

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 63-12361
63-12417
Exam Date: 6/14/2016

1. Current Owner:
HARRY L BETTIS PO BOX 7 EMMETT ID 83617 (208) 484-4858

2. Accompanied by: Harry Bettis and Dan Nelson (IDWR)
Phone No: 208-484-4858
Address: PO Box 7 Emmett ID 83617
Relationship to Permit Holder: Self

**Please Note: this beneficial use
field exam is for both 63-12361
and 63-12417**

3. **SOURCE:**
SOUTH FORK WILLOW CREEK

TRIBUTARY:
WILLOW CREEK

B. OVERLAP REVIEW

1. Other water rights with the same place of use: Place of use comparison showed that this permit is overlapped by water right 63-20949 which authorizes the irrigation of 160 acres and Stockwater use for 500 range cattle. It also overlaps with permit 63-12417
2. Other water rights with the same point-of-diversion: 63-20949 also diverts from the POD located in NENW of Section 31 TWP 06N R 01E.

C. DIVERSION AND DELIVERY SYSTEM**1. LOCATION OF POINT(S) OF DIVERSION:**

SOUTH FORK WILLOW CREEK NE¼NW¼ Sec. 31, Twp 06N, Rge 01E, B.M. GEM County
SOUTH FORK WILLOW CREEK NE¼NW¼ Sec. 31, Twp 06N, Rge 01E, B.M. GEM County (Rediversion)
SOUTH FORK WILLOW CREEK NE¼NW¼ Sec. 31, Twp 06N, Rge 01E, B.M. GEM County
SOUTH FORK WILLOW CREEK NE¼NW¼ Sec. 31, Twp 06N, Rge 01E, B.M. GEM County (Rediversion)
SOUTH FORK WILLOW CREEK SW¼NE¼ Sec. 31, Twp 06N, Rge 01E, B.M. GEM County
SOUTH FORK WILLOW CREEK SW¼NE¼ Sec. 31, Twp 06N, Rge 01E, B.M. GEM County (Rediversion)
SOUTH FORK WILLOW CREEK NW¼NE¼ Sec. 36, Twp 06N, Rge 01W, B.M. GEM County
SOUTH FORK WILLOW CREEK NW¼NE¼ Sec. 36, Twp 06N, Rge 01W, B.M. GEM County (Rediversion)

Method of Determination: PODs GPS'd and verified through ArcMap

2.

PLACE OF USE: IRRIGATION STORAGE and STOCKWATER 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	
06N	01E	31			X	X									X	X		X	
06N	01E	32									X	X	X	X					

PLACE OF USE: IRRIGATION

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
06N	01E	30											12.0 L 4						12.0
06N	01E	31						5.4 L 1											5.4
06N	01W	25															26.0	26.0	52.0
06N	01W	35												4.9				1.1	6.0
06N	01W	36	2.0	21.0	3.4		4.1		3.5	16.0		14.0							64.0

Total Acres: 139.4

STOCKWATER FROM STORAGE and IRRIGATION FROM STORAGE same as IRRIGATION

Method of Determination: Field exam and ArcMap

3.

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

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

1. Measurements:

E. FLOW CALCULATIONSx Additional Computation Sheets Attached

Measured Method:

We performed measurements for a Manning's Flow Calculation to establish what the creek could take as an out-flow at the high water mark. This calculated 112.83 cfs (System capacity). This is in line with the dam safety outlet capacity curve for 15 inches of head.

There will have to be a combined limit placed on the irrigation acres of 63-12361 and 63-20949. 63-20949 did not provide an inch per acre for the irrigation of 160 acres. 63-12361 will be licensed to provide .02 cfs per acre (in conjunction with 63-20249) for the entire 139.4 acres developed.

$$139.4 \times 0.02 = 2.79 \text{ cfs for irrigation needed}$$

WR 63-20949 provides 2.68 cfs for 160 acres

$$2.68/160 = 0.01675 \times 139.4 = 2.33 \text{ (provided for the 139.4 acres)}$$

$$2.79 \text{ (see above)} - 2.33 \text{ (provided by 63-20949)} = 0.46 \text{ cfs for irrigation recommended}$$
500 head of range cattle $\times 12 = 6000$ gpd
$$6000 \times 365 = 2190000/325850 = 6.7 \text{ af}$$

Permit was for 5.0 af for stockwater recommend 5.0 af stockwater with a combined limit with 63-

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = 139.4 \times 4.5 = 627.3 \text{ af}$$

$$V_{DR} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = 2.79 \times 246 \times 1.9835 = 1361.4 \text{ af}$$

$$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} = 627.3 \text{ af}$$

2. Volume Calculations for Other Uses:

Dam height is 76.6 ft.

Hydraulic height is 67 ft

$$67 \times 0.4 = 26.8 \text{ ft average depth}$$

The Reservoir Storage capacity is 1843 af

This dam has an overflow at 3216 ft $3216 - 3152 = 64 \times 0.4 = 25.6 \text{ ft average depth}$

$$1843 / 25.6 \text{ Ave depth} = 72 \text{ acres surface area}$$

Surface area is 72 ac.

Pond volume

1843.2 af capacity /requirement.

(No seepage and evaporation is used for on-stream storage if the beneficial use's purpose is not to keep it topped off)

According to Idaho code 42-202 the applicant can only store 5 af per irrigated acre for irrigation storage

$139.4 \times 5 = 697 + 5 \text{ af stockwater} = 702 \text{ af for WR 63-12361}$

If capacity is reduced to 702 af

According to the Aikman Dam Area and Capacity Curves the elevation of the water would be $3192 - 3153 = 39 \times .4 = 15.6 \text{ ft}$ average depth.

$45 \times 15.6 = 702.0 \text{ af capacity /requirement.}$

Recommend 702 af.

Multiple fill volume is 0 af

627.3 af (irrigation from storage)

- 702 af (capacity)

- 74.7 af

Since the irrigation requirement is 627.3 af and the capacity of the reservoir exceeds it, there is no multiple fill volume requirement.

