

MEMORANDUM

TO: Water Right Files 65-13470

FROM: Daniel Nelson – Staff Hydrologist

DATE: December 28, 2016

SUBJECT: Licensing Review of Water Right 65-13470

This field exam was performed by Lori Graves who formerly worked at our Western Region office. Ms. Graves found a well located in the NE1/4SE1/4 of Section 7 in Township 18 North, Range 3E, diverting approximately 0.04 cfs for aesthetic and wildlife uses to a pond also known as Lake Douglas also in the NE1/4SE1/4 of Section 7. Ms. Graves recommended an annual diversion volume for these two uses of 16.2 af. Ms. Graves stated in the field report that livestock no longer used the pond for stockwater, so she removed that use from her recommendation.

History:

These water rights have a rather long and convoluted history, so I feel it is important to include that history with the water right review to provide the background to understand what transpired to begin the licensing of these water rights.

The original owner of this property was M Resorts LTD. This property appears to have originally been a large ranch or several ranches that were purchased around the same time to create a golf course and other amenities. The properties had several domestic wells and what appears to have been some instream stockwater uses.

In 1992, M Resorts constructed a pond known as Betsy's Pond on an unnamed stream. In 1993, M Resorts filed permit 65-13452, to create a wildlife, aesthetic, and stockwater pond to cover the water use in Betsy's Pond. The permit was protested, but it was later approved with conditions requiring monitoring of the unnamed stream. In 1995, permit 65-13452 lapsed. In 1996, a complaint was filed claiming that M Resorts was still diverting the unnamed stream water, and had constructed several wells without a water right to divert into Betsy's Pond. Department staff visited the site and found that there were 7 existing wells and some of those well may have been diverted into Betsy's Pond during a test pumping exercise. However, Department staff also discovered that a channel had been constructed around Betsy's Pond, to ensure none of the unnamed stream water entered the pond.

The result of the complaint review was that M Resorts filed several applications and had six permits approved to cover the water use from the wells, and provide water for 3 ponds named Betsy's Pond, Whitetail Pond, Annie Pond, and Lake Douglas. Lake Douglas had two decreed water rights from an unnamed stream to the pond. The permit for Lake Douglas was from one of the 7 wells that was decreed for a domestic use for a RV Park that no longer exists. The Douglas Lake permit was not tied into the system that provided water to Annie Pond, Whitetail Pond or the golf course.

SPF Water Engineers performed the field exams on all of these permits except for permit 65-13470 for the ground water use in Lake Douglas, which was done by Department staff. Water right 65-13704 was split into water rights 65-13704 and 65-23452, since Betsy Lake was on its own system and no longer tied into the system supplying water to Whitetail Pond and the irrigation system. The field exams were done in 2010, and two of the permits have been licensed. This leaves 5 permits to be licensed for this permit holder. With the information supplied for these permits, it appears as though we can move forward with licensing these permits.

Overlap:

There are several water rights that directly overlap the point of diversion and/or the place of use. Water rights 65-7007 and 65-13453 allow the storage of water in Lake Douglas. Water rights 65-7007 and 65-13453 are from an unnamed stream, and Lake Douglas is an onstream storage facility. The uses for both rights include stockwater storage, domestic storage, recreation storage, wildlife storage and aesthetic storage. These rights are the only water rights that directly overlap the place of use.

Water right 65-8209 directly overlaps the point of diversion. This water right was decreed in the Snake River Basin Adjudication for domestic use for a RV Park. I could not find any RV Park in the aerial imagery available, but apparently there was one in this area at one time. The field examiner stated that the RV park no longer exists, so this water right doesn't appear to be too much of a concern.

There are several other domestic and stockwater rights in the area, but they do not appear to be a direct overlap. Please review the overlap memo for a more comprehensive overlap analysis.

