MEMORANDUM

TO: File 34-7543

FROM: Daniel A. Nelson

DATE: August 28, 2020

SUBJECT: Review of Field Report for 34-7543

I have been asked to review the measurement calculations on the field report for 34-743. During my initial review of the data supplied in the field report, I had several concerns about the lift and pressure used in the field report. In the field exam narrative, the field examiner made the following statement:

Both wells have static water at 55' \pm and plumps placed at 90' \pm , with 3" output pipes. No pressure gages, gate valves exist between the two pumps (submersible) and the open discharge into the storage tank.

The main concerns with the above statement is that the well driller's reports for these wells state that the static water levels are 15 for Well #1 and 17 feet for Well #2. The well numbers in the well driller's repot don't match both well numbers in the field report, but it appears as though all of the wells are within a few hundred feet of each other. Pump tests were done on both of the well driller reports that state that the drawdown in the Well #1 was 22 feet and Well #2 was 5 feet. This suggests that the pumping water level for these two wells is somewhere between 22 and 37 feet. Both tests were done at a diversion rate of 445 to 450 gpm, so the diversion rate for the pump test was higher than the permitted value of 0.44 cfs or 197 gpm.

Taking this information into account, I performed several theoretical calculations to determine what a reasonable diversion rate would be for these two wells. Please refer to the attached spreadsheet for the calculations. I will speak to each calculation below:

- 1.) Field Examiner's Calculation There are times when an error was made when calculating a flow rate, so I wanted to redo the field examiner's calculations to ensure they were correct. This section is based totally on the numbers used in the field examiner's calculations. I have confirmed that the calculations done by the field examiner were correctly done using his data. This creates a baseline for my other calculations.
- 2.) Per Well Driller's Report I performed this calculation using the maximum drawdown of 37 feet found on the well driller's reports, and the 53 psi used by the field examiner. Using the well driller report's drawdown, the diversion rate would be 0.48 cfs or more than the 0.44 cfs authorized by the permit.

- 3.) Per Estimated Open Discharge The pressure used by the field examiner was read off of a pressure gauge measuring the pressure of the system after the water tank booster pump instead of the pressure against the wells. He determined the pressure was 53 psi. Generally, open discharge systems are not diverting at this high of pressure. The pressure for an open discharge system is generally around 5 to 15 psi. This system does divert into a tank, so you need to add the height of the tank into equation. I am not sure how tall the tank is, but I am estimating that it is approximately 20 feet tall when compared to the nearby buildings. Lifting water up 20 feet would add an additional 9 psi of pressure (20 / 2.31 = 8.658 psi). Using the lift of 90 feet and an estimated discharge pressure of 25 psi to be safe, I calculated that the diversion rate from these two pumps would be approximately 0.52 cfs, which is more than the 0.44 cfs authorized by the permit.
- 4.) Estimated Lift Based on Field Exam Data When estimating lift or pumping water level for a pump, you never list the pumping water level at the same level as the pump. This would cause the pumps to pump air and destroy the pumps. At a minimum, pumps are placed at least 10 feet above the pumps. A general rule of thumb is the pumping water level is generally about half way between the pump and the static water level. Using this method of estimation, I determined the pumping water level was probably closer to 72.5 feet, which is the mid-point between the 55 foot static level and 90 foot pump location described in the field report. I also went back to the same pressure used by the field examiner of 53 psi. Using these numbers, I came up with a diversion rate of 0.40 cfs, which is lower than the permit, but still higher than the field examiner recommended.
- 5.) Estimated Lift Based on Field Exam data Open Discharge The next calculation I performed was done using the lift determined in calculation 4 and the open discharge amount determined in calculation 3. Based on the information provided by the field examiner, this is probably the most accurate measurement that can be made from the data provided. Using this information, I determined that the most probably diversion rate from these two pumps would be 0.59 cfs, which is well above the authorized amount of the permit.
- 6.) Estimated Lift Based on Field Exam data Back Calculation My final calculation was to find how much total dynamic head it would be require for these two wells to provide a diversion rate of 0.44 cfs. I used the maximum lift that could be used based on the pump location in the field report of 90 feet. I then calculated the pressure that would be needed to divert 0.44 cfs from the combination of the two wells. I found that approximately 37 psi would be needed at this diversion rate. If you take out the 15 psi for standard open discharge systems, this would leave an additional 22 psi or 50 feet of head left in the system. This would mean that the storage tank would need to be 50 feet tall or approximately 3.6 stories tall. The pictures just don't support that type of lift on the system.

Conclusion:

With the information in the field report, I cannot make a conclusive statement on the actual flow diverted from these two wells. The best way to determine the flow of these wells would have been to measure the wells at the time of the field examination. Unfortunately, that is no longer possible. Due to a number of factors, measuring the well at this time may not give an accurate picture of what was being diverted in 1993 or 27 years ago.