Calculations in case the Department approves a change of beneficial use for permit 63-12417 and approves a license (adequate irrigation was not developed to require this for irrigation storage)

$2,074.0 - 707.0 = 1,367.0 \text{ af requirement if new beneficial use needs to be topped off.}$

$1,843.2 - 707.0 = 1,136.2 \text{ af storage if new beneficial use does not require top-off.}$

63-12361	Irrigation Storage	702.0 af
63-12361	Stockwater Storage	5.0 af

G. NARRATIVE/REMARKS/COMMENTS: The department received proofs of beneficial use for these permits on November 25, 2008. These proofs were received late causing the priority dates to be advanced accordingly. Reviewing aerial photography, I found that the best storage year they have had was in 2011. This imagery was used to calculate the surface area of the reservoir. The water level in the reservoir was low during the field exam. We took measurements for the manning's calculation from the high water mark on the creek to determine the release capacity that the creek could handle. The irrigation systems are capable of diverting all of this water (this is their capacity). The pond spreadsheet shows a reservoir capacity of 1,843.2 af. With seepage and evaporation loss, there is a requirement of 2,074.4 af. Irrigation Storage was calculated to be 2,074.4 af for the reservoir. This is an on-stream reservoir that will allow storage during robust water years to provide irrigation during arid years. 697.0 af will come from permit 63-12361 for irrigation storage (senior right). and the remainder will come from permit 63-12417 (wildlife storage if amended). The irrigation from storage should be removed from 63-12417 because all irrigation from storage was developed under 63-12361. The applicant stated that they had 500 range cattle for this area. There was a condition for measuring devices at the inlet and the outlet of the reservoir. This reservoir's location is where the creek historically would have gained water from run-off of the hills. This water historically ran into the North Fork of Willow Creek. A measuring device at the inlet would give a false low reading (exempting this natural run-off). This condition should be changed to a 222 condition at licensing. Depth posts are located in the reservoir. Through aerial imagery I have confirmed 139.4 acres of irrigation on the North side of the creek. There was also 166.1 acres of possible irrigation in the South side of the creek. When discussing this with the applicant, he confirmed that they were only irrigating North of the creek. There will have to be a combined limit placed on the irrigation acres of 63-12361 and 63-20949. 63-20949 did not provide an inch per acre for the irrigation of 160 acres. 63-12361 will be licensed to provide .02 cfs per acre (in conjunction with 63-20249) for the entire 139.4 acres developed.

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

Since the applicant is not irrigating more acres than authorized under existing right 63-20949. A combined limit condition will be placed on this right and the following conditions addressing the protests on the irrigation of acres will be removed.

This right is limited to the irrigation of 500 acres within the place of use described above in a single irrigation season.

Irrigation use under rights 63-12361 and 63-12417 when combined shall not exceed a total of 500 acres in a single irrigation season.

Sprinkler irrigation occurring under rights 63-12361 and 63-12417 shall not exceed 300 acres in a single irrigation season. To enhance local groundwater recharge, the right holder shall flood irrigate remaining lands.

The following condition addressing the protest will remain on the right.

To the extent practical, the right holder shall release excess water from the storage facility in such a manner as to enhance the recharge of groundwater from Willow Creek.

H. RECOMMENDATIONS

1a. Recommended Amounts for WR 63-12361

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
STOCKWATER FROM STORAGE	01/01 to 12/31		5.0 AF
STOCKWATER STORAGE	01/01 to 12/31		5.0 AF
IRRIGATION	03/15 to 11/15	0.46 CFS	
IRRIGATION STORAGE	01/01 to 12/31		702.0 AF
IRRIGATION FROM STORAGE	03/15 to 11/15		627.3 AF
<u>Totals:</u>		0.46 CFS	707.0 AF

1b. Recommended Amounts for WR 63-12417: None, permit should be voided.

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

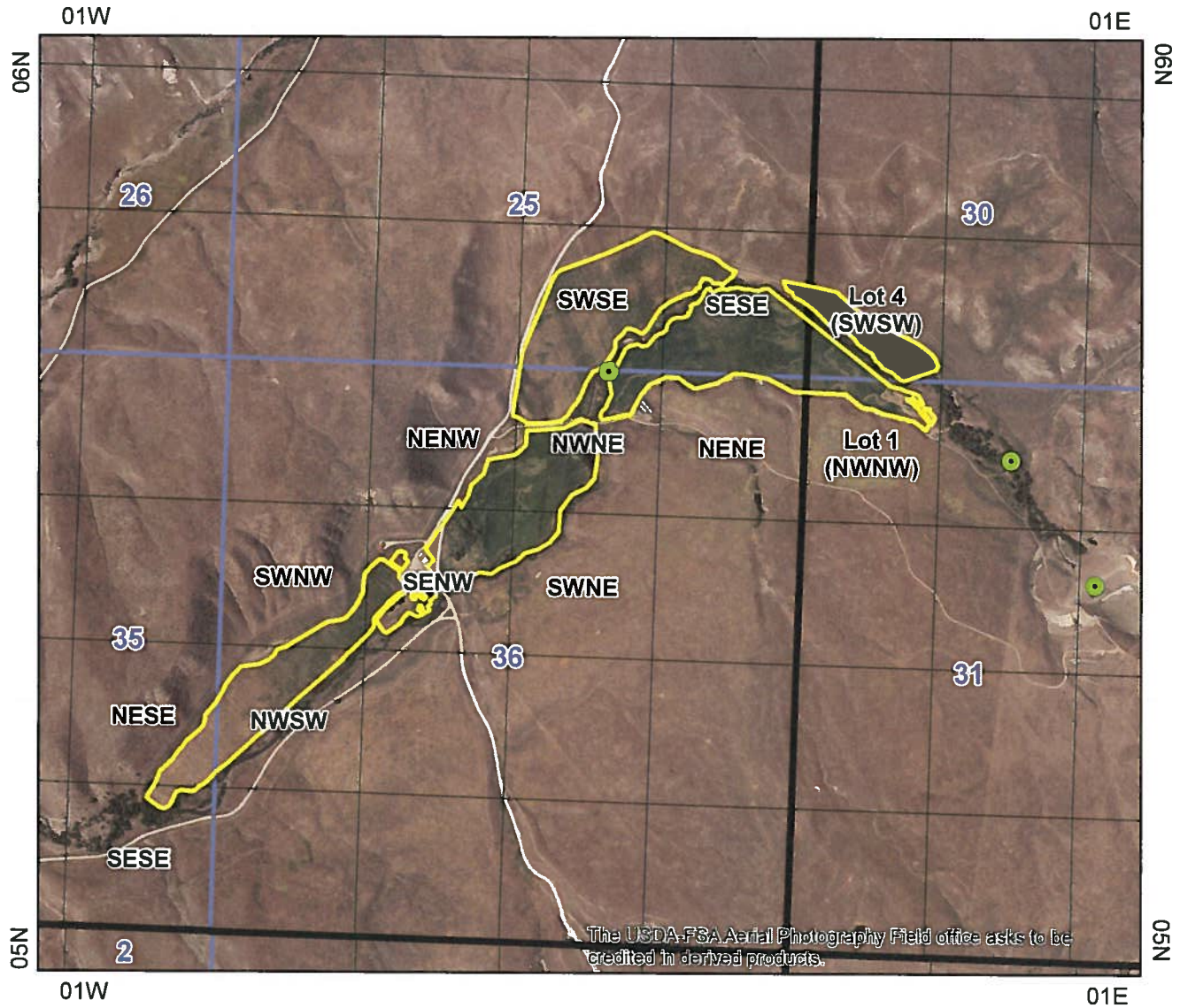
I. AUTHENTICATION Clay Webster Water Resource Agent

