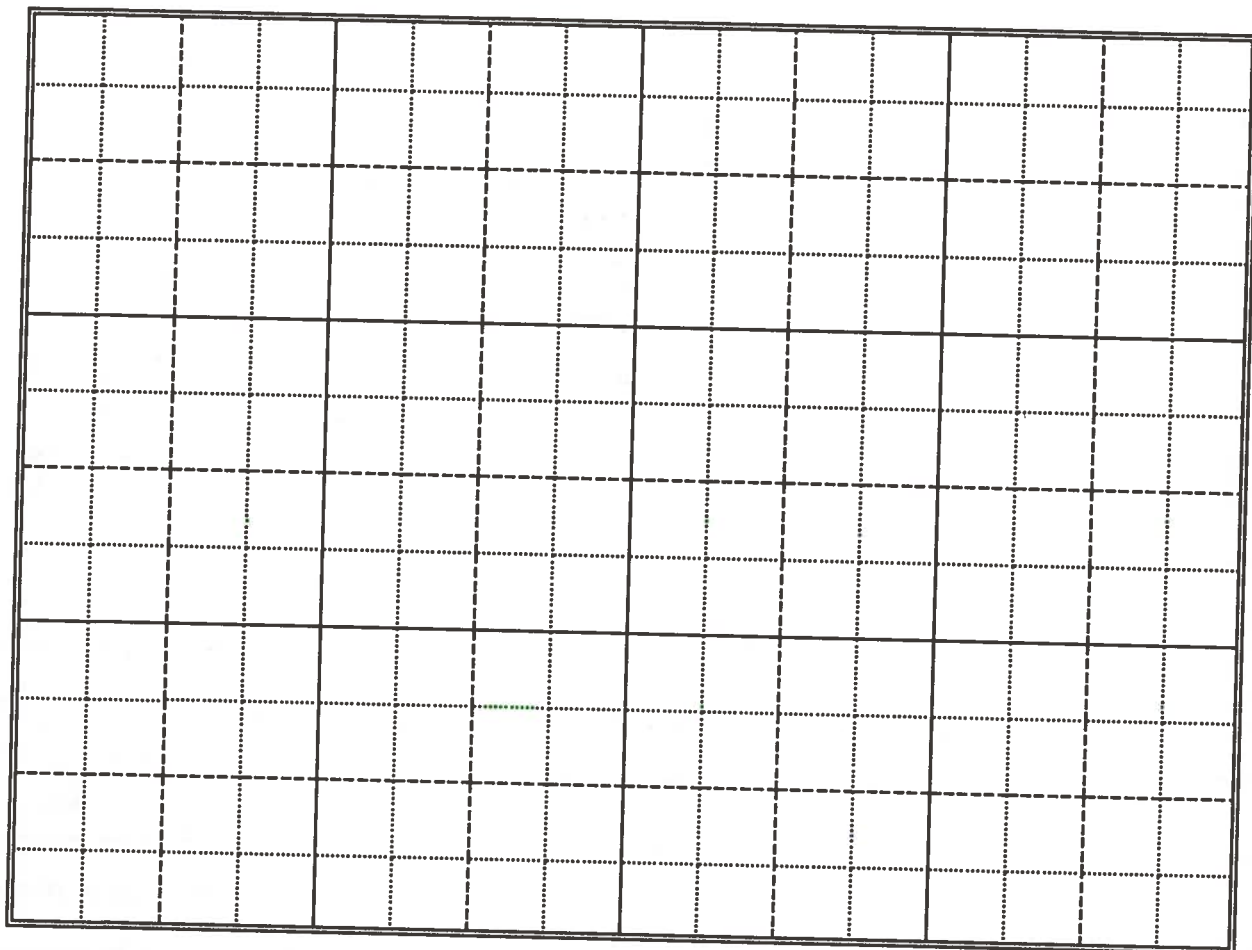


Indicate Method of Determination																			
TWP	RGE	SEC	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
4S	2E	32							FISH										
									FISH										
									Heart										
									DIVE										
									STOR										

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe i.d. as applicable.



Scale: 1" = _____

____ Copy of USGS Quadrangle Attached Showing location(s) of point(s) of diversion and place(s) of use (required).

____ Aerial Photo Attached (required for irrigation of 10+ acres)

☒ Photo of Diversion and System Attached

4.

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
	UNKNOWN	7		UNKNOWN	

*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

2. Measurements: Closed system - Theoretical Measurements. See last page.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Have conditions of permit approval been met? ? yes no

F. FLOW CALCULATIONS

_____ Additional Computation Sheets Attached

Measured Method:

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$ _____

$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation Season}) \times 1.9835 =$ _____

$V = \text{Smaller of } V_{I.R.} \text{ and } V_{D.R.} =$ _____

2. Volume Calculations for Other Uses:

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use		Rate of Diversion Q (cfs)	Annual Volume V (afa)
	From	To		
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Totals:			_____	_____

