

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 85-07225
Exam Date: 6/19/2017

1. Current Owner:
MARVIN D HAIRSTON PO BOX 28 PECK ID 83545

2. Accompanied by: Marvin D. Hairston
Phone No: (208) 486-6235
Email: lcs@cpcinternet.com
Address: same as above
Relationship to Permit Holder: Permit Holder

3. **SOURCE:**
LITTLE CANYON CREEK

TRIBUTARY:
BIG CANYON CREEK

B. OVERLAP REVIEW

1. Other water rights with the same place of use: Decreed water right 85-7350 is domestic right that overlaps the place of use. A license was issued for water right 85-7350 that allowed domestic use (in-house only), irrigation ½ acre, irrigation storage, irrigation from storage, fire protection and diversion to storage. The storage pond is a different pond from the two ponds associated with this permit. The storage pond associated with this permit is highlighted in purple on the field exam map and is west of the ponds associated with this permit. The irrigation and irrigation from storage for water right 85-7350 come out of the smaller domestic pond. The homes use this domestic use for this in-house use. It was determined in the Snake River Basin Adjudication, that all of these uses fit under a single domestic use, so the only use on the decree is domestic. This permit is for additional irrigation and fire protection.

2. Other water rights with the same point-of-diversion: There are no other water rights with a point of diversion in the same 40 acre tract as this permit.

C. DIVERSION AND DELIVERY SYSTEM1. **LOCATION OF POINT(S) OF DIVERSION:**

LITTLE CANYON CREEK NW¼NW¼ Sec. 21, Twp 36N, Rge 01E, B.M. CLEARWATER County

Method of Determination: Visual inspection and use of GIS mapping.

2.

PLACE OF USE: FIRE PROTECTION STORAGE, FIRE PROTECTION FROM STORAGE, AND IRRIGATION STORAGE

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
36N	01E	16											X						
36N	01E	17																X	

PLACE OF USE: IRRIGATION AND IRRIGATION FROM STORAGE

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
36N	01E	16											10.0						10.0
36N	01E	17																10.0	10.0

Total Acres: 20

DIVERSION TO STORAGE same as IRRIGATION

Method of Determination: Visual inspection and GIS Mapping.

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
Little Canyon Creek Pump	Franklin Electric	3	B5809-1665	Franklin Electric	23431614
Re-lift pump at Pond**	Unknown	3	Gas Powered portable pump		

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

** Please Note: The gas powered re-lift pump broke when it was used last, and it hasn't been replaced. All the owner could tell me was that it was a 3 Hp portable gas powered pump.

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date

2. Measurements: The pump was not installed and the pumping site was washed out at the time of the field examination. They don't use this system until mid-august and then only if needed.

E. FLOW

YES Additional Computation Sheets Attached

CALCULATIONS

Measured Method:

The 3 Hp pump that pumps water to the pond can only deliver approximately 0.04 cfs. From the pond, the water is diverted by the re-lift pump to the irrigation lines. The diversion rate capacity is limited to the 3 Hp pump in the creek that diverts water to the pond. The ponds are used to store enough water to provide water for the other uses at a diversion rate that is reasonable. The re-lift pump can divert 91 gpm or 0.20 cfs, which is enough water to operate the sprinklers. The sprinklers can run for over 10 days before the pond is depleted ($4.2 \text{ af pond capacity} / (0.20 \times 1.9835) = 10.6 \text{ days of irrigation at } 0.20 \text{ cfs}$).

Theoretical Calculation = 0.04 cfs
Permit allows 0.94 cfs.

I am recommending that the diversion rate for this system be limited to 0.04 cfs, since that is maximum amount of water that can be diverted from the creek. The amount of water needed to irrigate with is supplied by the diversion from storage components. Using the 0.04 cfs, it will take approximately 53 days to fill the pond ($4.2 \text{ af pond capacity} / (0.04 \times 1.9835) = 52.9 \text{ days diverting water to storage at } 0.04 \text{ cfs}$), but it appears as though that is what they have been doing using the pump system they showed me.

