

MEMORANDUM

TO: Water Right File 63-11572
FROM: Aaron Skinner – Water Resource Agent
DATE: March 2, 2017
SUBJECT: Field Exam Review

This water right permit was approved on November 13, 1991 for commercial, diversion to storage, and wildlife storage use for a rate of 0.20 cfs and 4.0 af. The Proof of Beneficial Use form was received on September 16, 1994. A field exam was completed by department staff on November 15, 1994.

I was assigned this file on March 2, 2017. A pond and overlap analysis were completed during my review and attached. My review of the documentation supplied with the field exam is as follows:

Ownership: This permit is in the name of Sheila and Dan Doherty. Currently, Ada County taxlot data shows Brian Harrigan as current owner of the POU. After licensing, an ownership change form will need to be received from Mr. Harrigan if he has interest in the right.

Source, POD, POU: The source is groundwater and is further identified on the field exam as an artesian well that supplies water to five water rights and this permit (WR nos. 63-3503A, 63-3503B, 63-7054, 63-32251 and 63-32252). The diversion is a 6" steel pipe that diverts water into an open ditch. The ditch tees off carrying water to the pond and into the greenhouse. The POD was identified on the incomplete field exam to be located in the NWSESE of Section 19. The Proof Report suggests the location to be in the NWSE of Section 19. The current PLS layer in ArcMap matches the Proof Report. Therefore, no amendment will be necessary and the location forwarded to licensing will be in the NWSE of Section 19.

The POU for wildlife storage was not outlined on the permit. It is assumed to be included in the Application for Permit as pond dimensions were noted on the form. The field exam did include the wildlife storage location. The POU is located in the greenhouse (commercial) for watering plants and humidification purposes while the pond is used for wildlife storage. Both uses are located in the NWSE of Section 19 as described in the field exam report and the Proof Report. The field exam was unclear if the ditch that runs through the greenhouse discharges back into the main ditch. Therefore, it was assumed that it did return to the main ditch and provides water the pond.

Diversion rate and Volume: The permit includes a rate of 0.20 cfs and volume limit of 4.0 af. The field examiner took a measurement and found a rate of 0.03 cfs. It is assumed the Agent chose a location capturing the maximum diversion rate 0.03 cfs will be recommended for licensing. In an effort to calculate a rate for commercial use, I stopped by the property and spoke with Mr. Harrigan. He said he purchased the house in 09/1994. As noted above, the initial field exam was completed on 11/1994. Mr. Harrigan said they have not used the commercial use since moving there, but would like to keep the use on the license. The commercial use is part of the 0.03 cfs measured and returns back to the main diversion to the pond. Therefore, it was assumed 1/3 of the diverted water runs through the greenhouse for commercial use. So, a rate of 0.01 cfs

and a volume limit of 7.3 af is recommended for the commercial component (4.5 gpm X 60 minutes X 24 hours X 365 days = 2,365,200 gallons. 2,365,200 gallons / 325,850 gallons/acre-foot = 7.3 af.). The diversion to storage is what the well produces, which is assumed to be the measured 0.03 cfs.

A pond analysis was completed for the pond. The surface area was calculated using ArcMap tools and totaled 0.60 acres with an average depth of 3 feet as outlined in the field exam report. The field exam report used a surface area of 0.76 acres based on pond dimensions of 67.5' X 492.5'. The pond is not a perfect rectangle, so the updated 0.60 acre feet was used in the pond analysis, which better represents the pond shape. The pond soil type at 3' was identified as CL. The Caldwell (NWS-101380) ppt. deficit station was used to quantify evaporation. Below are the pond loss calculations;

Seepage = 0.7 af

Evaporation = 1.6 af

Pond Capacity = 1.8 af

Total Use = 4.1 af

The field exam calculations total 2.3 af, but does not account for seepage and evaporation. 4.0 af will be recommended for licensing although a total use was determined to be 4.1 af as the permitted volume is limited to 4.0 af for wildlife storage.

Overlap Review: POD overlap analysis revealed 4 WRs that overlap; WR nos. 63-32251, 63-32552, 63-3503A, and 63-3503B. The field examiner noted overlapping WRs to be nos. 63-3503, 63-7054, and 63-10514. Comparing the two analysis, WR nos. 63-32251 and 63-32252 were split from 63-7054 during the decree process in 2007. WR no. 63-7054 was superseded and substituted by the split according to 2006 administrative proceedings found in the backfile. WR nos. 63-3503A and 63-3503B were split from 63-3503 during the decree process in 2007. WR no. 63-10514 is a waste water source west of the POD associated to this right, so is not pertinent to overlap.