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 ____ Other

I. AUTHENTICATION

Field Examiner's Name _____ Date _____

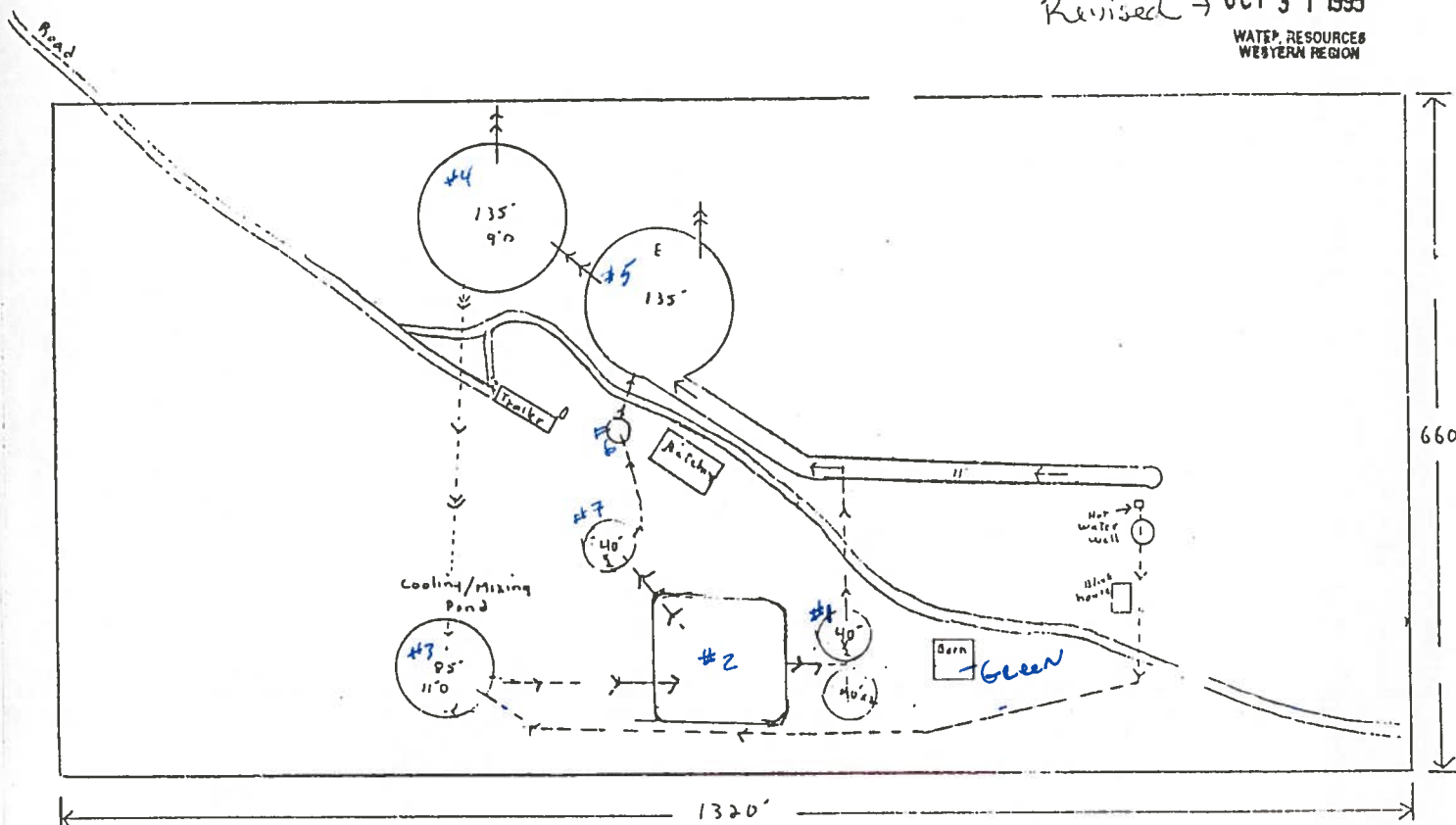
Reviewer _____ Date _____

SEAL

RECEIVED

Revised → OCT 31 1995

WATER RESOURCES
WESTERN REGION



1" = 132 FT

Ø = Depth of Pond or canal

- - - Pipeline direction of Flow

RECEIVED

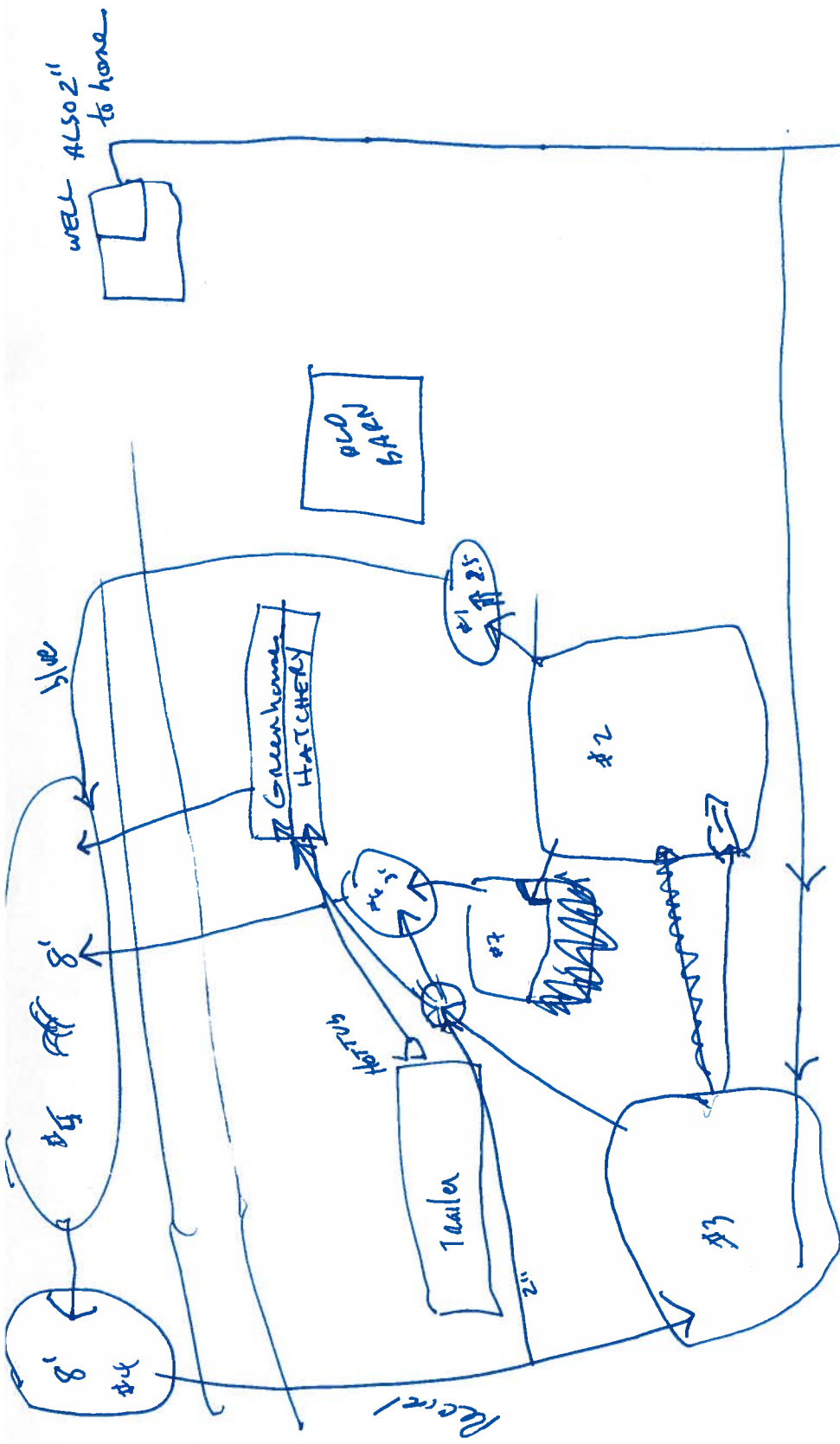
NOV 03 1995

Deposited by the State of California

RECEIVED

APR 20 1995

WATER RESOURCES
WESTERN REGION



2+3 diameter 135' = Area $14313.9 \times 8 \times 2 = 229022.4 \div 43560 = 5.26$
 85' = 5674.5×8 $45396 \div 43560 = 1.04$
 4

$150' \times 100' = 15000 \div 43560 = .34 \times 8 = 2.75 \text{ AF}$

Pond #1

$$40' \text{ diameter} = 1256.6 \times 2.5 \div 43560 = .072 \text{ AF}$$

Pond #2

$$* 114.5' \times 114.5' = 13110.25 \times \textcircled{8} \div 43560 = 2.41 \text{ AF}$$

$\nearrow$ exact
