

MEMORANDUM

TO: File 22-13918

FROM: Daniel Nelson – Staff Hydrologist

DATE: July 14, 2014

SUBJECT: Licensing Review for 22-13918

This is licensing review of the field exam that was supplied by the Certified Field Examiner (CFE), Scott King of SPF Engineering. This water right was split from water right 22-13220. The other portion of the split is 22-13917. Mr. King performed the field examination on both splits, and submitted the field exams as a package. There are couple issues that need to be addressed in the licensing of this permit. Water rights 22-7641, 22-12272, 22-13917 and 22-13918 are direct overlapping water rights. Water right 22-7660 is a water right from an unnamed stream that overlaps the storage component described in 22-7641. I will address each issue separately.

Diversion Rate:

The certified examiner measured the well for this permit as producing 519 gpm or 1.16 cfs. This seems like a reasonable capacity of the well. There are overlapping water rights using this well. This permit allows 0.98 cfs for 49 acres of irrigation and 1.10 cfs for diversion to storage developed under this permit. Water right 22-7641 allows 0.02 cfs from this well for domestic purposes, 0.10 cfs for aesthetic purposes, and 0.10 cfs for diversion to storage (for a separate pond) limited to 0.10 cfs. It must be noted that water right 22-7641 has a combined condition for the domestic use with water right 22-12272, but the domestic use under 22-12272 comes from a separate well from the one used on this system. I can't determine from the records if the domestic well is connected into the system that supplies water to the irrigation and storage reservoirs, but Scott King did confirm the wells are connected together. Water right 22-12272 is for 0.10 cfs for domestic use. Water right 22-13917 allows 0.10 cfs for irrigation. When all of the rights are added together, the total diversion rate needed is 1.20 cfs. Water rights 22-7641 and 22-13918 are in the ownership of Curlew Partners LLLP and 22-13917 and 22-12272 are in the ownership of JRG Partners. This makes reducing the diversion rate for one of the permits difficult because of the split ownership. It gets further complicated when considering the different water uses and the fact that water right 22-7641 is already a licensed right and 22-12272 is a decreed right. The only way to prevent confusion is to ensure that the capacity of the well doesn't change and limit all three water rights when combined to the amount measured by their examiner of 1.16 cfs.

Water right 22-13918 can be licensed for the full amount of 0.98 cfs for 49 acres.

Diversion Volume:

The field examiner originally determined that this permit 22-13918 should be limited to a diversion volume of 171.5 af for irrigation and 36.6 acre feet for storage. The field examiner originally included the pond volumes in the field exam recommendation for permit 22-13918, but has sent a letter retracting that assessment and limited the volume to consumptive use or the evaporation losses of the ponds to 14 acre feet. I reviewed the examiners evaporation calculations and agree with his assessment. Permit 22-13918 should be licensed for 171.5 af for irrigation for a total of 185.5 af.

However as stated above, there are other water rights on this system. Water right 22-7641 allows a total volume of 14.3 af, and permit 22-13917 allows 17.5 af. Water right 22-12272 is for 13,000 gpd for a maximum of 14.6 af per year. A diversion rate of 1.16 cfs can provide 840 af ($1.16 \text{ cfs} \times 1.9835 \times 365 = 840 \text{ af}$). The volume for all of the water rights are added together the total volume needed is 217.3 af, which is well below the capacity of the well. The diversion to storage, Aesthetic, and Domestic use are year round uses, so I had to use 365 days to calculate the volume amount.

Mitigation:

The mitigation for this permit is discussed in a memorandum composed by L. Glen Saxton on August 8, 2002. Whereas this permit was issued based on this mitigation plan, changing the mitigation to meet with current modeling standards is not acceptable unless the applicant provides an updated mitigation plan. No plan was submitted by the field examiner, therefore, we must assess this permit based on the information provided.

The original mitigation plan proposed to retire 70 acres of water right 31-2327B. According the 2002 memo, the 70 acres of water right 31-2327B could provide 93 acre feet of consumptive volume to be used for mitigation of permits 22-13917 and 22-13918. In the analysis, it was determined that 21 af would be needed for evaporation, and 92 af for consumptive use of irrigation for 54 acres for a total of 113 af. The difference of 20 af was attributed to the different seasons of use of the two water rights (15 af) and allowance of the margin of error (5 af).

