

MEMORANDUM

TO: Water Right File 63-12342
FROM: Aaron Marshall *AM*
DATE: March 15, 2010
SUBJECT: Licensing Review

On August 16, 1996, IDWR issued permit no. 63-12342 which authorized the development of a water right for cooling purposes from March 15 to November 15 at a maximum diversion rate of 0.26 cfs. The permit was issued for non-consumptive use since the Boise River and all tributary ground water upstream from Star Bridge is fully appropriated. Condition no. 5 on the permit states:

"Proposed water bearing zone to be appropriated is from 0 to 65 feet. All flows to be reinjected to same zone."

On August 29, 1997, IDWR received a proof of beneficial use statement for this right and on November 19, 1997, an IDWR examiner conducted the beneficial use field examination. The examiner confirmed that the point of diversion and place of use for this right are located in the Union Block Building in downtown Boise. The examiner described the closed-loop heat exchange system used for cooling and heating purposes and completed inspections of the production well and injection well. The examiner measured the water temperature in the production well at 67 °F and indicated the operating pressure of the heat exchange system ranges from 50 to 70 psi. The examiner estimated the maximum diversion rate at 0.47 cfs based on an operating pressure of 50 psi, a 10 hp motor, 70% well efficiency, and a dynamic depth to water of 15 feet. The examiner did not complete a direct flow measurement.

According to the well driller's report for the production well, the borehole is cased down to 79 feet, screened from 79 to 89 feet, and the static water level was 30 feet below ground surface at the time of completion. The driller tested the well by pumping 100 gallons per minute for 1 hour from a depth of 70 feet resulting in a drawdown of 40 feet inside the well.

According to the well driller's report for the injection well, the borehole was cased down to 63 feet, slotted from 21 to 63 feet, and the static water level was 30 feet below ground surface at the time of completion. In 1999 and 2007, the injection well was deepened to 115 feet and 195 feet respectively.

On March 23, 2009, IDWR received a request from SPF Water Engineering, on behalf of the permit holder, to change permit condition no. 5 to describe the water bearing zone from 79 to 195 feet and remove the water injection requirement. SPF explained that the injection well could no longer accommodate the flows necessary for the heat exchange system and that water would be injected into the municipal storm drain system and return water to the Boise River. SPF also filed an application for transfer to add a point of diversion to water right 63-12342 so the former injection well could be used to supply more water for heating and cooling in the Union Block Building. SPF also filed an application for permit, no. 63-33245, for heating and cooling purposes at a rate of 0.41 cfs to provide additional water up to the capacity of the heat exchange system.

The water injection requirement is intended to mitigate for injury to Boise River water users upstream from Star Bridge. It may be reasonable to allow the right holder to inject the water used for cooling purposes into the municipal storm drain system since it will flow to the Boise River. However, this

change did not occur during the authorized development period of the permit and should be considered in processing the application for transfer. This seems like a significant change for which the public should have the opportunity to protest. The water bearing zone for this right should be described on the license as completed during the authorized development period, from 79 to 89 feet below ground surface.

Using information provided by the well driller and field examiner, the maximum diversion rate can be estimated using two different operating pressures for the heat exchange system, 50 psi (Q_{50}) and 70 psi (Q_{70}). Both estimates are greater than the 0.26 cfs diversion rate authorized by permit 63-12342.

$$Q_{50} = (8.8 \times 10 \text{ hp} \times 0.70) / (70 \text{ ft} + (2.31 \times 50 \text{ psi})) = 0.33 \text{ cfs}$$

$$Q_{70} = (8.8 \times 10 \text{ hp} \times 0.70) / (70 \text{ ft} + (2.31 \times 70 \text{ psi})) = 0.27 \text{ cfs}$$

A memo in the water right file from Cindy Zimmerman, dated August 15, 1996, provides an estimate of the size of the Union Block Building, 28,000 ft², based on personal communication from Jim Campbell, the building construction manager at the time. The website for Parklane Management Company (<http://www.parklaneco.com/>) currently lists the building size as 39,189 ft² and indicates the building was last renovated in 1996. 39,189 ft² may be a more accurate estimate of the actual size of the building after the 1996 renovation.

