



State of Idaho

DEPARTMENT OF WATER RESOURCES

322 East Front Street • P.O. Box 83720 • Boise, Idaho 83720-0098

Phone: (208) 287-4800 • Fax: (208) 287-6700 • Web Site: www.idwr.idaho.gov

June 26, 2009

C. L. "BUTCH" OTTER
Governor

DAVID R. TUTHILL, JR.
Director

Re: Final Order Requiring Measuring Devices for Ground Water Diversions in Water District No. 140, Oakley Valley Area.

Dear Water User,

The Idaho Department of Water Resources (IDWR or Department) has issued the enclosed order requiring installation of measuring devices for diversions of ground water rights within Water District No. 140 and the Department's Administrative Basin No. 45, plus a portion of Administrative Basin No. 47 within the Artesian City Critical Ground Water Area. The enclosed order is a Final Order issued by the Department Pursuant to Section 67-5246, Idaho Code. Any party may file a petition for reconsideration of a final order as explained in the enclosed information sheet.

The order requires that measuring devices be installed on most irrigation and non-irrigation ground water diversions. The requirement excludes diversions for de minimis domestic and stock water uses. Also excluded are diversions for irrigation uses of 5 acres or less and/or other uses if the rate of diversion is less than or equal to 0.24 cubic feet per second (equivalent to 108 gallons per minute), and not part of a larger system where other rights are diverted.

Measuring devices for closed conduit systems must be magnetic flow meters meeting Department criteria unless a variance has been provided by the Water District 140 watermaster or IDWR. Devices must be installed by December 31, 2009 for non-irrigation diversions and no later than the start of the 2011 irrigation season for all qualifying irrigation diversions. The order provides for consideration of alternative measurement methods and flow meters upon submittal of requests and plans by water users, and upon approval by the watermaster or IDWR. 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 are available on IDWR's Internet site at the following address:

<http://www.idwr.idaho.gov/WaterManagement/WaterMeasurement/PDFs/MinAccepStand-1062009.pdf>

Water users that are required to install measuring devices must submit plans to the watermaster or IDWR for each of the diversions shown on Attachments A and B of the order. Plans must be submitted by September 15, 2009 for all non-irrigation use wells, and by May 15, 2010 for all irrigation use wells. Plans must include the well identification number or legal descriptions as shown in Attachments A and B, and include the following minimum information for each flow meter: meter manufacturer, model, rate and volume units, pipe size, , and a sketch, diagram or photo of the meter installation location. Where meters are already installed, users should proceed with submitting plans by the required due date that include all the above

information plus the existing meter installation date. Existing flow meters may be approved for use if they meet accuracy tests.

Alternative methods or meters may be proposed in the plans. Required information for alternative flow meters is the same as in the previous paragraph. Plans for alternative methods, such as use of power records (or Power Consumption Coefficients), should include detailed information about the overall diversion and conveyance system, including descriptions of various operating conditions, system discharge points, booster pumps, and power meters, as well as any information about multiple pumps or loads on the same power meter. Proposals for alternative measurement methods must be accompanied by a brief statement which explains the need or justification for the alternative method.

Water users may download generic forms for submittal of measuring device plans from the following IDWR web site address:

http://www.idwr.idaho.gov/WaterManagement/WaterMeasurement/water_measurement.htm

If you have questions concerning this order, please contact the Watermaster for Water District 140, Cindy Yenter, at the IDWR Twin Falls Regional Office (208-736-3033), or contact either Corbin Knowles or Tim Luke at the IDWR State Office (208-287-4800).

Respectfully,



Tim Luke
Water Distribution Section

Enclosures:

Final Order Requiring Measuring Devices in Water District 140, Dated June 25, 2009 (8 pages)

Explanatory Information to Accompany a Final Order (1 page)

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

Cc: Cindy Yenter, Watermaster, Water District 140
IDWR Southern Region

**BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE
STATE OF IDAHO**

**IN THE MATTER OF REQUIRING MEASURING)
DEVICES FOR GROUND WATER DIVERSIONS)
IN WATER DISTRICT NO. 140 (OAKLEY VALLEY)
AREA), AND FOR GROUND WATER DIVERSIONS) **FINAL ORDER**
IN THE ARTESIAN CITY CRITICAL GROUND)
WATER AREA IN ADMINISTRATIVE BASIN NO. 47)
_____)**

On December 28, 2006, the Director of the Idaho Department of Water Resources (Department or IDWR) signed a *Final Order Creating Water District No. 140* in the Department's Administrative Basin No. 45. On January 11 and January 12, 2007, certain water users within the Department's Administrative Basin No. 45 filed Petitions for Reconsideration regarding the Director's Final Order Creating Water District No. 140.