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = 20 \times 3.5 \text{ af} = 70 \text{ af}$$

$$V_{DR} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = 0.04 \times 246 \times 1.9835 = 19.5 \text{ af}$$

$$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} = 19.5 \text{ af}$$

2. Volume Calculations for Other Uses:

Please see the storage sheets for pond capacities and pond storage. Also note that both ponds are lined with Bentonite.

The ponds have a capacity as follows:

Pond 1 (west pond) =	Pond 2 (east pond)=	Total of both ponds =
2.4 af capacity	1.8 af capacity	4.2 af capacity of both ponds
<u>0.7 af evaporation</u>	<u>0.5 af evaporation</u>	<u>1.2 af evaporation for both ponds</u>
3.1 af total	2.3 af Total	5.4 af for both ponds

The permit has a limit of 5 af for storage, which sounds reasonable, since the ponds aren't filled unless needed. Even when needed, they are generally not needed until mid-August or later, so they would not have as much evaporation losses. I am recommending that the storage be limited to 5 af as requested in the permit.

It should also be noted that when the irrigation and the pond storage volumes are combined, they should not exceed 19.5 af, since 19.5 is the maximum volume that can be diverted through this system during the irrigation season. The ponds are not used during the non-irrigation season, so the permit holder should not be given credit for additional storage. They should be allowed to store year round if needed early in the irrigation season.

G. NARRATIVE/REMARKS/COMMENTS

The place of use for this permit is a pheasant hunting preserve. They raise pheasants and hunting dogs for purchase and use on their property. The crops grown now are different the crops that were grown at the time the permit was developed, so the current system is not used to the extent that it was during the development period. During the development period, the permit holder grew sweet corn and test crops to determine if specialty corn crops could be grown through dry land farming in this area. The irrigation water was used as a back-up in case the annual precipitation was not adequate enough to grow the crops only using dry land farming methods.

The crops currently grown on this property are cover crops for pheasant for the hunting preserve. The cover crops consist mainly of Timothy grass, and Crested Wheat. Both of these grass types provide a significant seed head that provides food for the pheasants that are raised in the facility. These grasses are also tall and thick stemmed that provides cover for the birds throughout all seasons. Both of these grasses can generally be grown using dry land farming practices in this area, but there are times that there is a need to provide some late season irrigation to ensure that seed heads properly mature enough to provide the needed nutrition to make it through the winter months.

Currently, the ponds are mainly used to for fire protection. The permit did have a domestic component, but none of the businesses or houses in the compound use the water from the ponds. The permit holder told me that if the grass crop is good, they will not put the pump in the creek. They did put the pump in the creek a couple of years ago, and filled the ponds when a fire threatened the facility. It appears as though the main purpose of the ponds now are for fire protection and are only filled when there is an active fire in the area.

With the small pump they are using to fill the ponds, it would take quite a bit of time to fill both ponds. They do get a little assistance from snow melt, but not enough to fill the ponds. Looking at the aerial photos, it appears as though there was some water in the west pond in 1992, 2004, and 2006. I couldn't find any aerial information showing that they had both ponds full. There was a little residual snow melt water in the east pond while I was there, but not much. This permit was filed in 1980, so I do believe that they have used them for their intended purposes.

The permit only has a requirement that they provide a means of measurement on the system. There is adequate piping on the system to install a strap on flow meter if needed. This system was not operational at the time of the field examination, so a theoretical calculation was used to determine the flow rate.