 $\times 11.0 \rightarrow$ capacity
 $\times 11.5$

(3.31)
 (3.46)

Pond #3

$$CIR = 290.4 \div 6720 \times 11 = 73920 \div 43560 = 1.70 \text{ AF}$$

Pond #4 + 5

$$135' \text{ diameter} = 14313.9 \times 8 \times 2 = 229022.4 \div 43560 = 5.26 \text{ AF}$$

Ponds #6 + 7 + hor tub

$\times 9 \times 2$

(5.91)

$$\#1 \approx \#1 = .072 \text{ AF} \quad \#6 + \text{hor tub} = .05$$

~~A = 11.91~~

$$= \pi (67.5)^2 \div 14313.9$$

(11.91)

$$\pi (20)^2$$

$$\begin{array}{r}
 .072 \\
 .072 \\
 2.41 \\
 1.70 \\
 5.26 \\
 .05 \\
 \hline
 9.564 \approx 10 \text{ AF}
 \end{array}$$

From
 Rachman's
 Rachman's Handbook
 18th Ed. 1968

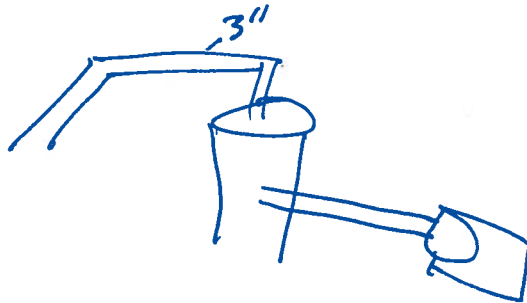
Artesian Flow is 15-20 gpm

10" discharge well

Pump is 7 hp, 120' set

Surface pump is 3/4 horse - back up for submersible

3" discharge
Designed for 200 gpm
Drawdown $\approx$ 80'



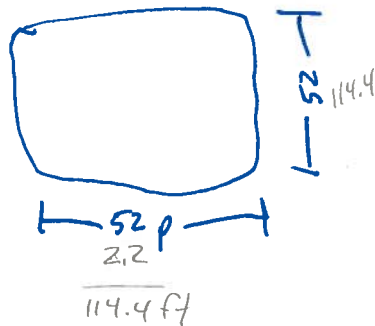
Pond #1:

