WELL MEASUREMENT PROGRAM STANDARD

Department of Natural Resources

Division of Water Resources

Revised October 1, 2019

Version 1.5

COLORADO
Division of Water Resources
Department of Natural Resources

Version No.	Date Released	Version Description
1.0	5/31/2016	DRAFT compilation of various division standards and policies into single program standard.
1.1	3/10/2017	DRAFT incorporating comments received from certified well testers and program participants after Version 1.0 release.
1.2	5/15/2017	Implemented version.
1.3	8/15/2017	Corrected Section 2.1.2.2 typo. Clarified tester certification process and corrected to reflect changes in CRS 37-80-110, effective August 9, 2017.
1.4	3/1/2018	Add "compound system" errantly omitted from PCC restrictions in Section 5.1. Revised certified tester qualifications in Section 7, including definition of Legal Guardian in Section 1.3.
1.5	10/1/2019	Clarify components of field exam in Section 7.

Pursuant to well measurement rules and rules for the management of designated ground water, cited in Section 1, adopted by the State Engineer in the South Platte River, Republican River, Arkansas River, Rio Grande and designated ground water basins (Rules), "the State Engineer may adopt written standards and specifications for the installation, calibration, testing, repair, and maintenance of meters" (totalizing flow meters or TFM). This standard is hereby adopted by the State Engineer as provided by those Rules.

The measurement rules also require the State Engineer to certify persons as being a "qualified well tester" or "approved" by the State Engineer to test the accuracy of totalizing flow meters and/or determine the Power Conversion Coefficient as an alternative measurement method.

Any direct conflict between this standard and specific terms and conditions in a decree of the court that are more restrictive, the terms and condition of the decree control and must be administered.

Any direct conflict between this standard and the Rules, the Rules language controls.

Any direct conflict between this standard and any Policy of the State Engineer, the Policy language controls.

Kevin G. Rein, P.E.
State Engineer, Director

10/1/2019
Date

TABLES

1.Program Overview

1.1. General

1.1.1. Authorization

1. This Well Measurement Program Standard (Standard) provides guidance to the meter testing and well tester certification process in accordance with well measurement rules and rules to manage designated ground water (Rules) adopted by the State Engineer. It provides the written standards, clarifications and guidance required to provide a consistent and cohesive program standard to manage the certification of measurement methods of well diversions and qualify well meter testers.

1.2. Measurement, Testing or Reporting Related Rules Citations

1.2.1. Division 1 - South Platte River

1. Rule 2.1.12: "'Notify' or 'Notification'…means submission…of a completed form or other format prescribed by the State Engineer."
2. Rule 3.1.1: "The State Engineer may adopt written standards and specifications for the installation, calibration, testing, repair, and maintenance of TFMs."
3. Rule 3.1.5.4: "…shall provide written proof of the certification…on a form or in a format to be prescribed by the State Engineer…"
4. Rule 3.2.1: "The State Engineer may adopt standards and specifications for PCC testing…"
5. Rule 3.2.1.1: PCC tests must "utilize rating procedures approved by the State Engineer…"
6. Rule 3.2.2.5: "…shall notify the Division Engineer in a format prescribed by the State Engineer of the date(s) and the name of the Qualified Well Tester performing a rating."
7. Rule 4.2: "…shall provide a Notice of Compliance to the Division Engineer by the compliance date of Rule 1.6 on a form or in a format prescribed by the State Engineer…"
8. Rule 6.2: "Well use data must be submitted in a format prescribed by the State Engineer…"
9. Rule 7.1: "…classify a Well as an Inactive Well by submitting a notarized affidavit on a form or in a format prescribed by the State Engineer."
10. Rule 7.2: "To activate an Inactive Well…may apply to the Division Engineer in a format approved by the State Engineer."

1.2.2. Division 1 - Republican River

1. Rule 16.5.A.1: "The State Engineer may adopt written standards and specifications for the installation, calibration, testing, repair, and maintenance of meters."

2. Rule 16.5.A.3: "Should a meter fail to meet the accuracy standard of Rule 16.5.A.1 the Well User may seek a variance… using standards provided by the State Engineer."
3. Rule 16.5.B.1.a(1): "PCC Tests shall be performed utilizing rating procedures approved by the State Engineer…"
4. Rule 16.5.D: "The Well User shall provide Measurement Method Verification…in a format prescribed by the State Engineer…"
5. Rule 16.6.A & B: "Well Users…shall provide Notice…on a form or format prescribed by the State Engineer…"
6. Rule 16.7.A: "All Well Users…shall report in a format prescribed by the State Engineer…Amounts pumped shall be reported more frequently if required by the State Engineer."
7. Rule 16.7.B: "Data as required by these Rules shall be submitted…in a format prescribed by the State Engineer."
8. Rule 16.8: "An owner of an Inactive Well must…provide Notification… in a format prescribed by the State Engineer."
9. Rule 16.11: "Any request for a variance shall be made…in a format prescribed by the State Engineer…"

1.2.3. Designated Basins

1. Policy 95-3 related to Rule 8 of the Rules and Regulations for the Management and Control of Designated Ground Water (2 CCR 410-1), paragraph 2.1.7: "'Field certified' means to verify that a flow meter is in accurate working condition under field conditions when installed or to verify that testing procedures approved by the Commission are properly adhered to when determining a power coefficient. These procedures are to be conducted under the supervision of an individual or entity annually approved for field certification by the Colorado Division of Water Resources."

