

MEMORANDUM

TO: Water Right Files 63-32226 and 63-32608

FROM: Daniel Nelson – Staff Hydrologist

DATE: March 18, 2016

SUBJECT: Licensing Review of Water Rights 63-32226 and 63-32608

These field exams were performed by Certified Field Examiner Scott King of SPF Water Engineering. Mr. King reported that 1.03 cfs for wildlife and diversion to storage and 10 af of wildlife storage was developed for permit 63-32226, and 2.80 cfs for wildlife and diversion to storage and 34 af of wildlife storage was developed for permit 63-32608 from an unnamed drain. Water rights 63-32226 and 63-32608 are for the same 5 ponds. Water right 63-32608 was filed to increase the amount of diversion rate and storage, since water right 63-32226 didn't provide adequate diversion rate from the drain and storage to cover all of the ponds. There are a couple of issues that need to be addressed. Each will be addressed below:

History:

A brief history of this property is needed to fully understand what is happening. There are approximately 59 acres currently owned by the Thorpe Family Trust. Thorpe Family Trust purchased the ground from Parma Ponds, LLC. Water right 63-32165 is a split off of water right 63-3001 that is used to irrigate 51.6 of the 59 acres. The remaining acres are comprised of drains, ditches and another pond. Permits 63-32226 and 63-32608 were filed to flood the 51.6 acres during hunting season or non-irrigation season to provide duck habitat. Permits 63-32226 and 63-32608 use the same water delivery system as water right 63-32165. Water rights 63-3001A, 63-3001C, and permit 63-32562 are also delivered through the same system, but these rights are not owned by the permit holder.

The water for all of the above rights are diverted from an unnamed drain and piped to the north over the Ross East End Drain. No water is diverted from the Ross East End Drain for these permits. The water in the pipe is delivered to junction box where water is split out to the different owners. The permit holder's portion of the water diverted through the pipeline is piped to the individual fields. The junction box has a weir for measurement and head gates for each of the water users that can be locked.

Points of Diversion:

Mr King GPS'ed the point of diversion and properly located it on the map. The point of diversion doesn't match the decreed water rights, but it appears as though a new delivery system was developed when these ponds were created. The point of diversion is in the same 40 acre tracts, so there shouldn't be an issue with the GPS location Mr. King provided.

Place of Use:

Mr. King provided an excellent map of the place of use, and included a disc with the shape file he created for the ponds. The pond locations and legal descriptions match the permits, so there shouldn't be an issue. However, the southwestern pond (Pond E) appears to go through the middle of the field. I contacted Mr. King about this and by reviewing historic 1994 aerial photos, you can see that there was actually two field in this area, so it reasonable to believe that that the old ditch line is a high spot in the field preventing the field to the north from being flooded. I feel the locations of the ponds are accurate and reasonable.

The Bureau of Land Management December 15, 1868 original survey describes a portion of the ponds in the NE1/4 SW1/4 as being in the old Boise River channel and described as the NE1/4 SW1/4 of Section 17, Township 5 North, Range 5 West, B.M. The remainder of the ponds in the NE1/4 SW1/4 are not in the old Boise River Channel and are described as being Government Lot 6 (NE1/4 SW1/4) of Section 17, Township 5 North, Range 5 West, B.M. The same thing is the case in the NW1/4 SW1/4 where a portion of the ponds fall in the old Boise River Channel and the only difference is that Government Lot 5 covers the NW1/4 of the SW1/4. This results in two legal descriptions for the same 40 acre tract – one with just the 40 acre tract designation and one with the 40 acre tract designation with the Government Lot designation.

Diversion Rate:

Mr. King measured the water diverted the ponds through a cipoletti weir, and I have no problems with the measurement. The measurement showed that 3.90 cfs was being diverted at the time of the field exam. Permit 63-32226 allows a diversion rate of 1.03 cfs and permit 63-32608 allows a diversion rate of 2.80 cfs during the non-irrigation season. During the irrigation season, the permit holder is limited to the 1.03 cfs diversion rate allowed by their irrigation water right 63-32165.

The amount measured of 3.90 cfs is adequate to supply the full diversion rate requested in both permits. Mr. King properly identified the flow through component of the permit described in the wildlife use as the maximum diversion rate allowable for each permit. Therefore, the wildlife use and the diversion to storage use both have the same diversion rate, and the total rate is limited to the same diversion rate for each permit.

