

MEMORANDUM

DATE: June 13, 2022
TO: Dillon Allen - Chobani
FROM: Patrick Kelly
 Terry Scanlan, P.E., P.G.
RE: ASR Project – Monitoring Well Construction and Preliminary Testing

Introduction

A test well drilling and aquifer testing program is underway to support the Chobani Aquifer Storage and Recovery (ASR) project. The purpose of the recent drilling and testing program is to characterize the geology, aquifer characteristics, and groundwater quality. This memo summarizes activities associated with the drilling, construction, and testing of four monitoring wells in May 2022.

In April 2022, a drilling permit was issued by IDWR to construct six (6) monitoring wells. Based on previous exploratory drilling and pumping tests conducted on site, a well yield of at least 25 gallons per foot was targeted. Well locations are shown on Figure 1 and the wells are described below.



Figure 1. Monitoring Well Locations

Well Construction

The air-rotary method was used for well construction. Wells were drilled with 10-inch overbore to 38 feet to meet the surface seal requirement, then a 6-inch open hole was drilled to a target depth of 200 feet. In each well, a 0.250-inch wall thickness, 6-inch diameter steel casing was installed to 38 feet. Bentonite chips were used to seal the well casing by pouring into the overbore space outside of the casing. Static water level was approximately 70 feet below ground surface at each well.

Drilling commenced May 11, 2022, at the MW-2 site. Monitoring wells 3, 1 and 4 were then drilled and completed by May 16th.

Well Driller's Report

Well driller's reports describe a lithology of topsoil and clay to no deeper than 21 feet underlain by materials described as hard basalt, soft basalt, and broken basalt, with intermixed zones or layers of talc. Water was first encountered at 70 to 75 feet and did not display artesian pressure in any of the wells.

Well test data listed on the driller's reports describe significant drawdown in each of the wells with discharge ranging from no water to 40 gallons per minute by air-lift. Data that is reported by air lifting is less accurate or indicative of aquifer characteristics than pumping. The method of blowing water out of the well with air pressure versus a pump and motor is less accurate and can sometimes inject groundwater into the substrate above the water table rather than out the top of the well

Well driller's reports for each well are attached.

Pumping Tests

Drilling operations were put on hold while we tested monitoring wells 1 through 4. A 5-inch, 90 gpm submersible pump and motor was installed in each well separately by Pump Service, Inc. HDR supplied pressure transducers capable of collecting water level data in the wells. Water level measurements were also collected manually with a water level sounder. A one-inch diameter sounding tube was installed to prevent measurement interference. Table 1 summarizes pumping test results.

Table 1. Pumping Test Results

Monitoring Well	MW-1	MW-2	MW-3	MW-4
Date	5/19/2022	5/19/2022	5/24/2022	5/23/2022
Discharge (gpm)	35	80	90	50
Drawdown (ft)	32.6	31.2	1.7	29.2
Specific Capacity (gpm/ft)	1.1	2.6	52.9	1.7

Results from MW-3 differ greatly from the other three wells. This well was tested first, prior to a sounding tube being installed. With the results of other wells drastically different, the well was tested a second time with a sounding tube to confirm a specific yield of 52.9 gpm/ft. This yield is significantly more water than any of the other wells drilled on-site. Review of the driller's report for this well describes soft broken basalt in the lithology. It is likely that the well has encountered water producing fractures in the rock. Further exploration is recommended of this well to identify water production zones.

Next Steps

With the positive testing results measured at MW-3, drilling of monitoring wells 5 and 6 has been placed on hold.

To allow testing of MW-3 at a higher pumping rate, the well will be modified as follow:

1. Pull out 6-inch casing
2. Ream borehole to 12-inch diameter to a depth of 58 feet
3. Install 8-inch I.D. casing from +2 to 58 feet
4. Seal casing in place with bentonite chips and neat cement
5. Ream borehole to nominal 8-inch diameter from 58 feet to 200 feet.

Following well modifications, the well will be test pumped using a high-capacity 6-inch diameter submersible pump capable of at least 250-gpm. Test pumping will consist of a short-term step-rate test to verify approximate capacity followed by a 48-hour constant-rate test to determine aquifer characteristics.

