



To: Ria Berns – Section Manager *Ecology*; Jay Cook, LHG – Technical Unit Supervisor *Ecology*; Kellie Gillingham – Water Resources *Ecology*; Anne Savery – *Tulalip Tribe*; Matthew Baerwalde – *Snoqualmie Tribe*

From: Donald DeBerg, P.E. – City Engineer *North Bend*

cc: Kenneth Hearing – Mayor *North Bend*; Mark Rigos, P.E. – Interim City Administrator *North Bend*; Tom Mohr, P.E. – Acting Public Works Director *North Bend*; David Miller, AICP – Community and Economic Development Director *North Bend*; Eileen Keiffer – City Attorney *Kenyon Disend, PLLC*; Chris Cote – SCADA Supervisor *North Bend*; Kraig Kramer – Lead Water Operator *North Bend*; Nicole DeNovio, PhD, LHG – Senior Consultant/Associate *Golder Associates*

Date: August 22, 2019

Re: Event Report for Metering Error Between Dates of July 2, 2019 and August 15, 2019

I. Event Report Summary

The City of North Bend (City) identified a mechanical error on August 15, 2019. This mechanical error led to under reporting of water pumped from the Centennial Well which, in turn, caused under mitigation between the periods of July 2, 2019, and August 15, 2019. The City had sufficient mitigation water available to provide the mitigation water required by the City's water right permit and the under mitigation was solely the result of an accidental mechanical error. We took immediate action to remedy the issue and provided the full amount of compensatory mitigation by 8AM on August 21, 2019. We are committed to complying with the water right. The following is a more detailed report of the event and the immediate action taken by the City staff to remedy the error upon its discovery.

II. Description of Problem

In 2019 the City found that the flow meter at the Centennial Well (Well NB-3) was reading approximately 5% lower than actual volume flowing through the meter. In an effort to correct this discrepancy and comply with metering requirements, the City procured a new flow meter and requested bids from contractors on the MRSC Small Works Roster to install the new meter. Having received no bids, City staff decided to perform the work in-house. The new flow meter was installed on July 2, 2019. We have since discovered that in the course of installing the new meter, two of the four signal cables were inadvertently landed on the incorrect terminals. The terminals on the flow meter head are numbered 6, 5, 7, 8, 4, 37, 30. The cable that is supposed to land on terminal 6 was actually placed in terminal 5 and the cable that is supposed to land on terminal 5 was actually placed in terminal 6 (see **Figure 1**). This resulted in the flow meter only recording 50% of the flow that was passing through it. Following best practices, immediately following the installation, staff performed a self-diagnosis on the flow meter and the meter reported no problems. This was performed several times in the following

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weeks with no reported issues. The self-diagnosis is a program in which a computer is connected to the meter and the computer performs a diagnostic check to ensure the meter is functioning correctly. Staff discovered the landing issue on August 15, 2019 and immediately corrected the wiring discrepancy, prior to pumping any water from the well on that day. As such, the volume reported by the flow meter on August 15, 2019 is correct. This error led to 11 missed mitigation days and 29 insufficient mitigation days between the dates of July 3, 2019 and August 15, 2019, inclusive. See **Table 1** below for a full accounting of the error.

