11	Well Test
UMAT0003219	Crbg.undifferentiated	0.74	Well Test
UMAT0003222	Crbg.undifferentiated	0.15	Well Test
UMAT0003224	Crbg.undifferentiated	0.36	Well Test
UMAT0003225	Crbg.undifferentiated	2.50	Well Test
UMAT0003229	Crbg.undifferentiated	0.18	Well Test
UMAT0003234	Crbg.undifferentiated	0.09	Well Test
UMAT0003235	Crbg.undifferentiated	0.07	Well Test
UMAT0003241	Crbg.undifferentiated.weatheredflowtop	0.53	Well Test
UMAT0003251	Sediment.QuaternaryLateTertiary.ConsolidatedFine	0.25	Well Test
UMAT0003254	Crbg.undifferentiated.uppermostbasalt	4.00	Well Test
UMAT0003255	Crbg.undifferentiated.uppermostbasalt	1.25	Well Test
UMAT0003256	Crbg.undifferentiated.interflowzone	0.50	Well Test
UMAT0003257	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.17	Well Test
UMAT0003258	Sediment.Quaternary.Alluvium.Fine	4.00	Well Test
UMAT0003266	Sediment.Quaternary.Alluvium.Fine	2.00	Well Test
UMAT0003269	Sediment.Quaternary.Alluvium.Fine	60.00	Well Test
UMAT0003278	Sediment.Quaternary.Alluvium.Coarse	2.50	Well Test
UMAT0003864	Crbg.undifferentiated	40.00	Well Test
UMAT0003872	Crbg.undifferentiated.uppermostbasalt	0.11	Well Test
UMAT0003875	Crbg.undifferentiated.denseflowinterior	0.93	Well Test
UMAT0003886	Sediment.QuaternaryLateTertiary.ConsolidatedFine	3.01	Pump Test
UMAT0003890	Sediment.Quaternary.Alluvium.Coarse	15.00	Well Test
UMAT0003899	Crbg.Wb.FrenchmanSprings.SandHollow	37.00	Well Test
UMAT0003917	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.38	Well Test
UMAT0003929	Sediment.FaultGouge	14.98	Pump Test
UMAT0003929	Sediment.FaultGouge	10.34	Well Test
UMAT0003930	Crbg.Wb.FrenchmanSprings.SandHollow	8.82	Well Test
UMAT0003932	Sediment.Quaternary.Alluvium.Coarse	5.00	Well Test
UMAT0003936	Sediment.Quaternary.Alluvium.Coarse	9.52	Well Test
UMAT0003951	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.53	Well Test
UMAT0003958	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	7.79	Well Test
UMAT0003962	Crbg.Grb.N2.SentinelBluffs	14.92	Pump Test
UMAT0003968	Crbg.undifferentiated.uppermostbasalt	0.13	Well Test
UMAT0003981	Sediment.Quaternary.Alluvium.Coarse	0.45	Well Test
UMAT0003983	Crbg.undifferentiated	0.05	Well Test
UMAT0003984	Sediment.Quaternary.Alluvium.Coarse	0.06	Well Test
UMAT0003988	Sediment.Quaternary.Alluvium.Coarse	6.00	Well Test
UMAT0004000	Crbg.undifferentiated	1.29	Well Test
UMAT0004003	Crbg.undifferentiated	0.33	Well Test
UMAT0004010	Crbg.Grb.N2.WinterWater	7.76	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0004014	Sediment.Quaternary.Alluvium.Coarse	0.09	Well Test
UMAT0004019	Crbg.undifferentiated.interflowzone	4.00	Well Test
UMAT0004020	Crbg.undifferentiated	1.67	Well Test
UMAT0004022	Crbg.undifferentiated	0.50	Well Test
UMAT0004024	Sediment.Quaternary.Alluvium.Coarse	3.75	Well Test
UMAT0004025	Crbg.undifferentiated	2.38	Well Test
UMAT0004028	Crbg.undifferentiated	0.85	Well Test
UMAT0004031	Crbg.undifferentiated	0.33	Well Test
UMAT0004032	Sediment.Quaternary.Alluvium.Coarse	0.50	Well Test
UMAT0004037	Crbg.undifferentiated	2.96	Well Test
UMAT0004039	Crbg.undifferentiated	0.43	Well Test
UMAT0004040	Sediment.Quaternary.Alluvium.Coarse	30.00	Well Test
UMAT0004042	Crbg.undifferentiated.denseflowinterior	0.80	Well Test
UMAT0004044	Crbg.undifferentiated.uppermostbasalt	0.43	Well Test
UMAT0004048	Crbg.undifferentiated.interflowzone	1.50	Well Test
UMAT0004063	Crbg.undifferentiated	0.50	Well Test
UMAT0004065	Sediment.Quaternary.Alluvium.Coarse	45.00	Well Test
UMAT0004072	Crbg.undifferentiated	1.74	Well Test
UMAT0004076	Sediment.Quaternary.Alluvium.Fine	20.69	Well Test
UMAT0004080	Sediment.QuaternaryLateTertiary.ConsolidatedFine	0.83	Well Test
UMAT0004087	Sediment.Quaternary.Alluvium.Coarse	2.50	Well Test
UMAT0004090	Sediment.Quaternary.Alluvium.Coarse	2.07	Well Test
UMAT0004094	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	14.84	Well Test
UMAT0004096	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.00	Well Test
UMAT0004100	Sediments.undifferentiated	2000.00	Well Test
UMAT0004101	Crbg.undifferentiated	4.00	Well Test
UMAT0004102	Sediment.QuaternaryLateTertiary.ConsolidatedFine	13.10	Well Test
UMAT0004107	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.74	Well Test
UMAT0004108	Sediment.Quaternary.Alluvium.Coarse	1.88	Well Test
UMAT0004113	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.80	Well Test
UMAT0004114	Sediment.Quaternary.Alluvium.Coarse	2.00	Well Test
UMAT0004115	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	71.43	Well Test
UMAT0004116	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.56	Well Test
UMAT0004118	Sediment.Quaternary.Alluvium.Coarse	3.13	Well Test
UMAT0004119	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.50	Well Test
UMAT0004120	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.08	Well Test
UMAT0004121	Sediment.Quaternary.Alluvium.Fine	1.88	Well Test
UMAT0004122	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.67	Well Test
UMAT0004126	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.34	Well Test
UMAT0004127	Sediment.Quaternary.Alluvium.Coarse	30.00	Well Test
UMAT0004133	Sediment.Quaternary.Alluvium.Coarse	13.33	Well Test
UMAT0004143	Sediment.Quaternary.Alluvium.Coarse	2.00	Well Test
UMAT0004144	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	71.43	Well Test
UMAT0004146	Sediment.Quaternary.Alluvium.Coarse	0.28	Well Test
UMAT0004148	Sediment.Quaternary.Alluvium.Coarse	1.33	Well Test
UMAT0004149	Sediment.Quaternary.Alluvium.Coarse	1.14	Well Test
UMAT0004152	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.50	Well Test
UMAT0004153	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0004155	Sediment.Quaternary.Alluvium.Coarse	37.50	Well Test
UMAT0004158	Sediment.Quaternary.Alluvium.Coarse	0.43	Well Test
UMAT0004160	Sediment.Quaternary.Alluvium.Coarse	18.18	Well Test
UMAT0004161	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.00	Well Test
UMAT0004162	Sediment.Quaternary.Alluvium.Coarse	15.00	Well Test
UMAT0004163	Sediment.Quaternary.Alluvium.Coarse	100.00	Well Test
UMAT0004166	Crbg.undifferentiated	3.69	Well Test
UMAT0004167	Crbg.undifferentiated	18.52	Pump Test
UMAT0004168	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.64	Well Test
UMAT0004175	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.20	Well Test
UMAT0004180	Crbg.Wb.FrenchmanSprings.SandHollow	4.39	Pump Test
UMAT0004182	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.08	Well Test
UMAT0004185	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	162.00	Pump Test
UMAT0004185	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	250.00	Well Test
UMAT0004186	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1300.00	Well Test
UMAT0004187	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.73	Pump Test
UMAT0004187	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.66	Well Test
UMAT0004192	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.35	Well Test
UMAT0004195	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.58	Well Test
UMAT0004202	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	24.17	Well Test
UMAT0004204	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.14	Well Test
UMAT0004205	Sediments.undifferentiated	1.69	Well Test
UMAT0004207	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.00	Well Test
UMAT0004211	Sediment.QuaternaryLateTertiary.ConsolidatedFine	3.33	Well Test
UMAT0004216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	90.00	Well Test
UMAT0004217	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.00	Well Test
UMAT0004219	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.75	Well Test
UMAT0004222	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Well Test
UMAT0004228	Sediment.Quaternary.Alluvium.Coarse	0.97	Well Test
UMAT0004229	Sediment.Quaternary.Alluvium.Coarse	5.00	Well Test
UMAT0004238	Sediment.Quaternary.Alluvium.Coarse	14.99	Pump Test
UMAT0004247	Sediment.Quaternary.Alluvium.Coarse	7.50	Well Test
UMAT0004249	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.25	Well Test
UMAT0004256	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	35.89	Well Test
UMAT0004261	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.35	Well Test
UMAT0004268	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.71	Well Test
UMAT0004269	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.50	Well Test
UMAT0004271	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.67	Well Test
UMAT0004275	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.67	Well Test
UMAT0004276	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0004279	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.09	Pump Test
UMAT0004281	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	16.60	Well Test
UMAT0004282	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.75	Well Test
UMAT0004284	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.23	Well Test
UMAT0004291	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.30	Well Test
UMAT0004293	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.61	Well Test
UMAT0004294	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.31	Well Test
UMAT0004297	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.11	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0004298	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.65	Well Test
UMAT0004301	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.38	Well Test
UMAT0004305	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.35	Well Test
UMAT0004306	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.00	Well Test
UMAT0004315	Sediment.Quaternary.Alluvium.Coarse	50.00	Well Test
UMAT0004320	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.00	Well Test
UMAT0004325	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.33	Well Test
UMAT0004327	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.29	Well Test
UMAT0004328	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	14.00	Well Test
UMAT0004329	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.07	Well Test
UMAT0004332	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	18.88	Well Test
UMAT0004344	Sediment.Quaternary.Alluvium.Coarse	50.00	Well Test
UMAT0004347	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.25	Well Test
UMAT0004362	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Well Test
UMAT0004366	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.67	Well Test
UMAT0004367	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.24	Well Test
UMAT0004368	Sediment.Quaternary.Alluvium.Coarse	16.50	Well Test
UMAT0004378	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.00	Well Test
UMAT0004379	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.93	Well Test
UMAT0004380	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.00	Well Test
UMAT0004381	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.88	Pump Test
UMAT0004383	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.75	Well Test
UMAT0004401	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.00	Well Test
UMAT0004407	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.94	Well Test
UMAT0004409	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.33	Well Test
UMAT0004410	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	11.20	Well Test
UMAT0004411	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.34	Well Test
UMAT0004414	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	100.00	Well Test
UMAT0004416	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.27	Well Test
UMAT0004418	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.55	Pump Test
UMAT0004425	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.00	Well Test
UMAT0004434	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.14	Well Test
UMAT0004449	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	25.00	Well Test
UMAT0004462	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.54	Well Test
UMAT0004464	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.00	Well Test
UMAT0004466	Sediment.Quaternary.Alluvium.Coarse	7.50	Well Test
UMAT0004471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.30	Pump Test
UMAT0004471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.29	Well Test
UMAT0004472	Sediment.Quaternary.Alluvium.Coarse	1.88	Well Test
UMAT0004476	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.58	Well Test
UMAT0004478	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	30.00	Well Test
UMAT0004479	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.00	Well Test
UMAT0004482	Sediment.Quaternary.Alluvium.Coarse	1.82	Well Test
UMAT0004483	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Well Test
UMAT0004486	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.26	Well Test
UMAT0004490	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.67	Well Test
UMAT0004504	Sediment.Quaternary.Alluvium.Coarse	10.00	Well Test
UMAT0004540	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.06	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0004541	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.70	Well Test
UMAT0004543	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.33	Well Test
UMAT0004549	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.00	Well Test
UMAT0004577	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0004579	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	90.00	Well Test
UMAT0004635	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0004644	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.45	Well Test
UMAT0004645	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.88	Well Test
UMAT0004646	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.38	Well Test
UMAT0004647	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.00	Well Test
UMAT0004653	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.98	Well Test
UMAT0004660	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.33	Well Test
UMAT0004677	Sediment.Quaternary.Alluvium.Coarse	2.00	Well Test
UMAT0004678	Sediment.Quaternary.Alluvium.Coarse	4.00	Well Test
UMAT0004680	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	11.10	Well Test
UMAT0004701	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.50	Well Test
UMAT0004717	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.70	Well Test
UMAT0004718	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.23	Well Test
UMAT0004724	Sediment.Quaternary.Alluvium.Coarse	1.67	Well Test
UMAT0004756	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.00	Well Test
UMAT0004757	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.95	Well Test
UMAT0004758	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.67	Well Test
UMAT0004759	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.82	Well Test
UMAT0004760	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.23	Well Test
UMAT0004763	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.14	Well Test
UMAT0004764	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.69	Well Test
UMAT0004767	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.09	Well Test
UMAT0004774	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.74	Well Test
UMAT0004778	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.50	Well Test
UMAT0004781	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.50	Well Test
UMAT0004799	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.14	Well Test
UMAT0004800	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.57	Well Test
UMAT0004805	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.00	Well Test
UMAT0004822	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.43	Well Test
UMAT0004827	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.08	Well Test
UMAT0004831	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.20	Well Test
UMAT0004840	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.80	Well Test
UMAT0004848	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.30	Well Test
UMAT0004849	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	5.60	Well Test
UMAT0004857	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.67	Well Test
UMAT0004859	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.29	Pump Test
UMAT0004859	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	80.00	Well Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	9.71	Pump Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	11.45	Pump Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	17.86	Well Test
UMAT0004874	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.68	Pump Test
UMAT0004874	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.89	Well Test
UMAT0004885	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	14.29	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0004888	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.05	Well Test
UMAT0004898	Unknown	10.00	Well Test
UMAT0004942	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.77	Well Test
UMAT0004944	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.67	Well Test
UMAT0004953	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.31	Well Test
UMAT0004968	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Well Test
UMAT0004970	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.18	Well Test
UMAT0004971	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.63	Well Test
UMAT0004974	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	22.50	Well Test
UMAT0005029	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.71	Well Test
UMAT0005036	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.60	Well Test
UMAT0005049	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.60	Well Test
UMAT0005052	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.08	Well Test
UMAT0005065	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.79	Well Test
UMAT0005127	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.50	Well Test
UMAT0005133	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.94	Well Test
UMAT0005136	Sediment.Quaternary.Alluvium.Coarse	8.75	Well Test
UMAT0005138	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	90.00	Well Test
UMAT0005147	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.43	Well Test
UMAT0005169	Sediment.Quaternary.Alluvium.Fine	0.41	Well Test
UMAT0005170	Sediment.QuaternaryLateTertiary.ConsolidatedFine	1.67	Well Test
UMAT0005172	Sediment.Quaternary.Alluvium.Coarse	6.50	Well Test
UMAT0005173	Sediment.Quaternary.Alluvium.Coarse	3.89	Well Test
UMAT0005180	Crbg.Wb.FrenchmanSprings.SandHollow	107.67	Well Test
UMAT0005187	Crbg.undifferentiated	7.32	Well Test
UMAT0005193	Crbg.Grb.N2.SentinelBluffs.Museum	11.67	Well Test
UMAT0005209	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	140.00	Well Test
UMAT0005210	Sediment.Quaternary.Alluvium.Coarse	7.50	Well Test
UMAT0005213	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	50.00	Well Test
UMAT0005227	Crbg.Wb.FrenchmanSprings.SandHollow	155.56	Well Test
UMAT0005231	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.19	Well Test
UMAT0005232	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	22.50	Well Test
UMAT0005241	Crbg.Grb.N2.SentinelBluffs.Museum	400.00	Well Test
UMAT0005267	Crbg.Wb.FrenchmanSprings.SandHollow	1.22	Pump Test
UMAT0005331	Crbg.Grb	1.98	Well Test
UMAT0005357	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.96	Well Test
UMAT0005370	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.33	Well Test
UMAT0005378	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.46	Well Test
UMAT0005412	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.71	Well Test
UMAT0005477	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.00	Well Test
UMAT0005496	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.82	Pump Test
UMAT0005513	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	53.00	Well Test
UMAT0005555	Crbg.undifferentiated	0.20	Well Test
UMAT0005606	Sediment.FaultGouge	4.80	Pump Test
UMAT0005625	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.61	Well Test
UMAT0005671	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.89	Pump Test
UMAT0005671	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.65	Well Test
UMAT0005788	Crbg.Smb.Umatilla	6.29	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0005841	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.16	Well Test
UMAT0005958	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.19	Well Test
UMAT0006015	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	22.93	Well Test
UMAT0006026	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.14	Well Test
UMAT0006051	Crbg.undifferentiated	0.08	Well Test
UMAT0006053	Crbg.Smb.WallaWalla	0.91	Pump Test
UMAT0006057	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0006151	Crbg.undifferentiated	2.58	Well Test
UMAT0006179	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.73	Well Test
UMAT0006180	Sediment.Quaternary.Alluvium.Coarse	6.67	Well Test
UMAT0006181	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.74	Well Test
UMAT0006184	Crbg.undifferentiated	10.00	Well Test
UMAT0006192	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.60	Well Test
UMAT0006202	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	22.50	Well Test
UMAT0006203	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.50	Well Test
UMAT0006208	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.02	Well Test
UMAT0006214	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.50	Well Test
UMAT0006283	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	12.40	Pump Test
UMAT0006283	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	41.67	Well Test
UMAT0006342	Sediment.Quaternary.Alluvium.Coarse	6.25	Well Test
UMAT0006360	Sediment.Quaternary.Alluvium.Coarse	0.21	Well Test
UMAT0006377	Sediment.Quaternary.Alluvium.Coarse	7.00	Well Test
UMAT0006446	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.47	Well Test
UMAT0006447	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.67	Well Test
UMAT0006450	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.92	Well Test
UMAT0006452	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.00	Well Test
UMAT0006455	Crbg.undifferentiated	2.00	Well Test
UMAT0006456	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.75	Well Test
UMAT0006461	Crbg.undifferentiated	2.28	Pump Test
UMAT0006463	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.38	Well Test
UMAT0006477	Sediment.Quaternary.Alluvium.Coarse	1.25	Well Test
UMAT0006512	Sediment.Quaternary.Alluvium.Coarse	17.86	Well Test
UMAT0006543	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.50	Well Test
UMAT0006566	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.69	Well Test
UMAT0006594	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.58	Well Test
UMAT0050016	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.92	Well Test
UMAT0050068	Sediment.Quaternary.Alluvium.Coarse	0.15	Well Test
UMAT0050183	Crbg.undifferentiated	3.47	Pump Test
UMAT0050237	Crbg.Grb.N2.SentinelBluffs.Museum	4.02	Pump Test
UMAT0050250	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.33	Well Test
UMAT0050354	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.38	Well Test
UMAT0050473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.06	Pump Test
UMAT0050473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	11.36	Well Test
UMAT0050478	Crbg.Smb.WallaWalla	9.78	Pump Test
UMAT0050478	Crbg.Smb.WallaWalla	1442.31	Pump Test
UMAT0050485	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.62	Pump Test
UMAT0050516	Crbg.Grb.N2.SentinelBluffs.Museum	14.57	Pump Test
UMAT0050630	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.00	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0050772	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.39	Well Test
UMAT0050938	Crbg.undifferentiated	0.68	Well Test
UMAT0051035	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.14	Well Test
UMAT0051045	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.90	Well Test
UMAT0051666	Sediment.Quaternary.Alluvium.Coarse	6.25	Well Test
UMAT0051744	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.94	Well Test
UMAT0051921	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.00	Well Test
UMAT0051947	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	18.00	Well Test
UMAT0052006	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	0.78	Pump Test
UMAT0052007	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	27.69	Pump Test
UMAT0052037	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.23	Pump Test
UMAT0052581	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.00	Well Test
UMAT0053214	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.67	Well Test
UMAT0053239	Sediment.Quaternary.Alluvium.Coarse	1.48	Well Test
UMAT0053447	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.43	Well Test
UMAT0053457	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.14	Well Test
UMAT0053462	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.13	Well Test
UMAT0053471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.33	Well Test
UMAT0053472	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.55	Well Test
UMAT0053492	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	26.00	Well Test
UMAT0053647	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	25.00	Well Test
UMAT0053711	Sediment.Quaternary.Alluvium.Coarse	3.33	Well Test
UMAT0053762	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0053763	Sediment.Quaternary.Alluvium.Coarse	0.90	Well Test
UMAT0053769	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.30	Well Test
UMAT0053829	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.05	Well Test
UMAT0053833	Sediment.Quaternary.Alluvium.Coarse	13.97	Well Test
UMAT0053888	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.92	Well Test
UMAT0053945	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.95	Well Test
UMAT0053951	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.67	Well Test
UMAT0053985	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.50	Well Test
UMAT0054097	Crbg.undifferentiated	13.08	Pump Test
UMAT0054136	Sediment.Quaternary.Alluvium.Coarse	2.50	Well Test
UMAT0054143	Sediment.Quaternary.Alluvium.Coarse	1.67	Well Test
UMAT0054171	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.33	Well Test
UMAT0054195	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.50	Well Test
UMAT0054216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.13	Pump Test
UMAT0054216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.00	Well Test
UMAT0054277	Crbg.Wb.FrenchmanSprings	1.46	Pump Test
UMAT0054296	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.00	Well Test
UMAT0054343	Sediment.Quaternary.Alluvium.Coarse	4.11	Well Test
UMAT0054393	Sediment.Quaternary.Alluvium.Coarse	1.00	Well Test
UMAT0054394	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.78	Well Test
UMAT0054424	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.00	Well Test
UMAT0054433	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0054434	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.33	Well Test
UMAT0054454	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.67	Well Test
UMAT0054461	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	25.00	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0054471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	24.00	Well Test
UMAT0054472	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.13	Pump Test
UMAT0054473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.00	Well Test
UMAT0054516	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.00	Well Test
UMAT0054522	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.93	Well Test
UMAT0054524	Crbg.Smb.IceHarbor.Martindale	21.21	Pump Test
UMAT0054524	Crbg.Smb.IceHarbor.Martindale	16.67	Well Test
UMAT0054725	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.89	Pump Test
UMAT0054725	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	60.00	Well Test
UMAT0054765	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.30	Well Test
UMAT0054787	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.18	Well Test
UMAT0054801	Sediment.Quaternary.Alluvium.Fine	10.00	Well Test
UMAT0054807	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.86	Well Test
UMAT0054835	Sediment.Quaternary.Alluvium.Coarse	30.00	Well Test
UMAT0054841	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.15	Well Test
UMAT0054887	Sediment.Quaternary.Alluvium.Coarse	2.05	Well Test
UMAT0054911	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.00	Well Test
UMAT0054912	Sediment.Quaternary.Alluvium.Coarse	8.00	Well Test
UMAT0054961	Crbg.undifferentiated	3.00	Well Test
UMAT0054966	Crbg.undifferentiated	3.00	Well Test
UMAT0054970	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.71	Well Test
UMAT0055053	Crbg.Grb.N2.WinterWater	2.50	Well Test
UMAT0055085	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	100.00	Well Test
UMAT0055099	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.79	Well Test
UMAT0055136	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	60.00	Well Test
UMAT0055175	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.13	Well Test
UMAT0055181	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.48	Well Test
UMAT0055227	Sediment.Quaternary.Alluvium.Coarse	40.00	Well Test
UMAT0055301	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.20	Well Test
UMAT0055317	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.00	Well Test
UMAT0055323	Sediment.Quaternary.Alluvium.Coarse	25.00	Well Test
UMAT0055418	Sediment.Quaternary.Alluvium.Coarse	1.71	Well Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.56	Pump Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.92	Pump Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0055427	Sediment.Quaternary.Alluvium.Coarse	2.50	Well Test
UMAT0055437	Sediment.Quaternary.Alluvium.Coarse	46.43	Pump Test
UMAT0055437	Sediment.Quaternary.Alluvium.Coarse	49.23	Well Test
UMAT0055438	Sediment.Quaternary.Alluvium.Coarse	6.77	Well Test
UMAT0055444	Crbg.undifferentiated.denseflowinterior	1.79	Well Test
UMAT0055523	Crbg.Grb.N2.SentinelBluffs	300.00	Well Test
UMAT0055526	Crbg.Grb.N2.SentinelBluffs	24.10	Well Test
UMAT0055549	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.78	Well Test
UMAT0055557	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Well Test
UMAT0055582	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.50	Well Test
UMAT0055584	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	0.16	Pump Test
UMAT0055590	Sediment.Quaternary.Alluvium.Coarse	15.00	Well Test
UMAT0055671	Crbg.Grb.N2.SentinelBluffs	25.00	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0055708	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.00	Well Test
UMAT0055733	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.16	Well Test
UMAT0055796	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.76	Well Test
UMAT0055842	Crbg.undifferentiated	3.66	Pump Test
UMAT0055884	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.21	Well Test
UMAT0055895	Sediment.Quaternary.Alluvium.Coarse	4.00	Well Test
UMAT0055980	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Well Test
UMAT0055981	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.76	Well Test
UMAT0056058	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.28	Well Test
UMAT0056059	Sediment.Quaternary.Alluvium.Coarse	10.00	Well Test
UMAT0056099	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	50.00	Well Test
UMAT0056140	Sediment.Quaternary.Alluvium.Coarse	2.04	Well Test
UMAT0056142	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.56	Well Test
UMAT0056219	Sediment.Quaternary.Alluvium.Coarse	7.80	Well Test
UMAT0056249	Sediment.Quaternary.Alluvium.Coarse	0.83	Well Test
UMAT0056282	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.00	Well Test
UMAT0056382	Crbg.Grb.N2.SentinelBluffs	388.89	Well Test
UMAT0056422	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.00	Well Test
UMAT0056448	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	60.00	Well Test
UMAT0056455	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.25	Well Test
UMAT0056456	Crbg.Smb.Umatilla	1.64	Pump Test
UMAT0056456	Crbg.Smb.Umatilla	1.92	Well Test
UMAT0056479	Sediment.Quaternary.Alluvium.Coarse	12.00	Well Test
UMAT0056484	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.19	Well Test
UMAT0056675	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.27	Well Test
UMAT0056873	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.38	Well Test
UMAT0056882	Sediment.Quaternary.Alluvium.Coarse	6.38	Pump Test
UMAT0056882	Sediment.Quaternary.Alluvium.Coarse	6.70	Well Test
UMAT0056930	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.86	Well Test
UMAT0057031	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	30.00	Well Test
UMAT0057118	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.50	Well Test
UMAT0057131	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	65.00	Well Test
UMAT0057215	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.18	Well Test
UMAT0057231	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.62	Well Test
UMAT0057337	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.00	Well Test
UMAT0057614	Sediment.Quaternary.Alluvium.Coarse	7.50	Well Test
UMAT0057710	Crbg.Grb.N2.WinterWater	0.46	Well Test
UMAT0057841	Crbg.undifferentiated	24.24	Pump Test
UMAT0057860	Crbg.undifferentiated	12692.31	Pump Test
UMAT0057868	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.30	Pump Test
UMAT0057868	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.36	Well Test
UMAT0058059	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.27	Well Test
UMAT0058102	Sediment.Quaternary.Alluvium.Coarse	10.00	Well Test
UMAT0058112	Sediment.Quaternary.Alluvium.Coarse	1.82	Well Test
UMAT0058127	Crbg.Grb.N2.SentinelBluffs.McCoy	78.74	Pump Test
UMAT0058255	Sediment.Quaternary.Alluvium.Coarse	0.92	Well Test
UMAT0058256	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.34	Well Test
UMAT0058411	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	21.00	Well Test

