

A2. Well and aquifer data:

A2 a: Well identifiers, aquifer, rate, and location

POA Well	Well Log ID	Applicant's Well #	Proposed Aquifer	Proposed Rate (cfs)	Location (T/R-S QQ-Q)	Latitude	Longitude
1	PROP 713			2.5	8S/41E-31 NE-SW	44.82388889	-117.7416667
2	PROP 714			2.5	8S/41E-31 NW-SW	44.82444444	-117.7461111
3	PROP 715			2.5	8S/41E-31 NE-SW	44.82222222	-117.7397222

A2 b: Well construction information by depth below land surface. All units in feet.

POA Well	Seal		Casing		Filter Pack		Open / Perforation / Screen		Well Bottom
	Min	Max	Min	Max	Min	Max	Min	Max	
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	300
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	300
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	300

A2 c: Well construction information by elevation above mean sea level. All units in feet.

POA Well	Land Surface Elevation	Seal		Casing		Filter Pack		Open / Perforation / Screen		Well Bottom
		Min	Max	Min	Max	Min	Max	Min	Max	
1	3450.14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3150.14
2	3415.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3115.1
3	3454.26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3154.26

A2 d: Information relevant to water levels, including land surface elevation, depth of first water, recent annual high level, and reference levels for permit conditions

POA Well	Depth of First Water from Well Log (ft bls)	Shallowest Static Water Level (ft bls)	Most Recent Annual High WL		Reference Levels for:				Well Tests			
					RSGL		Permit Conditions		(max yield on well log)			
			Depth (ft bls)	WL Date	Depth (ft bls)	Depth (ft bls)	Date	Pro-visional?	Yield (gpm)	Draw-down (ft)	Test Type	Duration (hours)
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Use data from application for proposed wells.

“SWL” = static water level (most recent or representative SWL). “amsl” = above mean sea level. “bls” = below land surface

Comments: All three POAs are proposed wells, not yet drilled.

A3. Description of hydrogeologic setting / conceptual model:

The three proposed POAs are expected to develop the bedrock, which could be volcanic rock (likely Basalt of Catherine Creek or Andesite of Sawtooth Crater of the Miocene Powder River Volcanics) or metamorphics such as Clover Creek Greenstone, or intrusive volcanics like granite, diorite, or gabbro (Permian metamorphosed mafic intrusive rocks). Nearby well logs are sparse and report a complicated picture of the geology underlying the alluvial sequence. Geologic mapping (Brooks, 1976; Brooks, 1977 and Swanson, 1981) shows a complex geometry between Mesozoic plutonic rocks (granite, diorite, and mafic intrusives), associated metamorphic rocks, in addition to much younger flows of Miocene Powder River Volcanics. It is likely that if Powder River Volcanics are encountered at the given locations, that these flows will not be of significant thickness or lateral extent and are unlikely to comprise a separate and distinct aquifer system from adjacent lithologies. In our conceptual framework, productive water-bearing zones are anticipated to occur at contacts between Miocene volcanic flow rocks and underlying Mesozoic rocks, or at the contact between bedrock and overlying and/or adjacent sediments. Water levels generally follow topography and trends are similar in bedrock to those observed in sedimentary wells.

B. BASIN PROGRAM:

OAR 690-310-0130 (1)(a)

B1. ☐ **Provisions of the** Powder Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water ☐ **are, or** ☒ **are not**, activated by this application.
(Not all basin rules contain such provisions.)

Comments: N/A

B2. ☐ **Well(s) #** _____, _____, _____, _____, _____, are limited by an administrative restriction under the applicable basin program.

Comments: N/A

C. WATER AVAILABILITY:

OAR 690-310-0130 (1)(b)

OAR 690-300-0010(57): “Water is Available” [...] means: [...]

- (d) The proposed groundwater source exhibits Reasonably Stable Groundwater Levels, as defined in OAR 690-008-0001; and
- (e) The total requested rate of groundwater allocation is obtainable by the expected yield of the well(s) proposed in the application given best available information; and
- (f) The proposed groundwater use does not have the Potential for Substantial Interference (OAR 690-009-0020(5)) with a surface water source [that does not have water available]

C1. Reasonably Stable Groundwater Levels

OAR 690-008-0001 (9): “Reasonably Stable Groundwater Levels” means that Annual High Water Levels, based on observed trends over time, remain within a range consistent with sustaining the function and character of a groundwater reservoir indefinitely, and:

- (a) The Annual High Water Levels as measured at one or more representative wells in a groundwater reservoir or part thereof:
- (A) indicate no decline or an average rate of decline of less than 0.6 feet per year over any immediately preceding averaging period with duration between 5 and 20 years. Four Annual High Water Levels are required to calculate the rate of change; one must have been measured in the year to which the evaluation of reasonably stable applies, and at least one must have been measured between 5 and 20 years prior; and
 - (B) have not declined by more than 25 feet from a reference level to the level in the year to which the evaluation of reasonably stable applies. The reference level shall be the highest known water level unless Annual High Water Levels have been measurably increased by human activity, in which case the Department may set a different reference level using best available information.
- (b) If water level data are insufficient to perform either test in (a) for a given year, then the Department will presume that groundwater levels are not reasonably stable unless:
- (A) the most recent evaluation of reasonably stable applies to a year within 5 years of the given year, in which case the Department may presume that the recent evaluation still applies; or
 - (B) groundwater has not yet been extracted or authorized for extraction from the groundwater reservoir, in which case the Department may presume that groundwater levels are reasonably stable.
- (c) The Department may evaluate Reasonably Stable Groundwater Levels for the year of the priority date of a groundwater right application or for a later year if more recent data are available.

- C1a. If part (a) of 690-008-0001(9) has been superseded by a basin program rule as per 690-008-0001(9)(B)(d) proceed to C1c. List one or more representative wells in the proposed groundwater reservoir or part thereof that have sufficient data to evaluate part (a) of 690-008-0001(9). Both the Rate (OAR 690-008-0001(9)(a)(A)) and Magnitude (OAR 690-008-0001(9)(a)(B)) tests for a given well must be passed in order to find that the water levels are Reasonably Stable. It is not necessary to include all POAs proposed on this application into this table, as long as they all access the same part of the groundwater reservoir and have the same reasonable stability status indicated in C1b below. If some POAs are found to be reasonably stable while others are not, then all the POAs on the application should be included in the table below, with their POA number indicated in the second column. In that situation, the reviewer does not need to indicate in this table which wells are considered representative for determining reasonable stability status for different POAs, but they should describe those relationships in the comments below.

Well Log ID	POA Well #	Reference Level for Evaluation of Reasonable Stability (ft bls)	Rate Test	Magnitude Test	Water Levels Reasonably Stable
PROP 713	1	N/A	N/A	N/A	N/A
PROP 714	2	N/A	N/A	N/A	N/A
PROP 715	3	N/A	N/A	N/A	N/A

Comments: All three POAs are proposed wells, not yet drilled. These data do not exist at the proposed POAs or nearby representative wells.

C1b. Summary finding for this application. Check only one primary finding. It is possible that different proposed POAs could access different parts of the GW reservoir, and for some of those parts to be Reasonably Stable while others are not. In that case, summary finding for the application should be “Not Reasonably Stable,” and the reviewer should indicate which POAs access part(s) of the groundwater reservoir that are Reasonably Stable. OAR 690-008-0001(9)(a): *Annual High Water Levels as measured at one or more representative wells in a groundwater reservoir or part thereof*:

☐ **Are Reasonably Stable**

☐ Groundwater has not yet been extracted or authorized for extraction from the groundwater reservoir

☐ **Are Not Reasonably Stable**

☐ If some Proposed POAs are Reasonably Stable, list the Reasonably Stable POAs here: _____

☒ **Sufficient data are not available to evaluate reasonable stability**

List representative wells identified during review that could be measured in order to overcome a finding of Insufficient Data: N/A

Comments: Wells are sparse in this area, and there is no obvious nearby well to serve as a proxy for the proposed 300' deep wells associated with this application.

C1c. OAR 690-008-0001(d): Evaluation for reasonably stable water levels per superseding basin program rules OAR 690-_____ for the _____ administrative basin.

Comments: N/A

C2. Well Yield

C2a. OAR 690-300-0010(57)(e): Is the total requested rate of groundwater allocation obtainable by the expected yield of the well(s) proposed in the application given best available information?

☐ Yes ☒ No

Comments: Application G-19493 requests a total of 2.5 cfs (1,122gpm) from up to 3 wells, requiring each well to produce a minimum of 374 gpm. In the well log database, 20 well logs were found in the following sections: T8S/R41E Sections 19,30,31,32; T8S/R40E Section 36; T9S/R40E Section 1; T9S/R41E Sections 6,7. Reported well yields range from 0 to 400 gpm, with a median yield of 40 gpm. This may be biased low due to the fact that many nearby wells are for domestic uses, however it is still an order of magnitude lower than the approximately 375 gpm per well that the application seeks.