Av. Depth 2.5 ft



Pond #2

Av. Depth 8 ft

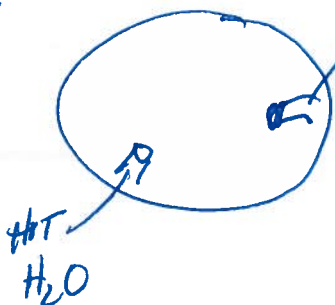


Small (6x10) tub in greenhouse is part of filtration system for hatching

Relief from 2nd pond on east of driveway @ 200 gpm

Pond #3

highest point
pumped to this
pond, gravity
to all others



Recirculated H₂O

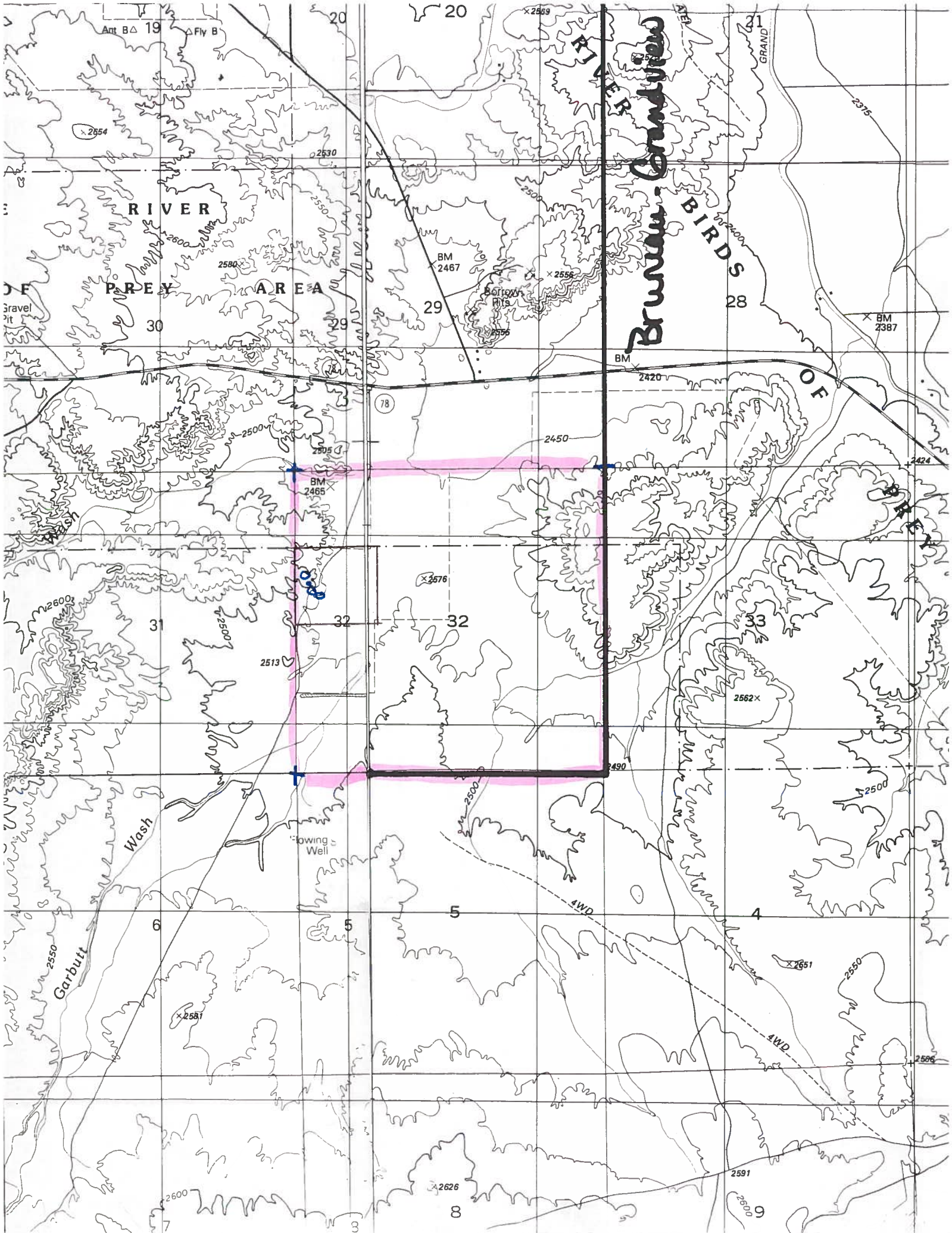
Av. depth 8 ft

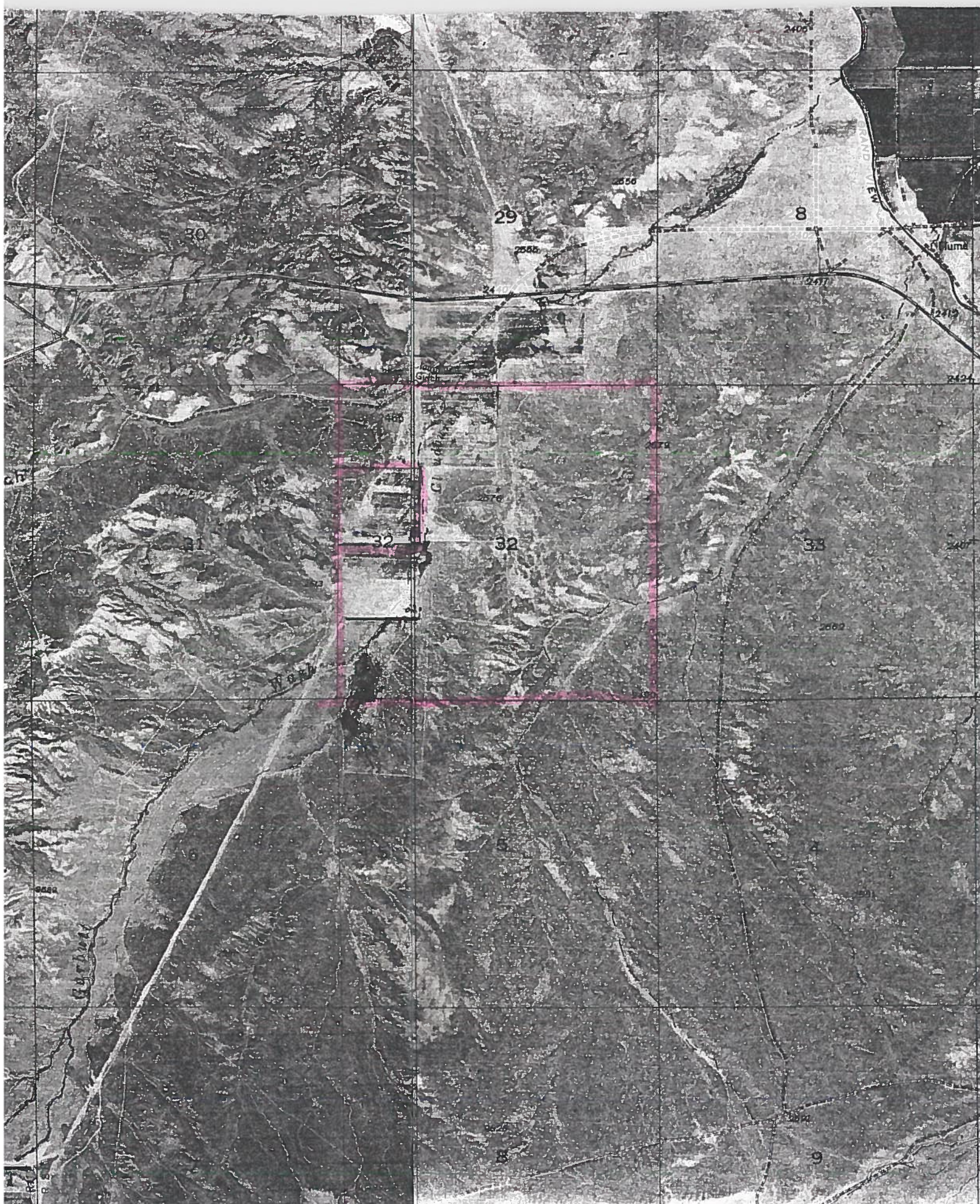
CIRC. 132 paces

$$\frac{132}{2.2} = 290.4$$

Directly behind house

$$\frac{132}{2.2} = 290.4$$





THEORETICAL HORSEPOWER EQUATION WORKSHEET (cjh 1/92)

Water Right No.: 57-7502
 Examiner: Phill Hummer
 Date of Field Exam: 5/15/2017

	Option 1	OPTION 2	OPTION 3
P/D No.:			
PUMP HORSEPOWER	7	7	7
BOOSTER HORSEPOWER	0	0	0
PUMPING LEVEL	120	120	120
DISCHARGE PRESSURE	10	15	20
FRICTION	0	0	0
RATE OF FLOW (cfs)	0.30	0.28	0.26
(gpm)	135.2	125.1	116.4

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.

Examiners Notes:

A field exam was conducted on 11/06/1997 by M. Minicucci. The notes indicate the main pump is 7 hp set at a depth of 120 feet and the back up pump is 3/4 hp set at the surface. The well pumps into a 3 inch pipe designed for 200 gallons per minute (0.45 cfs), the pipe takes water to a pond and terminates in an open discharge (picture #5 of pond #3). Typically pumps that discharge well water into an open system operate under very low pressures. For these reason I used 10, 15 and 20 psi in the rate of flow calculation. Using these values for the pressure the system would be capable of maximum diversion rate of 0.30, 0.28 and 0.26 cfs or an average of 0.28 cf

TRIS	Process	Basin Sequence	Owner	Source	POD	POU	Use	NENE	NWNE	SWNE	SENE	NENW	NWNW	SWNW	SENW	NESW	NWSW	SWSW	SESW	NESE	NWSE	SWSE	SESE	Total Acres
04502E32	Water Permit	57-7502	JORDAN, DAN	GROUND WATER	POD									X										
04502E32	Water Right	57-7103	ENVIROSAFE SERVICES OF IDAHO INC, JORDAN, DAN; KETTERLING, RANDY J; LAWRENCE, E P	GROUND WATER	POD									X										

possible overlap

04502E32	Water Right	57-7103	ENVIROSAFE SERVICES OF IDAHO INC, JORDAN, DAN; KETTERLING, RANDY J; LAWRENCE, E P	GROUND WATER	POU		DOMESTIC							X										
04502E32	Water Permit	57-7502	JORDAN, DAN	GROUND WATER	POU		FISH PROPAGATION							X										
04502E32	Water Right	57-7103	ENVIROSAFE SERVICES OF IDAHO INC, JORDAN, DAN; KETTERLING, RANDY J; LAWRENCE, E P	GROUND WATER	POU		HEATING							X										
04502E32	Water Right	2-7065A	KETTERLING, RANDY J; LAWRENCE, E P	SNAKE RIVER	POU		IRRIGATION							20										20