Well Test = data from specific capacity test from well log

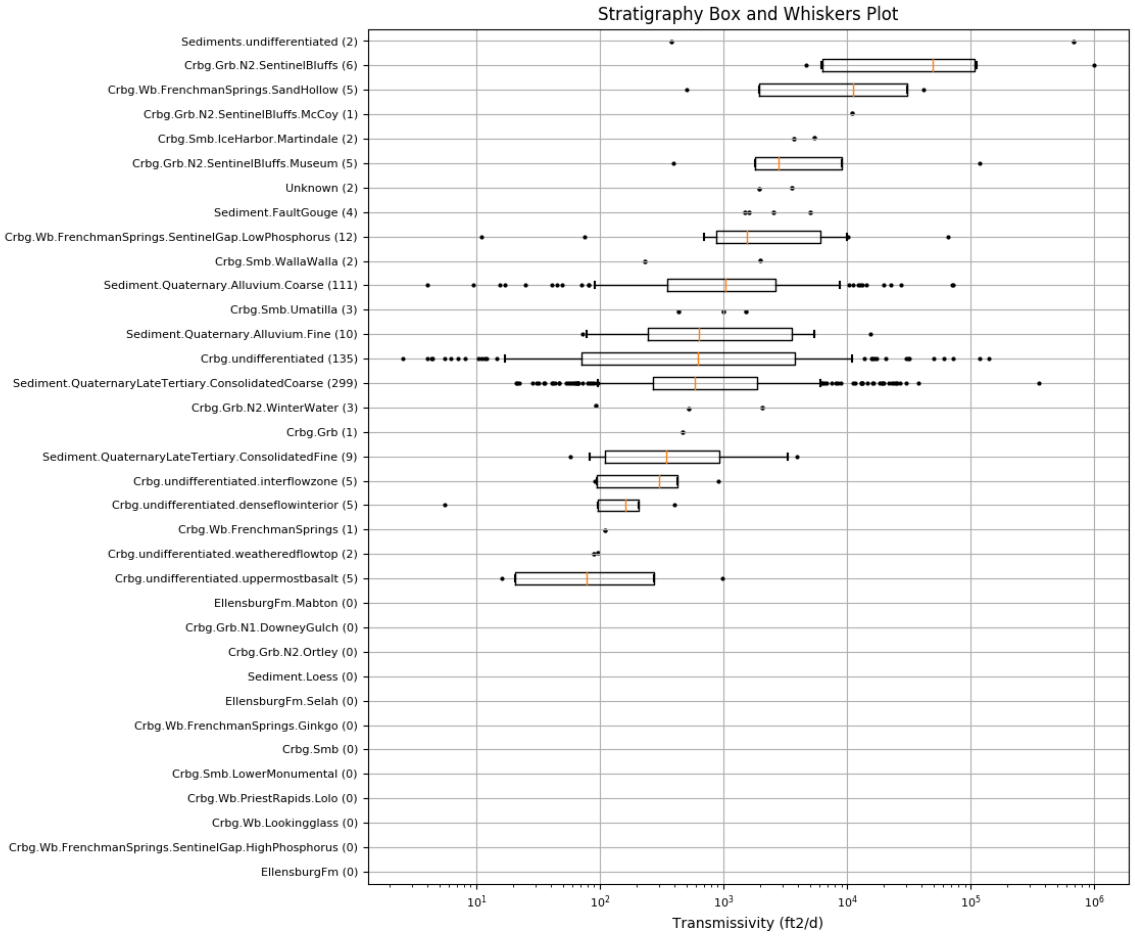
Pump Test = data from single well pumping test

Logid	Stratigraphic Unit	Specific Capacity (gpm/ft)	Test Type
UMAT0058447	Crbg.undifferentiated.interflowzone	0.49	Well Test
UMAT0058505	Sediment.Quaternary.Alluvium.Coarse	60.00	Well Test
UMAT0058714	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.79	Well Test
UMAT0058990	Sediment.Quaternary.Alluvium.Coarse	20.00	Well Test

Well Test = data from specific capacity test from well log

Pump Test = data from single well pumping test

Transmissivity by Stratigraphic unit



Wells are sorted by logid in the following tables.