Water Uses:

The permit allowed for stockwater, wildlife, and aesthetic uses. There is a note on the application from Steve Lester formerly from our Western Region office stating that the storage component for Lake Douglas was covered by overlapping unnamed stream water rights 65-7007 and 65-13453, and that this permit was filed to allow the permit holder to refresh the lake from an existing well.

The field examiner found that there were no livestock using this lake for drinking water, so they recommended that the stockwater component be removed at licensing. The lake is on the edge of a golf course in the middle of town, so I agree with the field examiner's assessment.

The wildlife and aesthetic uses were for refreshing the pond. There has been some concern on what exactly refreshing the pond referred to. In speaking with their consultant, it appears as though the refreshing of the pond was basically to cover the evaporation losses and to provide fresh water to the pond when the unnamed stream sources were not available. There is another pond on the same unnamed stream below Lake Douglas, so there does appear to be some flow through the pond. However, the unnamed stream basically carries away snow melt, so it doesn't appear to flow all year long. The unnamed stream doesn't even show up on the USGS Quadrangle Maps until after it leaves Lake Douglas, which suggest the pond was developed over a spring or boggy area.

From the field exam and speaking with the permit holder's consultant, it appears as though the refreshing of the pond is actually to prevent stagnation of the pond, cover evaporation losses, and provide fresh water throughout the later months of the season. In discussions with administrative staff, it was determined that the water use from this permit should be considered a part of the storage component, since the water does not appear to flow through the pond. The water from the well actually refills the reservoir to cover evaporation losses or to add additional water already stored to prevent stagnation of the pond. Therefore, an amendment will be needed to change the use from aesthetic and wildlife use to diversion to storage, aesthetic storage, and wildlife storage.

Points of Diversion:

The mapping capabilities at the time of the field examination were not as good as current practices and imagery. The field examiner did provide a photo showing the well by a pump house. It was very difficult to determine the location of the pump house with all of the trees at this location, but I feel I have come very close to designating the actual location of the point of diversion. Please see attached aerial imagery for reference.

Place of Use:

The place of use for this permit was correct. However, the pond has been enlarged over the years. The permit holder is planning on filing a new permit to cover the increase in pond size.

Diversion Rate:

The permit allowed a diversion rate of 0.04 cfs to be diverted from the well for aesthetic and wildlife purposes. The system was limited to a capacity of 0.04 cfs. The field examiner calculated a flow rate of 0.037 cfs rounded to 0.04 cfs. The calculations made by the field examiner included an area average for the pumping water levels and an estimated pressure of 5 psi. Due to the buried pipelines on this system, a measurement would have been difficult on this system, so the theoretical calculation appears to be the only method of determining the flow rate available. Although the calculation includes many assumptions, I feel it was the best method of determining the system capacity at the time. Since the permit will need to be amended to remove the aesthetic and wildlife use, the amendment should have a diversion rate of 0.04 cfs for the diversion to storage component of the amended permit.

At one time this well was used to supply an RV park pursuant to water right 65-8209. According to the field examiner, the RV park no longer exists. I couldn't find any evidence of the RV park in any of aerial imagery, but the water right was decreed in the Snake River Basin Adjudication. Therefore, I am going to recommend that this permit be licensed for 0.04 cfs with a condition that limits the use of this right when combined with 65-8209 to 0.04 cfs.

Surface Area of the Ponds:

In the attached aerial photos, you can see that the pond has increased in size over the years. We can only license the portion of the lake prior to proof of beneficial use being filed in 1998. The first aerial imagery available to the Department after proof of beneficial use statement was submitted is the 2004 aerial photo. Using the 2004 aerial photo, I found a surface area of approximately 1.6 acres. The pond surface area has increased dramatically since 2004. Please see the attached aerial photography. The field examiner determine that the pond has a surface area of 2 acre feet, which seems to be similar to my calculations. This is inconsistent with the analysis done during the licensing of water right 65-13453, but from the map supplied with the review, it appears as though reviewing agent only used the surface area based on the 1992 aerial photography, and not the 2004 aerial images. You can clearly see in the 2004 aerial images that the pond had been enlarged from the 1992 aerial imagery.

