

MEMORANDUM

TO: Water Right File 65-22359
FROM: Patrick Kelly; Water Resource Agent Sr.
DATE: January 7, 2018
SUBJECT: Review of Water Right File for Licensing

A field exam was completed by Steve Lester on September 8, 2004. My review of all documents supplied with the field exam is as follows:

Ownership: Current taxlot data shows the property is still owned by Bruce S Stephens. This matches the permit owner and person Mr. Lester met during the 2004 exam.

Point of Diversion: Examiner recorded a spring in the SESE ¼ ¼ of Sec 34. This matches the POD issued on the permit. Notes in the exam file state "other spring collects at bottom of pond". A second POD is not required since the spring is undeveloped/naturally fills pond. There is no POD overlap to consider.

Place of Use: The field exam includes a plat map which roughly sketches a POU with the east boundary designated with "no irr here". There is no recommendation of acres in the field exam report. However, using satellite imagery of the property, one can measure the approximate irrigation boundary using ArcMap tools. Property boundaries, tree lines, and visible developed land in 2004 aerial photos were used to measure a total irrigation area of 11 acres. This reduces the permit by 5 acres, but represents the beneficial use that was developed. There is no POU overlap to consider.

Diversion Rate and Volume: The diversion to storage comes from a spring at the north boundary of the property to a pond via ditch. Flow during the field exam was minimal, and too low to even complete an orange peel test. Mr. Stephens described the flow in the ditch as "typical" and the examiner estimated the flow at 10 gpm (0.02 cfs).

A 3 hp Baldor pump was found in the pond at the time of the field exam. Pressure observed on the system showed 46-48 psi. With 3' of lift written in the field exam notes, a theoretical calculation represents a 0.17 cfs flow.

$$Q = \frac{8.8 * (\text{Efficiency}) * \text{hp}}{\text{depth to water} + 2.31 * (\text{psi}) + \text{friction}}$$

Efficiency = 0.70
Depth to water = 3 ft.
psi = 46
hp = 3

Theoretical = 0.17 cfs

OR:

9 sprinklers * 3.2 gpm/sprinkler = 28.8 gpm = **0.06 cfs**

Volume Calculations for Irrigation:

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = \underline{\hspace{2cm}}$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = \underline{\hspace{2cm}}$$

$$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} = \underline{\hspace{2cm}}$$

Volume Calculations for Other Uses: Stockwater and Wildlife Storage uses = 29.7 af (see attached spreadsheet)
Irrigation storage = 5.0 af/ac * 11 ac = 55.0 af (limited by permit to 32.0 af).

Discussion: The diversion to storage is being greatly reduced based on the low flow observed in the ditch at the time of the field exam. Photos found in the file show a ditch with near stagnant water. The pond analysis attached to this report represents a negative value for days required to fill the pond at 10 gpm. This suggests that the 0.02 cfs cannot fill the pond by itself, and confirms notes in the file that suggest springs at base of the pond feed the system as well.

The irrigation system runs a 2" buried mainline from the pond to 3 risers where a line runs 9 sprinklers. There is a substantial difference between the 0.17 cfs theoretical and 0.06 cfs sprinkler flow rate calculation. Taking into consideration the 10.8 (11) acre POU, the sprinkler calculation provides 0.006 cfs/ac, or just over a quarter inch per acre. This is low in terms of what is allowable by department standards, but one must consider that this is an area that authorizes a low 3.0 af/ac headgate requirement. The sprinkler calculation represents the most accurate information available, and the irrigation use is used to supplement natural ground for grazing purposes.

A diversion of 0.06 cfs can produce 23.8 af during the irrigation season while 0.17 cfs will produce 67.4 af in the same period. Department standards allow 55.0 af from storage on 11 acres. Since we do not know exactly what rate the user irrigates from the pond, the permit limit of 32.0 af represents a minimal volume of what is being used for irrigation purposes.

A pond analysis was completed to calculate storage capacity and consumptive uses. Mr. Lester recorded a depth of 10' in his notes. Using the 0.4 slope gradient for an average depth of 4 ft and consumptive losses of the pond, the annual use totals 29.7 af.

The exam report recorded 12 horses and llama. Since the report does not indicate more than a single llama, and indicates a daily volume of 3.5-4 gallons, the total stock count is 13. Admin 3 allows up to 0.4 af for 11-25 head. Mr. Stephens stocks the pond with fish which fulfills the wildlife storage. Capacity and evaporation of the pond is justified for the size of the pond that was developed.

2006 correspondence between the permit owner and Steve Lester discuss the delay in processing the license. Since the information Steve was waiting for was received shortly after his request (based on the information written on the bottom of his letter dated January 10, 2006), a recommendation for license can be made.

