



State of Idaho

DEPARTMENT OF WATER RESOURCES

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August 20, 2007

C. L. "BUTCH" OTTER
Governor

DAVID R. TUTHILL, JR.
Director

Re: Order Requiring Measuring Devices and Head gates in Water District 74

Dear Water User,

The Idaho Department of Water Resources (IDWR or Department) has issued the enclosed preliminary order requiring installation of measuring devices and control works for certain diversions in Water District No. 74, Lemhi River and tributaries, prior to the 2008 irrigation season. Pursuant to Section 67-5243, Idaho Code, the preliminary order will become a final order without further action of the Department unless a party petitions for reconsideration or files an exception and/or brief as explained in the enclosed information sheet.

This order requires users receiving the order to submit plans for measuring devices and control works to the Department on or before November 15, 2007. The order only applies to the control and measurement of water at the head of the main canals, ditches, or points of diversions from the Lemhi River listed in the order, not the points of re-diversion or laterals from those main ditches. Please refer to the enclosed document "*Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices*" for information on types of measuring devices acceptable to IDWR. This document and other information on the topic is available on IDWR's Internet site at the following address:

http://www.idwr.idaho.gov/water/districts/water_measurement.htm

If you have questions concerning this order, please contact the watermaster for Water District 74, Rick Sager, or from IDWR, contact either Bob Foster, IDWR Salmon Field Office (208-756-6644), or Tim Luke, IDWR Water Distribution, Boise (208-287-4959).

Respectfully,

Tim Luke
Water Distribution

Enclosures:

Preliminary Order Requiring Controlling Works and Measuring Devices in Water District 74, Dated August 20, 2007

Explanatory Information to Accompany a Preliminary Order (2 pages)

IDWR Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices (6 pages)

Cc: Rick Sager, Watermaster, Water District 170
Bob Foster, Deputy Watermaster, Water District 170, IDWR, Salmon
IDWR Eastern Region

BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE
STATE OF IDAHO

IN THE MATTER OF REQUIRING MEASURING)
DEVICES AND CONTROLLING WORKS ON) PRELIMINARY
CERTAIN DIVERSIONS FROM THE LEMHI RIVER) ORDER
IN WATER DISTRICT NO. 74)
_____)

On May 2, 2007 the Idaho Department of Water Resources (IDWR) received a letter from the Watermaster of Water District No. 74, Lemhi River and tributaries, requesting IDWR to require installation of measuring devices for certain diversions on the Lemhi River. The watermaster stated in his May 2nd letter that he manually measures diversions in the district using a current meter. The watermaster has developed stage-discharge rating tables for diversions on the Lemhi River using the fixed staff gages that are installed on diversion fish screens. A rating table relates the stage or water level of a ditch against the ditch flow or discharge. The watermaster, working in coordination with IDWR staff, has determined that rating tables for many of the diversions on the Lemhi River cannot be adequately maintained due to frequent staff gage shifts caused by moss and algae, and/or changes in the physical conditions of the ditch due to ongoing ditch maintenance or delivery of water to lateral ditches. The watermaster has prioritized a need for installation of standard measuring devices on the following Lemhi River ditches or diversions: L-3, L-3A, L-7, L-15, L-21, L-22, L-25, L-30, L-30A, L-31, L-32, L-35, L-35A, L-43-B, L-45, L-46A, L-54, L-57, L-58, L-58B, L-61, and L-62.

Section 42-701, Idaho Code, provides in pertinent part:

42-701. INSTALLATION AND MAINTENANCE OF CONTROLLING WORKS AND MEASURING DEVICES BY WATER APPROPRIATORS – PROCEDURE UPON FAILURE TO INSTALL AND MAINTAIN – MEASURING AND REPORTING OF DIVERSIONS – PENALTY FOR FAILURE TO COMPLY – REPORT FILING FEE.

1. The appropriators or users of any public waters of the state of Idaho shall maintain to the satisfaction of the director of the department of water resources suitable headgates and controlling works at the point where the water is diverted. Each device shall be of such construction that it can be locked and kept closed by the watermaster or other officer in charge, and shall also be of such construction as to regulate the flow of water at the diversion point. Each such appropriator shall construct and maintain, when required by the director of the department of water resources, a rating flume or other measuring device at such point as is most practical in such canal, ditch, wellhead or pipeline for the purpose of assisting the watermaster or department in determining the amount of water that may be diverted into said canal, ditch, wellhead or pipeline from the stream, well or other source of public water. Plans for such headgates, rating flumes or other measuring devices shall be approved by the department of water resources.

