

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 78-07263C
Exam Date: 8/17/2016

1. Current Owner:
BRUNDAGE WATER USERS ASSN INC PO BOX 333 NEW MEADOWS ID 83654
2. Accompanied by: Micki Ebbv
Phone No: 208-347-2350
Address: 2990 Carr Lane
Relationship to Permit Holder: Share holder and board member to BWUA.

3. SOURCE:
BRUNDAGE CREEK

TRIBUTARY:
GOOSE CREEK

B. OVERLAP REVIEW

1. Other water rights with the same place of use: 78-2085, 78-7263A & 78-7263B
2. Other water rights with the same point-of-diversion: 78-2085, 78-7263A & 78-7263B

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

BRUNDAGE CREEK NW¼NE¼ Sec. 35, Twp 19N, Rge 01E, B.M. ADAMS County(Rediversion)
BRUNDAGE CREEK SE¼SE¼ Sec. 23, Twp 19N, Rge 01E, B.M. ADAMS County(Injection)
BRUNDAGE CREEK NW¼SE¼ Sec. 30, Twp 20N, Rge 03E, B.M. ADAMS County

Method of Determination: Aerial imagery and digital PLSS maps were used to confirm diversion locations. A GPS point was used to verify the Rediversion.

2. PLACE OF USE: 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	
19N	01E	26				33.0									38.0	5.0	16.0	36.0	128.0

Total Acres: 128

PLACE OF USE: 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	
20N	03E	17																	
20N	03E	20		X	X		X			X	X	X	X	X		X			
20N	03E	29					X	X	X										
20N	03E	30	X		X	X									X	X			

Method of Determination: For Irrigation from Storage, ArcMap tools were used to measure overlapping irrigation rights within the boundaries of the permit. WREdit tools were used in ArcMap to identify the Irrigation Storage POU description.

3.

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

X

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.

X

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

X

X 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

*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: Manning's Equation used for flow through the ditch.**E. FLOW CALCULATIONS**X Additional Computation Sheets AttachedMeasured Method: Time Volume estimation

$$Q = V \cdot A \quad A = 12.42 \text{ ft}^2 \text{ (per manning spreadsheet)}$$

$$\text{Average time to travel 10 ft.} = 15.86 \text{ sec} \quad \Rightarrow \quad V = 10 \text{ ft} / 15.86 \text{ s} = 0.63 \text{ ft/s}$$

$$Q = 0.63 \text{ ft/s} \cdot 12.42 \text{ ft}^2 = 7.83 \text{ cfs}$$

Measured Method: Manning Equation

$$Q = 63.78 \text{ cfs (See attached)}$$

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

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

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

2. Volume Calculations for Other Uses:

$$[\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = \text{Total Volume}$$

$$@ 7.83 \text{ cfs: Volume} = 7.83 \cdot 154 \cdot 1.9835 = 2,391.8 \text{ af}$$

$$@ 63.78 \text{ cfs: Volume} = 63.78 \cdot 154 \cdot 1.9835 = 19,482.2 \text{ af}$$

G. NARRATIVE/REMARKS/COMMENTS

There is a long history associated with the permit. The field exam for this permit appears to have been attempted a number of times by various employees of the Department. 78-7263C originated as a split that took place while 78-7263 was still in the permit phase. It is rare that we license an exchange, but in this case that is what we are doing.

78-7263A was examined by Steve Lester in 1995 which authorized 2,992 af of storage water at Brundage Reservoir. The site was visited again in 2000 by Steve. See the October 9, 2013 memo for background information regarding the process.

A final exam^{at A or C} was conducted by Patrick Kelly on August 17, 2016 and was accompanied by current property owner Micki Eby. Ms. Eby inherited the land from her parents (Ross) who have deceased. She also serves on the board to the Brundage Water Users Assn Inc. The intent of my visit was to confirm that 300 af of water was able to pass through the ditch in a season.

The point of rediversion is located by a check dam at the legal description described above. A headgate at the dam delivers water to an open ditch that meanders through the Eby property. There is a diversion point located further upstream at the point described by the six Little Salmon River rights still in the name of Ross. Water runs through a ditch along the east side of the land and joins with water coming from the rediversion. There is a significant gain in the Little Salmon River at the point of rediversion that is attributed to the flows of Mud Creek. The point of rediversion is a significant delivery point for the Eby land, and a transfer was recommended during the exam to add the rediversion point to the existing Ross rights.

