

Memorandum

To: Shelley Keen
From: Tim Luke *TJL*
Date: June 20, 1998
Re: City of Salmon Flow Measurements

Attached to this memo are copies of flow meter certification reports which I completed for two flow meter installations at the City of Salmon water works plant. I believe that the report which you are most interested is the one dated May 21, 1998. This report documents some measurements made for the diversion from Jesse Creek. A sketch of the diversion and meter location is also attached. I understand that Bob Foster has sent you photos of the diversion and meters. Attached also is a sketch showing the various diversions from Jesse Creek along with a water right delivery list for the Jesse Creek Water District, District 75-A. The list and sketch was prepared by George Austiguy sometime in 1992. I believe that several transfers have been filed since this time so the list and diversion map may be outdated.

Please note that water is also diverted by the City from Pollard Creek (and I think also from Chipps Creek), and then injected to and commingled with Jesse Creek immediately upstream from the city diversion on Jesse Creek. The commingled water is diverted to the City's holding ponds. From the ponds, water is diverted into the treatment plant. From the plant water is discharged to a storage tank and then distributed to city customers. The meter certification report dated May 20, 1998 documents measurements made for the meter located between the treatment plant and the storage tank.

According to the plant operator Paul Stokes, the operating flow measured for the Jesse Creek meter represents a normal operating flow. I think Stokes stated that the flows may frequently get several hundred gpm higher. Stokes has a record of some past meter readings and can provide them to us. In fact, I asked Stokes to send them to me but I have not seen them as of this writing.

You will note that there was about a 10% difference in flow rates between the city meter and the IDWR portable ultrasonic flow meter. I believe the city meter is probably more accurate for several reasons:

- 1) There was some question about pipe thickness, the pipe is ductile iron and the plant operator did not think the pipe had a cement liner, but the thickness gage did yield a consistent thickness of 0.385 in. which is a reasonable thickness for both the iron and the liner. We generally have trouble using our thickness gages on pipe with cement liners (this in fact was the case for the other pipe and city meter we measured on 5/20/98) I used the 0.385 thickness but inaccuracy in this measurement could result in a loss of accuracy on our portable meter.
- 2) The installed meter is a Water Specialties propeller meter. Our section's experience with this meter in the ESPA water measurement program is that these are among the most accurate that we've found, usually they are accurate to within five or six percent of our portable meters.
- 3) The measurement made on the diversion gate weir provided a discharge closer to the discharge given by the city meter. The weir is really a non-standard weir but one that should provide a reasonable measurement. The city uses the gate as a weir device.
- 4) The diagnostics provided by the IDWR portable meter were just barely acceptable at the normal flow.

After checking the meter at about 900 gpm, Stokes opened the diversion gate as far as he could so that we could try measuring somewhere near the system capacity. Stokes said he had never opened the gate to the extent that we did on 5/21/98. It took a few minutes to increase and stabilize the flow. At this high flow, rocks from the creek flowed into the pipe and hit the meter pretty hard. I had concerns about possible damage to the meter and asked Stokes to turn it back down. Moreover, I could not get a reading on our portable ultrasonic meter, probably because the flow was too turbulent. Prior to turning it down however, the city meter registered 3000 gallons in only 45 seconds. I timed this again and got 3000 gallons in 44 seconds. This is a flow of about 4000 gpm, or 8.9 cfs. After the water was turned down, the meter registered a flow of about 1282 gpm. I am not sure if the meter was really accurate at or after the high flow due to my concern about the rocks. At this latter flow, the IDWR meter was measuring over 1400 gpm, but my diagnostics were still poor. I did not continue with any additional measurements at lower flows as it was late in the day and I needed to return to Boise.

I hope this information is of use to you in your license analysis. I am sending copies of the certification report to the City of Salmon for their records along with some explanation of the comparisons. I will likely include a copy of this memo.

Cc: Bob Foster, IDWR

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
Water Measurement Program

1998 WATER MEASURING DEVICE CERTIFICATION

Date of Testing

5-21-98

Person performing test

T. LUKE, B. Foster

Name:	City of Salmon
Water Right No:	
Legal Description:	T. R. Sec. 1/4 1/4 1/4
Site Tag No:	NA
Diversion Name:	Lagoon In Flow Meter - From Jesseck Diversion

Current Owner

Name

City of Salmon

Phone

Address

Last, First, MI

City

State

Zip

Operator (if leased or operated by someone else)

Name

Last, First, MI

Phone

Contact: PAUL STOKES

SECTION I WELL SITE IDENTIFICATION

Global Positioning System Data:

NA

Data Collection Filename

Offset

IDWR Site Tag Identification No.