Diversion Volume:

The field examiner calculated the annual volume by calculating the capacity of the Lake Douglas and allowed that volume of water. This does not seem reasonable, since the permit didn't originally have a storage component associated with the permit. This permit was only allowed to refresh the pond. The pond would also only need to be refreshed periodically, since the overlapping water rights were used to cover the storage volume for Lake Douglas. This permit should not be allowed to increase the storage capacity of the pond.

On February 17, 2017, I met with Lori Graves (the former Department field examiner) and Terry Scanlan with SPF Water Engineering to discuss this permit and several others that Mr. Scanlan performed a certified field examiner's exam on for the permit holder. On March 2, I sent Mr. Scanlan an email formally requesting information we discussed in our February 17, meeting. In this information I asked Mr. Scanlan to show how long the pump is operated. During our meeting, we discussed several ways of determining the volume diverted from the well. The most reasonable method appeared to be limiting the volume to the 2.3 af calculated as the evaporation losses from the pond. After speaking with the permit holder, Mr. Scanlan informed me by email that the permit holder didn't have any records showing the amount of time the pump operates. Mr. Scanlan then stated he and the permit holder agreed with limiting the volume to the evaporation losses from the pond of 2.3 af. Therefore, I am recommending a total volume of 2.3 af that can be licensed with this permit.

During the licensing of water right 65-13453 the license reviewer used standards available at the time to determine the seepage and evaporation rates for the pond. Since this time, the Department has created a new tool to determine evaporation and seepage rates. Water right 65-13453 allows 5.3 af for the initial filling of the pond, 1.4 af for evaporation losses, and 3.9 af for seepage losses. Water right 65-7007 added an additional 5.6 af. Using the newer tools, I found that the pond in the 2004 aerial photo should have 13.4 af for the initial filling of the pond, 2.3 af for evaporation losses, and 1.8 af for seepage for a total of 17.5 af. Water rights 65-7007 and 65-13453 provide a total of 16.2 af leaving (17.5 af total needed – 16.2 af licensed = 1.3 af available). When comparing the amount licensed for water right 65-13453 to my analysis with the modern tools, the initial fill amount was low (10.6 licensed compared to 13.4 af calculated), the evaporation amount was low (1.4 af licensed compared to 2.3 calculated), and the seepage rate was high (3.9 af licensed compared to 1.8 af calculated). The existing water right licenses provide 5.3 af of existing volume for seepage and evaporation, and I calculated a total of 4.1 af for seepage and evaporation. Since the fill volume was miscalculated, I am recommending the 2.3 af allowed by this permit to cover the fill volume.

The pond was enlarged after 2004, so a new permit will be needed. When the proposed permit is approved and licensed, we should be able to bring these volume numbers into a more consistent state. Unfortunately, we will need to license this permit to avoid any restricts on the existing licenses. In order to provide the most accurate conditioning of this permit, I recommend condition 219 be used with the following language:

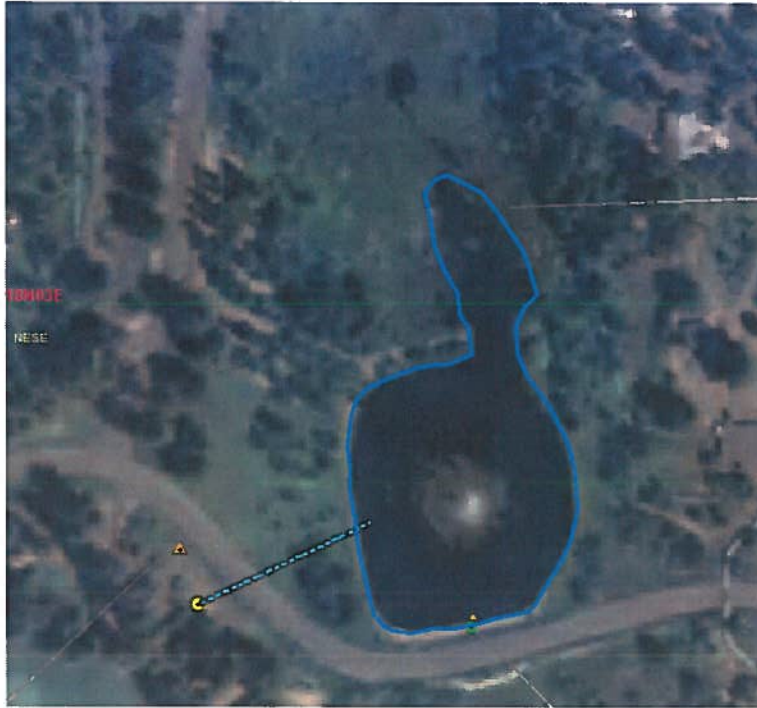
Rights 65-7007, 65-13453, and 65-13470 authorize total annual storage volume of 17.5 acre-feet, 13.4 acre-feet to be used for the initial filling of the pond and 4.1 acre-feet for the replacement of losses caused by seepage and evaporation.

The above condition shouldn't conflict with the existing water right licenses, and the actual pond volume amounts can be rectified by the proposed application for permit.

Conditions:

The permit had one condition which described the number of livestock using the stockwater component, and a description of the aesthetic and wildlife uses as refreshing the existing pond. I have added condition X 35 to limit the well capacity to 0.04 cfs when combined with water right 65-8209. Condition X36 will also need to be added. There should also be a condition that states the pond is known locally as Lake Douglas. As discussed above condition 219 should also be added to limit the volume. Along with condition 219, condition 220 will be needed to limit to a capacity of 13.4 acre feet and a surface area to 1.6 acres.

Permit 65-13470 – Place of Use Verification.



The above aerial photo shows the pond as of 2004. The 2004 aerial photo is the first aerial photo available after proof of beneficial use was filed. The aerial photo below shows the pond size as of 2015. As you can see, the pond has grown since its original development. The permit holder is filing a new application of permit for the increase in pond size since 2004.



Permit 65-13470 – Point of Diversion Location



The field examiner provided a photo showing the well location next to the pump house. It was difficult to find the pump house in the trees, but I believe the location shown above is correct.

Total Storage Calculations

FILE NUMBER	65-13470
REVIEWER	Dan Nelson
DATE	6/8/2017

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.)	1.6	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	8.4	"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)	13.44	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 " <u>From Storage</u> " component exceeding the initial fill on the permit to include a volume in this space.
Estimated Seepage Loss (AF)	1.8	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	2.3	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	17.5	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.

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	65-13470
REVIEWER	Dan Nelson
DATE	6/8/2017

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	1.6	AC.
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Pond Surface Area (SQ. FT.)	69696	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	1564	GPD
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Total Seepage Loss (AFA)	1.8	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.

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	65-13470
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DATE	6/8/2017

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: Twin Falls 2 NNE (NWS -- 109294)

Month	mm/day ¹	Days per month	mm/Month
Jan	-1.93	31	0.00
Feb	-1.46	28	0.00
March	-0.70	31	0.00
April	0.73	30	21.90
May	1.38	31	42.78
June	2.42	30	72.60
July	4.12	31	127.72
August	3.49	31	108.19
September	1.93	30	57.90
October	0.46	31	14.26
November	-1.99	30	0.00
December	-2.50	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 = 445.35

$$[(445.35 \text{ mm/yr}) \div (\text{convert to feet})] \times (\text{Surface area of pond, in acres}) = \text{Evaporation Loss in Acre Feet}$$

$$(445.35 \div 304.8) \times 1.60 = 2.3 \text{ AFA}$$