

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 72-16771
Exam Date: 6/30/2016

1. Current Owner:
KENT S WATSON PO BOX 650 CHALLIS ID 83226-0650 (208) 879-5914 And
DEBRA L WATSON PO BOX 650 CHALLIS ID 83226-0650 (208)879-5914

2. Accompanied by: Kent Watson, Permit holder
Phone No: 208-830-3272
Address: Same as above
Relationship to Permit Holder: Permit Holder

3. SOURCE: GROUND WATER

TRIBUTARY:

B. OVERLAP REVIEW

1. Other water rights with the same place of use: 72-2147B, 72-32E, 72-2149H, and 72-4158; irrigation rights.
2. Other water rights with the same point-of-diversion: None

C. DIVERSION AND DELIVERY SYSTEM

1. LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER SE¼NE¼ Sec. 20, Twp 14N, Rge 19E, B.M. CUSTER County

Method of Determination: Field visit and ArcMap aerial imagery

2 PLACE OF USE: AESTHETIC STORAGE

[illegible]

PLACE OF USE: DOMESTIC

[illegible]

PLACE OF USE: WILDLIFE STORAGE

[illegible]

PLACE OF USE: STOCKWATER

[illegible]

PLACE OF USE: IRRIGATION

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
14N	19E	20	34.0 L 1			32.0													66.0

Total Acres: 66

Method of Determination: Field visit, ArcMap aerial imagery.

3.

Delivery System Diagram Attached (required). Indicate all major components and distances between components.

☒ Indicate weir size/pipe as applicable.☒ Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.☒ Aerial Photo Attached (required for irrigation of 10+ acres).☒ Photo of Diversion and System Attached

4.

Well or Diversion ID No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
D0045670		7.5			

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
Flowmeter	Ultrasonic	Fuji				
Bucket/stopwatch						

2. Measurements: Ran a 10 minute test on the irrigation system with the Fuji flowmeter and recorded a maximum flow of 39.4 gpm or 0.09 cfs. I performed a bucket and stopwatch test on an outdoor hydrant which is fed by the main waterline through the house, and is capable of filling the stock troughs and pond. Flows of 28.1, 28.7, and 34.8 gpm were measured for and average flow of 30.5 gpm or 0.07 cfs. The measurement at the outdoor hydrant was conducted while the irrigation system was in operation, so the total measured system capacity is 0.16 cfs (0.09 cfs + 0.07 cfs).

E. FLOW CALCULATIONS

Flow rate for irrigation was measured at 39.4 gpm or 0.09 cfs. Flow rate for domestic is the permitted rate of 0.04 cfs, stockwater is 0.04 cfs, and diversion to storage is 0.04.

:

Measured Method

X

Additional Computation Sheets Attached

Irrigation – 0.09 cfs
Domestic – 0.04 cfs
Stockwater – 0.04 cfs
Diversion to storage – 0.04 cfs

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = 66.0 \times 3.5 \text{ AF/acre} = 231.0 \text{ AF}$$

$$V_{DR} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = 0.09 \times 1.9835 \times 214 = 38.2 \text{ AF}$$

$$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} = 38.2 \text{ AF}$$

2. Volume Calculations for Other Uses: Pond was measured at 99' x 135' x 8' deep. Surface area = 0.31 acres, volume is 2.5 acre-feet. Total volume required for pond is 3.2 AF. See attached *Pond Loss Spreadsheet*.

Volume for domestic use (in-house) standard of 0.6 AF

Volume for stockwater is calculated to be: 100 head at 12 gallons/head/day = 1200 gallons x 365 days = 438000 gallons divided by 325850 gallons/acre-foot = 1.3 AF

G. NARRATIVE/REMARKS/COMMENTS

The field exam for permit 72-16771 was completed on June 30, 2016 with the permit holder, Kent Watson, present. Water is diverted from the well via a 7.5 HP pump and is routed to the basement of the Watson home. Numerous valves send the water out to the various uses under this permit. A flowmeter measures flow to the pond, while another flowmeter, located in the pasture north of the house, measures the irrigation flow. The stockwater portion of the permit is served by two water troughs- a single cow water trough and a larger trough near the house, which can be filled with an underground pipe or a garden hose from one of the outdoor faucets. Cattle were actively grazing in the pasture on the day of the field exam.