On September 5, 2008, the Department sent an *Amended Final Order Creating Water District No. 140* to owners of all water rights in Administrative Basin 45, with the exception of domestic and stockwater rights defined in Section 42-111, Idaho Code.

A primary purpose of a water district is the administration of water rights within the water district by a watermaster. A watermaster administers water rights in part by measuring diversions and adjusting controlling works to deliver the authorized flow rate and/or volume to the water right holder. The Department finds that it is necessary to require the installation of measuring devices for ground water diversions within Water District No. 140 (Water District 140) and that portion of the Artesian City Critical Ground Water Area that extends outside of Water District No. 140 and located within Administrative Basin No. 47.

FINDINGS OF FACT

1. Prior to the formation of Water District 140, the Department created Water Measurement Districts in the Eastern Snake Plain Aquifer (ESPA). The *Final Order Creating Water Measurement Districts and Notice of Annual Meeting*, signed October 24, 1996, created three Water Measurement Districts for the purpose of measuring diversions of ground water within the ESPA, and making annual reports to the Department.

2. The ESPA West Water Measurement District (WWMD) area was defined in the October 24, 1996 order as: *'Those portions of administrative basins 36, 37, 43, and 45 which overlie the Eastern Snake Plain Aquifer as defined by Rule 50.01 of the Rules of Conjunctive Management...'* Holders of certain ground water rights located in the Burley area, within Administrative Basin 45 and Water District 140 have previously reported diversions to the WWMD.

3. Southwest Irrigation District (SWID) and Magic Valley Ground Water District (MVGWD) have previously measured and reported ground water withdrawals from diversions within the WWMD that are now in Water District 140. SWID also measured ground water withdrawals from diversions in Administrative Basins 45 and 47 which were not included in the WWMD. Goose Creek Irrigation District (GCID) has implemented a ground water measurement program within their boundaries in the past year and has begun to report withdrawals to the Water District 140 watermaster. Most of the ground water diversions in the GCID were not located in the WWMD and therefore not previously subject to measurement and reporting requirements.

4. There are four Critical Ground Water Areas (CGWAs) within Water District 140, including the Artesian City, West Oakley Fan, Golden Valley and Oakley Kenyon CGWAs. A portion of the Artesian City CGWA is also located with Administrative Basin 47 and outside the boundary of Water District 140. The four CGWAs are characterized by overall declining ground water levels and many irrigation wells experience significant pumping drawdown during the irrigation season. Pursuant to Section 42-233a, Idaho Code, "the Director may require all water right holders within a CGWA to report withdrawals of ground water and other necessary information for the purposes of assisting him in determining available ground water supplies and their usage."

5. The Golden Valley Water District or Water District No. 45-O (WD45-O) overlays the Cottonwood CGWA in Administrative Basin 45 and Water District 140. Water rights in WD45-O are administered in priority order pursuant to a decree dated October 1, 1971 and two subsequent DEPARTMENT Orders dated May 9, 1972 and August 30, 2004. Flow meters are required for all regulated diversions in WD45-O. Ground water withdrawals in WD45-O are measured and reported by the watermaster of WD45-O.

6. The current method used to determine annual ground water withdrawals from nearly all irrigation wells within Water District 140 that are currently required to be measured and reported is the power consumption coefficient (PCC) method. IDWR's *Water Measurement and Reporting Guidelines (February 2, 1999)* specify that "the PCC method will not be approved as a substitute for a meter for complex systems where flow rate or total dynamic head at the pump varies due to multiple valve adjustments; multiple discharge locations in a pipeline; the method of delivery varies between open discharge, low pressure or high pressure sprinkler systems during an irrigation season; multiple wells/pumps are tied together with common mainline(s); or the ground water level changes significantly during the year." A number of ground water pumping systems in Water District 140 and the CGWAs receive supplemental surface water, are fitted with booster pumps typically powered from the same kilowatt hour meter as the deep well, and are tied into the same mainline. Many ground water pumping systems are complex, operating at more than three (3) distinct flow and demand conditions. Pumping drawdown during the irrigation season has been documented by SWID as exceeding 200 feet in at least one

representative well within SWID boundaries¹. Water levels and/or pumping drawdown can vary up to 40 feet or more within many areas of Water District 140. Any one or more of these circumstances – changing ground water levels, multiple demand loads, or multiple operating conditions – causes use of the PCC method to be invalid. Measurements of many diversions that are currently measured within Water District 140 therefore do not meet the Department's IDWR minimum standards for measurement of ground water.