1.2.4. Division 2 - Arkansas River

1. Rule 3.1.1: "The State Engineer may adopt standards and specifications for the installation, calibration, testing, repair, and maintenance of meters."
2. Rule 3.2: "The State Engineer may adopt standards and specifications for power coefficient testing. As a minimum, power coefficients shall: be determined utilizing rating procedures approved by the State Engineer…"
3. Rule 4: "Notification…shall be on a form prescribed by the State Engineer. The Division Engineer shall be notified of any method of well measurement changes or changes in the above information on a form prescribed by the State Engineer."
4. Rule 5: "Notification…shall be on a form prescribed by the State Engineer. The Division Engineer shall be notified of any method of well measurement changes or changes in the above information on a form prescribed by the State Engineer."
5. Rule 6.3: "Data shall be submitted on forms prescribed by the State Engineer."

6. Rule 7.1: "Notification…shall be on a form prescribed by the State Engineer."
7. Rule 11: "When the strict application of any provisions of these rules would cause unusual hardship, the State Engineer may grant a variance for a specific instance."

1.2.5. Division 3 - Rio Grande

1. Rule 3.1.1: "The State Engineer may adopt standards and specifications for the installation, calibration, testing, repair, and maintenance of meters."
2. Rule 3.1.2: "…shall provide written proof of the verification…on a form to be prescribed by the State Engineer."
3. Rule 3.1.3: "Should a meter cease to operate accurately or fail verification at any time, the owner of the Well shall immediately Notify the Division 3 Engineer and establish a specific interim water measurement program until the meter is replaced. If the meter is not replaced and verified to be in accurate working condition within 14 calendar days of the Notification to the Division 3 Engineers' Office, the Well shall not be operated until the meter is replaced or the State Engineer grants a variance."
4. Rule 3.1.4: "Should a meter fail to meet the accuracy standard, the well owner may seek a variance to use a calibration coefficient…using standards established by the State Engineer."
5. Rule 3.2: "The State Engineer may approve a variance…"
6. Rule 3.2.1.1: "The State Engineer may adopt standards and specifications for PCC testing…As a minimum, PCC shall: (1) be determined utilizing rating procedures approved by the State Engineer…"
7. Rule 3.4: "All flow measuring equipment utilized in verification of accuracy and working condition in the field and/or rating of Wells must be calibrated…within plus or minus 2%, unless a variance is granted by the State Engineer."
8. Rule 4: "All owners of Wells within the scope of these rules who install totalizing flow meters shall provide written notice to the Division 3 Engineer by March 1, 2007, on a form to be prescribed by the State Engineer… The Division 3 Engineer shall be notified of any method of Well measurement changes on a form prescribed by the State Engineer."
9. Rule 6.1.1: "Notice to the Division 3 Engineer shall be on a form prescribed by the State Engineer. The Division 3 Engineer shall be notified of any change of method for measurement on a form to be prescribed by the State Engineer."
10. Rule 6.2: "Data shall be submitted on forms prescribed by the State Engineer."
11. Rule 7: "Inactive Wells are excluded from these rules provided that a notarized affidavit, on a form prescribed by the State Engineer…"
12. Rule 11: "When the strict application of any provisions of these rules would cause unusual hardship, the State Engineer may grant a variance."

1.3. **Definitions**

1. Certified Well Tester: a person who has successfully completed the certification process detailed in Section 7 and has a Well Tester Certificate that has not expired.

2. Complex System: any system where the total dynamic head at the pump will vary due to multiple discharge locations in a pipeline, or where the method of delivery will vary between open discharge, gated pipe, or sprinkler system during a single irrigation season, or where multiple Wells discharge into a common pipeline.

3. Compound System: a system where the power meter records electrical usage from any electrical device other than the pumping systems from a single well and its attached sprinklers.

4. Division Liaison: The Division of Water Resources (DWR) employee responsible for managing or leading the State Testers in that division and liaising with the Program Manager.

5. Field Exam: a Meter Test and/or PCC Test proctored by a State Tester relied on to obtain or extend a Well Tester Certificate.

6. Legal Guardian: a person who has the legal authority to care for the personal and property interests of another person, in this case a minor Certified Well Tester.

7. Measurement Method: the method used to quantify the volume of groundwater being pumped by a well; typically a Totalizing Flow Meter or Power Conversion Coefficient.

8. Measurement Method Verification: see Meter Test or Power Conversion Coefficient Test.

9. Meter Certification: see Meter Test.

10. Meter Test: the test performed by a Qualified Well Tester to verify the accuracy of a Totalizing Flow Meter.

11. PCC: see Power Conversion Coefficient

12. PCC Certificate: Certificate that demonstrates holder is qualified to determine a Power Conversion Coefficient.

13. PCC Test: see Power Conversion Coefficient Test

14. Power Conversion Coefficient: the amount of electrical energy expressed as kilowatt hours (KWH) consumed in pumping one acre-foot of groundwater from a well.

15. Power Conversion Coefficient Test: the field process prescribed by the State Engineer to determine the Power Conversion Coefficient and accurately submit the information to the State Engineer in a format prescribed by the State Engineer.

16. Program Manager: the Office of the State Engineer employee responsible for managing the Well Tester Certification Program; typically, the Chief of Hydrography and Well Metering.

17. Qualified Well Tester: An individual: a) determined by the State Engineer as being able to accurately determine the measurement accuracy of a TFM or calculate a PCC; or, b) authorized to test wells by one or more of the Rules.

18. State Tester: a DWR employee who, as a condition of their employment, demonstrates that they are a Qualified Well Tester .

19. Test Meter: a meter used by a Qualified Well Tester to conduct a Meter Test or Power Conversion Coefficient Test.

20. Test Meter Verification: document(s) certifying the calibration and accuracy of a Test Meter.

21. Testing Equipment: The Test Meter or other equipment used to determine the discharge from a well.

22. TFM: see Totalizing Flow Meter

23. TFM Certificate: Certificate that demonstrates holder is qualified to test a Totalizing Flow Meter.

24. Totalizing Flow Meter: a meter associated with a well that is designed and manufactured for the purpose of measuring and totalizing the flow of water through the meter.