3. Any appropriator or user of the public waters of the state of Idaho that neglects or refuses to construct or maintain such headgates, controlling works, or measuring devices..., upon receiving ten (10) days' notice from the director of the department of water resources within which to begin and diligently pursue to completion the construction or installation of the required device or devices or to begin and diligently pursue to completion a remedy to such defects as exist in accordance with said notice, then the director of the department of water resources may order the duly qualified and acting watermaster of the water district to shut off and refuse to deliver at the point of diversion, the water owned by such appropriator or user until the user does construct and maintain such headgates, controlling works or measuring devices or remedy the defects which exist or the director may take action pursuant to section 42-1701B, Idaho Code, to enforce the requirement to construct, install or maintain such devices.

4. The appropriators or users of the public waters of the state of Idaho shall be given a reasonable time within which to complete construction of such headgates, controlling works or measuring devices, depending upon the size and extent thereof, when due diligence has been used in the prosecution of such work.

ORDER

IT IS HEREBY ORDERED AS FOLLOWS:

1. Prior to diverting water during the 2008 irrigation season, the water right owners or water users identified with each individual diversion listed in Attachment A of this order shall install a measuring device and a functional, lockable controlling works of a type acceptable to IDWR. The controlling works and measuring device for each point of diversion listed on Attachment A shall be installed at, or in reasonable proximity, to the point where water is diverted from the Lemhi River.

2. All water users diverting water from the Lemhi River at the points of diversion listed on Attachment A must submit plans for measuring devices and controlling works to either the Water District 74 watermaster or IDWR no later than November 15, 2007. Plans shall be reviewed by IDWR to determine whether proposed measuring devices and controlling works are of a type acceptable to IDWR. If controlling works are already in place, a written description shall be submitted to IDWR by November 15, 2007.

3. The watermaster shall shut off and refuse to deliver water to any diversion listed on Attachment A that does not have an adequate measuring device and/or lockable controlling works at any and all times during the 2008 irrigation season.

Dated this 20th day of August, 2007.


