



Clearwater Geosciences, LLP
Ground Water Development and Exploration

EXPERT REPORT ON LCSC ENTERPRIZES LLC 2024 FIELD ACTIVITIES

In support of Transfer Applications
Nos. 84488 and 84490

Prepared for:
LCSC Enterprises LLC
November 25, 2024

The technical material in this report was prepared by or under the supervision and direction of the undersigned, whose seal as a Professional Geologist is affixed below.



The following members of the Clearwater Geosciences, LLP staff contributed to the preparation of this report.

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Introduction

The LCSC site is located north of the Snake River approximately 16 miles downstream (southwest) of the American Falls Dam (Figure 1). A better understanding of the local hydrogeology is required to fully evaluate the potential impact the proposed transfers will have on water in Snake River and Eastern Snake River Plain Aquifer. To date, analyses of the impact from the proposed transfers have been based upon regional understandings of aquifer-river relationships. This study provides site specific data from two new monitoring wells and water level data collected over a five-month period from the monitoring wells and an active irrigation well immediately adjacent to the proposed Place of Use (POU) and Point of Diversion (POD).

The water table in this area is shallow, and the proponents of the transfers have asserted possible localized effects to the Snake River from pumping of the aquifer via proposed new PODs. Of particular interest for these transfers is the relationship between pumping of the regional Eastern Snake River Plain Aquifer and the nearby Snake River. This study has been designed to describe hydrogeology of the subsurface, and to evaluate how the proposed wells might impact water in the Snake River. A secondary purpose of this investigation is to determine if a well can be constructed in such a way as to pump water that is not directly connected to the Snake River.

This summary report includes: 1) description of two monitoring wells drilled to define the geology of the shallow subsurface; 2) presentation of water levels monitored in three wells on a continuous basis throughout the irrigation season; and 3) synthesis of the data into a hydrogeological conceptual model for the site.

Field Investigation

Well Drilling

Two monitoring wells were drilled in April of 2024 by American Pump and Drilling Company at locations shown in Figure 2. A casing advancing drilling technique was employed. Six-inch diameter steel casing was advanced to the total depth of the well. This method provided excellent drill cutting recovery for preparing lithologic logs. The well logs prepared from the drill cuttings accurately represent of the subsurface geology. Both MW-1 and MW-2 were constructed in a similar manner. Two-inch diameter PVC well casing with 20 ft of PVC well screen was installed inside the 6-inch steel casing. As the filter pack was installed, the 6-inch casing was withdrawn. Sand levels were carefully monitored to ensure that the filter pack sand did not bridge. The sanitary well seal consists of bentonite chips.

MW-1 was drilled 90 ft west of the active irrigation well 352874 (Vern Duffin well, 1979). Well 352874 has a completed depth of 535 ft and it is open to the regional aquifer from 256 to 535 ft (see Attachment 1). The purpose of MW-1 is to define the shallow lithology and monitor the shallow water levels adjacent to Well 352974 while it is pumped during the irrigation season.



The as-built diagram for MW-1 is provide in Figure 3. The well was drilled to 43 ft by advancing the 6-inch steel casing to depth and then building the 2-inch diameter PVC well inside the casing. Slotted (0.020") PVC casing extends from 23 to 43 ft. The filter pack is 10-20 silica sand that extends from 18 to 43 ft. The annular seal consists of bentonite chips extending from 18 ft to land surface. Materials in the well were tagged every 5 ft to ensure that bridging did not occur. The depth to water in April was 29.95 ft below casing.

The lithology at the MW-1 location consists of top soil and sand from 0 to 4 ft, basalt boulders and gravel from 4 to 23 ft, basalt boulders, gravel and sand from 23 to 37 ft and sand and gravel from 37 to 43 ft. Minor amounts of silt and clay were observed and its presence increased with depth. However, the clay and silt likely occur in thin stringers in this section.

MW-2 is approximately 500 ft north of the Snake River as shown in Figure 2. The purpose of MW-2 is to monitor the shallow water near the Snake River while ground water pumping occurs during the irrigation season. Irrigation pumping that affects the shallow water at MW-2 would be interpreted to impact the Snake River as well.

The as-built diagram for MW-2 is provide in Figure 4. The well was drilled to 43 ft by advancing the 6-inch steel casing to depth. The water level in MW-2 was 10 ft higher than in MW-1 and the decision was made to build the well such that a few feet of open screen was above the water table in case water levels in the well were to rise later in the season. Thus, the bottom five feet of the hole was back filled with silica sand. Slotted (0.020") PVC casing extends from 17.5 to 37.5 ft. The filter pack is 10-20 silica sand that extends from 15 to 43 ft. The annular seal consists of bentonite chips extending from 15 ft to land surface. Materials in the well were tagged every 5 ft to ensure that bridging did not occur. The depth to water in April was 20.30 ft below casing.

The lithology at the MW-2 location consists of top soil and sand from 0 to 4 ft, sand and basalt boulders from 4 to 14 ft, sand, gravel and basalt boulders from 14 to 29 ft, gravel, sand, and clay from 29 to 34 ft with an increasing amount of clay from 34 to 37 ft, a water bearing gravel from 36 to 37 ft and sand and gravel from 37 to 43 ft.

Geology

The shallow geology is known from the monitoring wells, which penetrated the subsurface to 43 ft. The deep geology is known from the drilling log of LCSC irrigation Well 352874 and a well near the potato cellars Well 352857.

Well 352874 was drilled in 1979 to a depth of 535 ft. The well is cased from land surface to a depth of 256 ft and has an open hole below this to the bottom of the well. The well log is provided in Attachment 1. The lithology of the upper 40 ft of well 352874 is very similar to MW 1 and 2; consisting of a few feet of soil, a layer of basalt boulders, gravel and sand to 40 feet. The 205 ft thick interval from 40 to 245 feet is a clay rich layer of sediment. The clay is described as ranging in color from brown, yellow and white. The entire 205 ft thick interval is specified as non-water bearing on the well log. A 33 ft thick layer of brown clay is described



from 173 to 210 ft. The top of the regional basalt is at 245 ft and various textures and colors of basalt extends to 525 ft. From 525 to 535 ft the lithology is described as reddish rock with layers of crystals (this is possibly rhyolite).

