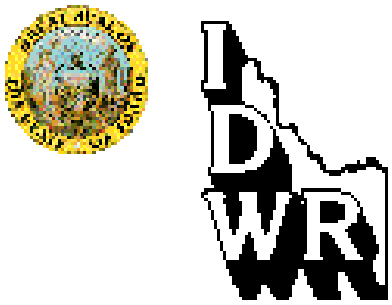
State of Idaho

Department of Water Resources

Water Measurement Guidelines



February 2, 1999

(Edits made 5/30/2006, 2/4/2009 and 6/30/2009)

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SECTION 1. – PURPOSE

These guidelines and procedures for collecting water measurement data and reporting the information to the Idaho Department of Water Resources (IDWR or Department) have been developed in order to have an orderly and uniform measuring and reporting program within the State of Idaho. The following guidelines apply to diversions that are subject to measurement and reporting pursuant to orders of the Department in the Eastern Snake Plain Aquifer (ESPA), or other areas where these guidelines are referenced in such orders. The guidelines are intended to provide uniform and acceptable measuring and reporting procedures that are flexible enough to incorporate improved methods and new or alternative technology.

SECTION 2. - DEFINITIONS

For the purposes of these guidelines, the following terms are used as defined below.

Annual Volume. The amount of water measured in acre-feet diverted during a calendar year (i.e. from January 1 through December 31).

Approved Examiner or Hydrographer. A person approved to make measurements in accordance with these guidelines. Approved Examiners include Hydrographers elected pursuant to Section 42-707, Idaho Code, when the diversion is located within a Water Measurement District; Watermasters elected pursuant to Section 42-605, Idaho Code, when the diversion is located within a water district; Certified Water Right Examiners pursuant to Section 42-217a, Idaho Code; registered professional engineers; registered professional geologists; and agents hired, employed or contracted to perform water measurement duties for any ground water district or irrigation district which has been excluded from a water measurement district. Unless specifically waived by the department, Approved Examiners shall attend periodic hydrographer training sessions sponsored by the department. The department may require and/or provide additional or more specialized training for any examiner, including in-field review or training, at the discretion of the department, or upon request of the examiner or district.

Cubic Feet per Second (cfs). The unit of discharge measurement commonly used in water measurement.

Department. The Idaho Department of Water Resources.

Director. The Director of the Idaho Department of Water Resources.

Diversion Rate or Rate of Diversion. A diversion's average rate of flow measured over a short period of time after the system has reached equilibrium.

Eastern Snake Plain Aquifer (ESPA). The aquifer underlying an area of the Eastern Snake Plain that is about 170 miles long and 60 miles wide as delineated in the report "Hydrology and Digital Simulation of the Regional Aquifer System, Eastern Snake River Plain, Idaho," U. S. Geological Survey ("USGS") Professional Paper 1408-F, 1992, excluding areas lying south of the Snake River and west of the line separating sections 34 and 35, Township 10 South, Range 20 East, Boise Meridian. See Rule 50.01, Rules for Conjunctive Management of Surface and Ground Water Resources, IDAPA 37.03.11.050.01.

Ground Water. Water below ground surface as provided in Section 42-230(a), Idaho Code.

Maximum Rate of Diversion. The maximum flow rate of a diversion determined by actual measurement of the system during normal operation and in accordance with the Beneficial Use Rules, IDAPA 37.03.02.010.04 and 37.03.02.040.02.

Power Consumption Coefficient (PCC). A parameter used to estimate the volume of water pumped during a period of time. It is the number of kilowatt-hours of electricity required by a system to pump one acre-foot of water.

Standard Meter. A portable flow meter used as a standard or primary meter as provided by Section 3 of these guidelines.

Surface Water. Rivers, streams, lakes, and springs when flowing in their natural channels as provided in Sections 42-101 and 42-103, Idaho Code.

Time Clocks or Timers. A device that records the cumulative operating hours of a pumping system.

SECTION 3. - STANDARD METERS FOR MEASURING FLOW IN CLOSED CONDUITS

For purposes of measuring flow rates in closed conduits for any reason, not limited to the derivation of power consumption coefficients, calibrating installed flow meters, and determining the flow rate for using Time Clocks or for other purposes, the department will accept as a Standard Meter any measuring device that meets the following requirements:

The standard meter shall be designed and specified by the manufacturer to measure flows to within ±2 percent of velocity or ±0.1 feet per second (fps).