Have conditions of permit approval been met? X Yes No

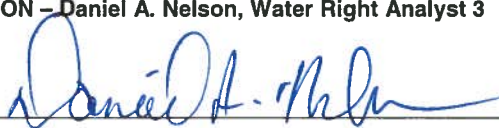
H. RECOMMENDATIONS**1. Recommended Amounts**

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
IRRIGATION STORAGE	01/01 to 12/31		5.0 AF
IRRIGATION FROM STORAGE	03/15 to 11/15		5.0 AF
FIRE PROTECTION STORAGE	01/01 to 12/31		5.0 AF
FIRE PROTECTION FROM STORAGE	01/01 to 12/31		5.0 AF
TOTAL STORAGE ALLOWED			5.0 AF
IRRIGATION	03/15 to 11/15	0.04 CFS	19.5 AF
DIVERSION TO STORAGE	01/01 to 12/31	0.04 CFS	
<u>Totals:</u>		0.04 CFS	19.5 AF

2. Recommended Amendments

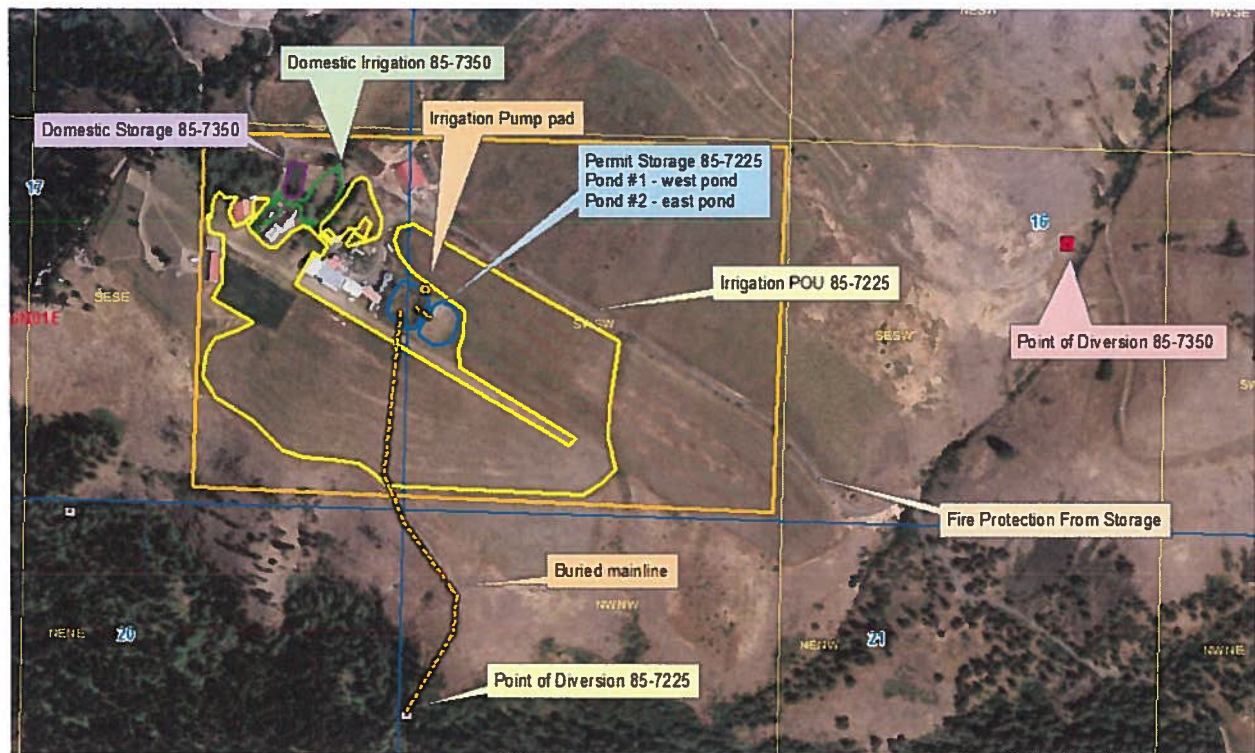
☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None
☐ Change P.U. as reflected above ☒ Add P.U. as reflected above ☐ None

I. AUTHENTICATION – Daniel A. Nelson, Water Right Analyst 3

Field Examiner's Name  Date 7-5-16

Reviewer _____ Date _____

Field Exam Map and System Diagram
Permit 85-7225
By Dan Nelson



The water for this permit is diverted from Little Canyon Creek by a 3 Hp submersible pump (see Pictures). The pump lifts the water uphill approximately 400 feet in elevation and over ¼ mile to the Pond #1 (the western most permit pond). Water overflowing Pond #1 overflows into Pond #2 (the eastern most pond). The water in the ponds are diverted out of the pond for irrigation by 3 Hp portable pump to 10 pivot sprinklers attached to hand lines.