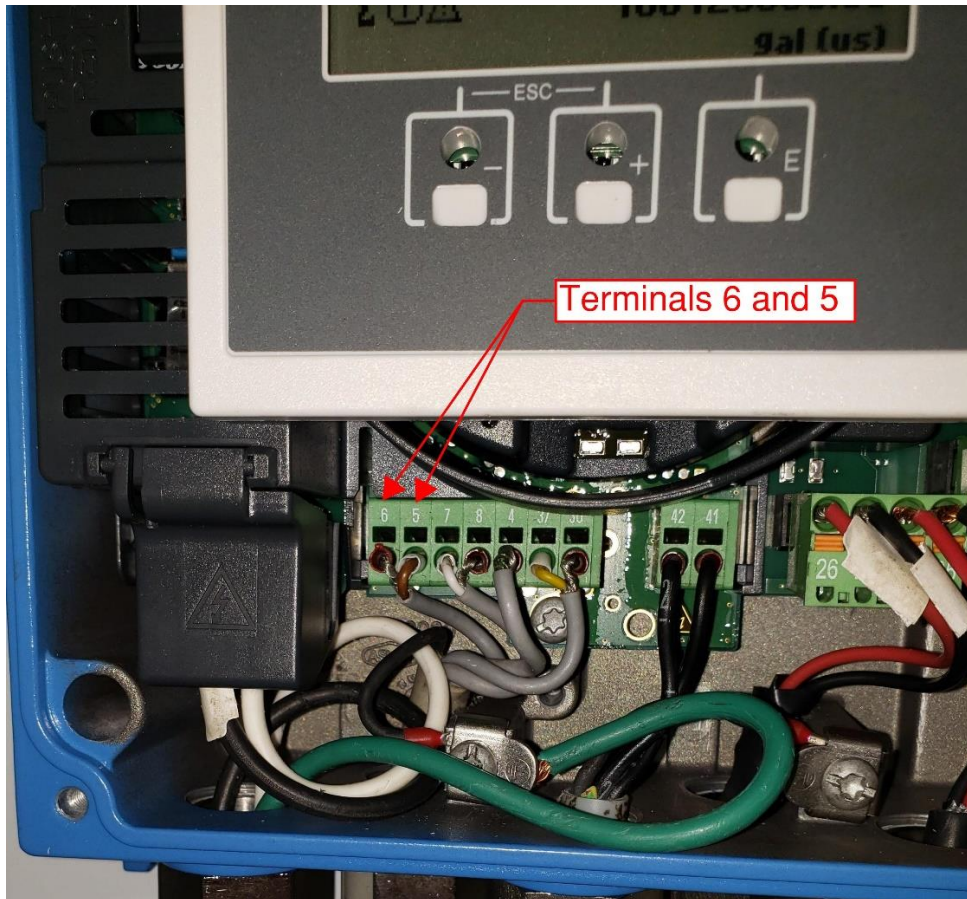


Figure 1. Flow meter head noting wires that were landed incorrectly.

III. Actions Taken to Correct Problem

The shortfall for August 15, 2019 was calculated prior to 8 AM on August 16, 2019 by using the backup spreadsheet method and was added to the August 16 mitigation volume. Mitigation flows for August 16 were adjusted accordingly at 8:00 AM to make up that shortfall, in accordance with the water rights permit for the well. This allowed City staff time to assess the river flows and capacity of the Hobo Springs mitigation system before implementing further actions. After determining the capacity of Boxley Creek was able to accept the flow and verifying that the change in flow to the South Fork of the Snoqualmie River was unlikely to cause safety concerns, at 2:30 PM on August 16, 2019, both mitigation valves were fully opened to allow mitigation water to flow at its maximum rate. This was done to initiate making up of the total shortfall accrued during the six-week metering error. Both valves were

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left fully opened for the remainder of August 16, 2019 through approximately 2:00 PM August 20, 2019 when staff had finalized their calculations and found that the shortfall would be made up by 8:00 AM August 21, 2019. Additional inspections were performed at the Boxley Creek outfall and Hobo Springs Collection box to ensure all mitigation infrastructure was performing as expected.

On August 16, 2019, City staff used the backup spreadsheet method of recalculating the mitigation requirements for every day between July 2, 2019 and August 16, 2019, inclusive. The mitigation requirements calculated by the backup spreadsheets was then transferred to a separate spreadsheet which was used to summarize the information and to calculate the previous 365 day volume pumped from the well and cumulative mitigation shortfall for the period. Until the regularly used mitigation database is updated with corrected information, staff will continue to use this method to calculate daily mitigation requirements.

City staff began sourcing pumps and pipes for use of the Cascade Golf Course water right on August 17, 2019. This continued through August 19, 2019 when all necessary items were secured. Pumps and some piping are owned by the City and more piping was secured from R&R Rentals and the City of Snoqualmie.