The standard meter shall be capable of being installed in the field to measure flow simultaneously with an installed meter without changing the system operating characteristics.

The standard meter shall be checked for accuracy and reliability at a laboratory facility approved by the department at least once every calendar year under the supervision of Department staff or qualified laboratory staff.

Laboratory testing of the standard meter shall compare the measurement of the standard meter being tested (M_1) to the measurement of the laboratory's flow meter (M_2). Percent error shall be defined as $(M_1 - M_2) / M_2 \times 100 = +/- \%$. Comparisons shall be made at a variety of flow rates and velocities and on different pipe sizes and materials as available at the laboratory. It is recommended that at a minimum, meters shall be tested on at least four different configurations of flows, velocities, pipe sizes and types with velocities ranging from 0.7 to 9.0 feet per second (fps).

Laboratory Accuracy. The standard meter shall have an acceptable laboratory testing accuracy not to exceed ±5 percent error for any individual measurement and ±4 percent RMS error for all measurements made during the testing session. RMS error is the root-mean-squared error, defined as the square root of the mean of the square of errors. Meters not meeting these standards shall not be considered standard meters.

Any meter that does not meet the previous laboratory accuracy criteria should be evaluated by the meter manufacturer. If accuracy problems are addressed or corrected by the manufacturer, the meter may be re-tested and certified as a standard meter if it meets the laboratory accuracy criteria. If a meter is re-tested and still fails to meet the established criteria, then the meter should either be replaced, or the owner shall propose to the department acceptable methods to adjust for any meter error.

SECTION 4. - STANDARDS FOR MEASURING FLOW IN CLOSED CONDUITS WITH INSTALLED FLOW METERS.

The following are minimum requirements for measurement of flow in a closed conduit using installed flow meters:

The meter shall meet the requirements found in the Department's *Minimum Acceptable*

Standards for Open Channel and Close Conduit Measuring Devices (see Appendix A)[1]. The accuracy of the meter shall be checked and calibrated when installed, and at least once every three years thereafter in accordance with the provisions of Section 5.

Meters not meeting these requirements shall be replaced with an acceptable meter except that the department may grant a variance to individual requirements on a case by case basis.

SECTION 5. - CALIBRATION OF INSTALLED FLOW METERS.

All installed flow meters shall be field checked for accuracy, and calibrated when necessary, by an approved examiner using a standard meter. Accuracy checks and calibrations shall be made upon installation or replacement of the flow meter and at least once every three years thereafter, or more frequently if found to be necessary. Meters shall be checked and calibrated in accordance with the following procedures:

Calibration shall be done by comparing the flow rate from a meter standardized as provided in Section 3 to the flow rate of the installed flow meter. The percent of error will be determined using the following formula: $(M_1 - M_2) / M_2 \times 100 = +/- \%$ where M_1 is the measurement from the permanently installed flow meter and M_2 is the measurement from the standard flow meter. The percent of error of the installed mechanical type flow meter shall not exceed plus or minus ten percent (±10%) of the standard meter. The percent of error of the installed magnetic type flow meter shall not exceed plus or minus five percent (±5%) of the standard meter.

If the percent of error of an installed meter exceeds plus or minus ten percent (±10%) for mechanical type meters or plus or minus five percent (±5%) for magnetic type meters of the standard meter, then one of the following actions shall be implemented:

a.) If the meter has an adjustment feature, it shall be adjusted following the meter manufacturer's instructions to assure that the installed meter is within the required percent of the standard meter for the full range of anticipated flows;

b.) If the meter does not have an adjustment feature but the readings are consistent and repeatable throughout the full range of anticipated flows (error is linear), then a calibration factor or multiplier shall be applied to the flow rate and volume totalizer readings. The

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

multiplier will be determined using the following formula: M_2 / M_1 where M_1 is the measurement from the permanently installed flow meter and M_2 is the measurement from the standard flow meter

c.) If the meter cannot be adjusted or calibrated or a calibration factor or multiplier developed to provide consistent, repeatable readings within the required percentile of the standard meter throughout the full range of anticipated flows, the meter shall be replaced.

In addition to the information required in Section 14, the following information shall be reported on forms supplied by the department for flow meters checked and/or calibrated:

a.) All flow measurement results from both the installed and standard meters

b.) Meter accuracy prior to making adjustments and after adjustments are complete

c.) The multiplier if one is developed

d.) A complete description of any changes made to the installed meter

SECTION 6. - STANDARDS FOR USING THE POWER CONSUMPTION COEFFICIENT (PCC) METHOD.