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

WELL TAG NO. D 0092905
 DRILLING PERMIT NO. 904688

Water Right / Injection Well No. _____

2. OWNER

Name Chobani LLC
 Address 3450 Kimberly Road
 City Twin Falls State ID Zip 83301

3. WELL LOCATION:

Twp. 10 ☐ North or ☒ South Rge. 17 ☒ East or ☐ West
 Sec. 24 1/4 SW 1/4 NW 1/4
 10 acres 40 acres 160 acres
 Gov't Lot _____ County Twin Falls
 Lat. 42 Deg. 32.612 (Deg and Dec min)
 Long. 114 Deg. 25.019 (Deg and Dec min)
 Address of Well Site 3450 Kimberly Road
 (MW-1) City Twin Falls
 Lot _____ Block _____ Sub. Name _____

4. USE:

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

5. TYPE OF WORK: (check all that apply)

☒ New Well ☐ Replacement Well ☐ Modify Existing Well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

SEALING PROCEDURES:

Seal Material	From	To	Quantity (lbs/ft3)	Placement method/proced.
bentonite	0	39	950 lbs	over bore / dry pour

8. CASING/LINER:

Dia.	From	To	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6	+2	39	0.250	steel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Was drive shoe used? ☐ Y ☒ N Shoe Depth _____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method _____
 Manufactured screen ☐ Y ☒ N Type _____

Method of installation

From (ft)	To (ft)	Slot size	Number/ft	Diameter	Material	Gauge/Schedule
N/A						

Length of headpipe _____ Length of tailpipe _____

Packer ☐ Y ☒ N Type _____

10. FILTER PACK:

Filter Material	From	To (ft)	Quantity	Placement Method
N/A				

1. FLOWING ARTESIAN.

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

Describe control device _____

12. STATIC WATER LEVEL and WELL TESTS:

Depth first water encountered(ft) 72' Static water level (ft) 72'

Water temp. (°F) < 85 Bottom hole temp(°F) < 85

Describe access port well cap

Well test:

Test method:

Drawdown (ft)	Discharge (gpm)	Test Duration	Pump	Bailer	Air	Flowing
	no returns		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Water Quality test comments: nitrate = 3 ppm

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
10	0	2	gravel		
10	2	39	gray basalt		
6	39	42	gray basalt		
6	42	55	brown basalt		
6	55	73	gray basalt		
6	73	76	broken basalt (lost returns)	x	
6	76	107	soft basalt	x	
6	107	109	soft broken basalt	x	
6	109	116	soft basalt	x	
6	116	121	very soft basalt	x	
6	121	141	soft basalt	x	
6	141	143	very soft broken basalt	x	
6	143	174	very soft talc	x	
6	174	185	soft basalt	x	
6	185	200	very soft talc & some basalt	x	
			would not stay open past 162'		

Completed Depth (Measurable) 162'

Date Started: 5/16/2022 Date Completed: 5/17/2022

14. DRILLER'S CERTIFICATION:

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

Company Name Apex Drilling LLC Co No 667

*Principal Driller David B Baker Date 5/17/2022

*Driller Date 5/17/2022

*Driller Steve Baker Date 5/17/2022

Operator I Mike Cunniff Date 5/17/2022

*Signature of Principal Driller and rig operator are required.

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

WELL TAG NO. D	0092906
DRILLING PERMIT NO.	904690
Water Right / Injection Well No.	

2. OWNER

Name	Chobani LLC				
Address	3450 Kimberly Road				
City	Twin Falls	State	ID	Zip	83301

3. WELL LOCATION:

Twp. 10 ☐ North or ☒ South Rge. 17 ☒ East or ☐ West
 Sec. 24 1/4 SE 1/4 NW 1/4
 10 acres 40 acres 160 acres
 Gov't Lot _____ County Twin Falls
 Lat. 42 Deg. 32.58 (Deg and Dec min)
 Long. 114 Deg. 24.952 (Deg and Dec min)
 Address of Well Site 3450 Kimberly Road
 (MW-2) City Twin Falls
 Lot _____ Block _____ Sub. Name _____

4. USE:

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

5. TYPE OF WORK: (check all that apply)

☒ New Well ☐ Replacement Well ☐ Modify Existing Well
☐ Abandonment ☐ Other

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other

SEALING PROCEDURES:

Seal Material	From	To	Quantity (lbs/ft3)	Placement method/proced.
bentonite	0	38	1,100 lbs	over bore / dry pour