On August 18, 2019, City staff emailed Ecology staff with a request to use the City's recently acquired Cascade Golf Course water right (Certificate #CG1-00142C) as a temporary mitigation source to supplement Hobo Springs. Had this source been available immediately, the shortfall could have been made up approximately 0.5 to 1.0 days sooner. This would have required permission to lay pipe across a private property to the south of the former golf course property and adjacent to the South Fork of the Snoqualmie River to supply this water to the river. On August 19, 2019, staff were able to contact the property owner. The property owner requested a formal agreement from the City, which would have likely taken over a week to develop and execute. Because the shortfall was projected to be resolved by August 21, 2019, and permission from the owner would have come after that date, this idea was abandoned.

On August 19, 2019, the City hired a third party to verify that the flow meter is reading correctly. This was done by placing a clamp-on ultrasonic flow meter just downstream of the City's permanently installed magnetic flow meter and comparing the two flow rates. The clamp on meter reported a reading of 1,070 gallons per minute and the permanent meter reported a reading of 1,085 gallons per minute at the same time for an error of 1.4%.

August 20, 2019 consisted of staff thoroughly reviewing the calculations and correcting any errors made in previous calculations. Ultimately, a total mitigation shortfall of approximately 6.282 million gallons was calculated for August 15, 2019, not counting the August 16, 2019 daily mitigation requirement and prior to any action being taken to make up the shortfalls. Initial emails to Ecology stated the shortfall was approximately 7 million gallons, including the daily mitigation requirement for August 16, 2019. Additionally, it was calculated that the entire shortfall would be made up prior to 8:00 AM on August 21, 2019, the time at which mitigation calculations are normally run. Upon making this determination, at 2:00 PM, staff calculated that a mitigation flow rate of approximately 1,095 gallons per minute would be adequate to meet current day mitigation requirements as well as finish correcting the shortfall. In an attempt to satisfy the requirement in the water right that mitigation water is delivered uniformly over

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the course of the “mitigation day”, the valves were adjusted to achieve a target flow of 1,115 gallons per minute for the remainder of the day. The shortfall was made up by 8:00 AM August 21, 2019, as anticipated, and we resumed normal mitigation operation.

IV. Mitigation Supply

Hobo Springs flows would have been sufficient to supply daily mitigation requirements between July 2, 2019 and August 15, 2019 had the meter been reading correctly. When compensatory mitigation was being delivered, Hobo Springs had approximately 1,200 gallons per minute of excess water flowing over the weir during the make-up period. Flow rates were limited only by the infrastructure’s ability to convey the flow. See **Chart 1** for a daily comparison of Hobo Springs flow available, actual mitigation volume delivered, and corrected mitigation requirement volume.