The point of diversion from Brundage Creek was not observed during my exam. Aerial photography, Dam Safety files and photos from previous visits in the file confirm that the water storage is occurring. Active water right POD's show a shape created in the NESE QQ. Brundage Reservoir dam crosses the QQ boundary, so the NW SE QQ described by the permit was kept for licensing. A case could be made for either QQ, so a licensing amendment to correct the POD will not be sought.

The place of use for irrigation from storage recognized a total of 183 acres on the permit for both sides of the Little Salmon

River. Irrigation use on Eby property west of the river was authorized by the exchange for a total of 55 acres. Irrigation west of the river has never occurred, so the exchange and use of 78-7263C will recognize the 128 acres east of the river that overlap the Ross rights. Since the 300 af of water provides a 2.4 af/ac on 128 acres of land, there are no concerns of exceeding the standard volume limits per acre established by the department.

As already stated, the primary objective of the visit was to confirm 300 af of water passes through the ditch. The headgate at the check dam (44d 56.835 N, 116d 17.962 W) delivers water to an open ditch that can be seen on aerial photography. The open ditch meanders through the property and provides water primarily for stock and grass irrigation. On the day of my visit, water was passing through the ditch at maximum capacity and was overflowing back into the Little Salmon River.

Ground surrounding the ditch was swampy and determining a good measurement location was difficult. A straight stretch of ditch was used to measure flow 120' from the headgate. A SonTek FlowTracker was taken out to the ditch to measure flows, however the equipment was not used. There was a significant amount of weed and grass that filled the ditch, and an open stretch clear of debris could not be found. Data was collected to complete a Manning's Equation method. A tag line was used to create a ditch profile by collecting depth measurements at a number of points across the ditch. Small bits of wood were used to gain an average time to travel a known distance. This gave an estimated rate of 0.63 ft/sec, and a total estimated diversion of 7.83 cfs. See the attached worksheet for additional information and a Mannings flow rate of 63.78 cfs.

There is a large discrepancy between the two flow methods described above. The Manning's rate of 63.78 cfs is unreasonable, but should be considered for error. A significant amount of debris prohibited flows to reach such a high velocity. This could not be accounted for appropriately in the calculation. The timed volume method is more reasonable, but may also be high considering the average velocity may not accurately represented throughout the ditch profile. To gain an accurate measurement, the FlowTracker really would need to be relied upon.

Considering both flow calculations, while they may represent high flow, they suggest a volume of 300 af associated with permit 78-7263C is being delivered. The required flow rate needed to achieve 300 af in a 154 day season is 0.98 cfs. This is clearly occurring.

There are no other water rights associated with the redirection point. Overlap with other rights is not considered.

At the time of this exam, 78-7305 is still an active application. This could be pursued as a 'live' water right from the Little Salmon River instead of an exchange to irrigate land west of the river. An assignment of application will need to be made to move forward with the application. Micki suggested an interest to move forward with the application.

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

H. RECOMMENDATIONS

1. Recommended Amounts

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
IRRIGATION FROM STORAGE	05/01 to 10/01		300.0 AF
IRRIGATION STORAGE	01/01 to 12/31		300.0 AF
<u>Totals:</u>			300.00 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 ☐ Other

I. AUTHENTICATION

Field Examiner's Name Patrick Kelly Date 8-17-2016
 Reviewer _____ Date _____

78-7263C System Diagram

-  78-7263C Injection POD
-  78-7263C Rediversion POD
-  6 Ross rights POD
-  Ross Ditch
-  Little Salmon River
-  Mud Creek
-  Big Creek
-  6 Ross rights and 78-7263C POU

116°17'57.72"W, 44°56'50.1"N

Manning Flow Rate Calculation Summary Report

General Information:

Permit/Claim Number(s): 78-7263C

Name of Claimant/Permit Holder: Brundage Water Users Assn Inc

Name of Ditch, Canal, or Stream: Ross Ditch

Date of Measurement: Aug-16

Data Collect By: Patrick Kelly

Measurement Location: _____

1/4

1/4

Section: _____

TWNS: _____

RNG: _____

Channel Description Information:

Channel Type

☐ Pipe Full

☐ Circular

☐ Rectangular

☐ V-Notch

☐ Trapezoidal

☒ User Defined

Channel Description: Headgate on Little Salmon River below Mud Creek delivers water to an open ditch on Ebby (Ross) property.

Open ditch runs through pasture land for stock and irrigation puposes. High amount of weed and grass present

in the ditch at the time of measurement.

