



## State of Idaho

# DEPARTMENT OF WATER RESOURCES

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C. L. "BUTCH" OTTER  
Governor

GARY SPACKMAN  
Interim Director

May 18, 2010

JOEL TEUSCHER  
WATERMASTER WD 11-F  
39 TEUSCHER LAND  
GENEVA, ID 83238

Re: Summary of April, 2010 Department Site Visit

Dear Mr. Teuscher,

This letter is a follow-up to my site visit to water district 11-F on April 29, 2010. I have attached a memo summarizing my site visit from that day for your reference. It appears that WD 11-F is making great strides in installing water measurement devices on diversions throughout the district. Following my site visit I was encouraged at the installation of devices that had already occurred and the commitment to install measurement devices on remaining prominent diversions within the district this year.

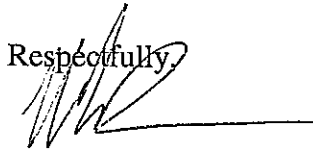
The following is a list of outstanding items that remain concerning some of the water measurement devices in WD 11-F. I would appreciate it if you could take the Department's concerns forward to the individual water users associated with each of the comments below.

- Please confirm with the Department when the ramped flume at the Tueller diversion is completed and operational, including a lockable headgate.
- Please confirm with the Department when a lockable head gate has been installed on the Loertscher diversion.
- The Department generally requires that surface water measurement devices accurately record flow rate to within +/- 10% of an acceptable corroborating measurement. As detailed in my memo at the time of my site visit the staff gages on the ramped flume installed on the Taylor Canal were reporting flow rates with 41-50% error. These devices must be modified to correct their inaccuracy in measurement; likely the realignment of the staff gages to support installed conditions will be sufficient. Please notify the Department when modification to the device is concluded and accuracy of flow measurement has been confirmed.
- The Department recommends that additional compacted back fill material and rip-rap material be installed at the Taylor Canal and Hall Ditch measurement devices to deter bank erosion and stream flow bypass of the devices.

- Please notify the Department when the additional water measurement devices detailed in the Intermountain Environmental quote IEIQ7771 have been obtained and installed by the water users.
- Please notify the Department when lockable head gates and measurement devices have been installed on the Makoff and Hershey diversions.

Please reply to this letter in written form (letter or email) with an update in status to the outstanding issues discussed above following the end of this irrigation season. Please contact me directly at 208-287-4959 or [Mathew.weaver@idwr.idaho.gov](mailto:Mathew.weaver@idwr.idaho.gov) with any questions regarding these matters.

Respectfully,



Mat Weaver, PE  
Staff Engineer

Encl:

Cc: James Cefalo, IDWR Eastern Region

# MEMO

To: Tim Luke

From: Mat Weaver MW

Cc: Joel Teuscher (Watermaster WD 11F)

Date: May 18, 2010

## RE: Basin 11F (Thomas Fork of the Bear) 4-29-2010 Field Visit

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On April 29, 2010 I visited Water District 11F (Thomas Fork region) to observe and inspect the progression of water measurement device installation in the area. I met with the Watermaster Joel Teuscher and Garth, Dustin and Devin Boehme. The Boehmes are water users in the region and are assisting with the installation of a number of water measurement devices in the area.

### Loertscher and Tueller Diversions

My first visit was to the Loertscher and Tueller Diversions (12S46E15SWSW). At the Tueller diversion a small ramped flume had been installed on a concrete footing. The ramped flume staff gage indicated a capacity of 3.5 CFS. The installation of device appeared to be well underway but not yet completed. There is currently no head gate of any type at the diversion. Garth Boehme indicated that a lockable head works would be installed prior to diverting water.

The Loertscher diversion also had a ramped flume (3.5 CFS capacity) installed on a concrete footing. Installation of this device appears to be complete and I observed rock armament lining the banks leading into the device. A head gate was installed on the diversion, although it was not lockable. Garth Boehme was uncertain if the water user intended to add a means of locking the device or not.

Refer to attached pictures of the diversions and measurement devices.

### Taylor Canal

My second site visit was to the Taylor Canal diversion (12S46E14SWNW). This diversion already had a lockable head gate. A large ramped flume (4-foot width, 40 CFS capacity) was installed approximately 50-100 feet downstream of the headgate and fish screen structure. The measurement device was backfilled, but no rock armament or bank protection was provided at the inlet or outlet of the device. Garth Boehme indicated the measurement device was installed on a concrete footing. I am concerned that the device has not been adequately backfilled and that without armament at the inlet and outlet the bank will see significant erosion at the location of the device with the potential for flow bypass. I instructed the Boehmes to improve on the backfill and provide some type of riprap at the inlet and outlet of the device.

During my site visit I current metered the flow rate of the canal at the location of the staff gages within the ramped flume. I took two current meter measurements: 13.7 CFS and 14.0 CFS (refer to attachments). At the time of my measurement the staff gages read approximately 21 CFS (west facing gage) and 19.8 CFS (east facing gage). The reason I performed the second current meter measurement

was due to the severe lack of correlation between the gage measurement and my first current meter measurement. The second current meter measurement was a more deliberate measurement with longer measurement times (40 seconds) and smaller measurement intervals (0.3 feet). My second measurement had an overall uncertainty of 4.4%. Both the small uncertainty and repeatability of my two measurements strongly indicate that the staff gages on the ramped flume are not within the Department's preferential range of accuracy of +/- 10%.