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
STWA0000026	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	499.74	Well Test
STWA0000074	Sediment.Quaternary.Alluvium.Coarse	228.12	Well Test
STWA0000141	Crbg.undifferentiated	5606.24	Well Test
STWA0020292	Crbg.undifferentiated	16800	Pump Test
STWA0021266	Crbg.undifferentiated	1928.4	Well Test
STWA0021290	Crbg.undifferentiated.interflowzone	424.98	Well Test
STWA0021310	Crbg.Grb.N2.SentinelBluffs.Museum	9124.22	Well Test
STWA0021333	Sediment.Quaternary.Alluvium.Fine	4241.38	Well Test
STWA0021337	Crbg.undifferentiated	815.05	Well Test
STWA0021357	Crbg.undifferentiated	4386.94	Well Test
STWA0021381	Crbg.undifferentiated	2670.22	Well Test
STWA0021382	Crbg.undifferentiated	72264.42	Well Test
STWA0021406	Crbg.undifferentiated	31746.33	Well Test
STWA0021409	Unknown	3549.09	Well Test
STWA0021426	Sediment.Quaternary.Alluvium.Coarse	1124.64	Well Test
STWA0021474	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	418.62	Well Test
STWA0021482	Sediment.QuaternaryLateTertiary.ConsolidatedFine	929.97	Well Test
STWA0021496	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	524.6	Well Test
STWA0021576	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	95.77	Well Test
STWA0021602	Crbg.undifferentiated	60792.42	Well Test
STWA0021613	Crbg.undifferentiated	6336.77	Well Test
STWA0021687	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	608.24	Well Test
STWA0021693	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	287.26	Well Test
STWA0021694	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1485.08	Well Test
STWA0021700	Crbg.undifferentiated	56.43	Well Test
STWA0021703	Sediment.Quaternary.Alluvium.Coarse	901.1	Well Test
STWA0021720	Crbg.undifferentiated	749.2	Well Test
STWA0021743	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	693.68	Well Test
STWA0021794	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1185.08	Well Test
STWA0021797	Crbg.undifferentiated	932.07	Well Test
STWA0021806	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	466.67	Well Test
STWA0021810	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	434.57	Well Test
STWA0021820	Crbg.undifferentiated	1778.27	Well Test
STWA0021823	Crbg.undifferentiated	1035.09	Well Test
STWA0021847	Crbg.undifferentiated	62.89	Well Test
STWA0021850	Crbg.undifferentiated	13903.22	Well Test
STWA0021853	Crbg.undifferentiated	17192.46	Well Test
STWA0021901	Crbg.undifferentiated	5942.14	Well Test
STWA0021914	Crbg.undifferentiated	30395.67	Well Test
STWA0021922	Crbg.undifferentiated	119195.86	Well Test
STWA0021929	Crbg.undifferentiated	141202	Well Test
STWA0021934	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1733.18	Well Test
STWA0021944	Crbg.undifferentiated	5298.33	Well Test
STWA0021964	Crbg.undifferentiated	2957.94	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
STWA0021976	Crbg.undifferentiated	9351.3	Well Test
STWA0021989	Crbg.undifferentiated	6000	Pump Test
STWA0021996	Crbg.undifferentiated	926.7	Well Test
STWA0022000	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	11674.15	Well Test
STWA0022010	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	857.77	Well Test
STWA0022027	Crbg.undifferentiated	68.31	Well Test
STWA0022032	Crbg.undifferentiated	10497.03	Well Test
STWA0022038	Crbg.undifferentiated	10751.17	Well Test
STWA0022047	Crbg.undifferentiated	421.05	Well Test
STWA0022063	Crbg.undifferentiated	3938.91	Well Test
STWA0022067	Crbg.undifferentiated	50337	Well Test
STWA0022116	Crbg.undifferentiated	15873.33	Well Test
STWA0022140	Crbg.undifferentiated	3636.74	Well Test
STWA0030520	Sediment.QuaternaryLateTertiary.ConsolidatedFine	3952.27	Well Test
STWA0154220	Sediment.Quaternary.Alluvium.Coarse	72904.67	Well Test
STWA0154223	Sediment.Quaternary.Alluvium.Coarse	22789.3	Well Test
STWA0154225	Sediment.Quaternary.Alluvium.Coarse	19990.11	Well Test
STWA0154679	Crbg.undifferentiated	615.5	Well Test
STWA0165633	Crbg.undifferentiated	8425.28	Well Test
STWA0168614	Crbg.undifferentiated	1055.05	Well Test
STWA0174032	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	194.61	Well Test
STWA0175031	Sediment.Quaternary.Alluvium.Fine	200.81	Well Test
STWA0176902	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	393.83	Well Test
STWA0293368	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	11219.02	Well Test
STWA0322677	Crbg.undifferentiated.weatheredflowtop	89.18	Well Test
STWA0347030	Crbg.undifferentiated	20434.27	Well Test
STWA0347044	Sediment.Quaternary.Alluvium.Coarse	562.39	Well Test
STWA0376602	Sediment.Quaternary.Alluvium.Coarse	499.49	Well Test
STWA0384906	Crbg.undifferentiated	15988.07	Well Test
STWA0408381	Sediment.Quaternary.Alluvium.Coarse	1459.71	Well Test
STWA0408445	Sediment.Quaternary.Alluvium.Coarse	2880.15	Well Test
STWA0410849	Sediment.Quaternary.Alluvium.Coarse	329.92	Well Test
STWA0429182	Crbg.undifferentiated	1528.56	Well Test
STWA0430368	Sediment.Quaternary.Alluvium.Coarse	1299.11	Well Test
STWA0472609	Sediment.Quaternary.Alluvium.Coarse	133.83	Well Test
STWA0472613	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	281.6	Well Test
STWA0472776	Sediment.Quaternary.Alluvium.Coarse	70767	Well Test
STWA0501155	Crbg.undifferentiated	855.62	Well Test
STWA0511923	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	788.09	Well Test
STWA0559951	Sediment.Quaternary.Alluvium.Coarse	449.62	Well Test
STWA0663515	Crbg.undifferentiated	52.03	Well Test
STWA1591751	Sediment.Quaternary.Alluvium.Coarse	70.91	Well Test
STWA1634725	Sediment.QuaternaryLateTertiary.ConsolidatedFine	82.29	Well Test
STWA1691570	Sediment.Quaternary.Alluvium.Coarse	414.94	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
STWA1711720	Sediment.Quaternary.Alluvium.Coarse	134.67	Well Test
STWA1874663	Sediment.Quaternary.Alluvium.Coarse	793.04	Well Test
STWA1894037	Sediment.Quaternary.Alluvium.Fine	77.76	Well Test
STWA1900319	Sediment.Quaternary.Alluvium.Coarse	49.66	Well Test
STWA1924775	Crbg.undifferentiated	1873.76	Well Test
STWA1970319	Crbg.undifferentiated	6197.51	Well Test
UMAT0001441	Crbg.undifferentiated	185.53	Well Test
UMAT0001443	Crbg.undifferentiated	65.08	Well Test
UMAT0001444	Crbg.undifferentiated	265.09	Well Test
UMAT0001448	Crbg.undifferentiated	8.12	Well Test
UMAT0001465	Crbg.undifferentiated	21.02	Well Test
UMAT0001466	Sediment.Quaternary.Alluvium.Coarse	769.71	Well Test
UMAT0001467	Sediment.Quaternary.Alluvium.Coarse	4	Well Test
UMAT0001471	Crbg.undifferentiated	176.35	Well Test
UMAT0001487	Crbg.undifferentiated	4647.26	Well Test
UMAT0001489	Crbg.undifferentiated	27.23	Well Test
UMAT0001490	Crbg.undifferentiated	2.52	Well Test
UMAT0001494	Crbg.undifferentiated	1680.99	Well Test
UMAT0001496	Crbg.undifferentiated	25.87	Well Test
UMAT0001499	Crbg.undifferentiated	305.58	Well Test
UMAT0001500	Crbg.undifferentiated	619.76	Well Test
UMAT0001501	Crbg.undifferentiated	31187.56	Well Test
UMAT0001502	Crbg.undifferentiated	266.47	Well Test
UMAT0001517	Crbg.undifferentiated	8719.44	Well Test
UMAT0003042	Crbg.undifferentiated	89.45	Well Test
UMAT0003046	Crbg.undifferentiated	35.34	Well Test
UMAT0003047	Crbg.undifferentiated	1349.93	Well Test
UMAT0003053	Crbg.undifferentiated	45.24	Well Test
UMAT0003054	Crbg.undifferentiated	73.57	Well Test
UMAT0003063	Crbg.undifferentiated	633.98	Well Test
UMAT0003065	Crbg.undifferentiated	49.85	Well Test
UMAT0003066	Crbg.undifferentiated	1300	Pump Test
UMAT0003067	Crbg.undifferentiated	2810.42	Well Test
UMAT0003073	Crbg.undifferentiated	810.8	Well Test
UMAT0003074	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	75.72	Well Test
UMAT0003075	Crbg.undifferentiated	242.51	Well Test
UMAT0003076	Crbg.undifferentiated	1561.44	Well Test
UMAT0003079	Crbg.undifferentiated	401.98	Well Test
UMAT0003084	Crbg.undifferentiated	160.2	Well Test
UMAT0003089	Crbg.undifferentiated	5100	Pump Test
UMAT0003091	Crbg.undifferentiated	1034.75	Well Test
UMAT0003092	Crbg.undifferentiated	348.05	Well Test
UMAT0003093	Crbg.undifferentiated	5961	Well Test
UMAT0003096	Crbg.undifferentiated	1578.02	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0003097	Crbg.undifferentiated	4.42	Well Test
UMAT0003104	Crbg.undifferentiated	9755.93	Well Test
UMAT0003106	Crbg.undifferentiated	707.7	Well Test
UMAT0003108	Crbg.undifferentiated	172.41	Well Test
UMAT0003109	Crbg.undifferentiated	467.81	Well Test
UMAT0003124	Crbg.undifferentiated	4.35	Well Test
UMAT0003127	Crbg.undifferentiated	17.1	Well Test
UMAT0003138	Sediment.Quaternary.Alluvium.Coarse	17.1	Well Test
UMAT0003143	Sediment.Quaternary.Alluvium.Coarse	211.48	Well Test
UMAT0003148	Crbg.undifferentiated.denseflowinterior	5.53	Well Test
UMAT0003149	Crbg.undifferentiated	20.58	Well Test
UMAT0003152	Crbg.undifferentiated	19.31	Well Test
UMAT0003166	Crbg.undifferentiated	124.56	Well Test
UMAT0003174	Crbg.undifferentiated	11.65	Well Test
UMAT0003191	Crbg.undifferentiated	5.53	Well Test
UMAT0003192	Crbg.undifferentiated	10.35	Well Test
UMAT0003196	Crbg.undifferentiated	116.48	Well Test
UMAT0003197	Crbg.undifferentiated	528.31	Well Test
UMAT0003211	Crbg.undifferentiated.denseflowinterior	96.29	Well Test
UMAT0003214	Crbg.undifferentiated	4	Well Test
UMAT0003217	Crbg.undifferentiated	7.1	Well Test
UMAT0003218	Crbg.undifferentiated	17.1	Well Test
UMAT0003219	Crbg.undifferentiated	151.81	Well Test
UMAT0003222	Crbg.undifferentiated	24.11	Well Test
UMAT0003224	Crbg.undifferentiated	63.18	Well Test
UMAT0003225	Crbg.undifferentiated	548.06	Well Test
UMAT0003229	Crbg.undifferentiated	29.49	Well Test
UMAT0003234	Crbg.undifferentiated	14.75	Well Test
UMAT0003235	Crbg.undifferentiated	11.09	Well Test
UMAT0003241	Crbg.undifferentiated.weatheredflowtop	96.46	Well Test
UMAT0003251	Sediment.QuaternaryLateTertiary.ConsolidatedFine	57.05	Well Test
UMAT0003254	Crbg.undifferentiated.uppermostbasalt	989.88	Well Test
UMAT0003255	Crbg.undifferentiated.uppermostbasalt	274.03	Well Test
UMAT0003256	Crbg.undifferentiated.interflowzone	90.51	Well Test
UMAT0003257	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	28.66	Well Test
UMAT0003258	Sediment.Quaternary.Alluvium.Fine	862.19	Well Test
UMAT0003266	Sediment.Quaternary.Alluvium.Fine	408.18	Well Test
UMAT0003269	Sediment.Quaternary.Alluvium.Fine	15593.78	Well Test
UMAT0003278	Sediment.Quaternary.Alluvium.Coarse	534.52	Well Test
UMAT0003864	Crbg.undifferentiated	11033.32	Well Test
UMAT0003872	Crbg.undifferentiated.uppermostbasalt	16.03	Well Test
UMAT0003875	Crbg.undifferentiated.denseflowinterior	205.56	Well Test
UMAT0003886	Sediment.QuaternaryLateTertiary.ConsolidatedFine	110	Pump Test
UMAT0003890	Sediment.Quaternary.Alluvium.Coarse	3417.44	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0003899	Crbg.Wb.FrenchmanSprings.SandHollow	11277.4	Well Test
UMAT0003917	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	63.36	Well Test
UMAT0003929	Sediment.FaultGouge	1600	Pump Test
UMAT0003929	Sediment.FaultGouge	5000	Pump Test
UMAT0003929	Sediment.FaultGouge	2545.36	Well Test
UMAT0003930	Crbg.Wb.FrenchmanSprings.SandHollow	1932.42	Well Test
UMAT0003932	Sediment.Quaternary.Alluvium.Coarse	1096.12	Well Test
UMAT0003936	Sediment.Quaternary.Alluvium.Coarse	1344.09	Well Test
UMAT0003951	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	96.46	Well Test
UMAT0003958	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	1844.9	Well Test
UMAT0003962	Crbg.Grb.N2.SentinelBluffs	4700	Pump Test
UMAT0003968	Crbg.undifferentiated.uppermostbasalt	20.58	Well Test
UMAT0003981	Sediment.Quaternary.Alluvium.Coarse	80.66	Well Test
UMAT0003983	Crbg.undifferentiated	6.22	Well Test
UMAT0003984	Sediment.Quaternary.Alluvium.Coarse	9.42	Well Test
UMAT0003988	Sediment.Quaternary.Alluvium.Coarse	1333.35	Well Test
UMAT0004000	Crbg.undifferentiated	253.9	Well Test
UMAT0004003	Crbg.undifferentiated	54.24	Well Test
UMAT0004010	Crbg.Grb.N2.WinterWater	2057.94	Well Test
UMAT0004014	Sediment.Quaternary.Alluvium.Coarse	15.36	Well Test
UMAT0004019	Crbg.undifferentiated.interflowzone	907.82	Well Test
UMAT0004020	Crbg.undifferentiated	339.1	Well Test
UMAT0004022	Crbg.undifferentiated	96.29	Well Test
UMAT0004024	Sediment.Quaternary.Alluvium.Coarse	785.22	Well Test
UMAT0004025	Crbg.undifferentiated	519.82	Well Test
UMAT0004028	Crbg.undifferentiated	195.4	Well Test
UMAT0004031	Crbg.undifferentiated	57.44	Well Test
UMAT0004032	Sediment.Quaternary.Alluvium.Coarse	90.51	Well Test
UMAT0004037	Crbg.undifferentiated	623.31	Well Test
UMAT0004039	Crbg.undifferentiated	76.75	Well Test
UMAT0004040	Sediment.Quaternary.Alluvium.Coarse	7457.92	Well Test
UMAT0004042	Crbg.undifferentiated.denseflowinterior	160.31	Well Test
UMAT0004044	Crbg.undifferentiated.uppermostbasalt	77.6	Well Test
UMAT0004048	Crbg.undifferentiated.interflowzone	301.91	Well Test
UMAT0004063	Crbg.undifferentiated	91.63	Well Test
UMAT0004065	Sediment.Quaternary.Alluvium.Coarse	12421.55	Well Test
UMAT0004072	Crbg.undifferentiated	321.53	Well Test
UMAT0004076	Sediment.Quaternary.Alluvium.Fine	5428.33	Well Test
UMAT0004080	Sediment.QuaternaryLateTertiary.ConsolidatedFine	162.31	Well Test
UMAT0004087	Sediment.Quaternary.Alluvium.Coarse	519.46	Well Test
UMAT0004090	Sediment.Quaternary.Alluvium.Coarse	437.53	Well Test
UMAT0004094	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3349.65	Well Test
UMAT0004096	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1413.23	Well Test
UMAT0004100	Sediments.undifferentiated	688765.21	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0004101	Crbg.undifferentiated	770.34	Well Test
UMAT0004102	Sediment.QuaternaryLateTertiary.ConsolidatedFine	3305.62	Well Test
UMAT0004107	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	154.54	Well Test
UMAT0004108	Sediment.Quaternary.Alluvium.Coarse	381.77	Well Test
UMAT0004113	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	873.15	Well Test
UMAT0004114	Sediment.Quaternary.Alluvium.Coarse	408.18	Well Test
UMAT0004115	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	18953.86	Well Test
UMAT0004116	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	332.89	Well Test
UMAT0004118	Sediment.Quaternary.Alluvium.Coarse	672.31	Well Test
UMAT0004119	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	298.98	Well Test
UMAT0004120	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	895.76	Well Test
UMAT0004121	Sediment.Quaternary.Alluvium.Fine	371.52	Well Test
UMAT0004122	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	591.6	Well Test
UMAT0004126	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	279.97	Well Test
UMAT0004127	Sediment.Quaternary.Alluvium.Coarse	8509.54	Well Test
UMAT0004133	Sediment.Quaternary.Alluvium.Coarse	2916.32	Well Test
UMAT0004143	Sediment.Quaternary.Alluvium.Coarse	377.64	Well Test
UMAT0004144	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	19449.32	Well Test
UMAT0004146	Sediment.Quaternary.Alluvium.Coarse	45.24	Well Test
UMAT0004148	Sediment.Quaternary.Alluvium.Coarse	285.21	Well Test
UMAT0004149	Sediment.Quaternary.Alluvium.Coarse	231.93	Well Test
UMAT0004152	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	93.56	Well Test
UMAT0004153	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	433.63	Well Test
UMAT0004155	Sediment.Quaternary.Alluvium.Coarse	10304.48	Well Test
UMAT0004158	Sediment.Quaternary.Alluvium.Coarse	81.73	Well Test
UMAT0004160	Sediment.Quaternary.Alluvium.Coarse	4804.55	Well Test
UMAT0004161	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2306.18	Well Test
UMAT0004162	Sediment.Quaternary.Alluvium.Coarse	3747.8	Well Test
UMAT0004163	Sediment.Quaternary.Alluvium.Coarse	27412.38	Well Test
UMAT0004166	Crbg.undifferentiated	831.79	Well Test
UMAT0004167	Crbg.undifferentiated	8000	Pump Test
UMAT0004168	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	810.3	Well Test
UMAT0004175	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	234.74	Well Test
UMAT0004180	Crbg.Wb.FrenchmanSprings.SandHollow	500	Pump Test
UMAT0004182	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	377.88	Well Test
UMAT0004185	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	10000	Pump Test
UMAT0004185	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	65619.34	Well Test
UMAT0004186	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	358909.82	Well Test
UMAT0004187	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1200	Pump Test
UMAT0004187	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	126.55	Well Test
UMAT0004192	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	65.32	Well Test
UMAT0004195	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	329.98	Well Test
UMAT0004202	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6155.14	Well Test
UMAT0004204	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	224.26	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0004205	Sediments.undifferentiated	378.88	Well Test
UMAT0004207	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5197.93	Well Test
UMAT0004211	Sediment.QuaternaryLateTertiary.ConsolidatedFine	707.7	Well Test
UMAT0004216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	24996.87	Well Test
UMAT0004217	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	204.09	Well Test
UMAT0004219	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	768.65	Well Test
UMAT0004222	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	420.25	Well Test
UMAT0004228	Sediment.Quaternary.Alluvium.Coarse	212.16	Well Test
UMAT0004229	Sediment.Quaternary.Alluvium.Coarse	1209.86	Well Test
UMAT0004238	Sediment.Quaternary.Alluvium.Coarse	1100	Pump Test
UMAT0004247	Sediment.Quaternary.Alluvium.Coarse	1694.21	Well Test
UMAT0004249	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	730.62	Well Test
UMAT0004256	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8834.69	Well Test
UMAT0004261	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1559.7	Well Test
UMAT0004268	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	135.32	Well Test
UMAT0004269	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	551.23	Well Test
UMAT0004271	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2472.05	Well Test
UMAT0004275	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	335.84	Well Test
UMAT0004276	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1181.04	Well Test
UMAT0004279	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	600	Pump Test
UMAT0004281	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3809.59	Well Test
UMAT0004282	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	836.63	Well Test
UMAT0004284	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	501.35	Well Test
UMAT0004291	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	520.86	Well Test
UMAT0004293	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	820.21	Well Test
UMAT0004294	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	647.11	Well Test
UMAT0004297	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	383.84	Well Test
UMAT0004298	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	121.35	Well Test
UMAT0004301	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	72.19	Well Test
UMAT0004305	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	293.89	Well Test
UMAT0004306	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2252.23	Well Test
UMAT0004315	Sediment.Quaternary.Alluvium.Coarse	8745.3	Well Test
UMAT0004320	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2306.18	Well Test
UMAT0004325	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	58.09	Well Test
UMAT0004327	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	986.86	Well Test
UMAT0004328	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3523.44	Well Test
UMAT0004329	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	213.75	Well Test
UMAT0004332	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4372.7	Well Test
UMAT0004344	Sediment.Quaternary.Alluvium.Coarse	13272.12	Well Test
UMAT0004347	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	267.26	Well Test
UMAT0004362	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	408.18	Well Test
UMAT0004366	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	532.25	Well Test
UMAT0004367	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	276.24	Well Test
UMAT0004368	Sediment.Quaternary.Alluvium.Coarse	3785	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0004378	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3757.79	Well Test
UMAT0004379	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	183.62	Well Test
UMAT0004380	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2391.93	Well Test
UMAT0004381	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	300	Pump Test
UMAT0004383	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	957.04	Well Test
UMAT0004401	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	632.39	Well Test
UMAT0004407	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	180.06	Well Test
UMAT0004409	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	481.42	Well Test
UMAT0004410	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2497.91	Well Test
UMAT0004411	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	60.02	Well Test
UMAT0004414	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	26820.35	Well Test
UMAT0004416	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	55.45	Well Test
UMAT0004418	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	36	Pump Test
UMAT0004425	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3478.21	Well Test
UMAT0004434	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4557.48	Well Test
UMAT0004449	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6843.47	Well Test
UMAT0004462	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	310.64	Well Test
UMAT0004464	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	862.19	Well Test
UMAT0004466	Sediment.Quaternary.Alluvium.Coarse	1694.21	Well Test
UMAT0004471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	710	Pump Test
UMAT0004471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	281.23	Well Test