25. Well User: Any person diverting groundwater from a well. This may include, but is not necessarily limited to the owner of a water right or well permit which allows the diversion of groundwater and/or any person having the right to use such a water right or well permit owned by another, including all agents, employees, lessees, assigns or successors of either the owner or person authorized to use water from the well.

26. Well Test Form: the State Engineer prescribed forms used by a Qualified Well Tester to document the results of a Meter Test or Power Conversion Coefficient Test.

27. Well Tester Certificate: the document issued by the State Engineer upon the successful completion of a Written Exam and Field Exam that verifies the holder is qualified to confirm the accuracy of a Totalizing Flow Meter (TFM Certificate) and/or determine the Power Conversion Coefficient (PCC Certificate).

28. Written Exam: a written test where applicants demonstrate the knowledge and ability to select and place measurement equipment, correctly apply engineering relationships, perform mathematical calculations and present results in a manner required to communicate the results of a Meter Test and/or Power Conversion Coefficient Test in compliance with Rules and Standard.

1.4. **Applicability**

1.4.1. Wells Subject to Rules

1. This Standard applies to the certification of totalizing flow meters (TFM) or alternate measurement methods, such as Power Conversion Coefficients (PCC), on wells that are subject to the Rules, as cited above, adopted by the State Engineer. It also outlines the administrative process by which the State Engineer will certify a member of the public as a "qualified well tester".

2. As stated in Sections 1.4.2 and 1.4.3, the Standard is not a new Rule or Policy and defers to all such existing instruments. The Standard, instead, is simply a sufficiently thorough guidance document regarding what the State Engineer considers sound engineering practices that assist in effectuating the Rules.

1.4.2. Effect of Standard on Prior Policies of the State Engineer

1. The State Engineer has previously provided program guidance to some of the Rules by means of a specific Policy. It is recognized that a Policy is perhaps not the most accurate form of communication. In addition, to accomplish an equitable administration of the same activity in five different areas, all of which are administered by the State Engineer, a single guidance document will provide more efficient and effective administration. The State Engineer is not aware of any substantitive differences between the current policy statements and this Standard. As a result, this Standard effectively supersedes any non-contradicting Policy previously issued by the State Engineer. It also provides a Standard to guide future Rules development.

2. Any specific information contained in an existing Policy that is found to conflict with this Standard should be brought to the attention of the State Engineer for resolution. Until the issue is resolved, the Policy controls.

3. Specific information contained in an existing Policy in regard to which this Standard is silent should not be construed as a conflict; the Policy controls.

1.4.3. Effect of Standard on Court Decrees or Rules of the State Engineer

1. It must be emphasized that this Standard cannot modify a Rule or decree of the Court.

2. Any direct conflict between this Standard and more restrictive terms and conditions in a decree of the court, the terms and conditions of the decree control and must be administered.

3. Any direct conflict between this Standard and any Rule adopted by the State Engineer, the Rule language controls.

1.5. Test Required Prior to Operating Well

1. A Well User must conduct a Meter Test (Section 1.3.9) or PCC Test (Section 1.3.12) and fulfill the reporting requirements of Section 6 before any water is diverted by a well/pump that is subject to the Rules, other than to accomplish the subject test.

2. An active well is considered out of compliance with the Rules if its measurement method certification has expired and notification of inactivation or other variance has not been approved by DWR. The well shall be considered to remain out of compliance until DWR has received and approved the Meter Test or PCC Test, inactivation notification, or other variance.

3. An expired measurement method certification remains expired and may come under enforcement even if a Meter Test or PCC Test was completed, but was not approved by the Division Engineer, before the previous certification expired.

4. No water may be withdrawn from any well that is out of compliance with the Rules except: (1) for the purposes of conducting a measurement method certification; (2) by a Licensed Water Well Contractor as required for well testing or disinfection pursuant to the State of Colorado Board of Examiners' Water Well Construction Rules (2 CCR 402-2). Any water withdrawn during such testing must be immediately returned to the same stream system without application to any use.

    a. If allowed by the respective Rule or specific term on an existing decree governing the well, should an approved measurement method become inoperable due to mechanical failure, the Well User may request a variance from the Division Engineer to use an interim water measurement program. See Section 6.9.1.

2. *Totalizing Flow Meters*

2.1. Meter/Installation Standards

2.1.1. General

1. These standards apply to all installations. Some existing installations may be exempted by Rule, specific decreed conditions or variance approved the Division Engineer.

2. Installation and placement of TFM should be in accordance with the manufacturer's recommendations and this Standard.

2.1.2. Totalizing Readout

1. All mechanical TFM must be equipped with a totalizing feature on the TFM and attached to the direct drive of the impeller.

2. The totalizing readout must not be reset without documenting and reporting the totalizer reading before and after being reset.

3. The totalizing readout must have non-volatile memory.

4. The totalizing readout must not allow the totalizing readout of the TFM to move backward or reduce the total amount registered on the TFM.

5. The totalizing readout must be of such scale that the readout does not "roll over" more frequently than every three years.

2.1.3. Piping Configuration

1. When installed on an enclosed pipe, the pipe should maintain full pipe flow at the TFM without excessive entrained air, throughout the entire time the well is pumping under normal operating conditions.

    a. Normal operating conditions are those specific pumping conditions that would normally exist while the well is operating for its permitted uses.

2.1.4. Changes in Piping Configuration or Re-Use of a Certified TFM

1. If the plumbing configuration is modified such that there is a reasonable expectation that the modification could impact the accuracy of the TFM, the TFM must be re-certified to assure the meter accuracy in its final installed configuration.