The domestic Well 352857 was drilled in 1979 to a depth of 250 ft. Below the surface soil is a layer described as sandstone that extends to 98 ft. A basalt layer extends from 98 ft to 125 ft and below the basalt is 9 ft of clay and 11 ft of sandstone overlying another layer of basalt. The basalt extends from 145 to 178 ft. The lithology is described as a sandstone from 178 ft to the bottom of the well. The presence of basalt layers in Well 353857 is different than that of Well 352874, which had no basalt until a depth of 245 ft. Layers or lobes of basalt are common in this area, however, the lack of basalt in Well 352874 suggests that it may have been eroded.

A geologic cross section was prepared based on MW-1, MW-2, Well 352874 and Well 352857. as shown in Figure 5. The cross section is presented in Figure 6. On the south the lithology consists of a layer of top soil underlain by a layer of basalt boulders, coarse sand, and gravel, below this is a clay rich layer of sediment overlying a sequence of basalt flows. On land surface at the LCSC are many rounded basalt boulders taken from the farm fields. The deposits of rounded basalt boulders were formed by the erosion basalt deposited during the Bonneville flood, which was caused by the catastrophic failure of Red Rock Pass draining Lake Bonneville. These deposits are unconsolidated and poorly sorted to unsorted sand and gravel (Armstrong, et al., 1978).

Beneath the Bonneville Flood sediments is layer of unconsolidated sediment that is clay rich. The various layers in this interval all contain clay and the entire sequence is non water bearing. This sequence of sediment may be the Upper Pleistocene Alluvium and possibly associated American Falls Lake Bed sediments as described by Armstrong, et. al., 1978.

The lower basalt penetrated at a depth of 245 ft can be one of several basalt flows of Quaternary and Tertiary age; without rock sample it is not possible to know the age of the basalt.

The sandstone described at the north end of the cross-section may be the Raft Formation, which is described as massive beds of light-colored clay and silt, and thin-bedded calcareous quartzose silt and sand that is cross bedded locally (Anderson et al., 1978). The thin basalt flows penetrated by Well 352857 may be one of the several Pleistocene age basalt units mapped by Anderson et. al., 1978.

The geologic data suggests that the channel of the Snake River has been active here for a long period of time. The river has been both eroding and depositing sediment. As illustrated in the cross-section (Figure 6) the ancestral Snake River may have eroded the Raft Formation and Pleistocene Basalts creating a river channel. Subsequently, the river channel was filled by alluvium and lake bed deposits forming the clay rich sedimentary sequence. The Bonneville Flood cut into the clay rich sequence and re-deposited coarse sediment and basalt boulders.



Water Levels in Nearby Wells

Water levels were periodically measured by hand in four wells. The elevations for these measurements are listed in Table 1. The water level elevations in the shallow monitoring wells and the distal Diamond D 336369 remained relatively constant. Well 352874 the pumped irrigation well, is cased to 256 ft and draws water from the aquifer between 256 ft and 535 ft. The fact that pumping of the deep aquifer did not impact water levels in shallow wells indicates that the upper aquifer is isolated from the lower aquifer by the clay rich sediments and clay layer between 40 and 245 ft.

Water levels were monitored continuously in MW-1, MW-2 and Well 352874 from April 28, 2024 to September 24, 2024. This period preceded the onset of irrigation and continued until the end of the irrigation season. Solinst Level Logger® transducers were installed in the wells and set to sampling intervals of 1 or 5 minutes. To download the data loggers, the transducers were removed from the wells and connected to a laptop PC periodically throughout the summer.

The hydrograph of water levels for all three wells is presented in Figure 7. Water levels in MW-1 and MW-2 remained relatively constant throughout the irrigation season. Water levels in Well 352874 were significantly impacted by pumping. When the pump cycled on water levels dropped over 35 ft to below the level of the pressure transducer. The transducer was installed as deeply as possible in Well 352874, but due to a constriction in the well it could not be set deeper. The water level in Well 352874 recovered when the pump was shut off and at the end of the irrigation season to the pre-irrigation season water level. The water level hydrograph shows that there is no hydraulic communication between the shallow aquifer tapped by MW-1 and MW-2 and the deep aquifer tapped by Well 352874. This indicates that the upper aquifer is isolated from the lower aquifer by the clay rich sediments and clay layer between 40 and 245 ft.

The recovery data for the Irrigation Well 352874 was analyzed to estimate aquifer transmissivity. Two methods for a confined aquifer were employed. The Theis solution and the Cooper-Jacob straight line method. The results are presented in Figure 8. The Theis Solution yields 1.44×10^4 ft²/day and the Cooper-Jacob Solution yields 1.53×10^4 ft²/day. Although the storativity value estimated from a single well pumping test is unreliable, the extremely low storativity values (on the order of 10^{-11} and 10^{-12}) suggests the deep aquifer is under confined conditions due to the clay rich sediments and clay layer between 40 and 245 ft.

Discussion

The field study has defined a shallow aquifer extending to about 40 ft, consisting of Bonneville Flood Deposits and Pleistocene Alluvium. The lower basalt aquifer is hydraulically isolated from the shallow aquifer by a thick sequence of clay rich sediments. The isolation of the shallow aquifer by the clay rich sediments is generally representative of perched aquifer conditions. Water level monitoring of the two shallow MW wells demonstrates hydraulic isolation from the deeper aquifer. Even though the head in the lower aquifer was decreased to more than 35 ft repeatedly during the irrigation season, the head in MW-1 only 90 ft away was unaffected.



Wells completed in the shallow perched aquifer will have a much better connection to the Snake River than deeper wells. Pumping of the shallow perched aquifer will result in relatively faster depletions of surface water. MW-2, which is 500 ft away from the Snake River, showed no seasonal response to irrigation pumping from Well 352874 (2460 ft north of MW-2). Pumping of the deeper well had no impact on the shallow perch aquifer adjacent to the Snake River because of the hydraulic isolation caused by the layer of clay rich sediments.