UMAT0004472	Sediment.Quaternary.Alluvium.Coarse	381.77	Well Test
UMAT0004476	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	537.43	Well Test
UMAT0004478	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7457.92	Well Test
UMAT0004479	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	632.39	Well Test
UMAT0004482	Sediment.Quaternary.Alluvium.Coarse	368.6	Well Test
UMAT0004483	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	408.18	Well Test
UMAT0004486	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	504.37	Well Test
UMAT0004490	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	125.88	Well Test
UMAT0004504	Sediment.Quaternary.Alluvium.Coarse	2485.97	Well Test
UMAT0004540	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	421.44	Well Test
UMAT0004541	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	564.45	Well Test
UMAT0004543	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1896.06	Well Test
UMAT0004549	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2306.18	Well Test
UMAT0004577	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1096.12	Well Test
UMAT0004579	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	23984.23	Well Test
UMAT0004635	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1096.12	Well Test
UMAT0004644	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1468.9	Well Test
UMAT0004645	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1248.97	Well Test
UMAT0004646	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	492.59	Well Test
UMAT0004647	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5065.82	Well Test
UMAT0004653	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	428.97	Well Test
UMAT0004660	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3288.11	Well Test
UMAT0004677	Sediment.Quaternary.Alluvium.Coarse	431.09	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0004678	Sediment.Quaternary.Alluvium.Coarse	907.82	Well Test
UMAT0004680	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2645.18	Well Test
UMAT0004701	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1623.18	Well Test
UMAT0004717	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	842.15	Well Test
UMAT0004718	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	41.77	Well Test
UMAT0004724	Sediment.Quaternary.Alluvium.Coarse	458.95	Well Test
UMAT0004756	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1600.99	Well Test
UMAT0004757	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1224.53	Well Test
UMAT0004758	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	138.1	Well Test
UMAT0004759	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	422.35	Well Test
UMAT0004760	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	40.91	Well Test
UMAT0004763	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1728.16	Well Test
UMAT0004764	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	324.04	Well Test
UMAT0004767	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	440.68	Well Test
UMAT0004774	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	374.43	Well Test
UMAT0004778	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2810.42	Well Test
UMAT0004781	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	273.46	Well Test
UMAT0004799	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	22.34	Well Test
UMAT0004800	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1954.69	Well Test
UMAT0004805	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	794.58	Well Test
UMAT0004822	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	88.82	Well Test
UMAT0004827	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	215.92	Well Test
UMAT0004831	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2738.1	Well Test
UMAT0004840	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	415.48	Well Test
UMAT0004848	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	46.56	Well Test
UMAT0004849	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	1262.56	Well Test
UMAT0004857	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	297.26	Well Test
UMAT0004859	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	30000	Pump Test
UMAT0004859	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	21929.91	Well Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	930	Pump Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	1000	Pump Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	4726.68	Well Test
UMAT0004874	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	220	Pump Test
UMAT0004874	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	177.42	Well Test
UMAT0004885	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3397.17	Well Test
UMAT0004888	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	217.19	Well Test
UMAT0004898	Unknown	1933.54	Well Test
UMAT0004942	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	144.94	Well Test
UMAT0004944	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	319.88	Well Test
UMAT0004953	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	62.56	Well Test
UMAT0004968	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	476.64	Well Test
UMAT0004970	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	35.25	Well Test
UMAT0004971	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1245.23	Well Test
UMAT0004974	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5487.71	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0005029	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	126.18	Well Test
UMAT0005036	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	330.29	Well Test
UMAT0005049	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	319.75	Well Test
UMAT0005052	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	656.59	Well Test
UMAT0005065	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	167.21	Well Test
UMAT0005127	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1864.48	Well Test
UMAT0005133	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	618.77	Well Test
UMAT0005136	Sediment.Quaternary.Alluvium.Coarse	1998.73	Well Test
UMAT0005138	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	23141.68	Well Test
UMAT0005147	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1436.23	Well Test
UMAT0005169	Sediment.Quaternary.Alluvium.Fine	72.85	Well Test
UMAT0005170	Sediment.QuaternaryLateTertiary.ConsolidatedFine	347.24	Well Test
UMAT0005172	Sediment.Quaternary.Alluvium.Coarse	1417.87	Well Test
UMAT0005173	Sediment.Quaternary.Alluvium.Coarse	904.35	Well Test
UMAT0005180	Crbg.Wb.FrenchmanSprings.SandHollow	30422.86	Well Test
UMAT0005187	Crbg.undifferentiated	1664.79	Well Test
UMAT0005193	Crbg.Grb.N2.SentinelBluffs.Museum	2798.38	Well Test
UMAT0005209	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	37975.54	Well Test
UMAT0005210	Sediment.Quaternary.Alluvium.Coarse	1537.3	Well Test
UMAT0005213	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13410.18	Well Test
UMAT0005227	Crbg.Wb.FrenchmanSprings.SandHollow	41710.55	Well Test
UMAT0005231	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	232.62	Well Test
UMAT0005232	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5488	Well Test
UMAT0005241	Crbg.Grb.N2.SentinelBluffs.Museum	118626.15	Well Test
UMAT0005331	Crbg.Grb	467.92	Well Test
UMAT0005357	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	192.58	Well Test
UMAT0005370	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	707.7	Well Test
UMAT0005378	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	300.17	Well Test
UMAT0005412	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	125.85	Well Test
UMAT0005477	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	198.65	Well Test
UMAT0005496	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	260	Pump Test
UMAT0005513	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13170.24	Well Test
UMAT0005530	Crbg.Grb.N2.SentinelBluffs	1005744.74	Well Test
UMAT0005555	Crbg.undifferentiated	35.85	Well Test
UMAT0005606	Sediment.FaultGouge	1500	Pump Test
UMAT0005625	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	519.3	Well Test
UMAT0005671	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	140	Pump Test
UMAT0005671	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	135.37	Well Test
UMAT0005788	Crbg.Smb.Umatilla	1528.14	Well Test
UMAT0005841	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	215.14	Well Test
UMAT0005958	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2488.46	Well Test
UMAT0006015	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6078.43	Well Test
UMAT0006026	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	224.26	Well Test
UMAT0006051	Crbg.undifferentiated	12.17	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0006053	Crbg.Smb.WallaWalla	230	Pump Test
UMAT0006057	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1126.12	Well Test
UMAT0006151	Crbg.undifferentiated	637.83	Well Test
UMAT0006179	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	348.92	Well Test
UMAT0006180	Sediment.Quaternary.Alluvium.Coarse	1493.85	Well Test
UMAT0006181	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	598.78	Well Test
UMAT0006184	Crbg.undifferentiated	2306.18	Well Test
UMAT0006192	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	121	Well Test
UMAT0006202	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5487.71	Well Test
UMAT0006203	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1038.7	Well Test
UMAT0006208	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	252.75	Well Test
UMAT0006214	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1694.21	Well Test
UMAT0006283	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	4000	Pump Test
UMAT0006283	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	10191.09	Well Test
UMAT0006342	Sediment.Quaternary.Alluvium.Coarse	1430.56	Well Test
UMAT0006360	Sediment.Quaternary.Alluvium.Coarse	40.66	Well Test
UMAT0006377	Sediment.Quaternary.Alluvium.Coarse	1615.24	Well Test
UMAT0006446	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	784.67	Well Test
UMAT0006447	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	307.45	Well Test
UMAT0006450	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	177.7	Well Test
UMAT0006452	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4731.92	Well Test
UMAT0006455	Crbg.undifferentiated	434.98	Well Test
UMAT0006456	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1216.49	Well Test
UMAT0006461	Crbg.undifferentiated	120	Pump Test
UMAT0006463	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	67.04	Well Test
UMAT0006477	Sediment.Quaternary.Alluvium.Coarse	259.73	Well Test
UMAT0006512	Sediment.Quaternary.Alluvium.Coarse	4658.24	Well Test
UMAT0006543	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	541.06	Well Test
UMAT0006566	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	639.67	Well Test
UMAT0006594	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	325.84	Well Test
UMAT0050016	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	202.57	Well Test
UMAT0050068	Sediment.Quaternary.Alluvium.Coarse	25.04	Well Test
UMAT0050183	Crbg.undifferentiated	1800	Pump Test
UMAT0050237	Crbg.Grb.N2.SentinelBluffs.Museum	390	Pump Test
UMAT0050250	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	280.31	Well Test
UMAT0050354	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	857.09	Well Test
UMAT0050473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1000	Pump Test
UMAT0050473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2901	Well Test
UMAT0050478	Crbg.Smb.WallaWalla	2000	Pump Test
UMAT0050485	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2000	Pump Test
UMAT0050516	Crbg.Grb.N2.SentinelBluffs.Museum	1800	Pump Test
UMAT0050630	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3757.79	Well Test
UMAT0050772	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	283.71	Well Test
UMAT0050938	Crbg.undifferentiated	132.51	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0051035	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	526.56	Well Test
UMAT0051045	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	183.87	Well Test
UMAT0051666	Sediment.Quaternary.Alluvium.Coarse	1430.56	Well Test
UMAT0051744	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	406.66	Well Test
UMAT0051921	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	862.19	Well Test
UMAT0051947	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4431.78	Well Test
UMAT0052006	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	700	Pump Test
UMAT0052007	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20000	Pump Test
UMAT0052037	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	130	Pump Test
UMAT0052581	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1573.32	Well Test
UMAT0053214	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	345.93	Well Test
UMAT0053239	Sediment.Quaternary.Alluvium.Coarse	319.98	Well Test
UMAT0053447	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	79.37	Well Test
UMAT0053457	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	452.06	Well Test
UMAT0053462	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	21.39	Well Test
UMAT0053471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1945.9	Well Test
UMAT0053472	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	103.79	Well Test
UMAT0053492	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6557.52	Well Test
UMAT0053647	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8372.72	Well Test
UMAT0053711	Sediment.Quaternary.Alluvium.Coarse	631.14	Well Test
UMAT0053762	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1126.12	Well Test
UMAT0053763	Sediment.Quaternary.Alluvium.Coarse	177.21	Well Test
UMAT0053769	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	53.57	Well Test
UMAT0053829	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	399.66	Well Test
UMAT0053833	Sediment.Quaternary.Alluvium.Coarse	3381.69	Well Test
UMAT0053888	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	631.8	Well Test
UMAT0053945	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	220.12	Well Test
UMAT0053951	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	335.84	Well Test
UMAT0053985	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	85.68	Well Test
UMAT0054097	Crbg.undifferentiated	2300	Pump Test
UMAT0054136	Sediment.Quaternary.Alluvium.Coarse	534.52	Well Test
UMAT0054143	Sediment.Quaternary.Alluvium.Coarse	345.93	Well Test
UMAT0054171	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2250.02	Well Test
UMAT0054195	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	534.52	Well Test
UMAT0054216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	100	Pump Test
UMAT0054216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1276.46	Well Test
UMAT0054277	Crbg.Wb.FrenchmanSprings	110	Pump Test
UMAT0054296	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3449.22	Well Test
UMAT0054343	Sediment.Quaternary.Alluvium.Coarse	1048	Well Test
UMAT0054393	Sediment.Quaternary.Alluvium.Coarse	198.65	Well Test
UMAT0054394	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	599.26	Well Test
UMAT0054424	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2365.96	Well Test
UMAT0054433	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1126.12	Well Test
UMAT0054434	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1945.9	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0054436	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13143.16	Well Test
UMAT0054454	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	384.07	Well Test
UMAT0054461	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6289.31	Well Test
UMAT0054471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6021.76	Well Test
UMAT0054472	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	210	Pump Test
UMAT0054473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1369.31	Well Test
UMAT0054516	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1615.24	Well Test
UMAT0054522	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	689	Well Test
UMAT0054524	Crbg.Smb.IceHarbor.Martindale	5400	Pump Test
UMAT0054524	Crbg.Smb.IceHarbor.Martindale	3704.55	Well Test
UMAT0054725	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	700	Pump Test
UMAT0054725	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15949.67	Well Test
UMAT0054765	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	46.66	Well Test
UMAT0054787	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	30.6	Well Test
UMAT0054801	Sediment.Quaternary.Alluvium.Fine	1614.47	Well Test
UMAT0054807	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	155.2	Well Test
UMAT0054835	Sediment.Quaternary.Alluvium.Coarse	7636.36	Well Test
UMAT0054841	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	454.34	Well Test
UMAT0054887	Sediment.Quaternary.Alluvium.Coarse	465.75	Well Test
UMAT0054911	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1369.31	Well Test
UMAT0054912	Sediment.Quaternary.Alluvium.Coarse	1863.51	Well Test
UMAT0054961	Crbg.undifferentiated	632.39	Well Test
UMAT0054966	Crbg.undifferentiated	632.39	Well Test
UMAT0054970	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	799.78	Well Test
UMAT0055053	Crbg.Grb.N2.WinterWater	519.46	Well Test
UMAT0055085	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	25157.26	Well Test
UMAT0055099	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	372.84	Well Test
UMAT0055136	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	14593.85	Well Test
UMAT0055175	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	680.82	Well Test
UMAT0055181	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	81.93	Well Test
UMAT0055227	Sediment.Quaternary.Alluvium.Coarse	11269.75	Well Test
UMAT0055301	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	242	Well Test
UMAT0055317	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	274.12	Well Test
UMAT0055323	Sediment.Quaternary.Alluvium.Coarse	6289.31	Well Test
UMAT0055418	Sediment.Quaternary.Alluvium.Coarse	354.88	Well Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	600	Pump Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	320	Pump Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1048.66	Well Test
UMAT0055427	Sediment.Quaternary.Alluvium.Coarse	534.52	Well Test
UMAT0055437	Sediment.Quaternary.Alluvium.Coarse	5000	Pump Test
UMAT0055437	Sediment.Quaternary.Alluvium.Coarse	12821.65	Well Test
UMAT0055438	Sediment.Quaternary.Alluvium.Coarse	1523.23	Well Test
UMAT0055444	Crbg.undifferentiated.denseflowinterior	402.99	Well Test
UMAT0055523	Crbg.Grb.N2.SentinelBluffs	92487.74	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0055526	Crbg.Grb.N2.SentinelBluffs	6151.12	Well Test
UMAT0055549	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	599.26	Well Test
UMAT0055557	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	495.86	Well Test
UMAT0055582	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3003.11	Well Test
UMAT0055584	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	11	Pump Test
UMAT0055590	Sediment.Quaternary.Alluvium.Coarse	3648.46	Well Test
UMAT0055671	Crbg.Grb.N2.SentinelBluffs	6705.09	Well Test
UMAT0055708	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2628.63	Well Test
UMAT0055733	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	31.67	Well Test
UMAT0055796	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	614.9	Well Test
UMAT0055842	Crbg.undifferentiated	330	Pump Test
UMAT0055884	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	43.52	Well Test
UMAT0055895	Sediment.Quaternary.Alluvium.Coarse	1067.51	Well Test
UMAT0055980	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1126.12	Well Test
UMAT0055981	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	417.98	Well Test
UMAT0056058	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	283.59	Well Test
UMAT0056059	Sediment.Quaternary.Alluvium.Coarse	2592.32	Well Test
UMAT0056099	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13143.16	Well Test
UMAT0056140	Sediment.Quaternary.Alluvium.Coarse	448.3	Well Test
UMAT0056142	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	356.42	Well Test
UMAT0056219	Sediment.Quaternary.Alluvium.Coarse	1953.85	Well Test
UMAT0056249	Sediment.Quaternary.Alluvium.Coarse	207.82	Well Test
UMAT0056282	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	958.32	Well Test
UMAT0056382	Crbg.Grb.N2.SentinelBluffs	112816.98	Well Test
UMAT0056422	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3818.18	Well Test
UMAT0056448	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	16344.84	Well Test
UMAT0056455	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	252.93	Well Test
UMAT0056456	Crbg.Smb.Umatilla	1000	Pump Test
UMAT0056456	Crbg.Smb.Umatilla	430.75	Well Test
UMAT0056479	Sediment.Quaternary.Alluvium.Coarse	2666.7	Well Test
UMAT0056484	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	463.45	Well Test
UMAT0056675	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	574.25	Well Test
UMAT0056873	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2277.95	Well Test
UMAT0056882	Sediment.Quaternary.Alluvium.Coarse	1200	Pump Test
UMAT0056882	Sediment.Quaternary.Alluvium.Coarse	1541.2	Well Test
UMAT0056930	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	701.93	Well Test
UMAT0057031	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8172.42	Well Test
UMAT0057118	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1958.62	Well Test
UMAT0057131	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	18521.57	Well Test
UMAT0057215	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	812.47	Well Test
UMAT0057231	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	141.83	Well Test
UMAT0057337	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	686.67	Well Test
UMAT0057614	Sediment.Quaternary.Alluvium.Coarse	2043.1	Well Test
UMAT0057710	Crbg.Grb.N2.WinterWater	92.94	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

