

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 47-8397

Exam Date: 04/19/2011

1. Current Owner: TWIN FALLS CANAL CO
CO/ BRIAN OLMSTEAD, MANAGER
PO BOX 326
TWIN FALLS ID 83301
(208)733-6731
2. Accompanied by: Brian Olmstead, Jay Barlogi, Dee Lowry (Twin Falls Canal Co.) & Jeff Cooper (IDWR)
Phone No: (208) 733-6731
Address: PO Box 326, Twin Falls, ID 83301
Relationship to Permit Holder: Brian Olmstead, Twin Falls Canal Co. Manager, and Dee Lowry, Cedar Draw Water Quality Research & Demonstration Project Manager.

3. SOURCE TRIBUTARY
CEDAR DRAW SNAKE RIVER

B. OVERLAP REVIEW

1. Other water rights with the same place of use: 47-7398 (Fish Propagation; 34.10 cfs)
2. Other water rights with the same point of diversion: 47-7398 (Fish Propagation; 34.10 cfs)

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

CEDAR DRAW NW1/4SE1/4 Sec. 11, Twp 09S, Rge 15E, B.M.
TWIN FALLS County

Method of Determination: Waypoint marked with a Garmin GPS map 76S receiver and downloaded into an ArcMap shapefile that corresponds with 2009 aerial photography and verified the point of diversion to be in Twp 09S Rge 15E S 11 NWSE ¼. See attached map.

2.

PLACE OF USE: WATER QUALITY IMPROVEMENT

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			<u>NE</u>	<u>NW</u>	<u>SW</u>	<u>SE</u>	<u>NE</u>	<u>NW</u>	<u>SW</u>	<u>SE</u>	<u>NE</u>	<u>NW</u>	<u>SW</u>	<u>SE</u>	<u>NE</u>	<u>NW</u>	<u>SW</u>	<u>SE</u>	
09S	15E	11										X							

Method of Determination:

3. _____ Delivery System Diagram Attached (required). Indicate all major components and distances between components. 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).
- _____ Photo of Diversion and System Attached

D. FLOW MEASUREMENTS

1.

Measurement

<u>Equipment</u>	<u>Type</u>	<u>Make</u>	<u>Model No.</u>	<u>Serial No.</u>	<u>Size</u>	<u>Calib. Date</u>
Staff Gauge on Contracted Rectangular Weir						

2. Measurements: At high flow measured 0.91' on Staff gauge at weir.

E. FLOW CALCULATIONS

_____ Additional Computation Sheets Attached

Measured Method: Formula for contracted rectangular weir (Francis formula):

$$Q = 3.33H^{3/2}(L - 0.2(H))$$

Where:

Q = discharge (cfs)

H = head on the weir (ft)

L = length of the weir (ft)

$$Q = 3.33(0.91)^{3/2}(14 - 0.2(0.91)) = 40.03 \text{ cfs}$$

To verify the accuracy of this measurement a Manning's equation was calculated (see next page) on the discharge from the 4' diameter corrugated metal pipeline that supplies water to the facility. The value selected for the roughness coefficient (n) was taken from a USGS administrative memorandum that discusses the roughness coefficient for corrugated metal pipe. According to this memo a 4' diameter corrugated pipe with a standard 2 2/3" pitch with a 1/2" rise should have an "n" value of 0.024 used in calculating the Manning's equation in both full and partly full pipes.¹

Manning Formula Uniform Pipe Flow at Given Slope and Depth

		Results:	
		Flow, q	39.3784 cfs
		Velocity, v	2.2013 m/s
Pipe diameter, d_0	4 ft	Velocity head, h_v	0.8106 ft
Manning roughness, n ?	.024	Flow area	5.4529 ft ²
Pressure slope (possibly ? equal to pipe slope), S_0	.015 rise/run	Wetted perimeter	5.8664 ft
Flow depth fullness (1 or 100% for full pipe)	44.8 %	Hydraulic radius	0.9295 ft
		Top width, T	3.9783 ft
		Froude number, F	1.09
		Shear stress (tractive force), tau	1.6783 psf

Mannings Equation as computed by HAWSEdc Free Online Engineering Calculators²

Slope was calculated using a Transit.

F. VOLUME CALCULATIONS**1. Volume Calculations for Other Uses:**

Head gates opened at beginning and closed at the end of irrigation season (4/01 to 10/31) = 214 days at 34.10 cfs. According to Dee Lowry, project manager, during the off season they try to run the system at 25 cfs. Therefore, 151 days of flow at 25.00 cfs:

$$25.0 \text{ cfs} \times 1.9835 \text{ AF} \times 151 \text{ D} = 7487.7 \text{ AF}$$

$$34.10 \text{ cfs} \times 1.9835 \text{ AF} \times 214 \text{ D} = 14,474.4 \text{ AF}$$

$$14474.4 + 7487.7 = \underline{21,962 \text{ AFA}}$$

G. NARRATIVE/REMARKS/COMMENTS

Application for permit 47-8397 submitted by Twin Falls Canal Co. was submitted July 26, 1996 and proof of Beneficial Use was submitted June 18, 1997.