7. The *Amended Final Order Creating Water District No. 140* included water rights from both surface and ground water sources in the water district. The Order acknowledges that many surface water rights are presently being administered and measured by existing water districts in Basin 45. WD45-O administers and measures certain ground water rights in the Cottonwood CGWA. The Order designates these existing water districts as sub-districts within Water District 140. Other ground water diversions in Water District 140 are either not being measured or reported pursuant to Section 42-701, Idaho Code, or do not meet present Department ground water measurement standards.

CONCLUSIONS OF LAW

1. Section 42-233a, Idaho Code, provides in pertinent part:

42-233a. "CRITICAL GROUND WATER AREA" DEFINED – PUBLIC HEARINGS – PUBLICATION OF NOTICE – GRANTING OR DENIAL OF APPLICATION – APPEAL.

When a "critical ground water area" is designated by the director of the department of water resources, or at any time thereafter during the existence of the designation, the director may approve a ground water management plan for the area. The ground water management plan shall provide for managing the effects of ground water withdrawals on the aquifer from which withdrawals are made and on any other hydraulically connected sources of water.

The director may require all water right holders within a critical ground water area to report withdrawals of ground water and other necessary information for the purpose of assisting him in determining available ground water supplies and their usage.

The director, upon determination that the ground water supply is insufficient to meet the demands of water rights within all or portions of a critical ground water area, shall order those water right holders on a time priority basis, within the area determined by the director, to cease or reduce withdrawal of water until such time as the director determines there is sufficient ground water.

¹ "Ground Water Management Plan (Draft 4): Southwest Irrigation District and Goose Creek Irrigation District", prepared by Brian Higgs, Water Well Consultants, undated, p10.

2. 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.

(2) If an appropriator determines that installation and maintenance of a measuring device required by the director would be burdensome for his diversion, the appropriator may, upon approval of the director, execute an agreement with the director and submit to the director such information and technical data concerning the diversion and pumping facilities as the director determines necessary to establish the relationship of power usage to water withdrawal by any pump used to divert public water.

(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.

3. Section 42-1416B Idaho Code provides, in pertinent part:

**42-1416B. CLAIM FOR EXPANDED USE IN CRITICAL GROUND WATER AREA -
-DETERMINATION OF WATER AVAILABILITY.**

(1) Within any critical ground water area designated pursuant to section 42-233a, Idaho Code, a claim to the expanded use of a ground water right, which use was expanded in violation of the mandatory permit requirements, may be decreed in a general water rights adjudication if the expansion occurred after the designation of the critical ground water area, before the commencement of the adjudication, and before the date of enactment of this section. The priority date for the right decreed shall be June 30, 1985.

(2) Water shall be deemed unavailable to fill the rights for expanded use, even if decreed in the adjudication, unless the director finds that a management program exists which will, within a time period acceptable to the director, limit the average annual water withdrawals from the aquifer designated in the critical ground water area to no more than the average annual recharge to the aquifer.

(3) Within two (2) years after a decree determining the water rights within a critical ground water area becomes final, but not sooner than four (4) years from the date of enactment of this section, the director of the department of water resources shall make a finding as to whether an adequate management program exists to bring withdrawals into balance with recharge.

(4) If the director finds that an adequate management program to bring withdrawals into balance with recharge does not exist, the director shall order all holders of rights to expanded use of ground water within the area to cease or reduce withdrawal of water until such time as the director determines that withdrawals have been brought into balance with recharge and sufficient ground water is available to resume or increase withdrawals.

4. The Director should require installation of measuring devices for diversions of ground water rights that are subject to administration by Water District 140. The requirement should include qualifying ground water diversions located within in each of the critical CGWA's in Water District 140 and that portion of the Artesian City CGWA that extends into Administrative Basin 47.