A. GENERAL

As an alternative to using a flow meter when approved in writing by the director, water diverted from a pump powered by an electric motor may be estimated using the power consumption coefficient (or PCC) method. Two measurements are required to calculate the PCC. One is the kilowatts (kW) of electrical energy required to operate the pumping plant, and the other is the total flow in gallons per minute (gpm) produced while operating at the tested PCC condition. An approved examiner using a standard meter shall make the measurements. PCC factors shall be remeasured at least once every three (3) years.

The PCC = (kW × 5431) ÷ gpm (units are kWh/AF; 5431 is a conversion factor).

Using the PCC, the total estimated volume of water pumped is calculated from the total annual kilowatt-hours (kWh) of electrical energy consumed by the pumping plant. Total annual volume (acre-feet) = Total annual kWh ÷ PCC.

The electrical energy consumption (kWh) as measured by each electric meter used for irrigation pumping will be supplied by the electrical utility to the department. The department will enter into agreements to provide energy consumption data to a water district, water measurement

district, ground water district or irrigation district for the limited purpose of computing and reporting volume withdrawals.

Pursuant to Section 62-1302, Idaho Code, the department receives electrical energy consumption data from electrical utilities for irrigation accounts only (as designated by the utility). When using the PCC method for other than irrigation accounts, other means are necessary for acquiring energy consumption data such as owner reporting of the information. Some utilities may release information with the owner's approval.

B. ACCEPTABLE USAGE OF PCC METHOD

The PCC method shall only be used with the written approval of the Director and shall only be used for systems that are simple in design and operational characteristics. The PCC method is most easily adaptable to a system with a single electrical power meter dedicated to one pumping plant.

Except as provided in Section 6(C), 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, gated pipe, or sprinkler systems during an irrigation season, where multiple wells/pumps are tied together with common mainline(s), or the ground water level changes significantly during the year.

C. USE OF PCC AND COMPLEX SYSTEMS

The department may approve the PCC method for a system that is complex if the PCC can be determined for each operational condition and all measured conditions are plus or minus ten percent (±10%) of each other. A maximum of three operating conditions is allowed for each diversion. The water user must report the PCC, flow (in gpm), power demand (kW) and wellhead pressure for each condition during the reporting period, as well as the amount or percentage of operating time under each condition. If PCCs at multiple conditions do not vary more than ten percent from any and all other PCCs, then each reported PCC and time condition shall be accepted and a standard qualifier as determined by the department shall be assigned to the computed total volume. If PCCs vary more than ten percent, then the operator must report estimated time or percentages of time under each

condition (reported to the district and in the annual report to the department). As an alternative to operator reporting, districts are encouraged to use other department approved methods of determining operation times at various conditions such as time clocks, data loggers, or sub-metering. If estimates of time for each operating condition are reported by the water user, then a total PCC volume may be computed and a standard volume qualifier, as determined by the department, shall be assigned to the computed volume. If PCCs vary by more than ten percent and percentages of time under each condition are either not reported, are questionable, or conflict with other information, then a PCC volume shall be computed using the lowest PCC (maximum yield condition), and a standard volume qualifier assigned to the volume estimate.

D. VOLUME CALCULATIONS FOR PCC METHOD

The following equation shall be used when computing the annual diversion volume (acre-feet) for systems with multiple PCCs, as described in Section 6(C):

$$\text{Volume} = \frac{\text{Total kWh} \times [(\text{gpm}_a \times \%_a) + (\text{gpm}_b \times \%_b) + (\text{gpm}_c \times \%_c)]}{5431 \times [(\text{kw}_a \times \%_a) + (\text{kw}_b \times \%_b) + (\text{kw}_c \times \%_c)}$$

where $\text{gpm}_{a/b/c}$, $\%_{a/b/c}$, $\text{kw}_{a/b/c}$, is the flow rate, percent of time, and kW demand respectively at conditions a, b, and c.

E. REPORTING

In addition to the information required in Section 14, the following information shall be reported on forms supplied by the department for each diversion for which the PCC method is used:

a.) Power meter information (serial number, manufacturer)

b.) PCC measurements (kW of energy, flow rate, PCC calculation, pressure)

c.) Description of system operating conditions

F. POWER METER (KwH METER) ACCESS

It shall be the responsibility of the water user or a district proposing to use the PCC method

to make arrangements with utility companies regarding access to all locked power meter boxes.