Irrigation is accomplished with a K-line system of 12 pods that are connected to 13 valved risers distributed throughout the pasture. They are connected by a 1.75 inch diameter plastic line and are towed by ATV to different locations around the pasture. The nozzles are rated at 4 gpm each, but the system doesn't produce that flow. A ten minute flowmeter test was performed with a Fuji flowmeter, with a maximum flow recorded of 39.4 gallons per minute (0.09 cfs).

Diversion to storage can be fulfilled either by a direct underground pipe from the house, or by a hose connected to one of the outdoor faucets. On the day of the exam, the pond was at a low level because Mr. Watson was letting the pond water evaporate in order to do maintenance work on the clay lining of the pond. The dimensions of the pond, as paced off by the field examiner, were 99' x 135' for a surface area of 0.31 acres. It appeared that the average depth, when full was 8'. This yields a capacity of 2.5 AF. Using the IDWR Pond Loss Calculation Spreadsheet, the total volume required for the pond was 3.2 acre-feet. Because the pond is lined with clay, seepage was assumed to be zero and evaporation losses for the year were calculated at 0.7 AF.

A bucket and stopwatch test was performed on an outdoor hydrant to determine flow rate. Three runs were timed, with times/flow rates as follows: 10.69 sec/28.1 gpm, 10.45 sec/28.7, and 8.62 sec/34.8 gpm, for an average of 30.5 gpm or 0.07 cfs. This faucet is fed by the line which runs through the house, so its measurement should suffice for the domestic flow. It also has the capability to feed the stockwater tank or the pond.

The irrigated acreage, measured from ArcMap aerial imagery, was determined to be 66.0 acres, which is the same acreage as the four existing water rights appurtenant to the property. This right will be supplemental to the four existing surface water rights. This is a reduction in the permitted acres, but reflects the actual acreage being irrigated. The reduction in flow rate is also a reflection of the actual measured irrigation flow.

Have conditions of permit approval been met? ☒ Yes ☐ No

H. RECOMMENDATIONS

1. Recommended Amounts

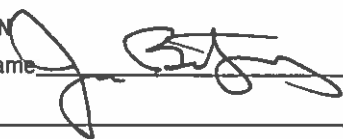
<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
STOCKWATER	01/01 to 12/31	0.04 CFS	1.3 AF
DOMESTIC	01/01 to 12/31	0.04 CFS	0.6 AF
IRRIGATION	04/01 to 10/31	0.09 CFS	38.2 AF
DIVERSION TO STORAGE	01/01 to 12/31	0.04 CFS	
AESTHETIC STORAGE	01/01 to 12/31		3.2 AF
WILDLIFE STORAGE	01/01 to 12/31		3.2 AF
<u>Totals:</u>		0.16 cfs	43.3 AF