The field examiner found that 14 acre feet of water was consumptively used (evaporated) from the ponds, and that the 49 acres and 171.5 acre feet of water was determined for the irrigation, so the portion of the mitigation right 31-2327B associated with this permit would be a proportionate share of the 70 acres. The field examiner also found that the full 5 acres and 17.5 acre feet of water right 22-13918 were irrigated. When you calculate the consumptive use for both permits you still have 106 acre feet which reduces the amount of error to 13 acre feet instead of the 20 acre feet allowed in the 2002 memo.

Therefore, I used a proportionate split of the acres to determine the number of acres from water right 31-2327B that needs to be assessed to each water right. This is important because the original permit was split and there are now two different owners. The attached spreadsheet shows how I split the 70 acres between the two water right permits. My calculations show that 64.5 acres of water right 31-2327B should be used to mitigate 22-13917 and 5.5 acres of water right 31-2327B should be used to mitigate 22-13918. Please see the attached spreadsheet for more details.

Conditions:

Conditions 3(046), and 6(048) were removed at licensing. Conditions 1(01M) and 3(R63) were carried forward to licensing. Condition 2(068) was replaced with a non standard condition. Condition 5 was replaced with condition 170. I also added condition 259 to better defined the volume separation from the irrigation use and the wildlife storage use. I also added condition X35 to account for the combined uses discussed in the diversion rate section of this memo. All of the acre foot amounts and irrigated acre amounts are additive, so X35 only addresses the diversion rate which is not an additive element of the combined rights. It is as follows:

Rights 22-7641, 22-13917 and 22-13918 when combined shall not exceed a total diversion rate of 1.16 cfs.

Another X35 condition is needed to account for the combined acres being irrigated out this well. This condition is as follows:

When the irrigation components of 22-7641, 22-12272, 22-13917 and 22-13918 are combined they shall not exceed a total diversion rate of 1.09 cfs.

Condition 170 was placed on this right and water right 31-2327B was changed to mitigation.

To mitigate for the depletion of water resulting from the use of water under this right and to prevent injury to senior water right holders, the right holder shall cease diverting and using water as authorized by the following water rights for the purposes and amounts specified below. Moreover, the official record for the following water right will be changed to show that diversion and use of water is not authorized because the rights, or portion thereof, are being dedicated to mitigation purposes.

Right No.	Use Changed to Mitigation	Mitigation Rate (cfs)	Mitigation Volume (AF)	Mitigation Acres
31-2327B	Irrigation	0.09	19.3	5.5

The land that will no longer be irrigated under this right is located within the NE, Section 26, Township 6N, Range 35E, B.M.

If the specified mitigation right, or portion thereof, is sold, transferred, leased, used on any place of use, or is not deliverable due to a shortage of water or a priority call, then the amount of water authorized for diversion under this right approval shall be reduced by the same proportion as the reduction to the mitigation rights.

Nelson, Dan

From: Nelson, Dan
Sent: Monday, August 04, 2014 8:01 AM
To: 'Scott King'
Subject: RE: 22-13917 and 22-13918

Hello Scott,

I haven't heard back from you on the email I sent you on July 17th. I asked in the July 17th email whether your client wanted us to include a combined limitation condition on all of the rights for the irrigation component, or whether you wanted to correct your map for 22-13917 to exclude the yard. Either way works for us, but I need to move forward on this one. If I don't hear from you by Friday 8/8/2014, I will continue to licensing of these two rights with the combined limitations.

Thank you for your time.

Dan

From: Scott King [<mailto:SKing@spfwater.com>]
Sent: Friday, July 18, 2014 8:36 AM
To: Nelson, Dan
Subject: RE: 22-13917

Thank you, Dan.
Will do.

From: Nelson, Dan [<mailto:Dan.Nelson@idwr.idaho.gov>]
Sent: Thursday, July 17, 2014 11:02 AM
To: Scott King
Subject: 22-13917

Hello Scott,

I have another question for you concerning the licensing of water right 22-13917. Your ArcMap shape file shows a place of use of 5.8 acres. The 5.8 acres include the lawn around the home. Water rights 22-12272 and 22-7641 cover the domestic use and up to ½ acre of yard irrigation. These two existing water rights would cover the a significant share of the excess 0.8 acres shown in your shape file, but we will need to address this in the conditions. We have a couple of options on how to handle this situation, so I wanted to contact you and have you give me your choice on how to describe water right 22-13917. We have the following two options:

- 1.) We can maintain the shape file submitted and add a condition onto water right 22-13917 that says something similar to "Water rights 22-7641, 22-12272 and 22-13917 when combined cannot irrigate more than 5.5 acres of ground." Please note, that this is only an example of the condition we would use. It could also include diversion rate and volume limitations if determined to be necessary.
- 2.) If you know the portion of the yard being irrigated under 22-7641 and 22-12272, you could send me an updated shape with the yard portion excluded and we would not need the combined limit condition.