Site Tag location description:

PLS/USGS Locator

For Department/District Use Only

Received by

Date

Reviewed by

Date

Data Entry by

Date

SECTION II INSTALLED METER INFORMATION

METER AND MOUNTING PIPE INFORMATION			
Date of meter Installation	1994	Multiplier - Flow rate	
Manufacturer	WATER SPECIALTIES	Multiplier - Totalizer	NA
Meter Type	Propeller	Location (good, fair, poor)	
Model	MC-I1-X	Pipe information	
Serial Number	944978	Pipe material	Ductile Iron
Size (nominal)	12"	Outside Diameter	12.89"
Measure Flow Rate?	(circle one) Yes No	Wall Thickness	0.385 (T-mike)
Measurement Units	(circle one) CFS GPM Other (specify)	Inside Diameter	12.5"
Measure Cumulative Volume?	(circle one) Yes No	Dist. of straight pipe upstream from meter	40'
Volume Units	Acre-Feet Yes No Other (specify) GALS.	Dist. of Straight pipe downstream from meter	16'

Consistent thickness next by T-mike thickness gage. Appears to be combined thickness of steel plus a lined.

SECTION III CERTIFICATION FOR CALIBRATION OF A WATER MEASUREMENT METER

See back page for instructions.

Measurement No. 1 (M_1) is the measured rate of flow from the permanently installed flow meter.

Measurement No. 2 (M_2) is the measured rate of flow from the measuring device being used to check the flow for the calibration. This method or device must be accurate to within $\pm 5\%$ error. Describe below the method and equipment used to perform this measurement.

PEEK DCT 7088 ULTRASONIC METER (Polysonics)

$$\text{Percent Difference} = (M_1 - M_2) \div M_2 \times 100 = \pm \% \quad (\text{Acceptable is within } \pm 10\%) \quad (\text{equation 1})$$

$$\text{Calibration Multiplier} = M_2 \div M_1 \quad (\text{equation 2})$$

Is flowmeter installed according to manufacturer's specifications? Yes / No / Unsure

Describe any apparent problems with installation or operation _____

Flowmeter accuracy prior to any adjustments: _____ Totalizer reading _____

Flowmeter accuracy after final adjustment: _____ Totalizer reading _____

Flowmeter calibration multiplier: NA

Water Level DataDoes the well have access to measure water levels? Yes / NoStatic Water Level _____ ft
Date _____Pumping Water Level _____ ft (at condition # _____)
Date _____**FLOWMETER ACCURACY CALIBRATION TABLE**

Owners meter (totalizer reading)	Time	Total Gallons	Ave. Flow Rate - GPM (M ₁)	Standard total gallons	Average flow rate (M ₂)	Percent diff. (±)	Comments and adjustments
1) 1000 gAL	66 sec	1000	909 gpm	1,116.0	1014 gpm	-10.4%	
2) 1000 gAL	66 sec	1000	909 gpm	1,117.8	1016 gpm	-10.4%	

Notes, Comments or Calculations: PEEK meter printer not charged or operable. PEEK meter flow rate based on observation & recording of volume readings at approx 66 sec. intervals - same length of time as city meter took to register 1000 gals. PEEK signal strength only +2-3%.
At increased flow and capacity, PEEK meter did not register flow - flow appeared to be too turbulent.

At low flow, Bob Foster & I measured head over with a staff gage over the adjustable gate above the pipe inlet. The gate is
Sketch and or photograph of installation: used as a weir by the city.

The weir is not standard, but should yield a reasonable estimate. Using contracted Rectangular weir Formula & ments.

head of 0.46', Q = 889 gpm; using suppressed weir formula, Q = 934 gpm. The weir flows are closer to the installed meter flow. Due to poor signal strength on PEEK meter, I recommend accepting the ^{installed} flow meter readings.
No calibration or adjustment factor is recommended.

Note: At high flows, a number of rocks from creek flowed down pipe & were hitting meter. Meter should be checked for damage.
 I certify that the above information is true and correct to the best of my knowledge and ability and the measurements taken and recorded are in accordance with the standards and specifications of the equipment used.