2. If a previously certified TFM is used to measure a different well due to relocation of a TFM assembly, the TFM must be re-certified in the new installation/configuration to assure the accuracy of the meter in its modified location and configuration.

2.1.5. Electrically Powered TFM

1. Electrically powered TFM should be hardwired to the same electric circuit used to power the well motor with no splices, disconnects or switches between the TFM and the circuit breaker such that the only way to turn off the power to the TFM would be to turn off the power to the well motor.

    a. The recommended configuration is a lockable switch box with tamper resistant seal where the power supply to the well from the electrical panel is connected to both the well motor and TFM such that the only way to disconnect the power from the TFM without also cutting power to the well motor would be to open the lockable switch box and physically disconnect the TFM wire from the terminal.

2. Any wire between a TFM and a remote register should be a continuous wire without splices, disconnects or switches.

3. All electrical wiring should be completely contained in conduit or otherwise routed and attached in such a manner as to prevent breakage from livestock, wildlife and the elements.

4. All electrical connections should be inside lockable boxes with tamper resistant seals.

5. All meter registers should be non-resettable and non-reversible.

6. All meters should have non-volatile memory.

2.1.6. Battery Powered TFM

1. Installations of an electrically powered TFM dependent upon a battery or batteries as its principal source of power are allowed provided the meter and installation meet all the applicable requirements of the Electrically Powered TFM in Section 2.1.5 and the:

    a. Well User requests and the Division Engineer approves an alternative measurement method variance prior to the installation of the meter;

    b. battery is integral to and housed within the meter housing such that a single tamper-resistant seal can be utilized to secure the meter and battery; and,

    c. Well User reports the totalizing reading from the meter no less frequently than monthly.[1]

2. Any battery replacement (either in the field or at the factory) requires re-certification of the TFM by a Qualified Well Tester.

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[1] If monthly accounting is not already a requirement of the Rules or decree of the court, the division engineer is strongly encouraged to enforce this provision by a written order to provide the most effective administration should accounting not be submitted monthly.

3. Solar-recharge devices (either with or without secondary external batteries) are used only to recharge the integrated battery powering the TFM.

2.2. Maintenance, Replacement, and Repair Requirements

2.2.1. General

1. All TFM replacement, repair and maintenance should be in accordance with the manufacturer's recommendations and must comply with the Rules and this Standard.

2. The Division Engineer may issue a Variance based on circumstances that so warrant.

2.2.2. Re-certification or Variance Required

1. TFM component replacement, repair or general maintenance of a TFM requires that a new Meter Test be performed with the test results submitted on Form 3.1 unless, in accordance with Section 2.2.4, the user seeks to repair the TFM without re-certifying the meter. Note that to repair without re-certifying the meter requires that a Variance is approved by the Division Engineer prior to such maintenance.

2. General maintenance and repair that does not require a new Meter Test, or a Variance, is limited only to those instances that do not require the removal or replacement of any component(s) of the TFM or breakage of the Register Seal or TFM Seal. This may include but not be limited to the following:

   a. Removal and replacement of register weather cover;

   b. Removal and replacement of TFM canopy lid or lid spring;

   c. Inspection of TFM propeller (mechanical propeller meters) without removal of any components of meter or propeller;

   d. Inspection of TFM magnetic or ultrasonic sensors without removal of any components of meter or sensor.

2.2.3. Temporary Removal of TFM

1. A TFM may be temporarily removed and reinstalled without requiring a new Meter Test if no maintenance and/or alteration is done to the TFM or piping configuration as specified in Section 2.1.4.

2. Temporary removal and reinstallation of the TFM must be documented on Form 3.1 and submitted by a Qualified Well Tester.

2.2.4. Repair of TFM Without Recertification

1. Depending upon the nature of the repair, a TFM may be temporarily removed, repaired and reinstalled or repaired in place without requiring a new Meter Test.

The Well User must have an approved Variance Request prior to the removal of a TFM for repair. Failure to obtain a Variance Request approval prior to conducting the work will require the Well User to perform a new Meter Test and submit Form 3.1 for approval.

2. The following conditions must be met to consider a Variance Request to remove, repair and reinstall a TFM without performing a new Meter Test:

   a. The current Meter Test must have a Correction Factor (Section 4.2) within ±5% to allow Maintenance and Repair actions to occur without requiring a new Meter Test.

   b. Person performing the TFM maintenance, component replacement or repair must be authorized by the TFM Manufacturer to perform such action.

   c. Person performing the TFM maintenance attests in writing that the proposed maintenance, component replacement or repair will not substantively reduce the TFM accuracy.

   d. The maintenance performed is documented, in writing and, if applicable, with pictures or sketches. The documentation must be submitted to the Division Engineer within 30 days of the maintenance. The Division Engineer must then attach the documentation to the approved Variance Request. The documentation must contain, at a minimum, the following information:

      i. Variance approval number, as assigned by DWR;

      ii. Name of Person or Entity performing action;

      iii. TFM Serial Number;

      iv. Well WDID and Permit Number;

      v. Date of action performed;

      vi. Description of action performed with pictures or sketches, if applicable;

      vii. Qualification of person performing action (Decree, Qualified Well Tester, Manufacturer's Certification, etc.); and,

      viii. Verification that TFM is operable upon completion of action.

2.3. TFM Register (Readout) Replacement/Repair Requirements

1. Any time a register is replaced or repaired on a previously certified TFM, the following procedure must be followed:

   a. All TFM register replacement and repairs must be in accordance with the manufacturer's recommendations and this Standard regarding accuracy.

   b. A Meter Test of the TFM with the new register in place must be performed before any water is diverted by the well/pump, except to perform the Meter Test. Form 3.1 must be submitted to the Division Engineer before any water is

diverted. In the event that water will be diverted prior to and for purposes other than a Meter Test, the Division Engineer must be provided the following information before pumping water from the well:

i. The name of the person performing the replacement or repair, along with a brief statement of that person's qualifications if not a Qualified Well Tester;

ii. The reading from the TFM register being replaced or repaired and the beginning reading of the new or repaired register identified on the Form 3.1 submitted for the repair.