Either of the above options would work for us, but Shelley asked me to contact you to ensure your client is in agreement with end result. We want to make sure you and your client are aware of the situation before we move forward. Please let me know what you want us to do in the next couple of weeks.

Thank you for your help Scott.

Daniel Nelson
Staff Hydrologist
Idaho Department of Water Resources
Telephone (208) 287-4856
Fax (208) 287-6700 (attn: Dan Nelson)

Permits	22-13917 and 22-13918
By	Dan Nelson
Date	7/14/2014

L. Glen Saxton Memo dated 8/8/2002 stated that the 70 acres of water right 31-2327B could provide 93 af of consumptive volume to permits 22-13917 and 22-13918. This calculation allowed for 20 acre feet for error in the calculations due mainly to the irrigation season of use. Therefore, the storage component should be taken out of the total consumptive use needs, and the irrigation components for both permits should split the remaining amount of 31-2327B.

Storage Calculation

Storage Volume in Acre Feet.	Conversion back to acres on 31-2327B*	Total Acres Required from 31-2327B for Mitigation
14	1.325	10.6

* The 2002 memo states that to convert the volume for 31-2327B you multiply each acre by 2.5 af (consumptive volume) and then multiply that number again by 0.53 for the losses of moving the water from Basin 31 to Basin 22. This shows that for every acres of mitigation under 31-2327B there is 1.325 af available for mitigation.

Permit	Acres Irrigated Per permit	Consumptive use in Basin 22 per 2002 memo	Total Volume needing Mitigated	Conversion back to acres on 31-2327B	Total Acres Required From 31-2327B for Mitigation
22-13917	5	1.7	8.5	1.325	6.4
22-13918	49	1.7	83.3	1.325	62.9

Total Acres Needed for Mitigation from 31-2327B =	79.8
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As you can see from the total acres needed from 31-2327B that there is still some error in the mitigation even with the 7 acre feet reduction of the storage consumptive use. Therefore, we will need to split the remaining mitigation acres after the storage acres are removed by the proportionate share of each water right. After you remove the 10.6 acres required for the storage use from the 70 acres of mitigation, there are 59.4 acres left. See below for the proportionate share of the remaining mitigation acres that need to be assessed to each water right.

Permit	Acres Irrigated on permit	Percentage of total acres irrigated under both permits	Mitigation Acres Remaining	Acres from 31-2327B that needs to be charged to each right for irrigation
22-13917	5	0.09	59.4	5.5
22-13918	49	0.91	59.4	53.9

Total Acres From 31-2327B Needed to Mitigate 22-13917 = 5.5 acres

Total Acres From 31-2327B Needed to Mitigate 22-13918 = 53.9 acres

Evaporation Loss Calculation

FILE NUMBER	22-13918
REVIEWER	Dan Nelson
DATE	7/14/2014

This spreadsheet has been designed by Idaho Department of Water Resources to estimate the annual evaporation losses from a pond.

The acronyms used on the Kimberly Research Center website are defined below:
P = Precipitation
ET= Evapotranspiration
P _d = Precipitation deficit
P _d =ET-P

User Input
Calculated value
Formula Explanations

USING THIS SPREADSHEET

To ascertain the evaporation from a pond, you will need to go to the Kimberly Research Center website. The link is found below. This web site provides the Precipitation Deficit for the area where the pond is located. The Precipitation Deficit is the total amount of free pan evaporation minus the precipitation for a given area, which gives the total amount of evaporative losses incurred by the pond. There are several weather sites that are used, and the entire state is pretty much covered. IDWR staff can find the nearest site using Arc Map. The shape file containing the sites can be found at <X:/Spatial/Climate/ETIdahostations.shp>.