C3. Groundwater Interference with Surface Water

OAR 690-300-0010(57): “Water is Available”, when used in OAR 690-310-0080, 690-310-0010 and 690-310-0130, means [...]:
(f) The proposed groundwater use does not have the Potential for Substantial Interference (OAR 690-009-0020(5)) with a surface water source [that is not available for further appropriation]

OAR 690-009-0040: (1) When evaluating a Proposed Groundwater Use, Hydraulic Connection and the Potential for Substantial Interference with a surface water source shall be determined by the Department according to these rules. These determinations shall be based upon the application of generally accepted hydrogeologic principles using best available information concerning the hydrologic system of interest and the well(s) under consideration.

(a) Appropriate information that is provided in the application or in the public comment period for the application shall be considered in the process of making these determinations.

(b) Best available information may include, but is not limited to, pertinent water well reports, aquifer test analyses, hydrologic and geologic studies and reports, groundwater and surface water elevation data, available numerical and analytical groundwater flow models, and any other information that is used in applying generally accepted hydrogeologic principals and methodologies.

(2) A determination of Hydraulic Connection is a prerequisite for a determination of the Potential for Substantial Interference.

(3) A determination of the Potential for Substantial Interference with a surface water source shall at a minimum include application of the generally accepted hydrogeological principles described in “Streamflow Depletion by Wells – Understanding and Managing the Effects of Groundwater Pumping on Streamflow” by P. M. Barlow and S. A. Leake, 2012.

(4) The Potential for Substantial Interference with a surface water source exists if the well(s) under consideration will, over the full term of the proposed or authorized groundwater use, obtain water from Streamflow Depletion.

OAR 690-009-0020(4): “Hydraulic Connection” means saturated conditions exist allowing water to move between two or more sources of water, either between groundwater and surface water or between groundwater sources.

OAR 690-009-0020 (7) “Streamflow Depletion” means a reduction in the flow of a surface water source due to pumping a hydraulically connected groundwater source. Streamflow Depletion encompasses:

- (a) captured groundwater that would otherwise discharge to a surface water source; or
 (b) induced infiltration from a surface water source to the hydraulically connected groundwater source.

C3a. OAR 690-009-0020(5): *Potential for Substantial Interference*, or “PSI”, means that a groundwater use will cause streamflow depletion based on the assessments described in OAR 690-009-0040, and therefore may cause or has caused substantial interference with or undue interference with a surface water source, based on the definitions in OAR 690-008-0001.

Summary of surface water sources evaluated for hydraulic connection and Potential for Substantial Interference. For hydraulic connection and potential for substantial interference, a value of 1 means yes, and blank means no.

POA Well	WRD Streamcode	Streamcode Surface Water Name	Water Availability Basin (WAB)	WAB Watershed ID	Hydraulically Connected	Potential for Substantial Interference
1	094060	POWDER R	POWDER R	243	Yes	Yes
2	094060	POWDER R	POWDER R	243	Yes	Yes
3	094060	POWDER R	POWDER R	243	Yes	Yes

Comments: The proposed POA wells will produce from either volcanic rock (presumably Basalt of Little Catherine Creek or Andesite of Sawtooth Crater), granite, or metamorphic rock. In any case, these bedrock units are truncated by local geologic structures at the fringe of the Baker Valley by basin-bounding faults. In our conceptual model, saturated transmissive horizons (volcanic rock) or fracture zones (intrusive or metamorphic rock) are in direct contact with adjacent saturated alluvial materials, which are hydraulically connected to the Powder River. While there is no analytical model suitable for modeling stream depletion in fractured rock aquifers, the water produced at the proposed POA wells would come from the groundwater flow system upgradient of the Powder River. Water pumped from the wells would represent capture per Barlow and Leake (2012), meaning water diverted by the wells would otherwise discharge to downgradient reaches of the Powder River. Under OAR 690-008-0001 definitions, any stream depletion will result in PSI. There is no water available in Watershed ID 243 in any month of the year.

List all surface water sources identified to have PSI and their associated Water Availability Basin:

WRD Streamcode	Streamcode Surface Water Name	Water Availability Basin (WAB)	WAB Watershed ID
094060	POWDER R	POWDER R	243
094060	POWDER R	POWDER R	243
094060	POWDER R	POWDER R	243

Comments: WAB # 243 is fully allocated every month of the year. Additional allocation would exacerbate declining surface water supplies in this basin.