SECTION 7. - MEASUREMENTS USING TIMERS.

In some cases, the director will approve measurement of volume diverted by recording the operating hours of the diversion pump with a time clock. This method shall only be used on systems with a known constant discharge such as pumps with open discharge which are not subject to throttling and have minimal water level fluctuations and where the PCC method cannot be used for accurate volume determination. The time clock shall record operation hours of the diversion pump to at least one-hour precision. An approved examiner using a standard meter shall measure flow rate at least once every three years. Volume shall be calculated based upon flow rate measurements and hours of operation using the following equation:

Volume (acre-feet) = gpm x hours ÷ 5431

where gpm is the measured flow rate and hours is the operating hours of the diversion pump.

In addition to the information required in Section 14, the following information shall be reported on forms supplied by the department for each diversion where the Time Clock method is used to determine volume:

a.) Rate of diversion measurement

b.) Analysis describing reasons why flow rate will remain constant (e.g. open discharge well pump operating at constant speed, flow not throttled, and drawing from an aquifer not experiencing significant draw down conditions) and why PCC cannot be used.

c.) Time clock reading at time of measurement

Time clocks may also be used to help track multiple operating conditions for diversions that are measured using the PCC method. For example, time clocks may be used to record operational hours for booster pumps or track certain seasonal conditions associated with crops or water level fluctuations.

SECTION 8. - STANDARDS FOR MEASURING FLOW IN OPEN CHANNELS.

Open channel flow diversions shall be measured using in accordance with the requirements found in the Department's *Minimum Acceptable Standards for Open Channel and Close Conduit Measuring Devices* (Appendix A). Construction, installation and maintenance of these devices shall follow published design standards and construction specifications. Calibration of any standard open channel measuring device is not required as long as the device is properly constructed, maintained and operated. An approved examiner or qualified engineer shall make determination of a standard device.

The department may authorize the use of a non-standard device or a rated section of a channel provided the device or rated section is rated or calibrated by an approved examiner by taking a set of flow measurements using an acceptable open channel current meter as provided in Section 9 or a portable standard measuring device.

SECTION 9. - STANDARD PORTABLE OPEN CHANNEL CURRENT METERS AND MEASURING DEVICES.

For purposes of measuring flows in open channels and calibrating non-standard open channel measuring devices or rating of open channel sections, the department will accept the use of the following types of portable open channel velocity flow meters and measuring devices:

- Price Type AA and Pygmy vertical axis current meters
- Horizontal axis propeller current meters (example: Ott or Hoff type meters)
- Electromagnetic sensors (propeller type or non-moving parts type)
- Accoustic Doppler flow meters (example: ADCP meters)

These meters should be used with standard discharge measurement methods as provided in Appendix B of the Idaho Department of Water Resources Watermaster Handbook, or pursuant to standards published by the US Geological Survey or the US Bureau of Reclamation. All current meters should meet minimum spin test requirements and/or other similar meter checks specified by the meter manufacturer prior to each discharge measurement.

Examples of acceptable portable standard measuring devices may include the types of devices listed in the Department's *Minimum Acceptable Standards for Open Channel and Close Conduit*

Measuring Devices.

SECTION 10. - CALIBRATION OF NON-STANDARD OPEN CHANNEL MEASURING DEVICES AND RATED SECTIONS

Where a section of a channel, or a structure in a channel, is to be rated in lieu of installing a standard measuring device, a minimum of five separate discharge-stage measurements must be made to develop an acceptable rating curve or table. The department may waive the minimum five discharge-stage measurements and accept a minimum of three discharge-stage measurements if the source of water does not fluctuate more than a few cfs. Sections must be rated over the full range of flows in the channel in order to develop an acceptable rating table or rating curve. Rated sections must have an accuracy of ±10 percent.

The user shall install a permanent staff gage at the rated section. Discharge measurements that are used for developing a rating must be made using a standard portable open channel current meter or measuring device as provided in Section 9. An approved examiner should complete measurements and rating tables or curves. A copy of the developed rating table must be submitted with the annual report required under Section 14(B), or remain on file with the appropriate reporting district pursuant to Section 14(C).

If a rated section is not fully developed or is in the process of being calibrated, an approved examiner shall record water level measurements at least once per week so that when the rating is completed the user can determine past diversions.