ORDER

IT IS HEREBY ORDERED AS FOLLOWS:

1. Holders of ground water rights in Administrative Basin 45 and that portion of the Artesian City CGWA in Administrative Basin 47, except those ground water rights, uses and diversions identified below, shall install and maintain on each point of diversion or well, a measuring device of a type acceptable to the Department for the purpose of assisting the WD 140 watermaster in reporting the amount of water withdrawn from each well. Owners of wells that are required to be measured shall submit written plans and install measuring devices according to the time schedule set forth in the table found in item 4 of this section. Exceptions to the measurement and reporting requirements of this order are made for the following ground water uses and diversions unless further notified by the Department:

- a. Domestic and stockwater uses as defined by Section 42-111, Idaho Code;
- b. Diversions of ground water or water systems with multiple diversions irrigating less than or equal to five (5) acres;
- c. Diversions of ground water or water systems with multiple diversions delivering ground water for any purpose other than irrigation that divert less than or equal to 0.24 cubic feet per second (approximately 108 gallons per minute).
- d. Diversions of water rights from geothermal resources located upstream of the Oakley Reservoir in Water District 140.

2. Measuring devices that are acceptable to the Department for wells that are required to be measured shall be magnetic flow meters meeting the specifications listed in the Department's *Minimum Acceptable Standards for Open Channel and Closed Conduit Measuring Devices* (copy attached). These specifications apply to both irrigation and non-irrigation water uses.

3. A variance of the magnetic flow meter requirement may be considered upon submittal of a written plan to the Water District 140 watermaster. Acceptable variances may include the following methods or devices:

- Development of a Power Consumption Coefficient (PCC), which is a ratio of power usage to water withdrawal. Acceptance of the PCC method may be provided *for qualifying irrigation diversions only*;
- Use of an hour meter (time clock) *for qualifying diversions only*;
- Use of an acceptable non-magnetic flow meter that was installed *prior to the date of this order*;
- *For irrigation diversions only*, use of an acceptable non-magnetic flow meter where it can be shown that installation of the standard magnetic flow meter would be burdensome.

Requests for variance of the measurement method must be received no later than the applicable Plan Due Date shown in the table in item 4 of this section, and will be considered by the Water District 140 watermaster and the Department on a case-by-case basis. Variances proposing use of an existing flow meter must meet Department criteria and accuracy tests. Existing meters which do not meet standards, or which fail, will be required to be replaced with a magnetic flow meter unless another variance is obtained. The suitability of any pumping plant for approval of an hour meter or the PCC method of

measurement will be based on criteria found in the *IDWR Water Measurement and Reporting Guidelines*.

4. For each point of diversion listed in Attachments A and B, a measurement plan must be submitted, and shall be reviewed by the Department and the Water District 140 watermaster to determine whether proposed measuring devices are of a type acceptable to the Department, and that the device(s) will be installed according to specifications. Plans must be received and measuring devices must be installed and operational by the dates found in the schedule below. If measuring devices are already in place, a written description and diagram of the works shall be submitted to the WD 140 watermaster along with a request for variance by the Plan Due Date. Requests for variances proposing use of alternative measuring devices or methods, including PCC and time clocks, must be submitted to the Water District 140 watermaster by the Plan Due Date. Attachment descriptions, plan due dates and required measurement device installation dates are set forth in the following table:

	Attachment Description	Plan Due Date	Installation Date
Attachment A	diversions for all non-irrigation ground water rights and uses (except those noted in items 1a. – 1d.)	9/15/2009	12/31/2009, or 30 days after plan approval if plan is not approved by 9/1/2009
Attachment B	diversions for all irrigation ground water rights and uses (except those noted in items 1a. – 1d. of this Order)	5/15/2010	3/15/2011 or prior to 2011 irrigation season for diversions that must be measured with flow meters. Approved variances must be implemented no later than the 2011 irrigation season