D. INJURY:

OAR 690-310-0130 (1): The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525 if...(c) The proposed use will not injure other water rights.

To make a finding of injury to an existing water right, the Department must make a finding of “Substantial Interference” as defined in OAR 690-008-0001(10). The finding of “Substantial Interference” with a surface water right is made by the Water Rights Services Division based on the evaluation in section C3. Sections D1 and D2, below, address the finding of “Substantial Interference” with a groundwater right.

OAR 690-008-0001(10): “Substantial or Undue interference”, means the spreading of the cone of depression of a well to intersect a surface water source or another well, or the reduction of the groundwater levels as a result of pumping or otherwise extracting groundwater from an aquifer, which contributes to:

- (b) The groundwater level being drawn down to the Economic Pumping Level of the senior appropriator(s); or*
- (c) One or more of the senior groundwater appropriators being unable to obtain either the permitted or customary quantity of groundwater, whichever is less, from a reasonably efficient well that fully penetrates the aquifer where the aquifer is relatively uniformly permeable. However, in aquifers where flow is predominantly through fractures, full penetration may not be required as a condition of substantial or undue interference.*

D1a. OAR 690-008-0001(10): Will the proposed groundwater use result in substantial or undue interference with an existing groundwater user?

☐ Yes ☒ No ☐ No, as long as the permit is conditioned as indicated in item F below.

Comments: In these proposed locations, groundwater movement is achieved primarily through unevenly spaced secondary fractures having random orientations. As a result, these systems are quite heterogeneous in terms of productivity and both horizontal and vertical hydraulic conductivity. Based on this conceptual model, there is no appropriate analytical model to predict drawdown at adjacent wells. In a fractured rock aquifer with characteristically low transmissivity, the cone of depression created by a pumping well is expected to be narrow and deep. There are no groundwater POAs located within 1 mile of the proposed POAs, meaning direct well-to-well interference is unlikely.

E. OTHER RULES OF THE COMMISSION:

OAR 690-310-0130 (1): The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525 if...(d) The proposed use complies with the rules of the Commission.

E1. OAR 690-200, 690-210 and 690-215: Well Construction

Identify any notable well construction deficiencies or hydrogeologic considerations to support review by Well Construction & Compliance.

E1a. Well #: _____ Logid: _____

E1b. Well construction deficiency or other comment is described as follows: _____

E2. OAR 690-310-0260: Water Rights Within or Above State Scenic Waterways

E2a. Are any of the proposed sources of appropriation hydraulically connected to a State Scenic Waterway or its tributaries?

☐ Yes ☒ No

Hydraulically connected State Scenic Waterway: N/A

Comments: N/A

E2b. Per ORS 390.835, is the Groundwater Section able to calculate ground water interference with surface water that contributes to a Scenic Waterway?

☐ Yes. The calculated interference is distributed below:

Calculate the percentage of consumptive use by month and fill in the table below. If interference cannot be calculated, per criteria in 390.835, do not fill in the table but check the "No" option below, thus informing Water Rights that the Department is unable to make a Preponderance of Evidence finding.

Exercise of this permit is calculated to reduce monthly flows in [Enter] Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

☒ No. Therefore, the Department is unable to find that there is a preponderance of evidence that the proposed use will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway.

Comments: N/A

E3. Other Relevant Rules of the Commission:

Comments: _____

F. RECOMMENDED MODIFICATIONS OR CONDITIONS:

OAR 690-310-0140(2): If the Department determines that the presumption is not established, the Department shall determine whether the proposed use will impair or adversely affect the public welfare, safety and health under ORS 537.525 and may either:

(a) Propose denial of the application upon a finding that the use will impair or adversely affect the public welfare, safety and health; or

(b) Make specific findings to demonstrate that even though the presumption is not established, the proposed use will not impair or adversely affect the public welfare, safety and health and propose approval of the application with appropriate modifications or conditions.

Based on the findings in sections A-D above, the following conditions are recommended if the permit is approved:

“Large water use”, 7RLN

Whenever possible, cuttings shall be collected during borehole construction at 10-foot intervals and at changes in formation. A split of each sample shall be submitted to the Department upon completion of each well.

The Department shall be granted measurement access to any authorized POA wells constructed under this permit upon reasonable notice by Department staff.