After the first year in which a rated section is developed, an approved examiner shall maintain the rating by providing at least two discharge-stage measurements per year. This additional data shall be incorporated into the existing rating table. Annual discharge-stage measurements should also be used to determine gage shifts when necessary. A copy of the updated rating shall be submitted to the department or remain on file with the appropriate reporting district pursuant to Section 14(C).

SECTION 11. - DIVERSION SITE IDENTIFICATION.

A. SITE IDENTIFICATION TAG

The approved examiner shall mark each point of diversion that is subject to measurement and reporting requirements with a site identification tag provided by the department. The person responsible for measuring the diversion rate or depth to water shall attach the tag to the most permanent structure that can be found at or near the point of diversion, such as a utility pole, electric panel support pole, exposed well casing, or a mainline pipe near a well head. The tag number shall be reported as the site identification number for the diversion in the annual report submitted to department.

B. GPS SITE LOCATION

To promote consistent data gathering of Global Positioning System (GPS) point location data, data providers should follow the recommendations of this section when collecting and submitting GPS data to IDWR. The location of each point of diversion that is measured should be located by latitude and longitude coordinates. Latitude and longitude measurements shall be acquired by using a GPS receiver or similar survey instruments accurate to within 50 feet except as provided in part C of this section.

All field data or files from GPS instruments should be collected in North American Datum 1983 (NAD83), and position or location units in degrees decimal-minutes (dddmm.mmm). Users of GPS units must be careful to know the datum in which they are collecting locations. Most Garmin or other recreational GPS receivers are defaulted to a WGS84 Datum and latitude-longitude location in degrees decimal-minutes. IDWR and other state agencies use NAD83 for data collection and map projections based on NAD83 so we recommend setting your GPS receiver datum to NAD83.

GPS data submitted to IDWR should be sent via electronic file, preferably an Excel spreadsheet file, dbaseIV, or text file format. Files submitted to IDWR must include a WMIS number if applicable, GPS site tag number, coordinates (the latitude and longitude), date of GPS data collection, location units (degrees decimal-minutes), elevation (in feet), the datum (NAD83), type/model of GPS receiver (i.e., Garmin 12 or Garmin 60C), and the person or entity collecting the data.

Users may use the GPS receiver settings normally set by IDWR Water Distribution Section

by referring to GPS Unit Recommended Settings attached to this document. Users may also use an IDWR web site utility link listed below to input GPS coordinates and return corresponding Public Land Survey (PLS) legal descriptions, as well as generate a map showing the location on either a satellite image or topographic map. This utility provides a very useful quality control check of points collected with GPS receivers. The program and instructions for use may be accessed via the following link: http://maps.idwr.idaho.gov/tools/asp/locator.asp?app=wells . Note that the WMIS database will normally include a legal description of each point of diversion to the nearest 40-acre subdivision, or to the nearest 10-acre subdivision if so described by the water right. However, water right legal descriptions may not always exactly correspond to the same legal locations collected by GPS receivers.

C. OTHER SITE LOCATION METHODS

Proposals for providing latitude and longitude data using other methods must be reviewed and approved by IDWR. Latitude, longitude, and elevation that have previously been determined by the USGS or other entities may be accepted by IDWR.

SECTION 12. - MEASUREMENT AND REPORTING OF GROUND WATER LEVELS.

A. INDIVIDUAL MEASUREMENT OF WATER LEVELS.

Owners of diversions not in a water district or a water measurement district which are required to measure and report pursuant to an order issued under Section 42-701, Idaho Code, or by a condition of a permit, license or approved transfer or which are excluded from measurement districts are required to independently measure and report the depth to ground water at each well from which water is authorized to be diverted unless waived by the director. A water user reporting pursuant to these requirements shall:

For irrigation and seasonally used wells, measure and report each year the depth to water or closed-in artesian pressure in the well prior to the commencement of diversion and the depth to water or the closed in artesian pressure without the pump operating during the pumping period.

For wells used year-around, measure and report each year the depth to water or closed-in artesian pressure in the well without the pump operating at least twice per calendar year.

The measurements shall be made using either a steel tape or an electrical probe approved by

the department to obtain a measurement with an accuracy of ±2 percent of measurement or 2 feet, whichever is greater.

