



Clearwater Geosciences, LLP
Ground Water Development and Exploration

EVALUATION OF HENRY'S LAKE OVERLOOK WATER SUPPLY WELL ON IDFG SPRING (SHERWOOD SPRING)

FREMONT COUNTY, IDAHO

**Submitted By
Clearwater Geosciences, LLP**

November 2021



1.0 Authorization

This evaluation was authorized in May of 2021, by the Henry's Lake Overlook Property Owners Association, Inc. (Association), the governing body of Henry's Lake Overlook Subdivision (Subdivision). The project scope is to perform the work necessary to comprehensively evaluate if, and to what degree, if any, pumping of the Subdivision's culinary well (Well) impacts a water source where water is authorized (Spring) for use by the Idaho Department of Fish and Game (IDFG) under water right 21-2100.

2.0 Background

In 2006, the developer of the Subdivision applied for a water right permit (21-13038), which was protested by IDFG. IDFG was concerned with the location of the proposed Well because it is near the Spring (located west of the proposed Well (Figures 1 and 2)). Water from the Spring is used to feed an important IDFG fish hatchery. The approximate location of the IDFG Spring box and the location of the Well are labeled on the map in Figure 2.

IDFG requested, and the developer agreed, to several conditions on the development of the water right, including how the Well was to be constructed. After the Well was drilled it was apparent that the developer did not construct the Well like he was supposed to. The conditions in the water right permit were that the Well had to be constructed at least 500 feet in distance from the Spring box and that the Well had to be cased 100 feet in depth below the Spring box elevation. The Well is over 800 feet to the west of the Spring up on a steep hill, in compliance with the permit conditions. However, in violation of the permit conditions, the well driller started perforations at 150' below land surface (Figure 3). When compared to the elevation of the Spring box, the perforations should have started at a depth of 230 feet, which would have put the perforations at 100 feet below the elevation of the Spring box. The perforations start only about 20' below the elevation of the Spring. The Idaho Department of Water Resources (IDWR) found that this warranted administrative action to void the permit because the Well did not comply with conditions of the water right permit. While the action to void this permit was originally challenged, the challenge was later withdrawn, and the Association submitted a new water right permit application (21-13262). While 21-13262 was not timely protested by IDFG, to satisfy IDWR review criteria to ensure no existing water rights will be injured, this report has been prepared. This analyzes the hydrological relationship between pumping from the Well and flow at the Spring.

On June 25, 2021, an onsite meeting was held with representatives from IDFG, IDWR, the Association, and Clearwater Geosciences. After a tour of the IDFG Spring box, the Well and the IDFG Hatchery piping and flow monitoring system, several options for monitoring were discussed. It was decided that the best approach would be to measure the flow exiting the IDFG Spring box and the water levels and flow of the Well during a 24-hour pumping tests. Water chemistry from the two sources would also be tested to determine if the Spring and Well tapped two unique aquifers. It was also determined that a significant amount of pretest and post-test data on the Spring flow and Well water levels were needed to evaluate ambient trends that might influence the test results.



3.0 Analysis

3.1 Geology

The Spring and Subdivision are located in the southern part of the Madison Range, Fremont County, Idaho. The site is a few hundred feet above the northern end of a glacial intermontane basin that hosts Henry's Lake. The basin trends southeast to northwest and is bounded by the Henry's Lake Mountains to the west and the Madison Range to the east. The geology of the basin consists of alluvial and fluvial channel deposits (sand, silt, clay, gravel), glacial outwash deposits (sand, gravel), and glacial till (silt, sand, gravel). There are also surface exposures (that likely underlie the sedimentary deposits) of Huckleberry Ridge Tuff (rhyolite) and much older metamorphic rock.

The Subdivision and Spring are a few tens to hundreds of feet above the basin and the local geology is much different than the geology of the basin. The geology of the study area largely consists of Precambrian-age rocks that were metamorphosed about 2,750 m.y. (million years) ago. Figure 4 is a copy of the geologic map for the area and the trace of the Madison Range Fault is shown by a dotted line. Displacement on this fault served to separate the rising Madison Range from the down dropped sedimentary and volcanic rocks that lie beneath the Henrys Lake Basin.

The Pre Cambrian mica gneiss and schist is a platy metamorphic rock. This rock is light to dark gray, foliated, fine to coarse grained, biotite quartz feldspar gneiss and schist. In the cut bank for the drilling pad excavated for the Well, hand samples of the excavated rock were consistent with the regional mapping (Figure 4). The Pre Cambrian mica gneiss and schist is the rock hosting the rock for both the Well and the Spring.

Well logs on file with IDWR show a variety of geologic materials in this area, which is consistent with the geologic setting of the area, *i.e.*, mountain building faults, volcanic eruptions, and sedimentary deposition. On the Well log, the driller labeled the lithology as shale, but gneiss and schist could have easily been mistaken for shale (Figure 3).

The geologic map shows that of the many measurements of the rock bedding, the majority have a northeast to southwest strike and a southeast dip. The measurement closest to the existing Well location indicates a northeast strike and a dip of 60 degrees to the southeast. The trend of the rock bedding often creates anisotropy in aquifer permeability, but for metamorphic rock, permeability of the original bedding is sealed by the metamorphic process (heat and pressure) and permeability is created by secondary fractures, for instance, the fractures associated with the nearby Madison Range Fault. This fault trends northwest-southeast through the study area but the scarp could not be seen due to sedimentary cover.

3.2 Hydrogeology

The water bearing characteristics of metamorphic rocks is low unless the formation is fractured. Freeze and Cherry (1979) list unfractured metamorphic and igneous rocks at the lowest range of values of hydraulic conductivity (see page 29, Table 2.2). However,



fractured metamorphic and igneous rocks can have much higher hydraulic conductivity, on the order of a clean sand. Because of the tectonic history of this area and the proximity of the Madison Range Fault, the hydraulic conductivity of the aquifer beneath the study area is expected to be in the range of fractured metamorphic rock. The occurrence of the Spring may be caused by the contact of more permeable fractured metamorphic rock against less permeable basin fill sediment forcing water to flow upward and exit the aquifer.

Surface water exits the basin to the southeast to join other outer sources to form the Henry's Fork of the Snake River. Based on 1976 USGS water level data, the general direction of groundwater flow in Henry's Lake Basin is to the southwest. Because of the contrast in geology across the Madison Range Fault, the local ground water gradient in the Study Area may or may not be consistent with the regional gradient. The available well coverage in the study area is sparse and a water table map cannot be generated. The subsurface is undoubtedly heterogeneous, and even with many more wells, it would be difficult to contour a water table map with confidence because faults and fractures would tend to isolate and compartmentalize portions of the aquifer.

Springs are found at the intersection of land surface with the water table. Therefore, the elevation of a spring approximates the potentiometric surface of the aquifer at the location of the spring. The elevation of the IDFG Spring Box is approximately 6,560 ft and the elevation of the wellhead for the Well is approximately 6,670 ft. On June 25, 2021, the depth to water in the Well was measured at 133.82 ft below the top of casing. This indicates that the elevation of the water table at the Well is about 6,536 ft. Taken at face value, the water level data indicates the hydraulic head is higher at the Spring than at the Well. This suggests that the direction of groundwater flow may be from the spring toward the Well along the trend of the Madison Range Fault (Figure 4). However, three points are needed to define hydraulic gradient and further discussion is warranted to bracket the uncertainty of the conclusions derived from the data.

The land surface elevation for the spring box and the Well were taken off a topographic map so there is uncertainty to this calculation. Assuming an uncertainty in the land surface elevation of +/- 10 ft, the elevation of the Spring discharge is at least 4 ft above the water level in the Well. The water level in the Well may have been impacted by pumping prior to the water level measurement, however, the water level in the aquifer at the Spring box would have been similarly impacted by the continual discharge of the Spring (*i.e.*, discharge from the aquifer). The water level data are insufficient to state with certainty that the Well and spring tap separate aquifers or define the direction of groundwater flow.

