

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 63-12153
Exam Date: 08/13/2019

1. Current Owner:
MITCHEL A TAIN PO BOX 44 IDAHO CITY ID 83631-0044
2. Accompanied by: MITCHEL TAIN
Phone No:
Address:
Relationship to permit Holder:

3. **SOURCE:**
GROUND WATER

Method of Determination: Pictures of well in field exam report

B. OVERLAP REVIEW

1. Other water rights with the same place of use: YES Overlap

Water Right No.	Source	Purpose of Use	Basis
63-31620	McIntyre Gulch	Irrigation, Irrigation Storage, Stockwater	Decree

Comments: _____

2. Other water rights with the same point-of-diversion: NO Overlap

Comments: _____

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

GROUND WATER SW $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 27, Twp 06N, Rge 05E, B.M. BOISE County

Method of Determination: GPS, digital PLS map

PLACE OF USE: IRRIGATION

Twp	Rng	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
06N	05E	27											14.3	0.7					15.0

Total Acres: 15.0

Method of Determination: Aerial imagery, site visit, digital PLS map

3.

☒ Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.

☒ Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.

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

☒ Photo of Diversion and System Attached

4.

Well or Diversion ID No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
D0058931		1.5		Submersible	

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
None						

2. Measurements:

8 sprinklers at one time with 11/64" nozzles

E. FLOW CALCULATIONS

Additional Computation Sheets Attached

Measured Method:

Theoretical 0.07 cfs

Permit: 0.40 cfs

BU Limit: 0.02 cfs/acre x 14.7 acres = 0.29 cfs

Exam Fee Limit: 0.20 cfs

Recommend: 0.07 cfs

F. VOLUME CALCULATIONS

1. Volume Calculations for irrigation:

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = 14.7 \text{ acres} \times 3.5 \text{ afa/acre} = 51.5 \text{ afa}$$

$$V_{DR} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 = 0.07 \text{ cfs} \times 214 \text{ days} \times 1.9835 = 29.7$$

$$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} = 29.7 \text{ afa}$$

2. Volume Calculations for Other Uses:

No other uses

G. NARRATIVE/REMARKS/COMMENTS

This permit was approved on October 10 2008 authorizing the diversion of 0.40 cfs groundwater to irrigate 20 acres of land. Proof of beneficial use was submitted on September 16, 2015. I completed this field exam on August 13, 2019.

The point of diversion is a six-inch well which was drilled to a depth of 465 feet. A 1.5 hp pump diverts water from the well to three-inch polyethylene (PE) mainline which feeds several three-inch PE laterals. Laterals have a maximum of 8 impact sprinklers, and some of the smaller ones have 4 sprinklers. Sprinklers had 11/64" nozzles. The system is operated so that only 8 sprinklers are run at any one time. The system is used to water 15 acres of pasture and forested land. According to the owners, the forest land is irrigated to grow herbs and native grasses to be used to feed cattle one day.

I was unable to get a measurement during the field exam. Furthermore, there was no pressure gauge to get the pressure at the well head. To estimate the flow rate I would need to use either the horsepower equation or the Freeman Formula which is used to calculate flow rate from a sprinkler based on pressure and nozzle diameter. In the case of the horsepower equation I was missing the variables of lift and pressure. For the Freeman Formula, I needed pressure at the sprinkler heads to determine the flow rate. However, for laminar flow there should be no water stored in the pipe while the system is operating. Therefore, the pump should produce the same flow rate that passes through the sprinklers. I modified the Freeman Equation to represent the flow rate from 8 sprinklers in cfs and set it equal to horsepower equation. Then, I solved for lift. I modeled a range of scenarios based on that equation, which can be seen in Attachment A. The variables I modeled were pressure loss (dP) and well head pressure (P1). Then for each scenario I calculated the rates predicted by the two equations for the predicted lift.

The closest lateral has 8 sprinklers, is less than 200 feet from the well head, and is at roughly the same elevation (give or take a few feet). Therefore, the highest diversion rate is achieved when that lateral is operating. According to the predicted pressure loss table (Attachment B) we would not expect more than 0.26 psi loss per 100 ft of line. So, in Attachment A, I ruled out any scenario that considered greater than 2 psi loss (dP). I also ruled out any scenario which predicted a lift less than the static water level. I averaged all of the remaining flow rate values (in green) and got a diversion rate of 0.06 cfs. However, I am recommending 0.07 cfs for the license; the maximum of the green values which occurs at 15 psi well head pressure and a lift of 102 ft. This is likely an overestimation of the rate and is therefore a reasonable value to use for limiting the diversion rate without a direct measurement.