Signature Tim J. Lube
 (person performing measurements)

Date 6-8-93

City diversion from creek - gate wide open, city meter Q = 4,000 gpm or 8.91 cfs
This flow may be questionable due to potential damage from rocks.
see attached sketch

INSTRUCTIONS: Permanently installed flowmeters must be checked at the time of installation and at least once every four years or whenever major repairs or maintenance has been performed. **All documentation to support data such as notes, printout tapes, etc., should be attached to this form for submittal.**

Meter certification and calibration is necessary to verify the installation and accuracy of permanently installed flowmeters and to enhance the accuracy of flowmeter measurements. The Department's goal for permanent flowmeters is an installed accuracy of ± 10 percent or better. Inaccuracies exceeding ± 10 percent are not acceptable. If a flowmeter is not accurate to within ± 10 percent, a **calibration multiplier** may be used if the inaccuracy is consistent over the normal range of flows measured by the meter. If a meter is not accurate to within ± 10 percent and the inaccuracy is not consistent, the meter should be repaired, replaced, or relocated in order to alleviate the problem.

The **calibration multiplier** is an adjustment applied to flowmeter readings which should result in a more accurate measurement. Calculate the multiplier by dividing the standard meter reading by the permanent meter reading (see equation 2, page 2). The calibration multiplier will be applied by the Department or District to the meter reading submitted by the owner of the meter.

The following items should be documented on this form:

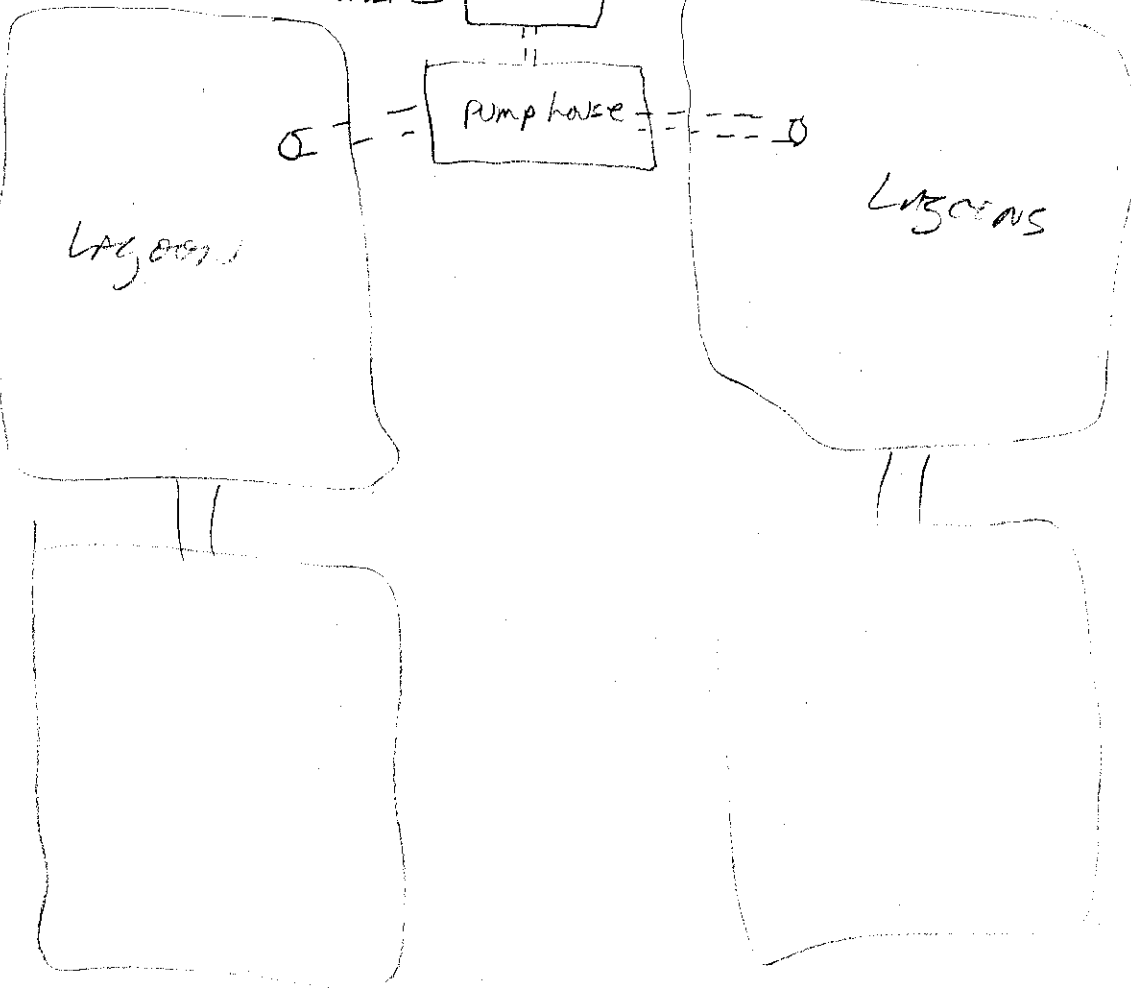
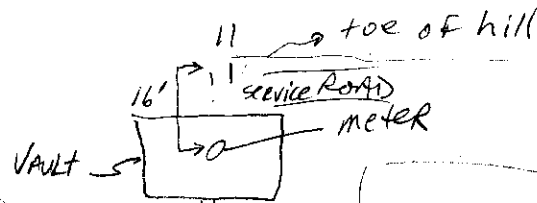
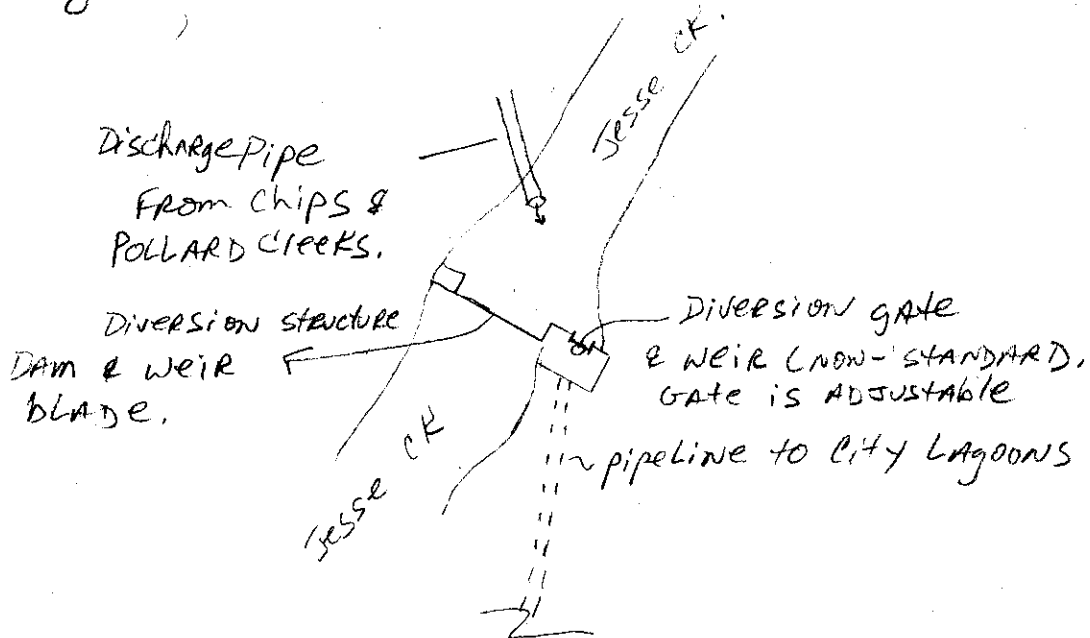
- 1) Flowmeter accuracy prior to any adjustments.
- 2) Any adjustments made to the flowmeter.
- 3) Final flowmeter accuracy when adjustments or repairs are made
- 4) Flowmeter calibration multiplier when the final accuracy is not within $\pm 10\%$.
- 5) Flowmeter totalizer and rate readings prior to adjustment, and after adjustments are complete.

Use the **flowmeter accuracy calibration table** to record totalizer and rate readings from both the permanent and standard flowmeters. Calculate the percent difference between the two meter readings using equation 1 on page 2. Document any adjustments made to the meter.

Flowmeter accuracy is not always consistent; a meter may be accurate at one flow rate, but not at others. Whenever possible, check the meter's accuracy at two or three different flow rates over the range of flows normally measured by the meter (low, high, moderate).

City of Salmon
 Jesse CK Diversion
 & City Flow meter.