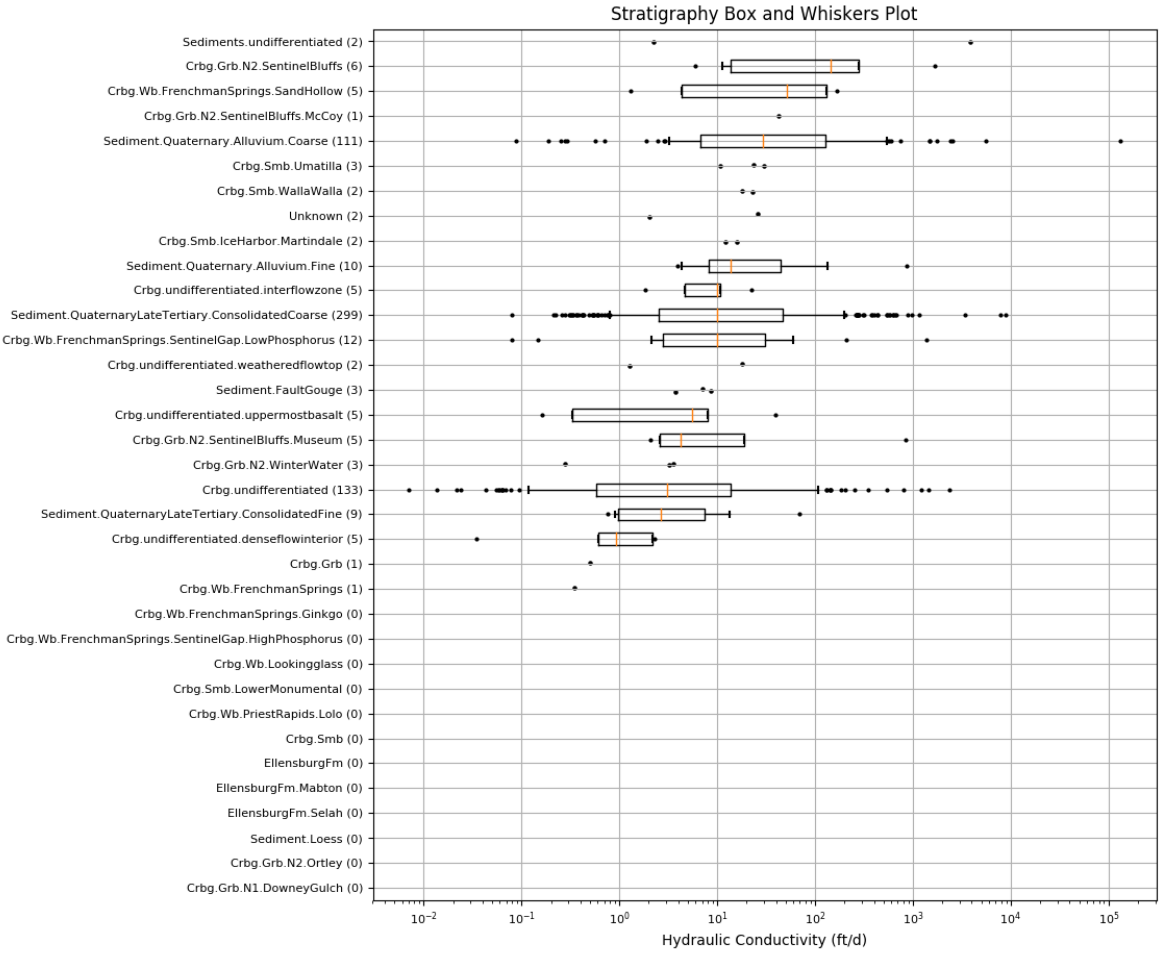
Pump Test = Transmissivity calculated from single well pumping test