The diversion rate I am recommending is less than a quarter of the inch-to-the-acre standard that is typical for irrigation rights. This is due to the low volume produced by the pump and the fact that the owner irrigates using only one lateral at a time. Each lateral irrigates roughly 1/10th of an acre. So, the full rate applied to a smaller portion at a time is sufficient to grow their desired crops. The system must be run near continuously to provide enough water for each zone. However, even if the system was run continuously at the recommended rate it would produce less than the 3.5 afa/acre standard. Therefore, the annual volume is also limited.

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

H. RECOMMENDATIONS**1. Recommended Amounts**

<u>Beneficial Use</u>	<u>Period of Use</u>	<u>Rate of Diversion</u>	<u>Annual Volume</u>
IRRIGATION	04/01 to 10/31	0.07 CFS	29.7 AF
<u>Totals:</u>		0.07 CFS	29.7 AF

2. Recommended Amendments

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

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

I. AUTHENTICATION

Cody Parker - Water Resource Agent, Senior

Field Examiner's Name Cody Parker Date 8-14-19

Reviewer Patricia Kelley Date 8-16-2019

Attachment A

$$Q = 0.62 \times D^2 \times \sqrt{P}$$

$$Q = \frac{8.8 \times 0.7 \times HP}{Lift + 2.31(P)}$$

Where

D = 0.172 inches

$$Lift = \frac{513.3}{\sqrt{P2}} - 2.31P1$$

dP	P1	P2	Lift	QSP	QHP
1	10	9	148	0.055026	0.054004
2	10	8	158.379	0.051879	0.050915
3	10	7	170.9092	0.048529	0.047627
4	10	6	186.4538	0.044929	0.044094
5	10	5	206.4547	0.041014	0.040252
1	11	10	136.9097	0.058003	0.056925
2	11	9	145.69	0.055026	0.054004
3	11	8	156.069	0.051879	0.050915
4	11	7	168.5992	0.048529	0.047627
5	11	6	184.1438	0.044929	0.044094
1	12	11	127.0458	0.060834	0.059703
2	12	10	134.5997	0.058003	0.056925
3	12	9	143.38	0.055026	0.054004
4	12	8	153.759	0.051879	0.050915
5	12	7	166.2892	0.048529	0.047627
1	13	12	118.1469	0.063539	0.062358
2	13	11	124.7358	0.060834	0.059703
3	13	10	132.2897	0.058003	0.056925
4	13	9	141.07	0.055026	0.054004
5	13	8	151.449	0.051879	0.050915
1	14	13	110.0238	0.066133	0.064904
2	14	12	115.8369	0.063539	0.062358
3	14	11	122.4258	0.060834	0.059703
4	14	10	129.9797	0.058003	0.056925
5	14	9	138.76	0.055026	0.054004
1	15	14	102.5352	0.06863	0.067354
2	15	13	107.7138	0.066133	0.064904
3	15	12	113.5269	0.063539	0.062358
4	15	11	120.1158	0.060834	0.059703
5	15	10	127.6697	0.058003	0.056925
1	16	15	95.57349	0.071039	0.069718
2	16	14	100.2252	0.06863	0.067354
3	16	13	105.4038	0.066133	0.064904
4	16	12	111.2169	0.063539	0.062358
5	16	11	117.8058	0.060834	0.059703
1	17	16	89.055	0.073368	0.072005
2	17	15	93.26349	0.071039	0.069718
3	17	14	97.9152	0.06863	0.067354
4	17	13	103.0938	0.066133	0.064904
5	17	12	108.9069	0.063539	0.062358
5	20	15	86.33349	0.071039	0.069718
5	30	25	33.36	0.09171	0.090006