The non-responsive behavior of water levels in the shallow aquifer from pumping Well 352874 from the aquifer below 245 ft demonstrates that it is possible to construct a well in this location that is not directly connected to the Snake River. This isolation of the deep aquifer from the shallow aquifer was accomplished in Well 352874 with steel well casing extending from land surface to a depth of 256 ft. The well was drilled with a cable tool rig that drove the 16-inch casing 11 ft into the top of the basalt. A similar approach can be used for the wells proposed for the new PODs to ensure that pumping of the deep aquifer does not impact the Snake River. An alternative method to isolate the shallow surface water from the deep aquifer would be to overbore the drill hole and seal the annulus between the formation and well casing with grout or cement.

Summary

Two 2-inch diameter, 43 ft deep monitoring wells were drilled for this project. MW-1 was drilled proximal to an existing irrigation well, that taps the deep aquifer. MW-2 was drilled near the Snake River to monitor surface water – ground water interactions. Water levels were monitored continuously in three wells for 5 months during the 2024 irrigation season. Water levels in the shallow aquifer wells were not impacted by pumping of the irrigation well even though drops in head level of the lower aquifer was greater than 35 ft. Correlation of the lithology into a north-south cross section illustrates a thick sequence of clay rich sediments that acts as a perching layer isolating the shallow aquifer from the deeper aquifer. The new and existing data demonstrates that new wells to be installed for Transfers 84488 and 84490 can be constructed to not directly impact the Snake River.

References

Armstrong, R.L., J.F. Smith jr., H.R. Covington and P.L. Williams, 1978, Preliminary Geologic Map of the West Half of the Pocatello 1° x 2° Quadrangle, Idaho, USGS.



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Table 1. Periodic water elevations for wells in the LCSC area wells.

Date	4/16/2024	4/19/2024	4/29/2024	7/2/2024	8/27/2024	9/24/2024
MW-1	4201.05	4201.25	4201.35	4200.5	4200.68	4200.74
MW-2	4197.2	4197.45	4197.35	4196.69	4196.72	4196.74
Diamond D 336369		4195.2			4196.15	
Well 352874	4196.8		4201.2	4193.55	4195.07	



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Figure 1. Location of the LCSC Site shown with a yellow pin.

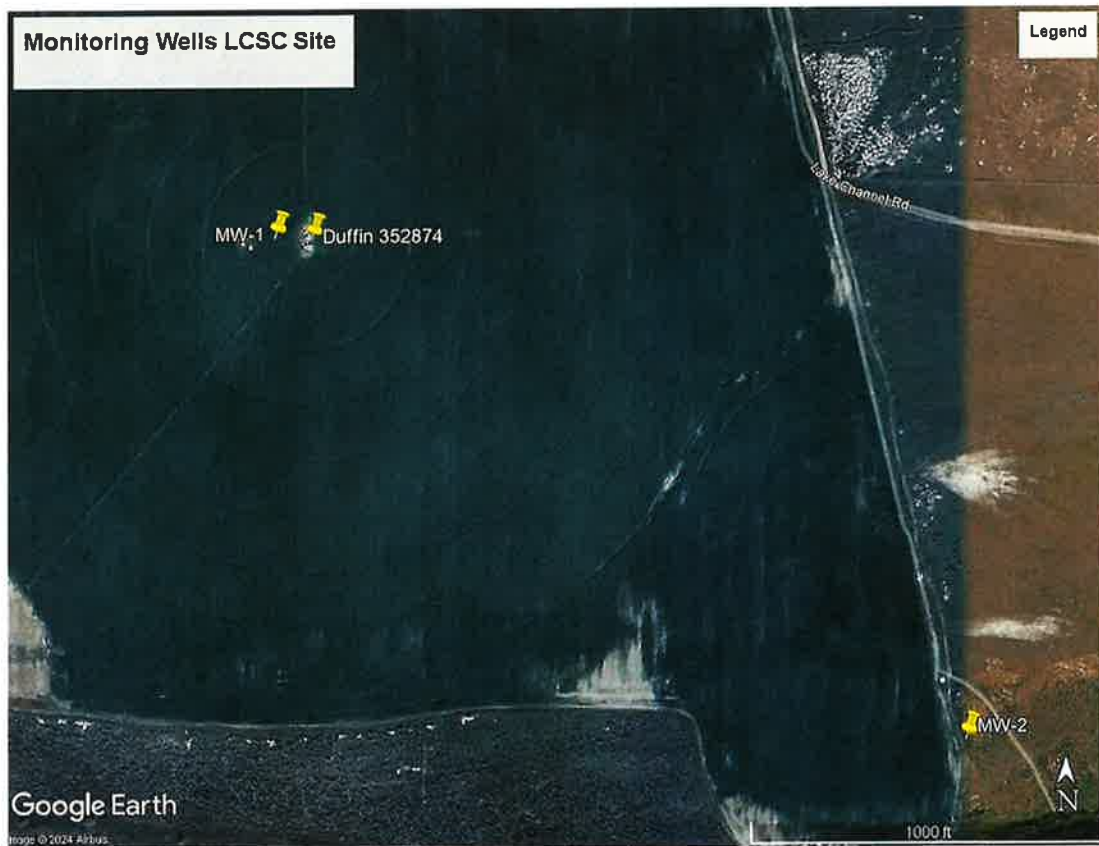


Figure 2. Locations of monitoring wells, MW-1 and MW-2, drilled for this project and Irrigation Well 352874.