5. Implementation of the flow meter requirement on irrigation wells is delayed until 2011 to allow for a flow meter pilot program to be carried out within SWID. Acceptable magnetic flow meters will be installed on a minimum of six to twelve irrigation wells in SWID during the 2009 and/or 2010 irrigation season(s). Flow meters selected for the pilot program must meet all Department criteria and must be installed according to manufacturer's specifications. In cooperation with the Water District 140 watermaster, the SWID hydrographer shall test the accuracy of each flow meter, shall record flow meter serial numbers, test results and other pertinent data for each flow meter in the WMIS database, and shall take a totalizer reading on each meter before, after, and on a monthly basis during the irrigation season or seasons in which the study is conducted. Annual use data collected from flow meters may be compared to annual use data estimated using current measurement methods for those wells. Overall performance of the flow meters will also be rated by the SWID hydrographer, Water District 140 watermaster and well owner. Results from the pilot program shall be used to help guide the selection and installation of irrigation flow meters in Water District 140. During the term of the pilot flow meter program, and until flow meter implementation is fully phased in, all other irrigation wells in SWID shall continue to be measured by SWID using the currently identified measurement method, and estimated annual use data shall be reported to Water District 140.

6. Extensions and Exemptions. If a user cannot comply with the deadline in item 4 above, the Department may grant an extension of time for the diversion to be brought into compliance. Requests for extensions must be received by the Department on or before the Plan Due Date specified in the table in item 4 above. Requests for extensions will be considered by the Department on a case-by-case basis. A potential reason for an extension may be due to requirements of other government entities such as a Federal land set aside program, or because the diversion is temporarily not in use. In some situations, the Department may exempt points of diversion on Attachments A and B from the requirements of item 4 above. Conditions that may result in an exemption include, but are not limited to, the following:

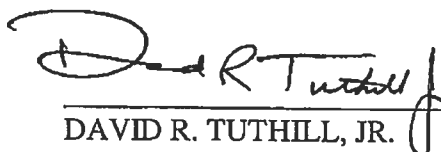
- Abandonment, non-use, or consolidation of diversions that results in a diversion on Attachments A or B being unused, or which reduces the total diversion rate to less than or equal to 0.24 cfs and/or irrigation of less than five acres.

8. This Order shall be effective immediately on any new ground water diversions authorized after the date of this Order, except those ground water uses or diversions identified in items 1 a. through 1d. of this section. This Order shall be effective after specific notification of the watermaster for any ground water diversion not otherwise listed on one of the Attachments hereto. This Order does not require the installation of lockable controlling works, although nothing in this Order shall preclude the watermaster from mandating the installation of lockable controlling works on any diversion if such works are determined to be necessary for adequate administration and control of the diversion.

9. The watermaster shall shut off and refuse to deliver water to any diversion that does not have, or who fails to maintain, an adequate measuring device at any and all times following the required installation dates shown in the table in item 4 above unless an extension or exemption has been provided by the Department.

10. The watermaster shall be responsible for collection of all measurement data and annual reporting of such data. Organized sub-districts within Water District 140, or other organized entities including irrigation districts, ground water districts, or municipalities, may propose a method for the recording and reporting of measurements to the Water District 140 watermaster from wells within their respective organizations. Reporting methods or plans should follow the standards set forth in the *IDWR Water Measurement and Reporting Guidelines*. Organized Water District 140 sub-districts or other organized entities may include proposals for recording and reporting measurements in the written plans that are required by this order, in accordance with the Plan Due Dates set forth in the table in item 4 above.

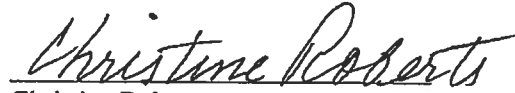
Dated this 25th day of June, 2009.



DAVID R. TUTHILL, JR.
DIRECTOR

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 26 day of June, 2009, 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, and posted on the Department's website: www.idwr.idaho.gov. 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.



Christine Roberts
Office Records Specialist
Idaho Department of Water Resources

**EXPLANATORY INFORMATION
TO ACCOMPANY A
FINAL ORDER**

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

(Required by Rule of Procedure 740.02)

The accompanying order is a "Final Order" issued by the department pursuant to section 67-5246, Idaho Code.

PETITION FOR RECONSIDERATION

Any party may file a petition for reconsideration of a final order within fourteen (14) days of the service date of this order as shown on the certificate of service. **Note: The petition must be received by the Department within this fourteen (14) day period.** 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 67-5246(4), Idaho Code.

