

Groundwater Application Review Summary Form

Application # G- 18708

GW Reviewer D. BOSCHMANN Date Review Completed: 8/30/2018

Summary of GW Availability and Injury Review:

Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 8/30/2018
 FROM: Groundwater Section Darrick E. Boschmann
 Reviewer's Name
 SUBJECT: Application G- 18708 Supersedes review of N.A.
 Date of Review(s)

PUBLIC INTEREST PRESUMPTION; GROUNDWATER

OAR 690-310-130 (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. Department staff review groundwater applications under OAR 690-310-140 to determine whether the presumption is established. OAR 690-310-140 allows the proposed use be modified or conditioned to meet the presumption criteria. This review is based upon available information and agency policies in place at the time of evaluation.

A. GENERAL INFORMATION: Applicant's Name: Broken Leg Ranch County: Grant

- A1. Applicant(s) seek(s) 2.89 cfs from 2 well(s) in the John Day Basin, Upper John Day subbasin
- A2. Proposed use Irrigation (36.2 ac. Primary; 195.16 ac. suppl.) Seasonality: March 1 – October 31
- A3. Well and aquifer data (attach and number logs for existing wells; mark proposed wells as such under logid):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	proposed	Well 1	CRBG	2.89	13.00S-29.00E-26-NW NW	130 FEET SOUTH AND 6300 FEET EAST FROM NW CORNER, SECTION 27
2	proposed	Well 2	CRBG	2.89	13.00S-29.00E-23-SW SW	630 FEET NORTH AND 5500 FEET EAST FROM SW CORNER, SECTION 22
3						
4						
5						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	2735	?	?	-	500'+	?	?	?	?	?	?	-
2	2785	?	?	-	500'+	?	?	?	?	?	?	-

Use data from application for proposed wells.

A4. **Comments:** The proposed wells are in Grant County, along the John Day River about 4.5 miles west of Mount Vernon. The area immediately underlying the proposed wells is mapped as Qtg (terrace gravels) and Qa (alluvium) by Brown and Thayer, 1966. In this area these Quaternary deposits overly varying thicknesses of Tr (Rattlesnake Formation) and Tm (Mascall Formation) before reaching the underlying Tp (Picture Gorge Basalt Formation of the Columbia River Basalt Group - CRBG). Within several miles of the proposed wells, exposures of the underlying Clarno FM are mapped, as well as isolated exposures of the older Mesozoic and Paleozoic rocks (Brown and Thayer, 1966).

The Rattlesnake FM is known to be up to ±630 feet thick at the type section on Cottonwood Creek (Enlows, 1976). The mapping of Brown and Thayer (1966) indicates a thickness of over 500 feet near this location.

The Mascall FM is reported to range from 1340 (Kuiper, 1988) up to 2000 (Thayer, 1950) feet thick, and reportedly interfingers with the uppermost Picture Gorge Basalt flows at the basal contact (Kuiper, 1988; Gannett, 1984). The mapping of Brown and Thayer (1966) indicates a thickness of up to well over 1000 feet near this location.

The applicant proposes to develop groundwater from the CRBG aquifers, which will require drilling through the Quaternary deposits, the Rattlesnake FM, and the Mascall FM before reaching even the uppermost flows of CRBG. On the south side of the John Day Fault it is possible the combined thickness of these deposits may be quite thin, but a maximum combined thickness of up to 2630 feet for these formations has been reported, and north of the John Day Fault Brown and Thayer

(1966) depict a very thick section of these deposits overlying the CRBG. The water well report for GRAN 299 reports a completeoin at 1210 feet in conglomerate, and does not reach CRBG.

South of the John Day Fault it is possible that no CRBG will be encountered, and that below the Rattlesnake and Mascall Formations only Clarno FM and older pre-Tertiary rocks will be encountered.

The mapping of Brown and Thayer (1966) indicates that if the applicant is successful in their efforts to drill through the overlying formations into the CRBG, the wells will produce groundwater from water-bearing zones in the Picture Gorge Basalt Formation of the CRBG.