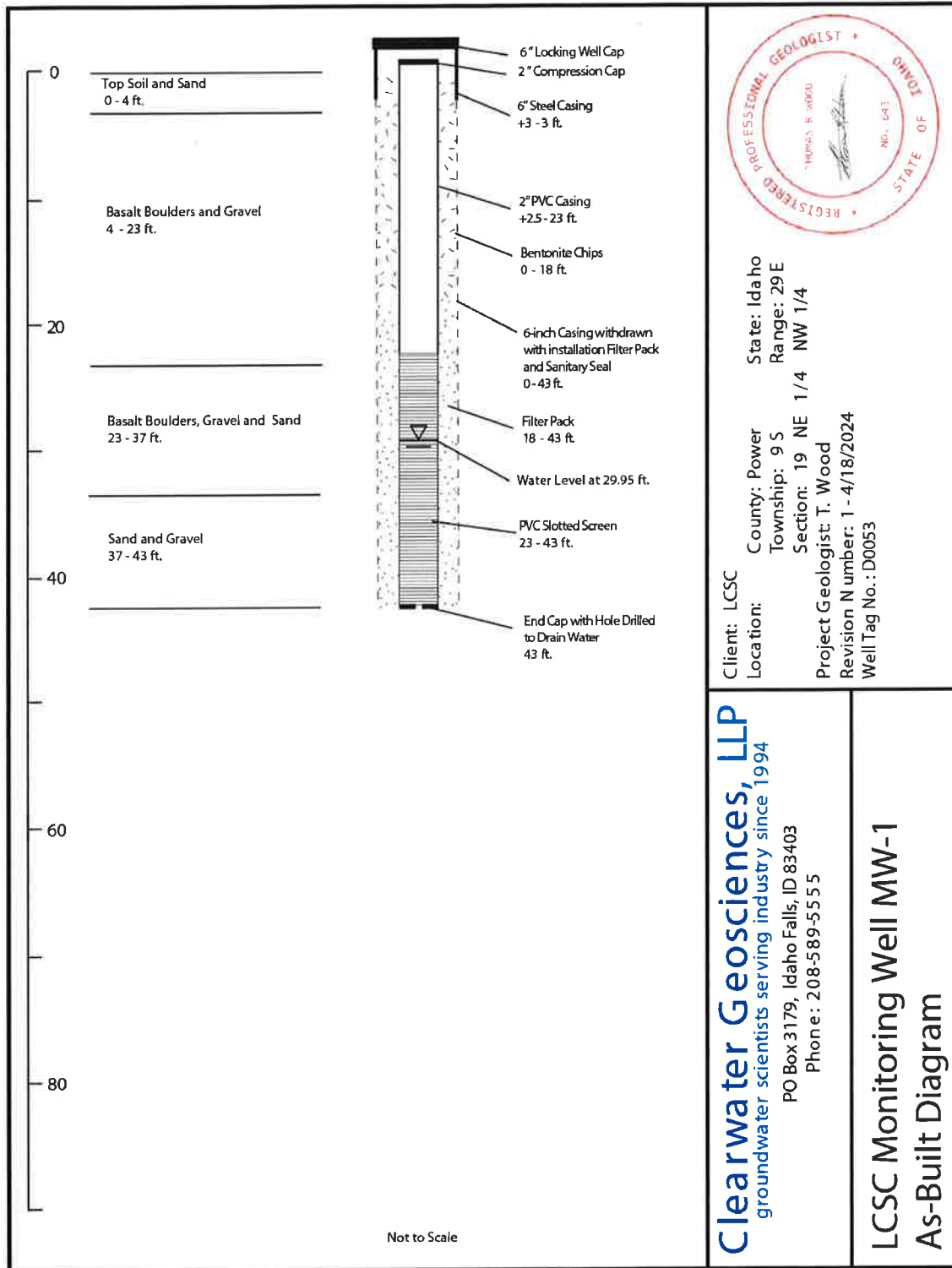


Figure 3. As-built diagram of MW-1.

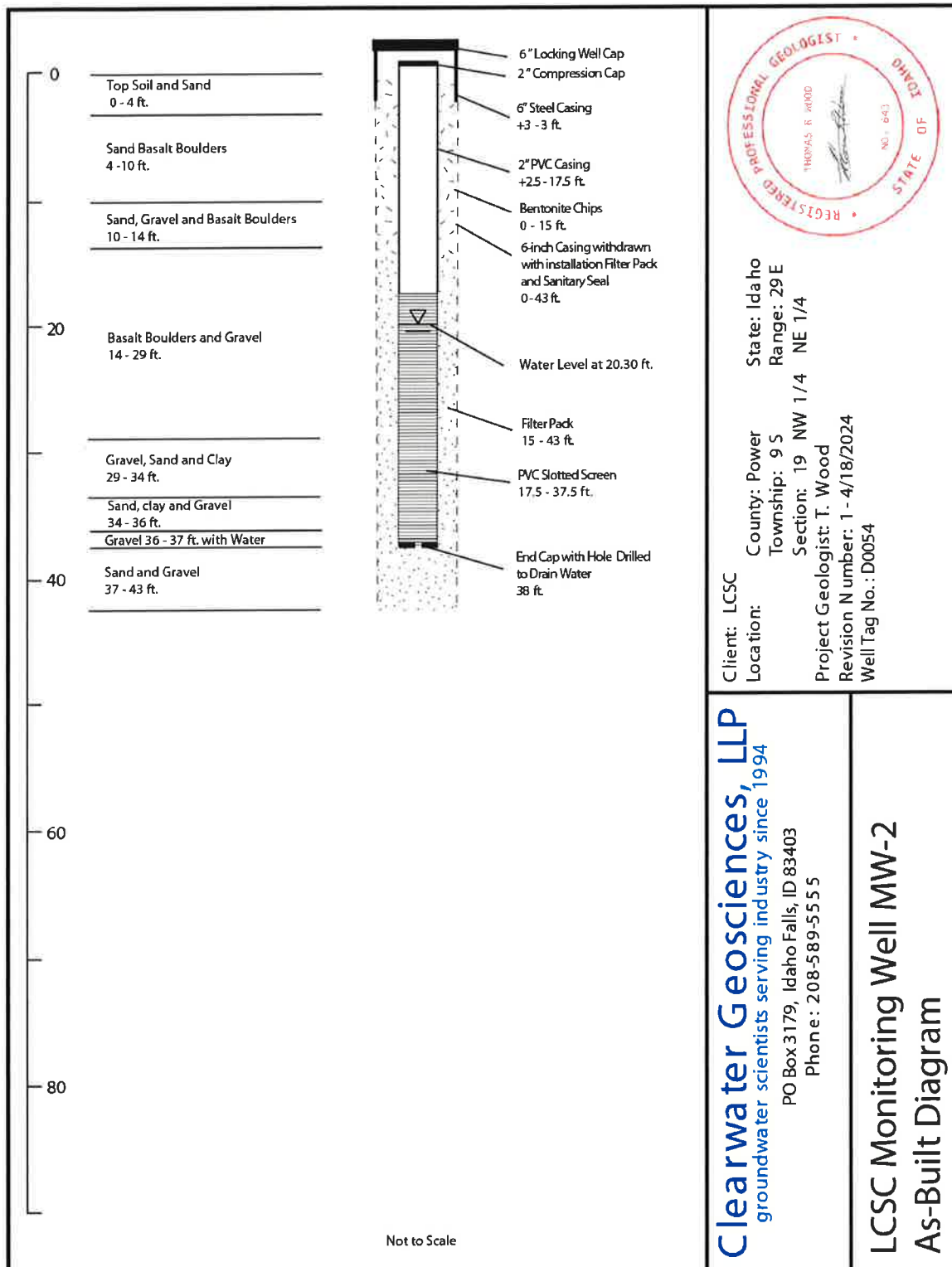


Figure 4. As-built diagram of MW-2.