Field Examiner's Name Clay Webster Date 8/4/2016

Reviewer _____ Date _____

State of Idaho
Department of Water Resources
Attachment to Field Exam
63-12361

This map depicts the IRRIGATION and IRRIGATION FROM STORAGE place of use boundary for this water right at the time of this exam and is attached solely for illustrative purposes.



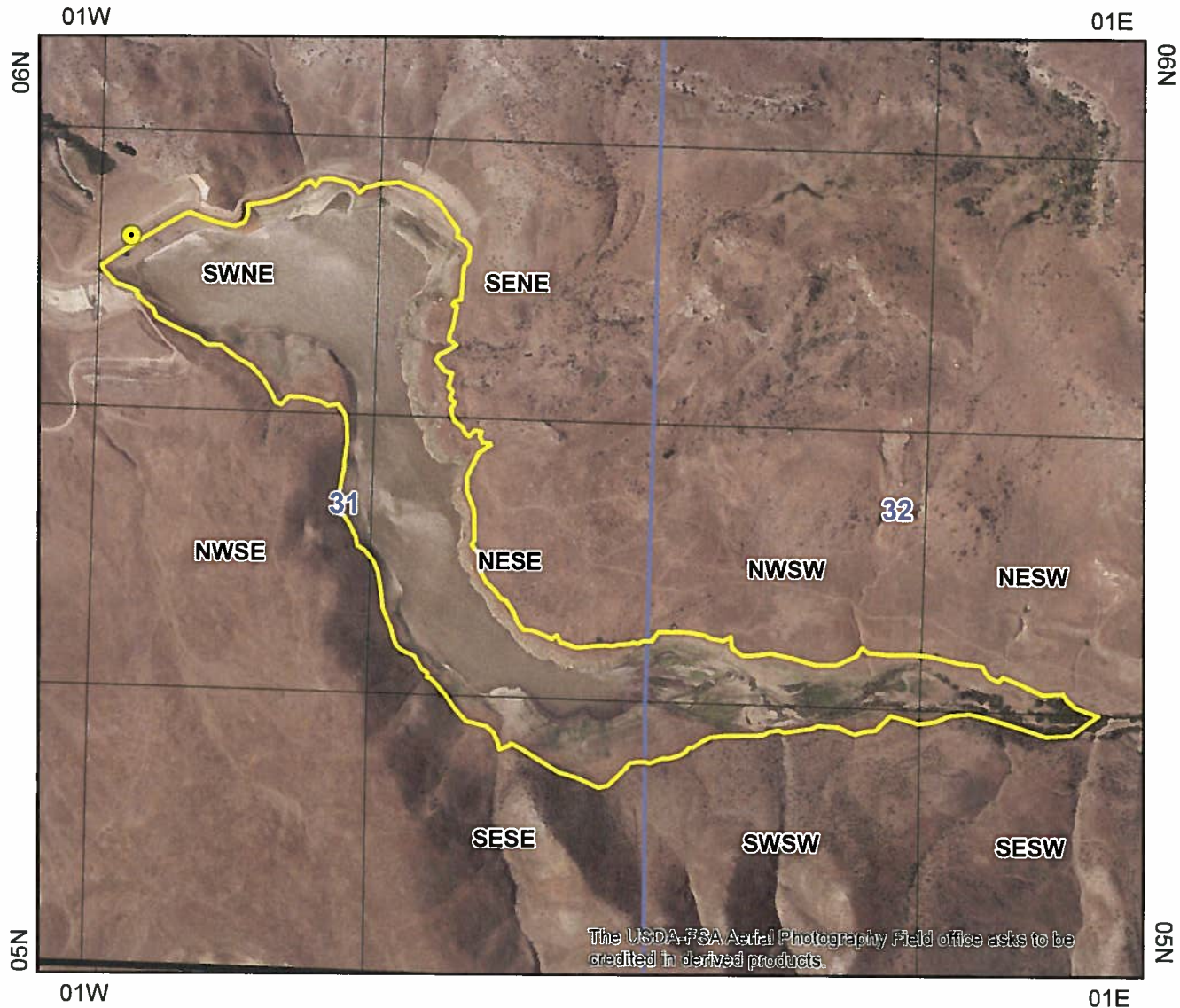
-  Point of Diversion
-  Place Of Use Boundary
-  Townships
-  PLS Sections