8. CASING/LINER:

Dia.	From	To	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
6	+2	38	0.250	steel	<input checked="" 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"/>

Was drive shoe used? ☐ Y ☒ N Shoe Depth

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method _____
 Manufactured screen ☐ Y ☒ N Type _____

Method of installation

From (ft)	To (ft)	Slot size	Number/ft	Diameter	Material	Gauge/Schedule
N/A						

Length of headpipe	Length of tailpipe
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Packer	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N	Type
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10. FILTER PACK:

Filter Material	From	To (ft)	Quantity	Placement Method
N/A				

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) 70' Static water level (ft) 70'
 Water temp. (°F) < 85 Bottom hole temp(°F) < 85
 Describe access port well cap

Well test:

Drawdown (ft)	Discharge (gpm)	Test Duration	Pump	Baller	Air	Flowing
130'	40+	20 minutes	<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"/>

Test method:

Pump	Bailer	Air	Flowing
<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"/>

Water Quality test comments:

nitrate = 3 ppm

13. LITHOLOGIC LOG and/or repairs or abandonment:

[illegible]

Completed Depth (Measurable)	203'
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Date Started: 5/11/2022 Date Completed: 5/12/2022

14. DRILLER'S CERTIFICATION:

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

Company Name	Apex Drilling LLC	Co No	667
*Principal Driller	<u>Dan B Baker</u>	Date	5/12/2022
*Driller	<u>Dan B Baker</u>	Date	5/12/2022
*Driller	<u>Mike Baker</u>	Date	5/12/2022
Operator 1	<u>Mike Baker</u>	Date	5/12/2022

* Signature of Principal Driller and rig operator are required.

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

WELL TAG NO. D 0092907
 DRILLING PERMIT NO. 904691
 Water Right / Injection Well No.

2. OWNER

Name Chobani LLC
 Address 3450 Kimberly Road
 City Twin Falls State ID Zip 83301

3. WELL LOCATION:

Twp. 10 North or ☒ South Rge. 17 East or ☐ West
 Sec. 24 1/4 SE 1/4 NW 1/4
 10 acres 40 acres 160 acres
 Gov't Lot County Twin Falls
 Lat. 42 Deg. 32.566 (Deg and Dec min)
 Long. 114 Deg. 24.810 (Deg and Dec min)
 Address of Well Site 3450 Kimberly Road
 (MW-3) City Twin Falls
 Lot Block Sub. Name

4. USE:

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

5. TYPE OF WORK: (check all that apply)

☒ New Well ☐ Replacement Well ☐ Modify Existing Well
☐ Abandonment ☐ Other

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES:

Seal Material	From	To	Quantity (lbs/ft3)	Placement method/proced.
bentonite	0	38	800 lbs	over bore / dry pour

8. CASING/LINER:

Dia.	From	To	Gauge/Schedule	Material	Casing	Liner	Threaded	Welded
6	+2	38	0.250	steel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Was drive shoe used? ☐ Y ☒ N Shoe Depth

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method

Manufactured screen ☐ Y ☒ N Type

Method of installation

From (ft)	To (ft)	Slot size	Number/ft	Diameter	Material	Gauge/Schedule
N/A						

Length of headpipe Length of tailpipe

Packer ☐ Y ☒ N Type

10. FILTER PACK:

Filter Material	From	To (ft)	Quantity	Placement Method
N/A				

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) 75' Static water level (ft) 75'
 Water temp. (°F) < 85 Bottom hole temp(°F) < 85
 Describe access port well cap

Well test:**Test method:**

Drawdown (ft)	Discharge (gpm)	Test Duration	Pump	Bailer	Air	Flowing
125'	30+	20 minutes	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Water Quality test comments:

nitrate = 3 ppm

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
10	0	3	gravel		
10	3	5	top soil		
10	5	8	hard brown clay		
10	8	38	gray basalt		
6	38	39	gray basalt		
6	39	42	red ash & basalt		
6	42	57	gray basalt		
6	57	68	soft brown basalt		
6	68	73	gray basalt		
6	73	76	soft broken brown basalt w/ talc	X	
6	76	79	soft brown basalt	X	
6	79	85	soft gray basalt	X	
6	85	94	brown basalt		
6	94	112	soft gray basalt	X	
6	112	115	soft broken gray basalt	X	
6	115	138	soft gray basalt		
6	138	141	soft brown basalt & talc	X	
6	141	151	soft gray basalt	X	
6	151	156	brown talc	X	
6	156	160	brown talc & basalt	X	
6	160	203	brown talc & broken basalt	X	