Figure 5. Wells in the area of LCSC and line of geologic cross section.



Geologic Cross Section for LCSC

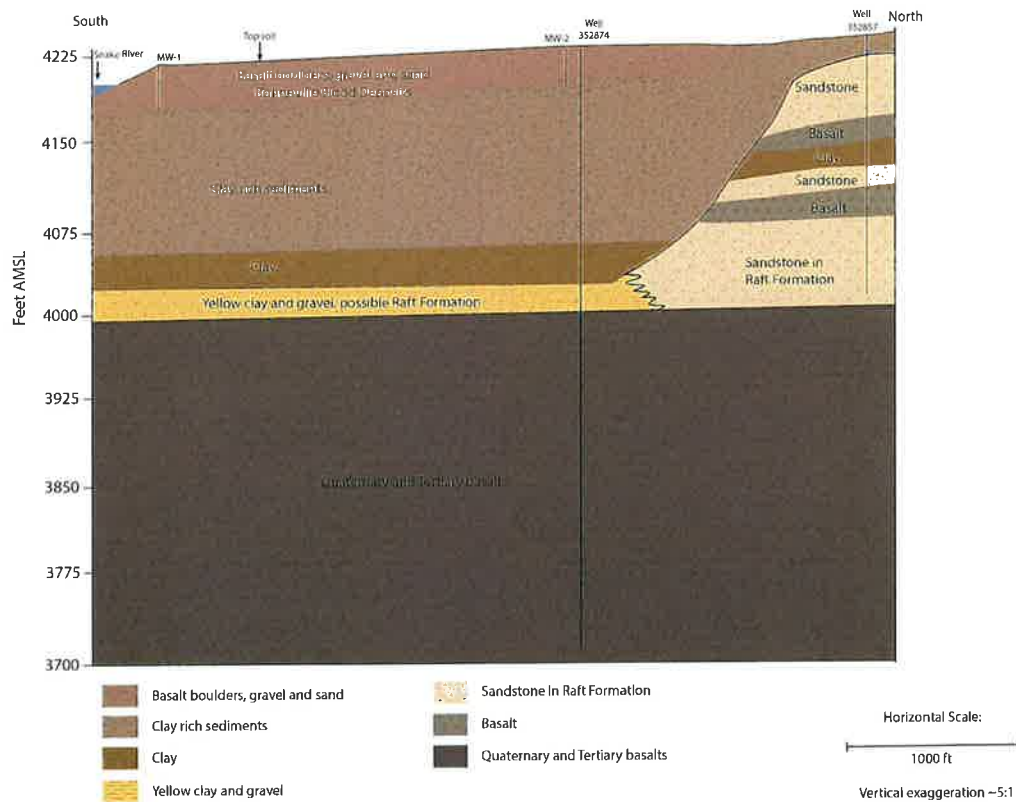


Figure 6. Geologic cross-section from the southeast at Snake River trending northwest to Well 352457.



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All Water Levels April 29 to September 24, 2024

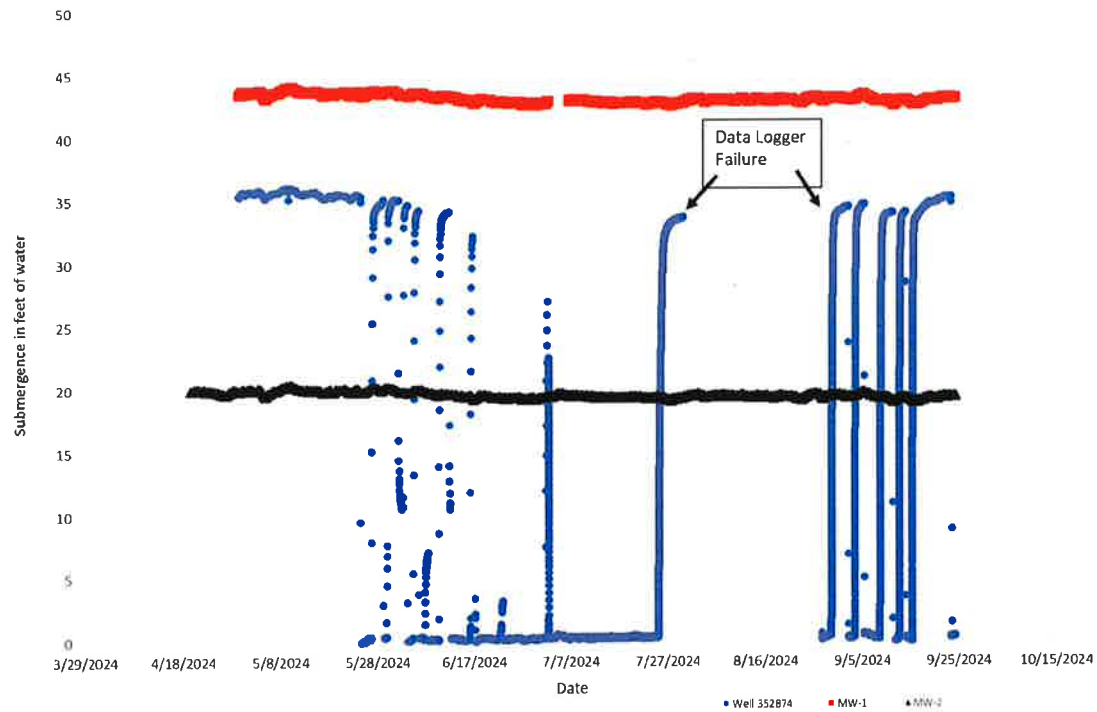


Figure 7. Water levels in MW-1, MW-2 and Well 352874 from April 29 to September 24, 2024.