POU overlap analysis revealed 9 WRs with potential overlap. WR nos. 63-3503B and 63-32251 overlap with this permit, but are defined as irrigation use. Because the artesian well has not been measured, a limiting rate is unknown. Therefore, it is assumed the system can support each right accordingly. A note in the backfile was found regarding a complaint from Robert Bruno (caretaker for Doherty) dated 1/5/1995. Mr. Bruno stated users were adjusting valves and/or head gates on the shared artesian well. As a result, the pond was being denied water. The Department responded with a list of priority dates for the associated WRs to the artesian well and stated the issue was a civil matter not something the Department has jurisdiction over. That said, it is assumed this matter was worked out amongst neighbors and well flow limitation have yet to be defined. The other 7 WRs identified in the analysis were not pertinent to this permit's POU.

Condition 046 and 26A were removed and not forwarded to licensing. Conditions 219 and 220 outlining consumptive use and pond surface area were added. The condition explaining the commercial use was left and recommended to licensing.

Summary: The rate and volume recommended for licensing is 0.03 cfs and 4.0 af for diversion to storage and wildlife storage respectively. The rate of 0.01 cfs will be recommended for commercial use with a 7.3 af volume limit. Therefore, **the total volume limit for the license is recommended to be 11.3 af and an overall rate of 0.03 cfs.**

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	63-12572
REVIEWER	Aaron Skinner
DATE	3/2/2017

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	0.6	AC.
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Pond Surface Area (SQ. FT.)	26136	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	586	GPD
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Total Seepage Loss (AFA)	0.7	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

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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

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

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

$$\left(\frac{798.77}{304.8} \right) \times 0.60 = 1.6 \text{ AFA}$$

Total Storage Calculations

FILE NUMBER	63-12572
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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.)	0.6	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	3	"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)	1.8	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)	0.7	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	1.6	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	4.0	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.

Flow Rate into Pond (CFS)	0.20	The "Flow Rate into Pond" depicts the actual flow, either measured or estimated, into the pond. For offstream facilities, this will be equivalent to "diversion to storage" rate.
Highest Daily Evaporation Rate From Evaporation Tab. (mm/Day)	5.01	This number is carried over from the "Evaporation Loss" sheet. It is the highest recorded number in the "Precipitation Deficit Table".
Required Daily Maintenance Volume (AF/Day)	0.01	"Required Daily Maintenance Volume" is the maximum volume of water needed on any given day during the year to maintain pond volume. It is calculated by adding the highest daily evaporation loss to the average daily seepage loss in acre feet. The average daily seepage loss is calculated by dividing the "Estimated Seepage Loss" by 365 days. This is acceptable, since the seepage rate shouldn't vary throughout the season unless the pond completely freezes over during the winter months. The highest daily evaporation loss is calculated by dividing the Highest Daily Evaporation Rate by the 304.8 conversion factor and multiplying this number by the pond surface area to attain a combined daily acre feet requirement.
Minimum Maintenance Flow (CFS)	0.01	The "Minimum Maintenance Flow" is the minimum amount of flow required to maintain the level of the pond. This number is determined by dividing the "Maximum Required Daily Maintenance Volume" by 1.9835. This flow can be used to determine if the flow rate into the pond is adequate to maintain the pond level.
Days Required to Fill the Pond	5	The "Days Required to Fill the Pond" is calculated by dividing the "Pond Capacity" by the "Flow Rate" minus "Minimum Maintenance Flow" multiplied by 1.9835. This section will assist you in determining if the flow rate being diverted to the pond is adequate to fill the pond while maintaining the pond level. The length of time to fill the pond will help determine if the flow rate is adequate for the size of pond being proposed. If this number is approximately 6 months (180 days) or more, the reviewer should have a discussion with the applicant to make sure he/she understands that it will take a significant length of time to fill the pond.
Days Required to Fill the Pond at 13,000 Gallons per Day	64	Some water users may want to fill a pond under the 13,000 gallons per day domestic exemption. The "Days Required to Fill the Pond at 13,000 Gallons per Day" is calculated by converting the "Pond Capacity" and the "Required Daily Maintenance Volume" to gallons. The "Pond Capacity" is then divided by 13,000 gallons minus the "Required Daily Maintenance Volume" in gallons to determine the number of days to fill pond. If this number is approximately 6 months (180 days) or more, the reviewer should have a discussion with the applicant to make sure he/she understands that it will take a significant length of time to fill the pond. Negative values indicate that the supply of 13,000 gallons per day is not enough volume to overcome the required daily maintenance volume; the pond will never fill.