0 0.175 0.35 0.7 Miles



State of Idaho
Department of Water Resources
Attachment to Field Exam
63-12361

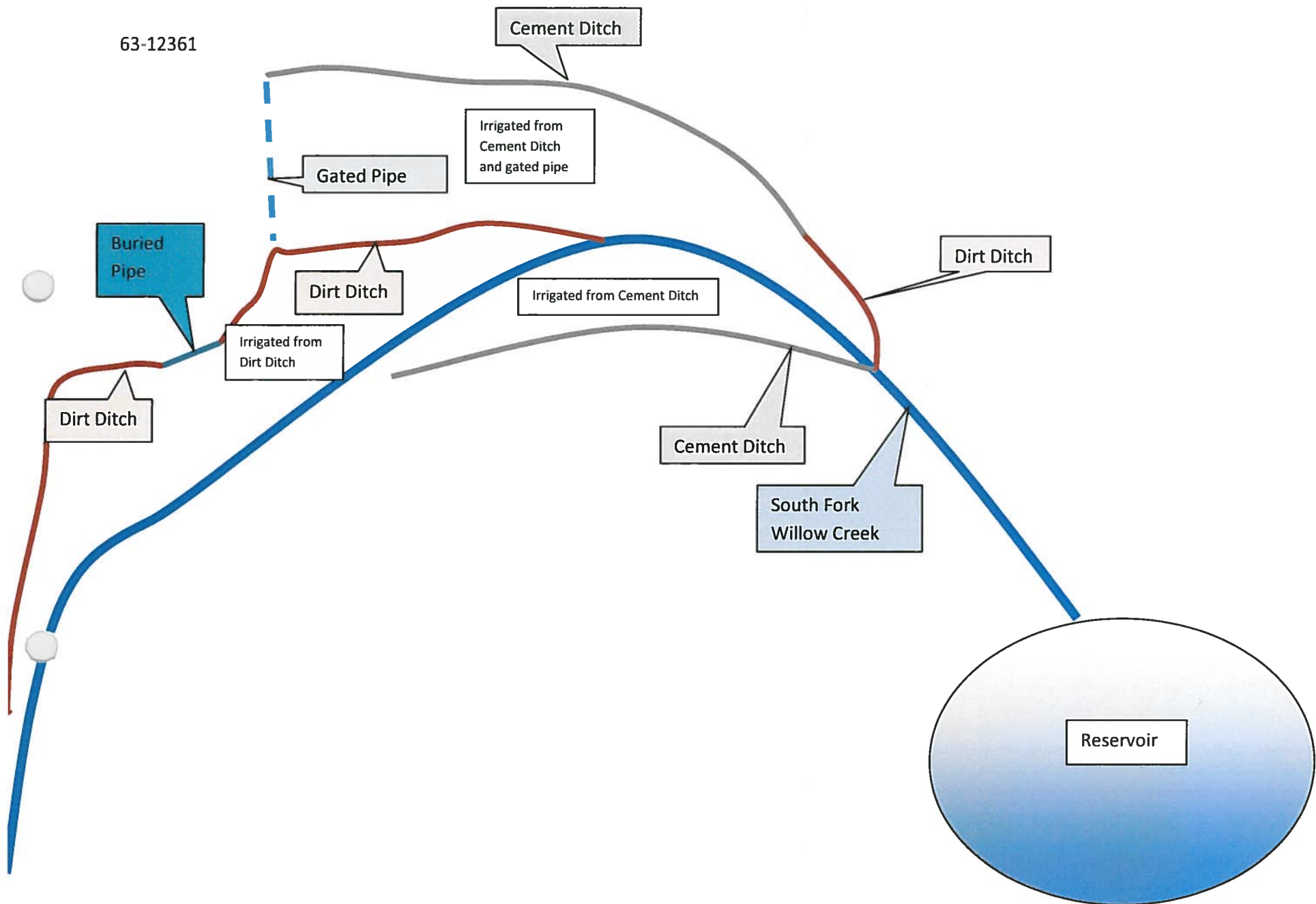
This map depicts the IRRIGATION STORAGE and STOCKWATER STORAGE place of use boundary for this water right at the time of this Exam and is attached solely for illustrative purposes.