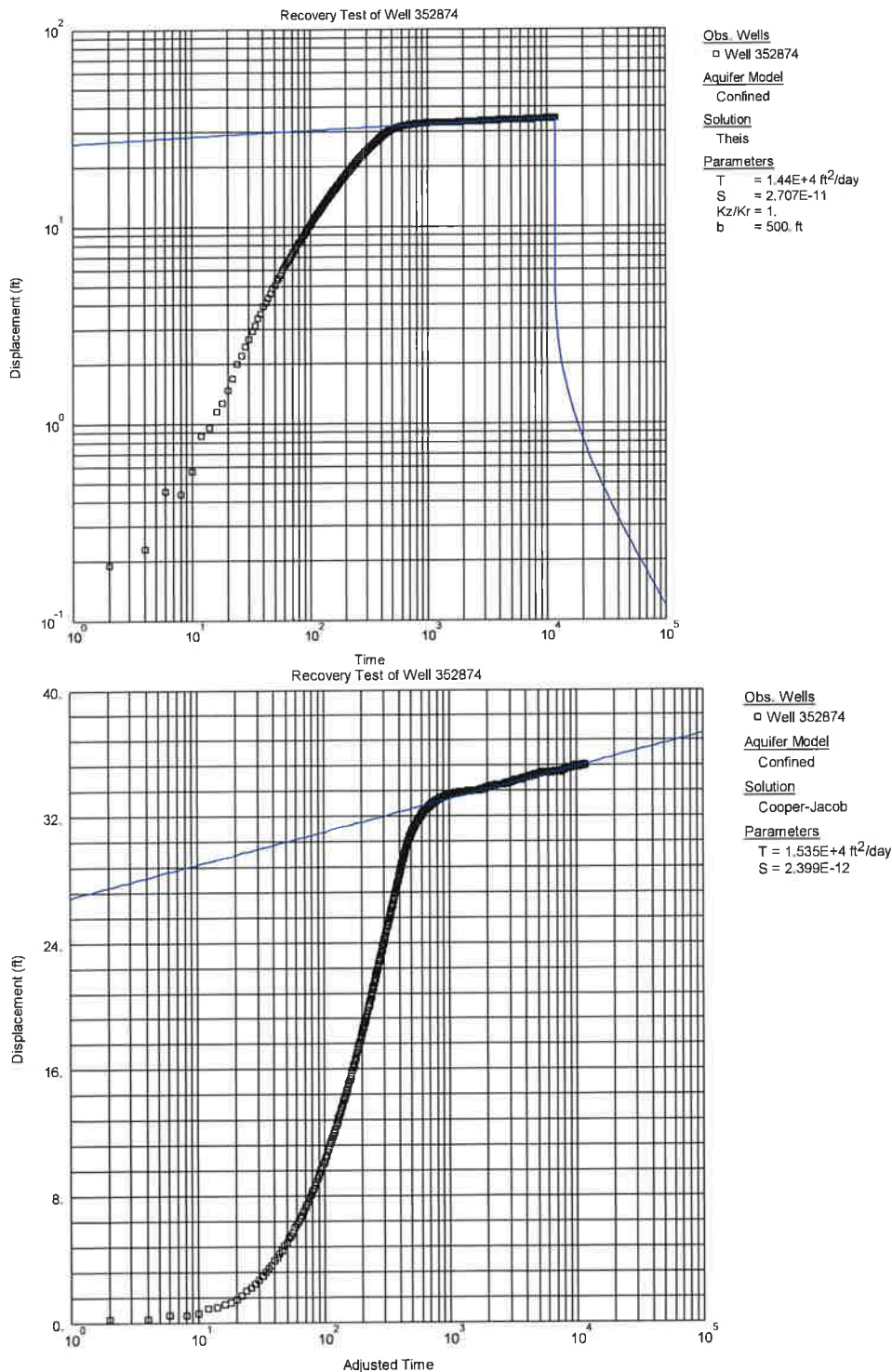


Figure 8. Time-drawdown plots and curve matching for calculating aquifer transmissivity. Top Theis Solution $1.44 \times 10^4 \text{ ft}^2/\text{day}$; Bottom Cooper-Jacob Solution $1.53 \times 10^4 \text{ ft}^2/\text{day}$.



ATTACHMENT 1

WELL LOGS



Clearwater Geosciences, LLP
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Form 238-7
Rev 7/12/23

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0099453

Drilling Permit No. 912743

Water right or injection well #

2. OWNER: LCSC Enterprises, LLC.

Name MW-1

Address 433 E Las Colinas Blvd Ste 1290

City Irving State TX Zip 75039

3. WELL LOCATION:

Twp. 09 North ☐ or South ☒ Rge. 29 East ☐ or West ☐

Sec. 19 NE 1/4 NW 1/4

Gov't Lot County Power

Lat. 42° 37.914' (Deg. and Decimal minutes)

Long. -113° 6.935' (Deg. and Decimal minutes)

Address of Well Site South end of Lake Channel Rd.

City American Falls

Lot Blk. Sub. Name

4. USE:

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

5. TYPE OF WORK:

☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft ³)	Placement method/procedure
Bentonite	0	18	750	Surface load

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing Liner Threaded Welded
2"	+2	23	SCH80	PVC	☐ ☐ ☒ ☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s)

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method

Manufactured screen ☒ Y ☐ N Type PVC

Method of installation

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
23	43	20	20	2"	PVC	SCH80

Length of Headpipe Length of Tailpipe

Packer ☐ Y ☒ N Type

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft ³)	Placement method
10/20 sand	18	43	2950	Surface load

11. FLOWING ARTESIAN:

Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG)

Describe control device

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered (ft) 30 Static water level (ft) 27.6

Water temp. (°F) Cold Bottom hole temp. (°F) Cold

Describe access port

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)	Pump	Bailer	Air	Flowing artesian
10	30		☐	☐	☒	☐

Water quality test or comments:

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water	
				Y	N
8	0	4	Top soil		X
8	4	23	Basalt boulders/gravel		X
8	23	37	Basalt/gravel/sand	X	
8	37	43	Sand/gravel		X

Completed Depth (Measurable): 43'

Date Started: 4/16/24

Date Completed: 4/17/24

14. DRILLER'S CERTIFICATION:

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

Company Name Thomas Drilling, Inc./ APD Co. No. 390

*Principal Driller Date 4-18-24

*Driller Date 4-18-24

*Operator Date

*Operator Date

Other Date

Other Date

* Signature of Principal Driller and rig operator are required.