X west of POD; surface/not q

N	ALDRICH, BURNETTA; ALDRICH, EARL	GROUND WATER	> Decreed 4/11/2007
N	ALDRICH, BURNETTA; ALDRICH, DIANE; ALDRICH, EARL; ALD	GROUND WATER	
N	ALDRICH, BURNETTA; ALDRICH, EARL	GROUND WATER	> Decreed 2/16/2007
N	HARRIGAN, ANN; HARRIGAN, BRIAN; HEGEWALD, ART	GROUND WATER	

VNW	SEW	NESW	NWSW	SWSW	SESW	NESE	NWSE	SWSE	SESE	TotalAcres
				X	X			X	X	

04N01W19																						
Process	BasinSequence	Draft	Owner	Source	Use	NENE	NWNE	SWNE	SENE	NENW	NWNW	SWNW	SENW	NESW	NWSW	SWSW	SESW	NESE	NWSE	SWSE	SESE	TotalAcres
Water Right	63-10105	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-10514	N	ALDRICH, BURNETTA; ALDRICH, EARL	WASTE WATER	IRRIGATION														10			10
Water Right	63-10840	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-11482	N	NAU, HOWARD	GROUND WATER	IRRIGATION																	
Water Right	63-11572	Y	DOHERTY JR, DAN W; DOHERTY, SHEILA	GROUND WATER	COMMERCIAL											10	25			35	20	90
Water Right	63-11737	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-11922	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-12162	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-12173	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-12181	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-12295	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-12378	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-12416	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-12560	N	CITY OF MERIDIAN	GROUND WATER	MUNICIPAL											X	X			X	X	
Water Right	63-136	N	BARKER ROSHOLT & SIMPSON LLP; BOISE PROJECT BOARD	BOISE RIVER	IRRIGATION				X	X				X		X	X		X		X	
Water Right	63-1378	N	BARKER ROSHOLT & SIMPSON LLP; BOISE PROJECT BOARD	BOISE RIVER	IRRIGATION				X	X				X		X	X		X		X	
Water Right	63-145	N	EUREKA WATER CO; HONSINGER, CHARLES L	BOISE RIVER	IRRIGATION	X	X	X	X	X	X	X	X	X					X			
Water Right	63-15560	N	CODE, WILHELMINA	GROUND WATER	DOMESTIC														X			
Water Right	63-1618U	N	JOHNSON, RICHARD Z; PERRAULT, JOSEPH; PIONEER IRRIGA	BOISE RIVER	IRRIGATION									X	X	X	X		X	X	X	
Water Right	63-16383	N	EUREKA WATER CO; HONSINGER, CHARLES L	PHYLLIS SLOUGH	IRRIGATION	X	X	X	X	X	X	X	X	X					X			
Water Right	63-16383	N	EUREKA WATER CO; HONSINGER, CHARLES L	PHYLLIS SLOUGH	STOCKWATER	X	X	X	X	X	X	X	X	X					X			
Water Right	63-18410	N	CODE, CLIFFORD L; CODE, NANCY L	GROUND WATER	DOMESTIC									X								
Water Right	63-18676	N	CODE, CLIFFORD L; CODE, NANCY L; CODE, WILHELMINA; W	GROUND WATER	DOMESTIC									X								
Water Right	63-18776	N	TURNBULL, ARTYLEE; TURNBULL, JOHN D	GROUND WATER	DOMESTIC			X														
Water Right	63-18776	N	TURNBULL, ARTYLEE; TURNBULL, JOHN D	GROUND WATER	STOCKWATER			X														
Water Right	63-198AJ	N	DAVIS, THOMAS; HONSINGER, CHARLES L; NAMPA & MERID	BOISE RIVER	IRRIGATION													X			X	
Water Right	63-198AJ	N	DAVIS, THOMAS; HONSINGER, CHARLES L; NAMPA & MERID	MORES CREEK	IRRIGATION													X			X	
Water Right	63-199B	N	DAVIS, THOMAS; HONSINGER, CHARLES L; NAMPA & MERID	BOISE RIVER	IRRIGATION													X			X	
Water Right	63-199B	N	DAVIS, THOMAS; HONSINGER, CHARLES L; NAMPA & MERID	MORES CREEK	IRRIGATION													X			X	
Water Right	63-200A	N	BARKER ROSHOLT & SIMPSON LLP; BOISE PROJECT BOARD	BOISE RIVER	IRRIGATION			X	X					X				X	X		X	

[illegible]