NOT TO SCALE



22-141 50 SHEETS
 22-142 100 SHEETS
 22-144 200 SHEETS



STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
Water Measurement Program

1998 WATER MEASURING DEVICE CERTIFICATION

Date of Testing 5-20-1998

Person performing test T. LUKE, B. Foster

Name:	<u>CITY OF SALMON</u>
Water Right No:	_____
Legal Description:	T _____ R _____ Sec. _____ 1/4 _____ 1/4 _____ 1/4 _____
Site Tag No:	<u>NA</u>
Diversion Name:	<u>TREATMENT PLANT METER - INFLOW</u>

Current Owner

Name CITY OF SALMON Phone _____
Last, First, MI
Address _____ City _____ State _____ Zip _____

Operator (if leased or operated by someone else)

Name _____ Phone _____
Last, First, MI

Contact: PAUL STOKES

SECTION I WELL SITE IDENTIFICATION NA

Global Positioning System Data:

Data Collection Filename _____ Offset _____

IDWR Site Tag Identification No. _____

Site Tag location description: _____

PLS/USGS Locator _____

For Department/District Use Only

Received by _____ Date _____

Reviewed by _____ Date _____

Data Entry by _____ Date _____

SECTION II INSTALLED METER INFORMATION

METER AND MOUNTING PIPE INFORMATION			
Date of meter Installation	1991	Multiplier - Flow rate	
Manufacturer	SENSUS	Multiplier - Totalizer	—
Meter Type	Propeller	Location (good, fair, poor)	
Model	PROP-ROF-1	Pipe information	
Serial Number		Pipe material	Ductile Iron
Size (nominal)	14"	Outside Diameter	16.72
Measure Flow Rate?	(circle one) Yes No	Wall Thickness	0.1875"
Measurement Units	(circle one) CFS (GPM) Other(specify)	Inside Diameter	16.3"
Measure Cumulative Volume?	(circle one) Yes No	Dist. of straight pipe upstream from meter	20 Ft
Volume Units	Acre-Feet Yes No Other(specify) GALS.	Dist. of Straight pipe downstream from meter	6 Ft.

see
PECK
MANUAL
TABLE 5B
B3
CLASS 50
Ductile Iron
Cement + Liner
TOTAL
THICKNESS
= 0.375"

SECTION III CERTIFICATION FOR CALIBRATION OF A WATER MEASUREMENT METER

See back page for instructions.

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PECK DCT 7088 ULTRASONIC meter (Polysonics)

$$\text{Percent Difference} = (M_1 - M_2) \div M_2 \times 100 = \pm \% \quad (\text{Acceptable is within } \pm 10\%) \quad (\text{equation 1})$$

$$\text{Calibration Multiplier} = M_2 \div M_1 \quad (\text{equation 2})$$

Is flowmeter installed according to manufacturer's specifications? Yes / No / Unsure

Describe any apparent problems with installation or operation _____

Flowmeter accuracy prior to any adjustments: _____ Totalizer reading _____

Flowmeter accuracy after final adjustment: _____ Totalizer reading _____

Flowmeter calibration multiplier: _____

Water Level Data *NIT*Does the well have access to measure water levels? Yes / NoStatic Water Level _____ ft
Date _____Pumping Water Level _____ ft (at condition # _____)
Date _____**FLOWMETER ACCURACY CALIBRATION TABLE**

Owners meter (totalizer reading)	Time	Total Gallons	Ave. Flow Rate - GPM (M ₁)	Standard total gallons	Average flow rate (M ₂)	Percent diff. (±)	Comments and adjustments
0	4:43 pm						
3729	4:46 pm	3729	1243	NA	1206*	+3.07%	

Notes, Comments or Calculations: * PRINTER WAS NOT CHARGED OR OPERABLE. AVERAGE FLOW RATE FROM PECK ULTRA-SONIC METER IS AVERAGE OF 9 INSTANTANEOUS READINGS TAKEN EVERY 20 SECONDS OVER 3 minute period. Flows on peck meter RANGED FROM 1140 TO 1243 GPM. PECK meter RECORDED excellent signal strengths, STABLE DELTA T & DIAGNOSTICS.

Sketch and or photograph of installation: GIVEN consistent discharge measurements AND percent differences of only 3%, ADJUSTMENT OF City meter is not recommended.

I certify that the above information is true and correct to the best of my knowledge and ability and the measurements taken and recorded are in accordance with the standards and specifications of the equipment used.