Refer to attached pictures of the diversion and measurement device.

### **Hall Ditch**

My final site visit was to the diversion point of the Hall Ditch (12S46E26SWSW). This diversion already had a lockable head gate. A large ramped flume (4-foot width, 40 CFS capacity) was installed approximately 50-100 feet downstream of the headgate. Once again, the measurement device was backfilled, but no rock armament or bank protection was provided at the inlet or outlet of the device. Garth Boehme indicated the measurement device was installed on a concrete footing. I am concerned that the device has not been adequately backfilled and that without armament at the inlet and outlet the bank will see significant erosion at the location of the device with the potential for flow bypass. I instructed the Boehmes to improve on the backfill and provide some type of riprap at the inlet and outlet of the device.

During my site visit I current metered the flow rate of the canal at the location of the two staff gages within the ramped flume; I measured a rate of 5.6 CFS (refer to attachment). At the time of my measurement the staff gages read approximately 6.5 CFS (west facing gage) and 6.0 CFS (east facing gage). Depending on the gage reading my current meter measurement indicates a potential error in measurement of 6.6-13.8%. In my opinion this device has been adequately installed.

Refer to attached pictures of the measurement device.

### **Proposed Doppler and Magnetic Meter Measurement Devices**

Garth Boehme provided me a quote from Intermountain Environmental for the purchase and installation of acoustic Doppler flow meters on the Thomas Fork Canal diversion, Hamilton Canal diversion, Moulding diversion, and the Steven & Larsen diversion. In addition the quote included the purchase and installation of in-line magmeters for the Gene Boehme diversion, Wood Canyon diversion (Peterson), Garth Boehme diversion, Bryce Boehme diversion, Hamilton Pump diversion, and the Dave Peterson diversion. The quote is attached for reference. Joel and Garth indicated that they had ordered but not yet purchased the above measurement items. The measurement devices summarized on the quote will be paid for by both the water users (50%) and Federal Economic Stimulus money (50%) awarded to Rock Holbrook through his grant writing efforts and currently being allocated by the NRCS out of their Bear Lake County extension office. Garth and Joel also indicated that all of the water user's money was into the NRCS and they were awaiting an approval and release of money from the NRCS to purchase and install the measurement devices. At this point I anticipate that these remaining measurement devices will not be installed this year.

Regarding the Steven & Larsen ditch diversion the Watermaster indicated a new lockable head gate had been installed but due to impassable roads I was unable to view the headgate.

### **Outstanding Measurement Devices**

I am aware of two diversions that have not installed measurement devices and are not participating in the use of Federal Economic Stimulus money with the other water users. These two diversions are the Makoff diversion and Hershey Diversion. Apparently Intermountain Environmental, Inc. has worked with them enough to determine that a ramped flume with a capacity of 10 CFS would work at both diversions, but got no further with the water users. Garth Boehme indicated that although flumes for their diversions are indicated on the group quote they have withdrawn from participation and he does not know what their current intent is regarding water measurement.

### **Recommendations**

Following my site visit I have the following recommendations for on-going water measurement in the Thomas Fork area.

1. Follow up with the Watermaster to confirm that the installation of the Tueller measurement device is completed along with the installation of a lockable head gate.
2. Follow up with the Watermaster to confirm that the installation of a lockable head gate at the Loertscher diversion occurs.
3. Coordinate with the Watermaster in confirming the inaccuracy of the staff gages at the Taylor canal and modifying the device as necessary to comply with an accuracy of +/- 10%. I would anticipate that the Watermaster could coordinate with Intermountain Environmental to accomplish these tasks. The Department should confirm device accuracy following modifications at some future date.
4. Recommend to the Watermaster that additional backfill and the installation of rip rap at the inlet and outlet of the Taylor Canal and Hall ditch measurement devices be undertaken.
5. Ask the Watermaster to keep the Department apprised of the purchase and installation of the proposed acoustic Doppler flow meters and in-line magmeters throughout WD 11F.
6. Confirm with the Watermaster the installation of a lockable head gate and measurement device on the Makoff and Hershey diversions.
7. Conduct a follow up site visit to the Thomas Fork area following the installation of all measurement devices identified in this memo for verification of installation and accuracy.





Figure 1 - Loertscher and Tueller Diversion. Note Tueller ramp flume in background.



Figure 2 - Loertscher measurement device.





Figure 3 - Tueller Diversion



Figure 4 - Taylor Canal ramped flume.





Figure 5 - Hall Ditch ramped flume.



Figure 6 - Hall Ditch ramped flume west facing staff gage.