IDWR Administrator's Memorandum, Application Processing No. 23, describes a method for estimating the rate of flow necessary for heating purposes. This method can be modified and used to estimate the annual volume of water beneficially used for cooling purposes under permit 63-12342.

1) Change in temperature across the heat exchange system, ΔT_s :

$$\Delta T_s = 0.3(t - S) = 0.3(72 - 67) = 1.5^\circ\text{F}$$

Where, S = source water temperature in °F

t = temperature required by system in °F

2) Annual volume of water needed for cooling, (V_A):

$$V_A = \frac{e \times \text{CDD} \times A \times 2.88}{\Delta T_s} = \frac{0.67 \times 807 \times 39,189 \times 2.88}{1.5} = 40,683,072.8 \text{ gallons} = \mathbf{125 \text{ acre-feet}}$$

Where, e = insulation efficiency of building, dimensionless coefficient

CDD = cooling degree days during season of use, 03/15 to 11/15 (see attached data sheet)

A = area of building being cooled in ft²

ΔT_s = change in water temperature across cooling system

The license for water right 63-12342 should be issued based on the beneficial use that occurred during the authorized development period in accordance with the permit, 0.26 cfs and 125 acre-feet per year for cooling purposes from March 15 to November 15.

NOWData - NOAA Online Weather Data

Boise Area (ThreadEx Station)

Daily Climate Normals

CDD (base 65)

1971-2000

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0	0	0	0	0	2	7	11	5	1	0	0
2	0	0	0	0	0	2	7	11	5	1	0	0
3	0	0	0	0	0	2	8	11	5	1	0	0
4	0	0	0	0	0	2	8	11	5	1	0	0
5	0	0	0	0	0	2	8	10	4	1	0	0
6	0	0	0	0	0	3	8	10	4	0	0	0
7	0	0	0	0	1	3	8	10	4	0	0	0
8	0	0	0	0	1	3	9	10	4	0	0	0
9	0	0	0	0	1	3	9	10	3	0	0	0
10	0	0	0	0	1	3	9	10	3	0	0	0
11	0	0	0	0	1	3	9	10	3	0	0	0
12	0	0	0	0	1	3	9	10	3	0	0	0
13	0	0	0	0	1	3	10	10	3	0	0	0
14	0	0	0	0	1	4	10	10	2	0	0	0
15	0	0	0	0	1	4	10	9	2	0	0	0
16	0	0	0	0	1	4	10	9	2	0	0	0
17	0	0	0	0	1	4	10	9	2	0	0	0
18	0	0	0	0	1	4	10	9	2	0	0	0
19	0	0	0	0	1	4	10	9	2	0	0	0
20	0	0	0	0	1	5	10	8	1	0	0	0
21	0	0	0	0	1	5	10	8	1	0	0	0
22	0	0	0	0	1	5	10	8	1	0	0	0
23	0	0	0	0	1	5	10	8	1	0	0	0
24	0	0	0	0	1	6	11	8	1	0	0	0
25	0	0	0	0	1	6	11	7	1	0	0	0
26	0	0	0	0	2	6	11	7	1	0	0	0
27	0	0	0	0	2	6	11	7	1	0	0	0
28	0	0	0	1	2	6	11	7	1	0	0	0
29	0	0	0	1	2	7	11	6	1	0	0	0
30	0	-	0	1	2	7	11	6	1	0	0	0
31	0	-	0	-	2	-	11	6	-	0	-	0
Month	0	0	0	3	31	122	297	275	74	5	0	0

Sum/average of daily normals might not match monthly normal due to rounding.

Normals used in this product are from BOISE AIR TERMINAL

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.