GARY SPACKMAN
ADMINISTRATOR

ATTACHMENT A

NAME	ADDRESS	CITY	ST	ZIP	DIVERSION
DONNA ALDOUS	56 THREE MILE LN	SALMON	ID	83467	L-07
LOLA ANDREWS	309 N WARPATH	SALMON	ID	83467	L-07
HENRY APEL	16 STRAWBERRY LANE	SALMON	ID	83467	L-07
DARELL BAGLEY	14575 E LANGELL V RD	BONANZA	OR	97623	L-30A
BRET BAIRD	82 HWY 28	SALMON	ID	83467	L-07
GARY BARRETT	P O BOX 2377	SALMON	ID	83467	L-15
LAURIE BARRETT	24 RED ROCK STAGE RD	SALMON	ID	83467	L-15
ROBERT BERASI	26 SEVENTEEN MILE RD	SALMON	ID	83467	L-25
KRIS BIRD	71 HWY 28	SALMON	ID	83467	L-07
GEORGE BLODGETT	701 IMPERIAL DRIVE 3C	SALMON	ID	83467	L-07
JOEL CANNON	171 LEMHI RD	SALMON	ID	83467	L-03
JOANN CARROLL	62 CEMETARY LANE	SALMON	ID	83467	L-07
JAMES CASTERSON	903 HWY 28	SALMON	ID	83467	L-15
LOWELL CERISE	56 WHITING ROAD	SALMON	ID	83467	L-07
CITY OF SALMON	200 MAIN STREET	SALMON	ID	83467	L-07
CARY COOK	436 HIGHWAY 28	SALMON	ID	83467	L-07
JIM CRISMON	P O BOX 2	TENDOY	ID	83468	L-30
JEROLD DANCE	401 N WARPATH	SALMON	ID	83467	L-07
GORDON D DANIELS	P O BOX 1472	SALMON	ID	83467	L-07
SHIRLEY DECORA	147 LEMHI BACK RD	SALMON	ID	83467	L-03
TERRY DELESKI	PO BOX 122	TENDOY	ID	83468	L-32
MARLENE DIMICK	5 BEACH ROAD	SALMON	ID	83467	L-07
RICK DORONY	61 HIGHWAY 28	SALMON	ID	83467	L-07
DOUBLE BARREL MANAGEMENT	71 RED ROCK STAGE RD	SALMON	ID	83467	L-15
CARL ELLSWORTH	P O BOX 60	LEADORE	ID	83464	L-58B
MARVIN ENGLAND	PO BOX 723	SALMON	ID	83467	L-07
BILL ENGQUIST	1277 HWY 28	SALMON	ID	83467	L-21
NINA ERICKSON	18 STRAWBERRY LANE	SALMON	ID	83467	L-07
FAR NIENTE RANCH	P O BOX 135	HOLT	CA	95234	L-46A
ALYCE FELKER	P O BOX 177	CARMEN	ID	83462	L-07
PAUL FISHER	12 FISHER LANE	SALMON	ID	83467	L-07
DAN FRENCH & P FISHER	218 HWY 28	SALMON	ID	83467	L-3A, L-07
LARRY GARDNER	PO BOX 52	TENDOY	ID	83468	L-32
MARLENE GEORDGE	P O BOX 62	SALMON	ID	83467	L-07
ROSS GODDARD	P O BOX 11	TENDOY	ID	83468	L-30, L-31
CLYDE GOODWIN	204 LEMHI RD	SALMON	ID	83467	L-07
DARLENE HAAS	PO BOX 55	TENDOY	ID	83468	L-32
JAREL HAGEN	P O BOX 1021	SUNDANCE	WY	82729	L-32
BILL R HAGER	PO BOX 26	TENDOY	ID	83468	L-32

ATTACHMENT A

NAME	ADDRESS	CITY	ST	ZIP	DIVERSION
BERT HATCH	5 S. BEAN LANE	SALMON	ID	83467	L-07
RAY HATHHORN	92 HWY 28	SALMON	ID	83467	L-07
TERRY HEATON	102 HIGHWAY 28	SALMON	ID	83467	L-07
RICHARD HENTZEN	2381 RICHARDS AVE	IDAHO FALLS	ID	83404	L-25
MATTHEW NERBEK	72 THREE MILE LANE	SALMON	ID	83467	L-07
LYNN A HERBST	P O BOX 21	TENDOY	ID	83468	L-30A, L-31
STEVEN HERBST	74 LEMHI BACK ROAD	SALMON	ID	83467	L-03
LAVERNE HOKANSON	27 HOKANSON LANE	SALMON	ID	83467	L-03
DAVE HULL	19 SUMMY LANE	SALMON	ID	83467	L-03
JACK JOKOVAC	71 RED ROCK STAGE RD	SALMON	ID	83467	L-15, L-22
AUDREY B JENSON	P O BOX 32	TENDOY	ID	83468	L-30
GARY JENSON	P O BOX 923	SALMON	ID	83467	L-30
RICHARD JORDAN	7187 HAPPY VALLEY RD	KUNA	ID	83634	L-15
EUGENE JUD	13765 HARDING AVE #D	SAN MARTIN	CA	95046-9412	L-07
JOHN KATRI	5870 S 45TH W	IDAHO FALLS	ID	83402	L-21
GALEN KILLSER	8 KOSSLER LANE	SALMON	ID	83467	L-22
LDS CHURCH					
C/O LYNN DAHLE	522 S RIVER ST	SALMON	ID	83467	L-07
LEMHI CATTLE OWNERS ASSOC					
C/O JACK ALVORD	P O BOX 37	TENDOY	ID	83468	L-35, L-35A
DENNIS LILE	PO BOX 793	SALMON	ID	83467	L-07
BILL LOUDY	P O BOX 68	TENDOY	ID	83468	L-32
VELMA MAHAFFEY	P O BOX 14	LEMHI	ID	83465	L-43B
CHARLES MAJOR	8 HOKANSON LANE	SALMON	ID	83467	L-03
MARVIN MATHEWS	12 CLARK DRIVE	SALMON	ID	83467	L-07
GRANT MAURER	166 RED ROCK STAGE RD	SALMON	ID	83467	L-22
SHANE MCAFEE	PO BOX 2008	SALMON	ID	83467	L-25
MCFARLAND LIVESTOCK CO INC	P O BOX 50	LEMHI	ID	83465	L-46A
SAM MCKINNEY	P O BOX 52	LEMHI	ID	83465	L-46A
CLYDE NELSON	152 LEMHI ROAD	SALMON	ID	83467	L-03
GARY NICHOLS	P O BOX 898	SALMON	ID	83467	L-07
BRETT PARK	179 LEMHI ROAD	SALMON	ID	83467	L-03
MORGAN PEETS	522 RIVER ST	SALMON	ID	83467	L-22
JOHN PETERSEN	1537 HWY 28	SALMON	ID	83467	L-30
MARK L PHILLIPS	607 E CONFEDERATE DR	SALMON	ID	83467	L-07
DAN PIERSON	PO BOX 1383	SALMON	ID	83467	L-21
CLEMENT POGGE	268 HWY 28	SALMON	ID	83467	L-07