REFERENCES:

Barlow, P.M and Leake, S.A, 2012, Streamflow Depletion by Wells—Understanding and Managing the effects of groundwater pumping on streamflow, U.S. Geological Survey Circular 1376, 84 p.

Brooks, H.C., McIntyre, JR; Walker, GW, 1976, Geology of the Oregon part of the Baker 1 degree by 2 degree quadrangle, DOGAMI GMS-7.

Brooks, H.C. and McIntyre, JR, 1977, Reconnaissance geologic map of the Virtue Flat quadrangle, Baker County, Oregon, DOGAMI Open File Report O-77-5.

Swanson et al., 1981, Reconnaissance geologic map of the Columbia River Basalt Group, northern Oregon and western Idaho, USGS Open-File Report 81-797.

Well Location Map

Legend

Proposed_wells
 site_type
 ● PROP

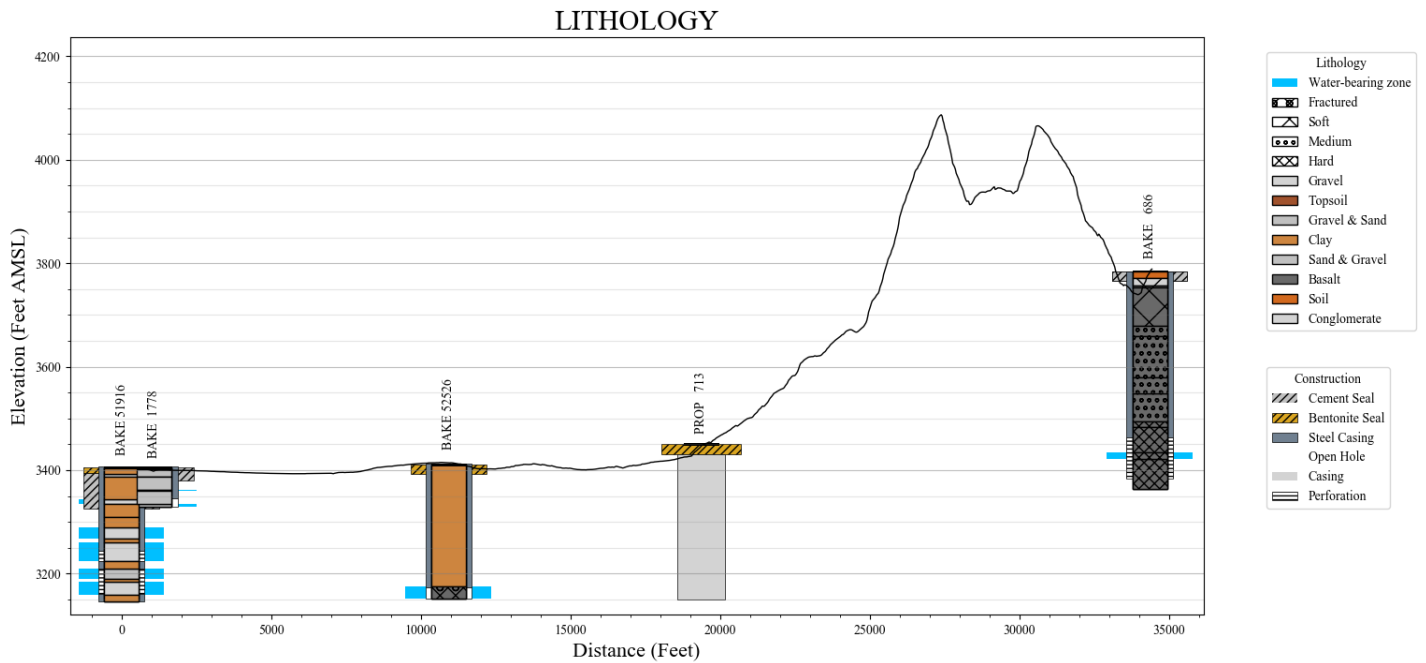
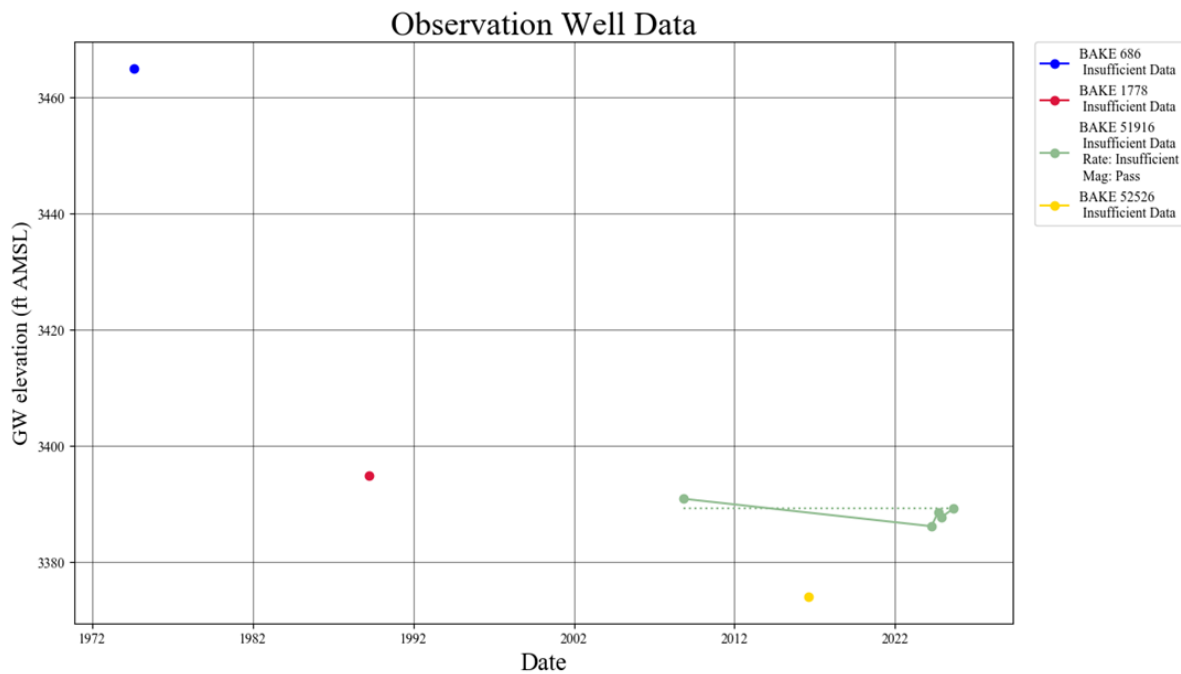
Wells by Aquifer System
 ● Quaternary-Late Tertiary Sediment Aquifers
 ● Quaternary-Late Tertiary Volcanic and Volcaniclastic Rock Aquifers
 ● Late Tertiary Basalt Aquifers
 ● Middle-Early Tertiary Volcanic and Volcaniclastic Rock Aquifers
 ● Tertiary Marine Volcanic and Sedimentary Rock Aquifers
 ● Mesozoic Granitic Rock Aquifers
 ● Mesozoic-Paleozoic Rock Aquifers
 ● <Null>