Because the diversion rate of 0.06 cfs for irrigation use does not fulfill the 24 hour rule associated with the developed pond, the irrigation storage and irrigation from storage is required for license. The live water irrigation use is removed from the right, and differences between the theoretical vs sprinkler calculations can be disregarded.

Conditions that require rental pool and watermaster control are removed since the source is Springs tributary to Sinks.

Recommended Amounts:

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
Diversion to Storage	1/1 – 12/31	0.02 cfs	
Irrigation Storage	4/15 – 10/31		32.0 af
Irrigation from Storage	4/15 – 10/31		32.0 af
Stockwater Storage	1/1 – 12/31		29.7 af
Wildlife Storage	1/1 – 12/31		29.7 af
	<u>Totals</u>	0.02 cfs	61.7 af

Recommended Amendments:

☐ Change P.D. ☐ Add P.D. ☒ None

☐ Change P.U. ☐ Add P.U. ☐ Other

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	65-22359
REVIEWER	Patrick Kelly
DATE	12/5/2017

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	0.38	AC.
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Pond Surface Area (SQ. FT.)	16553	SQ. FT.
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My Soil Classification is	CL - 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	24763	GPD
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Total Seepage Loss (AFA)	27.7	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 <X:\Spatial\Soils\USCS\PondSoils.lyr>. 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	65-22359
REVIEWER	Patrick Kelly
DATE	12/5/2017

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: McCall (NWS - 105708)

Month	mm/day ¹	Days per month	mm/Month
Jan	-1.98	31	0.00
Feb	-1.57	28	0.00
March	-0.90	31	0.00
April	0.39	30	11.70
May	0.88	31	27.28
June	1.82	30	54.60
July	3.44	31	106.64
August	2.88	31	89.28
September	1.49	30	44.70
October	0.20	31	6.20
November	-2.07	30	0.00
December	-2.53	31	0.00

Total mm/year = 340.40

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.

$$\left(\frac{340.40}{304.8} \right) \times 0.38 = 0.4 \text{ AFA}$$

((mm/yr) ÷ (convert to feet)) X (Surface area of pond, in acres) = Evaporation Loss in Acre Feet

Total Storage Calculations

FILE NUMBER	65-22359
REVIEWER	Patrick Kelly
DATE	12/5/2017

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.)	0.38	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	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)	1.5	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)	27.7	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.4	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	29.7	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.



State of Idaho

DEPARTMENT OF WATER RESOURCES

Western Region, 2735 Airport Way, Boise, Idaho 83705-5082 - (208) 334-2190

FAX (208) 334-2348

DIRK KEMPTHORNE
Governor

KARL J. DREHER
Director

January 10, 2006

BRUCE STEPHENS
123 WHITEFOOT LN
MC CALL ID 83638

Re: Permit No. 65-22359

Dear Mr. Stephens:

I understand you recently contacted the Idaho Department of Water Resources (IDWR) to inquire about the status of your permit. As you recall, I examined your system in September 2004. The exam report will be used to advance the permit to a license.

I recall some discussion about the nozzle size for your sprinklers. You may have already given me that information, although I cannot find it in my notes. Please let me know what size sprinkler nozzles are used. The exam report can be completed with that final piece of information.

Based on your reply, I should be able to forward the completed exam report to the IDWR State Office in the next few months. The State Office will review the report and issue a license to you sometime after that. There may be a lengthy delay in finally receiving the license. Any delay would be attributed to the need for IDWR to concentrate its resources to complete its work for the Snake River Basin Adjudication. This year should be the final push in that regard.

The field examination was the key step to verify your beneficial use under the permit. Please be assured that any delay in issuing a license does not jeopardize your permit or your ability to divert and use water as described by the permit.

Please contact me at 208-334-2190 if you need more information or have any questions.

Sincerely,

Steve Lester
Water Rights Supervisor

1/11/06 phone reply - nozzles 1/8"

-SL

Lester, Steve

From: Gibson, Deborah
Sent: Friday, January 06, 2006 3:53 PM
To: Lester, Steve
Subject: Status of Bruce Stevens' permit no. 65-22359

Hi Steve:

Bruce Stevens called me today, and he was wondering what the status of the issuance of a license was. He said you had done the field exam, but I see it hasn't been filed with the S.O. He called me in June, and hasn't heard anything since. If you have some information for Bruce, his phone number is (208)634-3391. Otherwise, you can call me with an update, and I can call Bruce.

Thanks!!!

Deborah Gibson

Deborah Gibson
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Idaho Department of Water Resources
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