Figure 1-1. Well log for MW-1.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 238-7
Rev 7/12/23

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0099454
Drilling Permit No. 912744
Water right or Injection well #
2. OWNER: LCSC Enterprises, LLC.
Name MW-2
Address 433 E Las Colinas Blvd Ste 1290
City Irving State TX Zip 75039

3. WELL LOCATION:
Twp. 09 North ☐ or South ☒ Rgo. 29 East ☐ or West ☐
Sec. 19 NE 1/4 NW 1/4
Gov't Lot County Power
Lat. 42° 37.914' (Deg. and Decimal minutes)
Long. -113° 6.935' (Deg. and Decimal minutes)
Address of Well Site South end of Lake Channel Rd.
City American Falls
Lot Blk. Sub. Name

4. USE:
☐ Domestic ☐ Municipal ☒ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other

5. TYPE OF WORK:
☒ New well ☐ Replacement well ☐ Modify existing well
☐ Abandonment ☐ Other

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other

Seal material	From (ft)	To (ft)	Quantity (lbs or ft ³)	Placement method/procedure
Bentonite	0	18	1000	Surface load

Diameter (nominal)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing	Unin	Threaded	Welded
2"	+2	18	SCH80	PVC	☐	☐	☒	☐

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s)

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☒ N Method
Manufactured screen ☒ Y ☐ N Type PVC
Method of installation

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule
18	38	20	20	2"	PVC	SCH80

Length of Headpipe Length of Tailpipe
Packer ☐ Y ☒ N Type

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft ³)	Placement method
10/20 sand	18	43	830	Surface load

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☒ N Artesian Pressure (PSIG)
Describe control device

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 18 Static water level (ft) 18
Water temp. (°F) Cold Bottom hole temp. (°F) Cold
Describe access port

Well test:	Test method:
Drawdown (inlet)	Pump ☐ Bailor ☐ Air ☒ Flowing artesian ☐
Discharge or yield (gpm)	
10	
Test duration (minutes)	
30	

Water quality test or comments:

13. LITHOLOGIC LOG and/or repairs or abandonment:					Water	
Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.		Y	N
8	0	4	Top soil			X
8	4	10	Sand/Basalt boulders			X
8	10	14	Basal/gravel/sand			X
8	14	29	Basal/gravel			X
8	29	34	Gravel/sand		X	
8	34	36	Sand/clay/gravel		X	
8	36	43	Gravel/sand		X	

Completed Depth (Measurable): 38'
Date Started: 4/15/24 Date Completed: 4/16/24

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Thomas Drilling, Inc./ APD Co. No. 390
Principal Driller Date 4-18-24
Driller Date 4-18-24
Operator Date
Operator Date
Other Date
Other Date

* Signature of Principal Driller and rig operator are required.

Figure 1-2. Well log for MW-2.



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Form 2J8-7
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STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Location Corrected by IDWR To:

T09S R29E Sec. 18 SESW

By: mclscell 2012-05-09

Stamp: 1900 requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER
Name: Deann Duffin
Address: Aberdeen, Ida 83210
Owner's Permit No. _____

2. NATURE OF WORK
☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning) _____

3. PROPOSED USE
☐ Domestic ☒ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED
☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☒ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION
Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____
Thickness _____ Diameter _____ From _____ To _____
Inches _____ inches _____ feet _____ feet
Inches _____ inches _____ feet _____ feet
Inches _____ inches _____ feet _____ feet
Was casing drive shoe used? ☒ Yes ☐ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches
Number _____ From _____ To _____
_____ perforations _____ feet _____ feet
_____ perforations _____ feet _____ feet
_____ perforations _____ feet _____ feet
Well screen installed? ☐ Yes ☐ No
Manufacturer's name _____ Type _____ Model No. _____
Diameter _____ Slot size _____ Set from _____ feet to _____ feet
Diameter _____ Slot size _____ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☐ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 20' Material used in seal: ☐ Cement grout ☐ Puddling clay ☐ Well cuttings
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☐ Overbore to seal depth
Method of joining casing: ☐ Threaded ☐ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port 2" pipe

6. LOCATION OF WELL
Sketch map location must agree with written location. 4/
Subdivision Name _____
Lot No. _____ Block No. _____
County Bingham
NW 1/4 NW 1/4 Sec. 19, T. 9 S. R. 29 E

7. WATER LEVEL
Static water level _____ feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ OF. Quality _____

8. WELL TEST DATA
☐ Pump ☐ Baller ☐ Air ☒ Other MAR 7 1980
Discharge G.P.M. _____ Pumping _____

9. LITHOLOGIC LOG

Hole Diam.	Depth From	To	Material	Water Yes No
16"	0	3'	Top soil	
	3'	5'	Gray sandy clay & rock	
	5'	10'	Black lava Balders	
	10'	15'	Broken Black Lava	
	15'	35'	Black lava Gravel & clay	
	35'	40'	Gravel	
	40'	70'	Brown sandy clay & gravel	
	70'	110'	Yellow clay & red gravel	
	110'	173'	White Silty clay	
	173'	270'	Brown clay	
	270'	345'	Yellow & brown clay & gravel	
	345'	395'	Black lava Black	
	395'	425'	Brownish lava	
	425'	435'	Black lava	
	435'	465'	Multicolored lava	
	465'	485'	Red lava & clay	
	485'	495'	Multicolored lava	
	495'	520'	Red & Black lava	
	520'	535'	Red & Black lava & clay	
	535'	545'	Red & White clay	
	545'	550'	Red lava & white sand	
	550'	555'	Multicolored lava & red clay	
	555'	565'	White & Black clay	
	565'	575'	Black lava	
	575'	585'	Multicolored lava	
	585'	595'	Gray lava	
	595'	605'	Sharp gray lava (no cuttings)	
	605'	615'	Red lava	
	615'	625'	Multicolored lava	
	625'	635'	Red & black with layers of gravel	
	635'	645'	Red clay & red lava & gravel	
	645'	655'	End of hole	