3.3 Water Chemistry

As water moves through an aquifer it tends to come into chemical equilibrium with the rock and sediment of the aquifer matrix. In this manner, groundwater develops a chemical fingerprint or signature that is representative of the aquifer it flows through. Distinct chemical signatures of the Well water and the Spring water would indicate that



they were not in direct communication. To this end, water samples were collected on June 25, 2021 from both the Spring and the Well and transported under chain of custody protocols to IASEnviroChem in Pocatello for analysis. The results of the chemical testing are provided in Attachment 1.

The analyses conducted were for cations and ions that are typically used for geochemical evaluations. As can be seen in Attachment 1, the water chemistry results are very similar. There is not a unique or distinguishing characteristic for either water from the Well or Spring. The biggest difference is for iron. The Spring water having none and the Well water having a small amount. This may be attributed to contact with the steel well casing and is deemed as not significant. It appears that both the water that discharges from the Spring and from the Well have traveled through the Pre Cambrian Mica Schist and have a similar geochemical signature. The water chemistry data are insufficient to state with certainty that the Well and Spring tap separate aquifers.

3.4 Pumping Test

The approach for conducting the pumping test, or more accurately, an interference test, was as follows:

1. Install a down hole pressure transducer in the Well and monitor background aquifer levels prior to the test;
2. Install a rectangle weir in the Spring box and using a pressure transducer and automatic data logger to monitor background spring discharge prior to the test;
3. At the driest part of the season, when the levels in spring discharge should be at the lowest, conduct a 24-hour pumping test by allowing the pump in the Well to discharge at its maximum rate; and
4. Monitor recovery of the Spring and the water levels in the Well.

This approach was deemed the most conservative for evaluating the impact of Well pumping on the Spring because: 1) the test occurred when aquifer conditions would be at the lowest; 2) natural recharge from snowfall and precipitation would be at a minimum so as not to interfere with data analysis and mask Well to Spring interference; and 3) the Subdivision never pumps the Well at its maximum rate for 24 hours and thus the calculated impacts will be overestimated.

A downhole IN-SITU brand pressure transducer and data logger was installed in Well on June 25, 2021. The pressure transducer was set at a depth of 63 ft below the water level in the Well with a sampling interval of 5 minutes. The Well data logger ran continuously until September 17, 2021. The average pumping rate for the Well based on the totalizing flow meter readings on June 25th and prior to the start of the pumping test on September 14th was calculated as follows:

Volume = Difference in totalizer readings $1,712,000 - 1,349,400 = 362,600$ gallons
Time = 78 days x 1440 min/day = 112,320 minutes
Average pumping rate = Volume/Time $362,600 \text{ gallons} / 112,320 \text{ minutes} = 3.3 \text{ GPM}$
Volume per day = 4,649 gallons per day



Figure 5 is a plot of the collected data in the Well. The water temperature remained relatively constant at 46 degrees F. The water level was nearly constant prior to the installation of the weir in the Spring box, and even after the water level re-stabilized at a lower level, the water level was again relatively constant. After the weir was installed in the spring box the aquifer water level equilibrated at a level ~ 0.30 ft lower than the previous level.

The Well pump cycled on and off in response to the demands of the Subdivision. The effect on the water level in the Well was minimal. Figure 6 is a hydrograph showing the water levels in the Well prior to the pumping test. The scatter in the data is caused mostly by the cycling on and off of the pump, although other factors such as changes in barometric pressure and wind also had an effect. The specific capacity of the Well is about 700 gpm/ft, which is high and indicates the aquifer is very productive at this location.

A rectangular weir was installed at the Spring box on August 8, 2021. The weir dimensions were determined by the size of the existing check gate retaining water in the spring box and the resolution of the pressure transducer to be used for monitoring the water levels in the pool behind the weir. Calculations of flow were based on standard USBR equations such as can be found on <http://irrigation.wsu.edu/Content/Calculators/Water-Measurements/Rectangular-Contracted-Weir.php>. Figure 8 shows the relationship of gpm to the measured height of water for the 18-inch rectangular weir (width of the weir used in this study).

The weir was installed by removing the top check boards from the check gate for the Spring box (Figure 8). Blue plastic sheeting was installed over and to the sides of the lower check boards to limit leakage through the check gate forcing water to go through the weir. The pressure transducer was clamped to a metal rod that was welded to a heavy metal plate. The transducer, metal rod, and steel plate were placed in the Spring box upstream from the weir before the water began to crest as it went through the weir (per USBR protocols). The initial height of water above the weir was determined by using a level to shoot a line from the metal lip of the weir to the top of the water at the metal rod (above the transducer). This established the initial flow rate. Changes in head measured using the transducer were then calculated using the standard equation for a rectangular weir.

Figure 9 is a plot of the spring discharge in cubic feet per second (cfs) over time. Immediately after the weir was installed the flow began to decrease. The flow decreased for about 5 days until it reached an equilibrium with the new flow restrictions caused by the weir. Apparently, the weir provided less restriction to flow causing the head in the Spring box to drop. The decrease in head in the Spring box had a corresponding impact on head in the aquifer as described on the Well hydrograph. After the head established a new equilibrium, the discharge remained relatively stable until the pumping test on September 14th. During the pumping test there was a maximum decrease in Spring flow



of approximately 0.006 cfs (3 gpm). After the termination of the pumping test the Spring discharge returned to the previous discharge.

Figure 10 is plot of the water levels in the Well and the Spring discharge for the entire monitoring period. The impact of installing the weir on both Spring discharge and water levels in the aquifer are apparent. Additionally, the impact on Spring discharge from pumping during the 24-hour test can be seen.

The impact from pumping on water levels in the Well and Spring box discharge are difficult to see unless the vertical scale is expanded. Figure 11 is a detailed plot of Well water levels and Spring discharge for the period one day prior to the test to one day after the test. It appears that there is a short lag time between the time the pump was turned on and the impact to discharge of the spring. Under confined aquifer conditions, the response time should be nearly instantaneous, but the large storage capacity of the Spring box feeding the weir may act to attenuate the response of the Spring. It appears that the aquifer is largely confined.

The data were analyzed using the commercially available AQTESOLV software. The Theis equation was applied to the water levels monitored by the pressure transducer in the Spring box and the plot of the match is presented in Figure 12. The match of the Spring data to the Theis curve is reasonable. The calculated transmissivity is 595 ft²/day and the storativity is 0.0719. To estimate the potential impact of pumping the Well for a longer time period, a predictive simulation was made using the aquifer parameters from the 24-hour pumping test and assuming the Well was pumped continuously for 100 days at a rate of 42 gpm. As shown in Figure 13, at the end of the 100-day time period the predicted impact on the Spring will be a decline in water level of 0.05 ft (0.6 inches). Imputing 0.05 ft as H into the weir equation results in a calculated decrease in flow of 26 gpm (Figure 13), about 10% of the current Spring flow. It is important to note here that such long-term continuous high-rate pumping from the Well represents an extreme situation and unlikely to actually occur. Furthermore, the Thesis solution we used to fit the observed drawdowns of the Spring box during the 24-hour pumping test is subjected to several assumptions that may not be all satisfied at the site. Therefore, this predicted long-term impact of the Spring flow is only qualitative. Nevertheless, the predicted impact under such hypothetical long-term high-rate pumping scenario is insignificant.

