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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 wel.

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.

Monitoring Well MW-1 MW-2 MW-3 MW-4 5/19/2022 5/19/2022 Date 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

Table 1. Pumping Test Results

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.

	TAG NO					092905		12. ST	ATIC W	ATER L	EVEL and WELL TES	TS:				
DRILLING PERMIT NO. 904688						Depth first water encour			intered(ft) 72' Static water level (ft)			72'				
Water Right / Injection Well No.								Water	temp. (°I	F)	< 85 Bott	< 85 Bottom hole temp(°F) <				
2.OWN	ER							Descrit	be acces	s port		well cap				
Name				Cł	nobani L	LC		Well to					Test method:			
						y Road			Drawdo	wn (ft)	Discharge (gpm)	Test Duration	Pump Bailer Air	Flowi	ng	
City		Twin	Fall	s	Sta	ate ID	Zip 83301				**no returns**					
3. WELL	LOCATI	ON:														
							ast or 🗌 West	Water	Quality	test co	mments:	nitrate =	3 ppm		-Wiles	
Sec.	24	<u> </u>	: :-		1/4	SW 1/4	NW 1/4	13. LIT	HOLOG	IC LO	3 and/or repairs or ab	andonment:				
							160 acres	Воге								
Gov't Lot	_	1		ounty		n Falls	2	Dia.	From (ft)	To (ft)	Remarks, Litholog			_	ater	
Lat.		4	Deg.		32.01	2	(Deg and Dec min) (Deg and Dec min)	_	_			nment, water tem	ıp.	Y	N	
Long.	11	4	Deg.		25.01	9	(Deg and Dec min)	10	0		gravel			-		
Address	of Well S	ite			1450 KIN	nberly Ro	ao	10	2	_	gray basalt			-	-	
-							vin Falls	6	39	_	gray basalt			-	\vdash	
4. USE:		Block	,		Sub. Nar	ne		6	42		brown basalt			-	\vdash	
	ti-	Monitor	_1 857	1 145				6	55		gray basalt			-		
☐ Domestic ☐ Municipal 🔛 Monitor ☐ Irrigation ☐ Thermal ☐ Injection ☐ Other								6	73	-	broken basalt	(lost	returns)	X		
Const.								6	76	_	soft basalt			X	1	
								6	107		soft broken basal	t		X		
5. TYPE								6	109		soft basalt			X	\vdash	
Mew □				cement W	/ell [_]	Modify Existin	ng Well	6	116		very soft basalt			X	\vdash	
	ndonment	_	Other	-				6	121		soft basalt			X		
6. DRILL								6	141		very soft broken	basalt		X	-	
Air F		☐ Muc		ry L	Cable	Other _		6	143		very soft talc			X		
SEALI	NG PRO		_	-	1			6	174	_	soft basalt			X	1	
	al Material	-	From	_			ment method/proced.	6	185	200	very soft talc & so	ome basalt		X		
be	entonite		0	39	950	bs ove	er bore / dry pour							_		
				_						17	would not stay or	en past 162'				
8. CASIN			_													
Dia. Fro	_	Gauge/ Schedul		Materi			Threaded Welded							_		
6 +	2 39	0.25)	stee	H									1		
			+											<u> </u>		
			+						_					-	-	
Man deix		-40	4_											-	1	
Was drive					N Shoe	e Depth		-						-	\vdash	
9. PERF								-						\vdash	-	
Manufact		Y 🗷		etnoa N										-		
			_ '	M 14	rype				-					-		
Method of From (ft)	To (ft)	Slot siz	a N	umber/ft	Diameter	Material	Gauge/Schedule	-						+-	\vdash	
N/A	10 (11)	OIOT OIL	-	diliboliti	Diamotor	Widterial	Caugerochedule	-				<u> </u>		-		
INIA			+					\vdash						-	H	
			+											1	\vdash	
Length of	l headnin		_		Length of	tailnine		Comple	ated Der	th (Ma	asurable)	162	יכ	_	-	
Packer	_ ``		Type		Length	Lampipe _		Date S			1101000	Completed:	5/17/202	2		
Packer Y M N Type								L			IFICATION:	ompleted.	OFTITEOL			
	er Material		From	To (ft)	Quantity	Plai	cement Method					ware complied with - * *	no timo the de	201104		
	N/A			1					ny matali Iny Nam		Apex Drilling L		- 00			
									oal Drille	7		Date	5/17/2			
1. FLOV	VING AR	TESIAN	 -	1	1			*Driller				Date	5/17/2			
				Artesia	n Pressur	e (PSIG)		*Driller	- 4	5	F. N.L.		5/17/2			
Describe			•	A I COID	(Cabul	- (i did)_		Operati		1/1	LIONOER	Date	5/17/2			
2000106	SOLITOR CI	4106	-					Operati	UI I	freely	cun/	Date	SITTLE	.U4.Z		