- A5. Provisions of the John Day 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: _____

- A6. Well(s) # _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction. Name of administrative area: _____

Comments: _____

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. Based upon available data, I have determined that groundwater* for the proposed use:

- a. is over appropriated, is not over appropriated, or cannot be determined to be over appropriated during any period of the proposed use. * This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;
- b. will not or will likely be available in the amounts requested without injury to prior water rights. * This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;
- c. will not or will likely to be available within the capacity of the groundwater resource; or
- d. will, if properly conditioned, avoid injury to existing groundwater rights or to the groundwater resource:
- The permit should contain condition #(s) 7B, 7F, 7N, 7P, 7T, flow meter, 7J, 7K;
 - The permit should be conditioned as indicated in item 2 below.
 - The permit should contain special condition(s) as indicated in item 3 below;

- B2. a. Condition to allow groundwater production from no deeper than _____ ft. below land surface;
- b. Condition to allow groundwater production from no shallower than _____ ft. below land surface;
- c. Condition to allow groundwater production only from a single aquifer in the Columbia River Basalt Group;
- d. Well reconstruction is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

Describe injury –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): _____

B3. Groundwater availability remarks:

The application proposes to develop groundwater from water-bearing zones within the Columbia River Basalt Group, a series of lava flows with a composite thickness that reportedly ranges up 2625 ft in the area (Picture Gorge Basalt thickness from Swanson, 1979). The typical lava flow consists of a permeable flow top & flow bottom, and a dense, relatively impermeable interior. Together, the basalt lava flow contact zones (vesicular/brecciated flow tops, pillow complexes and breccia zones) along with any sedimentary interbeds are referred to as interflow zones, and make up the primary aquifers within the CRBG, whereas the dense flow interiors commonly act as aquitards (Riedel, 2002).

Potential for water-level declines and overdraft of the resource exists virtually everywhere the Columbia River Basalt Group aquifers are developed.

If a permit is issued, the following conditions are recommended:

7B: Interference Condition

7F: Proposed Well location Condition

7N: Annual Measurement and Decline Condition

7P: Well Tag Condition

7T: Dedicated Measuring Tube Condition for all POA wells

Flow meter condition: Use the water rights "large" permit condition requiring a totalizing flow meter and reporting

7J: Scenic waterway condition

7K: The well shall be continuously cased and continuously sealed from land surface into hard dense basalt below any permeable flow-top zones at the contact with overlying sedimentary formations. The well shall be open to a single aquifer of the Columbia River Basalt Group and shall meet the applicable well construction standards (OAR 690-200 and OAR 690-210). In addition, the open interval in the well shall be no greater than 100 feet. An open interval of greater than 100 feet may be allowed if substantial evidence of a single aquifer completion can be demonstrated to the satisfaction of the Department hydrogeologists, using information from a video log, downhole flowmeter, water chemistry and temperature, or other downhole geophysical methods. These methods shall characterize the nature of the basalt rock and assess whether water is moving in the borehole. Any discernable movement of water within the well bore when the well is not being pumped shall be assumed as evidence of the presence of multiple aquifers in the open interval. If during well construction, it becomes apparent that the well can be constructed to eliminate interference with hydraulically connected streams in a manner other than specified in this permit, the permittee can contact the Department Hydrogeologist for this permit or the Ground Water/Hydrology Section Manager to request approval of such construction. The request shall be in writing, and shall include a rough well log and a proposed construction design for approval by the Department. The request can be approved only if it is received and reviewed prior to placement of any permanent casing and sealing material. If the request is made after casing and seal are placed, the requested modification will not be approved. If approved, the new well depth and construction specifications will be incorporated into any certificate issued for this permit.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

C1. **690-09-040 (1): Evaluation of aquifer confinement:**

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	CRBG	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	CRBG	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation:

Aquifers in the Columbia River Basalt group lavas are typically confined by thick low-permeability interiors of overlying flows.

C2. **690-09-040 (2) (3):** Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected?			Potential for Subst. Interfer. Assumed?	
						YES	NO	ASSUMED	YES	NO
1	1	John Day River		2730	100	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	1	John Day River		2730	500	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: _____

The geologic mapping by Brown and Thayer (1966) indicates CRBG lava flows on the north side of the John Day River are dipping 9-25 degrees to the southwest, and are offset along John Day Fault with steeply dipping CRBG lava flows, rocks of the Clarno FM and pre-Tertiary rocks on the southwest side of the fault system. The implication of this geometry is that aquifers within the CRBG north of the fault are juxtaposed with low permeability formations south of the fault, suggesting this is the termination of these aquifers at this location, and that this is a groundwater discharge area for these aquifers in this region. It is not known with certainty where hydraulic connection with surface water occurs, but the presence of numerous springs in the area are evidence of the groundwater-surface water connection locally.