Completed Depth (Measurable) 203'

Date Started: 5/12/2022 Date Completed: 5/13/2022

14. DRILLER'S CERTIFICATION:

I/we certify that all minimum well construction standards were complied with at the time the rig was moved

Company Name Apex Drilling LLC Co No 667
 Principal Driller Date 5/13/2022
 Driller Date 5/13/2022
 Driller Date 5/13/2022
 Operator I Date 5/13/2022

* Signature of Principal Driller and rig operator are required.

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

1. WELL TAG NO. D 0092908
 DRILLING PERMIT NO. 904692
 Water Right / Injection Well No. _____

2. OWNER

Name Chobani LLC
 Address 3450 Kimberly Road
 City Twin Falls State ID Zip 83301

3. WELL LOCATION:

Twp. 10 North or ☒ South Rge. 17 East or ☐ West
 Sec. 24 1/4 SE 1/4 NW 1/4
 Gov't Lot _____ County Twin Falls
 Lat. 42 Deg. 32.627 (Deg and Dec min)
 Long. 114 Deg. 24.944 (Deg and Dec min)
 Address of Well Site 3450 Kimberly Road
 (MW-4) City Twin Falls
 Lot _____ Block _____ Sub. Name _____

4. USE:

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

5. TYPE OF WORK: (check all that apply)

☒ New Well ☐ Replacement Well ☐ Modify Existing Well
☐ Abandonment ☐ Other _____

6. DRILL METHOD:

☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other _____

7. SEALING PROCEDURES:

Seal Material	From	To	Quantity (lbs/R3)	Placement method/proced.
bentonite	0	38	900 lbs	over bore / dry pour

8. CASING/LINER:

Dia.	From	To	Gauge/Schedule	Material	Casing	Liner	Threaded	Welded
6	+2	38	0.250	steel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Was drive shoe used? ☐ Y ☒ N Shoe Depth _____

9. PERFORATIONS/SCREENS:

Perforations ☐ Y ☒ N Method _____
 Manufactured screen ☐ Y ☒ N Type _____

Method of installation

From (ft)	To (ft)	Slot size	Number/ft	Diameter	Material	Gauge/Schedule
N/A						

Length of headpipe _____ Length of tailpipe _____
 Packer ☐ Y ☒ N Type _____

10. FILTER PACK:

Filter Material	From	To (ft)	Quantity	Placement Method
N/A				

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) 70' Static water level (ft) 70'
 Water temp. (°F) < 85 Bottom hole temp(°F) < 85
 Describe access port well cap

Well test:

Drawdown (ft)	Discharge (gpm)	Test Duration	Pump	Bailer	Air	Flowing
130'	40+	20 minutes	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Test method:

Water Quality test comments: nitrate = 3 ppm

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
10	0	2	top soil		
10	2	21	hard brown clay		
10	21	33	gray basalt		
10	33	38	soft brown basalt		
6	38	39	soft brown basalt		
6	39	73	gray basalt		
6	73	87	soft brown basalt		X
6	87	94	soft gray basalt		X
6	94	97	broken basalt		X
6	97	112	soft gray basalt		X
6	112	115	brown ash & basalt w/ talc		X
6	115	118	soft gray basalt		X
6	118	120	broken basalt		X
6	120	122	soft brown basalt w/ talc		X
6	122	125	soft brown basalt		X
6	125	152	soft gray basalt w/ talc		X
6	152	157	brown talc		X
6	157	159	soft brown basalt & talc		X
6	159	175	soft gray basalt & talc		X
6	175	203	soft gray basalt & talc w/ broken spots		X

Completed Depth (Measurable) 203'

Date Started: 5/13/2022 Date Completed: 5/16/2022

14. DRILLER'S CERTIFICATION:

We certify that all minimum well construction standards were complied with at the time the rig was moved

Company Name Apex Drilling LLC Co No 667
 *Principal Driller *Dan B Baker* Date 5/16/2022
 *Driller *Scott Baker* Date 5/16/2022
 *Driller *Scott Baker* Date 5/16/2022
 Operator I *Scott Baker* Date 5/16/2022

* Signature of Principal Driller and rig operator are required.