State of Idaho
DEPARTMENT OF WATER RESOURCES

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C. L. "BUTCH" OTTER
Governor

DAVID R. TUTHILL, JR.
Director

JANUARY 23, 2009

RE: Measurement and control of Basin 72 diversions in WD170

Dear Water Right Holder:

This letter is being sent to water right holders of record for water rights in Water Resources Administrative Basin 72 that are affected by the Idaho Department of Water Resources (IDWR) order entitled, *Preliminary Order Requiring Measuring Devices and Controlling Works on Diversions from the Salmon River and Tributaries in Water District No. 170,* issued by the Director of IDWR on February 20, 2007. The purpose of this letter is to remind users of the measurement and control requirement and to provide information that will assist users in bringing their diversions into compliance.

The order required users in Basin 72 to install measurement and control structures on certain diversions before diverting water during the 2009 irrigation season. A copy of the order is available from the Water District No. 170 webpage on the IDWR Internet site at,

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

Many users have been in contact with IDWR and have either brought their diversions into compliance or have plans in place to do so in the spring. If you have not been in contact with IDWR, or if you have questions about bringing your diversions into compliance, please review the information in this letter and attachments and feel free to call or write with questions or concerns.

The attached document "Frequently Asked questions" provides answers to common questions IDWR has received regarding compliance with the order. The second attachment, "*Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices*" provides some minimum measuring device specifications required by IDWR. Further information is available from the IDWR Internet site (http://www.idwr.idaho.gov/water/districts/).

If you have further questions, concerning this matter, please contact Nick Miller or Bob Foster of IDWR.

Sincerely,

Nick Miller, P.E.
Staff Engineer, Water Distribution Section

Enclosures:

Frequently Asked Questions about compliance with the measurement and control order in Water District No. 170 – 3 pages
Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices – 4 pages

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FREQUENTLY ASKED QUESTIONS

ABOUT COMPLIANCE WITH THE MEASUREMENT AND CONTROL ORDER IN WATER DISTRICT NO. 170

1. Who must comply with the order?

The order requires that all diversions within Water District No. 170 that authorize diversion of more than 0.24 cubic feet per second (cfs) or for the irrigation of more than five (5) acres must be equipped with measurement and control structures prior to diverting water in 2009. If you are receiving this letter, you are an owner of record of a water right diverting from a location that meets these criteria.

As further described in No. 2 below, the order only requires measurement and control at the head of a ditch. In situations where multiple parties divert from a common ditch or well, multiple measurement and control structures are not required by the order and users on common ditch systems may need to coordinate with the other users on the system to ensure the diversion is brought into compliance.

2. What needs to be done?

The order requires measurement and control only at the point where the water is diverted from the source. This order does not require measurement and control at points of rediversion from a ditch. In other words, it requires a headgate, valve, or other control structure at wellheads and the heads of ditches, as well as a structure or device for measuring the diverted flow. Although some designs may incorporate measurement and control in a single structure, typically they are separate structures as discussed below.

- *Control Structures* Pumps and groundwater wells can be controlled with power switches and/or valves. Open channel and other gravity-flow diversions are typically controlled by a headgate or valve. The control structure must be lockable or capable of being made lockable and be able to completely stop the diversion of water. Additionally, control structures should be sized, constructed, placed, and oriented such that they will not be frequently washed out, damaged, or over-topped during normal high-water.

- *Measuring Devices* 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. The type of measuring device suitable for a particular application depends on a number of site conditions. The enclosed 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

  Standard measuring devices can often be constructed by users or by a machine shop, or may be purchased as pre-fabricated units from a distributor. Measuring devices should be installed in a location close to the headgate to minimize the time needed for adjustments to be observable at the device. However, recognize that site conditions may require placement at some distance from the headgate.

3. **What is the deadline for compliance?**

The order requires only that diversions be brought into compliance prior to diverting water during the 2009 irrigation season. Because of this, the "deadline" depends on when a user starts using water in 2009.

Non-compliant diversions diverting water after May 1, 2009 will be closed by the Watermaster pursuant to section 2d of the order, which states, "The watermaster shall shut off and refuse to deliver water to any diversion for water rights on Attachment B that does not have an adequate measuring device and/or lockable controlling works at any and all times following the start of the 2009 irrigation season, unless an extension, exemption, or deferral has been granted by IDWR".

If you are unable to bring the diversion into compliance, and either cannot or will not cease diversion of water, you must contact IDWR and request an exemption or extension.