Logid	Stratigraphic Unit	Transmissivity (ft^2/d)	Test Type
UMAT0057841	Crbg.undifferentiated	9000	Pump Test
UMAT0057868	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	21	Pump Test
UMAT0057868	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	65.38	Well Test
UMAT0058059	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	266.69	Well Test
UMAT0058102	Sediment.Quaternary.Alluvium.Coarse	2592.32	Well Test
UMAT0058112	Sediment.Quaternary.Alluvium.Coarse	337.68	Well Test
UMAT0058127	Crbg.Grb.N2.SentinelBluffs.McCoy	11000	Pump Test
UMAT0058255	Sediment.Quaternary.Alluvium.Coarse	223.46	Well Test
UMAT0058256	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	65.36	Well Test
UMAT0058411	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5773.22	Well Test
UMAT0058447	Crbg.undifferentiated.interflowzone	94.2	Well Test
UMAT0058505	Sediment.Quaternary.Alluvium.Coarse	14235.87	Well Test
UMAT0058714	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	437.47	Well Test
UMAT0058990	Sediment.Quaternary.Alluvium.Coarse	5707.14	Well Test

Well Test = Transmissivity calculated from specific capacity test reported on well log

Pump Test = Transmissivity calculated from single well pumping test

Hydraulic Conductivity by Stratigraphic Unit



Wells are sorted by Logid in the following tables

Logid	Strat Unit	Hydraulic Conductivity	Test Type
STWA0000026	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.33	Well Test
STWA0000074	Sediment.Quaternary.Alluvium.Coarse	4.56	Well Test
STWA0000141	Crbg.undifferentiated	62.29	Well Test
STWA0021266	Crbg.undifferentiated	8.38	Well Test
STWA0021290	Crbg.undifferentiated.interflowzone	22.37	Well Test
STWA0021310	Crbg.Grb.N2.SentinelBluffs.Museum	18.85	Well Test
STWA0021333	Sediment.Quaternary.Alluvium.Fine	13.64	Well Test
STWA0021337	Crbg.undifferentiated	67.92	Well Test
STWA0021357	Crbg.undifferentiated	64.51	Well Test
STWA0021381	Crbg.undifferentiated	6.85	Well Test
STWA0021382	Crbg.undifferentiated	184.11	Well Test
STWA0021406	Crbg.undifferentiated	793.66	Well Test
STWA0021409	Unknown	2.02	Well Test
STWA0021426	Sediment.Quaternary.Alluvium.Coarse	51.12	Well Test
STWA0021474	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.57	Well Test
STWA0021482	Sediment.QuaternaryLateTertiary.ConsolidatedFine	7.44	Well Test
STWA0021496	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.52	Well Test
STWA0021576	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.54	Well Test
STWA0021602	Crbg.undifferentiated	345.41	Well Test
STWA0021613	Crbg.undifferentiated	6.46	Well Test
STWA0021687	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.95	Well Test
STWA0021693	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.61	Well Test
STWA0021694	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.07	Well Test
STWA0021700	Crbg.undifferentiated	0.24	Well Test
STWA0021703	Sediment.Quaternary.Alluvium.Coarse	11.26	Well Test
STWA0021720	Crbg.undifferentiated	3.06	Well Test
STWA0021743	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.08	Well Test
STWA0021794	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	65.84	Well Test
STWA0021797	Crbg.undifferentiated	2.96	Well Test
STWA0021806	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.46	Well Test
STWA0021810	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.05	Well Test
STWA0021820	Crbg.undifferentiated	2.67	Well Test
STWA0021823	Crbg.undifferentiated	1.38	Well Test
STWA0021847	Crbg.undifferentiated	2.03	Well Test
STWA0021850	Crbg.undifferentiated	30.03	Well Test
STWA0021853	Crbg.undifferentiated	132.25	Well Test
STWA0021901	Crbg.undifferentiated	19.48	Well Test
STWA0021914	Crbg.undifferentiated	144.06	Well Test
STWA0021922	Crbg.undifferentiated	2383.92	Well Test
STWA0021929	Crbg.undifferentiated	255.34	Well Test
STWA0021934	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	18.24	Well Test
STWA0021944	Crbg.undifferentiated	7.25	Well Test
STWA0021964	Crbg.undifferentiated	2.80	Well Test
STWA0021976	Crbg.undifferentiated	3.43	Well Test
STWA0021996	Crbg.undifferentiated	1.27	Well Test
STWA0022000	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	583.71	Well Test
STWA0022010	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.99	Well Test
STWA0022027	Crbg.undifferentiated	0.25	Well Test
STWA0022032	Crbg.undifferentiated	14.68	Well Test
STWA0022038	Crbg.undifferentiated	33.81	Well Test
STWA0022047	Crbg.undifferentiated	0.90	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
STWA0022063	Crbg.undifferentiated	7.05	Well Test
STWA0022067	Crbg.undifferentiated	107.00	Well Test
STWA0022116	Crbg.undifferentiated	141.73	Well Test
STWA0022140	Crbg.undifferentiated	60.61	Well Test
STWA0030520	Sediment.QuaternaryLateTertiary.ConsolidatedFine	13.49	Well Test
STWA0154220	Sediment.Quaternary.Alluvium.Coarse	2430.16	Well Test
STWA0154223	Sediment.Quaternary.Alluvium.Coarse	542.60	Well Test
STWA0154225	Sediment.Quaternary.Alluvium.Coarse	454.32	Well Test
STWA0154679	Crbg.undifferentiated	4.53	Well Test
STWA0165633	Crbg.undifferentiated	42.13	Well Test
STWA0168614	Crbg.undifferentiated	11.99	Well Test
STWA0174032	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.14	Well Test
STWA0175031	Sediment.Quaternary.Alluvium.Fine	7.44	Well Test
STWA0176902	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.06	Well Test
STWA0293368	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	164.99	Well Test
STWA0322677	Crbg.undifferentiated.weatheredflowtop	17.84	Well Test
STWA0347030	Crbg.undifferentiated	204.34	Well Test
STWA0347044	Sediment.Quaternary.Alluvium.Coarse	10.61	Well Test
STWA0376602	Sediment.Quaternary.Alluvium.Coarse	4.99	Well Test
STWA0384906	Crbg.undifferentiated	142.75	Well Test
STWA0408381	Sediment.Quaternary.Alluvium.Coarse	24.33	Well Test
STWA0408445	Sediment.Quaternary.Alluvium.Coarse	30.32	Well Test
STWA0410849	Sediment.Quaternary.Alluvium.Coarse	4.40	Well Test
STWA0429182	Crbg.undifferentiated	5.62	Well Test
STWA0430368	Sediment.Quaternary.Alluvium.Coarse	12.37	Well Test
STWA0472609	Sediment.Quaternary.Alluvium.Coarse	2.85	Well Test
STWA0472613	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.21	Well Test
STWA0472776	Sediment.Quaternary.Alluvium.Coarse	2527.00	Well Test
STWA0501155	Crbg.undifferentiated	3.18	Well Test
STWA0511923	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.12	Well Test
STWA0559951	Sediment.Quaternary.Alluvium.Coarse	8.17	Well Test
STWA0663515	Crbg.undifferentiated	0.16	Well Test
STWA1591751	Sediment.Quaternary.Alluvium.Coarse	2.95	Well Test
STWA1634725	Sediment.QuaternaryLateTertiary.ConsolidatedFine	6.33	Well Test
STWA1691570	Sediment.Quaternary.Alluvium.Coarse	7.03	Well Test
STWA1711720	Sediment.Quaternary.Alluvium.Coarse	3.37	Well Test
STWA1874663	Sediment.Quaternary.Alluvium.Coarse	11.33	Well Test
STWA1894037	Sediment.Quaternary.Alluvium.Fine	3.89	Well Test
STWA1900319	Sediment.Quaternary.Alluvium.Coarse	0.71	Well Test
STWA1924775	Crbg.undifferentiated	10.18	Well Test
STWA1970319	Crbg.undifferentiated	29.51	Well Test
UMAT0001441	Crbg.undifferentiated	4.64	Well Test
UMAT0001443	Crbg.undifferentiated	0.19	Well Test
UMAT0001444	Crbg.undifferentiated	0.38	Well Test
UMAT0001448	Crbg.undifferentiated	0.06	Well Test
UMAT0001465	Crbg.undifferentiated	0.22	Well Test
UMAT0001466	Sediment.Quaternary.Alluvium.Coarse	26.54	Well Test
UMAT0001467	Sediment.Quaternary.Alluvium.Coarse	0.09	Well Test
UMAT0001471	Crbg.undifferentiated	4.41	Well Test
UMAT0001487	Crbg.undifferentiated	7.61	Well Test
UMAT0001489	Crbg.undifferentiated	0.07	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0001490	Crbg.undifferentiated	0.01	Well Test
UMAT0001494	Crbg.undifferentiated	4.33	Well Test
UMAT0001496	Crbg.undifferentiated	0.36	Well Test
UMAT0001499	Crbg.undifferentiated	5.88	Well Test
UMAT0001500	Crbg.undifferentiated	12.65	Well Test
UMAT0001501	Crbg.undifferentiated	537.72	Well Test
UMAT0001502	Crbg.undifferentiated	3.10	Well Test
UMAT0001517	Crbg.undifferentiated	1453.24	Well Test
UMAT0003042	Crbg.undifferentiated	0.68	Well Test
UMAT0003046	Crbg.undifferentiated	0.06	Well Test
UMAT0003047	Crbg.undifferentiated	1.33	Well Test
UMAT0003053	Crbg.undifferentiated	0.14	Well Test
UMAT0003054	Crbg.undifferentiated	0.10	Well Test
UMAT0003063	Crbg.undifferentiated	0.73	Well Test
UMAT0003065	Crbg.undifferentiated	0.22	Well Test
UMAT0003066	Crbg.undifferentiated	130.00	Pump Test
UMAT0003067	Crbg.undifferentiated	13.71	Well Test
UMAT0003073	Crbg.undifferentiated	15.01	Well Test
UMAT0003074	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	0.15	Well Test
UMAT0003075	Crbg.undifferentiated	0.73	Well Test
UMAT0003076	Crbg.undifferentiated	8.35	Well Test
UMAT0003079	Crbg.undifferentiated	6.93	Well Test
UMAT0003084	Crbg.undifferentiated	0.35	Well Test
UMAT0003089	Crbg.undifferentiated	4.50	Pump Test
UMAT0003091	Crbg.undifferentiated	3.47	Well Test
UMAT0003092	Crbg.undifferentiated	3.25	Well Test
UMAT0003093	Crbg.undifferentiated	3.40	Well Test
UMAT0003096	Crbg.undifferentiated	2.23	Well Test
UMAT0003097	Crbg.undifferentiated	0.01	Well Test
UMAT0003104	Crbg.undifferentiated	1219.49	Well Test
UMAT0003106	Crbg.undifferentiated	8.33	Well Test
UMAT0003108	Crbg.undifferentiated	2.03	Well Test
UMAT0003109	Crbg.undifferentiated	13.76	Well Test
UMAT0003124	Crbg.undifferentiated	0.06	Well Test
UMAT0003127	Crbg.undifferentiated	0.17	Well Test
UMAT0003138	Sediment.Quaternary.Alluvium.Coarse	0.57	Well Test
UMAT0003143	Sediment.Quaternary.Alluvium.Coarse	30.21	Well Test
UMAT0003148	Crbg.undifferentiated.denseflowinterior	0.03	Well Test
UMAT0003149	Crbg.undifferentiated	0.29	Well Test
UMAT0003152	Crbg.undifferentiated	0.32	Well Test
UMAT0003166	Crbg.undifferentiated	2.22	Well Test
UMAT0003174	Crbg.undifferentiated	0.18	Well Test
UMAT0003191	Crbg.undifferentiated	0.06	Well Test
UMAT0003192	Crbg.undifferentiated	0.06	Well Test
UMAT0003196	Crbg.undifferentiated	1.62	Well Test
UMAT0003197	Crbg.undifferentiated	2.89	Well Test
UMAT0003211	Crbg.undifferentiated.denseflowinterior	0.92	Well Test
UMAT0003214	Crbg.undifferentiated	0.02	Well Test
UMAT0003217	Crbg.undifferentiated	0.12	Well Test
UMAT0003218	Crbg.undifferentiated	0.50	Well Test
UMAT0003219	Crbg.undifferentiated	3.37	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0003222	Crbg.undifferentiated	0.36	Well Test
UMAT0003224	Crbg.undifferentiated	0.73	Well Test
UMAT0003225	Crbg.undifferentiated	2.53	Well Test
UMAT0003229	Crbg.undifferentiated	0.39	Well Test
UMAT0003234	Crbg.undifferentiated	0.08	Well Test
UMAT0003235	Crbg.undifferentiated	0.06	Well Test
UMAT0003241	Crbg.undifferentiated.weatheredflowtop	1.29	Well Test
UMAT0003251	Sediment.QuaternaryLateTertiary.ConsolidatedFine	1.43	Well Test
UMAT0003254	Crbg.undifferentiated.uppermostbasalt	39.60	Well Test
UMAT0003255	Crbg.undifferentiated.uppermostbasalt	5.48	Well Test
UMAT0003256	Crbg.undifferentiated.interflowzone	1.82	Well Test
UMAT0003257	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.38	Well Test
UMAT0003258	Sediment.Quaternary.Alluvium.Fine	29.73	Well Test
UMAT0003266	Sediment.Quaternary.Alluvium.Fine	13.61	Well Test
UMAT0003269	Sediment.Quaternary.Alluvium.Fine	866.32	Well Test
UMAT0003278	Sediment.Quaternary.Alluvium.Coarse	16.70	Well Test
UMAT0003864	Crbg.undifferentiated	27.72	Well Test
UMAT0003872	Crbg.undifferentiated.uppermostbasalt	0.16	Well Test
UMAT0003875	Crbg.undifferentiated.denseflowinterior	2.28	Well Test
UMAT0003886	Sediment.QuaternaryLateTertiary.ConsolidatedFine	0.90	Pump Test
UMAT0003890	Sediment.Quaternary.Alluvium.Coarse	155.34	Well Test
UMAT0003899	Crbg.Wb.FrenchmanSprings.SandHollow	51.73	Well Test
UMAT0003917	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.06	Well Test
UMAT0003929	Sediment.FaultGouge	7.00	Pump Test
UMAT0003929	Sediment.FaultGouge	3.73	Well Test
UMAT0003930	Crbg.Wb.FrenchmanSprings.SandHollow	4.29	Well Test
UMAT0003932	Sediment.Quaternary.Alluvium.Coarse	17.13	Well Test
UMAT0003936	Sediment.Quaternary.Alluvium.Coarse	44.80	Well Test
UMAT0003951	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.41	Well Test
UMAT0003958	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	4.36	Well Test
UMAT0003962	Crbg.Grb.N2.SentinelBluffs	5.90	Pump Test
UMAT0003968	Crbg.undifferentiated.uppermostbasalt	0.33	Well Test
UMAT0003981	Sediment.Quaternary.Alluvium.Coarse	3.51	Well Test
UMAT0003983	Crbg.undifferentiated	0.04	Well Test
UMAT0003984	Sediment.Quaternary.Alluvium.Coarse	0.29	Well Test
UMAT0003988	Sediment.Quaternary.Alluvium.Coarse	45.98	Well Test
UMAT0004000	Crbg.undifferentiated	2.42	Well Test
UMAT0004003	Crbg.undifferentiated	1.54	Well Test
UMAT0004010	Crbg.Grb.N2.WinterWater	3.60	Well Test
UMAT0004014	Sediment.Quaternary.Alluvium.Coarse	0.19	Well Test
UMAT0004019	Crbg.undifferentiated.interflowzone	10.68	Well Test
UMAT0004020	Crbg.undifferentiated	6.17	Well Test
UMAT0004022	Crbg.undifferentiated	0.92	Well Test
UMAT0004024	Sediment.Quaternary.Alluvium.Coarse	41.33	Well Test
UMAT0004025	Crbg.undifferentiated	5.91	Well Test
UMAT0004028	Crbg.undifferentiated	2.83	Well Test
UMAT0004031	Crbg.undifferentiated	0.84	Well Test
UMAT0004032	Sediment.Quaternary.Alluvium.Coarse	5.32	Well Test
UMAT0004037	Crbg.undifferentiated	31.17	Well Test
UMAT0004039	Crbg.undifferentiated	2.84	Well Test
UMAT0004040	Sediment.Quaternary.Alluvium.Coarse	1491.58	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0004042	Crbg.undifferentiated.denseflowinterior	0.60	Well Test
UMAT0004044	Crbg.undifferentiated.uppermostbasalt	8.00	Well Test
UMAT0004048	Crbg.undifferentiated.interflowzone	10.06	Well Test
UMAT0004063	Crbg.undifferentiated	0.58	Well Test
UMAT0004065	Sediment.Quaternary.Alluvium.Coarse	174.95	Well Test
UMAT0004072	Crbg.undifferentiated	0.56	Well Test
UMAT0004076	Sediment.Quaternary.Alluvium.Fine	49.35	Well Test
UMAT0004080	Sediment.QuaternaryLateTertiary.ConsolidatedFine	0.97	Well Test
UMAT0004087	Sediment.Quaternary.Alluvium.Coarse	39.96	Well Test
UMAT0004090	Sediment.Quaternary.Alluvium.Coarse	3.22	Well Test
UMAT0004094	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	29.64	Well Test
UMAT0004096	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.78	Well Test
UMAT0004100	Sediments.undifferentiated	3847.85	Well Test
UMAT0004101	Crbg.undifferentiated	1.33	Well Test
UMAT0004102	Sediment.QuaternaryLateTertiary.ConsolidatedFine	68.87	Well Test
UMAT0004107	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.85	Well Test
UMAT0004108	Sediment.Quaternary.Alluvium.Coarse	38.18	Well Test
UMAT0004113	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.28	Well Test
UMAT0004114	Sediment.Quaternary.Alluvium.Coarse	15.70	Well Test
UMAT0004115	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	107.69	Well Test
UMAT0004116	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	30.26	Well Test
UMAT0004118	Sediment.Quaternary.Alluvium.Coarse	9.60	Well Test
UMAT0004119	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.99	Well Test
UMAT0004120	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.42	Well Test
UMAT0004121	Sediment.Quaternary.Alluvium.Fine	4.37	Well Test
UMAT0004122	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.45	Well Test
UMAT0004126	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.55	Well Test
UMAT0004127	Sediment.Quaternary.Alluvium.Coarse	567.30	Well Test
UMAT0004133	Sediment.Quaternary.Alluvium.Coarse	324.04	Well Test
UMAT0004143	Sediment.Quaternary.Alluvium.Coarse	29.05	Well Test
UMAT0004144	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	972.47	Well Test
UMAT0004146	Sediment.Quaternary.Alluvium.Coarse	1.89	Well Test
UMAT0004148	Sediment.Quaternary.Alluvium.Coarse	6.48	Well Test
UMAT0004149	Sediment.Quaternary.Alluvium.Coarse	7.03	Well Test
UMAT0004152	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.52	Well Test
UMAT0004153	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.94	Well Test
UMAT0004155	Sediment.Quaternary.Alluvium.Coarse	1472.07	Well Test
UMAT0004158	Sediment.Quaternary.Alluvium.Coarse	4.09	Well Test
UMAT0004160	Sediment.Quaternary.Alluvium.Coarse	137.27	Well Test
UMAT0004161	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1153.09	Well Test
UMAT0004162	Sediment.Quaternary.Alluvium.Coarse	5593.73	Well Test
UMAT0004163	Sediment.Quaternary.Alluvium.Coarse	548.25	Well Test
UMAT0004166	Crbg.undifferentiated	1.53	Well Test
UMAT0004167	Crbg.undifferentiated	50.00	Pump Test
UMAT0004168	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	21.90	Well Test
UMAT0004175	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.60	Well Test
UMAT0004180	Crbg.Wb.FrenchmanSprings.SandHollow	1.30	Pump Test
UMAT0004182	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.45	Well Test
UMAT0004185	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	210.00	Pump Test
UMAT0004185	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	1367.07	Well Test
UMAT0004186	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7888.13	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0004187	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	26.00	Pump Test
UMAT0004187	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.75	Well Test
UMAT0004192	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.59	Well Test
UMAT0004195	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.17	Well Test
UMAT0004202	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	45.59	Well Test
UMAT0004204	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.19	Well Test
UMAT0004205	Sediments.undifferentiated	2.26	Well Test
UMAT0004207	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	257.71	Well Test
UMAT0004211	Sediment.QuaternaryLateTertiary.ConsolidatedFine	2.64	Well Test
UMAT0004216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	543.41	Well Test
UMAT0004217	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.72	Well Test
UMAT0004219	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	24.15	Well Test
UMAT0004222	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	21.01	Well Test
UMAT0004228	Sediment.Quaternary.Alluvium.Coarse	212.16	Well Test
UMAT0004229	Sediment.Quaternary.Alluvium.Coarse	604.93	Well Test
UMAT0004238	Sediment.Quaternary.Alluvium.Coarse	60.00	Pump Test
UMAT0004247	Sediment.Quaternary.Alluvium.Coarse	67.77	Well Test
UMAT0004249	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.04	Well Test
UMAT0004256	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	37.76	Well Test
UMAT0004261	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	67.81	Well Test
UMAT0004268	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.75	Well Test
UMAT0004269	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.03	Well Test
UMAT0004271	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	39.24	Well Test
UMAT0004275	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.55	Well Test
UMAT0004276	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.63	Well Test
UMAT0004279	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.30	Pump Test
UMAT0004281	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	544.23	Well Test
UMAT0004282	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	19.46	Well Test
UMAT0004284	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.51	Well Test
UMAT0004291	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.47	Well Test
UMAT0004293	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.76	Well Test
UMAT0004294	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.98	Well Test
UMAT0004297	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.34	Well Test
UMAT0004298	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.43	Well Test
UMAT0004301	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.33	Well Test
UMAT0004305	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.73	Well Test
UMAT0004306	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.79	Well Test
UMAT0004315	Sediment.Quaternary.Alluvium.Coarse	1749.06	Well Test
UMAT0004320	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	58.38	Well Test
UMAT0004325	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	11.62	Well Test
UMAT0004327	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.82	Well Test
UMAT0004328	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	66.48	Well Test
UMAT0004329	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.26	Well Test
UMAT0004332	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	40.12	Well Test
UMAT0004344	Sediment.Quaternary.Alluvium.Coarse	132721.20	Well Test
UMAT0004347	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.87	Well Test
UMAT0004362	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.72	Well Test
UMAT0004366	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.74	Well Test
UMAT0004367	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.80	Well Test
UMAT0004368	Sediment.Quaternary.Alluvium.Coarse	138.90	Well Test
UMAT0004378	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	31.85	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0004379	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.98	Well Test
UMAT0004380	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	39.87	Well Test
UMAT0004381	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.00	Pump Test
UMAT0004383	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.45	Well Test
UMAT0004401	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	632.39	Well Test
UMAT0004407	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.82	Well Test
UMAT0004409	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.19	Well Test
UMAT0004410	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	27.45	Well Test
UMAT0004411	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.50	Well Test
UMAT0004414	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8940.12	Well Test
UMAT0004416	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.42	Well Test
UMAT0004418	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.31	Pump Test
UMAT0004425	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	151.23	Well Test