Found at: <http://www.kimberly.uidaho.edu/ETIdaho/online.php>

Precipitation Deficit

Station: Twin Falls 2 NNE (NWS -- 109294)

Month	mm/day ¹	Days per month	mm/Month
Jan	0.00	31	0.00
Feb	0.02	28	0.56
March	0.40	31	12.40
April	1.37	30	41.10
May	2.08	31	64.48
June	3.16	30	94.80
July	3.33	31	103.23
August	3.15	31	97.65
September	1.94	30	58.20
October	0.95	31	29.45
November	0.00	30	0.00
December	0.00	31	0.00

PLEASE NOTE: We cannot use the season average, because there are several areas in Northern Idaho with a negative Precipitation Deficit. Therefore, we must enter each monthly deficit, and enter in a zero (0) for each negative month. The reason for this is that precipitation can only offset evaporation to the extent of the evaporation.

Please enter the daily average Precipitation Deficit as shown in the example below.

Although it has sometimes been useful to consider wintertime evaporation to be zero, Allen and Robison (2007, p. 169) noted, "Evaporation during nongrowing (wintertime) periods varies widely"

¹Negative monthly mean values should be entered in the above table as "0".

Total mm/year = 501.87

$$[(\text{mm/yr}) \div (\text{convert to feet})] \times (\text{Surface area of pond, in acres}) = \text{Evaporation Loss in Acre Feet}$$

(501.87 ÷ 304.8) X 8.50 = 14.0 AFA

Surface Area of Pond is automatically Carried over from the Seepage Loss Sheet.

ET_{Idaho} 2012 -- Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho

Please send suggestions for improving this site to robison@kimberly.uidaho.edu Copyright 2012, University of Idaho.

Driggs (NWS -- 102676)

Statistics based on thirty year normal spans 1969 to 2008 years

For a different land cover or crop click on the above link.

You can highlight this table and copy via the clipboard to a Microsoft Excel or OpenOffice spreadsheet to plot or otherwise work with this data.

Open water - shallow systems (ponds, streams)															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ^j	mm/day												mm		
Monthly ^c	-0.70	0.02	0.40	1.37	2.08	3.16	3.33	3.15	1.94	0.95	-0.15	-0.68	455	0	455
15-Day Moving Average ^d	-0.75	-0.10	0.39	1.32	2.19	3.07	3.29	3.09	1.76	1.05	-0.11	-0.63			
7-Day Moving Average ^e	-0.74	-0.04	0.38	1.32	2.10	3.03	3.30	3.12	1.84	0.99	-0.15	-0.65			
3-Day Moving Average ^f	-0.71	0.00	0.39	1.36	2.07	3.11	3.32	3.16	1.89	0.94	-0.14	-0.68			
Standard Deviation ^k	mm/day												mm		
Monthly ^c	0.99	0.65	1.07	0.93	1.56	1.10	1.27	0.89	1.07	1.37	0.62	1.17	128	0	128
15-Day Moving Average ^d	0.97	0.93	0.90	1.25	1.54	1.67	1.14	1.06	1.37	1.24	0.82	0.92			
7-Day Moving Average ^e	1.27	1.23	1.22	1.73	2.22	2.32	1.64	1.42	1.88	1.72	1.17	1.20			
3-Day Moving Average ^f	1.71	1.64	1.77	2.32	3.15	2.92	2.38	1.97	2.64	2.52	1.64	1.69			
20% Exceedance ^l	mm/day												mm		
Monthly ^c	-0.14	0.57	1.10	2.07	3.04	4.24	4.18	3.59	2.86	1.50	0.32	-0.09	566	0	566
15-Day Moving Average ^d	0.43	0.72	1.60	2.93	4.19	4.86	4.75	4.46	3.38	2.59	0.99	0.46			
7-Day Moving Average ^e	0.72	1.30	2.15	3.89	5.05	5.52	5.14	4.73	4.18	3.02	1.63	0.77			