Twin Falls Canal Co. applied for a Permit for 34.10 cfs at a former fish facility converted to water quality improvement project, located five miles north of Buhl on the south side of the Snake River. According to Dee Lowry, Project Manager, several previous owners were unsuccessful at propagating fish in this facility. This was likely due to the high sediment load from the Cedar Draw waters settling out in the fish raceways. The Twin Falls Canal Co. managed to obtain funds from several sources to purchase the facility and appurtenances (water right 47-7398, 34.10 cfs for fish propagation) in order to create a water quality improvement project. The project involved growing various plant species along the lower half of each of the twelve raceways to improve water quality through plant & microbial uptake of nutrients and contaminants, and deposition of suspended solids from water prior to the water's diversion into the Snake River. The last raceway on the west side also diverts water (approximately 1.0 cfs) into a constructed wetland. Each raceway consists of an upper portion (175' long x 25' wide; Avg. water depth 1.8') with a head gate at the top and concrete spillways on the lower end spilling water into a lower elevation raceway (155' long x 25 wide; Avg. water depth 11.56'), with various species of aquatic plants growing in each of the lower raceways. Plant treatments in the raceways were of the following known species: Baltic Rush (*Juncus balticus*); Nebraska Sedge (*Carex nebrascensis*); Hard stem Bulrush (*Scirpus acutus*); Broad Leaved Cattail (*Typha latifolia*); Sego Pondweed (*Potamogeton pectinatus*); Little Duckweed (*Lemna obscura*); Coyote Willow (*Salix exigua*); and floating mats of mixed vegetation.

The wetland on the west end has a five component design starting with a sediment basin to capture larger particles from the water; a primary filter, consisting of a level area receiving sheet flow to remove fine sediments and buffer abnormal runoff rates; a shallow wetland for nutrient uptake through microbes and aquatic plants; then a deep water pond for additional sediment and nutrient uptake; and a final filter, a vegetated area that removes algae and nutrients and moves overflow during runoff and high water events. The wetland contains the previously listed plant species and the following additional plant species: Creeping Foxtail (*Alopecurus arundinaceus*); Creeping Spikerush (*Eleocharis palustris*).³

An initial reading of 0.625' on a staff gauge was recorded by Jeff Cooper and me at the weir prior to opening the head gates. Twenty minutes after opening the head gates, Staff gauge measurements were taken by Dee Lowry and myself with both gauges reading 0.91'. Slope, pipe diameter and flow depth measurements were taken at the discharge point of the corrugated metal pipe that diverted water from Cedar Draw into the facility to estimate flow using the Manning's equation.

Wetlands contained numerous species of birds (osprey; geese; swallows) and water was higher in clarity at the outflow in comparison to the inflow. Research indicates this type of water quality improvement system can have a removal efficiency of 66 to 95% of total phosphorous, nitrogen and suspended solids.³

Recommend the permitted amount of 34.1 cfs and 21,962 AFA.

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>
WATER QUALITY IMPROVEMENT	1/01 to 12/31	34.100 CFS	21,962.0
<u>Totals:</u>		34.100 CFS	21,962.0

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 Bill Mill Date 5/6/2011

Reviewer John Varnita Date 5/16/2011

References:

¹W. Boning – Chief Office of Surface Water. Office of Surface Water Technical Memorandum No. 93.17, June 22, 1993. Page 2.

<http://water.usgs.gov/admin/memo/SW/sw93.17html>

²Tom Haws, P.E. - Arizona Residential Civil Engineering Services (Last Modified 04/26/2011 14:46:29). Manning Formula Uniform Pipe Flow at Given Slope and Depth

<http://www.hawsedc.com/engcalcs/index.php>

³J. C. Hoag – USDA, Aberdeen PMC MCRS, A Constructed Wetland System for Water Quality Improvement of Nursery Irrigation Wastewater. 1997. Page 132-135.

<http://www.fcnanet.org/proceedings/1997/hoag.pdf>

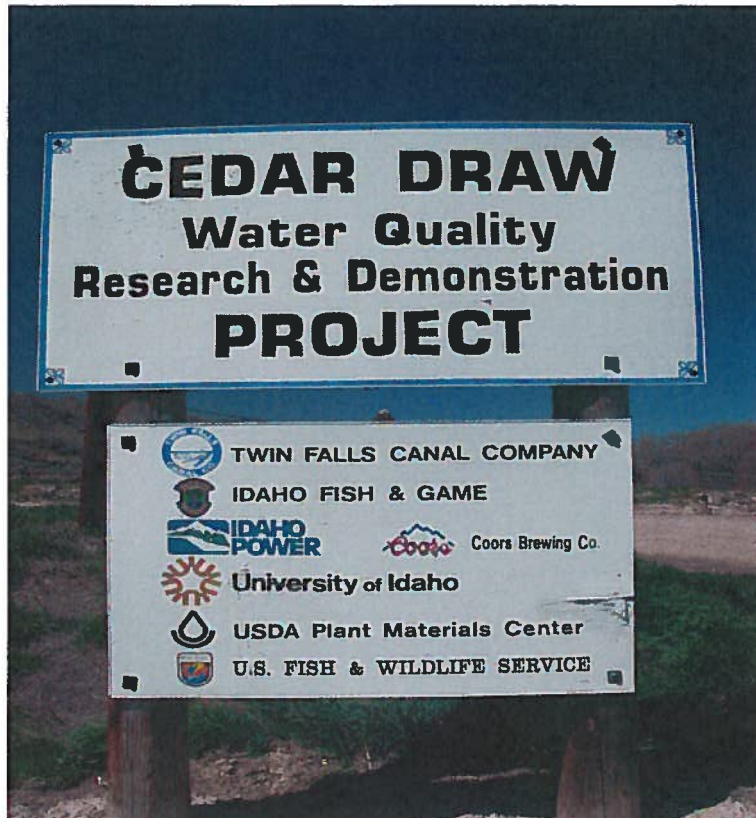


Figure 1: Project Sign



Figure 2: Opening head gates at point of diversion



Figure 3: Discharge into facility



Figure 4: Contracted Rectangular Weir



Figure 5: Upper raceway



Figure 6: Lower raceway



Figure 7: Constructed wetland



Figure 8: Deepwater pond and outlet

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