Diversion Volume:

Please see attached spreadsheet for analysis of volume.

Mr. King originally determined the storage volume as 10 af for permit 63-32226 and 34 af for permit 63-32608 or a total of 44 af when the two permits are combined. The capacities of the 5 ponds were calculated to be 44 af. See the attached spreadsheets. Mr. King also didn't provide a volume for the wildlife use. The storage calculated by Mr. King did not include any seepage or evaporation losses. Therefore, we needed to determine the actual volume of the storage components when including the seepage and evaporation, and the volume of the wildlife flow through amounts.

In Mr. King's email dated 12/15/2015, he stated that the water from the drain is delivered to the ponds non-stop for 181 days during the non irrigation season. This would supply a diversion volume of 1,375af ($3.83 \text{ cfs} \times 1.9835 \times 181 \text{ days} = 1,375 \text{ af}$). There is 1,375 af of water we have to work with to provide adequate storage volumes and a volume for the wildlife use.

On February 26, 2016, Mr. King supplied information to provide the evaporation and seepage rates for the ponds. Mr. King came up with a seepage volume of 0.5 af and evaporation rate of 9.7 af. The seepage volume that Mr. King compiled was only for a 1 acre pond. The ponds for these two permits have a surface area of 23 acres. I redid the pond spreadsheet using the correct surface area, and I found that 12.5 af is lost to seepage. When I did a calculation of the evaporation losses, I came up with a higher evaporation rate. I used the Parma Experimentation Station and Mr. King used the Parma AgriMet station. Mr. King came up with a evaporation rate of 9.7 af, and I came up with an evaporation rate of 10.4 af. I will license the permits based on the 10.4 af to ensure the permit holder is covered.

With a flow through volume of 1,375 and a total storage volume of 66.9 af ($44 \text{ af capacity} + 12.5 \text{ af seepage} + 10.4 \text{ af evaporation} = 66.9 \text{ af storage}$), the wildlife flow through for these permits would be 1,308 af ($1375 \text{ af total available} - 66.9 \text{ af storage} = 1,308 \text{ wildlife volume}$). This leaves the calculations for the volumes for each permit. I did this based on the permit and the percentage amounts.

Permit 63-32226 was limited to 1.03 cfs and 10 af of storage. A diversion rate of 1.03 cfs provides 370 af of the total 1,375 af. The 10 af of storage allowed by this permit covers 22.7% of the storage allowed. Therefore, 22.7 % of the seepage and evaporation rates should be allocated to this permit. $12.5 \text{ af of seepage} \times 0.227 = 2.8 \text{ af of seepage}$, and $10.4 \text{ af of evaporation} \times 0.227 = 2.4 \text{ af of evaporation}$. This permit should provide 15.2 af of storage ($10 \text{ af capacity} + 2.8 \text{ af seepage} + 2.4 \text{ af evaporation} = 15.2 \text{ af total storage}$). The wildlife use should be limited to 1.03 cfs and 355 af ($370 \text{ total volume} - 15.2 \text{ af storage} = 354.8 \text{ af}$).

Permit 63-32608 was limited to 2.80 cfs and 34 af of storage (per the field report). A diversion rate of 2.80 cfs provides 1,005 af of the total 1,375 af. The 34 af of storage allowed by this permit covers 77.3% of the storage allowed. Therefore, 77.3 % of the seepage and evaporation rates should be allocated to this permit. $12.5 \text{ af of seepage} \times 0.773 = 9.7 \text{ af of seepage}$, and $10.4 \text{ af of evaporation} \times 0.773 = 8.0 \text{ af of evaporation}$. This permit should provide 51.7 af of storage ($34 \text{ af capacity} + 9.7 \text{ af seepage} + 8.0 \text{ af evaporation} = 51.7 \text{ af total storage}$). The wildlife use should be limited to 2.80 cfs and 953 af ($1005 \text{ total volume} - 51.7 \text{ af storage} = 953.3 \text{ af}$).

Overlap:

Several water rights appear to overlap this water right, but there are no other storage water rights on these ponds. Water right 63-32165 is owned by the permit holder, and it supplies irrigation water for the fields that are flooded during the non-irrigation season to create the storage for these ponds. Water right 63-32165 is diverted out of the same point of diversion. Water rights 63-3001A, 63-3001C, 63-32652, and 63-32166 are all diverted out the same point of diversion, but 63-3001A and 63-3001C are for property south of the Ross East End Drain. The permit holder's property surrounds a parcel of land owned by Douglas Merges who holds Permit 63-32652 for a wildlife pond and water right 63-32166 for irrigation. Both of Douglas Merges' water rights are diverted from the same point of diversion.