Taking the information that is available from the field report, it is reasonable to deduce that the 0.44 cfs authorized by the permit could have been diverted from this system. I do feel that the flow rate of 0.36 cfs was probably too low for this system. Without further information, I don't know how we could deny a claim that this system didn't provide the 0.44 cfs authorized by the permit if not a higher rate of diversion.

THEORETICAL HORSEPOWER EQUATION WORKSHEET (cjh 1/92)

Webs Distants			-	Q =	8,8 * (Effi	ciency) * hp
Water Right No.:	34-7543 Dan Nolson		The above calculates	the formula =	depth to water + 2	2.31*(psi)+friction
Date of Review:	5/22/2018		Assumptions:	%70 efficiency	S	
			r isseniptione.	No Friction	1	
		1.) Per Field Exa	miner	2.) Per Well D	Driller's Report	
P/D No.:		Well #2 Well #3		Well #2	Well #3	
PUMP HORSEPOWER BOOSTER HORSEPOWE	R	7.5	50	7.5	5	
PUMPING LEVEL		90 9	ō	37	37	
DISCHARGE PRESSURE		53 5	3 Total	53	53 Total	
RATE OF FLOW (cfs) RATE OF FLOW (gpm)		0.22 0.14	0.36	0 29	0.19 0.48 87 216.76	
		57				
		2) Per Estimated One	Disabasa	(1) Entimated Lift Board	nd on Field Even data	
P/D No.		Well #2 Well #3	TDischarge	Well #2	Well #3	
		Troning				
PUMP HORSEPOWER		7.5	5	7.5	5	
BOOSTER HORSEPOWE	R	0	0	0	0	
PUMPING LEVEL		90 9	0	72.5	72.5	
DISCHARGE PRESSURE		25 2	5	53	53	
RATE OF ELOW/ (cfs)		0.31 0.2	Total	0.24	Total	
RATE OF FLOW (gpm)		140 9	4 233.89	106	71 177.28	
		S		(Sec. 22) 22		
		C V Colimated Life Decedary	Table Diversi data 1	C . Caller de D. D.	d Faid From data	
P/D No.:		Onen Dischar	ne chann data -	o.) Estimated Lift Base Back Ca	liculation	
		Well #2 Well #3		Well #2	Well #3	
PUMP HORSEPOWER				1		
BOOSTER HORSEPOWE	R	7.5	5	7.5	5	
PUMPING LEVEL				0	0	
		72.5 72	5	90	90.0	
DISCHARGE PRESSURE						
		25 2	5	37	37	
RATE OF FLOW (cfs)		035 0.2	l otal	0.26	0 18 0 44	
TOTIL OF TLOW (gpm)		159 10	6 265.32	118	79 196.94	
Examiners Notes:	See Memo for Expla	ination				

USE TYPEWRITER OR
BALL POINT PEN

State of Idaho Department of Reclamation

WELL	DRILLER'S	REPORT
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State o	of Idah	o 3		2	7.27	5 ×	2
USE TYPEWRITER OR Department of Department o	f Recl	amatio	n	7 - 1 - 2 ⁴⁴⁴ - 1 16 - 16	8 1 11 12		
WELL DRILLI State law requires that this report be	ER'S	ith the	State F	Reclamation Engineer	s 52 ta.	1	/
1. WELLOWNER 17046218	7. W	ATER	LEVEL	or the well.	لتعاسين	<u>.</u>	<u>{ , .</u>
Name <u>City of Moore</u>	s	tatic wa	iter level	feet below land su	rface		
Address Moore, Idaho	F	lowing? empera	U Yo	es 🖄 No G.P.M. flow, 8°F. Quality			-
Owner's Permit No.	Ċ	ontrolle	closed-in ed by	Dipressurep.s.i.	🗆 Plug		
2. NATURE OF WORK Well #2	8. W	ELL T	EST DA	ТА			
愛 New well □ Deepened □ Replacement	ĽŽ	i Pump		Bailer Other			
□ Abandoned (describe method of abandoning)		ischarge 450	G.P.M.	Draw Down	Hours Pu 312	mped	
				· · · · · · · · · · · · · · · · · · ·		1	_
3. PROPOSED USE		ITHO	ÓGIC I	06	30124	1	-
	Hole	De	pth	Manufal	1	Wa	ter
😰 Municipal 🗆 Industrial 🗔 Stock	Diam.	From	15	Clay & Gravel		Yes	No
4. METHOD DRILLED		15	18	Clay & Gravel	· · · · · · · · · · · · · · · · · · ·	X	-
Cable Cable Rotory D Dug Cother		<u>18</u> 25 ·	<u>25</u> 50	<u>Clay & Large gra</u> Clay Sand Gray	rel	x	-
5. WELL CONSTRUCTION		50	55	Clay Sand (some	gravel)	X	-
	-	60	110	Sand Gravel (s	some clay)	X	
Diameter of hole <u>12</u> inches Total depth <u>140</u> feet Casing schedule: [2] Steel Concrete		110	115		re clay	X	-
Thickness Diamater From To	12	130	140	10 II moz	ce clay	X	F
<u></u>		-					-
inches inches feet feet							
inches feet feet feet feet					E	4	. 7
Wasa packer or seal used? □ Yes ☑ No Perforated?					<u></u>	1	E
How perforated? Effectory D Knife Torch		-	1			-	
Number From To				···· ··· ···		-	-
perforations feet feet							-
Well screen installed? Yes Void No	-			· · · · · · · · · · · · · · · · · · ·			-
Manufacturer's name Type Model No		-			A		
DiameterSlot size Set from feet to feet						-	-
DiameterSlot sizeSet fromfeet tofeet							
Gravel packed? 🖸 Yes 😰 No Size of gravel							-
Placed from feet to feet							-
Surface seal? 12 Yes □ No To what depth_ <u>18</u> feet Material used in seal □2 Cement grout □ Puddling clay							
6. LOCATION OF WELL							
Sketch map location must agree with written location.	10.			1060			
	W	ork sta	rted	December 17, timished	Dec. 31,	1.9	69
W	11. DRILLER'S CERTIFICATION (3025) This well was drilled under my supervision and this report is						
		Andr	ew Wel	Ll Drilling Contract	tors		
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<u>SE %_NW %</u> Sec. <u>28</u> , T. <u>5</u> N/55; R. <u>26</u> E#W	A	Ighied By	reno	Filidren	<u> </u>	_70	