Min 0.051
Max 0.069
Average 0.060

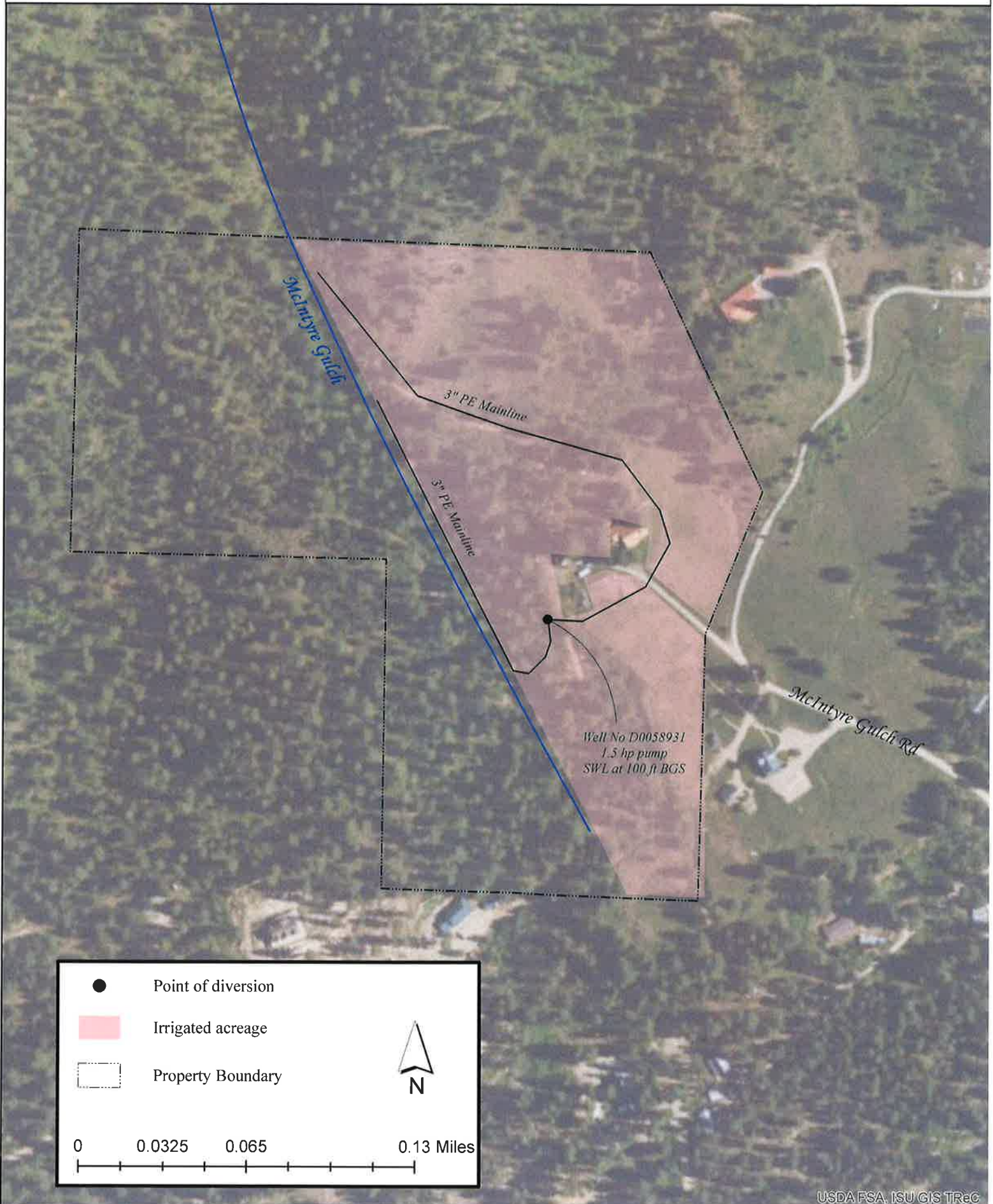
TotalMin 0.040
TotalMax 0.073
TotalAve 0.058

Attachment B

Polyethylene Pipe Nominal Pipe Size: 3"

Inside Diameter: 0.078 m (3.1 inches)

Flow			Velocity		Pressure Drop			
(m ³ /s)	(liter/s)	(US gpm)	(m/s)	(ft/s)	(Pa/100m)	(mmH ₂ O/100m)	(psi/100ft)	(ftH ₂ O/100ft)
0.0012	1.2	19	0.25	0.82	1130	115	0.05	0.115
0.0013	1.3	21	0.27	0.89	1278	130	0.057	0.131
0.0014	1.4	22	0.28	0.96	1433	151	0.066	0.151
0.0015	1.5	24	0.31	1.03	1640	167	0.072	0.167
0.0016	1.6	25	0.33	1.1	1865	190	0.082	0.19
0.0017	1.7	27	0.36	1.17	2106	215	0.093	0.21
0.0018	1.8	29	0.38	1.24	2270	231	0.1	0.23
0.0019	1.9	30	0.4	1.3	2528	258	0.112	0.26
0.002	2	32	0.42	1.37	2803	288	0.124	0.29
0.003	3	48	0.63	2.1	5802	592	0.26	0.59
0.004	4	63	0.84	2.7	9417	960	0.42	0.96
0.005	5	79	1.05	3.4	14014	1429	0.62	1.43
0.006	6	95	1.26	4.1	20180	2058	0.89	2.1
0.007	7	111	1.46	4.8	26093	2661	1.15	2.7
0.008	8	127	1.67	5.5	34081	3475	1.51	3.5
0.009	9	143	1.88	6.2	40864	4167	1.81	4.2
0.01	10	159	2.1	6.9	50449	5144	2.2	5.1
0.011	11	174	2.3	7.6	61043	6225	2.7	6.2
0.012	12	190	2.5	8.2	72646	7408	3.2	7.4
0.013	13	206	2.7	8.9	80522	8211	3.6	8.2
0.014	14	222	2.9	9.6	93386	9523	4.1	9.5
0.015	15	238	3.1	10.3	107204	10932	4.7	10.9
0.016	16	254	3.3	11	121974	12438	5.4	12.5
0.017	17	269	3.6	11.7	137697	14041	6.1	14.1
0.018	18	285	3.8	12.4	145293	14815	6.4	14.8
0.019	19	301	4	13	161885	16507	7.2	16.5
0.02	20	317	4.2	13.7	179373	18291	7.9	18.3