2. Recommended Amendments

☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☒ None

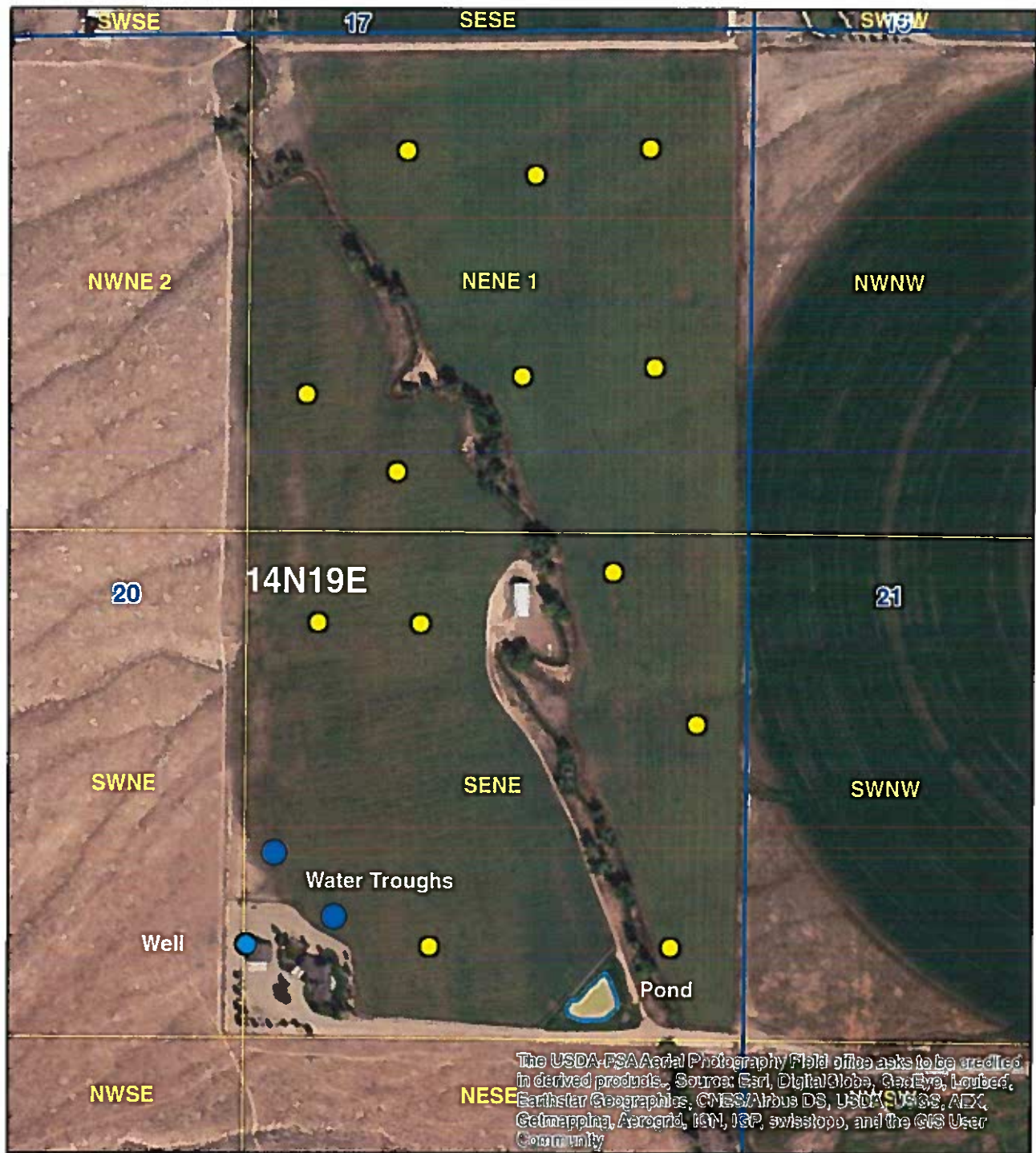
☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ None

I. AUTHENTICATION

Field Examiner's Name  Date 07-27-2016

Reviewer _____ Date _____

Idaho Department of Water Resources



Legend

- Township/Range
- Sections
- QQ
- Irrigation Risers

72-16771 Watson System Diagram



0 0.0425 0.085 0.17 Miles

Field Exam 72-16771

No.02

LOG NAME:WAQQQ

START :06-30 12:25

END :06-30 12:35

INTERVAL:00:01:00

	ft/s	gal/m	(+TOTAL) gal	
06-30 12:25:00	6.54E+00	3.60E+01	0	NORMAL
06-30 12:26:00	6.54E+00	3.60E+01	34	NORMAL
06-30 12:27:00	7.15E+00	3.94E+01	72	NORMAL
06-30 12:28:00	6.97E+00	3.84E+01	110	NORMAL
06-30 12:29:00	6.74E+00	3.71E+01	148	NORMAL
06-30 12:30:00	6.76E+00	3.72E+01	186	NORMAL
06-30 12:31:00	6.71E+00	3.70E+01	223	NORMAL
06-30 12:32:00	6.63E+00	3.65E+01	257	NORMAL
06-30 12:33:00	6.57E+00	3.62E+01	293	NORMAL
06-30 12:34:00	6.50E+00	3.58E+01	330	NORMAL
06-30 12:35:00	6.22E+00	3.42E+01	362	NORMAL