# Discharge Measurement Summary

Date Generated: Fri Apr 30 2010

## File Information

File Name HALLDITCH.WAD  
Start Date and Time 2010/04/29 10:50:08

## Site Details

Site Name  
Operator(s) NVD

## System Information

Sensor Type FlowTracker  
Serial # P1765  
CPU Firmware Version 3.2  
Software Ver 2.11

## Units (English Units)

Distance ft  
Velocity ft/s  
Area ft<sup>2</sup>  
Discharge cfs

## Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.2%	0.0%
Velocity	0.6%	1.7%
Width	0.2%	0.2%
Method	2.7%	-
# Stations	5.8%	-
<b>Overall</b>	<b>6.5%</b>	<b>2.0%</b>

## Summary

Averaging Int.	40	# Stations	9
Start Edge	LEW	Total Width	4.000
Mean SNR	37.1 dB	Total Area	4.875
Mean Temp	39.06 °F	Mean Depth	1.219
Disch. Equation	Mid-Section	Mean Velocity	1.1480
		<b>Total Discharge</b>	<b>5.5958</b>

## Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	10:50	2.20	None	1.300	0.0	0.0	0.0000	1.00	1.2267	0.325	0.3986	7.1
1	10:50	2.70	0.6	1.300	0.6	0.520	1.2267	1.00	1.2267	0.650	0.7973	14.2
2	10:51	3.20	0.6	1.300	0.6	0.520	1.1713	1.00	1.1713	0.650	0.7612	13.6
3	10:53	3.70	0.6	1.300	0.6	0.520	1.1729	1.00	1.1729	0.650	0.7623	13.6
4	10:54	4.20	0.6	1.300	0.6	0.520	1.2457	1.00	1.2457	0.650	0.8096	14.5
5	10:55	4.70	0.6	1.300	0.6	0.520	1.2890	1.00	1.2890	0.650	0.8378	15.0
6	10:59	5.20	0.6	1.300	0.6	0.520	1.1243	1.00	1.1243	0.650	0.7307	13.1
7	11:02	5.70	0.6	1.300	0.6	0.520	0.7664	1.00	0.7664	0.650	0.4981	8.9
8	11:02	6.20	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

# Discharge Measurement Summary

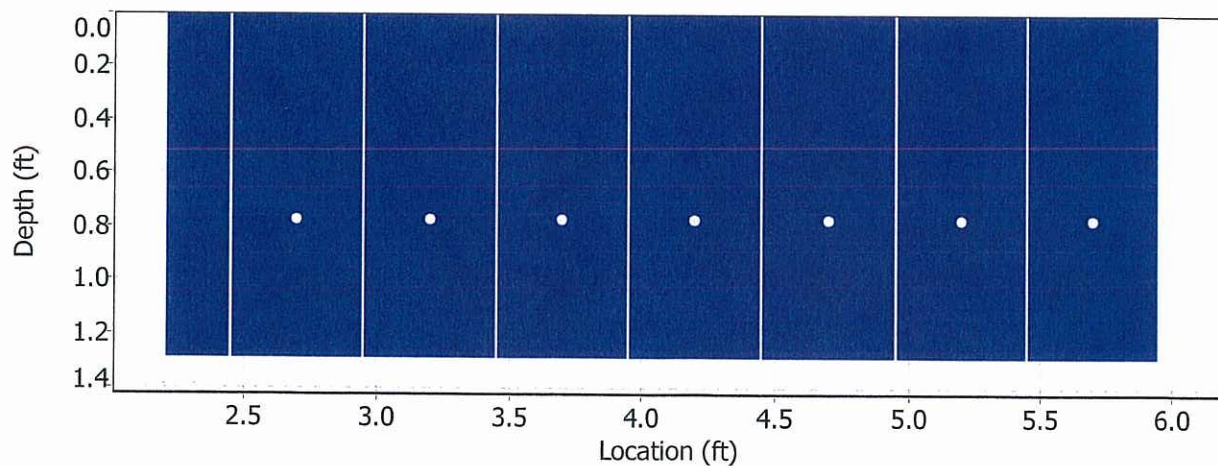
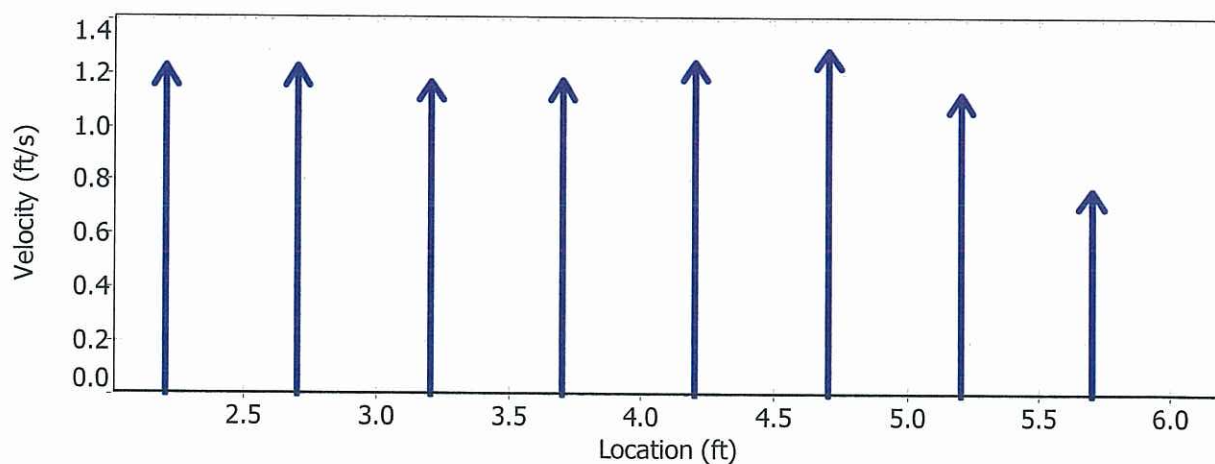
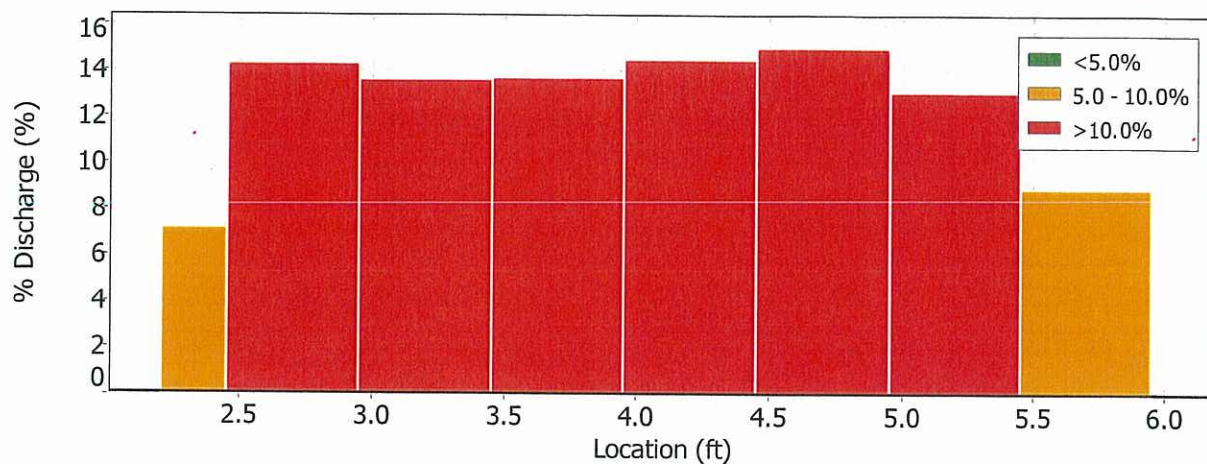
Date Generated: Fri Apr 30 2010