Heating for home

different than 7502 heating for greenhouse and maybe ponds

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond 1

Pond Surface Area (AC.)	0.1	AC.
-------------------------	-----	-----

Pond Surface Area (SQ. FT.)	4356	SQ. FT.
-----------------------------	------	---------

I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	GP	
Suggested Seepage Rate (FT./DAY)	0.2000	FT./DAY

formula
0.2

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
--

Convert to GPD	6517	GPD
----------------	------	-----

Total Seepage Loss (AFA)	7.3	AFA
--------------------------	-----	-----

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

Pond 1

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: Grasmere NWS - 103809

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.08	31	0.00
Feb	0.56	28	15.68
March	1.62	31	50.22
April	2.87	30	86.10
May	3.50	31	108.50
June	4.28	30	128.40
July	5.05	31	156.55
August	4.18	31	129.58
September	2.82	30	84.60
October	1.81	31	56.11
November	0.48	30	14.40
December	-0.02	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 = **830.14**

$$\left(\frac{830.14}{304.8} \right) \times 0.10 = 0.3 \text{ AFA}$$

Total Storage Calculations

FILE NUMBER	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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

Pond 1

Surface Area (AC.)	0.1	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	2.5	"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)	0.25	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)	7.3	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.3	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	7.8	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.

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond 2

Pond Surface Area (AC.)	0.2	AC.
-------------------------	-----	-----

Pond Surface Area (SQ. FT.)	8712	SQ. FT.
-----------------------------	------	---------

I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	GP	
Suggested Seepage Rate (FT./DAY)	0.2000	FT./DAY

formula
0.2

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
--

Convert to GPD	13033	GPD
----------------	-------	-----

Total Seepage Loss (AFA)	14.6	AFA
--------------------------	------	-----

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

Pond 2

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: Grasmere NWS - 103809

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.08	31	0.00
Feb	0.56	28	15.68
March	1.62	31	50.22
April	2.87	30	86.10
May	3.50	31	108.50
June	4.28	30	128.40
July	5.05	31	156.55
August	4.18	31	129.58
September	2.82	30	84.60
October	1.81	31	56.11
November	0.48	30	14.40
December	-0.02	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 = 830.14

$$\left(\frac{830.14}{304.8} \right) \times 0.20 = 0.5 \text{ AFA}$$

Total Storage Calculations

FILE NUMBER	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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

Pond 2

Surface Area (AC.)	0.2	"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)	1.6	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)	14.6	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)	16.7	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.

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond 3

Pond Surface Area (AC.)	0.1	AC.
-------------------------	-----	-----

Pond Surface Area (SQ. FT.)	4356	SQ. FT.
-----------------------------	------	---------

I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	GP	
Suggested Seepage Rate (FT./DAY)	0.2000	FT./DAY

formula
0.2

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
--

Convert to GPD	6517	GPD
----------------	------	-----

Total Seepage Loss (AFA)	7.3	AFA
--------------------------	-----	-----

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

Pond 3

User Input
Calculated value
Formula Explanations

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>.

The acronyms used on the Kimberly Research Center website are defined below:

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

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: Grasmere NWS - 103809

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.08	31	0.00
Feb	0.56	28	15.68
March	1.62	31	50.22
April	2.87	30	86.10
May	3.50	31	108.50
June	4.28	30	128.40
July	5.05	31	156.55
August	4.18	31	129.58
September	2.82	30	84.60
October	1.81	31	56.11
November	0.48	30	14.40
December	-0.02	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 = 830.14

$$\left(\frac{830.14}{304.8} \right) \times 0.10 = 0.3 \text{ AFA}$$

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

Total Storage Calculations

FILE NUMBER	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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

Pond 3

Surface Area (AC.)	0.1	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	11	"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)	1.1	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)	7.3	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.3	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	8.7	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.

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond 4

Pond Surface Area (AC.)	0.3	AC.
-------------------------	-----	-----

Pond Surface Area (SQ. FT.)	13068	SQ. FT.
-----------------------------	-------	---------

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
0.02

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
--

Convert to GPD	1955	GPD
----------------	------	-----

Total Seepage Loss (AFA)	2.2	AFA
--------------------------	-----	-----

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

Pond 4

User Input
Calculated value
Formula Explanations

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>.

The acronyms used on the Kimberly Research Center website are defined below:

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

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: Grasmere NWS - 103809

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.08	31	0.00
Feb	0.56	28	15.68
March	1.62	31	50.22
April	2.87	30	86.10
May	3.50	31	108.50
June	4.28	30	128.40
July	5.05	31	156.55
August	4.18	31	129.58
September	2.82	30	84.60
October	1.81	31	56.11
November	0.48	30	14.40
December	-0.02	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 = 830.14

$$((830.14 \div (\text{convert to feet})) \times (\text{Surface area of pond, in acres})) = \text{Evaporation Loss in Acre Feet}$$

(830.14 ÷ 304.8) X 0.30 = 0.8 AFA

Total Storage Calculations

FILE NUMBER	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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

Pond 4

Surface Area (AC.)	0.3	"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)	2.4	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)	2.2	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.8	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	5.4	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.