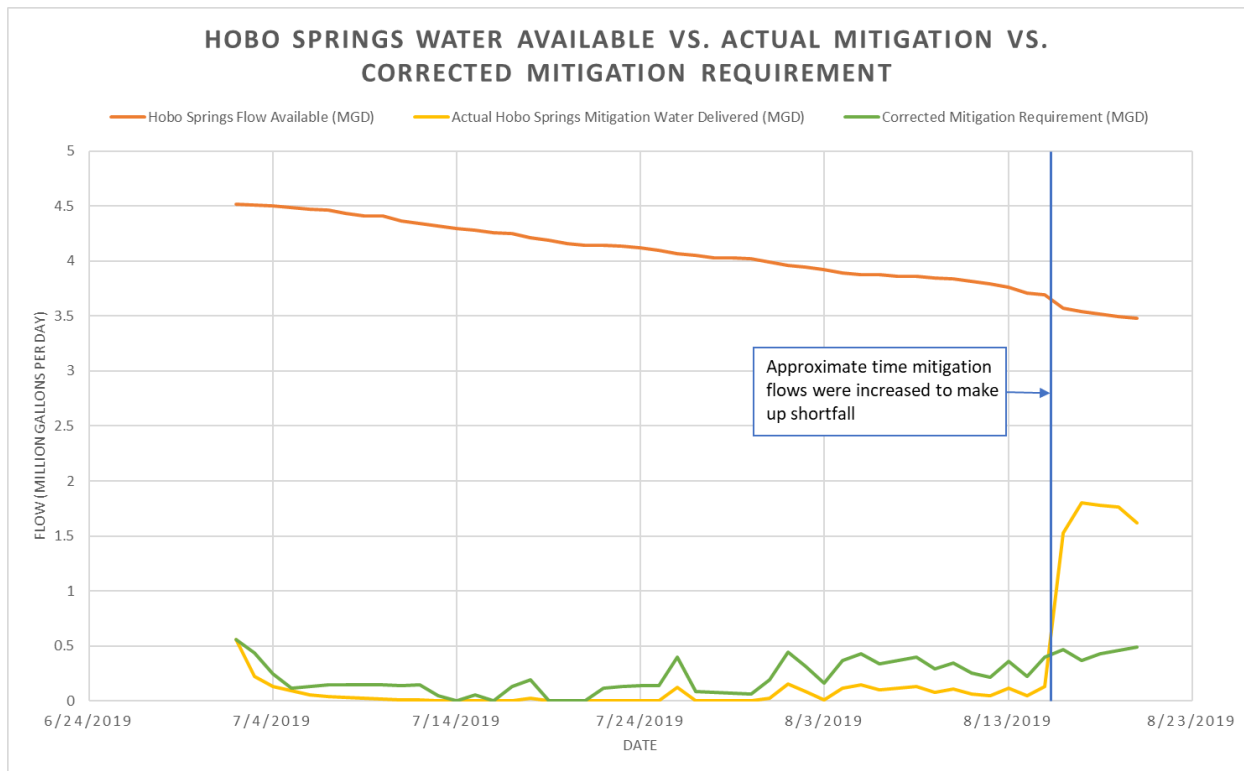


Chart 1. Daily comparison of actual mitigation volume delivered, corrected mitigation requirement, and Hobo Springs flow available.

V. River Impact

The impact on the river due to the City’s inadvertent under mitigation was small. As a percentage of river flow, the maximum daily mitigation shortfall of 291,749 gallons on August 1, 2019 would have comprised approximately 0.07% of mainstem Snoqualmie River flow near Snoqualmie (USGS Gauge # 12144500) and approximately 0.31% of the South Fork of the Snoqualmie River flow near North Bend (USGS Gauge # 12144000). We estimate the difference in rise in the South Fork of the Snoqualmie River to be approximately 0.005 ft. or 0.06 in. based on flow vs. stage differences shown on the USGS gaging station website. The City’s immediate action provided compensatory mitigation over a period of only

five days making up for 40 days of the inadvertent under mitigation. See **Chart 2** for a comparison of the South Fork of the Snoqualmie River flow as compared to the actual mitigation delivered and the corrected mitigation requirement.