4. Summary

A careful evaluation of the impact of pumping the Well on the Spring was made by monitoring ambient water levels in the Well, discharge from the Spring, and comparing water chemistry from the two sources. A 24-hour pumping test was performed to evaluate aquifer parameters and to look for direct impact on spring flow under pumping stress. The monitoring and testing results were put into the context of the local geology and hydrology and the aquifer parameters estimated. Using the derived aquifer parameters, a qualitative prediction was made of the potential impact to the Spring under a very high pumping scenario.



The following conclusions can be drawn from the work performed:

- The Well and Spring tap the same aquifer.
- Discharge from the Well affects flows at the Spring which indicates direct hydraulic connection between the Spring and the Well.
- The aquifer is confined but does have a relatively high storativity with respect to the observed drawdowns of water level in the Spring box.
- While discharge from the Well during the 24-hour pumping test affects flows at the Spring, the effect is minimal and perhaps negligible. The decline in Spring discharge after pumping the Well nonstop for 24 hours was approximately 3 gpm (about 1% of the Spring's current discharge).
- Under normal pumping conditions at the Well prior to the initiation of the 24-hour pumping test the impacts from Well pumping could not be observed in Spring discharge (for the 78 days prior to the test the average pumping rate was 3.3 GPM), clearly indicating that the current normal pumping practice at the Well has negligible effect on the Spring discharge.
- Under an unrealistically high pumping scenario of pumping the Well continuously at 42 gpm 24 hours per day for 100 days the decline in spring flow is predicted to be 26 gpm (this is about 10 % of the overall Spring discharge).

In summary, the work performed demonstrates a hydraulic connection between the Well and the Spring. Current pumping of the Well has no discernable impact on the Spring discharge. High pumping of the Well nonstop for 24-hours can cause a small but measurable decline in Spring flow (about 1%). Unrealistically high pumping rates for long periods of time are predicted to reduce Spring discharge by about 10%. Under the current use of the Well, impacts to Spring discharge are inconsequential and not measurable.

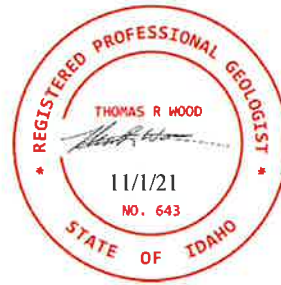
The 24-hour pumping test occurred during the high use period of the Well, during the driest part of the year and therefore the results over-predict impacts from pumping on an annual basis. During the late winter and spring (when water is necessary for spawning fish at the hatchery), water levels in the aquifer will probably be higher due to recharge from melting snow causing the impacts from pumping to diminish as a percentage of spring discharge. Additionally, during the late winter and spring, use of the Well is virtually nonexistent because the subdivision homes are minimally occupied during this time period, as use of most of the homes in the Subdivision seasonal (with highest use in are occupied during the summer months (June, July, and August) and therefore the yearly overall average pumping rate will be less than the average pumping rate determined for the period between June 25th and September 14th.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

It is my professional opinion that current pumping from the Well, as constructed, does not have a significant impact on discharge at the Spring and that these impacts will not result in injury under I.C. §42-203A. This is because operation of the Well will not negatively impact the water supply that satisfies IDFG's water right from the Spring (21-2100). The permit for 21-13262 should be issued by IDWR.

Thomas R. Wood, Ph.D., P.G.
Idaho Registered Geologist, #643



5. References

- Tysdal, R.G., D.M. Kulik, T.J. Peters, 1988, Mineral Resources of the Henry's Lake Wilderness Study Area, Fremont County, Idaho, U.S.G.S. Survey Bulletin 1718-D.
- Witkind, I.J. 1972, Geologic map of the Henrys Lake quadrangle, Idaho and Montana: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-78-A, scale 1:62,500.



Clearwater Geosciences, LLP
Ground Water Development and Exploration



Figure 1. General area of study shown with blue box.



HENRY'S LAKE OVERLOOK



Figure 2. Henry's Lake Overlook Subdivision and location of IDFG Spring Box.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 206-7
11/97
10/01
Independent

DMD

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Use Typewriter or Ballpoint pen.

Office Use Only
Inspected by: _____
Twp. _____ Rge. _____ Sec. _____
1/4 1/4 1/4
Lat. _____ Long. _____

1 WELL TAG NO.
DRILLING PERMIT NC

Other IDWR NO. D0048450

2 OWNER:

Name: American Classic Development, LLC

Address: 2734 W. Rasmussen Road

City: Park City State: UT Zip 84098

3 LOCATION OF WELL by legal description.

N
Twp 16 North South
Rge 43 East West
Sec 33
Gov't Lot _____ County Fremont
Lat. _____ Long. _____
Address of Well Site: 1000' off US 87
City Island Park
(Give at least name of Road - Distance to Road or Landmark)

Lot No 3 Blk No 1 Subd. Name: Henry's Lake Overlook

4 USE:

☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☒ Thermal ☐ Injection ☐ Other

5 TYPE OF WORK:

☒ New Well ☐ Modify ☐ Abandonment ☐ Other

6 DRILL METHOD:

☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other

7 SEALING PROCEDURES:

SEAL/FILTER PACK	AMOUNT	
Bentonite 0 -10	400 lbs / 8 bags	Annular
Cement Slurry -10 -140	4 1/2 Yards	Tremmie
Bentonite -140 -145	300 lbs / 6 bags	Annular
Gravel Pack -145 -173	1 Yard	

Was drive shoe used? ☒ Yes ☐ No Shoe Depth(s) 173'
Was drive shoe seal tested? ☒ Yes ☐ No

8 CASING/LINER:

Dia.	From	To	Gauge	Material	Casing Liner Welded Threaded
8"	+2	173	322	Steel	☒ ☐

Length of headpipe: _____ Length of Tailpipe: _____

9 PERFORATIONS/SCREENS:

From	To	Slot Size	Number	Diameter	Material	Casing Liner
-150	-173	1/4 X 6	50		Steel	☒ ☐

STATIC WATER LEVEL OR ARTESIAN PRESSURE:

132 ft below ground Artesian Pressure: _____ lb

Describe access port or control devices: _____

11 WELL TESTS:

☐ Pump ☐ Bailor ☒ Air ☐ Flowing Artesian

Flowing Artesian

Yield	Drawdown	Pumping Level	Time
40+			

Water Temp _____ Bottom hole temp _____

Water Quality test or comments: _____

12 LITHOLOGIC LOG:

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
12	0	22	Brown Clay & Brown Shale		X
12	22	67	Firm Grey Shale		X
12	67	91	Fractured Grey Shale		X
12	91	153	Firm Grey Shale		X
12	153	157	Broken Grey Shale - Lost returns - 40 gpm	X	
12	157	162	Firm Grey Shale		X
12	162	168	Broken Caving Grey Shale	X	
8	168	193	Firm Grey Shale		X
8	193	205	Broken Grey Shale	X	

RECEIVED

JUL 09 2007

Department of Water Resources
Eastern Region

Completed Depth: 205 ft

Date Started: 06/21/07

Date Completed: 06/28/07

13 DRILLER'S CERTIFICATION:

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm: Independent Drilling KC Firm No. 343

Firm Official: Brent Hendricks Date: 7/5/2007

and

Supervisor/Operator: Jeff Lee Date: 7/5/2007

Figure 3. Well log for Subdivision Well.