0002006	40 CTATIC I	NATEDI	EVEL and WELL TER	TC.			
WELL TAG NO. D 0092906 DRILLING PERMIT NO. 904690			EVEL and WELL TES untered(ft) 70'		el (ft)	70'	
			< 85 Bot		()		
Water Right / Injection Well No							
Name Chobani LLC	Well test:	oco por			Test method:		
Address 3450 Kimberly Road		down (ft)	Discharge (gpm)		Pump Bailer Air	Flowing	1
		30'	40+	20 minutes			
3. WELL LOCATION:	-						
Twp. 10 ☐ North or ☑ South Rge. 17 ☒ East or ☐ W	est Water Qualit	v test co	mments:	nitrate = 3	3 ppm	10/13	No.
			G and/or repairs or at		and the testing		
Sec. 24 1/4 SE 1/4 NW 160 acres 1/4 160 acres	Bore		1				
Gov't Lot CountyTwin Falls	Día. Fron		Remarks, Litholog		• •	Wat	_
Lat. 42 Deg. 32.58 (Deg and De	min) (in) (ft)			nment, water tem	٥.	Y	N
Long. 114 Deg. 24.952 (Deg and De	min) 10 0					+	
Address of Well Site 3450 Kimberly Road	10 3	_	hard brown clay			\vdash	
(MW-2) City Twin Falls	10 16	_	gray basalt				
Lot Block Sub. Name		_	brown basalt			1	_
4. USE:	10 34		gray basalt			1	_
Domestic Municipal Monitor Irrigation Thermal Inject			gray basalt			-	
Other	6 54		soft brown basal	t		1	
	6 56		brown basalt				-
5. TYPE OF WORK: (check all that apply)	6 65		soft gray basalt			Х	_
New Well Replacement Well Modify Existing Well	6 70		gray basalt			X	
Abandonment Other	6 100		soft brown basal	t w/ talc		X	_
6. DRILL METHOD:	6 10		soft gray basalt			Х	_
Air Rotary Mud Rotary Cable Other	6 170	_	soft brown basal			X	_
. SEALING PROCEDURES:	6 18		soft brown basal			X	_
Seal Material From To Quantity (lbs/fi3) Placement method.	oroced. 6 19	5 203	soft brown basal	t w/ talc & cinde	ers	X	_
bentonite 0 38 1,100 lbs over bore / dry	pour	-				+	_
	_	+-				+	-
8. CASING/LINER:		-				+	-
Schedule Waterial Casing Liner Threaded Vi		_				+	
		+-				+	
		+				+	-
		+	 				
Was drive shoe used? ☐ Y ☑ N Shoe Depth	_ 	-					
9. PERFORATIONS/SCREENS:							
Perforations							
Manufactured screen Y N Type							
Method of installation							
From (ft) To (ft) Slot size Number/ft Diameter Material Gauge/S	chedule						
N/A							
Length of headpipe Length of tailpipe	Completed I	Depth (Me	easurable)	203	3'		
Packer ☐ Y ☑ N Type	Date Started	i: 5	5/11/2022 Date	Completed:	5/12/202	22	
10. FILTER PACK:	14. DRILLE	R'S CER	TIFICATION:				
Filter Material From To (ft) Quantity Placement Meth	d I/We certify that	t all minimur	n well construction standards	were complied with at the	ne lime the rig was	moved	
N/A	Company N	ame	Apex Drilling	LLC CONO			
	*Principal D	riller	Nand BL	Salcapate	5/12/2		
11. FLOWING ARTESIAN.	*Driller		200	Date	5/12/2		
Flowing Artesian 🔲 Y 🛂 N Artesian Pressure (PSIG)	*Driller	Te	The Orlean	Date	5/12/2		
Describe control device	Operator I	Ken	e Ceny	Date	5/12/2	2022	