Water Availability Basin the well(s) are located within: JOHN DAY R > COLUMBIA R - AB S FK JOHN DAY R

C3a. **690-09-040 (4):** Evaluation of stream impacts for each well that has been determined or assumed to be hydraulically connected and less than 1 mile from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% natural flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
1	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MF212A	30	<input checked="" type="checkbox"/>	64.70	<input checked="" type="checkbox"/>	*	<input checked="" type="checkbox"/>
2	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MF212A	30	<input checked="" type="checkbox"/>	64.70	<input checked="" type="checkbox"/>	*	<input checked="" type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

C3b. **690-09-040 (4):** Evaluation of stream impacts by total appropriation for all wells determined or assumed to be hydraulically connected and less than 1 mile from a surface water source. Complete only if Q is distributed among wells. Otherwise same evaluation and limitations apply as in C3a above.

SW #	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

C4b. 690-09-040 (5) (b) The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.

- C5. If properly conditioned, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:
- i. The permit should contain condition #(s) _____;
 - ii. The permit should contain special condition(s) as indicated in "Remarks" below;

C6. SW / GW Remarks and Conditions: _____

C1. 690-09-040 (1)

It is determined that all wells will produce water from a confined aquifer.

C2. 690-09-040 (2) (3)

It is determined that all wells are hydraulically connected with the John Day River.

C3a./C3b. 690-09-040 (4)

PSI is assumed for Well 1 to SW 1; Well 2 to SW 1.

References Used: _____

Brown, C.E., and Thayer, T.P., 1966. Geologic map of the Mount Vernon quadrangle, Grant County, Oregon: U.S. Geological Survey, Geologic Quadrangle Map GQ-548, scale 1:62,500

Enlows, H.E., 1976. Petrography of the Rattlesnake Formation at the type area, central Oregon. State of Oregon, Department of Geology and Mineral Industries.

Kuiper, J.L., 1988, Kuiper, J.L., 1988. Stratigraphy and sedimentary petrology of the Mascall Formation, Eastern Oregon. Oregon State University Master's Thesis, 165 pgs.

Gannet, M., 1984. Ground Water Assessment of the John Day Basin. Oregon Water Resources Department, Salem, Oregon.

Thayer, T.P. and Ray, R.L., 1950. Preliminary notes on later Miocene volcanism in the John Day region, Oregon. Northwest Science, 24, pp.89-90.

Reidel, S.P., Johnson, V.G., and Spane, F.A., 2002. Natural gas storage in basalt aquifers of the Columbia Basin, Pacific Northwest USA: a guide to site characterization, Pacific Northwest National Laboratory, Richland, Washington.

Swanson, D.A., Wright, T.L., Hooper, P.R. and Bentley, R.D., 1979. Revisions in stratigraphic nomenclature of the Columbia River Basalt Group (No. 1457-G). USGS Bulletin 1457-G.

D. WELL CONSTRUCTION, OAR 690-200

- D1. Well #: _____ Logid: _____
- D2. **THE WELL does not appear to meet current well construction standards based upon:**
- a. review of the well log;
 - b. field inspection by _____;
 - c. report of CWRE _____;
 - d. other: (specify) _____
- D3. **THE WELL construction deficiency or other comment is described as follows:** _____
- D4. Route to the Well Construction and Compliance Section for a review of existing well construction.