ATTACHMENT A

NAME	ADDRESS	CITY	ST	ZIP	DIVERSION
MICHAEL POSTEL	P O BOX 35	LEMHI	ID	83465	L-45
DAVID QUERNER	2187 PINE CREST DR	CORONA	CA	92882	L-25
RIATA LIVESTOCK					
STEVEN SHINER	P O BOX 43	LEMHI	ID	83465	L-46A
KELLY RICHIE	P O BOX 74	TENDOY	ID	83468	L-30
BRET RIGGAN	121 HWY 93 N	SALMON	ID	83467	L-07
JAMES E RIGGAN	267 HWY 28	SALMON	ID	83467	L-07
A RAND ROBISON	503 N 4000E	RIGBY	ID	83442	L-54, L-57, L-58
ROGER ROCKWELL	1259 HWY 28	SALMON	ID	83465	L-21
JOHN E SELLS	P O BOX 7597	INCLINE VILLAGE	NV	89452	L-32
RICK SESSIONS	10 MTN LEGEND LANE	SALMON	ID	83467	L-07
SHINER RANCHES INC	P O BOX 26	LEMHI	ID	83465	L-45
GEORGE L SHOUP	P O BOX 48	TENDOY	ID	83468	L-30
GLADYS SMITH	129 LEMHI RD	SALMON	ID	83467	L-03
JORDON SMITH	807 MAIN	SALMON	ID	83467	L-03
EDWARD SNOOK	1205 HIGHWAY 28	SALMON	ID	83467	L-21, L-22
FRED SNOOK	44 CEMETERY LANE	SALMON	ID	83467	L-07
QUINTON SNOOK	9 QUINTON LANE	SALMON	ID	83467	L-21, L-22, L-30
CHARLES SPRINGER	48 HAYNES CREEK RD	SALMON	ID	83467	L-30
PAUL STOKES	10 PARKVIEW RD	SALMON	ID	83467	L-07
STEVE STOKES	61 LEMHI RD	SALMON	ID	83467	L-03
PATTY L STRICKLAN	140 HWY 28	SALMON	ID	83467	L-07
RODGER C SWANSON	71 PRICE CREEK RD	SALMON	ID	83467	L-30
KIM THOMAS	PO BOX 375	SALMON	ID	83467	L-07
ROBERT THOMAS	12 REBA LANE	SALMON	ID	83467	L-07
JOANNE TINGLE	P O BOX 812	SALMON	ID	83467	L-03, L-07
JOHN TRACY	20 TRACY LANE	SALMON	ID	83467	L-03
DOUGLAS TRAGER	1438 HWY 28	SALMON	ID	83467	L-25
KARL TYLER	PO BOX 16025	MISSOULA	MT	59803	L-58B, L-61, L-62
JAMES WAGNER	216 RED ROCK STAGE RD	SALMON	ID	83467	L-21
JAMES WEISS	P O BOX 62	WISDOM	MT	59761	L-25, L-30
JAY WELLARD	9 THREE MILE LANE	SALMON	ID	83467	L-07
BRUCE WHITSON	P O BOX 22	LEMHI	ID	83465	L-03
GRACE WILLIAMS	3 SCOTT LANE	SALMON	ID	83467	L-07
GEORGE WILSON	P O BOX 66	TENDOY	ID	83468	L-25, L30
JOANN WOLTERS	64 MILLER LANE	SALMON	ID	83467	L-07