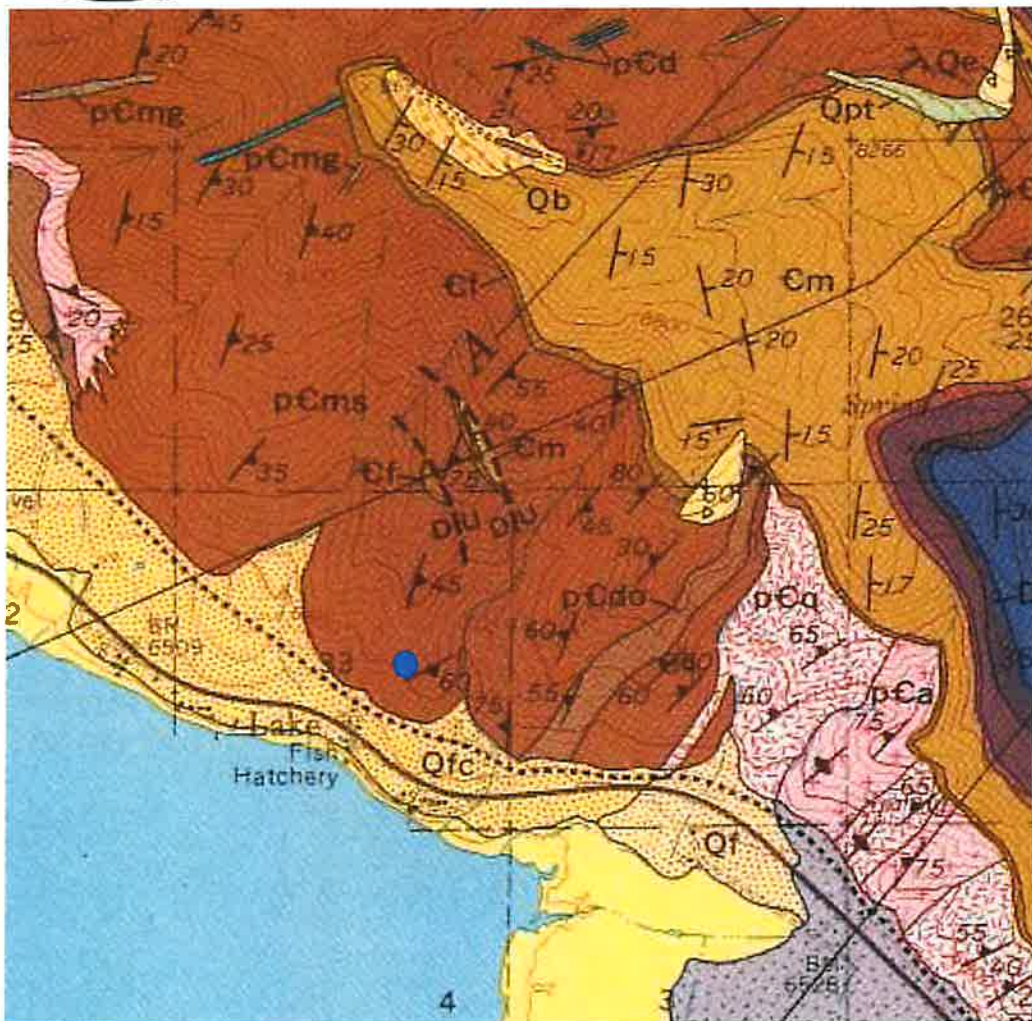


Figure 4. Geologic map of the area surrounding the Subdivision with a blue circle at the approximate location of the Subdivision Well. The dotted line southwest of the Well location is the trace of the Madison Range Fault. The geologic rock of the study area is mapped as pre-Cambrian Mica Schist (see color key below) with a northeast strike and a dip of 60 degrees to the southeast (from Witkind, 1972).

pCms
Mica schist



Clearwater Geosciences, LLP
Ground Water Development and Exploration

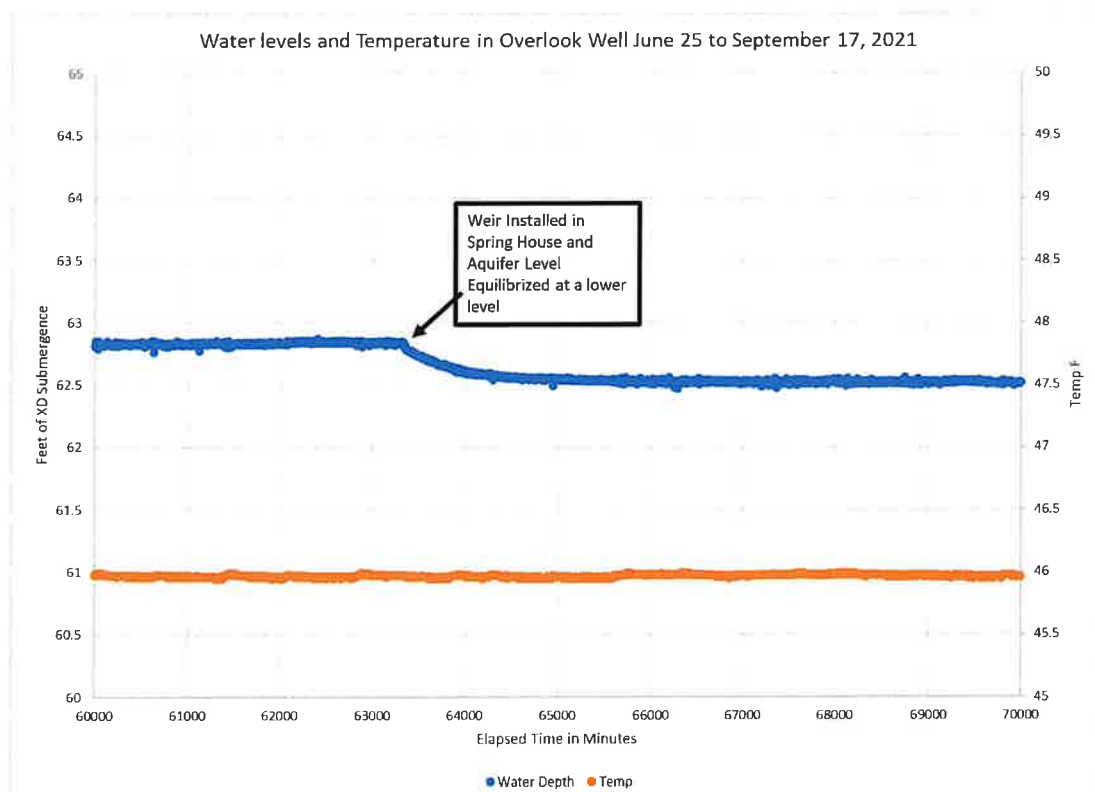


Figure 5. Transducer depth below water and temperature measured in the Subdivision Well .