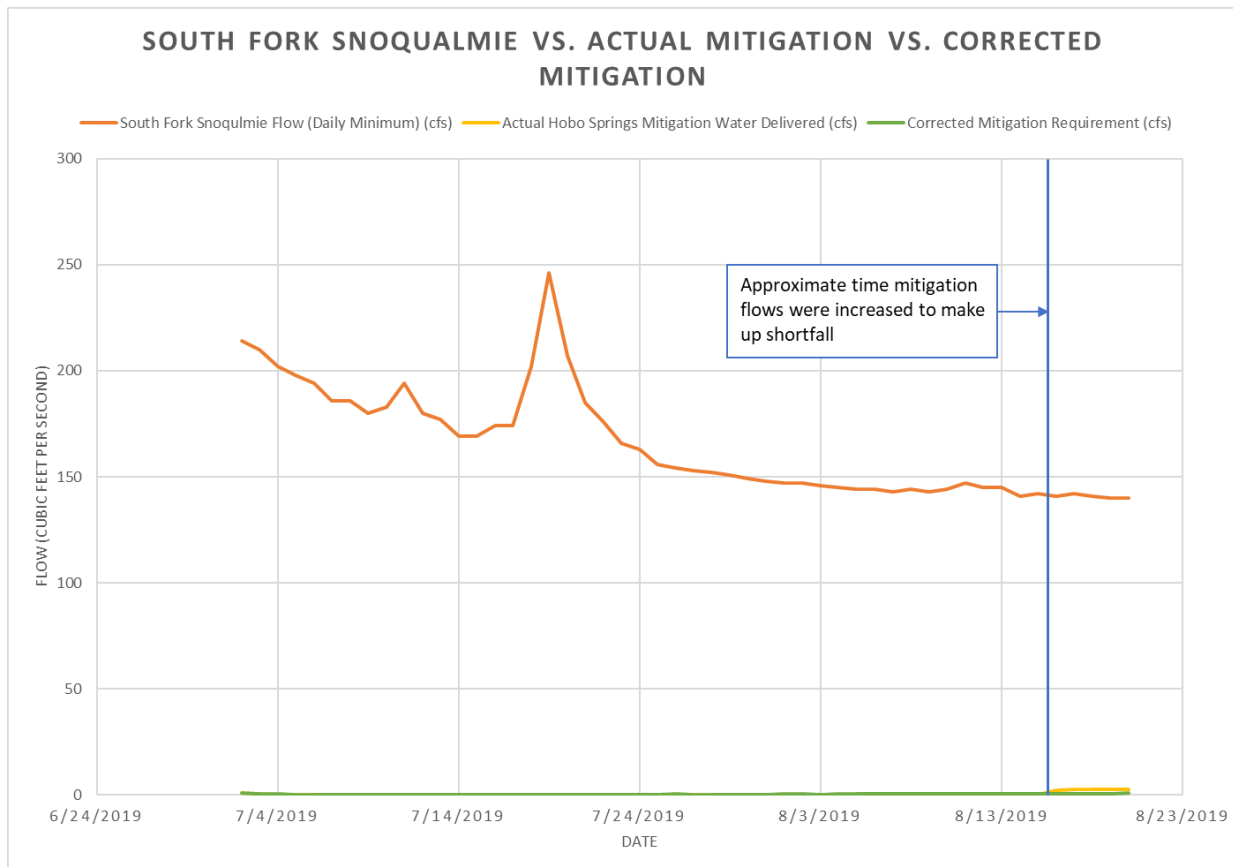


Chart 2. Comparison of flow in the South Fork of the Snoqualmie River, actual mitigation delivered, and corrected mitigation requirement.

VI. Reporting

Golder Associates initially reported this problem to Jay Cook, Kellie Gillingham, and Buck Smith, all with the Washington State Department of Ecology via telephone message on August 16, 2019. At that time, the volume of the shortfall was unknown. City staff spent Friday, August 16, 2019 and Saturday, August 17, 2019 performing calculations to determine the volume of the shortfall. After making this determination, Ecology was again contacted via email on August 18, 2019 with a description of the problem, approximate volume of the shortfall (approximately 7 million gallons, including August 16, 2019 daily mitigation requirement), actions underway to make up the shortfall, request to use Cascade Golf Course, and preliminary measures that could be taken in the future to prevent recurrence of this issue. The City again contacted Ecology via email on August 19, 2019 with an update to the situation and later in the day with information regarding the use of the Cascade Golf Course water right, and rescinding the request to use that water right due to access issues, initially made on August 18, 2019. This report will conclude reporting on this issue.

VII. Steps to be Taken to Prevent Recurrence of This Issue

The City has implemented the following safeguards to prevent recurrence of this and similar issues in the future:

1. The City will use contractors experienced in work of this type and magnitude in the future, rather than using internal staff.
2. During the repair or replacement of any critical flow meters, the City will have a second instrument on-site to confirm accuracy prior to placing the new or replaced meter into service.
3. The City will only perform work of this type at times of the year that mitigation has not historically been required, whenever possible.
4. The City will include a section on metering in an update to the Operations & Maintenance Plan. This will include discussion of Ecology's metering rule, how it applies to this system, and how the City will comply with the requirements of the rule.
5. The City will include a section strictly focused on mitigation water in the Emergency Response Plan required to be developed in accordance with the Water Infrastructure Act of 2018.
6. Finally, the City will formalize a request to Ecology to permanently convert the Cascade Golf Course water right from an irrigation water right to a mitigation water right. Upon successful conversion, the City will acquire all rights to, and construct the necessary infrastructure to make the Cascade Golf Course water right a viable mitigation source.