USE ADDITIONAL SHEETS IF NECESSARY

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USE TYPEWRITER	0
BALL POINT PE	N

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State of Idaho

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1 - 27 - 70 Date

USE TYPEWRITER OR BALL POINT PEN Department of	f Reci	amatic	on In A R					
WELL DRILLI State law requires that this report be within 30 days after complet	filed w	ith the	State R	eclamation Engineer	CG (950	N	1 -	
1. WELL OWNER 17040218	7. 1	ATER	LEVEL	Duren Departmen	of Reclama	ation		
NameCity of Moore	s	tatic wa	ater level	16** feet below land su	rface			
Address Moore, Idaho	F	lowing empera	ture	s Kol No G.P.M. flow ⊾8_°F. Quality	Ĺ.	_	_	
Owner's Permit No.		rtesian ontroll	closed-ir ed by	pressurep.s.i. □ Valve □ Cap I] Plug			
2. NATURE OF WORK Well # 1	8. W	ELL T	EST DA	ГА			-	
X New well Deepened Replacement	8	Pump		🗆 Bailer 🔲 Öther				
	D	ischarge	G.P.M.	Draw Down	Hours Pu	mped	-	
Abandoned (describe method of abandoning)		445		21'10"	6			
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	-		~					
3. PROPOSED USE		ITUO	00101	5	()123			
			oth I		-	Wa	tor	
🖄 Municipal 🗆 Industrial 🗖 Stock	Diam,	From	To	Materiel		Yes	No	
	12	0	5	Soil & Gravel				
4. METHOD DRILLED	-	5	15	Large Gravel & C	lay	-	_	
Cable Control Rotory Control Dug Conther		30	40	Pea Gravel Sand	lay	X		
		40	45	Pea Gravel Some	Clay	X		
5. WELL CONSTRUCTION	1	45	52	Larger Gravel		X		
Diameter of hole 12 inches Total depth 174 feet		74	122	Clay Sand	000 00000	5	_	
Casing schedule: 🕼 Steel 🛛 Concrete		65	75	Gravel Some Cla	V grave		19	
Thickness Diameter From To		75	105	Gravel Silt		X		
<u></u>		105	160	Gravel Silt S	and	X		
inches inches feet feet	10	160	165	Clean Gravel & S	and	A X	-	
inches feet feet	14	102	174	Gravel Silt c	and	-		
inches inches feet feet	14					-	.+	
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perforations54 feet71 feet	-	1					-	
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Manufacturer's name	-						_	
Type Model No.						-		
DiameterSlot sizeSet fromfeet tofeet								
Diameter Slot size Set from feet to feet								
Gravel packed? 🖸 Yes 🛱 No Size of gravel								
Placed from feet to feet						-	-	
a							-	
Surface seal? La Yes L No To what depth <u>10</u> feet. Material used in seal IX Cement arout D Puddling clay								
	-							
6. LOCATION OF WELL	-			······································				
Sketch map location must agree with written location.	10.							
<u>N</u>	W	/ork sta	rted_No	v.3, 1969 finished	Nov.20, 1	.969	-	
			-	17	-		-	
	11.0	DRILLI	ER'S CEI	RTIFICATION 307	49			
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<u>├</u>	t	rue to 1	he best o	of my knowledge.	~		1	
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34	Ē	Andre	w Wel	Inilling Contract	Num	oer		
County Butte	1	1268	E. 17	h St. Idaho Fall	s, Idaho	834	01	

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