The measurements shall be recorded on a form provided by the department and filed with the annual report of water diversion from the well. The form shall provide for reporting of the name and address of the wateruser, the identification number of the water right or rights diverting water from the well, the identification number from the well GPS site tag, the legal description of the well to the nearest 10 acre subdivision or as described by the water right, the location of the point on the well from which measurements are referenced, the date, time, and reading of each measurement made during the year, the name of the person making the measurement, the method of measurement, information on whether the well was pumping and the diversion rate, when it was last pumped and for how long prior to the measurement if known, and observations on the likely accuracy of the measurement.

****(Include illustration of ground level datum and measuring point)****

B. DISTRICT MEASUREMENT OF WATER LEVELS.

Water districts, water measurement districts, and ground water and irrigation districts that have been excluded from a water measurement district shall measure the depth to water in a network of wells approved by the department. Objectives of these networks are to identify and analyze trends in ground water levels and to fill spatial data gaps between existing U.S. Geological Survey, IDWR, and other agency monitoring well networks. Districts shall work closely with the department in developing monitoring well networks. Development of the network and measurement of wells shall follow these guidelines:

In developing the network, observation wells shall be selected for areas which are not currently being monitored by the U.S. Geological Survey, and priority shall be given to include sites that have either been discontinued by the USGS or have a record of past USGS or other agency measurements.

The department recommends that districts attempt to attain a minimum density for the overall monitoring network of 1 well per Township. In areas of concern or more intense development, the department may recommend a greater density of monitoring wells.

Network wells shall be of representative depth in relation to common depths of nearby

production wells. They should also be representative of the geohydrologic unit(s) of nearby production wells.

To help ensure the quality and accuracy of district reported water level data, networks shall include some wells that are already measured in the IDWR/USGS state-wide ground water monitoring network. The number of these wells is recommended to be 5 percent of the district's network or at least one well, whichever is greater. These wells should be measured close to the same date of measurements made by the USGS to check district measurements against USGS measurements.

Districts shall measure and report each year the depth to water or closed-in artesian pressure in the well at least three times each year. These three required measurements shall be made in March, July, and November. In some regions where irrigation begins later in the year, the department may approve that measurements be made in early May instead of March. The intent is to make measurements before, during, and after the pumping season on a regular time basis to identify trends in ground water levels. The early measurements should be made before the start of pumping for the season; late measurement after pumping has ceased for the year and pumping affects stabilized.

The measurements shall be made by an approved examiner using either a steel tape, a calibrated electrical probe or sounder, or other method approved by the department to obtain a measurement accuracy of ±0.05 ft.

The depth to water shall be measured to the nearest 0.1 foot and, whenever possible, verified by a second measurement. Measurements that vary 0.1 foot or more require an additional measurement. Only the measurement that is deemed most accurate by the approved examiner shall be reported to the department.

Calibration of electric probes or sounders shall be regularly checked. One preferred method of calibration is to first measure the depth to water in a well with the electric probe, then make a verification measurement with steel tape, provided there is no cascading water in the well. If the sounding line is properly calibrated, the difference between the two measurements should be less than 0.1 foot per 100 feet of depth to water. Unused wells without pumps are most appropriate for calibration work.

Districts are strongly encouraged to follow further guidelines and recommendations as published by the USGS. Some of these recommendations are available from the Department.

Recommendations include items like keeping field notes, equipment books, records of measurements, documentation and identification of measurement points, etc.

In cases where a layer of oil is atop the water surface in a network well (frequently encountered in wells with oil-lubricated irrigation turbine pumps), the depth to the oil surface shall be measured and reported with appropriate remarks of such conditions. It is recommended that when these conditions exist, a measuring tube be installed the next time the pump is pulled and reinstalled. One recommendation for a designated monitoring tube is 1/2 to 3/4-inch plastic tube run in with the pump column during pump installation with the tube attached to the column at regular intervals. The tube should extend below the oil weeps of the pump to eliminate oil problems for the electric probe. The tube then provides measurement access for tapes and probes with significant reduction in lodging and oil problems.

Measurements shall be recorded on a form provided by the department. The form shall provide for reporting of the name and address of the water user, the identification number of the water right or rights diverting water from the well, the identification number from the well site tag, the location of the well in latitude and longitude, the legal description of the well to the nearest 10 acre subdivision or as described by the water right, the elevation of the well, the location of the point on the well from which measurements are referenced, the date, time, and reading of each measurement made during the year, the name of the person making the measurement, the method of measurement, information on whether the well was pumping and the diversion rate, when it was last pumped and for how long prior to the measurement, observations on the likely accuracy of the measurement, and other information required by the Director.