VIII. Conclusion

We take our duties under our water right permit extremely seriously; the unexpected metering error forced us to examine our internal processes which will lead to further safeguards in the system. We took immediate actions to remedy the mechanical error and deliver the compensatory mitigation water once discovered and as discussed above. It is important to reiterate that the City had sufficient mitigation water to provide the mitigation water as planned in the City's water right and that the under mitigation was solely the result of a mechanical error. All compensatory mitigation for the 40 days of under mitigation was supplied in less than a week from the date that the error was discovered. The City looks forward to working with the Department of Ecology and is extremely appreciative of the assistance of Department of Ecology staff in assisting the City in remedying this error.

Table 1

	Reported Volume Pumped from Centennial Well	Actual Volume Pumped from Centennial Well	Difference	Actual Hobo Springs Mitigation Water Delivered	Corrected Mitigation Requirement	Daily Mitigation Shortfall	Cumulative Mitigation Shortfall	Volume to add to previous 365 day Centennial report volume ¹	Volume pumped previous 365 days from MWMS report	Revised volume pumped previous 365 days
Date	(Gallons)	(Gallons)	(Gallons)	(Gallons)	(Gallons)	(Gallons)	(Gallons)	(Million Gallons)	(Million Gallons)	(Million Gallons)
7/2/2019	308,057	616,114	308,057	561,100	558,204	(2,896)	(2,896)	0.308057	92.9	93.208
7/3/2019	153,076	306,152	153,076	224,100	437,646	213,546	210,650	0.461133	93	93.461
7/4/2019	15,752	31,504	15,752	135,000	244,031	109,031	319,681	0.476885	93.2	93.677
7/5/2019	153,506	307,012	153,506	91,000	112,893	21,893	341,574	0.630391	93.2	93.830
7/6/2019	153,785	307,570	153,785	56,900	130,046	73,146	414,720	0.784176	93.3	94.084
7/7/2019	153,774	307,548	153,774	41,000	143,762	102,762	517,482	0.937950	93.5	94.438
7/8/2019	154,276	308,552	154,276	30,000	146,672	116,672	634,154	1.092226	93.6	94.692
7/9/2019	154,971	309,942	154,971	22,000	147,889	125,889	760,043	1.247197	93.8	95.047
7/10/2019	150,269	300,538	150,269	19,000	149,403	130,403	890,446	1.397466	93.9	95.297
7/11/2019	154,573	309,146	154,573	12,000	142,407	130,407	1,020,853	1.552039	94.1	95.652
7/12/2019	4,964	9,928	4,964	10,000	148,410	138,410	1,159,263	1.557003	94.3	95.857
7/13/2019	486	972	486	-	45,463	45,463	1,204,726	1.557489	94.3	95.857
7/14/2019	116,921	233,842	116,921	-	-	-	1,204,726	1.674410	94.3	95.974
7/15/2019	59,214	118,428	59,214	-	55,147	55,147	1,259,873	1.733624	94.3	96.034
7/16/2019	155,639	311,278	155,639	-	5,921	5,921	1,265,794	1.889263	94.4	96.289
7/17/2019	188,355	376,710	188,355	-	128,018	128,018	1,393,812	2.077618	94.2	96.278
7/18/2019	155,889	311,778	155,889	25,000	195,044	170,044	1,563,856	2.233507	94.4	96.634
7/19/2019	500	1,000	500	-	-	-	1,563,856	2.234007	94.5	96.734