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond 5

Pond Surface Area (AC.)	0.4	AC.
-------------------------	-----	-----

Pond Surface Area (SQ. FT.)	17424	SQ. FT.
-----------------------------	-------	---------

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
0.02

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
--

Convert to GPD	2607	GPD
----------------	------	-----

Total Seepage Loss (AFA)	2.9	AFA
--------------------------	-----	-----

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

Pond 5

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: Grasmere NWS - 103809

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.08	31	0.00
Feb	0.56	28	15.68
March	1.62	31	50.22
April	2.87	30	86.10
May	3.50	31	108.50
June	4.28	30	128.40
July	5.05	31	156.55
August	4.18	31	129.58
September	2.82	30	84.60
October	1.81	31	56.11
November	0.48	30	14.40
December	-0.02	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 = 830.14

$$((830.14 \div 304.8) \times 0.40) = 1.1 \text{ AFA}$$

Total Storage Calculations

FILE NUMBER	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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

Pond 5

Surface Area (AC.)	0.4	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	9	"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)	3.6	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)	2.9	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	1.1	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	7.6	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.

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond 6

Pond Surface Area (AC.)	0.01	AC.
-------------------------	------	-----

Pond Surface Area (SQ. FT.)	436	SQ. FT.
-----------------------------	-----	---------

I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	GP	
Suggested Seepage Rate (FT./DAY)	0.2000	FT./DAY

formula
0.2

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
--

Convert to GPD	652	GPD
----------------	-----	-----

Total Seepage Loss (AFA)	0.7	AFA
--------------------------	-----	-----

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

Pond 6

User Input
Calculated value
Formula Explanations

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>.

The acronyms used on the Kimberly Research Center website are defined below:

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

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: Grasmere NWS - 103809

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.08	31	0.00
Feb	0.56	28	15.68
March	1.62	31	50.22
April	2.87	30	86.10
May	3.50	31	108.50
June	4.28	30	128.40
July	5.05	31	156.55
August	4.18	31	129.58
September	2.82	30	84.60
October	1.81	31	56.11
November	0.48	30	14.40
December	-0.02	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 = 830.14

$$\left(\frac{830.14}{304.8} \right) \times 0.01 = 0.027$$

0.027

Total Storage Calculations

FILE NUMBER	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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

Pond 6

Surface Area (AC.)	0.01	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	3	"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)	0.03	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)	0.7	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.0	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	0.8	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.

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

User Input
Calculated value
Formula Explanations

INPUTS

Pond 7

Pond Surface Area (AC.)	0.02	AC.
-------------------------	------	-----

Pond Surface Area (SQ. FT.)	871	SQ. FT.
-----------------------------	-----	---------

I used the following method to obtain my Soil Classification information:	NRCS Web Soil Survey	
My Soil Classification is	GP	
Suggested Seepage Rate (FT./DAY)	0.2000	FT./DAY

formula
0.2

Formula: (Surface Area X Seepage Rate) X 7.48 = Gallons Per Day Loss
--

Convert to GPD	1303	GPD
----------------	------	-----

Total Seepage Loss (AFA)	1.5	AFA
--------------------------	-----	-----

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	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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: Grasmere NWS - 103809

Month	mm/day ¹	Days per month	mm/Month
Jan	-0.08	31	0.00
Feb	0.56	28	15.68
March	1.62	31	50.22
April	2.87	30	86.10
May	3.50	31	108.50
June	4.28	30	128.40
July	5.05	31	156.55
August	4.18	31	129.58
September	2.82	30	84.60
October	1.81	31	56.11
November	0.48	30	14.40
December	-0.02	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 = 830.14

$$((830.14 \text{ mm/yr}) \div (\text{convert to feet})) \times (\text{Surface area of pond, in acres}) = \text{Evaporation Loss in Acre Feet}$$

$$(830.14 \div 304.8) \times 0.02 = 0.1 \text{ AFA}$$

Total Storage Calculations

FILE NUMBER	57-7502
REVIEWER	Phill Hummer
DATE	2/16/2018

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.)	0.02	"Surface Area" is automatically carried over from the "Seepage Loss" sheet.
Average Pond Depth (FT.)	2.5	"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)	0.05	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)	1.5	The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.
Estimated Evaporation Loss (AF)	0.1	The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.
Total Volume Required (AF)	1.6	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.

ET_{Idaho} 2012 -- Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho

Please send suggestions for improving this site to robison at kimberly dot uidaho dot edu Copyright 2012, University of Idaho.

Grand View (NWS -- 103760)

Statistics based on thirty year normal spans 1940 to 2008 years

For a different land cover or crop click on the above link.

You can highlight this table and copy via the clipboard to a Microsoft Excel or OpenOffice spreadsheet to plot or otherwise work with this data.