**EXPLANATORY INFORMATION
TO ACCOMPANY A
PRELIMINARY ORDER**

(To be used in connection with actions when a hearing was not held)

(Required by Rule of Procedure 730.02)

The accompanying order or approved document is a "Preliminary Order" issued by the department pursuant to section 67-5243, Idaho Code. It can and will become a final order without further action of the Department of Water Resources ("department") unless a party petitions for reconsideration, files an exception and brief, or requests a hearing as further described below:

PETITION FOR RECONSIDERATION

Any party may file a petition for reconsideration of a preliminary order with the department within fourteen (14) days of the service date of this order. The department will act on a petition for reconsideration within twenty-one (21) days of its receipt, or the petition will be considered denied by operation of law. See Section 67-5243(3) Idaho Code.

EXCEPTIONS AND BRIEFS

Within fourteen (14) days after (a) the service date of a preliminary order, (b) the service date of a denial of a petition for reconsideration from this preliminary order, or (c) the failure within twenty-one (21) days to grant or deny a petition for reconsideration from this preliminary order, any party may in writing support or take exceptions to any part of a preliminary order and may file briefs in support of the party's position on any issue in the proceeding with the Director. Otherwise, this preliminary order will become a final order of the agency.

REQUEST FOR HEARING

Unless a right to a hearing before the Department or the Water Resource Board is otherwise provided by statute, any person aggrieved by any final decision, determination, order or action of the Director of the Department and who has not previously been afforded an opportunity for a hearing on the matter may request a hearing pursuant to section 42-1701A(3), Idaho Code. A written petition contesting the action of the Director and requesting a hearing shall be filed within fifteen (15) days after receipt of the denial or conditional approval.

ORAL ARGUMENT

If the Director grants a petition to review the preliminary order, the Director shall allow all parties an opportunity to file briefs in support of or taking exceptions to the preliminary order and may schedule oral argument in the matter before issuing a final order. If oral arguments are to be heard, the Director will within a reasonable time period notify each party of the place, date and hour for the argument of the case. Unless the Director orders otherwise, all oral arguments will be heard in Boise, Idaho.

CERTIFICATE OF SERVICE

All exceptions, briefs, requests for oral argument and any other matters filed with the Director in connection with the preliminary order shall be served on all other parties to the proceedings in accordance with IDAPA Rules 37.01.01302 and 37.01.01303 (Rules of Procedure 302 and 303).

FINAL ORDER

The Director will issue a final order within fifty-six (56) days of receipt of the written briefs, oral argument or response to briefs, whichever is later, unless waived by the parties or for good cause shown. The Director may remand the matter for further evidentiary hearings if further factual development of the record is necessary before issuing a final order. The department will serve a copy of the final order on all parties of record.

Section 67-5246(5), Idaho Code, provides as follows:

Unless a different date is stated in a final order, the order is effective fourteen (14) days after its issuance if a party has not filed a petition for reconsideration. If a party has filed a petition for reconsideration with the agency head, the final order becomes effective when:

- (a) the petition for reconsideration is disposed of; or
- (b) the petition is deemed denied because the agency head did not dispose of the petition within twenty-one (21) days.

APPEAL OF FINAL ORDER TO DISTRICT COURT

Pursuant to sections 67-5270 and 67-5272, Idaho Code, if this preliminary order becomes final, any party aggrieved by the final order or orders previously issued in this case may appeal the final order and all previously issued orders in this case to district court by filing a petition in the district court of the county in which:

- i. A hearing was held,
- ii. The final agency action was taken,
- iii. The party seeking review of the order resides, or
- iv. The real property or personal property that was the subject of the agency action is located.

The appeal must be filed within twenty-eight (28) days of this preliminary order becoming final. See section 67-5273, Idaho Code. The filing of an appeal to district court does not itself stay the effectiveness or enforcement of the order under appeal.

