

MEMORANDUM

TO: Water Right Permit File 37-22380

FROM: Daniel A. Nelson

DATE: December 18, 2019

SUBJECT: Addressing Licensing Concerns

A review of this permit by administrative staff raised some concerns, and I will address those concerns in this memorandum.

No Combined Limitation for Diversion Rate:

The diversion rate for this permit is additive to the existing rights, so no combined limitation condition was added. However, there is a combined limitation on the existing rights, so it should be carried forward to this water rights. Water right 37-20834 limits the diversion rate when water rights 37-8136, 37-8532, 37-20833, and 37-20834 to 5.78 cfs. This permit adds an additional 3.61 cfs to the system. Therefore, the combined condition will need to limit the existing rights and this permit to 9.39 cfs ($5.78 \text{ cfs} + 3.61 \text{ cfs} = 9.39 \text{ cfs}$). This flow rate matches the flow rate suggested in Ashley Ritter's memo dated July 31, 2019.

Question of Volume on Industrial Use:

The second concern was based on the volume recommendation for the industrial use. The existing water rights were able to meet the total volume demands for this facility. The volume recommended by the existing water rights for industrial use was limited to 990 af for industrial use. None of the remaining rights authorized a domestic use of water. The Water District records confirmed that this diversion volume has not been exceeded.

This permit was filed to increase the diversion rate to allow multiple pieces of equipment to operate at the same time, which would increase the efficiency of the facility. I originally recommended basing the volume on a percentage of what the new diversion rate would provide and applied it to the existing volume limitations. Administrative staff determined that the percentage method shouldn't be used in this case.

The diversion rate for this permit can produce more than double the volume limitations, but it isn't reasonable that the additional volume will be used for the minor uses in the shop and the domestic uses. It was determined that it would be best to not include a volume for this permit, since the volume will be limited by the condition that limits the combined use for industrial use when combined with the existing rights to 990 af for industrial uses. This will make it similar to a supplemental water right for irrigation where it is impossible to determine the exact amount of volume the additional diversion rate will provide to the system.

Domestic Volume Seems High:

It was suggested that the domestic volume I recommended for this permit was high. The field examiner's recommendation for volume stated that they were based on the domestic calculations for water right 37-20834. The domestic calculations for 37-20834 limited the domestic use to 75 gallons per day for 20 units for 229 days which equals 1.1 af when rounded. The field examiner then stated that the diversion rate was based on Administrative Processing Memorandum #22. Administrative Processing Memorandum #22 authorizes a volume of 0.6 af per home for in-house use only. In the volume calculations used by the field examiner, they used a volume amount per unit of 0.4 af. I am guessing that the field examiner took the 0.6 af for year round use and adjusted it to 229 days that the facility is in operation. When I did this I came up with approximately 0.376 af per unit for 229 days. When I ran through these calculations, it made more sense than the 1.1 af calculations used in 37-20834. Therefore, I have changed the recommendation to 0.4 af per unit or 8 af for the 20 units. A special condition will be needed to address the volume for the domestic use in the conditions, since there will be no volume for the industrial use.

MEMORANDUM

To: Water Right File No 37-22380
From: Ashley Ritter
Date: July 31, 2019
Re: Licensing Review of Water Right 37-22380

Intro

On November 28, 2018, Charles G. Brockway, a Certified Water Rights Examiner with Brockway Engineering (Brockway) performed a field exam for permit 37-22380 on behalf of the permit holder Walker Sand and Gravel LTD CO (Walker Sand and Gravel).

In the exam narrative Brockway states that the Old Crusher Well and New Crusher Well are extremely productive and that the pumping capacity is affected by major seasonal fluctuations in aquifer level at this location. The field exam was performed near the lowest seasonal period in the aquifer level (later fall and/or winter), with the high point usually occurring in June or July. Brockway requests that the impact of these sizable aquifer fluctuations on system capacity be considered in the licensing process.

Diversion Rate

During the field exam Brockway performed several flow measurements on the Old and New Crusher Wells (Crusher Wells). The maximum flow measured from both wells was 3,281 gallons per minute (gpm) or 7.31 cubic feet per second (cfs). Brockway then added this flow rate to the flow rate from previous exams on the Shop Well (0.40cfs) and the VP Well (0.57 cfs) to get a total system capacity of 8.28 cfs. The depth to water during the collected flow measurement in the New Crusher Well was 81 feet below ground surface (bgs). An attempt to measure the water level in the Old Crusher well was unsuccessful. It is assumed that Old Crusher Well pumping level is likely similar to the 81 feet bgs measured at the New Crusher Well.

Water Level Data

Water level data in the Old Crusher Well casing has been collected by Walker Sand and Gravel staff from April 2006 through July 2008. According to Brockway, during this time the Old Crusher Well was an open casing with no pump installed. Water level in the Old Crusher Well has been collected by Idaho Department of Water Resources (IDWR) with a water level transducer and data logger from October 16, 2014 through October 22, 2018. Review of the available water level data suggests that the magnitude of seasonal fluctuation appears to have ranged from 15 feet in 2015 to 36 feet in 2017. The highest recorded water level during the permit development period (November 20, 2008 to December 01, 2018) was 32 feet bgs compared to 72 feet bgs (40 feet difference) at the end of record on October 22, 2018.

Brockway reasons that as aquifer levels increase, the lift will decrease, reducing the total dynamic head (TDH) requirement and increasing the flow rate delivered by the well pumps in accordance with their performance curves. Brockway created an alternative system curve correctly predicting the measured operating point by the intersection of the system curve and the pump curve. Brockway then created a composite pump curve shifted up 40 feet to represent higher aquifer levels, which have been documented during the

development period. At this condition, (where the composite pump curve and system curve intersect) the system capacity of the Crusher Wells is predicted at 3,780 gpm (8.42 cfs).

The total system capacity would then be $8.42 \text{ cfs} + 0.97 \text{ cfs}$ (Shop and VP Wells) = 9.39 cfs. As stated in the field report, other water rights that share the same points of diversion account for 5.78 cfs of the total system capacity. Therefore, the additional increment of beneficial use under permit 37-22380 is 3.61 cfs ($9.39 - 5.78$, previously licensed rate).

IDWR Theoretical Calculations

A Theoretical Horsepower Equation was used to calculate the approximate flow rate for the Crusher Wells at higher aquifer conditions (40 feet pumping water level difference). The theoretical flow rate calculated for the Crusher Wells was greater than the flow rate estimated by Brockway's evaluation. Brockway's review uses actual pump curves for the pumps installed in each well and a TDH value that is based on actual measurements. Therefore, it is likely that Brockway's estimated flow rate for the Crusher Wells is more accurate.

Conclusions

IDWR's Beneficial Use Examination Rule (IDAPA 37.03.02.040.04) states the following:

Unacceptable Measurements. Theoretical diversion rates or theoretical carrying capacities are not acceptable as a measure of the rate of diversion except as indicated in these rules and for some diversion systems where the flow rate cannot be measured accurately due to physical characteristics of the diversion and distribution system.

At the time of the field exam the maximum flow rate from the Crusher wells could not be measured accurately due to physical characteristics of the diversion and distribution system (low aquifer level). Based on the above referenced IDAPA Rule, the theoretical flow rates presented by Brockway appear to be reasonable.

It is recommended that the estimated flow rate calculated at high aquifer conditions provided by Brockway be licensed under water right 37-22380. This would allow permit 37-22380 to be licensed for 3.61 cfs with a limit of 9.39 cfs in combination with overlapping water rights 37-8136, 37-8532, 37-20833, and 37-20834.