2.4. Tamper Resistant Seals

2.4.1. Required At All Times

1. Qualified Well Testers must install tamper resistant seals upon completing a Meter Test or authorized maintenance on all the following devices listed below. The Well User is responsible to ensure that factory installed or tamper resistant seals are installed and maintained at all times on all of the following devices:

   a. The housing of the TFM must be sealed in such a way that the meter cannot be removed or disassembled without breaking the seal.

   b. The TFM register or readout must be sealed in such a way that the readout cannot be modified or manually adjusted.

   c. All programmable TFM registers must be secured and sealed such that any modifications to the programmable functions of the meter would break the seal.

   d. All saddle or insert type mechanical meters and magnetic/ultrasonic sensors must at all times be secured in place with a tamper resistant seal around the pipe. The seal must be secured such that removal or movement of the TFM will break the seal.

   e. Any electrical junction box associated with electrically powered TFMs.

   f. All discharge valves in piping associated with a well that relies upon the PCC alternate measurement method.

2. Tamper-resistant seals shall be of durable construction, intended for direct exposure to the elements.

3. Each tamper-resistant seal shall be pre-stamped with an alpha-numeric identifier that is not used on any other seal.

4. Any seal that is installed for any reason (meter replacement, meter verification, etc.) must be documented on Form 3.1. Meter certification will not be considered valid unless the following information related to the tamper-resistant seal is included on Form 3.1:

a. Device being sealed; i.e. sensor connection to pipe, register/programmable housing, other (valve position, electric box, etc.)

b. Previous seal number;

c. New seal number;

2.4.2. Broken or Missing Seals

1. Wells that have a missing or broken tamper resistant seal on any of the devices requiring a seal must conduct a new Meter Test.

2. Well User may appeal this requirement to the Division Engineer if a Qualified Well Tester can attest that:

   a. the seal broke due to environmental conditions (i.e. wire fatigue associated with the weather) or other incidental, unintentional cause.

   b. no modifications were made to the installed TFM or PCC configuration.

3. Repeated replacement of broken/missing seals may subject the Well User to the use of seals approved by the Program Manager.

2.4.3. Wells Using PCC Alternate Measurement Method

1. A well that relies upon the PCC alternate measurement method to determine the volume of water pumped from the well must not have any adjustable restriction (such as a valve) in the discharge piping OR each such adjustable restriction must be equipped with a tamper-resistant seal such that the restriction may not be adjusted without breaking the seal.

2.5. **Remote Readouts or Registers**

2.5.1. Remote registers must be accessible and readable

1. Section 37-92-502(6) C.R.S., authorizes staff of the State Engineer to access all water measurement devices to monitor compliance with the Rules. Therefore, all TFM and power meter devices must be installed and maintained in a manner so as to be accessible and readable when an inspection is made, and must be installed outside of electrical cabinets and/or appliances.

2. All TFM and power meter displays must be accessible and readable whether or not the well/pump is running.

3. In the event that a TFM is connected to a remote register and the remote register is a secondary reading device to the TFM register, the remote register reading must display a direct numeral duplication of the TFM register, in accordance with ANSI/AWWA C706-10 Standard, Effective October 1, 2010 or as modified. The Well User shall verify that the TFM register and the remote register readouts are duplicative OR report the register reading from the actual TFM register but NOT the remote readout.

4. During a Meter Test, the remote register reading must be the same as the TFM's totalizing reading, and the information must be reported on Form 3.1. If the remote register does not duplicate the TFM totalizer readout, the remote register must be disconnected.

5. A Meter Test certifies the accuracy of the TFM based on the display that is integral to the TFM, not the remote register.

3. Testing Procedures

3.1. General

1. All Measurement Method Verifications must be performed by the Qualified Well Tester that signs the respective Form 3.1 or Form 3.2.

2. Measurement Method Verifications on a well with no legal means to operate, such as a decree that the water pumped is nontributary or an approved augmentation, substitute water supply or replacement plan, must return the pumped water immediately to the same stream system without application to beneficial use.

3. All wells shall be pumped continuously a minimum of fifteen minutes before any verification measurement readings are recorded (start-up time).

4. A minimum of three separate volume readings, each spanning a minimum of 5 minutes or a single volume reading spanning a minimum of 15 minutes from both the installed and test meters totalizing feature (excluding Collins Meter) must be obtained for a test to be considered valid.

5. All time increments, including start-up time, must be documented on Form 3.1 and Form 3.2 for test to be considered valid.

6. If the test is based on three five minute volumes, the calculated flow rate (volume/time) must not change more than 2.5% between any of the readings for the test to be valid.

7. All calculations should be adequately documented on Form 3.1 including, but not limited to, beginning and ending totalizer reading on both installed and test meters with corresponding start and finish times. To obtain the most accurate comparison of installed TFM and Test Meter, the installed TFM and Test Meter tests must be conducted concurrently or within a short amount of time of each other under the same operating conditions.

8. Instantaneous readings are not allowed for the Test Meter (except for Collins type testing equipment).

3.2. Testing Equipment

1. All Qualified Well Testers are required to provide Test Meter Verification that their Test Meter (excluding Collins Test Meters) has been calibrated, rated accurate within ±2%, and been determined to be in good working condition by a facility qualified to certify accuracy using National Institute of Standards and Technology (NIST) traceable standards before being approved for use as a Test Meter. Certifications by meter manufacturer for a new meter will be accepted, provided the Certification is less than 2 years old.