**File Information**

File Name HALLDITCH.WAD  
Start Date and Time 2010/04/29 10:50:08

**Site Details**

Site Name  
Operator(s) NVD





# Discharge Measurement Summary

Date Generated: Fri Apr 30 2010

## File Information

File Name TAYLOR.WAD  
Start Date and Time 2010/04/29 11:36:47

## Site Details

Site Name  
Operator(s) NVD

## System Information

Sensor Type FlowTracker  
Serial # P1765  
CPU Firmware Version 3.2  
Software Ver 2.11

## Units (English Units)

Distance ft  
Velocity ft/s  
Area ft<sup>2</sup>  
Discharge cfs

## Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.2%	0.0%
Velocity	0.8%	5.1%
Width	0.2%	0.2%
Method	2.7%	-
# Stations	5.8%	-
<b>Overall</b>	<b>6.5%</b>	<b>5.2%</b>

## Summary

Averaging Int.	40	# Stations	9
Start Edge	LEW	Total Width	4.000
Mean SNR	35.6 dB	Total Area	7.500
Mean Temp	38.47 °F	Mean Depth	1.875
Disch. Equation	Mid-Section	Mean Velocity	1.8284
		<b>Total Discharge</b>	<b>13.7131</b>

## Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	11:36	1.10	None	2.000	0.0	0.0	0.0000	1.00	1.7497	0.500	0.8748	6.4
1	11:36	1.60	0.6	2.000	0.6	0.800	1.7497	1.00	1.7497	1.000	1.7497	12.8
2	11:37	2.10	0.6	2.000	0.6	0.800	2.0509	1.00	2.0509	1.000	2.0509	15.0
3	11:38	2.60	0.6	2.000	0.6	0.800	2.2031	1.00	2.2031	1.000	2.2031	16.1
4	11:39	3.10	0.6	2.000	0.6	0.800	1.6024	1.00	1.6024	1.000	1.6024	11.7
5	11:40	3.60	0.6	2.000	0.6	0.800	1.2671	1.00	1.2671	1.000	1.2671	9.2
6	11:41	4.10	0.6	2.000	0.6	0.800	1.9508	1.00	1.9508	1.000	1.9508	14.2
7	11:42	4.60	0.6	2.000	0.6	0.800	2.0144	1.00	2.0144	1.000	2.0144	14.7
8	11:42	5.10	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