REQUEST FOR HEARING

Unless the right to a hearing before the director or the water resource board is otherwise provided by statute, any person who is aggrieved by the action of the director, and who has not previously been afforded an opportunity for a hearing on the matter shall be entitled to a hearing before the director to contest the action. The person shall file with the director, within fifteen (15) days after receipt of written notice of the action issued by the director, or receipt of actual notice, a written petition stating the grounds for contesting the action by the director and requesting a hearing. See section 42-1701A(3), Idaho Code. **Note: The request must be received by the Department within this fifteen (15) day period.**

APPEAL OF FINAL ORDER TO DISTRICT COURT

Pursuant to sections 67-5270 and 67-5272, Idaho Code, any party aggrieved by a final order or orders previously issued in a matter before the department may appeal the final order and all previously issued orders in the matter 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: a) the date of issuance (not service) of the final order, b) the date of issuance of an order denying petition for reconsideration, or c) the failure within twenty-one (21) days to grant or deny a petition for reconsideration, whichever is later. See section 67-5273, Idaho Code. The filing of an appeal to district court does not in itself stay the effectiveness or enforcement of the order under appeal.

Attachment B

Irrigation Ground Water Diversions
(Sorted by Owner Last Name, then Organization Name*)

Owner Organization Name	Owner/Contact Last Name	Owner/Contact First Name	PLS Legal Description	Diversion Name	Metal Tag Number	Water District	Reporting District
ADAMS	ADAMS	ELDON	12S 25E S6 SESWSW L7			140	140
ADAMS	ADAMS	LARRY M & KATHY	11S 20E S26 SESESE	11S 20E 26DDD1	A0006932	140	SWI
ADAMS	ADAMS	LARRY M & KATHY	11S 20E S34 NESW	11S 20E 34CAB1	A0006930	140	SWI
ADAMS	ADAMS	LARRY M & KATHY	12S 20E S12 SWSWSE	12S 20E 12DCC1	A0006939	140	SWI
ALLRED	ALLRED	JACK W	12S 22E S13 SWSWSE	12S 22E 13DCC1	A0006706	140	SWI
ALLRED	ALLRED	JACK W	12S 22E S14 SWSWSE	12S 22E 14DCC1	A0006704	140	SWI
ALLRED	ALLRED	JACK W	12S 23E S7 SWSWSE	12S 23E 07DCC1	A0005088	140	SWI
ALLRED	ALLRED	JACKSON W	11S 23E S34 NWNWSW	11S 23E 34CBB1	A0005072	140	SWI
ALLRED	ALLRED	JACKSON W	11S 23E S34 NWSWSW	11S 23E 34CCB1	A0005066	140	SWI
ALLRED	ALLRED	JACKSON W	11S 23E S34 SWNWNW	11S 23E 34BBC1	A0005068	140	SWI
ANDERSON	ANDERSON	A W	12S 24E S12 SWSENE			140	140
ASHER	ASHER	TOM	12S 25E S6 NESWSE			140	140
AUSTIN	AUSTIN	CARL F	15S 21E S25 NESENE			140	140
AUSTIN	AUSTIN	CARL F	15S 21E S25 NESESW			140	140
AUSTIN	AUSTIN	CARL F	15S 21E S25 NESESW			140	140
AUSTIN	AUSTIN	CARL F	15S 22E S30 NENWNW L1		A0017747	140	140
BAKER	BAKER	RONALD G	12S 21E S6 NWNSE	12S 21E 06DAB1	A0006947	140	SWI
BAKER	BAKER	RONALD G	12S 21E S6 SWSWNE	12S 21E 06ACC1	A0006948	140	SWI
BAKER	BAKER	WADE	11S 22E S23 SESESW			140	SWI
BANNER	BANNER	KEVIN	12S 25E S6 NWSW L6			140	140
BEAMS	BEAMS	WAYNE	14S 23E S9 NENW	Exchange Well		140	140
BECK	BECK	DAVID	12S 21E S10 SENW	12S 21E 10BCA1	A0005114	140	SWI
BECK	BECK	DAVID	12S 21E S10 SWSE	12S 21E 10DCD1	A0005127	140	SWI
BECK	BECK	DAVID	12S 21E S6 SWNESW	12S 21E 06CAC1	A0006950	140	SWI
BECK	BECK	DAVID	12S 21E S8 NENW	12S 21E 08BAD1	A0006945	140	SWI
BECK	BECK	DAVID	12S 21E S8 SWSW	12S 21E 08CCC2	A0006941	140	SWI
BECK	BECK	DAVID	12S 21E S9 NWSW	12S 21E 09BCC1	A0006944	140	SWI
BECK	BECK	DAVID	12S 21E S9 SWSW			140	SWI
BECK	BECK	DENNY J	11S 22E S4 SWNWSW	11S 22E 04CBC2	A0005241	140	SWI
BECK	BECK	GRANT M	11S 22E S21 SWSWNW	11S 22E 21BCC1	A0005249	140	SWI
BECK	BECK	JOSEPH C	11S 22E S4 SWSWNW	11S 22E 04BCC1	A0005242	140	SWI
BEDKE	BEDKE	FRANK A	12S 22E S31 SESESE		A0002667	140	GCI
BEDKE	BEDKE	FRANK A	13S 22E S31 NWNENE			140	GCI
BEDKE	BEDKE	SCOTT	13S 22E S29 SESWNW			140	GCI
BELL	BELL	LEO R	12S 25E S18 NWSENE		A0017733	140	140
BELL	BELL	LEO R	12S 25E S9 SENWNE		A0017732	140	140
BERNAD	BERNAD	BETTY A	09S 25E S30 SESE			140	MVG
BESSIRE	BESSIRE	GLENN C	11S 20E S30 SESE	11S 20E 30DDD1	A0006913	140	SWI