2. A Test Meter must be re-certified, at a minimum, every 2 years beginning with the date the Test Meter is initially certified.

3. Qualified Well Testers are required to submit copies of their Test Meter Verification to the Division Engineer. All meter certification tests and PCCs conducted by calibrated equipment will be rejected if the Test Meter Verification is not submitted to the Division Engineer or is more than two years old on the date of the field test.

4. Test Meters must be used in accordance with manufacturer recommendations and specifications. Deviations from manufacturer recommendations and specifications shall be noted and submitted on the prescribed test forms.

5. A volumetric vessel (bucket) that is used as testing equipment to verify installed flow meters shall be calibrated by weight, using the value of 8.34 lbs per gallon for cool water or dimensionally using the value of 7.48 gallons per cubic foot. The scale used for vessel calibration shall be accurate for the calibrated weight of water as demonstrated by copies of the scale certification, which must be included in the test report, along with printouts of the vessel weight before and after the test.

6. Other equipment used to measure, typically, small flows, such as a bucket and stopwatch or an engineered flume, may be used to do a Meter Test or PCC Test when connecting a Test Meter is not possible or would not provide reliable results. Approval to use alternate equipment must be obtained in advance from a State Tester and the use of such equipment must be documented.

3.3. Test Conditions

1. The Well Test must be performed under normal operating conditions, which represents specific pumping conditions that would normally exist while the well is operating for its permitted uses.

2. Modification of the pumping system (,i.e., adjusting valves or discharge) to ensure full pipe flow or to eliminate excessive entrained air for the purpose of a verification test is not permitted, unless the modification is then maintained throughout the entire year (permanent modification).

3. The pipe on which the TFM is installed should maintain full pipe flow without excessive entrained air, throughout the entire year, while the well is pumping under normal operating conditions.

4. If excessive entrained air is present, the tester is required to demonstrate that the operating pressure at the TFM has not changed by more than 10% during the duration of the verification test. If the change in operating pressure is greater than 10%, the verification test will be considered failed. Permanent Modifications to the pumping system may be required to eliminate air prior to further verification testing.

5. The pressure should be stable and not fluctuating (bouncing) by more than 10% when observing and recording each reading.

3.4. Mechanical (Turbine) TFM

1. For field verification of a mechanical turbine TFM, instantaneous readings are not allowed on either the installed TFM or a mechanical test meter.

2. For field verification of a mechanical TFM, the totalizing feature of both the installed and test meters must be used. The only exception to this would be for a Collins-tube type test meter that measures the velocity directly.

3.5. Non-Mechanical (Magnetic, Ultrasonic) TFM

1. For field verification of a non-mechanical (magnetic, ultrasonic) TFM, the totalizing feature of both the installed and test meters must be used unless the time for the totalizing feature on the installed flow meter to advance the smallest increment exceeds fifteen minutes. In that case, the instantaneous readings test protocol that follows may be used.

2. Collect a minimum of ten instantaneous readings taken at evenly spaced intervals over a minimum time period of fifteen minutes, not including the start-up time required to reach equilibrium pump conditions.

3. The instantaneous flow rates must not vary by more than 2.5% between any readings for the test to be valid.

4. Average the instantaneous readings and compare to the Test Meter totalizer reading divided by the test duration.

3.6. Collins-Type Meter

1. For a Collins tube, a Two-Point Test shall be accomplished by taking a front and back reading on both sides of the pipe at a distance equal to 0.354 * I.D (inside diameter) from the center of the pipe. The readings from each side of the pipe shall be averaged separately. If the difference between the average velocities from each side of the pipe is greater than ½ foot per second (0.5 fps), a Ten-Point Test must be performed[2]. A Two-Point Test will not be accepted.

2. If the Collins Meter is located less than three pipe diameters from any obstruction (i.e. flow meter, bend, valve, reduction, etc.) a Ten-Point Test is required.

3. For flow constants (gallons/minute/foot/seconds) not listed on the Collins Meter chart, the appropriate equation below should be used. (Note: The following equations can always be used; D = Inside Diameter (inches)):

   a. Pipe sizes up to 10-inch NPS (Nominal Pipe Size): $(2.55 * D^2) - D$

   b. Pipe sizes over 10-inch NPS: $(D^2 * 2.45)$

[2] Collins test criteria based on Western Area Power Administration Revised Irrigation Pumping Plant Test Procedure Manual, "Flow Rate Measurement Using Collins Flow Gauge Kit".

3.7. Volumetric Test

1. Use of volumetric test will be considered on a case by case basis. Any Tester that proposes to utilize a volumetric test must contact the Division of Water Resources prior to commencement of the test to propose measurement technique. Failure to obtain preliminary approval may result in denial of test and require re-testing. The following guidelines are recommended:

    a. A minimum test time of one minute is required for a single volumetric measurement. This means that the minimum volume allowable in gallons is equal to the well flow rate in gallons per minute (gpm). For example, a 50 gpm well would require a minimum single vessel volume of 50 gallons for a one minute test.

    b. Three separate tests shall be performed when using a volumetric test method. The results of the three separate tests shall be averaged together and entered on Form 3.1.

    c. The volumetric vessel shall be calibrated by weight using the value of 8.34 lbs per gallon for cool water or dimensionally using the value of 7.48 gallons per cubic foot.

    d. The scale used for vessel calibration shall be accurate for the calibrated weight of water and shall be documented on Form 3.1. Scale certification documentation such as scale tickets should be submitted with Form 3.1.

4. Totalizing Flow Meter Accuracy and Variances

4.1. Definition of Accurate

1. Totalizing flow meters shall be deemed accurate when the flow measured by the meter is within plus or minus 5% of an independent Meter Test.

