

MEMORANDUM

TO: Water Right File – 63-10730
FROM: Justin Shearer – Water Resource Agent
DATE: November 8, 2016
SUBJECT: Field exam review

This water right permit was approved on February 2, 1989 for the beneficial uses of Irrigation, Irrigation Storage, Irrigation from Storage, Wildlife Storage, and Diversion to Storage use for 20 AF. The field exam was completed by an unknown IDWR member in 1993. The back-file was analyzed and interpreted by Water Resource Agent Justin Shearer 9/28/16. The field exam was submitted with the Proof of Beneficial Use form to Western Region July, 29 1993. The Field exam was returned from the State Office to Western Region on October 12, 1993 for clarification of the volume measurement calculations and missing information in regards to the dimensions of the wildlife storage ponds.

I have reviewed the field exam and back file that was submitted and further examined the aspects of this permit in-office. Of the beneficial uses applied for in the permit only diversion to storage and wildlife storage were actually developed.

My review of the documentation supplied with the field exam is as follows:

Ownership: Permit 63-10730 is in the name of Donald W Holaday. Canyon County tax-lot data shows that the original property has since been subdivided and respective sects are under new ownership split across three tax lots, with two respective owners. Because of the apparent C.O.O based on tax lots data, a Request for Ownership Change with notice of License if approval should be sent to all current property owners with said Wildlife Storage POU on their property.

Source, POU, POD: The source is a spring, tributary to Dixie Slough. The wildlife storage pond was partially excavated and naturally fills from the source spring. The place of use for the pond is identified within the permitted POU based on PLSS maps over aerial photography using ArcMap. The POD for the pond was determined based on 1993 Exam notes, application, and ArcMap imagery. Using imagery from 1981 I was able to compare beneficial use POU was actually developed for pond. Furthermore, the portion of the POU situated in the SW-NE QQ was existing, thus no beneficial use can be claimed for it. The beneficial use form submitted February 2, 1992 indicated that a diversion dam from Dixie Slough was not necessary, but that a pump in Dixie Slough provided irrigation needs. However, irrigation related uses from either Dixie Slough, or the Spring POD's had not been developed at the time of the field exam in 1993, nor is there evidence from present day satellite imagery to suggest it has taken place since.

Diversion rate and Volume: The permitted diversion to storage rate was 0.15 cfs. The 1993 exam measured the max depth of the pond at approx. 4'. Aerial photography and ArcMap GIS tools were used to measure the wildlife storage pond and calculated a surface area of 1.5 acres for the wildlife storage POU. Average pond depth was calculated using the max depth value measured as part of the 1993 exam allowing for an avg. depth of 1.6'. This value then allowed estimated storage calculations for Pond Capacity of 2.4 AF, Seepage Loss of 109.5 AF, Evaporation Loss of 3.9 AF, and a Total Volume Required for pond storage of 115.8 AF. Note the estimated Total Volume

Required value is significantly higher than the permitted volume of 20.0 AF. However, it can be assumed that with more precise measurement technologies and consideration of seepage and evaporation loss unavailable/unaccounted for at the time this WR was permitted, we are able to determine a more accurate Total Volume Required for pond storage, Nonetheless, the recommended volume for storage remains the permitted volume of 20.0 AF.

Overlap Review: No active storage rights exist on property. Other WR's in the area are large irrigation district WR's.

Summary: 63-10730 was filed to divert 0.150 CFS and provide a capacity of 20.0 AF for multiple beneficial uses, however Diversion to Storage and Wildlife Storage are the only beneficial uses developed. Therefore, the licensure of this Water Right is justified, but only for the diversion to storage and wildlife storage pond. Because it appears there has been a C.O.O. based on tax lots data, please send Request for Ownership change with notice of License approval to all current property owners with said Wildlife Storage on their property.

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	63-10730
REVIEWER	Justin
DATE	9/27/2016

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	1.5	AC.
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Pond Surface Area (SQ. FT.)	65340	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	SM	
Suggested Seepage Rate (FT./DAY)	0.2000	FT./DAY

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
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Convert to GPD	97749	GPD
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Total Seepage Loss (AFA)	109.5	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.

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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DATE	9/27/2016

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	-0.36	31	0.00
Feb	0.53	28	14.84
March	1.60	31	49.60
April	2.47	30	74.10
May	3.23	31	100.13
June	4.09	30	122.70
July	5.03	31	155.93
August	4.46	31	138.26
September	3.15	30	94.50
October	1.41	31	43.71
November	0.23	30	6.90
December	-0.47	31	0.00

Total mm/year = 800.67

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.

$$\left(\frac{800.67}{304.8} \right) \times 1.50 = 3.9 \text{ AFA}$$

Total Storage Calculations

FILE NUMBER	63-10730
REVIEWER	Justin
DATE	9/27/2016

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.)	1.5	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	1.6	"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)	2.4	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)	109.5	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	3.9	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	115.8	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.

Flow Rate into Pond (CFS)	0.15	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)	5.03	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)	0.32	"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)	0.16	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	-88	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	-8	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.



Existing, not developed
for B.U. - JH
9/29/16

Prior Exam 1993

E. NARRATIVE/REMARKS/COMMENTS

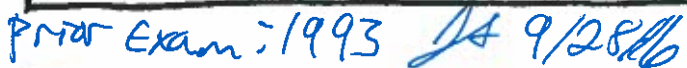
THIS SYSTEM AT THE TIME OF THE EXAM WASN'T DIFFERENT FROM THE SIGN
SOURCE FOR THE SIGN SOURCE. There also was not any evidence
that irrigation had occurred. There is substantial evidence
as the pictures indicate, that there is a spring that has been
diverted to create multiple marshes. THE SPRING HAS A SUBSTANTIAL
FLOW: A LARGE CAVITY OF 11 FT - CIRC 70 FT IS HEAVY WITHIN
THE MARSHLAND CREATED BY THE OWNER. FROM THE ^(spring) SOURCE THE MAN-MADE
CANAL WINDS ITS WAY ACROSS THE PROPERTY. AT THE END
OF THE CANAL, NEAR DIXIE SLough, THE OWNER HAS INSTALLED
A HEADGATE: HAS CONSTRUCTED A GULLWAY FROM THE CANAL
TO DIXIE SLough. THE CAPACITY (FLOW) FROM THE SPRING IS
UN-MEASURABLE BECAUSE IT LIES 11 FEET IN WATER. ESTIMATIONS
DISPLAY THAT THERE IS APPROX 1000' x 10' (CANAL/SUBMARINE) x 10' WIDE x
4' DEEP.

$$1000 \text{ ft} \times 10 \text{ ft} \times 4 \text{ ft} = 40,000 \text{ ft}^3$$

Have conditions of permit approval been met? ☒ yes ☐ no

Prior Exam: 1993
9/28/16

SYSTEM DESCRIPTION
ATTACHMENT TO FIELD EXAM FORM



Prior Exam: 1993 JA 9/28/96