Water Availability Tables

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

JOHN DAY R > COLUMBIA R - AB S FK JOHN DAY R

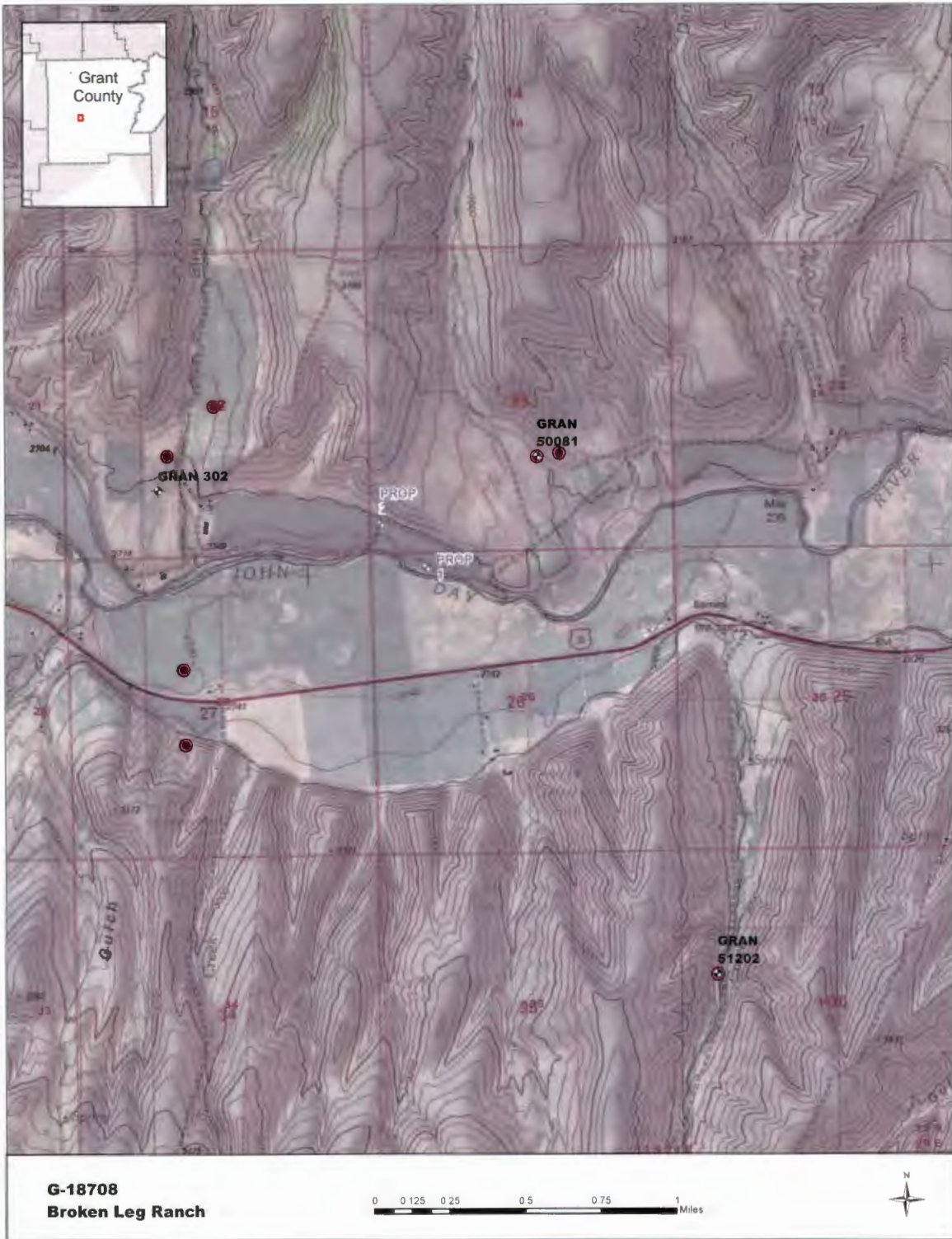
Watershed ID #: 212 Basin: JOHN DAY Exceedance Level: 80
 Time: 10:58 AM Date: 08/30/2018

Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
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Monthly values are in cfs.
 Storage is the annual amount at 50% exceedance in ac-ft.

JAN	166.00	4.91	161.00	0.00	80.00	81.10
FEB	210.00	5.31	205.00	0.00	118.00	86.70
MAR	288.00	5.86	282.00	0.00	118.00	164.00
APR	433.00	31.40	402.00	0.00	118.00	284.00
MAY	433.00	63.20	370.00	0.00	118.00	252.00
JUN	261.00	83.80	177.00	0.00	80.00	97.20
JUL	129.00	119.00	9.85	0.00	50.00	-40.20
AUG	88.60	93.40	-4.84	0.00	30.00	-34.80
SEP	64.70	63.30	1.37	0.00	30.00	-28.60
OCT	108.00	26.10	81.90	0.00	50.00	31.90
NOV	143.00	4.56	138.00	0.00	80.00	58.40
DEC	156.00	4.82	151.00	0.00	80.00	71.20
ANN	235,000	30,700	204,000	0	57,300	149,000

Well Location Map



Water-Level Trends in Nearby Wells