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES (IDWR)

MINIMUM ACCEPTABLE STANDARDS FOR
OPEN CHANNEL AND CLOSED CONDUIT
MEASURING DEVICES

The source and means of diversion of water, whether surface or ground water, generally determines the measurement and reporting process. Surface water sources such as streams, springs and waste channels are normally diverted into open channels (ditches or canals), but closed conduits (pipes or culverts) are also used. Ground water is usually diverted into pipes (which may also discharge into open channels).

Measuring devices are required at or near the point of diversion from the public water source.

OPEN CHANNEL

SURFACE WATER DIVERSIONS

I. Flow Measurement

The following discussion is applicable only to diversions from surface water sources. Measurement of a ground water diversion with an open channel measuring device must be pre-approved by the Department.

A. Standard Open Channel Measuring Devices

Standard weirs, flumes and submerged orifices are pre-calibrated devices commonly used for measuring water in open channels. The installation of one of these devices provides a fixed relationship between the stage and flow.

Various size weirs, flumes and submerged orifices are available and each type and size has a separate rating, or relationship between head and flow. Standard designs and information about installation and use of different measuring devices, including rating tables, can be provided by the department. All open channel flow diversions should be measured using one of the following standard open channel flow measuring devices commonly used in Idaho:

- contracted rectangular weir
- suppressed rectangular weir
- Cipolletti weir
- 90 degree V-notch weir
- Parshall flume
- trapezoidal flume
- submerged rectangular orifice
- constant head orifice
- ramped broad crested weir (or ramped flume)

Construction and installation of these devices should follow published guidelines. Additional information is available on the IDWR Internet site at the addresses below. Additional references are available upon request.

http://www.idwr.idaho.gov/water/districts/water_measurement.htm

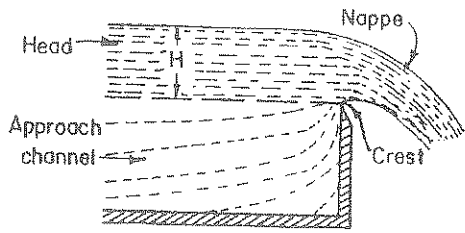


Figure 1. Generalized profile of a standard sharp-crested weir.

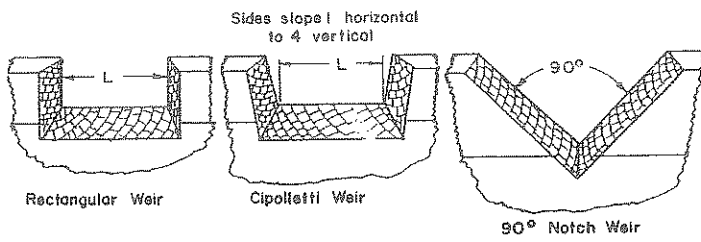


Figure 2. Examples of common weir types.

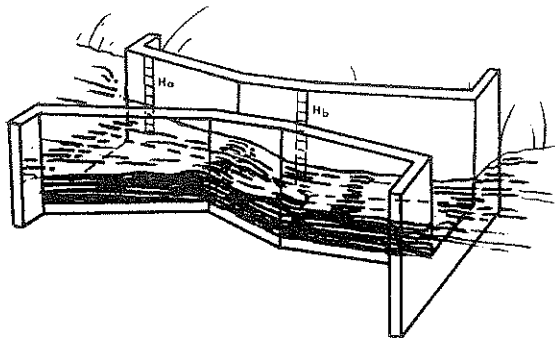


Figure 3. Parshall Flume.

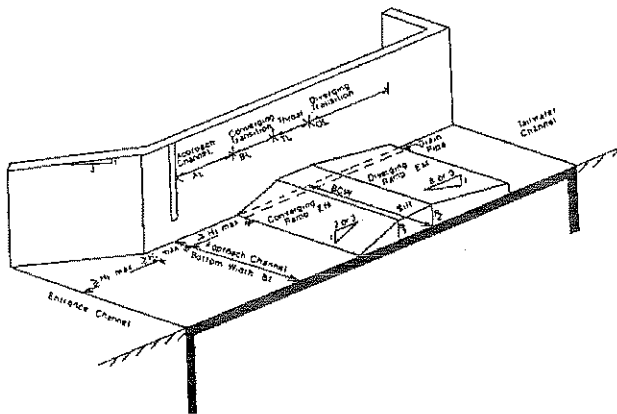


Figure 4. Ramped Flume.