The permit holder's property sits in-between the Riverside Irrigation District and Haas Ditch Company, so it isn't within the borders of any canal company. Permit 63-33643 is also owned by the permit holder, but it is for on-stream storage on a different drain and for different ponds.

Ownership:

Permit 63-32226 is currently in the name of Parma Ponds LLC. An assignment of permit has been submitted, but proof of beneficial use was submitted beyond the lapse date for this permit. The permit holder provided the needed information to license the permit, so an order to re-instate the permit will be composed to go along with the licensing of this permit.

Conditions:**63-32226:**

Condition #1 (106) was removed as is standard. Condition #3 (121) was changed to condition 103 and Condition #6 was changed to condition R43 as is standard. Water right numbers 63-3001A and 63-3001C were added to condition #8 (F06), since they are diverted out of the same point of diversion per the field examination. Condition #12 was changed to standard condition 204. Conditions #14 and #15 we combined into standard condition 259. The remaining conditions on the permit will be carried over to licensing.

63-32608:

The same changes made to the conditions for permit 63-32226 will be made to permit 63-32608. Permit 63-32608 included an additional condition marked as condition 1 (26A), which will be removed at licensing as is standard.

Total Storage Calculations

FILE NUMBER	63-33643
REVIEWER	Dan Nelson
DATE	11/13/2015

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.)	23	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	1.91	"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)	43.9	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)	12.5	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	10.4	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	66.8	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.

Evaporation Loss Calculations

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

FILE NUMBER	63-33643
REVIEWER	Dan Nelson
DATE	11/13/2015

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

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

Precipitation Deficit

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

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.71	31	0.00
Feb	0.10	28	2.80
March	0.00	31	0.00
April	0.00	30	0.00
May	0.00	31	0.00
June	0.00	30	0.00
July	0.00	31	0.00
August	0.00	31	0.00
September	2.88	30	86.40
October	1.56	31	48.36
November	0.00	30	0.00
December	-0.59	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 = 137.56

Evaporation is based on the 181 days of evaporation use.

$$((137.56 \text{ mm/yr}) \div (\text{convert to feet})) \times (\text{Surface area of pond, in acres}) = \text{Evaporation Loss in Acre Feet}$$

(137.56 ÷ 304.8) X 23.00 = 10.4 AFA

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

Example Data:

Seepage Loss Calculations

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

FILE NUMBER	63-33643
REVIEWER	Dan Nelson
DATE	11/13/2015

Seepage is based on the 181 days of the season of use.

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	23	AC.
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Pond Surface Area (SQ. FT.)	1001880	SQ. FT.
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I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	CL	
Suggested Seepage Rate (FT./DAY)	0.0030	FT./DAY

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
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Convert to GPD	22482	GPD
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Total Seepage Loss (AFA)	12.5	AFA
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Though sand and gravel seepage rates may actually be higher, the maximum allowable rate is 0.2 ft/day, pursuant to Administrative Memo "Seepage Loss Standards for Ponds and Reservoirs."

Suggested Seepage Rates for Different Soil Types:
GW, GP, GM, GC, SW, SP and SM (silty sand, sand silt mixtures and gravel mixtures) = 0.2 ft per day
OL and ML (inorganic silts - very fine sands, silty, or clayey fine sands) = 0.02 ft per day
SC (clayey sands, sand clay mixtures) = 0.007 ft per day
CL (Low to medium plasticity clays) = 0.003 ft per day
MH, OH, PT and CH (high plasticity clays) = 0.0003 ft per day
LINED PONDS (liners can be chemical, fabric, or bentonite) = 0 ft per day
Ponds Intercepting Groundwater (excavated ponds filled by ground water) = 0 ft per day

PLEASE NOTE: The initial basis for the Suggested Seepage Rates in the table above is found on Page 16 of Seepage from Fish Ponds, Bulletin 599, August 1989 Alabama Agricultural experiment Station, Auburn University, Auburn University Alabama. If you don't know the soil type, please refer to the map provided at the NRCS Web Soil Survey (Tab #1), an ArcMap Soil Classification Map (Tab #1.1), or published NRCS Soil Survey (Tab #1.2). Use "0" if the pond fill relies on the water table.