Point of diversion – well

Flowmeter to irrigation system



Field Exam 72-16771



System plumbing in basement of Watson home

Flowmeter to pond



Field Exam 72-16771



Single cow stock trough

Water trough



Field Exam 72-16771



Riser and valve for irrigation system

Pod on K-line string – 12 pods per line



Field Exam 72-16771



Irrigated pasture on Watson property – cattle grazing in background

Lower portion of irrigated pasture on Watson property



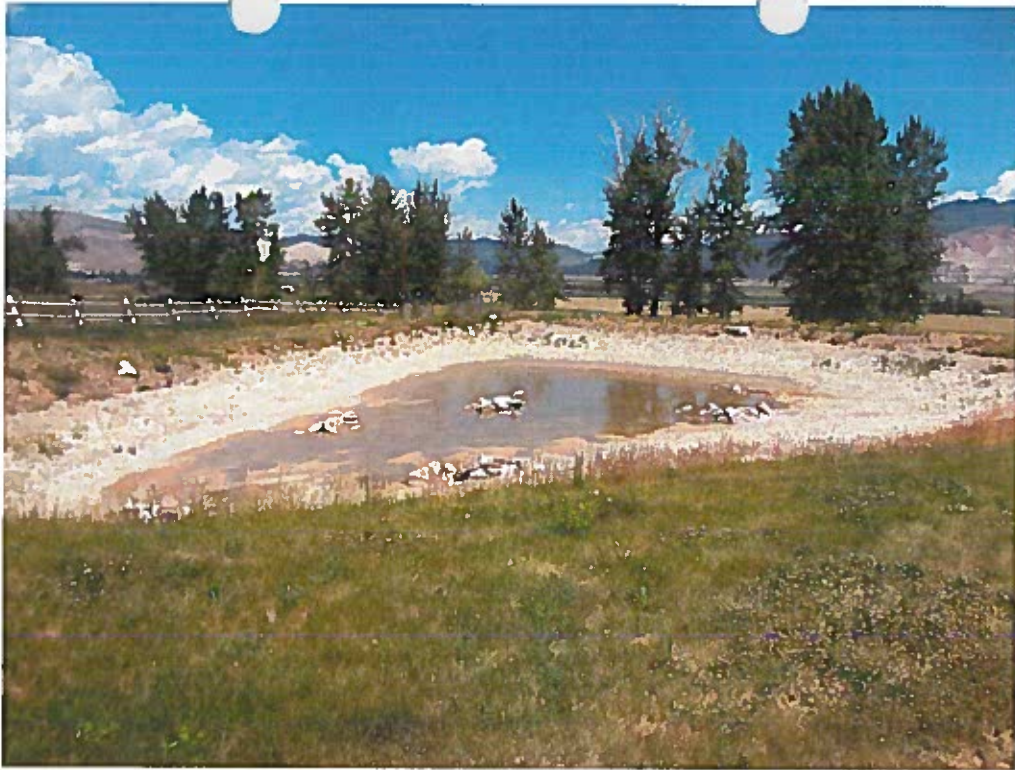
Field Exam 72-16771



Views of Watson home, lawn, and landscaping



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View of pond looking northeast

View of pond looking east



Field Exam 72-16771



View of pond with Watson home in background

Evidence of elk using the pond was found in the grassy area around pond



Field Exam 72-16771



View of Watson home and irrigated pasture

Outdoor hydrant on Watson property



Field Exam 72-16771

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	72-16771
REVIEWER	Jim Bitzenburg
DATE	7/18/2016

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	0.31	AC.
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Pond Surface Area (SQ. FT.)	13504	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	Lined	
Suggested Seepage Rate (FT./DAY)	0.0000	FT./DAY

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
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Convert to GPD	0	GPD
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Total Seepage Loss (AFA)	0.0	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	72-16771
REVIEWER	Jim Bitzenburg
DATE	7/18/2016

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	-0.05	31	0.00
Feb	0.45	28	12.60
March	1.20	31	37.20
April	2.32	30	69.60
May	2.82	31	87.42
June	3.72	30	111.60
July	4.46	31	138.26
August	3.89	31	120.59
September	2.31	30	69.30
October	1.42	31	44.02
November	0.08	30	2.40
December	-0.19	31	0.00

Total mm/year = 692.99

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.

$$((692.99 \div (\text{convert to feet})) \times (\text{Surface area of pond, in acres})) = \text{Evaporation Loss in Acre Feet}$$

(692.99 ÷ 304.8) X 0.31 = 0.7 AFA

Total Storage Calculations

FILE NUMBER	72-16771
REVIEWER	Jim Bitzenburg
DATE	7/18/2016

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.)	0.31	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	8	"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)	2.48	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)	0.0	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.7	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	3.2	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)	0.04	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)	4.46	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)	0.00	"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)	0.00	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	33	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	70	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.