Clearwater Geosciences, LLP
Ground Water Development and Exploration

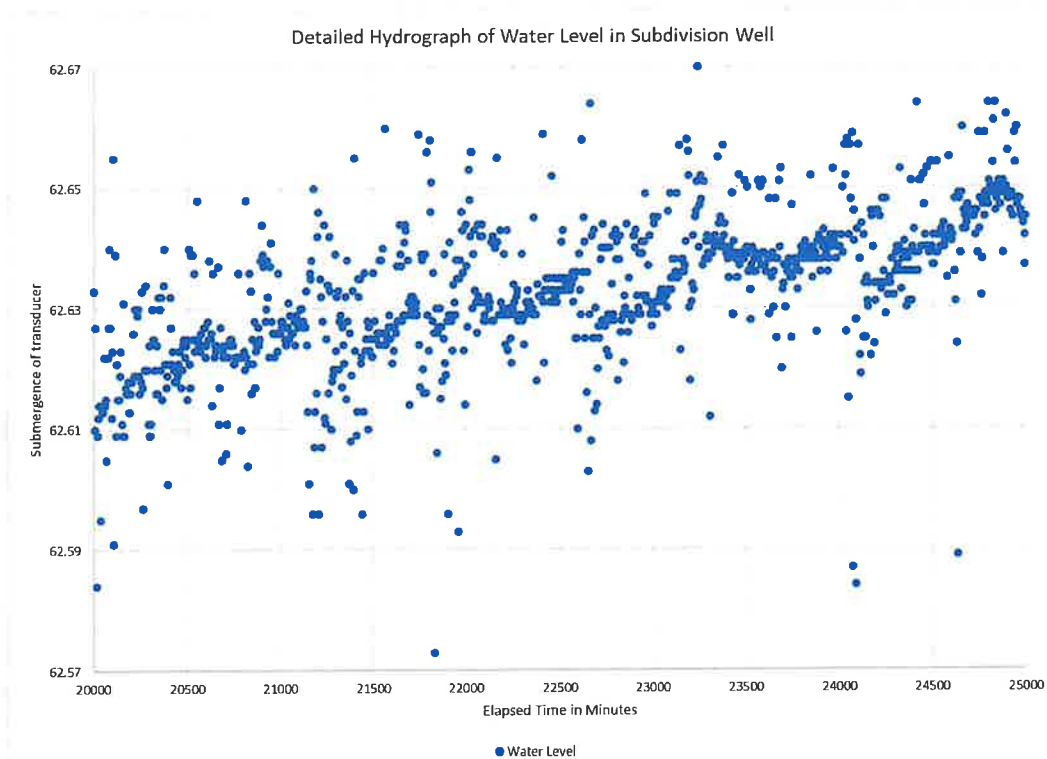


Figure 6. Detailed hydrograph of water level in Subdivision Well.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

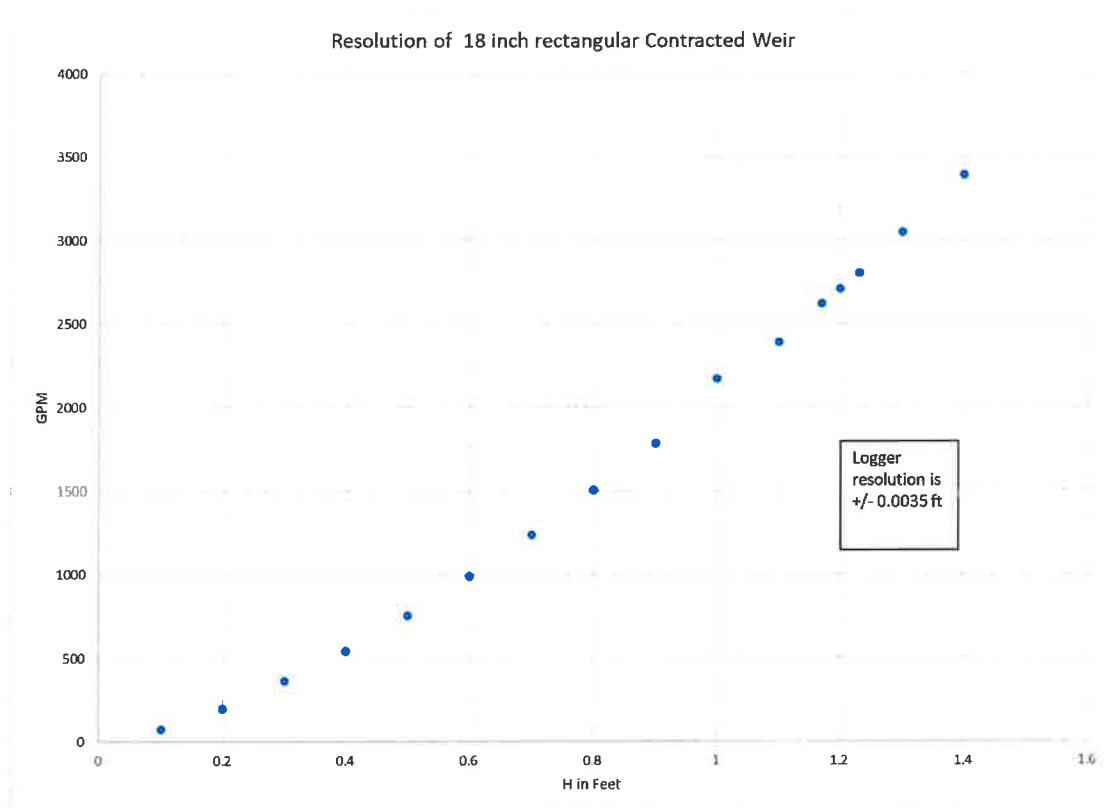


Figure 7. Evaluation of weir resolution with IN-SITU Brand Pressure Transducer.



Clearwater Geosciences, LLP
Ground Water Development and Exploration



Figure 8. 18-inch rectangular weir temporarily installed in check gate of IDFG Spring Box. Blue plastic sheeting was used to limit leakage through and around check boards below weir. The pressure transducer was clamped to a steel rod welded to a metal plate set behind the staff gauge (not visible in photograph).



Clearwater Geosciences, LLP
Ground Water Development and Exploration

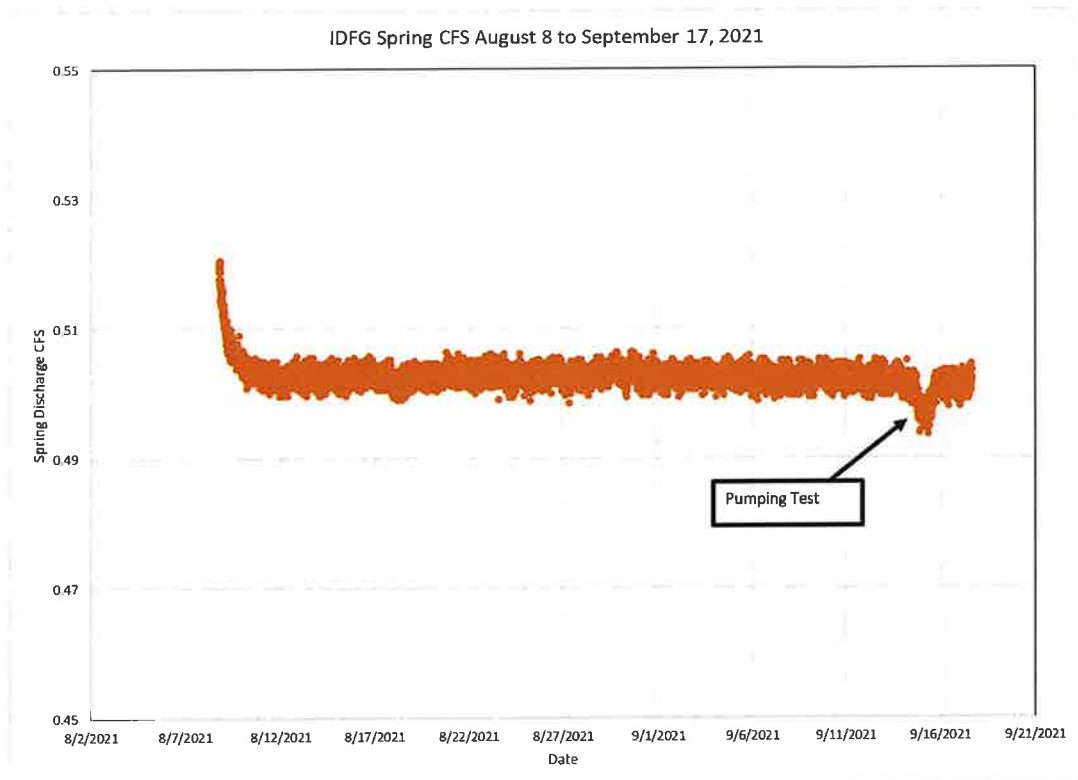


Figure 9. Discharge of spring in cfs from August 8 to September 17, 2021.