At the time the permit was filed, the land was used to grow seed corn and test crops for the University of Idaho Extension Office, but now the irrigation water is used to maintain the pasture type grasses used to provide food and cover for the hunting preserve. This place of use is in the Palouse region, which is known for dry farming. Irrigation of this farm is generally only done at the end of the season in August and September to ensure the grasses seed out properly to provide a food source and cover for the pheasants raised on the preserve for hunters. All of the fields have been designed with ridges or contours to give additional hiding spots for the pheasants.

The permit was filed for fire protection only, but the permit holder fills the pond for fire protection and then pumps out of the pond. Therefore, the permit should be amended to fire protection storage, and fire protection from storage. The main intent of the ponds has always been to provide a means to have adequate water to fight an existing fire. The creek pump doesn't supply enough water at pressure to operate a fire hose. However, the pump from the pond can easily provide the amount of water needed to fight the fire.

Permit 85-7225

The aerial photos below are the only aerial photos I could find of water in the ponds. None of these aerial photos give definite proof that the ponds had ever been fully filled. However, the permit was filed and proof submitted 1988 before any of these photos were taken, so the ponds could have been filled prior to these photos. The 1987 aerial photo does not show any ponds, so they had to have been developed in 1988. I am assuming they were filled in 1988 to proof up on the permit.



Total Storage Calculations

FILE NUMBER	85-7225 Pond 1
REVIEWER	Dan Nelson
DATE	6/19/2017

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.)	0.4	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	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)	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)	3.1	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.

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	85-7225 Pond 1
REVIEWER	Dan Nelson
DATE	6/19/2017

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

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	-1.84	31	0.00
Feb	-1.10	28	0.00
March	-0.10	31	0.00
April	1.24	30	37.20
May	1.84	31	57.04
June	3.22	30	96.60
July	4.54	31	140.74
August	4.14	31	128.34
September	2.31	30	69.30
October	0.48	31	14.88
November	-1.86	30	0.00
December	-2.06	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 = 544.10

$$\left(\frac{544.10}{304.8} \right) \times 0.40 = 0.7 \text{ AFA}$$

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

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	85-7225 Pond 1
REVIEWER	Dan Nelson
DATE	6/19/2017

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	0.4	AC.
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Pond Surface Area (SQ. FT.)	17424	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.

Total Storage Calculations

FILE NUMBER	85-7225 Pond 2
REVIEWER	Dan Nelson
DATE	6/19/2017

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.)	0.3	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	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)	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)	0.0	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.5	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	2.3	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.

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	85-7225 Pond 2
REVIEWER	Dan Nelson
DATE	6/19/2017

User Input
Calculated value
Formula Explanations

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P = Precipitation
ET= Evapotranspiration
P _d = Precipitation deficit
P _d =ET-P

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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

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March	-0.10	31	0.00
April	1.24	30	37.20
May	1.84	31	57.04
June	3.22	30	96.60
July	4.54	31	140.74
August	4.14	31	128.34
September	2.31	30	69.30
October	0.48	31	14.88
November	-1.86	30	0.00
December	-2.06	31	0.00

Total mm/year = 544.10

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.

$$\left(\frac{544.10}{304.8} \right) \times 0.30 = 0.5 \text{ AFA}$$

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	85-7225 Pond 2
REVIEWER	Dan Nelson
DATE	6/19/2017

User Input
Calculated value
Formula Explanations

INPUTS

Pond Surface Area (AC.)	0.3	AC.
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Pond Surface Area (SQ. FT.)	13068	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.