THE TAR NO. ID		0092907	12. ST/	ATIC WA	TER LE	VEL and WELL TES	rs:			
VELL TAG NO. D DRILLING PERMIT NO			Denth f	irst water	r encou	ntered(ft) 75'	Static water le	vel (ft)7	'5'	
			Water t	emp. (°F)	< 85 Bott	om hole temp("F)			
			Descrit	e access	port		well cap			
2.OWNER	Chobar	ni II C	Well te					Test method:		
Name	Chobar 3450 Kimb	erly Road		Drawdov	vn (ft)	Discharge (gpm)	Test Duration	Pump Bailer Alr	Flowin	g
Address	5450 Killib	State ID Zip 83301		125		30+	20 minutes			
City IWITI	raiis	State ID Zip Occor								
3. WELL LOCATION:	P. Courtle D	ge. 17 🛮 East or 🗌 West	Water	Quality t	test co	mments:	nitrate =	3 ppm	-	
						and/or repairs or at	andonment:			
Sec. <u>24</u>	10 acres	SE 1/4 NW 1/4 40 acres 160 acres	Bore							
Gov't Lot	County		Dia.	From	То	Remarks, Litholog			Y	ater
Lat. 42	Den 32	.566 (Deg and Dec min)	(in)	(ft)	(ft)	abando	nment, water ter	np.	1	N
114	Den 24	.810 (Deg and Dec min)	10	0	3	gravel			-	_
Address of Well Site	3450	Kimberly Road	10	3	5	top soil			-	_
(MW-3)	C	ity I win Falls	10	5	8	hard brown clay			-	-
Lot Block	Sub.	Name	10	8	38	gray basalt				-
4. USE:			6	38	39	gray basalt				-
Domestic Municip	oal 🖁 Monitor 🗌 Im	rigation 🗌 Thermal 📗 Injection	6	39	42	red ash & basalf			-	-
Other			6	42	57	gray basalt				-
-			6	57	68	soft brown basa	lt		-	-
5, TYPE OF WORK: (ch	eck all that apply)		6	68	73	gray basalt			1	-
New Well	Replacement Well		6	73	76	soft broken brov		ic	X	-
Abandonmenl	Other		6	76	79	soft brown basa			X	-
6. DRILL METHOD:	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		6	79	_	soft gray basalt			X	-
Air Rotary 🔲 Mu	d Rotary 📋 Cable	e Other	6	85	94	177.1			-	+
SEALING PROCEDU	RES:		6	94		soft gray basalt			X	-
Seal Material	From To Quar	ntity (lbs/ft3) Placement method/proced.	6	112		soft broken gray	basalt		X	+
bentonite	0 38 8	00 lbs over bore / dry pour	6	115		soft gray basalt			-	+
			6	138	_	soft brown basa			X	-
8, CASING/LINER:			6	141		soft gray basalt			X	+
Dia. From To Gauges	ule Material	Casing Liner Threaded Welded	6	151		brown talc			X	+
6 +2 38 0.25			6	156		brown talc & ba			Х	+
			6	160	203	brown talc & brown	oken basalt		X	+-
									-	+
									+-	+
Was drive shoe used?	□ Y ☑ N	Shoe Depth	_						+	+
9. PERFORATIONS/SC	REENS:								+-	+
Perforations	N Method		_						+	+
Manufactured screen	🗆 Y 🖾 N Тур	oe	-	-					+	+
Method of installation			,	4	-				+	+
From (ft) To (ft) Slot :	size Number/ft Dia	meter Material Gauge/Schedule		-	-				-	+
N/A			4		-	-			+	+
					-	+			+	+
]	202 UNES	Carriers	(203'	-1	
Length of headpipe	Ler	ngth of tailpipe	_			leasurable)	No. of the Control of	5/13/20	22	
Packer 🗌 Y 🔀 N	Туре		-	Started:			e Completed:	5,10/20		_
10. FILTER PACK:						RTIFICATION:	4	at the time the ris	s moved	1
Filter Material	From To (ft) C	Quantity Placement Method				ım well construction standar	CATCHICAGO COM	c	s moved 67	•
N/A				ipany Na	_	Apex Drilling	11/1/2	E142		,
				ncipal Dri	ller	War DE	Da	E142	_	_
11. FLOWING ARTESIA	AN.		*Dril		1		Da	E/42		_
Flowing Artesian 🔲 Y	N Artesian P	ressure (PSIG)	*Dril		-	the lot		E142		
Describe control device			Ope	rator I	fr	de complete are required	Da	te 5/13	2022	_