Geological Features:
 - Baker City Municipal Airport
 - S. Airport Ln
 - Old-Trail Rd
 - W Airport Rd
 - N Cedar Rd
 - Birch St
 - H St
 - Sunset Ln
 - Baldock Crch
 - Flagstaff Gulch
 - Flagstaff Hill
 - Highway 86
 - North Fork
 - Tuffaceous lacustrine and fluvial sediments
 - Olivine basalt sheet flows
 - Basalt of Powder River
 - Basalt
 - Terrace and bench gravels
 - Tuffaceous sedimentary rocks
 - Basalt of
 - Quartz diorite
 - Jurassic-lower Cretaceous plutons
 - Basalt and andesite
 - Pre-upper Triassic intrusive complex
 - Mafic
 - Alluvium

Proposed Wells:
 - PROP 714
 - PROP 713
 - PROP 715

Other Labels:
 - 4227 ft
 - Cross-Sectional Diagram Line 33
 - 686
 - 52955
 - 629
 - 623
 - 26
 - 25
 - 52438
 - 52784
 - 29
 - 28
 - 27
 - 50499
 - 52975
 - 2111
 - 52864
 - 972
 - 973
 - 52647
 - 984
 - 985
 - 51946
 - 1778
 - 51927
 - 51972
 - 52803
 - 1075
 - 1080
 - 53001
 - 1074

Scale:
 0 0.25 0.5 1 Miles

Cross Sectional Diagram**Water-Level Measurements in Nearby Wells****Bedrock Well Yield Statistics: T8S/R41E Section 31; T8S/R40E Section 36; T9S/R40E Section 1; T9S/R41E Sections 6,7**