# Discharge Measurement Summary

Date Generated: Fri Apr 30 2010

**File Information**

File Name

TAYLOR.WAD

Start Date and Time

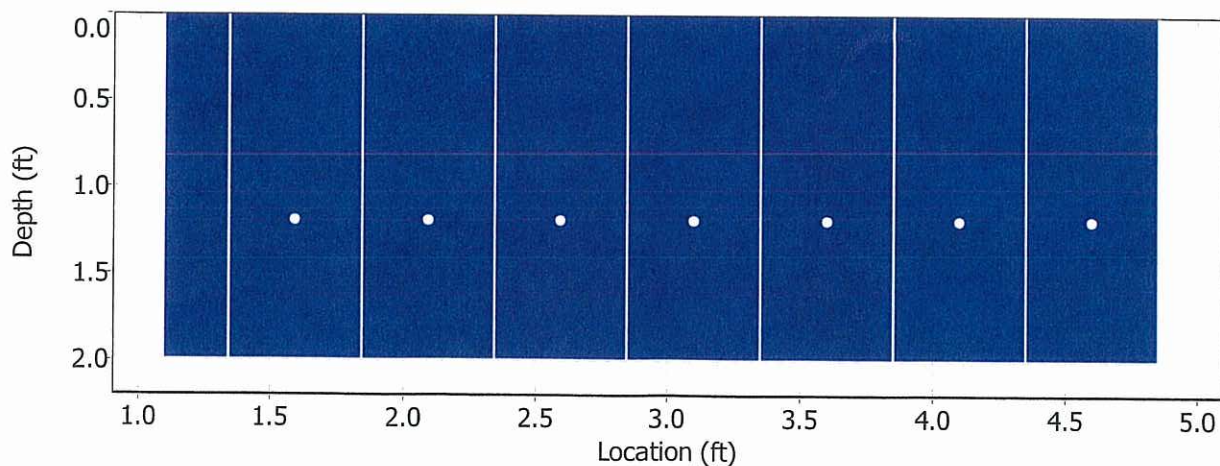
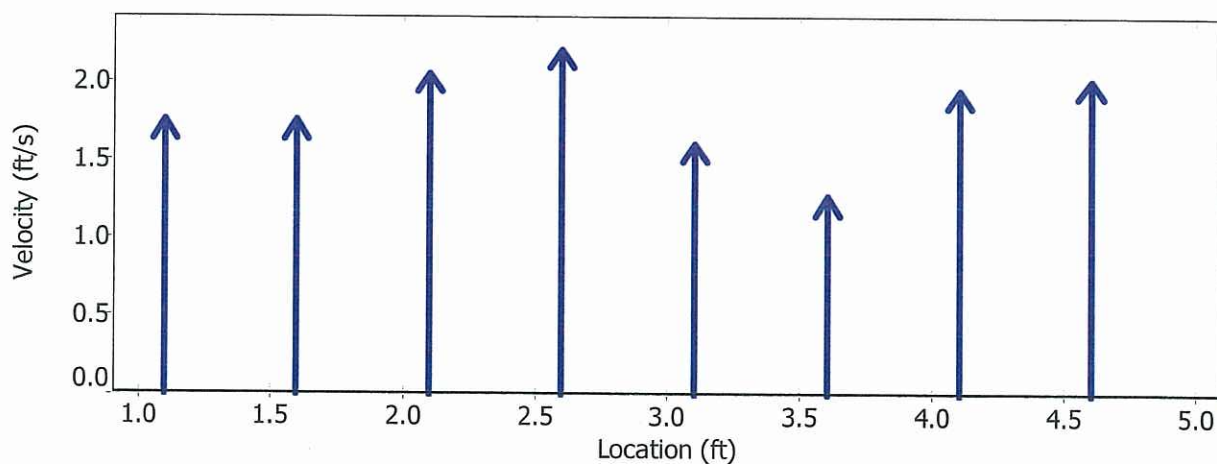
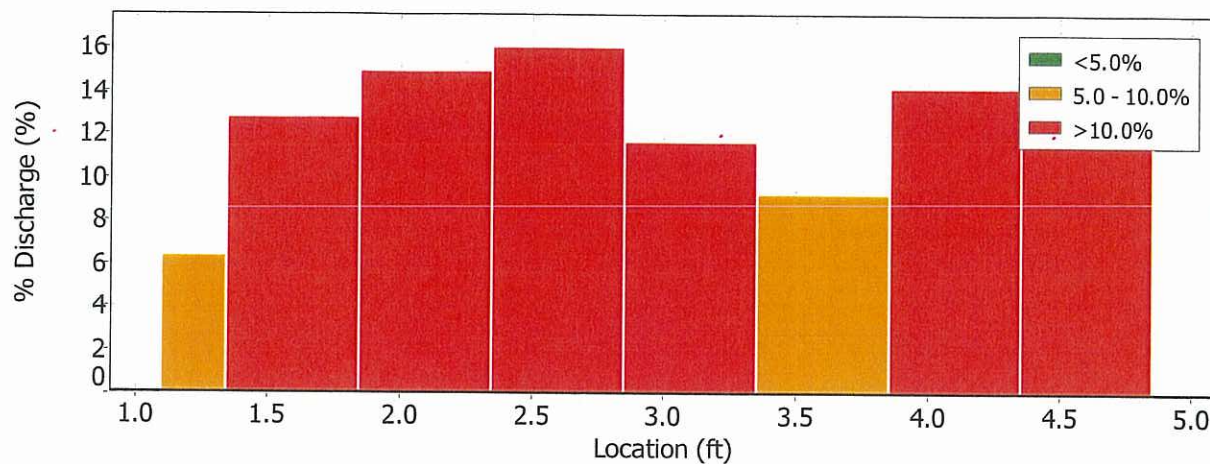
2010/04/29 11:36:47