Signature Timothy J. Luke
(person performing measurements)Date 6-8-93

INSTRUCTIONS: Permanently installed flowmeters must be checked at the time of installation and at least once every four years or whenever major repairs or maintenance has been performed. **All documentation to support data such as notes, printout tapes, etc., should be attached to this form for submittal.**

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The **calibration multiplier** is an adjustment applied to flowmeter readings which should result in a more accurate measurement. Calculate the multiplier by dividing the standard meter reading by the permanent meter reading (see equation 2, page 2). The calibration multiplier will be applied by the Department or District to the meter reading submitted by the owner of the meter.

The following items should be documented on this form:

- 1) Flowmeter accuracy prior to any adjustments.
- 2) Any adjustments made to the flowmeter.
- 3) Final flowmeter accuracy when adjustments or repairs are made
- 4) Flowmeter calibration multiplier when the final accuracy is not within $\pm 10\%$.
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Use the **flowmeter accuracy calibration table** to record totalizer and rate readings from both the permanent and standard flowmeters. Calculate the percent difference between the two meter readings using equation 1 on page 2. Document any adjustments made to the meter.

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Jesse CR WATER Dist.

WATER DIST 75-A

Compiled By E. Austing
& T. L. Ke
CA 1992

PRIORITY	WATER RIGHT NUMBER	WATER USER	PRIORITY DATE	AMOUNT CFS	IN	DIVERSION POINT
1	75-00018	CITY	06/01/1867	0.3	15	D5 WATER WORKS
1	75-00016	CITY	06/01/1867	2.0	100	D5 WATER WORKS
1	75-00017A	CITY	06/01/1867	1.26	63	D5 WATER WORKS
1	75-00017B	CITY	06/01/1867	0.24	12	D5 WATER WORKS
TOTAL:				3.80	190	
2	75-00019A	BLACKADAR	06/01/1868	1.31	65	D7 FARMERS DITCH
2	75-00019B	CITY	06/01/1868	0.49	25	D5 WATER WORKS
2	75-00019C	CITY	06/01/1868	1.50	75	D5 WATER WORKS
2	75-00019D	ARROWHEAD	06/01/1868	0.3	15	D2 CHIPS CREEK
3	75-00024	GAVER	06/01/1877	0.1	5	D7 FARMERS DITCH
4	75-00021	ARROWHEAD	05/01/1883	0.1	5	D2 CHIPS CREEK
5	75-00026A	CITY	05/01/1884	0.3	15	D5 WATER WORKS

AS 13-000196
A75-000196

AS

PRIORITY	WATER RIGHT NUMBER	WATER USER	PRIORITY DATE	AMOUNT CFS	IN	DIVERSION POINT
5	75-00026B	M. WILSON	05/01/1884	0.2	10	D7 FARMERS DITCH
6	75-00020	GAVER	06/01/1888	0.3	15	D6 JESSE CREEK
7	75-00022	ARROWHEAD	05/01/1889	2.0	100	D2 CHIPS CREEK AS
8	75-00003	M. AUSTIN	04/01/1894	1.4	70	D7 FARMERS DITCH
8	75-00005	ARROWHEAD	04/01/1894	5.0	250	D8 POLLARD CREEK AS
8	75-00001	SCHULENBURGER AND SORENSEN	04/01/1894	0.7	35	D7 FARMERS DITCH
8	75-00007	CITY	04/01/1894	4.0	200	D5 WATER WORKS
8	75-00113	BLACKADAR	04/01/1894	2.0	100	D7 FARMERS DITCH
8	75-00009	M.AUSTIN	04/01/1894	1.5	75	D7 FARMERS DITCH
8	75-00002	E. EDWARDS	04/01/1894	1.7	85	D1 CHIPS CREEK
9	75-00014	J. PROKSCH	04/01/1902	1.2	60	D9 POLLARD CREEK

PRIORITY	WATER RIGHT NUMBER	WATER USER	PRIORITY DATE	AMOUNT CFS	IN	DIVERSION POINT
10	75-00010	EDWARDS	09/01/1914	1.6	80	D1 CHIPS CREEK
11	75-00013	SORENSEN AND SCHULENBERGER	09/14/1914	0.6	30	D6 JESSE CREEK
11	75-00012	EDWARDS	09/14/1914	1.6	80	D1 CHIPS CREEK
11	75-00011	EDWARDS	09/14/1914	1.1	60	D1 CHIPS CREEK
12	75-02162	EDWARDS	08/31/1960	3.2	160	D1 CHIPS CREEK
13	75-07563	CITY	12/03/1990	5.0	250	D5 WATER WORKS