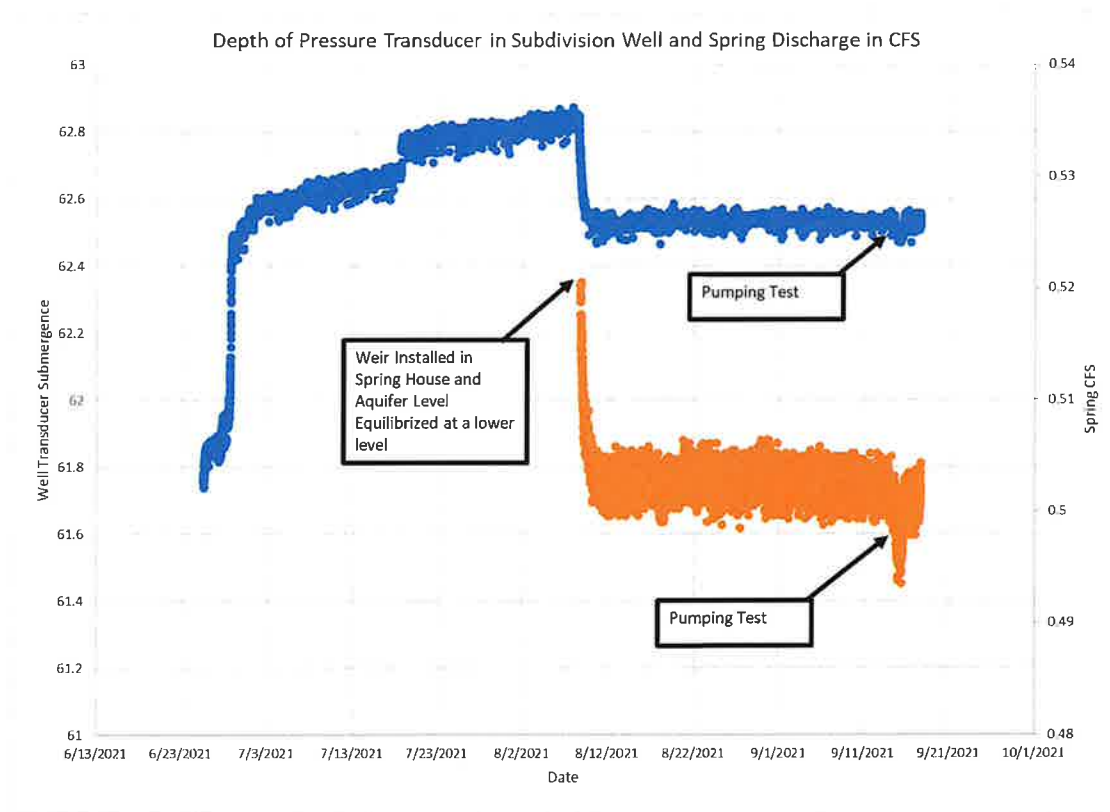


Figure 10. Plot of Well water levels and spring discharge over time.

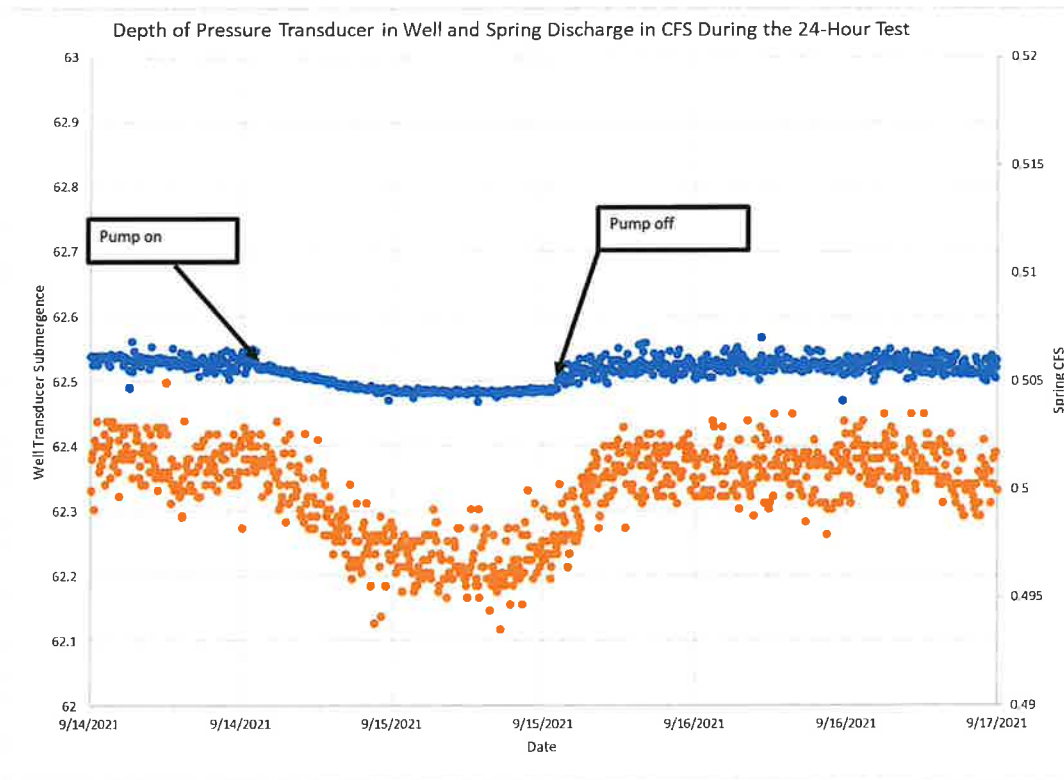


Figure 11. Plot of Well water levels and spring discharge prior to, during and after 24-hour pumping test.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

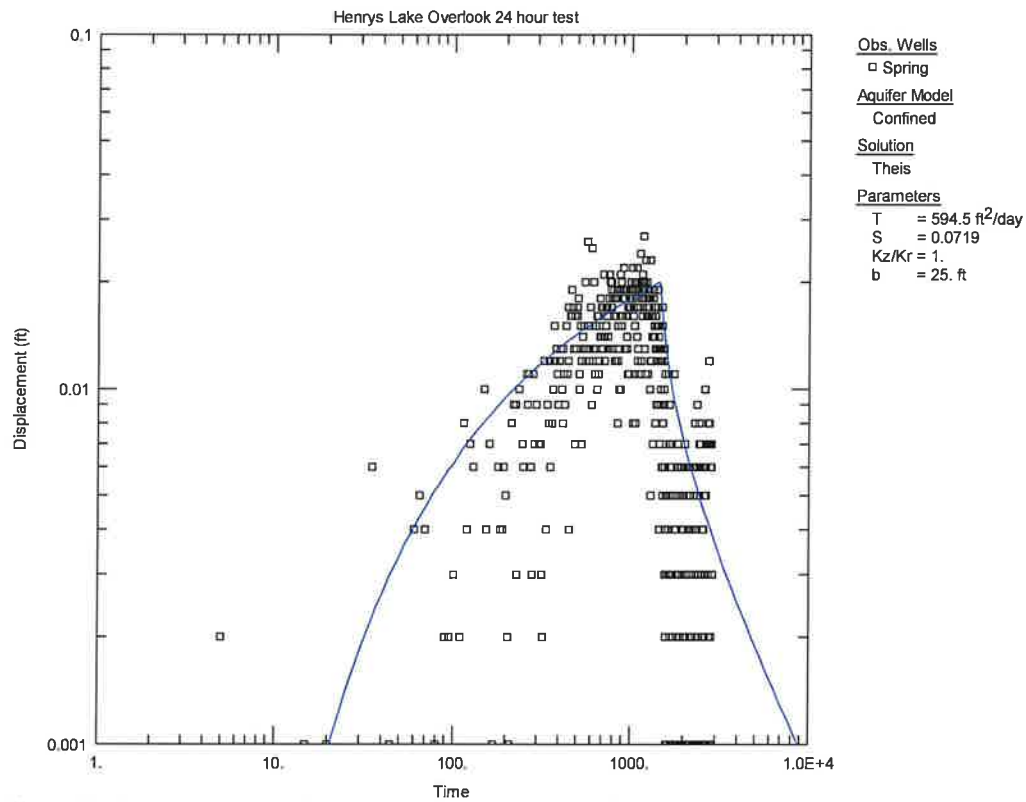


Figure 12. Type curve match of spring drawdown during pumping test to Theis Solution.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