**Site Details**

Site Name

Operator(s)

NVD





# Discharge Measurement Summary

Date Generated: Fri Apr 30 2010

## File Information

File Name TAYLOR2.WAD  
Start Date and Time 2010/04/29 11:46:58

## Site Details

Site Name  
Operator(s) NVD

## System Information

Sensor Type FlowTracker  
Serial # P1765  
CPU Firmware Version 3.2  
Software Ver 2.11

## Units (English Units)

Distance ft  
Velocity ft/s  
Area ft<sup>2</sup>  
Discharge cfs

## Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.1%	0.0%
Velocity	0.8%	2.2%
Width	0.1%	0.1%
Method	2.1%	-
# Stations	3.6%	-
<b>Overall</b>	<b>4.4%</b>	<b>2.4%</b>

## Summary

Averaging Int.	40	# Stations	14
Start Edge	LEW	Total Width	4.000
Mean SNR	35.6 dB	Total Area	7.598
Mean Temp	38.65 °F	Mean Depth	1.900
Disch. Equation	Mid-Section	Mean Velocity	1.8466
		<b>Total Discharge</b>	<b>14.0314</b>

## Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	11:46	1.10	None	2.000	0.0	0.0	0.0000	1.00	1.6755	0.300	0.5024	3.6
1	11:46	1.40	0.6	2.000	0.6	0.800	1.6755	1.00	1.6755	0.600	1.0049	7.2
2	11:47	1.70	0.6	2.000	0.6	0.800	1.8783	1.00	1.8783	0.600	1.1265	8.0
3	11:48	2.00	0.6	2.000	0.6	0.800	1.9091	1.00	1.9091	0.600	1.1450	8.2
4	11:49	2.30	0.6	2.000	0.6	0.800	2.2277	1.00	2.2277	0.600	1.3360	9.5
5	11:50	2.60	0.6	2.000	0.6	0.800	2.2782	1.00	2.2782	0.600	1.3663	9.7
6	11:51	2.90	0.6	2.000	0.6	0.800	2.2277	1.00	2.2277	0.600	1.3360	9.5
7	11:53	3.20	0.6	2.000	0.6	0.800	1.6217	1.00	1.6217	0.600	0.9726	6.9
8	11:54	3.50	0.6	2.000	0.6	0.800	1.1739	1.00	1.1739	0.600	0.7040	5.0
9	11:55	3.80	0.6	2.000	0.6	0.800	1.3287	1.00	1.3287	0.600	0.7969	5.7
10	11:56	4.10	0.6	2.000	0.6	0.800	1.8980	1.00	1.8980	0.600	1.1383	8.1
11	11:57	4.40	0.6	2.000	0.6	0.800	2.0689	1.00	2.0689	0.600	1.2408	8.8
12	11:58	4.70	0.6	2.000	0.6	0.800	1.9413	1.00	1.9413	0.701	1.3617	9.7
13	11:58	5.10	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