4.2. Correction Factors

1. TFMs that fail to meet the accuracy standard of Section 4.1 must use a Correction Factor as summarized in Table 4-1.

Table 4-1: Meter Correction Factors

% of Field Measurement	Correction Factor	Requirements
±5%	NA	Meter considered Accurate. No Variance is required and no Correction Factor is applied.
±5% to ±8%	0.949 to 0.920 OR 1.051 to 1.080	Variance is required. Correction Factor must be applied. Test is valid for a maximum of four years.
±8% to ±10%	0.919 to 0.900 OR 1.081 to 1.100	Variance is required. Correction Factor must be applied. TEST WILL BE VALID FOR ONE YEAR ONLY. No later than one year from the date of this test, a new measurement test must be conducted and the accuracy of the new Test must be within at least ±8.0% or better.
Above ±10%	NA	UNACCEPTABLE. Meter/System must be repaired or replaced.

2. The Correction Factor must be calculated by a Qualified Well Tester.

4.3. Applying Correction Factors

1. The CF is applied from the date of the test until a new Form 3.1 is submitted and approved by the Division Engineer, as in the following example.

    a. A meter has a CF of 0.93 from a prior test. The meter reading on November 1 is D acre-feet.

    b. The meter is read by DWR on June 30; the totalizer reading is E acre-feet.

    c. The meter is re-certified on July 31; the accuracy is now less than ±5%, which means a CF is no longer required. The totalizer reading at the time is F.

d. The meter reading on October 31 is G acre-feet.

e. The volume pumped by this well from November 1 to June 30 is [0.93*(E – D)].

f. The volume pumped by this well from June 30 to July 31 is [0.93*(F – E)].

g. The volume pumped by this well from July 31 to October 31 is (G – F).

5. *Power Conversion Coefficient Alternate Measurement Method*

5.1. Installations Not Qualified for PCC

1. Any of the following conditions disqualify the use of the PCC alternate measurement method:

   a. Wells where the pump motor is not monitored by a dedicated electric power meter;

   b. Systems that do not operate with a full pipe of water throughout the pumping season;

   c. Systems that have to be adjusted with a valve or temporarily modified to achieve a full pipe (squeezed down) at any point during the irrigation year and/or in order to perform a PCC Test;

   d. Any "complex" system (See Section 1.3.2);

   e. Any "compound" system (See Section 1.3.3).

2. If the Division Engineer determines the PCC is not an accurate method of measurement after reviewing the information provided, the PCC method will not be allowed and the well must be equipped with a TFM.

5.2. General Test Procedures

1. The PCC Test must be conducted with a full pipe of water, without excessive entrained air, under normal operating conditions. (See Section 5.1.1.b & c)

   a. Normal operating conditions are those specific pumping conditions that would normally exist while the well is operating for its permitted uses. Modification of the pumping system (,i.e., adjusting valves or discharge) to ensure full pipe flow or to eliminate excessive entrained air for the purpose of a verification test is not permitted, unless the modification is then maintained throughout the entire year (permanent modification).

2. At least one single volume reading spanning a cumulative elapsed time of no less than fifteen minutes must be obtained by the Qualified Well Tester if using calibrated flow measurement testing equipment (excluding Collins Meter) after the system has been stabilized.

   a. In situations where the pump has run a minimum of two hours prior to the beginning of the test, system stabilization may be assumed if the change in pumping water level does not exceed 6 inches over a 30 minute period, as determined by at least three measurements of the pumping water levels taken at the beginning and end of two consecutive 15 minute periods.

3. If the Qualified Well Tester uses a Collins Test Meter to perform the PCC Test, the procedures specified in Section 3.6 must be followed.

4. When determining the Average Rate of the Power Demand for the well system, a minimum of 5 readings with the elapsed time of each reading equaling no less than one minute must be taken. The average of the five readings will then be used in the Power Demand calculations.

5.2.1. Pumping Level Available

1. The test must document that the operating pressure and drawdown have not changed by more than 10% per hour when operated at a constant discharge rate by taking a minimum of five measurements of both pumping level and operating pressure at the beginning and end of at least four consecutive fifteen minute periods.

5.2.2. Pumping Level Not Available

1. Document the reason that pumping level is not available on Form 3.2, such as: no access hole, well is pumping air, non-vertical wellbore, permission not granted by Well User, etc.

2. The pump must run a minimum of two hours prior to the beginning of the test.

3. The test must document that neither the operating pressure nor discharge rate change by more than 2.5% over a one hour period by taking a minimum of five measurements of both operating pressure and discharge at the beginning and end of at least four consecutive fifteen minute periods.

5.3. **New PCC Required**

1. If the system has been re-nozzled, the discharge rate from the irrigation system modified, or any other modification that could reasonably alter the PCC, a new PCC is required before any water is pumped from the well.

2. If permanent modifications to the pumping and/or piping systems are made, a new PCC rating is required before any water is pumped from the well.

6. *Documentation/Data Required*

6.1. Standard Forms

1. The Rules require information be submitted on current forms or in a current format prescribed by the State Engineer.

2. Standard forms, listed in Table 6-1, and addressed in the following sections are available at:

http://water.state.co.us/DWRDocs/Forms/Pages/UandMForms.aspxhttp://water.state.co.us/DWRDocs/Forms/Pages/UandMForms.aspx

Table 6-1: Standard Forms

Form No.	Form Title
3.1	Notice of Totalizing Flow Meter Re-Verification, Installation or Replacement
3.2	Notice of Power Consumption Coefficient Rating or Re-Rating
3.2S	Electric Hour Meter/Privately Owned Electric Meter Supplemental Report
4.0	Ground Water User Information
4.2	Notice of Compliance
6.1	Water Use Reporting Form (TFM)
7	Notice of Inactivation
7.1	Notice of Reactivation
11	Variance Request

3. Forms may be submitted in paper format by U.S. Mail or in Portable Document Format (.pdf) via email using the addresses provided on the forms. Emailed submittals shall meet the following criteria:

   a. One test per email.

   b. Subject line of email shall contain at a minimum the WDID or Permit Number of the Well.

   c. The test documentation file must be included as an attachment to the email. The Well Test, Photos, Documentation, etc. shall be combined and attached to the email as ONE Document/Attachment. The attachment shall be formatted as a PDF file only.

   d. Submittals and their attachment should be reduced to the smallest file size while maintaining adequate quality. Typically the file should not exceed 10 MB when submitted by email.