7/20/2019	481	962	481	-	-	-	1,563,856	2.234488	94	96.234
7/21/2019	154,797	309,594	154,797	-	-	-	1,563,856	2.389285	93.9	96.289
7/22/2019	153,721	307,442	153,721	-	112,922	112,922	1,676,778	2.543006	93.7	96.243
7/23/2019	153,704	307,408	153,704	-	132,662	132,662	1,809,440	2.696710	93.7	96.397
7/24/2019	153,927	307,854	153,927	-	139,522	139,522	1,948,962	2.850637	93.3	96.151
7/25/2019	311,275	622,550	311,275	-	142,507	142,507	2,091,469	3.161912	92.8	95.962
7/26/2019	407	814	407	126,800	399,390	272,590	2,364,059	3.162319	92.8	95.962
7/27/2019	100,693	201,386	100,693	1,400	86,732	85,332	2,449,391	3.263012	92.3	95.563
7/28/2019	100,718	201,436	100,718	-	79,057	79,057	2,528,448	3.363730	91.9	95.263
7/29/2019	100,776	201,552	100,776	-	68,393	68,393	2,596,841	3.464506	91.3	94.765
7/30/2019	190,307	380,614	190,307	-	61,526	61,526	2,658,367	3.654813	90.9	94.555
7/31/2019	334,717	669,434	334,717	26,000	193,506	167,506	2,825,873	3.989530	90.4	94.390
8/1/2019	234,376	468,752	234,376	152,000	443,749	291,749	3,117,622	4.223906	90	94.224
8/2/2019	74,635	149,270	74,635	86,000	311,492	225,492	3,343,114	4.298541	89.7	93.999
8/3/2019	289,547	579,094	289,547	10,500	164,009	153,509	3,496,623	4.588088	89.4	93.988
8/4/2019	309,662	619,324	309,662	115,000	367,206	252,206	3,748,829	4.897750	89	93.898
8/5/2019	246,050	492,100	246,050	146,000	427,715	281,715	4,030,544	5.143800	88.7	93.844
8/6/2019	268,617	537,234	268,617	102,000	338,459	236,459	4,267,003	5.412417	88.5	93.912
8/7/2019	284,164	568,328	284,164	116,000	367,110	251,110	4,518,113	5.696581	87.9	93.597
8/8/2019	168,827	337,654	168,827	132,000	396,923	264,923	4,783,036	5.865408	87.5	93.365
8/9/2019	259,363	518,726	259,363	81,000	293,802	212,802	4,995,838	6.124771	87	93.125
8/10/2019	146,989	293,978	146,989	107,000	345,464	238,464	5,234,302	6.271760	86.5	92.772
8/11/2019	141,790	283,580	141,790	64,000	257,544	193,544	5,427,846	6.413550	85.9	92.314
8/12/2019	273,614	547,228	273,614	45,000	219,272	174,272	5,602,118	6.687164	85.4	92.087
8/13/2019	134,927	269,854	134,927	115,000	358,631	243,631	5,845,749	6.822091	85.2	92.022
8/14/2019	294,684	589,368	294,684	48,000	223,086	175,086	6,020,835	7.116775	84.7	91.817
8/15/2019	645,998	645,998	-	135,000	396,497	261,497	6,282,332	7.116775	84.2	91.317
8/16/2019	507,842	507,842	-	1,529,600	464,724	(1,064,876)	5,217,456	7.116775	84.1	91.217
8/17/2019	591,949	591,949	-	1,799,000	371,586	(1,427,414)	3,790,042	7.116775	83.9	91.017
8/18/2019	622,309	622,309	-	1,780,700	426,708	(1,353,992)	2,436,050	7.116775	83.7	90.817
8/19/2019	656,412	656,412	-	1,763,500	457,246	(1,306,254)	1,129,796	7.116775	83.7	90.817
8/20/2019	639,322	639,322	-	1,620,200	488,872	(1,131,328)	(1,532)	7.116775	83.8	90.917

1. This volume is the cumulative difference between Reported Volume Pumped from Centennial Well and Actual Volume Pumped from Centennial Well.

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