# Discharge Measurement Summary

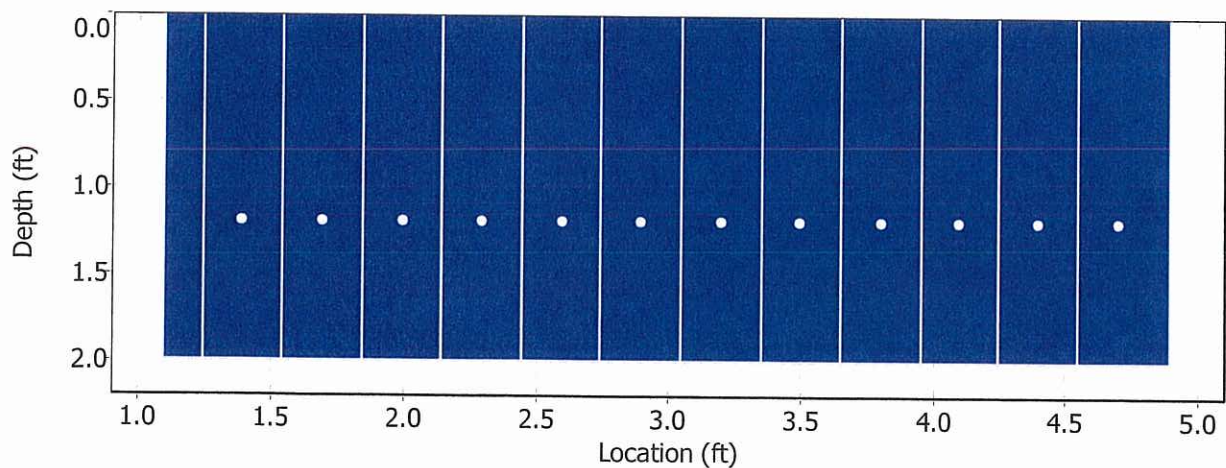
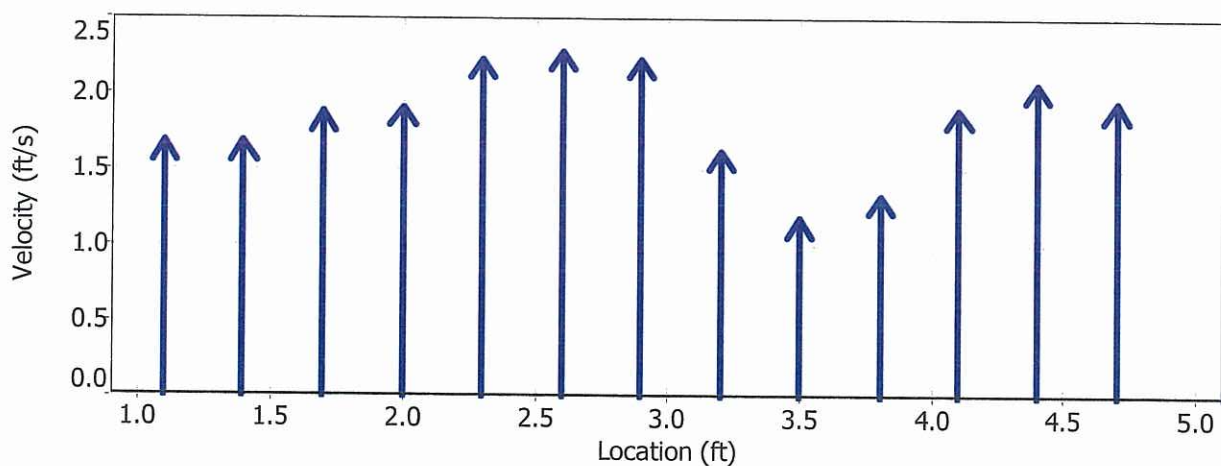
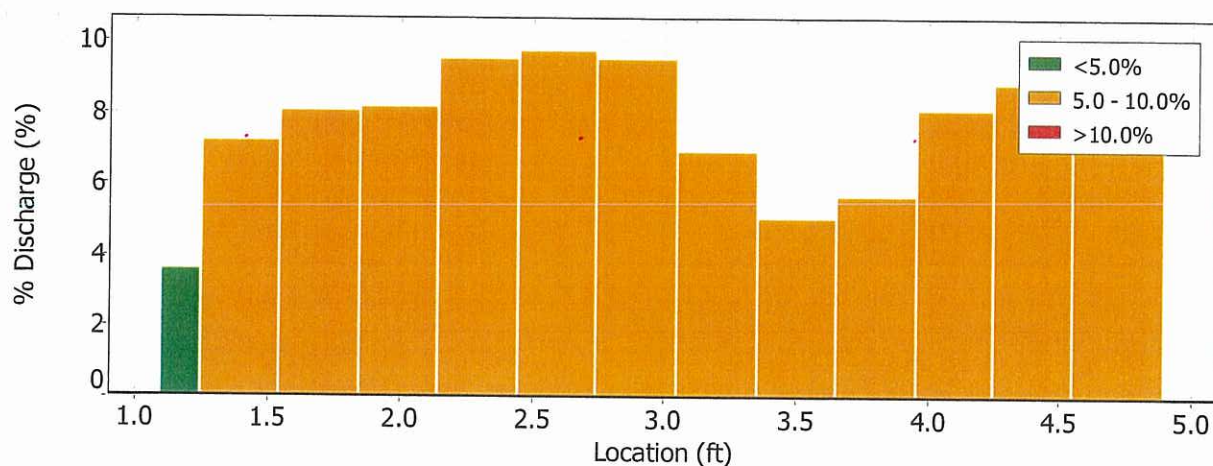
Date Generated: Fri Apr 30 2010

## File Information

File Name TAYLOR2.WAD  
Start Date and Time 2010/04/29 11:46:58

## Site Details

Site Name  
Operator(s) NVD







## QUOTATION

601 W. 1700 S., Suite B, Logan, UT 84321  
Phone: 435-755-0774 Fax: 435-755-0794  
Fed ID: 87-0502649 DUNS: 80-936-8012

Date	Quote #
09/28/09	IEIQ7771

**Quote To:** Water District 11 F

Garth Boehme  
Box 14  
Geneva, ID 83238  
USA

**Phone:** (208)847-2036

**Fax:**

**e-Mail:**

**Ship To:** DELIVER & INSTALL

Geneva, ID 83238  
USA

Any questions concerning this quote please contact me at (800) 948-6236 x223 or through email at [jhanks@inmtn.com](mailto:jhanks@inmtn.com).