Measurements and other information shall be included in the annual report of the district in a form approved by the Director in accordance with Section 14.

In addition to the network of monitoring wells, the department encourages districts to report water level measurements made during diversion examinations or for other purposes as determined by the district. These other measurements should meet or exceed the accuracy guidelines specified in part A of this section. These measurements will be reported with the district's annual report.

SECTION 13. - REPORTING METHODS AND REQUIREMENTS.

A. DIVERSION EXAMINATIONS.

The authorized examiner during diversion examinations shall gather the following information, to the extent that such data are available and shown on forms provided by the department:

a.) Current owner and operator

b.) Diversion site identification (GPS, Site Tag, PLS, Utility Pole Number)

c.) Description of other sources of water for the place of use

d.) Well pump and motor information including motor horsepower, pump model number, and motor and pump serial numbers

e.) Booster pump and motor information including motor horsepower, pump model number, and motor and pump serial numbers

f.) Sketch or schematic of point of diversion and system layout including location of meter(s) used to measure flow and their relationship to canals, ditches, piping, pumps, valves, elbows, fittings and other piping and system components (sketch, photo, or map as appropriate)

g.) Water meter information including manufacturer, type, size, model, and serial number

h.) All flow measurements made in completing the examination

i.) For PCC exams, demand (kW) meaurements and PCC calculations, and descriptions of individual PCC conditions

k.) Specific references to any system or pump modifications that have occurred since prior exam or changes that are anticipated within the ensuing year.

l.) Signature of person performing test

m) Date of test

B. INDIVIDUAL ANNUAL REPORTS.

Owners of diversions not in a water district or a water measurement district that are required to report pursuant to an order issued under Section 42-701, Idaho Code, or by a condition of a permit, license or approved transfer or which are excluded from measurement districts are required to independently submit diversion reports on a form supplied by the department after the end of the

irrigation season for irrigation uses, or after the year's end for year-round uses. Annual diversion reports for each year shall either be 1) post marked or 2) received by the department on or before January 15 of the following calendar year. A report processing fee of $25 per diversion pursuant to Section 42-701, Idaho Code shall be included with diversion reports. If water was not diverted during the reporting period, the $25 reporting fee is not required.

Annual reports for diversions measured with flow meters shall include monthly flow meter totalizer readings and monthly rate of diversion measurements including at least one measurement at the maximum rate of diversion.

Annual reports for diversions measured by the PCC method shall include utility information including pole number, power meter serial number and account number, and a crop report including the number of acres and type of crops grown for irrigation uses.

Annual reports for diversions measured with timers shall include monthly timer readings.

Annual reports for diversions measured with open channel devices shall follow part D of this section.

Annual reports for diversions measured by any other method shall follow the methodology and reporting requirements as called for in the agreement to use such alternative method.

All reports shall include the current owner's name and address, a description of any changes made to the diversion works since the last report that could effect system capacity, and a signature authorizing the information submitted is true and correct.

C. DISTRICT REPORTING.

Water measurement districts, ground water and irrigation districts that have been excluded from a water measurement district, water districts reporting ground water diversions, agencies, and other entities shall report as follows:

Districts shall use forms provided by the department to record measurements and related data. Hard copy files will be maintained at the district office and will be made available to the department upon request. Districts upon approval of IDWR may make modification to forms.

Data collected will be pursuant to these Guidelines and/or approved district implementation plans.

Districts shall maintain records and provide reports to the department as provided under

Sections 42-708 and 42-709, Idaho Code.

Annual reports for each year shall be submitted to the department by electronic media no later than March 15 of the following calendar year.

To ensure uniform reporting by all districts, electronic reports shall be submitted to the department using department provided data entry packages. Upon approval of the department, a district may submit an electronic report as fixed length, non-delimited ASCII files with individual fields of the type and length approved by the department.

Districts measuring diversions with installed flow meters shall develop plans to read meters so that both volume and rates of diversion are recorded and reported to the department. The annual report submitted to the department will include an annual volume based on recorded meter volumes, or adjusted meter volumes if necessary, as well as a maximum rate of diversion recorded from the meter. To accomplish this requirement, the districts may use self-reporting from individual water users supplemented by an annual meter inspection and recording by the hydrographer or agent of the district. Self-report forms used for this purpose shall provide for monthly recording of volumes and flow rates.