10. Work started 10-11-78 finished 1-18-79

11. DRILLERS CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Firm Name Paul Vallmer Son Firm No. 67
Address Box 3
Aberdeen, Ida Date 3-12-79
Signed by (Firm Official) Paul Vallmer
and
(Operator) Jim Taylor

USE ADDITIONAL SHEETS IF NECESSARY - FORWARD THE WHITE COPY TO THE DEPARTMENT

Figure 1-3. Well log for Duffin 352874.



Clearwater Geosciences, LLP
Ground Water Development and Exploration

Form 210-7
73

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

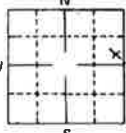
Location Corrected by IDWR To:

WELL DRILLER'S REPORT

T09S R29E Sec. 18 NWSWSE

State law requires that this report be filed with the Director, Department of
within 30 days after the completion or abandonment of the w.

By: mciscell 2012-08-28

1. WELL OWNER Name <u>Vern Duffin</u> Address <u>Aberdeen, Ida 83210</u> Owner's Permit No. _____		7. WATER LEVEL Static water level <u>85'</u> feet below land surface. Flowing? ☐ Yes ☒ No G.P.M. flow _____ Artesian closed in pressure _____ p.s.i. Controlled by: ☐ Valve ☐ Cap ☐ Plug Temperature _____ °F. Quality _____																																																							
2. NATURE OF WORK ☒ New well ☐ Deepened ☐ Replacement ☐ Abandoned (describe method of abandoning) _____		8. WELL TEST DATA <u>Good</u> ☐ Pump ☐ Bailor ☐ Air ☐ Other _____ Discharge G.P.M. _____ Pumping Level _____ Hours Pumped _____																																																							
3. PROPOSED USE ☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal ☐ Industrial ☐ Stock ☐ Waste Disposal or injection ☐ Other _____ (specify type) _____		9. LITHOLOGIC LOG <table border="1"><thead><tr><th>Hole Diam.</th><th>Depth From</th><th>To</th><th>Material</th><th>Water Yes</th><th>No</th></tr></thead><tbody><tr><td></td><td>0</td><td>3'</td><td>Dirt</td><td></td><td></td></tr><tr><td></td><td>3'</td><td>15'</td><td>Sand Semi Solid</td><td></td><td></td></tr><tr><td></td><td>15'</td><td>98'</td><td>Sand Stone</td><td></td><td></td></tr><tr><td></td><td>98'</td><td>125'</td><td>Leua</td><td></td><td></td></tr><tr><td></td><td>125'</td><td>130'</td><td>Clay</td><td></td><td></td></tr><tr><td></td><td>130'</td><td>145'</td><td>Sandstone</td><td></td><td></td></tr><tr><td></td><td>145'</td><td>178'</td><td>Leua</td><td></td><td></td></tr><tr><td></td><td>178'</td><td>250'</td><td>Sand Stone</td><td></td><td></td></tr></tbody></table>		Hole Diam.	Depth From	To	Material	Water Yes	No		0	3'	Dirt				3'	15'	Sand Semi Solid				15'	98'	Sand Stone				98'	125'	Leua				125'	130'	Clay				130'	145'	Sandstone				145'	178'	Leua				178'	250'	Sand Stone		
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4. METHOD DRILLED ☒ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary ☐ Cable ☐ Dug ☐ Other _____		RECEIVED FEB 22 1980 DEPARTMENT of Water Resources Eastern District Office MAR 5 1980 Department of Water Resources																																																							
5. WELL CONSTRUCTION Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____ Thickness _____ Diameter _____ From _____ feet _____ feet Inches _____ Inches _____ feet _____ feet Inches _____ Inches _____ feet _____ feet Inches _____ Inches _____ feet _____ feet Was casing drive shoe used? ☒ Yes ☐ No Was a packer or seal used? ☐ Yes ☒ No Perforated? ☐ Yes ☒ No How perforated? ☐ Factory ☐ Knife ☐ Torch Size of perforation _____ inches by _____ inches Number _____ From _____ To _____ perforations _____ feet _____ feet perforations _____ feet _____ feet perforations _____ feet _____ feet Well screen installed? ☐ Yes ☒ No Manufacturer's name _____ Type _____ Model No. _____ Diameter _____ Slot size _____ Set from _____ feet to _____ feet Diameter _____ Slot size _____ Set from _____ feet to _____ feet Gravel packed? ☐ Yes ☐ No ☐ Size of gravel _____ Placed from _____ feet to _____ feet Surface seal depth <u>150'</u> Material used in seal: ☒ Cement grout ☒ Pudding clay ☐ Well cuttings Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☐ Overbore to seal depth Method of joining casing: ☐ Threaded ☐ Welded ☐ Solvent Weld _____ ☐ Cemented between strata Describe access port <u>2" pipe well cap.</u>																																																									
6. LOCATION OF WELL Sketch map location must agree with written location.  Subdivision Name _____ Lot No. _____ Block No. _____ County <u>Power</u> <u>SE 1/4 NE 1/4 Sec. 22, T. 7 N, R. 31 E</u>		11. DRILLERS CERTIFICATION I/We certify that all minimum well construction standards were complied with at the time the rig was removed. Firm Name <u>Paul Vollmer & Son</u> Firm No. <u>67</u> Address <u>Box B Aberdeen, Ida</u> Date <u>3-12-79</u> Signed by (Firm Official) <u>Amy Vollmer</u> and (Operator) <u>Amy Vollmer</u>																																																							

USE ADDITIONAL SHEETS IF NECESSARY - FORWARD THE WHITE COPY TO THE DEPARTMENT

Figure 1-4. Well log for Duffin 352857.

