

MEMORANDUM

TO: Water Rights File 67-7925
FROM: Sandra Thiel
DATE: August 21, 2018
SUBJECT: Field Exam Review

In September 1993, the department issued permit 67-7925 for irrigation, irrigation storage and irrigation from storage. A Department employee submitted a beneficial use field report in 1997. According to the field exam permit holders irrigated 22 acres. The pond has a surface area of 3.8 acres and a maximum depth of 15 feet (average depth of $10 \times 3.8 = 38.0$ af). The pond spreadsheet found a required total volume of 71.6. The permit is for 50 af. The total volume for this right should be 50.0 af.

The Department issued the permit to Donald and Charlotte Stevenson. In 1998, they assigned the permit to Roland and Gail Dustman. According to the 2018, Adams County parcel data Andrew and Roxana Leigh own the place of use and point of diversion.

In 2017, the Department issued a license for the same pond that included stock water and stock water storage. The maximum diversion volume on the license is 18.4 af. The field exam for permit 67-7835B occurred on October 20, 1993. At that time the average depth was 5 feet. The field examiners reached somewhat different conclusions about the pond capacity. The average depth at the time of the 1997 field exam was 10 feet. Apparently the pond was deepened since the first exam. The license should include condition 219 to limit the annual storage volume of rights 67-7925 and 67-7835B.

The permit includes condition 803:

The right holder shall use the full allotment of his surface water right, to the extent it is available, in conjunction with groundwater diverted pursuant to this right.

The permit source is unnamed stream tributary to Bacon Creek. This condition applies to ground water and should be removed from the permit at licensing.

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	67-7925
REVIEWER	S. Thiel
DATE	7/25/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	3.82	AC.
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Pond Surface Area (SQ. FT.)	166399	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	ML	
Suggested Seepage Rate (FT./DAY)	0.0200	FT./DAY

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
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Convert to GPD	24893	GPD
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Total Seepage Loss (AFA)	27.9	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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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	-2.61	31	0.00
Feb	-2.02	28	0.00
March	-0.42	31	0.00
April	1.13	30	33.90
May	1.94	31	60.14
June	2.47	30	74.10
July	4.02	31	124.62
August	3.21	31	99.51
September	1.71	30	51.30
October	-0.10	31	0.00
November	-2.46	30	0.00
December	-2.98	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 = 443.57

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

$$(443.57 \div 304.8) \times 3.82 = 5.6 \text{ AFA}$$

Total Storage Calculations

FILE NUMBER	67-7925
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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.)	3.82	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	10	"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)	38.2	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. <i>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.</i>
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). <i>Note: You must have a "From Storage" component exceeding the initial fill on the permit to include a volume in this space.</i>
Estimated Seepage Loss (AF)	27.9	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	5.6	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	71.6	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.