D. NON-CONTINUOUS RECORDING

All non-continuous recording surface water measuring devices and other non-totaling devices shall be read and the readings recorded at least once per week, or more frequently where needed, to obtain sufficient data to obtain accurate flow and volume data. Department forms, or forms approved by the department shall be used to record and report flow information using the following conventions:

a.) Intermittent diversions will require reporting of turn-on and turn-off dates.

b.) All flows must be recorded in cubic feet per second (cfs).

c.) Assume constant flow rates between measurements.

d.) Enter a flow rate of 0 (zero) cfs for any day within the period or season of use in which water is not diverted.

e.) The type of measuring device used must be described in the section or space provided on the report form.

f.) A rating table or chart must be provided for both standard and non-standard open channel

measuring devices (for standard devices, a rating table need only be provided the first year unless the device has been altered and re-rated).

g.) Report any or all discharge measurements used for purposes of calibrating or rating non-standard measuring devices, rated sections, etc.

SECTION 14. - OTHER ALTERNATIVE MEASURING METHODS.

The department encourages ingenuity in measuring diversions in order to decrease costs and increase accuracy and reliability of data. Proposals for alternative methods shall be submitted to the department for review and acceptance. The department in writing must approve alternative methods before they are considered acceptable. The department may require prototypes, testing and analysis to ensure such methods meet department criteria. At a minimum, such methods shall:

a.) Provide a determination of the maximum rate of the diversion with a maximum error of ±10 percent of rate.

b.) Provide a determination of annual diversion volume with a maximum error of ±10 percent of volume.

c.) For irrigation uses, provide a crop report documenting the number of acres and type of crops irrigated.

SECTION 15. - RECOMMENDATIONS FOR NEW OR RETROFITTED DIVERSION SYSTEMS.

The department strongly encourages owners, designers, and builders of new or retrofitted diversion systems to implement the following recommendations.

A. MEASURING LOCATION

A means of measuring flow as close to the point of diversion as reasonable should be accommodated. For pipeline systems, an acceptable location may include a section of straight pipe free of elbows, valves and other fittings. Typically, this section of straight pipe should be at least 15 pipe diameters in length. On a system consisting of both a well and booster pump, it is preferable that the measurement location be upstream of the booster. If it is necessary to measure downstream of the booster, the location should be far below the booster (such as 20 or more pipe diameters prior to the

measuring section) as pumps create extreme turbulence which degrades meter performance and longevity. Most meter manufactures recommend that meters be placed at least 10 pipe diameters downstream, and 5 pipe diameters upstream of minor turbulence causing fittings such as discharge heads, single elbows, and valves, and farther downstream if the disturbance is more severe, such as two elbows out of phase, pumps, and valves which significantly throttle flow.

B. USING POWER RECORDS

For pumping diversions where power records may be used to determine diversion volume and where there will be other loads on the power meter, such as multiple booster pumps, it is often preferable that one power meter be dedicated to the diversion pump, and another power meter be used to serve the other loads.

C. WATER LEVEL MEASUREMENT

For measuring water levels it is recommended that a measuring tube be placed in the well during pump installation. These are often made of 1/2 to 3/4 inch tube installed with the pump column to ensure that steel tape and/or electric sounders are not lodged in the well during measurement. The monitoring tube should be extended below the oil weeps on oil lubricated systems to help prevent oil problems frequently associated with water level measurement. It is important that the tube is attached to the pump column at regular intervals (but not so tightly that the tube becomes constricted), and does not spiral up the pump column but instead runs straight up the column.

SECTION 16. – TRAINING

Unless specifically waived by the department, authorized examiners shall attend periodic hydrographer training sessions sponsored by the Department. The Department may require and/or provide additional or more specialized training for any examiner, including in-field review or training, at the discretion of the Department, or upon request of the examiner or district. Water district watermasters that are responsible for measurement and reporting of ground water diversions should also attend hydrographer training sessions unless specifically waived by the department.

Section 17. – Responsibility of Water Users

According to 42-701 of Idaho Code, appropriators or users of any public water of the state of Idaho are required to maintain control works and measuring devices required by the director. This includes head gates, controlling works, flow meters, power meters recording power usage (for the PCC method for measurement), for the purpose of delivery of water by a watermaster to quantify water diverted at the authorized point of diversion. It is not the department's responsibility to construct or maintain diversion works. Users who neglect or refuse to construct or maintain such controlling works and measuring devices may be shut off and refused the delivery of water.