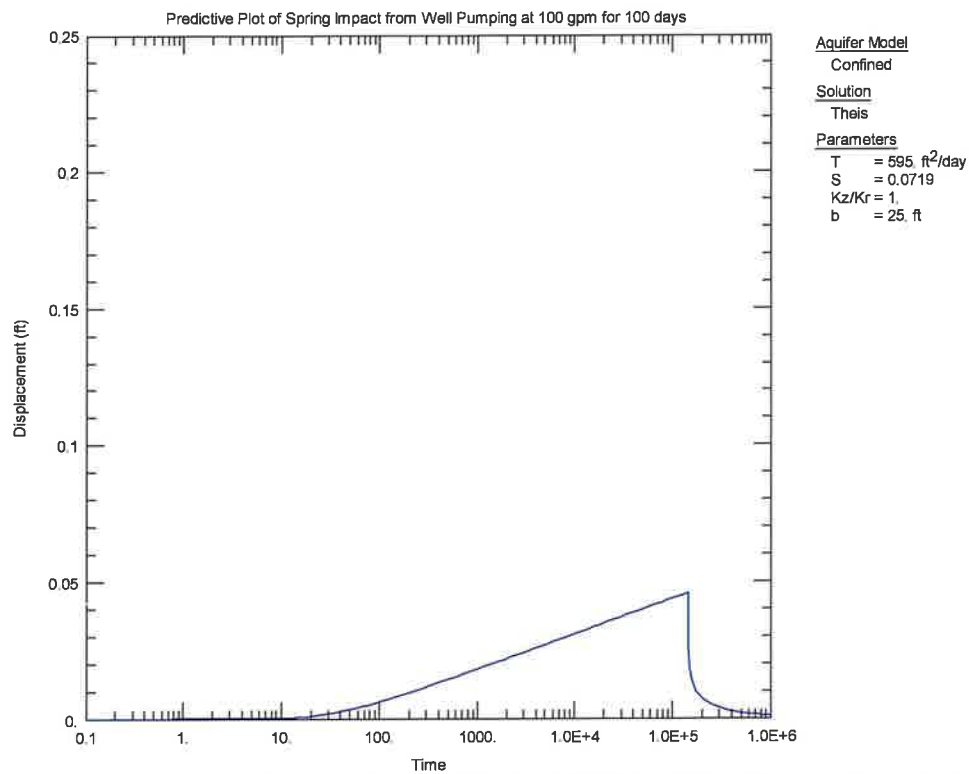


Figure 13. Predicted drawdown at spring from pumping Subdivision Well at 42 gpm continuously for 100 days.



Attachment A

Water Chemistry Data



Clearwater Geosciences, LLP
Ground Water Development and Exploration

LAB FEDERAL ID#: ID00952		DATE REPORTED BY LAB: 7/13/2021
DATE RECEIVED: 6/28/2021		
COMPLIANCE SAMPLE:		REPLACEMENT SAMPLE:
PWS #:	PWS NAME: Clear Water Geosciences	
CONTACT NAME: Tom Wood		CONTACT PHONE: (208) 589-5555

IAS EnviroChem

3314 Pole Line Rd.
Pocatello, ID 83201

phone: (208) 237-3300

fax: (208) 237-3336

email: iasec3308@iasenvirochem.com

www.iasenvirochem.com

LAB SAMPLE NUMBER: I106378-01	COLLECTION DATE/TIME: 06/25/21 11:00
SAMPLE TYPE: SP - Special	SAMPLING POINT/LOCATION - TAG#/FACILITY ID: Spring box

INORGANIC CHEMICAL ANALYSIS REPORT For Public Water Systems

FRDS	Compound	Result	Units	MCL	MDL	Method	Analysis Date	Analyst
SECONDARY AND OTHER IOC CONTAMINANTS (Optional)								
1927	Alkalinity, Total as CaCO ₃	100	mg/L		5	2320B	07/02/2021	JW
1017	Chloride	2	mg/L	250	1	300.0	06/28/2021	TP
1028	Iron	ND	mg/L	0.3	0.01	200.7	07/09/2021	JW
1032	Manganese	ND	mg/L	0.05	0.01	200.7	07/09/2021	JW
1925	pH	7.7	Units	6.5-8.5		150.1	06/28/2021	JW
1064	Specific Conductance (EC)	185	uS/cm		0.5	120.1	06/28/2021	JW
1055	Sulfate	5	mg/L	250	1	300.0	06/28/2021	TP
1930	Total Dissolved Solids	121	mg/L	500	2	160.1	06/29/2021	JW

ND = Not Detected MCL = Maximum Contaminant Level MDL = Method Detection Limit



Clearwater Geosciences, LLP
Ground Water Development and Exploration

LAB FEDERAL ID#:	ID00952	DATE REPORTED BY LAB:	7/13/2021
DATE RECEIVED:	6/28/2021		
COMPLIANCE SAMPLE:		REPLACEMENT SAMPLE:	
PWS #:	PWS NAME:	Clear Water Geosciences	
CONTACT NAME	Tom Wood	CONTACT PHONE:	(208) 589-5555

IAS EnviroChem

3314 Pole Line Rd.
Pocatello, ID 83201
phone: (208) 237-3300
fax: (208) 237-3336
email: iasec3308@iasenvirochem.com
www.iasenvirochem.com

LAB SAMPLE NUMBER:	COLLECTION DATE/TIME:
I106378-02	06/25/21 13:00
SAMPLE TYPE:	SAMPLING POINT/LOCATION - TAG#/FACILITY ID:
SP - Special	Well pump house

INORGANIC CHEMICAL ANALYSIS REPORT For Public Water Systems

FRDS	Compound	Result	Units	MCL	MDL	Method	Analysis Date	Analyst
SECONDARY AND OTHER IOC CONTAMINANTS (Optional)								
1927	Alkalinity, Total as CaCO ₃	110	mg/L		5	2320B	07/02/2021	JW
1017	Chloride	1	mg/L	250	1	300.0	06/28/2021	TP
1028	Iron	1.11	mg/L	0.3	0.01	200.7	07/09/2021	JW
1032	Manganese	ND	mg/L	0.05	0.01	200.7	07/09/2021	JW
1925	pH	7.7	Units	6.5-8.5		150.1	06/28/2021	JW
1064	Specific Conductance (EC)	199	uS/cm		0.5	120.1	06/28/2021	JW
1055	Sulfate	6	mg/L	250	1	300.0	06/28/2021	TP
1930	Total Dissolved Solids	132	mg/L	500	2	160.1	06/29/2021	JW

ND = Not Detected MCL = Maximum Contaminant Level MDL = Method Detection Limit

Clearwater Geosciences
Tom Wood
1818 East 49th South
Idaho Falls, ID 83404


G. Ryan Partie
Laboratory Director



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Notes and Definitions

U	Analyte included in the analysis, but not detected
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference



Clearwater Geosciences, LLP
Ground Water Development and Exploration

1106378

Clearwater Geosciences

Received: 06/28/2021
RAB

2 Samples

IAS EnviroChem

3314 Pole Line Rd. • Pocatello, ID 83201
Phone: (208) 237-3300 • Fax: (208) 237-3336
email: iasec3308@iasenvirochem.com • www.iasenvirochem.com