THEORETICAL HORSEPOWER EQUATION WORKSHEET (cjh 1/92)

Water Right No.: 85-7225
 Reviewer: Dan Nelson
 Date of Review: 6/19/2017

P/D No.:	Creek Pump	Portable Irrigation Pump
PUMP HORSEPOWER	3	3
BOOSTER HORSEPOWER	0	
PUMPING LEVEL	400	10
DISCHARGE PRESSURE	10	35
RATE OF FLOW (cfs)	0.04	0.20
	20	91

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

Assumptions: %70 efficiency.
 No Friction

Examiners Notes:

The pump wasn't installed on the system at the time of the field examination. The system is generally only set up to supply water in August when area starts drying out. According to the contours for the map, the point of diversion on Little Canyon Creek is located at 1560 feet of elevation. The ponds are located at 1960 feet of elevation. The total lift for this system is 400 feet (1960 - 1560 = 400). The pump open discharges into the two ponds. I estimated a minimum discharge pressure of 10 psi for the open discharge as is standard. The pump was stored in the shed, and attained the Hp from the nameplate on the pump.

The water from the ponds has also been used from some minor irrigation. Most of the irrigation occurred in the 1990's when the permit holder grew test crops. In recent years, the irrigation use has been used to maintain the various grasses used in their hunting preserve. The irrigation system consists of 10 sprinklers with L36Ah Low Pressure Sprinklers. These sprinklers are older sprinklers generally used on Pivots, but the permit holder used them on handlines. The sprinklers have a double nozzle with a 3/16 QF-SBN-3 Star nozzle on one side and a 9/64 QF-LPN-3 Square hole nozzle on the other side of the sprinkler. These sprinklers were designed to have different water patterns to provide better coverage. These types of nozzles haven't been used in several years, but I did find a rating table for the nozzles. At 35 psi the Star nozzle would divert 6 gpm and the square nozzle would divert 3.4 gpm for a total of 9.4 gpm. With 10 sprinklers, the total diversion rate needed from the pond pump would be 94 gpm. The permit holder told me that he used a 3 Hp portable pump at the pond. The theoretical calculation for the pond pump matches the sprinkler rating table, so I believe that the water use from storage is reasonable.

L36H / L36AH

3/4" 19 mm Full Circle, Plastic, Low Angle
Impact Sprinkler

- Durable Delrin™ plastic body and arm
- AH unit has standard spoon for smaller nozzles
- H unit has slotted spoon for larger nozzles

Features

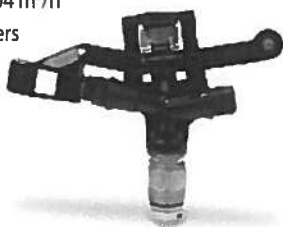
- Exceptionally wide range of quick-fit nozzles
- Stainless steel springs and fulcrum pin
- Brass bearing sleeve
- Chemically resistant washers
- Dual nozzle ports

Benefits

- Superior chemical and grit resistance
- Low angle fights strong wind conditions
- Great choice for pivot or under tree applications
- Easy maintenance
- Added design flexibility
- Built to last
- Two-year Customer Satisfaction Policy

Specifications

- Bearing: 3/4" Male NPT, Brass
- Trajectory Angle: 10°
- Operating Range: 20-60 psi 1.4-4.1 bar
- Flow Rate: 1.6-17.8 gpm 0.36-4.04 m³/h
- Radius: 40-61 ft. 12.2-18.76 meters



L36AH Quick-Fit Straight Bore Nozzle Performance (QF-SBN-3)*						
psi @ Nozzle	NOZZLE SIZE					
	7/64"	1/8"	9/64"	7/64"	1/8"	9/64"
35	45	2.10	46	2.70	46	3.40
40	46	2.20	47	2.90	47	3.60
45	47	2.30	48	3.00	48	3.80
50	47	2.40	49	3.20	50	4.00
55	48	2.60	49	3.40	51	4.20
60	48	2.70	50	3.50	52	4.40

