

MEMORANDUM

TO: Water Right File – 63-32601
FROM: Patrick Kelly; Water Resource Agent, Sr.
DATE: March 1, 2016
SUBJECT: Review of Water Right File for Licensing

The water right permit was approved on December 1, 2008 for aesthetic storage totaling 75 af. A field exam was completed by Terry Scanlan of SPF Water Engineering with the Request to Reinstate due to the lapse of permit. My review of the documentation supplied with the field exam is as follows:

Point of Diversion: Examiner recorded a diversion in the NENE $\frac{1}{4}$ $\frac{1}{4}$ of Sec 14, 4N, 1W. This matches the permit and aerial photography showing a pond within the legal description. The four POD's permitted represent wells that were proposed to fill the pond. A single well in the NENE delivers ground water recharge to account for evaporative losses under mitigating right 63-32789. The remaining wells on the property are to be abandoned according to the report. There is no information to suggest a POD overlap or that an amendment is required.

Place of Use: POU in the NENE $\frac{1}{4}$ $\frac{1}{4}$ of Sec 14, 4N, 1W matches the permit. There is no information to suggest a POU overlap or that an amendment is required.

Diversion Rate and Volume: There is no diversion rate or seepage loss for a pond that is excavated and naturally fills. Depth measurements were made to estimate an average pond depth of 20 feet. Surface area of the pond is 4.7 acres with a pond capacity totaling 94 af. Evaporation losses total 12.3 af.

Discussion: This is within the B63 ground water restricted area. Consumptive losses are mitigated through 63-32789 and delivery of 13.0 af from the well to the pond each year. Even with the extra acre surface area, consumptive losses are still mitigated according to the attached pond analysis.

An average depth of 20 ft suggests that the pond has steeper slopes and a relatively flat bottom shape. This seems reasonable given the pond was excavated. Permit limits the surface area to 3.7 acres $\Rightarrow 3.7 \text{ ac} * 20 \text{ ft} = 74 \text{ af}$.

Application for permit (63-34183) was filed with the report to account for the extra surface area and capacity of the pond.

Recommended Amounts:

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
Aesthetic Storage	01/01 – 12/31	--	74 af
	<u>Totals</u>	--	74 af

Recommended Amendments:

☐ Change P.D. ☐ Add P.D. ☒ None

☐ Change P.U. ☐ Add P.U. ☐ Other

Evaporation Loss Calculations

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

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User Input
Calculated value
Formula Explanations

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

USING THIS SPREADSHEET

Use the link below to access the Kimberly Research Center website. This website provides the Precipitation Deficit for a station most representative of the pond under examination. The Precipitation Deficit is the total amount of free water surface 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 throughout the state. 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>.

Instructions:

1. Use the link below to navigate to ET Idaho 2012.
2. Select the station which is most representative to your pond location.
3. Click Submit Query.
4. Under "Land Covers with Evapotranspiration Estimates," select "Open Water - Shallow Systems (ponds, streams)" or "Open Water - small stock ponds" depending on the pond size.
5. Click the link to "Precipitation Deficit."
6. Reference and copy (ctrl + C) the first subheading "Mean" values.
7. Click the "Paste Values from ET Idaho" button. The table will automatically enter a zero (0) for any negative precipitation deficit values.

Found at: <http://data.kimberly.uidaho.edu/ETIdaho/>

Precipitation Deficit

Station: Caldwell (NWS - 101380)

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.83	31	0.00
Feb	0.18	28	5.04
March	1.22	31	37.82
April	2.51	30	75.30
May	3.74	31	115.94
June	4.22	30	126.60
July	5.01	31	155.31
August	4.27	31	132.37
September	3.06	30	91.80
October	1.89	31	58.59
November	-0.12	30	0.00
December	-0.78	31	0.00

PLEASE NOTE: The seasonal average for precipitation deficit should not be used for calculations because precipitation often exceeds evaporation during wetter months of the year. If the pond is kept full, excess precipitation during wetter months does not serve to refill the pond during drier months.

For example, see Sandpoint KSPT (NWS -- 108137), the annual precipitation deficit is -106 mm. However, April through September have positive precipitation deficit values. To properly estimate the annual volume of water necessary to refill a pond due to evaporation losses, the table will automatically enter a zero (0) for each month that the precipitation value is reported as a negative value.

As described above, precipitation offsets evaporation in winter months, so the net effect is that wintertime precipitation deficit is usually zero.

Total mm/year = 798.77

$$\left(\frac{798.77}{304.8} \right) \times 4.70 = 12.3 \text{ AFA}$$

Total Storage Calculations

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This spreadsheet has been designed by Idaho Department of Water Resources to estimate the total seepage, evaporation and fill capacity required for a pond.

User Input
Calculated value
Formula Explanations

Surface Area (AC.)	4.7	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	20	"Average Pond Depth" depicts the actual depth of the pond either measured or estimated. Note: If you know the maximum depth and not the average depth, the Field Examiner's Handbook suggests multiplying the maximum depth by 0.4 to get the average depth, or you can use any method that seems reasonable to attain average depth.
Pond Capacity (AF)	94	Pond Capacity is calculated by multiplying the Pond Surface Area by the Average Pond Depth. If you know the capacity, divide the capacity by surface area and enter the average pond depth in the space above. Note: If pond capacity is determined using a method shown on the "Pond Capacity" sheet, the user may need to modify the value of "Pond Capacity" (cell B9) manually. Note that if the value is modified manually, the formula will be altered for future use.
Multiple Fill Volume Above Initial Fill to Fulfill From Storage Needs- "Multiple Fills" (AF)	0	The "Multiple Fill Volume Above Initial Fill" is the acre-feet of water required to meet a <i>from storage</i> component if the <i>from storage</i> component exceeds a one time fill. This section should not include the amount of water needed to fill the pond initially or the amount of water needed to maintain the pond level due to evaporation or seepage. For example: if a pond has a capacity of 5 acre feet and 2.5 acre feet of seepage and evaporation, but the pond is used for irrigation that requires 10 acre feet of from storage for the irrigation use, then you would insert 5 acre feet into this location (10 acre feet needed - 5 acre feet from the initial fill = 5 acre feet of additional storage needed). Note: You must have a "From Storage" component exceeding the initial fill on the permit to include a volume in this space.
Estimated Seepage Loss (AF)	0.0	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	12.3	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	106.3	The "Total Volume Required" is calculated by adding the Pond Capacity, Multiple Fills, Seepage Loss, and Evaporation Loss amounts to determine the total amount of storage required.