-  Point of Diversion
-  Place Of Use Boundary
-  Townships
-  PLS Sections

0 0.1 0.2 0.4 Miles



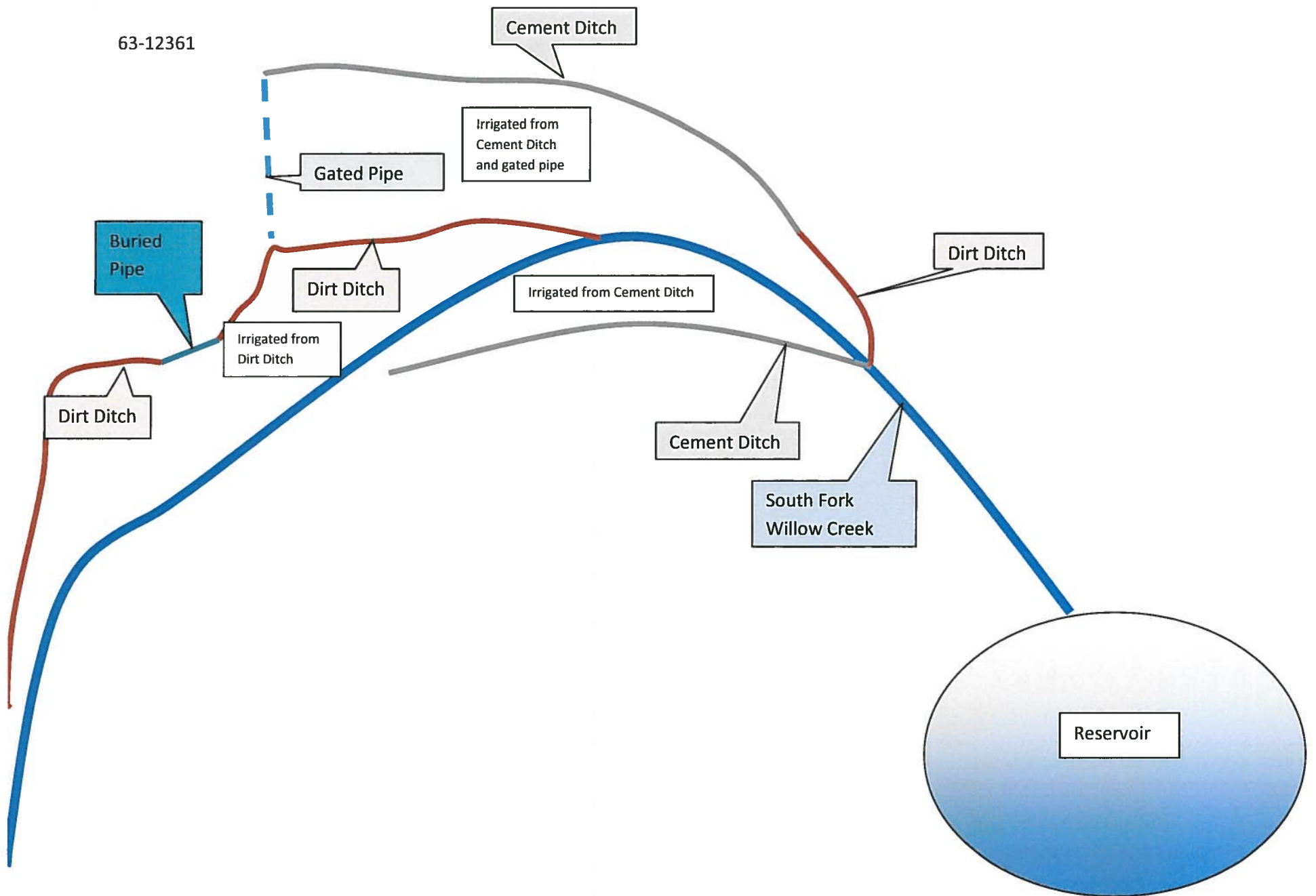


63-12361 and 63-12417 System diagram

63-12361 & 63-12417







63-12361 and 63-12417 System diagram

Manning's Equation Calculator for Flow Rate in Any Open Channel

READ ME

S = 0.0143 ft/ft

n = 0.035 manning's coefficient

A = 18.15 area (ft²)

18.150

WP = 13.46 wetted perimeter (ft)

R = 1.35 hydraulic radius (ft)

Q = 112.83 flow rate (CFS)

Channel Slope

Slope Options

☐ Manual Entry ☒ Slope Calculator

Slope Calculator

Rise = 0.5 feet

Run = 35 feet

Slope, S = 0.0143 ft/ft

Channel Material, (n):

natural channel, w/ stones and weeds

Go To WP & A Calculator I

Go To WP & A Calculator II

Manning's Equation (1), is an empirical formula that solves for velocity (v) in a open channel under uniform flow. The continuity equation (2) when combined with equation (1) allows for the computation of the flow rate (Q) in an open channel under uniform flow.

In equations (1) and (3), η refers to Manning's Coefficient of Roughness and can be found in tabulated form for many open channel types. R is the hydraulic radius of the open channel and is equal to the area of the open channel divided by the wetted perimeter, $R = A/P$. S is the slope of the energy grade line which is often assumed to be equal to the slope of the channel.

Because Manning's Equation is empirical the units are not arbitrary. To obtain a velocity in ft/s and a flow rate in ft³/s, area must be reported in ft², hydraulic radius must be reported in ft, and S must be reported in ft/ft. Manning's Coefficient of Roughness is a unitless constant.

$$(1) \quad v = 1.49 \left(\frac{1}{\eta} \right) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$

$$(2) \quad Q = vA$$

$$(3) \quad Q = 1.49 \left(\frac{1}{\eta} \right) (A) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$

**Wetted Perimeter and X-Sectional Flow Calculator for
Flow Rate in a User Defined Open Channel**

READ ME

Input No. of Measurement Points Used to Define the Channel

Note: a minimum of four measurement points must be used, with a maximum of 12.

◀ ▶

12 No. of Selected Measurement Points

Clear Input Data from Table

Input Channel Measurement Points		
	X (ft)	Y (-ft)
1st Meas. Point:	1.0	0.4
2nd Meas. Point:	3.0	0.9
3rd Meas. Point:	4.0	1.2
4th Meas. Point:	5.0	1.3
5th Meas. Point:	6.0	1.9
6th Meas. Point:	7.0	2.1
7th Meas. Point:	8.0	2.3
8th Meas. Point:	9.0	2.1
9th Meas. Point:	10.0	1.9
10th Meas. Point:	11.0	1.8
11th Meas. Point:	12.0	1.2
12th Meas. Point:	14.0	0.0