B. Non-standard open channel devices: Rated Structures or Rated Sections

IDWR may authorize the use of non-standard devices and rated sections provided the device or section is rated or calibrated against a set of flow measurements using an acceptable open channel current meter or a standard portable measuring device. Further restrictions and requirements are available from the Department upon request.

C. Closed Conduit Measuring Devices

Refer to the Ground Water measuring section for installation, accuracy, and calibration standards of closed conduit measuring devices.

GROUND WATER DIVERSIONS

Ground water diverters have the option of installing a flowmeter, or using power records to estimate water withdrawals. Information regarding the use of power records will follow this discussion of flowmeters.

I. Flow Measurement

There are many flowmeters on the market, with costs ranging from several hundred dollars to several thousand dollars. In general, the higher priced meters are more accurate and require less maintenance. Most meters on the market have an acceptable accuracy rating for IDWR's guidelines. However, some types and designs are much more prone to maintenance problems. Moving parts tend to wear when sand or silt is present, and moss often plugs small orifices and slows moving parts. No single flowmeter is best for every situation. We recommend that you visit with qualified dealers and discuss your needs with them.

A. Minimum Standards

The following are minimum standards for closed conduit flowmeters:

- Minimum manufacturers' design accuracy of +/- 2 percent of reading
- Installed accuracy of at least +/- 10 percent of reading
- Meter must be calibrated with an independent, secondary measuring device when installed, and at least once every four years thereafter. In many cases, IDWR or the water district will perform this calibration.
- Must read instantaneous flow or be capable of flow rate calculation
- Must record total volume
- Non-volatile memory (power outage does not zero volume reading)
- Sufficient digits to assure "roll-over" to zero does not occur within 2 years
- Volume reading cannot be "reset" to zero
- Installed to manufacturers' specifications

Meter manufacturers typically specify that a meter must be located in a section of straight pipe at least 10 pipe diameters downstream and 5 pipe diameters upstream of any valves, bends, contractions, or other interferences which will distort the flow pattern. However, some types of meters will produce acceptable results when installed in shorter sections of

straight pipe. For example, at least one electro-magnetic flowmeter provides excellent measurement accuracy with only 5 lengths of straight pipe upstream from the meter.

Each manufacturer should provide the installation specifications for its meters. These **specifications must be adhered to** in order to achieve the accuracy required for the water measurement program. Again, we stress the importance of visiting with a qualified dealer and discussing your specific needs with them.

B. Types of Measuring Devices for Closed Conduits

Types	Pipe Sizes	Maintenance Required	Relative Purchase Price
Differential Head <ul style="list-style-type: none"> ● Orifice ● Venturi ● Annubar 	small to large	Low to high. Sand wears on sharp edges, and particles can plug small orifices and tubes.	low to medium
Force Velocity <ul style="list-style-type: none"> ● Turbine ● Propeller ● Impeller 	small to large	Typically moderate to high. Often problematic when exposed to sand or moss. Some cannot measure low velocities	low to medium
Ultrasonic	small to large	Low. Typically non-invasive with no moving parts to wear	high
Vortex	small to medium (about 12 to 14 inch maximum pipe diameter)	Low. Few or no moving parts to wear.	high
Electro-Magnetic	small to medium (about 12 to 14 inch maximum pipe diameter)	Low. No moving parts. Can provide good results with shorter lengths of straight pipe.	high

Power Records

An alternative to installing flowmeters is the use of power records and other information to estimate the annual diversion from a pump. This method, which we call the Power Consumption Coefficient (PCC) method, utilizes information obtained from the pumping plant while running at or near full capacity. Two parameters are measured while the pump is operating: flow rate and input power. With this information, one can calculate the number of kilowatt-hours required to pump one acre foot of water. This number is unique to each well and pumping plant due to the physical attributes of the system.

To determine the rate of flow, a portable measuring device, such as an ultrasonic non-invasive meter or a differential head device, can be used. Simultaneous with the flow measurement, power is measured using the utility's kilowatt-hour meter. A qualified individual with the necessary equipment will be required to perform these measurements.