Quoted By	Terms	Ship Via	FOB
Josh Hanks	NET 30	Deliver	NONE

Model #	Description	Qty	Unit Price	Ext. Price
NAF10.0	Flume, Ramp, 10.0 cfs max. capacity [MAKOFF]	1	\$629.00	\$629.00
NAF10.0	Flume, Ramp, 10.0 cfs max. capacity [HERSHEY]	1	\$629.00	\$629.00
NAF3.5	Flume, Ramp, 3.5 cfs max. capacity [LOERTSCHER] (Picked Up on 11/24)	1	\$407.00	\$407.00
NAF3.5	Flume, Ramp, 3.5 cfs max. capacity [GARY]	1	\$407.00	\$407.00

**THOMAS FORK FLUME FISH PASSAGE:**

CR200	Datalogger (-40 to +50C)	1	\$435.00	\$435.00
ENC12/14-SC-MM	12" x 14" Weather-Resistant Enclosure - SC 1 Conduit for Cables - MM Tripod Mast Mounting	1	\$295.00	\$295.00
9922	Cable, 18 AWG, 2 Cond., Santoprene (per ft.)	15	\$0.42	\$6.30
CD295	CD295 CSA DataView II Display, for use with CR200-series dataloggers	1	\$375.00	\$375.00
SR50A-L	CSC Sonic Ranging Sensor SDI-12 Maximum cable length is 200 ft for the SDI-12 output	1	\$925.00	\$925.00
9720	Cable 22 AWG, 2 Twisted Pair, Santoprene (per ft.)	25	\$0.58	\$14.50
SPC-ACC	Mount for SR50A to Ramp Flume	1	\$100.00	\$100.00
NAF7.0	Flume, Ramp, 7.0 cfs max. capacity	1	\$506.25	\$506.25
SV-INS	Installation and programming for the equipment to monitor the flume and receive data from the flow meter. Includes cost to install flume. POWER will be supplied from AVFM-II battery and solar panel.	1	\$1,900.00	\$1,900.00

Model #	Description	Qty	Unit Price	Ext. Price
AVFM-II	Area-Velocity Flow Meter Model [C-1-A-1-A-1-A-1-A] [THOMAS FORK MAIN CULVERT] Includes: 25 ft sensor cable and 12 vdc power option (4-20 mA output)	1	\$2,800.00	\$2,800.00
SPC-ACC	20 Watt Solar Panel, Charging Regulator, Deep Cycle Battery and Cover, Includes Installation Fee	1	\$1,000.00	\$1,000.00
AVFM-II	Area-Velocity Flow Meter Model [C-1-A-1-A-1-A-1-A] [HAMILTON UNDER BRIDGE] Includes: 25 ft sensor cable and 12 vdc power option (4-20 mA output)	1	\$2,800.00	\$2,800.00
SPC-ACC	20 Watt Solar Panel, Charging Regulator, Deep Cycle Battery and Cover, Includes Installation Fee	1	\$1,000.00	\$1,000.00
AVFM-II	Area-Velocity Flow Meter Model [C-1-A-1-A-1-A-1-A] [MOULDING] Includes: 25 ft sensor cable and 12 vdc power option (4-20 mA output)	1	\$2,800.00	\$2,800.00
SPC-ACC	20 Watt Solar Panel, Charging Regulator, Deep Cycle Battery and Cover, Includes Installation Fee	1	\$1,000.00	\$1,000.00
AVFM-II	Area-Velocity Flow Meter Model [C-1-A-1-A-1-A-1-A] [STEVEN & LARSEN] Includes: 25 ft sensor cable and 12 vdc power option (4-20 mA output)	1	\$2,800.00	\$2,800.00
SPC-ACC	20 Watt Solar Panel, Charging Regulator, Deep Cycle Battery and Cover, Includes Installation Fee	1	\$1,000.00	\$1,000.00
AG2000-400	In-line Irrigation Magmeter, 6" CFS/CF [KEN RIGBY] Remote Display FT420W	1	\$1,907.00	\$1,907.00
AG2000-400	In-line Irrigation Magmeter, 4" CFS/CF [GENE BOEHME]	1	\$1,163.00	\$1,163.00
AG2000-600	In-line Irrigation Magmeter, 6" CFS/CF [WOOD CANYON - PETERSON]	1	\$1,264.00	\$1,264.00
AG2000-800	In-line Irrigation Magmeter, 8" CFS/CF [GARTH BOEHME]	2	\$1,451.00	\$2,902.00
AG2000-600	In-line Irrigation Magmeter, 6" CFS/CF [BRYCE BOEHME]	1	\$1,264.00	\$1,264.00
AG2000-600	In-line Irrigation Magmeter, 6" CFS/CF [HAMILTON PUMP]	1	\$1,264.00	\$1,264.00
AG2000-800	In-line Irrigation Magmeter, 8" CFS/CF [DAVE PETERSON]	1	\$1,451.00	\$1,451.00
SubTotal				\$33,044.05
Sales Tax				\$0.00
Est. Shipping & Insur.				\$0.00
<b>Total</b>				<b>\$33,044.05</b>

We appreciate the opportunity to provide this quotation. Please feel free to contact us with any questions or comments.