3-Day Moving Average ^f	0.96	1.62	2.58	4.62	5.63	5.90	5.48	5.31	4.44	3.43	1.91	1.01			
80% Exceedance^m	mm/day												mm		
Monthly ^c	-1.42	-0.49	-0.34	0.38	1.08	2.24	2.59	2.47	0.78	0.39	-0.64	-1.13	350	0	350
15-Day Moving Average ^d	-2.24	-1.29	-1.04	-0.78	-0.22	0.45	1.54	1.30	-0.64	-0.96	-1.59	-1.94			
7-Day Moving Average ^e	-3.58	-2.67	-3.07	-2.47	-3.46	-3.32	-0.64	-0.54	-2.59	-2.36	-2.73	-3.33			
3-Day Moving Average ^f	-5.74	-4.74	-5.70	-5.47	-8.10	-7.17	-5.36	-3.47	-6.85	-6.71	-6.14	-6.04			
Ave Highest P_{def}	mm/day												--		
15-Day Moving Average ^g	0.20	0.55	1.10	2.29	3.39	4.30	4.29	3.88	2.71	1.93	0.61	0.21			
7-Day Moving Average ^h	0.53	1.11	1.68	3.15	4.49	5.11	4.82	4.44	3.69	2.68	1.13	0.51			
3-Day Moving Average ⁱ	0.79	1.41	2.16	3.85	5.18	5.63	5.21	4.91	4.13	3.12	1.57	0.80			
Ave Lowest P_{def}	mm/day												--		
15-Day Moving Average ^g	-1.47	-0.49	-0.20	0.44	0.97	1.88	2.50	2.27	0.98	0.04	-0.78	-1.31			
7-Day Moving Average ^h	-2.48	-1.41	-1.29	-1.04	-1.17	-0.33	1.15	1.02	-0.41	-1.16	-1.78	-2.27			
3-Day Moving Average ⁱ	-4.22	-3.02	-3.02	-3.58	-4.78	-2.96	-2.02	-1.37	-3.61	-4.07	-3.78	-4.24			
Special normal distribution parameters for monthly, seasonal, and annual intervals															
Skew ^m	-0.27	-0.82	-0.20	0.22	-0.17	-0.26	-0.08	-0.10	-0.09	-0.20	-0.48	-0.78	-0.02	0.00	-0.02
Kurtosis ^o	0.93	3.22	0.63	2.82	0.64	2.47	0.61	0.64	2.10	0.90	3.92	2.56	2.71	0.00	2.71

^a Growing Season: This is usually the time from green up or planting in the spring to a killing frost or harvest in the fall. It is not applicable for entries without a growing season and will be blank.

^b Nongrowing Season: This is usually the time from a killing frost or harvest in the fall to the of green up in the spring. It is not applicable for entries without a growing season.

^c Mean of the average daily value for month

^d Mean of the fourteen 15-day period averages contained in the month

^e Mean of the twenty three 7-day period averages contained in the month

^f Mean of the twenty seven 3-day period averages contained in the month

^g Mean of the highest/lowest 15-day period average in month

^h Mean of the highest/lowest 7-day period average in month

ⁱ Mean of the highest/lowest 3-day period average in month

^j This value represents the *mean value* for the parameter for the month over the 'normal' period of record. Generally, the 'normal' period is the last thirty years with data.

^k This value represents the *standard deviation* for the parameter for the month over the 'normal' period.

^l This value represents the *value* for the parameter that has a 20% chance of being exceeded that month during any particular year. Conversely, there is an 80% chance that the parameter value will be less than the *value* shown.

^m This value represents the *value* for the parameter that has a 80% chance of being exceeded that month during any particular year. Conversely, there is an 20% chance that the parameter value will be less than the *value* shown.

ⁿ This value represents the *skewness (asymmetry) of the distribution of the parameter values* for the month (year) over the 'normal' period. A value near zero indicates that the distribution approximates a normal (Gaussian) and symmetrical distribution. A negative skew indicates that the parameter distribution has relatively few low values compared to high values. A positive skew indicates that the distribution has relatively few high values compared to the number of low values. A skew value near 1 indicates that the underlying distribution approximates a lognormal distribution.

^o This value represents the *kurtosis* of the parameter value distribution for the month (year) over the 'normal' period. Kurtosis is a measurement of the height to width ratio of the probability distribution, or the *peakedness (slenderness)*. A normal (Gaussian) distribution has a kurtosis of 3. A high kurtosis distribution has a sharper peak and longer tails, while a low kurtosis distribution has a more rounded peak and shorter tails.

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The citation for the evapotranspiration data used from this site should be: *Allen, Richard G. and Clarence W. Robison, 2012. Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho: Supplement updating the Time Series through December 2008, Research Technical Completion Report, Kimberly Research and Extension Center, University of Idaho, Moscow, ID.*

Questions regarding the data should be addressed to [Clarence W. Robison](#) or [Richard G. Allen](#), University of Idaho, Kimberly Research and Extension Center, 3793 North 3600 East, Kimberly, ID 83341. Telephone (208)-423-6610

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