Water Right / Injection Well No. 2. OWNER Name Chobani LLC Well test: Describe access port Well test: Drawdown (ft) Discharge (gpm) Test Duration Pump Bailer A	Water Y
Water Right / Injection Well No. Z	water
Describe access port Describe access port	Water Y
Name	Water Y
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 To acres 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 Discharge (gpm) Test Duration Pump Baller A 40 + 20 minutes □ □ 130' 40+ 20 minutes □ □ 130' 40+ 20 minutes □ □ 130' 40+ 20 minutes □ □ 110' 40+ 20 minutes □ □ 1110' 40+ 20 minutes □ □ 1111' 10	Water
Twin Falls State ID Zip 83301 130' 40+ 20 minutes	Water
Negand Dec min Sec. 24 1/4 SE 1/4 NW 1/4 Sec. 24 1/4 SE 1/4 NW 1/4 Sec. 24 1/4 Sec. 24 1/4 Sec. 1/4 NW 1/4 Sec. 1/4 Sec. 1/4 NW 1/4 NW 1/4 Sec. 1/4 NW 1/4 NW 1/4 NW	Water Y N
Water Quality test comments: Mater Quality test comments:	Y
Sec. 24	Y
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: Dia. From To (fit) (fit) (fit) Address, Lithology, or description or repairs, or abandonment, water temp. 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	Y
County C	Y
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 6 39 73 gray basalt Figure 1 Other 1 Thermal Injection 6 73 87 soft brown basalt	
Domestic Municipal Munic	
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 Address of Well Site 3450 Kimberly Road 10 2 21 hat d 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	
(MW-4) City IWIN Falls Lot Block Sub. Name 10 33 38 soft brown basalt 6 38 39 soft brown basalt 6 39 73 gray basalt 10 37 Soft brown basalt 6 73 87 soft brown basalt	
Lot Block Sub. Name 4. USE: Domestic Municipal Monitor Irrigation Thermal Injection Other Other	
4. USE: Domestic Municipal Monitor Irrigation Thermal Injection 6 39 73 gray basalt 6 73 87 soft brown basalt	
Domestic Municipal of Monthly Magazier Manual Magazier Magazie	
Other	X
n n n a a lautura pasan	х
6 94 97 broken basalt	х
5. TYPE OF WORK: (check all that apply)	х
New Well Replacement Well Would Listing Tell	х
Abandonment Other 6 115 118 soft gray basalt	х
6. DRILL METHOD:	х
Air Rotary Mud Rotary Cable Other 6 118 120 broken basait 6 120 122 soft brown basalt w/ talc	х
7. SEALING PROCEDURES:	х
Seal Material From To Quantity (IoS/III3) Placement method process.	х
bentonite 0 38 900 lbs over bore / dry pour 6 125 152 soft gray basait with the	х
6 157 159 soft brown basalt & talc	х
8. CASING/LINER:	х
Dia. From 10 Schedule Material Casing Life Transport Schedule S	х
6 +2 38 0.250 steel 6 175 203 soft gray basait & tallowy broken specific	
Was drive shoe used? Y N Shoe Depth	\rightarrow
9. PERFORATIONS/SCREENS:	\rightarrow
Perforations Y N Method	\rightarrow
Manufactured screen ☐ Y ☑ N Type	\rightarrow
Method of installation	-
From (ft) To (ft) Slot size Number/ft Diameter Material Gauge/Schedule	\rightarrow
N/A	\rightarrow
	\rightarrow
203'	
Length of headpipe Length of tailpipe Completed Depth (Interactions) 5/16	2022
Packer ☐ Y ☑ N Type Date Started: 5/13/2022 Date Completed: 5/10/2022	
10. FILTER PACK: 14. DRILLER'S CERTIFICATION:	ume moved
Filter Material From To (ft) Quantity Placement Method We certify that all minimum well construction standards were complied with at the time the right formation of the company Name Apex Drilling LLC, Co No.	667
N/A	16/2022
"Principal Driller Was 50	16/2022
11. FLOWING ARTESIAN.	16/2022
Flowing Artesian Y N Artesian Pressure (PSIG)	
Describe control device Operator I Could Date Operator I Signature of Principal Driller and rig operator are required.	16/2022