State of Idaho
Department of Water Resources
Beneficial Use Field Report
63-12153

IRRIGATION

05E



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

0 0.045 0.09 0.18 Miles





Metal tag no D0058931



The six-inch well with a two-way valve that diverts water to separate mainlines.

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Impact sprinklers used to irrigate the place of use. The sprinklers have 1 1/64" nozzles. Eight such sprinklers are used at one time.



The forested land that is watered using the system. The owner says herbs and natural grasses are grown here for cattle.

Picture Attachment

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Right No. 63-12153



One of the above-ground laterals used to water the pasture included in the POU.

06N05E27

Basin Sequ Owner Source Use

	NENE	NWNE	SWNE	SENE	NENW	NWNW	SWNW	SENW	NESW	NWSW	SWSW	SESW	NESE	NWSE	SWSE	SESE	Total Acres
63-12153 TAIN, MI GROUND IRRIGATION											14.3	0.7					15
63-31620 TAIN, LIS MC INTYI IRRIGATION											18						18

Irrigation overlap from separate source

06N05E27

Basin Sequ Owner Source

	NENE	NWNE	SWNE	SENE	NENW	NWNW	SWNW	SENW	NESW	NWSW	SWSW	SESW	NESE	NWSE	SWSE	SESE
63-12153 TAIN, MI GROUND WATER											X					
63-15127 ROSS, ME SPRING											X					
63-25141 UNITED S GROUND WATER	X															
63-31539 UNITED S SPRING		X														
63-31620 TAIN, LIS MC INTYRE GULCH										X	X					

Separate source no POD overlap



State of Idaho

DEPARTMENT OF WATER RESOURCES

Western Region • 2735 Airport Way • Boise, Idaho 83705-5082

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C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

March 30, 2018

MITCHEL A TAIN
PO BOX 44
IDAHO CITY ID 83631

RE: Water right permit no. 63-12153

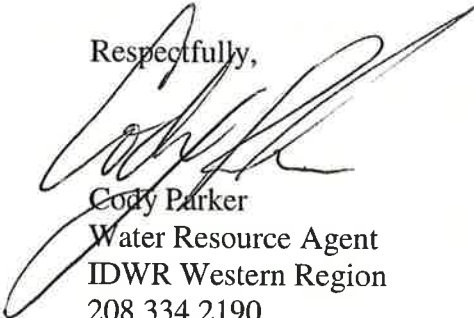
Dear Mr. Tain,

I am writing you today in regard to the water right permit referenced above, which authorizes the diversion of 0.40 cfs groundwater for irrigation. We spoke last year over the phone to schedule a field exam for this permit. You mentioned that development of the permit had stalled and you were hoping to get an extension. However, it appears that you have already received an extension and no further time may be granted. My purpose for writing today is to schedule a time with you to complete the field examination for your water right permit.

If you have not developed the irrigation authorized by your permit a water right license cannot be issued and you should relinquish the permit by completing the enclosed form and returning to me at the address above. However, if you have developed the use authorized by the permit you should contact me to schedule a time to complete the field exam. I look forward to your reply within thirty (30) days of the date of this letter. If you do not make a timely reply in this regard, I will assume that you have no further interest in pursuing a water right license and I will take action to void the permit.

Please let me know if you have any questions regarding the content of this letter. Thank you in advance for your help.

Respectfully,



Cody Parker

Water Resource Agent
IDWR Western Region
208.334.2190

cody.parker@idwr.idaho.gov