*Note: Owner names are those associated with Water District 140 measurement reporting records.

Some names may not match current water right ownership records used in mailing the attached order.

**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 flow meter. 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

Currently there are two types of magnetic flow meters available. Full profile magnetic type flow meters are flanged into the piping system and measures across the velocity profile. Insertion type magnetic meters are installed through a small diameter hole in the piping system and attempt to measure the average velocity (determined by pipe diameter and insertion depth of sensor) in the flow profile. Small diameter (< 12" in diameter) pipes should be fitted with a full profile magnetic type meter due to higher accuracy and less straight pipe requirements for installation. Larger pipe diameters may use insertion type meters but must meet the standards for accuracy listed below. Insertion type magnetic meters will require larger straight distances of pipe to minimize turbulence above and below the measurement point.

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 $\pm 2\%$ of flow rate from 0.1 to 33 feet per second (fps), with a repeatability of $\pm 0.5\%$ of reading.
- 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. See Table 1 below for examples of appropriate meter multipliers based on expected annual volume use.

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 $\pm 5.0\%$ as compared to a second, standard flow meter. The installed flow rate accuracy for mechanical flow meters is $\pm 10\%$ 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. Full profile magnetic flow meters require three (3) pipe diameters upstream of the meter and two (2) downstream.
 - b. Insertion magnetic flow meters require (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.

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

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 $\pm 10\%$ 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 $\pm 1.0\%$.*

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. Alternative flow meters may vary with respect to straight pipe length requirements. Mechanical flow meters require ten (10) pipe diameters upstream of the meter and five (5) pipe diameters downstream.

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

1. Use of Power Records as an Alternative Measurement Method

An alternative to installing flow meters is the use of power records and other information to estimate the annual diversion from a pump. Estimating total water diversion from power records requires the derivation of a relationship between power demand and flow under normal operating conditions. This relationship, called a power consumption coefficient (PCC), is a ratio of the number of kilowatt hours needed to pump an acre-foot of water. This number is unique to each well or pumping plant due to the physical attributes of the system and can be applied to the year end power records to determine the total acre-feet pumped.

Total power consumption at individual irrigation pumping plants is supplied to the Department by electric utilities. To determine the rate of flow, a portable measuring device, such as a non-invasive ultrasonic flow meter 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.

Some complex systems cannot use this method due to the potential for large errors. See the discussion in the following section 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 three years.

2. 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 flow meter 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).

The total water diverted can be accurately estimated from the PCC method if the system configuration or operation is not complex. Unfortunately, the PCC or power records will not always yield acceptable results, and it will be necessary to install a flow meter. **Flow meters 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, re-lift pumps from surface water sources etc., a flow meter 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 as part of the well pumping system, the alternate method may be acceptable.

- The electrical 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 re-lift 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.
- 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 and/or other discharge points, would likely have flow rates that change considerably. These changes generally 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 that cause the flow to vary more than 25% (or pressures to vary more than 15%) over the irrigation season.

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
Magnetic meters	small to large	Low. No moving parts to wear, high accuracy (full profile mags) in low velocity environments	Medium to high
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