☒ Photo(s) Attached

☒ Map(s) Attached

Channel Cross Sectional Information:

Basis

☐ High Water Mark

☒ Water Surface

Pipe Full

Circular Channel

Rectangular Channel

User Defined Channel:

Meas. No.	Distance (ft)	Depth (-ft)
1	0.00	0.00
2	1.00	0.71
3	2.00	0.92
4	3.00	1.00
5	4.00	2.00
6	6.00	2.08
7	7.00	1.17
8	9.00	0.96
9	11.08	0.00
10		
11		
12		

Triangular Channel

Trapezoidal Channel

Channel Slope Information:

Basis

☒ High Water Mark

☐ Channel Bottom

☐ Land Surface

	Upstream Elevation Meas. (ft)	Downstream Elev. Meas. (ft)	Distance Between US & DS Points (ft)	Slope (ft/ft) US - DS /Dist.
Upper Alignment:	_____	_____	_____	_____
Middle Alignment:	_____	_____	_____	_____
Topo Map Est.	<u>3900</u>	<u>3880</u>	<u>1400</u>	<u>0.0143</u>

Manning Calculation Output

Q = 63.78 CFS

V = 5.14 FPS

A = 12.42 SF

S = 0.0143 FT/FT

n = 0.035

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

S = 0.0143 ft/ft
 n = 0.035 manning's coefficient
 A = 12.42 area (ft²)
 WP = 12.25 wetted perimeter (ft)
 R = 1.01 hydraulic radius (ft)

Q = 63.78 flow rate (CFS)

READ ME

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.

Channel Slope ☐ Slope Options ☒ Manual Entry ☒ Slope Calculator

Slope Calculator

Rise = 20 feet
 Run = 1400 feet
 Slope, S = 0.0143 ft/ft

Channel Material, (n): natural channel, very poor condition

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

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

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

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.

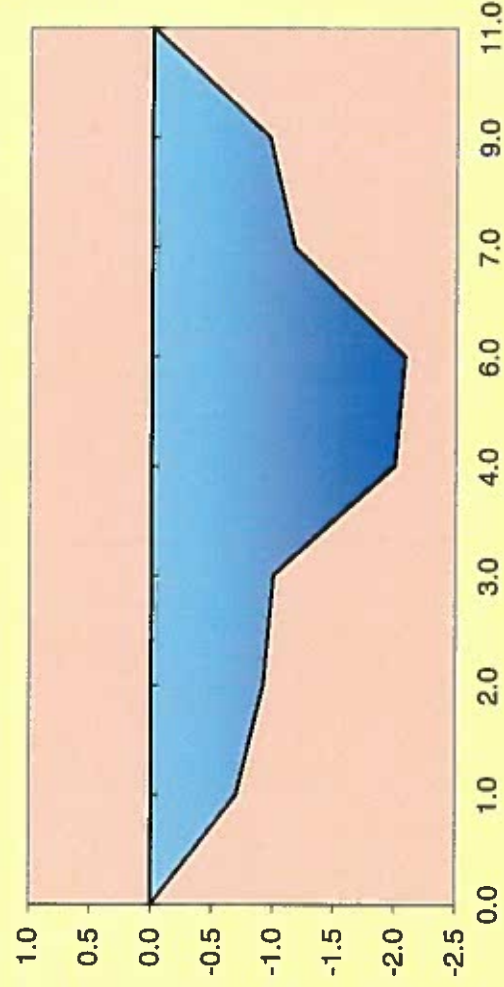
◀ ▶

9 No. of Selected Measurement Points

Input Channel Measurement Points

	X (ft)	Y (-ft)
1st Meas. Point:	0.0	0.0
2nd Meas. Point:	1.0	-0.7
3rd Meas. Point:	2.0	-0.9
4th Meas. Point:	3.0	-1.0
5th Meas. Point:	4.0	-2.0
6th Meas. Point:	6.0	-2.1
7th Meas. Point:	7.0	-1.2
8th Meas. Point:	9.0	-1.0
9th Meas. Point:	11.0	0.0

Flow Area



X-Sectional Area of Flow

A = 12.42 square feet

Wetted Perimeter

WP = 12.25 feet



Diversion dam on
Little Salmon
River

44d 56.835 N
116d 17.962 W

HG on right
delivers water to
Eby property east
of LSR.

HG on left built to
divert water to
Hubbard Ditch
west of LSR.



Little Salmon
River looking
south upstream.



Little Salmon River looking north downstream.

Eby ditch shown to the right.



Eby Ditch looking east at the HG.

Water passing through ditch at maximum capacity. Water overflow was passing back to the LSR shown to the left.



Eby Ditch.



Eby Ditch where profile was measured.

Heavy grass and weed growth in the ditch shown did not allow for a measuring device to be used.