X-Sectional Area of Flow

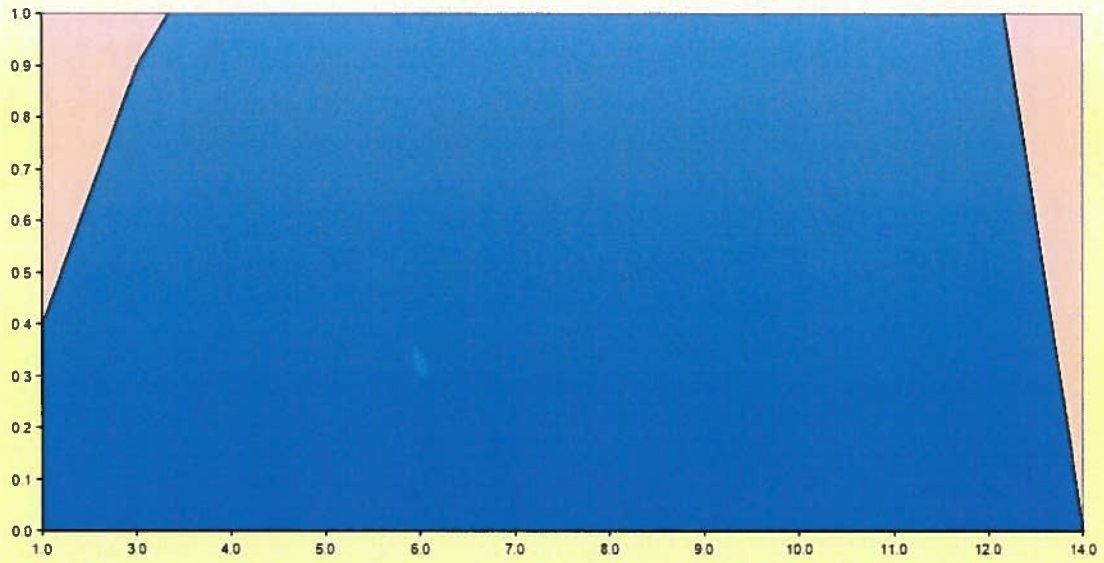
A = 18.15 square feet

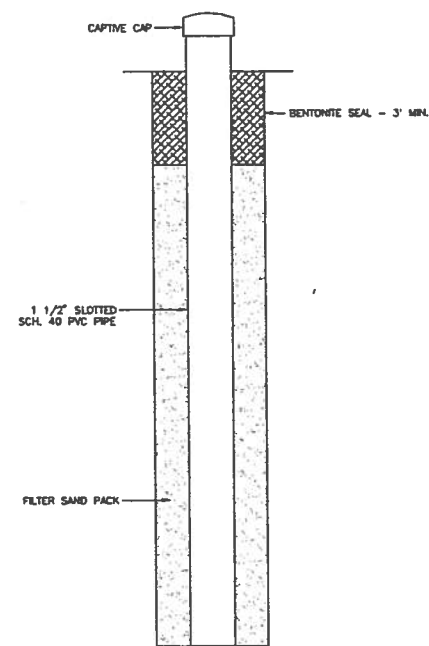
Wetted Perimeter

WP = 13.46 feet

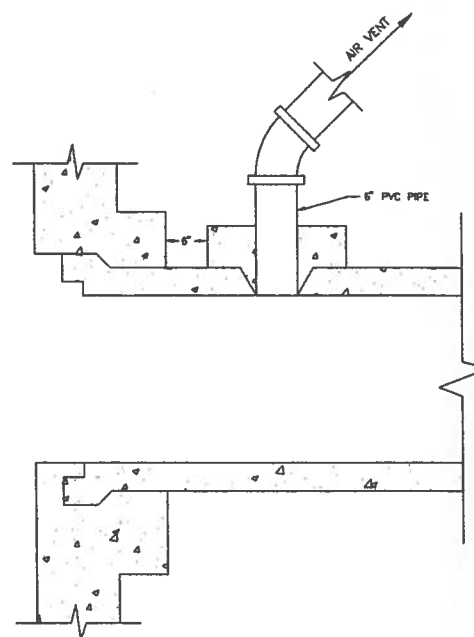
Export WP & A Values

Flow Area

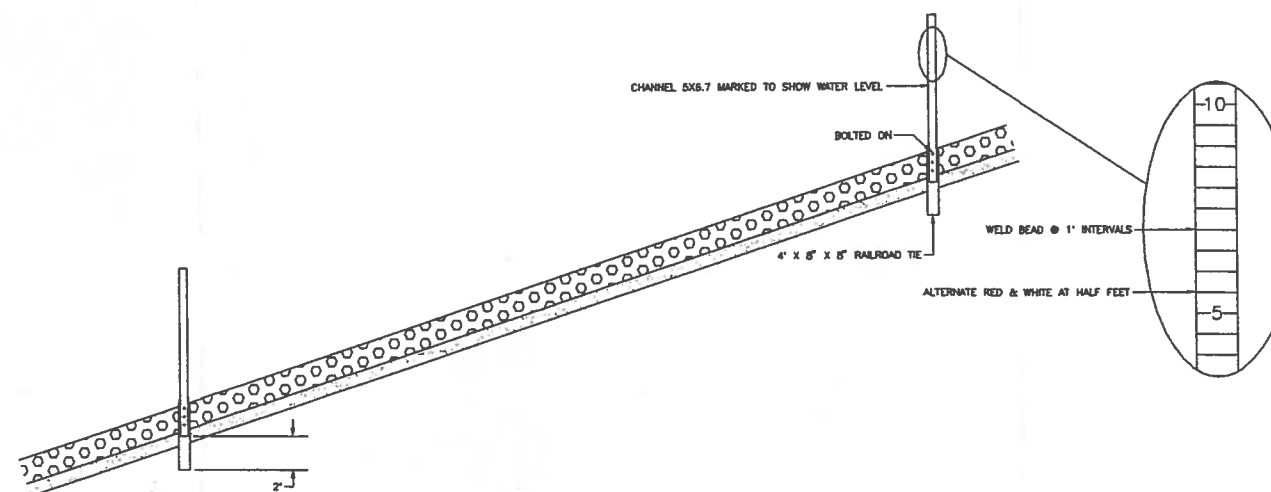
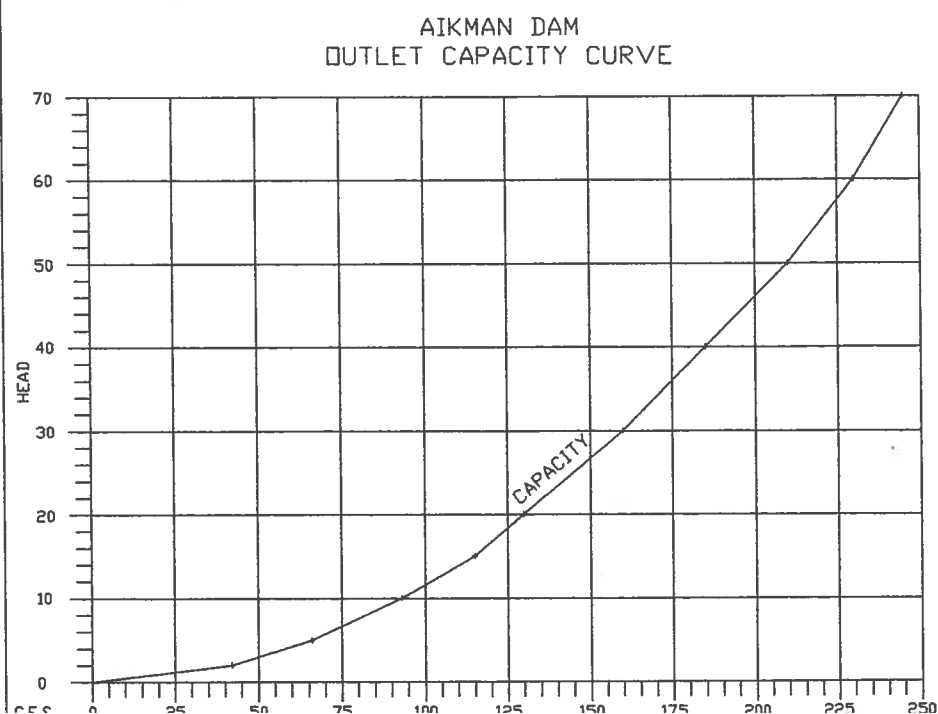
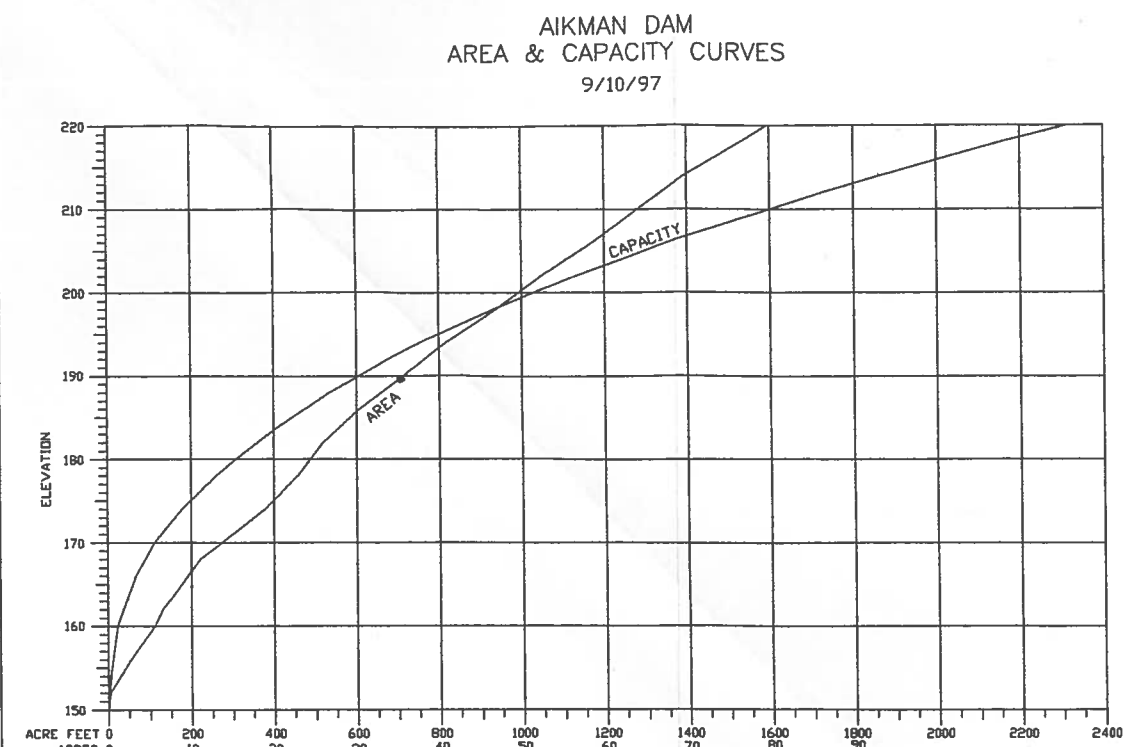




PIEZOMETER DETAIL
SCALE: N.T.S.



VENT PIPE DETAIL
SCALE: 1"=1'



WATER LEVEL GAGE
SCALE: 1"=5'

AIKMAN DAM	
DETAILS	
JOB #: 96-102	DRAWING NAME: SHT8-DET
DESIGNED: DJW	DATE: 11/12/97
CHECKED: DJW	PAGE 8 OF 16
PLOTTED: DEW	SCALE: VARIES
A & B ENGINEERING	
BOISE, IDAHO	

REV. 7/08/98 - MODIFIED WATER LEVEL GAGE
REV. 10/18/97 - ADDITIONAL DETAIL

IDAHO DEPARTMENT OF WATER RESOURCES **-- DAM SAFETY RECORD OF INSPECTION --**

Inspector: Rick Collingwood	Dam Owner: Harry Bettis	Hazard: High
Pool Level: -20 ft. Below NHW	Dam Height: 76.6 ft.	Hydraulic Ht: 67 ft.
Reservoir Storage: 2,000 AF	Surface Area: 72 ac.	NAT DAM ID: ID00491
Others Present: Sonny Hornbaker		Weather Conditions: Partly Sunny, Breezy