Idaho Chain of Custody - Drinking Water Analysis				
Company: Clearwater Geosciences		PWS #:		
Water System Name: Henrys Lake Overlook/IFG Spring		County: Fremont		
Contact / Project Manager: Tom Wood		Phone: 208 589 5555		
Address: 1818 East 49th South		Email: thomasrwood@gmail.com		
City, State, Zip: Idaho Falls, ID 83404				
Payment Options				
Send Bill or Receipt To: Tom Wood		Amount \$		
Payment due with samples unless credit has been established		Received by		
Email Invoice to:				
☐ Cash ☒ Bill ☐ Check# ☐ PO # ☐ Other				
Sample Information For all samples, Public and Private		Sample Type		
Sample Collected By: <i>TRW</i> Tom Wood		☐ RT-Routine ☐ CO-Confirmation		
Sample Collection Location: ~~Spring box~~ Spring box		☐ DU-Duplicate ☒ SP-Special		
(Name of well or other source for sample collected at the source. A different chain of custody should be used for each location collected from.)		☐ Other Special		
Date Sample Taken 6/25/21		Time Sample Taken 11 AM PM		
For Public Water System Source Samples		Public Water System Jurisdiction		
Location Tag #		A copy of report to be sent to: (Regulator)		
CHECK DESIRED ANALYSIS				
IOCs ☐ Arsenic ☐ Sodium ☒ Nitrate ☐ Copper/Lead ☐ Sulfate ☐ Phase II IOC metals: Ba, Cd, Cr, F, Hg, Se ☐ Phase V IOC: Be, Ni, Sb, Ti ☐ Primary IOC package with Cyanide Waiver: Ba, Be, Cd, Cr, Hg, Ni, Sb, Se, Ti, Fluoride ☐ Secondary/Optional IOC package: Ag, Al, Ca, Cu, Fe, K, Mg, Mn, Pb, Zn, Chloride, Ammonia, Hydrogen Sulfide, Silica, Color, Hardness, Odor, pH, Conductivity, Alkalinity, TDS, Langlier Index Corrosivity, Surfactants ☐ Complete IOC package: Ag, Al, As, Ba, Be, Ca, Cd, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Ti, Zn, Chloride, Fluoride, Nitrate, Nitrite, Sulfate, Ammonia, Hydrogen Sulfide, Silica, Color, Hardness, Odor, pH, Conductivity, Alkalinity, TDS, Langlier Index Corrosivity, Surfactants ☐ Cyanide		VOCs ☐ VOC 524.2 ☐ TTHM ☐ Haloacetic Acids (HAAS) RADs ☐ Gross Alpha ☐ Gross Beta ☐ Radium 226 ☐ Radium 228 ☐ Uranium	SOCs ☐ Full SOC (all 8 below) ☐ Phase II SOC (all 5 below) ☐ Semivolatiles (525.2) ☐ Herbicides (515.1) ☐ Carbamates (531.1) ☐ Pesticides (505) ☐ EDB/DBCP (504.1) ☐ Phase V SOC (all 3 below) ☐ Diquat (549.1) ☐ Endothall (548.1) ☐ Glyphosate (547) ☐ Bromate	Other (specify) Chloride Sulfate ~~Sulfate~~ <i>TRW</i> Alkalinity Iron Manganese conductivity TDS pH
Sample Submitted By: <i>[Signature]</i>		Received By: <i>[Signature]</i>		
Shipping or Delivery Date:		Received Date/Time: 06/28/21 11:4		
		Temp. °C: 15.8°C		
		Samples received in a cooler? Y/N		

Page 5 of 6

1818 E 49th South Idaho Falls, ID 83404 208.589.5555

pg. 27



Clearwater Geosciences, LLP
Ground Water Development and Exploration

IAS EnviroChem

3314 Pole Line Rd. • Pocatello, ID 83201
Phone: (208) 237-3300 • Fax: (208) 237-3336
email: iasec3308@iasenvirochem.com • www.iasenvirochem.com

Idaho Chain of Custody - Drinking Water Analysis			
Company:	Clearwater Geosciences	PWS #:	
Water System Name:	Henrys Lake Overlook/IFG Spring	County:	Fremont
Contact / Project Manager:	Tom Wood	Phone:	208 589 5555
Address:	1818 East 49th South	Email:	thomaswood@gmail.com
City, State, Zip:	Idaho Falls, ID 83404		

Payment Options	
Send Bill or Receipt To:	Tom Wood
Amount \$	
Payment due with samples unless credit has been established	Received by
Email Invoice to:	
☐ Cash	☒ Bill
☐ Check#	☐ PO #
☐ Other	

Sample Information	Sample Type
For all samples, Public and Private	
Sample Collected By: <i>TRW</i> Tom Wood <i>TRW</i>	☐ RT-Routine ☐ CO-Confirmation
Sample Collection Location: <i>Well</i> pump house ~~_____~~	☐ DU-Duplicate ☒ SP-Special
(Name of well or other source for sample collected at the source.)	☐ Other <u>Special</u>
A different chain of custody should be used for each location collected from.)	
Date Sample Taken 6/25/21	Time Sample Taken <i>7</i> AM / PM <i>TRW</i>

For Public Water System Source Samples	Public Water System Jurisdiction
Location Tag #	A copy of report to be sent to: (Regulator)

CHECK DESIRED ANALYSIS			
IOCs ☐ Arsenic ☐ Sodium ☒ ~~Fluoride~~ ☐ Nitrite ☐ Copper/Lead ☐ Sulfate ☐ Phase II IOC metals: Ba, Cd, Cr, F, Hg, Se ☐ Phase V IOC: Ba, Ni, Sb, Ti ☐ Primary IOC package with Cyanide Walver: Ba, Be, Cd, Cr, Hg, Ni, Sb, Se, Ti, Fluoride ☐ Secondary/Optional IOC package: Ag, Al, As, Ba, Be, Ca, Cd, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Pb, Zn, Chloride, Ammonia, Hydrogen Sulfide, Silica, Color, Hardness, Odor, pH, Conductivity, Alkalinity, TDS, Langelier Index Corrosivity, Surfactants ☐ Complete IOC package: Ag, Al, As, Ba, Be, Ca, Cd, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Ti, Zn, Chloride, Fluoride, Nitrate, Nitrite, Sulfate, Ammonia, Hydrogen Sulfide, Silica, Color, Hardness, Odor, pH, Conductivity, Alkalinity, TDS, Langelier Index Corrosivity, Surfactants ☐ Cyanide	VOCs ☐ VOC 524.2 ☐ TTHM ☐ Halocetic Acids (HAA5) RADs ☐ Gross Alpha ☐ Gross Beta ☐ Radium 226 ☐ Radium 228 ☐ Uranium	SOCs ☐ Full SOC (all 8 below) ☐ Phase II SOC (all 5 below) ☐ Semivolatiles (525.2) ☐ Herbicides (515.1) ☐ Carbamates (531.1) ☐ Pesticides (505) ☐ EDB/DBCP (504.1) ☐ Phase V SOC (all 3 below) ☐ Diquat (549.1) ☐ Endothal (548.1) ☐ Glyphosate (547)	Other (specify) Chloride Sulfate <i>TRW</i> ~~Fluoride~~ Alkalinity Iron Manganese conductivity TDS pH ☐ Thiomate

Sample Submitted By: *[Signature]*
Shipping or Delivery Date: _____

Received By: *[Signature]*
Received Date/Time: *6/25/21 1114*
Temp. °C: *58.2*
Samples received in a cooler? *Y/N*