Open water - shallow systems (ponds, streams)															
Precipitation Deficit (Click here for a graph)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Growing Season ^a	Non Growing Season ^b	Annual
Mean ^j	mm/day												mm		
Monthly ^c	-0.08	0.59	1.62	2.87	3.50	4.28	5.05	4.18	2.82	1.81	0.48	-0.02	819	0	819
15-Day Moving Average ^d	-0.09	0.52	1.63	2.91	3.54	4.28	5.09	4.16	2.73	1.88	0.44	-0.05			
7-Day Moving Average ^e	-0.10	0.58	1.61	2.86	3.51	4.28	5.07	4.17	2.79	1.83	0.44	-0.05			
3-Day Moving Average ^f	-0.09	0.60	1.63	2.87	3.49	4.29	5.06	4.18	2.81	1.81	0.47	-0.03			
Standard Deviation ^k	mm/day												mm		
Monthly ^c	0.56	0.53	1.07	0.69	1.35	0.80	0.78	0.75	0.73	0.83	0.50	0.73	95	0	95
15-Day Moving Average ^d	0.56	0.71	1.02	0.83	1.21	1.03	0.68	0.69	1.02	0.74	0.66	0.64			
7-Day Moving Average ^e	0.80	0.91	1.20	1.22	1.64	1.36	0.88	0.89	1.25	1.04	0.87	0.82			
3-Day Moving Average ^f	1.15	1.22	1.57	1.68	2.17	1.79	1.21	1.19	1.60	1.34	1.18	1.13			
20% Exceedance ^l	mm/day												mm		
Monthly ^c	0.15	0.95	2.18	3.54	4.34	4.96	5.61	4.61	3.32	2.29	0.88	0.40	860	0	860
15-Day Moving Average ^d	0.54	1.34	2.73	4.04	4.85	5.38	5.87	4.95	3.77	2.80	1.17	0.60			
7-Day Moving Average ^e	0.78	1.84	3.29	4.71	5.61	5.95	6.16	5.22	4.19	3.05	1.67	0.88			

3-Day Moving Average ^f	0.98	2.17	3.95	5.24	6.18	6.56	6.61	5.66	4.70	3.57	1.95	1.09			
80% Exceedance^m	mm/day												mm		
Monthly ^c	-0.49	0.24	0.88	2.11	2.81	3.47	4.57	3.69	2.44	1.41	-0.01	-0.57	769	0	769
15-Day Moving Average ^d	-1.02	-0.43	0.13	1.40	1.85	2.55	3.94	3.05	1.41	0.74	-0.69	-1.36			
7-Day Moving Average ^e	-2.21	-1.37	-0.48	-0.24	-0.07	0.96	2.71	1.87	-0.26	-0.76	-1.54	-2.52			
3-Day Moving Average ^f	-4.47	-3.55	-3.15	-2.90	-4.04	-1.13	0.46	0.05	-3.15	-2.70	-3.59	-4.38			
Ave Highest P_{def}	mm/day												--		
15-Day Moving Average ^g	0.34	0.92	2.22	3.55	4.34	5.01	5.48	4.64	3.41	2.38	0.88	0.40			
7-Day Moving Average ^h	0.60	1.42	2.76	4.17	5.11	5.61	5.79	5.01	3.84	2.79	1.29	0.66			
3-Day Moving Average ⁱ	0.82	1.76	3.36	4.83	5.67	6.26	6.26	5.39	4.35	3.19	1.60	0.90			
Ave Lowest P_{def}	mm/day												--		
15-Day Moving Average ^g	-0.46	0.16	1.04	2.26	2.73	3.57	4.64	3.65	2.16	1.31	-0.02	-0.46			
7-Day Moving Average ^h	-1.23	-0.50	0.23	1.15	1.33	2.47	4.00	3.09	1.29	0.45	-0.63	-1.08			
3-Day Moving Average ⁱ	-2.65	-1.86	-1.47	-0.54	-1.16	0.86	2.63	1.85	-0.11	-0.80	-2.04	-2.27			
Special normal distribution parameters for monthly, seasonal, and annual intervals															
Skew ^m	-0.17	-0.60	-0.35	0.23	-0.44	-0.86	-0.03	-0.30	-1.23	-0.11	-0.26	-0.18	0.31	0.00	0.31
Kurtosis ^o	0.76	3.93	1.13	2.14	1.22	3.09	0.68	0.82	4.02	0.83	2.55	0.65	4.45	0.00	4.45

^a Growing Season: This is usually the time from green up or planting in the spring to a killing frost or harvest in the fall. It is not applicable for entries without a growing season and will be blank.

^b Nongrowing Season: This is usually the time from a killing frost or harvest in the fall to the of green up in the spring. It is not applicable for entries without a growing season.

^c Mean of the average daily value for month

^d Mean of the fourteen 15-day period averages contained in the month

^e Mean of the twenty three 7-day period averages contained in the month

^f Mean of the twenty seven 3-day period averages contained in the month

^g Mean of the highest/lowest 15-day period average in month

FIELD EXAM PHOTO INDEX SUMMARY

Date: 11/6/1997

Roll No.: _____

Photographer: RTIMICCC

PHOTO NO.	SUBJECT
1	Artesian well
2	WELL house - Home in background
3	Pond #1
4	Pond #2 @ discharge
5	Pond #3 Highest point. Other ponds gravity fed from here.
6	small pond next to house w/ large pond on east side of drive
7	Hatchery green house
8	Green house
9	Discharge into 1 st pond on east side of road
10	Lowest pond
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	



PHOTOGRAPHER AND DATE OF PHOTOS D. D'Amico 11/6/1997

FILE NO. AND LEGAL DESCR. 57-07502 T4S R2E S32 SWNW



Point of diversion. Well is in background. Pump in foreground is back-up, 3/4 HP. Used for emergency only. Three inch discharge to ponds. Well also supplies dom/heating under license 57-07103; separate system for those uses. Discharges into 10 inch pipe to ponds.



Location of well. 10 inch pipe with valve to ponds. 2nd pipe also to ponds.



Pond #1



Pond #2 at the discharge



Pond #3 This pond is the highest point in the system, all the other ponds are gravity fed from this pond.



Small pond next to the house (maybe #6) with a large pond on the East side of the drive in the background. (maybe #5)



Hatchery greenhouse



Photo showing the greenhouse



Photo showing the discharge into the first pond on the East side of the road



Photo showing the lowest pond in the system