PRIMARY DAM OR IMPOUNDING STRUCTURE

Type of Construction: ☒ - Earthen ☐ - Rockfill ☐ - Concrete ☐ - Timber Crib ☐ - Other:

Instrumentation: ☐ - Piezometers ☐ - Inclinometers ☐ - Seismic ☒ - Other: Settlement Pins

Is there another dam, dike, or hydraulic structure impounding a portion of this reservoir? ☐ - Yes ☒ - No

If "Yes", explain:

	Seepage	Erosion	Animal	Vegetation
Upstream Slope	Dry	None Observed	None Observed	Bare to Sparse
Crest	Dry	Animal/Vehicle	None Observed	Bare to Sparse
Downstream Slope	Dry	None Observed	None Observed	Bare to Sparse
Downstream Toe	Dry	None Observed	None Observed	Mixed Vegetation
Left Abutment	Dry	None Observed	None Observed	Bare to Sparse
Right Abutment	Dry	None Observed	None Observed	Bare to Sparse

Observations and Remarks:

Upstream Slope - Good Condition. River cobble rip rap. Isolated tree and brush.
 Crest - Minor vehicle rutting. Sparse sage, grass, and weeds.
 Downstream Toe - Mixed vegetation - sage, grass, brush. Thick brush commencing at the downstream slope near the right abutment and groin. No visible surface water, but vegetation may be sustained by point source seepage. An additional source of water for sustaining the thick brushy area may be water discharged from the toe drain discharge pipes. The thick brush is located downstream of the two toe drain PVC discharge pipes.

Condition Assessment

☒ - Satisfactory ☐ - Fair ☐ - Poor ☐ - Unsatisfactory ☐ - Not Rated (See Remarks)

Is this structure suitable for the continued impoundment of water? ☒ - Yes ☐ - No

If "No", explain with recommended action:

Name of Dam: Aikman

IDWR File No: 63-12361

Date: 6-17-14

Idaho Department of Water Resources

Dam Safety Data Sheet

Dam Name: AIKMAN

Region: W

Other Dam Name:

National ID Number: ID00491

State ID Number: 63-12361

Last Modified: 3/30/2016

General Information

Status: REGULATED

Hazard: HIGH

Purpose: IRRIGATION

Size Category: 1

Location

County: GEM

Latitude: 43.8167318218

River or Stream: SOUTH FORK WILLOW CREEK WILLOW CREEK

Longitude: -116.3828889

Township: 06N

IDTM X: 2308364.55

Range: 01E

IDTM Y: 1404501.59

Section: 31

Location Method: GPS

Quad Name: SOUTHEAST EMMETT

Quad Number: W57

Dam Owner

HARRY L BETTIS

HARRY BETTIS, PRIVATE OWNER

McCALL PHONE (208) 634-5319; ALTERNATE NUMBER (208) 484-4858

Embankment Physical Characteristics

Dam Type: EARTH

Hydraulic Height: 67 Feet

Dam Height: 76.6 Feet

Year Completed: 1999

Dam Length: 675 Feet

Condition: SATISFACTORY

Regulatory Data

Inspection Date: 6/17/2014

Emergency Action Plan: Yes

Storage Authorization: 12/31/2014

Next Dam Inspection: 2016

Certificate Expired: 12/31/2016

Inspection Frequency: 2 Years

Survey Date: 2001

Joint Inspection:

Condition Assessment: SATISFACTORY

Idaho Department of Water Resources

Dam Safety Data Sheet

Dam Name: AIKMAN
Other Dam Name:
State ID Number: 63-12361

Region: W
National ID Number: ID00491
Last Modified: 3/30/2016

Reservoir

Drainage Area: 20.3 Sq Miles
Surface Area: 72 Acres

Normal Storage: 2000 Acre feet
Maximum Storage: Acre feet

Spillway

Spillway Depth: 8 Feet
Spillway Channel Type: CONCRETE
Spillway Width: 170 Feet
Inflow Design Flood (IDF): PMF

Spillway Type: UNCONTROLLED
Spillway Gates: NONE
Max Discharge: 825 CFS

Outlet

Outlet Conduit Type:
Outlet Size: 36 Inches
Outlet Capacity: 230 CFS

Outlet Gate:
Outlet Last Inspected: 1/9/1900
Outlet Video: 63-12361-OUTIN-07

Deficiency:

IDWR Restrictions: - PROJECT SHALL BE OPERATED PER THE APPROVED OPERATION PLAN.
- NOTE: PROJECT LOCATION IS S. FORK OF <> B-I-G <> WILLOW CREEK

Comments: - ALSO HAS WATER RIGHT NO. 63-12417 for xxx acre-feet.

SPILLWAY (WITH FUSE-PLUG INSTALLED):
=> RELEASE CAPACITY CALCULATED W/ 3.0' FREEBOARD.
=> NOTE --> Check on this: FUSEPLUG RANGE FROM 2.0' - 5.5' IN HEIGHT.
=> Q100 =760 CFS; WILL PASS W/ 3.2' FREEBOARD.
=> PMF = CFS W/ 0.3' FREEBOARD (ASSUMES FUSE ERODES)
=> IN 2006, A PORTION OF THE FUSE WASHED-OUT

OUTLET
=> 36-INCH DIA. STEEL PIPE

INSTRUMENTATION (PER DESIGN PLANS)
=> SIX (6) PIEZOMETERS
=> THREE (3) SETTLEMENT HUBS
=> TWO (2) UNDERDRAINS



Outlet control



Irrigation and creek looking NW from dam



Reservoir



Vent pipe



Inlet



Outlet



Outlet pipe structure (from Dam Safety Record)



Outlet pipe into concrete dissipater box (from Dam Safety Record)



Head gate South side of South Fork of Willow Creek



Irrigation control gate South of South Fork of Willow Creek



Ditch North of South Fork of Willow Creek



Irrigation control box for ditch



Cement ditch south of field



Field with cement ditch running along North end



Field with gated pipe along West end



Ditch along Western end of field between field and Willow Creek Rd