4. **What do the terms "exemption" and "extension" mean, and when to they apply?**

If circumstances exist that will delay or prevent a user from complying with the order prior to diverting water during 2009, that user must contact IDWR and request an extension or exemption from the requirements of the order. In some cases, a user may be authorized to divert water without installing a measurement and/or control structure. An extension may be given in cases where a point of diversion is not being used, is not currently configured such that measurement and control is feasible, or if additional time is required to bring the diversion into compliance (typically due to circumstances beyond the user's control). An exemption may be granted if the diversion is found to not meet the criteria for measurement. This would happen if, for example, a permit is ultimately licensed for less than 0.24 cfs or if a water right is abandoned, transferred, or diverted from a different location that results in the total diversion authorized from a location to be less than the 0.24 cfs/ 5-acre threshold.

5. **My diversion is not used, what do I have to do?**

If a diversion is not going to be used in 2009, you do not need to do anything to comply with the measurement and control order. However, the diversion must be brought into compliance if/when diversion of water is resumed at that location.

6. **My diversion is within an existing sub-district (either 72-A Garden and Challis Creeks, or 72-F Morgan Creek). What do I have to do?**

IDWR has been working with, and will continue to work with the local watermasters for these sub-districts to ensure the diversions are all in compliance. The vast majority of these diversions are already in compliance. If additional work is needed, the local watermasters will contact the appropriate users.

7. **My ditch has a fish screen installed by Idaho Fish & Game. Am I already in compliance?**

In most cases, diversions with fish screens will only need to have a measuring device installed. Fish screen installations typically have control structures (headgates) in place, so the control requirement is likely satisfied. However, fish bypass structures do not control or

measure the flow of water. So, a headgate must be installed if not already present and a measuring device must be installed if a separate measuring device is not already present.

8. My diversion is on Federal land, who do I contact?

IDWR has no special requirements for diversions on public land. However, water right owners with points of diversion within the Sawtooth National Recreation Area (SNRA), or on grounds owned by the Bureau of Land Management (BLM), or the United States Forest Service should contact the appropriate agency and identify any special requirements prior to developing plans for headgates and measuring devices. Contact information for each of these agencies is given below. If your diversion is within the Sawtooth National Recreation Area, please contact Sawtooth National Forest office at the number below.

Sawtooth National Forest
Forest Supervisor's Office
2647 Kimberly Rd. E.
Twin Falls, ID. 83301
208-737-3247
Contact: Jackie Richter

Salmon-Challis National Forest
Forest Supervisor's Office
1206 So. Challis Street
Salmon, ID 83467
(208) 756-5100
Contact: Norma Staaf

Bureau of Land Management
Challis Field Office
801 Blue Mountain Road
Challis, Idaho 83226
(208) 879-6200
Contact: Tim Vane

9. Where can I get more help/information?

The IDWR Internet site has a number of publications on measurement and control that may assist a user in selecting and installing appropriate structures. The address is:

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

Additionally, IDWR can provide assistance in recommending structures to measure and control your diversions. If you have any questions or would like to discuss your diversions, please contact either Nick Miller or Bob Foster. Their contact information is given below.

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Watermaster, Water District No. 170
Staff Engineer, Idaho Department of Water Resources
322 E. Front St. Boise, ID 83720-0098
208-287-4956 (Office)
208-287-6700 (Fax)

Bob Foster
Deputy Watermaster, Water District No. 170
Senior Water Resource Agent, Idaho Department of Water Resources
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2087-756-6644 (Office)
208-756-6644 (Fax)

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 affects the selection of a measuring device. 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 when required by IDWR are to be installed at or near the point of diversion from the public water source.

Open Channel

I. SURFACE WATER DIVERSIONS

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 IDWR.

A. Standard Open Channel Measuring Devices

All open channel surface water 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)
- acoustic Doppler flow meter (ADFM)

Construction and installation of these devices should follow published guidelines. References are available upon request.

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 IDWR upon request.

II. CLOSED CONDUIT MEASURING DEVICES

Closed conduit or pipe line diversions require installation of a flowmeter. 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. Flow Meter Specifications

Listed below are the flow meter requirements and specifications for full-flowing closed conduits or pipes. These specifications apply to all irrigation and non-irrigation water uses except domestic systems as defined in Section 42-111, Idaho Code. Water users may apply to IDWR for a variance to these specifications in accordance with Criteria for Request for Variance of measuring Device Requirements of Section II C. of this document

Meters shall be magnetic flow meters meeting the following minimum specifications:

1) Flow range of 0.1 to 33 feet per second (fps).
2) Listed manufacturer accuracy of ± 0.5% of flow rate from 1.6 to 33 feet per second (fps), and ± 2% of flow rate from 0.1 to 1.5 feet per second (fps).
3) The register or display unit shall:
   a) Have a waterproof and tamperproof seal.
   b) Have an LCD backlit display showing instantaneous flow rate and totalized volume.
   c) Have a minimum of six (6) digits for flow rate.
   d) Have a minimum of eight (8) digits for totalized volume display or a sufficient number of digits so that "rolling over" will not occur within two years operation, based on the maximum rate of flow and annual volume elements of the authorizing water rights. For totalizing data, IDWR recommends using the attached guidelines (see Table 1) for proper meter (totalizing units) selection for the intended use.
   e) Have password or similar protection of all settings and data to protect against unauthorized change or accidental loss of data.
   f) Contain a back up battery (according to manufacturers specifications) to prevent loss of data in the case of primary power failure.
   g) The display unit must contain user programmable features that allow the selection of flow units. Available flow units must include, but are not limited to, gallons per minute (gpm) or cubic feet per second (cfs). The meter flow rate display must also allow decimal display formatting of up to three (3) places when using cubic feet per second units.
   h) The volume totalizer display must contain user programmable features that allow the selection of volumetric units that must include but are not limited to, total gallons or acre feet. The meter must also allow decimal display formatting of up to four (4) places, and the application of unit multipliers ranging from .0001 to 10,000.

4) Signal Output when Data Logger is Required
Data loggers are required only for magnetic flow meters installed as per conditions of approval for water right transfers in the Eastern Snake Plain Aquifer, or as may be required by specific water right conditions of approval in other locations.
Scaled pulse frequency output (or pulse counting) is required for continuous recording of totalized volume data on data loggers. Output signals must be compatible with data logger inputs. Analog output signal for flow rate (usually 4-20mA) is also optional (most magnetic flow meters provide both analog and pulse frequency as standard output signals).

B. Meter Installation and Diversion System Requirements

Meters required under Section II A. above shall meet the following installation requirements:

1) The minimum and maximum system operating flows and pressures must be fully within the range of measurable flows and pressures identified in the meter specifications.
2) Pipes must be full flowing.
3) The installed flow rate accuracy of the installed magnetic flow meter must be ± ***5.0%*** as compared to a second, standard flow meter. The installed flow rate accuracy for mechanical flow meters is ± ***10%*** of rate of as compared to a second, standard flow meter.
4) Meters must be installed according to manufacturer's specifications. Most manufacturers' recommend that meters be installed a certain distance from turbulence-causing bends and fittings such as discharge heads, single elbows, and valves. Industry standards for such distances are listed below, but larger distances may be required if the turbulence is severe.
    a. Magnetic flow meters require three (3) pipe diameters upstream of the meter and two (2) downstream.
    b. Mechanical flow meters require ten (10) pipe diameters upstream of the meter and five (5) pipe diameters downstream.
5) Meter Certification: IDWR will certify the installed flow meter for accuracy using a second, standard flow meter. A location for measuring flow with a second standard meter must be provided as close to the installed meter as possible. A section of straight pipe with a minimum of 24 inches in length (for pipe diameters 16 inches and smaller) of unobstructed exposed pipe shall be provided for calibration purposes. The calibration section must be free of elbows, valves and other fittings, and must contain the same flows that are passing through the meter. The 24-inch certification section may be incorporated into the manufacturer's pipe requirements above or below the flow meter.

C. Requests for Variance of Closed Conduit Measuring Device Requirements

Owners of closed conduit diversions may request a variance of the standard magnetic flow meter requirements of section II A. above for the following reasons:

a) An operable flow meter is already installed
b) Installation and maintenance of the standard meter would be burdensome

If a meter is already installed, that meter may be used if the meter is field-tested by IDWR staff and/or the water district watermaster using a portable certified standard flow meter and upon a determination that the meter is installed properly and accurate to within ±10% of actual rate of flow and volume. ***IDWR or the water district watermaster should apply a calibration factor to flow meters whenever the calibration measurement is greater than ±1.0%.***

If a user demonstrates that installation and maintenance of the standard meter would be burdensome, then IDWR may consider alternate measurement options including:

a) Development of Power Consumption Coefficient to estimate water use volumes (generally acceptable for simple ground water irrigation diversion systems only)
b) Installation of one or more time clocks or hour meters (requires periodic flow measurements and recording of hours of water use from meter or clock)
c) Installation of an alternative flow meter as shown in Table 2 below.

Users considering making a variance request may contact IDWR or the local water master for further information.

Table 1; Use for proper meter selection based on water right volume.

Volume Acre Feet (AF)	Multiplier X gallons (gal)	Multiplier X Acre Feet (AF)
0-150	1, 10, 100	.0001, .001
150-1000	10, 100, 1000	.001, .01
>1000	100, 1000	.001, .01

Table 2; Types of Measuring Devices for Closed Conduits

Types	Pipe Sizes	Maintenance Required	Relative Purchase Price
Differential Head • 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 • 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 or Acoustic Doppler	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