With the power consumption coefficient, an annual volume of water pumped can be calculated from the total annual kilowatt-hours of energy consumed by the pumping plant. The total power usage for each pumping plant will be supplied to the Department by electric utilities.

Some complex systems cannot use this method due to the potential for large errors. See the discussion on page 5 to see if this method can be used.

Because systems wear and water levels change, it is necessary to occasionally verify the flow to power ratio. Therefore, the power consumption coefficient must be re-calibrated at least once every four years.

Can power records be used to estimate my diversion?

Only irrigation water users may use power records to estimate their diversion because the utilities will only provide consumption information for irrigation uses. If you are not an irrigation user, but want to use power records, you must propose a method of reporting your power consumption data.

Owners of **surface water diversions** must have a flow measuring device in most cases. The alternate method of estimating water withdrawals with power records cannot be used unless you pump from a public water source and can show the Department that it will yield reliable results (case by case determination).

Owners of **ground water diversions** can either install a totalizing flowmeter or ask the Department to use power records to estimate withdrawals. If the pump discharges to an open channel, an open channel measuring device can be employed to measure the water diverted if the device and a method of tracking hours of operation are pre-approved by the Department. Flow meters which register only instantaneous flow rate are not acceptable unless the water user can demonstrate a reliable method of tracking the number of hours the pump operates

through the season (the flow measuring device must then be read and flow rate recorded at least once per week).

Estimating total water diversion from power records requires the derivation of a relationship between power demand and flow. Flow rate and power demand must be measured simultaneously to determine the number of kilowatt hours needed to pump an acre foot of water. This relationship, called a power consumption coefficient, is applied to the year end power records to determine the total acre feet diverted.

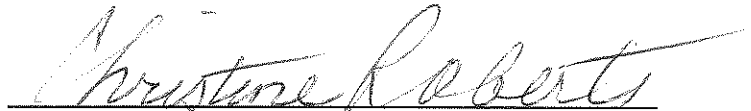
The total water diverted can be accurately estimated if the system configuration or operation is not complex. Unfortunately, power records will not always yield acceptable results, and it will be necessary to install a flowmeter. **Flowmeters must be installed** if any of the following conditions exist:

- The well flows (artesian) so that water can be diverted when the pump is off.
- The energy consumption meter that records power used by the pump also records power used by other devices not integral to the irrigation system. For example, if the meter also records power used by a home, shop, cellar, etc., a flowmeter must be installed because power used by the pump cannot be isolated from the other devices. However, if the meter also records power used by center pivots, booster pumps, or other devices which operate when the main pump operates, the alternate method may be acceptable.
- The energy consumption meter records the power used by more than one well pump. If a deep well pump which discharges to an open pond or ditch and a relift pump are both connected to the same electrical meter, the discharge from the well pump can be measured, and a time clock can be installed to record the total number of hours of pump operation which can be multiplied by the flow rate to determine the total volume of water diverted.
- The energy supplied to the pump cannot be accurately and reliably measured. For example, most diesel and propane driven pumps do not have provisions to measure the fuel used by the engine. These will be reviewed on a case-by-case basis.
- The flow rate from the pump varies significantly due to changes in demand or operation. For example, pumps that discharge into a pressurized system some times and then open discharge at other times, or pumps that supply multiple pivots, would likely have flow rates that change drastically. These changes would alter the flow to power ratio, causing inaccurate estimates of diversions. The alternate method of estimating water withdrawals with power records may only be used if the water user can propose an acceptable method of tracking these changes in operation.
- Changing water levels cause the flow or operating pressures to vary significantly over the irrigation season.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 20th day of August 2007, the above and foregoing document was served on each individual or entity on the service list for this matter on file at the Idaho Department of Water Resources, 322 East Front Street, Boise, Idaho. Each individual or entity on the service list was served by placing a copy of the above and foregoing document in the United States mail, postage prepaid and properly addressed.

Documents served: Order Requiring Measuring Devices & Head gates in Water District 74

A handwritten signature in cursive script, reading "Christine Roberts", written over a horizontal line.

Christine Roberts
Technical Records Specialist
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