UMAT0004434	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	569.69	Well Test
UMAT0004449	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	380.19	Well Test
UMAT0004462	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.77	Well Test
UMAT0004464	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	431.10	Well Test
UMAT0004466	Sediment.Quaternary.Alluvium.Coarse	211.78	Well Test
UMAT0004471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.00	Pump Test
UMAT0004471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.17	Well Test
UMAT0004472	Sediment.Quaternary.Alluvium.Coarse	19.09	Well Test
UMAT0004476	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.07	Well Test
UMAT0004478	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	372.90	Well Test
UMAT0004479	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	151.65	Well Test
UMAT0004482	Sediment.Quaternary.Alluvium.Coarse	23.04	Well Test
UMAT0004483	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	40.82	Well Test
UMAT0004486	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	63.05	Well Test
UMAT0004490	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.93	Well Test
UMAT0004504	Sediment.Quaternary.Alluvium.Coarse	113.00	Well Test
UMAT0004540	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	105.36	Well Test
UMAT0004541	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.91	Well Test
UMAT0004543	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	632.02	Well Test
UMAT0004549	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	658.91	Well Test
UMAT0004577	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	68.51	Well Test
UMAT0004579	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	675.61	Well Test
UMAT0004635	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	73.07	Well Test
UMAT0004644	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.40	Well Test
UMAT0004645	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	62.45	Well Test
UMAT0004646	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	23.46	Well Test
UMAT0004647	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	281.43	Well Test
UMAT0004653	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	14.30	Well Test
UMAT0004660	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	274.01	Well Test
UMAT0004677	Sediment.Quaternary.Alluvium.Coarse	107.77	Well Test
UMAT0004678	Sediment.Quaternary.Alluvium.Coarse	165.06	Well Test
UMAT0004680	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	45.61	Well Test
UMAT0004701	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	38.65	Well Test
UMAT0004717	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.60	Well Test
UMAT0004718	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.27	Well Test
UMAT0004724	Sediment.Quaternary.Alluvium.Coarse	25.50	Well Test
UMAT0004756	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	64.04	Well Test
UMAT0004757	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	15.31	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0004758	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.76	Well Test
UMAT0004759	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.02	Well Test
UMAT0004760	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.31	Well Test
UMAT0004763	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	29.80	Well Test
UMAT0004764	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.50	Well Test
UMAT0004767	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.20	Well Test
UMAT0004774	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.35	Well Test
UMAT0004778	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	104.09	Well Test
UMAT0004781	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.67	Well Test
UMAT0004799	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.37	Well Test
UMAT0004800	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	59.23	Well Test
UMAT0004805	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.66	Well Test
UMAT0004822	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.54	Well Test
UMAT0004827	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.32	Well Test
UMAT0004831	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	76.06	Well Test
UMAT0004840	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.31	Well Test
UMAT0004848	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.49	Well Test
UMAT0004849	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	2.10	Well Test
UMAT0004857	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.17	Well Test
UMAT0004859	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	400.00	Pump Test
UMAT0004859	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	317.82	Well Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	12.00	Pump Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	13.00	Pump Test
UMAT0004864	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	59.08	Well Test
UMAT0004874	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.00	Pump Test
UMAT0004874	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.84	Well Test
UMAT0004885	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	45.91	Well Test
UMAT0004888	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.94	Well Test
UMAT0004898	Unknown	26.13	Well Test
UMAT0004942	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.68	Well Test
UMAT0004944	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.68	Well Test
UMAT0004953	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.56	Well Test
UMAT0004968	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	79.44	Well Test
UMAT0004970	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.22	Well Test
UMAT0004971	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	124.52	Well Test
UMAT0004974	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	88.51	Well Test
UMAT0005029	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.70	Well Test
UMAT0005036	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.54	Well Test
UMAT0005049	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.61	Well Test
UMAT0005052	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.76	Well Test
UMAT0005065	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.71	Well Test
UMAT0005127	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	69.05	Well Test
UMAT0005133	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	28.13	Well Test
UMAT0005136	Sediment.Quaternary.Alluvium.Coarse	235.14	Well Test
UMAT0005138	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	308.56	Well Test
UMAT0005147	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	84.48	Well Test
UMAT0005169	Sediment.Quaternary.Alluvium.Fine	10.41	Well Test
UMAT0005170	Sediment.QuaternaryLateTertiary.ConsolidatedFine	0.76	Well Test
UMAT0005172	Sediment.Quaternary.Alluvium.Coarse	47.26	Well Test
UMAT0005173	Sediment.Quaternary.Alluvium.Coarse	7.23	Well Test
UMAT0005180	Crbg.Wb.FrenchmanSprings.SandHollow	130.57	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0005187	Crbg.undifferentiated	14.11	Well Test
UMAT0005193	Crbg.Grb.N2.SentinelBluffs.Museum	4.28	Well Test
UMAT0005209	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	271.25	Well Test
UMAT0005210	Sediment.Quaternary.Alluvium.Coarse	45.21	Well Test
UMAT0005213	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	894.01	Well Test
UMAT0005227	Crbg.Wb.FrenchmanSprings.SandHollow	168.87	Well Test
UMAT0005231	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.27	Well Test
UMAT0005232	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	144.00	Well Test
UMAT0005241	Crbg.Grb.N2.SentinelBluffs.Museum	841.32	Well Test
UMAT0005331	Crbg.Grb	0.51	Well Test
UMAT0005357	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.97	Well Test
UMAT0005370	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	37.25	Well Test
UMAT0005378	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.16	Well Test
UMAT0005412	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.01	Well Test
UMAT0005477	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	16.55	Well Test
UMAT0005496	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.93	Pump Test
UMAT0005513	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	164.63	Well Test
UMAT0005530	Crbg.Grb.N2.SentinelBluffs	1676.24	Well Test
UMAT0005555	Crbg.undifferentiated	3.59	Well Test
UMAT0005606	Sediment.FaultGouge	8.60	Pump Test
UMAT0005625	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.12	Well Test
UMAT0005671	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.40	Pump Test
UMAT0005671	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.35	Well Test
UMAT0005788	Crbg.Smb.Umatilla	23.51	Well Test
UMAT0005841	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.54	Well Test
UMAT0005958	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.23	Well Test
UMAT0006015	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	75.98	Well Test
UMAT0006026	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.19	Well Test
UMAT0006051	Crbg.undifferentiated	0.02	Well Test
UMAT0006053	Crbg.Smb.WallaWalla	18.00	Pump Test
UMAT0006057	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	28.15	Well Test
UMAT0006151	Crbg.undifferentiated	2.82	Well Test
UMAT0006179	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.25	Well Test
UMAT0006180	Sediment.Quaternary.Alluvium.Coarse	746.93	Well Test
UMAT0006181	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.12	Well Test
UMAT0006184	Crbg.undifferentiated	36.61	Well Test
UMAT0006192	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.33	Well Test
UMAT0006202	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	195.99	Well Test
UMAT0006203	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	45.16	Well Test
UMAT0006208	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.53	Well Test
UMAT0006214	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3388.42	Well Test
UMAT0006283	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	8.00	Pump Test
UMAT0006283	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	21.10	Well Test
UMAT0006342	Sediment.Quaternary.Alluvium.Coarse	34.06	Well Test
UMAT0006360	Sediment.Quaternary.Alluvium.Coarse	0.25	Well Test
UMAT0006377	Sediment.Quaternary.Alluvium.Coarse	53.84	Well Test
UMAT0006446	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.81	Well Test
UMAT0006447	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.69	Well Test
UMAT0006450	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.77	Well Test
UMAT0006452	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	43.02	Well Test
UMAT0006455	Crbg.undifferentiated	8.70	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0006456	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.14	Well Test
UMAT0006461	Crbg.undifferentiated	1.70	Pump Test
UMAT0006463	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.06	Well Test
UMAT0006477	Sediment.Quaternary.Alluvium.Coarse	8.96	Well Test
UMAT0006512	Sediment.Quaternary.Alluvium.Coarse	119.44	Well Test
UMAT0006543	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.96	Well Test
UMAT0006566	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.33	Well Test
UMAT0006594	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.43	Well Test
UMAT0050016	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.97	Well Test
UMAT0050068	Sediment.Quaternary.Alluvium.Coarse	0.28	Well Test
UMAT0050183	Crbg.undifferentiated	3.00	Pump Test
UMAT0050237	Crbg.Grb.N2.SentinelBluffs.Museum	2.10	Pump Test
UMAT0050250	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.89	Well Test
UMAT0050354	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.37	Well Test
UMAT0050473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.00	Pump Test
UMAT0050473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	55.79	Well Test
UMAT0050478	Crbg.Smb.WallaWalla	23.00	Pump Test
UMAT0050485	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	50.00	Pump Test
UMAT0050516	Crbg.Grb.N2.SentinelBluffs.Museum	2.60	Pump Test
UMAT0050630	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	28.47	Well Test
UMAT0050772	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.11	Well Test
UMAT0050938	Crbg.undifferentiated	1.10	Well Test
UMAT0051035	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	43.88	Well Test
UMAT0051045	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.95	Well Test
UMAT0051666	Sediment.Quaternary.Alluvium.Coarse	71.53	Well Test
UMAT0051744	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.47	Well Test
UMAT0051921	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.69	Well Test
UMAT0051947	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	192.69	Well Test
UMAT0052006	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	3.00	Pump Test
UMAT0052007	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	200.00	Pump Test
UMAT0052037	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.00	Pump Test
UMAT0052581	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	31.47	Well Test
UMAT0053214	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.92	Well Test
UMAT0053239	Sediment.Quaternary.Alluvium.Coarse	3.30	Well Test
UMAT0053447	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.44	Well Test
UMAT0053457	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.22	Well Test
UMAT0053462	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.21	Well Test
UMAT0053471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	41.40	Well Test
UMAT0053472	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.53	Well Test
UMAT0053492	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	92.36	Well Test
UMAT0053647	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	279.09	Well Test
UMAT0053711	Sediment.Quaternary.Alluvium.Coarse	157.79	Well Test
UMAT0053762	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	20.66	Well Test
UMAT0053763	Sediment.Quaternary.Alluvium.Coarse	4.54	Well Test
UMAT0053769	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.32	Well Test
UMAT0053829	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.27	Well Test
UMAT0053833	Sediment.Quaternary.Alluvium.Coarse	28.18	Well Test
UMAT0053888	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.03	Well Test
UMAT0053945	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.62	Well Test
UMAT0053951	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.17	Well Test
UMAT0053985	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	21.42	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0054097	Crbg.undifferentiated	10.00	Pump Test
UMAT0054136	Sediment.Quaternary.Alluvium.Coarse	14.45	Well Test
UMAT0054143	Sediment.Quaternary.Alluvium.Coarse	9.10	Well Test
UMAT0054171	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	34.09	Well Test
UMAT0054195	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.94	Well Test
UMAT0054216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.60	Pump Test
UMAT0054216	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.55	Well Test
UMAT0054277	Crbg.Wb.FrenchmanSprings	0.35	Pump Test
UMAT0054296	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	107.79	Well Test
UMAT0054343	Sediment.Quaternary.Alluvium.Coarse	4.87	Well Test
UMAT0054393	Sediment.Quaternary.Alluvium.Coarse	5.68	Well Test
UMAT0054394	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.22	Well Test
UMAT0054424	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	31.13	Well Test
UMAT0054433	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	18.16	Well Test
UMAT0054434	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	38.92	Well Test
UMAT0054436	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	268.23	Well Test
UMAT0054454	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.06	Well Test
UMAT0054461	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	103.10	Well Test
UMAT0054471	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	120.44	Well Test
UMAT0054472	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.80	Pump Test
UMAT0054473	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	24.90	Well Test
UMAT0054516	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	65.93	Well Test
UMAT0054522	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	28.71	Well Test
UMAT0054524	Crbg.Smb.IceHarbor.Martindale	12.00	Pump Test
UMAT0054524	Crbg.Smb.IceHarbor.Martindale	16.04	Well Test
UMAT0054725	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.00	Pump Test
UMAT0054725	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	265.83	Well Test
UMAT0054765	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.42	Well Test
UMAT0054787	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.61	Well Test
UMAT0054801	Sediment.Quaternary.Alluvium.Fine	134.54	Well Test
UMAT0054807	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.24	Well Test
UMAT0054835	Sediment.Quaternary.Alluvium.Coarse	162.48	Well Test
UMAT0054841	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.09	Well Test
UMAT0054887	Sediment.Quaternary.Alluvium.Coarse	5.82	Well Test
UMAT0054911	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	22.82	Well Test
UMAT0054912	Sediment.Quaternary.Alluvium.Coarse	46.59	Well Test
UMAT0054961	Crbg.undifferentiated	3.95	Well Test
UMAT0054966	Crbg.undifferentiated	3.93	Well Test
UMAT0054970	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.16	Well Test
UMAT0055053	Crbg.Grb.N2.WinterWater	3.25	Well Test
UMAT0055085	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	204.53	Well Test
UMAT0055099	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.33	Well Test
UMAT0055136	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	97.29	Well Test
UMAT0055175	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.02	Well Test
UMAT0055181	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.66	Well Test
UMAT0055227	Sediment.Quaternary.Alluvium.Coarse	150.26	Well Test
UMAT0055301	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	4.65	Well Test
UMAT0055317	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	13.71	Well Test
UMAT0055323	Sediment.Quaternary.Alluvium.Coarse	224.62	Well Test
UMAT0055418	Sediment.Quaternary.Alluvium.Coarse	5.82	Well Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.00	Pump Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	5.00	Pump Test
UMAT0055419	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	16.13	Well Test
UMAT0055427	Sediment.Quaternary.Alluvium.Coarse	12.73	Well Test
UMAT0055437	Sediment.Quaternary.Alluvium.Coarse	20.00	Pump Test
UMAT0055437	Sediment.Quaternary.Alluvium.Coarse	50.68	Well Test
UMAT0055438	Sediment.Quaternary.Alluvium.Coarse	7.77	Well Test
UMAT0055444	Crbg.undifferentiated.denseflowinterior	2.16	Well Test
UMAT0055523	Crbg.Grb.N2.SentinelBluffs	280.27	Well Test
UMAT0055526	Crbg.Grb.N2.SentinelBluffs	11.29	Well Test
UMAT0055549	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	8.32	Well Test
UMAT0055557	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.89	Well Test
UMAT0055582	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	58.88	Well Test
UMAT0055584	Crbg.Wb.FrenchmanSprings.SentinelGap.LowPhosphorus	0.08	Pump Test
UMAT0055590	Sediment.Quaternary.Alluvium.Coarse	107.31	Well Test
UMAT0055671	Crbg.Grb.N2.SentinelBluffs	20.95	Well Test
UMAT0055708	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	52.57	Well Test
UMAT0055733	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.37	Well Test
UMAT0055796	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	9.46	Well Test
UMAT0055842	Crbg.undifferentiated	2.10	Pump Test
UMAT0055884	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.09	Well Test
UMAT0055895	Sediment.Quaternary.Alluvium.Coarse	17.79	Well Test
UMAT0055980	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	12.37	Well Test
UMAT0055981	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	7.60	Well Test
UMAT0056058	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.29	Well Test
UMAT0056059	Sediment.Quaternary.Alluvium.Coarse	35.51	Well Test
UMAT0056099	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	438.11	Well Test
UMAT0056140	Sediment.Quaternary.Alluvium.Coarse	8.30	Well Test
UMAT0056142	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.56	Well Test
UMAT0056219	Sediment.Quaternary.Alluvium.Coarse	39.08	Well Test
UMAT0056249	Sediment.Quaternary.Alluvium.Coarse	3.46	Well Test
UMAT0056282	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	47.92	Well Test
UMAT0056382	Crbg.Grb.N2.SentinelBluffs	271.19	Well Test
UMAT0056422	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	47.14	Well Test
UMAT0056448	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	181.61	Well Test
UMAT0056455	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	3.89	Well Test
UMAT0056456	Crbg.Smb.Umatilla	30.00	Pump Test
UMAT0056456	Crbg.Smb.Umatilla	10.77	Well Test
UMAT0056479	Sediment.Quaternary.Alluvium.Coarse	66.67	Well Test
UMAT0056484	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.93	Well Test
UMAT0056675	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	14.36	Well Test
UMAT0056873	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	56.95	Well Test
UMAT0056882	Sediment.Quaternary.Alluvium.Coarse	30.00	Pump Test
UMAT0056882	Sediment.Quaternary.Alluvium.Coarse	38.53	Well Test
UMAT0056930	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	17.12	Well Test
UMAT0057031	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	263.63	Well Test
UMAT0057118	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	31.59	Well Test
UMAT0057131	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	168.38	Well Test
UMAT0057215	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	10.16	Well Test
UMAT0057231	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	2.29	Well Test
UMAT0057337	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	114.45	Well Test
UMAT0057614	Sediment.Quaternary.Alluvium.Coarse	17.61	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test