L36AH Quick-Fit Low Pressure Nozzle (Square Hole) (QF-LPN-3)*						
psi @ Nozzle	NOZZLE SIZE					
	7/64"	1/8"	9/64"	7/64"	1/8"	9/64"
20	40	1.60	40	2.10	41	2.60
25	41	1.80	41	2.30	42	2.90
30	42	2.00	43	2.50	43	3.20
35	43	2.10	44	2.70	45	3.40
40	44	2.20	45	2.90	46	3.60
45	45	2.30	45	3.00	46	3.80
50	45	2.40	46	3.20	46	4.00

L36H Quick-Fit Straight Bore Nozzle (QF-SBN-3) (Star Hole) Performance*												
psi @ Nozzle	NOZZLE SIZE											
	5/32"	11/64"	3/16"	13/64"	7/32"	15/64"	1/4"	17/64"	9/32"	5/32"	11/64"	3/16"
35	48	4.20	49	5.00	50	6.00	51	7.10	52	8.30	53	9.50
40	49	4.50	51	5.40	52	6.40	53	7.60	54	8.90	55	10.10
45	51	4.70	52	5.70	53	6.80	54	8.10	55	9.40	56	10.70
50	53	5.00	54	6.00	54	7.20	55	8.50	56	9.90	57	11.30
55	53	5.20	54	6.30	55	7.50	55	8.90	57	10.30	58	11.80
60	54	5.40	55	6.60	55	7.80	56	9.20	58	10.60	59	12.40

L36H Quick-Fit Low Pressure Nozzle (QF-LPN-3) Performance*												
psi @ Nozzle	NOZZLE SIZE											
	5/32"	11/64"	3/16"	13/64"	7/32"	15/64"	1/4"	17/64"	9/32"	5/32"	11/64"	3/16"
20	43	3.20	45	3.80	35	4.50	36	5.30	38	6.00	38	7.20
25	45	3.50	46	4.20	38	5.00	39	5.90	39	6.80	40	8.00
30	46	3.90	48	4.60	40	5.50	41	6.50	41	7.60	41	8.80
35	47	4.20	49	5.00	42	6.00	42	7.10	42	8.30	43	9.50
40	48	4.50	50	5.40	43	6.40	43	7.60	43	8.90	44	10.10
45	49	4.70	50	5.70	43	6.80	44	8.10	44	9.40	45	10.70
50	49	5.00	51	6.00	44	7.20	45	8.50	45	9.90	45	11.30

Note: Performance data taken using 13' (4m) riser

* Nozzles must be purchased separately.
See Chart below.

Part Numbers and Ordering Information

Sprinkler Only	
Sprinkler without Nozzle L36H	A07360
Sprinkler without Nozzle L36AH	A07350

Nozzle Only			XX = Nozzle Size									
U.S. Standard L36H Sprinkler			5/32"	11/64"	3/16"	13/64"	7/32"	15/64"	1/4"	17/64"	9/32"	
Plastic Quick-Fit Straight Bore Nozzle	QF-SBN-3	107881-XX	10	11	12	13	14	15	16	17	18	
Plastic Quick-Fit Low Pressure Nozzle	QF-LPN-3	109247-XX	10	11	12	13	14	15	16	17	18	
U.S. Standard L36AH Sprinkler			7/64"	1/8"	9/64"							
Plastic Quick-Fit Straight Bore Nozzle	QF-SBN-3	107881-XX	07	08	09							
Plastic Quick-Fit Low Pressure Nozzle	QF-LPN-3	109247-XX	07	08	09							
Plastic Quick-Fit Plug		10788199	Bold nozzle size numbers denote the most common nozzle choices.									

PHOTOGRAPHER AND DATE OF PHOTOS Daniel A. Nelson 6/19/2017

FILE NUMBER 85-7225



The first photo is a photo of the 3 Hp pump. It is a submersible pump generally used in wells.

The second picture is a picture of the sprinklers that were used. Please note that it is a double nozzle sprinkler.

The bottom two pictures show the nozzles on the sprinklers. The one on the side of the impact arm is the star nozzle and the other side is the square nozzle. These nozzles are typically used on low pressure pivots.



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The photos above show the west pond or Pond #1 and the photos below show the east pond or Pond #2.