Logid	Strat Unit	Hydraulic Conductivity	Test Type
UMAT0057710	Crbg.Grb.N2.WinterWater	0.28	Well Test
UMAT0057841	Crbg.undifferentiated	38.00	Pump Test
UMAT0057868	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.08	Pump Test
UMAT0057868	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	0.26	Well Test
UMAT0058059	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.78	Well Test
UMAT0058102	Sediment.Quaternary.Alluvium.Coarse	71.02	Well Test
UMAT0058112	Sediment.Quaternary.Alluvium.Coarse	2.46	Well Test
UMAT0058127	Crbg.Grb.N2.SentinelBluffs.McCoy	42.00	Pump Test
UMAT0058255	Sediment.Quaternary.Alluvium.Coarse	4.86	Well Test
UMAT0058256	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	1.63	Well Test
UMAT0058411	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	72.17	Well Test
UMAT0058447	Crbg.undifferentiated.interflowzone	4.71	Well Test
UMAT0058505	Sediment.Quaternary.Alluvium.Coarse	158.18	Well Test
UMAT0058714	Sediment.QuaternaryLateTertiary.ConsolidatedCoarse	6.84	Well Test
UMAT0058990	Sediment.Quaternary.Alluvium.Coarse	300.38	Well Test

Well Test = Hydraulic conductivity calculated from specific capacity test reported on well log

Pump Test = Hydraulic conductivity calculated from single well pumping test