4. Submitted forms must be completely legible and contain all the required information, including required signatures. Submittals not complete or legible will

not be accepted as having met the requirements of this Standard and will be returned to the address of the sender.

6.2. TFM Certification

1. The Rules require certification that a totalizing flow meter is operating accurately. This is documented by the submission of Form 3.1.

2. If such certification cannot be accomplished, a Variance must be obtained.

3. Unless a Variance has been obtained documenting a well as "inactive", the well is considered out of compliance with the Rules if its meter certification has expired and until DWR has received and approved the Meter Test or, if granted a variance, PCC test.

4. An expired measurement method certification remains expired and may come under enforcement even if a subsequent measurement method certification test has been completed IF the subsequent test results have not been submitted and approved by the Division Engineer prior to the expiration of the previous certification.

5. Completed measurement method certification test results must be submitted to the Division Engineer within and no later than 30 days from the completion of the test. A certification test may be rejected and considered invalid if the test report is received by the Division Engineer more than 30 days after the completion of the test.

6. All tests not accepted will be returned to the Well User and the Qualified Well Tester using the address for each provided on the forms.

6.3. Certification Variance - General Requirements

1. The available variances are shown in Table 6-2. Note that not all variances are allowed by all the Rules.

2. Approval of a Variance Request by the Division Engineer must be obtained by the Well User prior to any proposed modifications. In order to avoid difficulty to the Well User in the event the Variance Request is denied, it is also recommended that a Variance be obtained prior to materials being ordered.

3. The Division Engineer should act in a way as to avoid "undue hardship", which is broadly construed to lessen the burdens of compliance with the Rules consistent with and not contrary to any term or condition of a water court decree regarding the operation of the Well for which a variance is sought while acting in a way that is consistent with reliable measurement and reporting of groundwater withdrawals.

4. The granting of a Variance is solely a variance from certain requirements of this Standard or, perhaps, the respective Rules. The Variance is not a substitute for compliance with any other lawful requirements applicable to the withdrawal and use of groundwater, nor does the Variance excuse any such non-compliance.

5. An approved Variance shall be identified by the WDID number and the date the variance is granted (YYYYMMDD).

Table 6-2: List of Variances

Variance Type	Variance
Alternate Method of Measurement	TFM Measuring Multiple Wells
	Power Conversion Coefficient
	Electric Hour Meter
	Privately Owned Electric Meter
	Battery Powered TFM
Inactivation	Well has no pump and/or motor
	Well has pump and motor, but power meter has been removed by service provider
	Well has pump and motor, but power drop has been pulled by service provider
Inactivation - Alternate Condition	Power at the meter, but the pump is only electrical device on that meter
	Power at the meter and the pump is NOT the only electrical device on that meter
	Pump is not electrically powered (Alternative Power Source)
	Temporary Inactive until a measuring device is installed and/or a well test is performed
	Inactivity confirmed by operable TFM readings
Meter Test	Variance of 3.1 - Allow use of a Calibration Coefficient
	Variance of 3.2 - Water level cannot be obtained
	Variance of 3.2 - Variance to Standard System Stabilization Methods

6.4. Alternate Method of Measurement Variance

6.4.1. General Information

1. If a Well User wants to use a measurement method other than a certified TFM that measures the discharge from one well, a Request for Variance must be submitted on Form 11 for review by the Division Engineer. Failure to accurately or completely submit Form 11 may result in the rejection of the Variance Request.

6.4.2. TFM on Multiple Wells

1. If a TFM is recording discharge from multiple wells, a variance is required. The TFM will still use Form 3.1 to document the certification if the variance is approved.

6.4.3. Power Conversion Coefficient (PCC)

1. If a Well User wants to use a Power Conversion Coefficient (PCC) in lieu of or in addition to a TFM, a PCC variance is required. If approved, certification of the PCC will be documented on Form 3.2.

6.4.4. Hour Meter or Privately Owned Electric Meter

1. If a Well User is allowed to rely on an Hour Meter or a Privately Owned Electric Meter, a PCC is still required. In addition to Form 3.2, the Qualified Well Tester must also submit Form 3.2S.

6.4.5. Battery Powered TFM

1. To use a TFM that is battery powered, a Well User must request and be granted an alternative measurement method variance.

2. As discussed in Section 2.1.6, the Well User must submit meter readings monthly to prevent the loss of data from a mid-year battery failure.

6.5. Permanent Inactivation

1. When structures are physically incapable of operating without significant modification, a Variance may be granted. This Variance requires the submission of a Form 7 – Inactivation Notice. Once this Variance is granted, the Well User is generally exempt from all aspects of this Standard, including reporting. Common conditions associated with this Variance are:

    a. Well has no pump and/or motor.

    b. Well has pump and motor, but power meter has been removed by service provider.

    c. Well has pump and motor, but power drop has been removed by service provider.

6.6. Temporary Inactivation

1. This Variance also requires the submission of a Form 7 – Inactivation Notice; however, this variance does not exempt the Well User from annual or monthly meter reading reporting requirements. A Temporary Inactivation may be granted a Variance for, typically, one year for one of the following sets of conditions:
    a. Power at the meter, but the pump is only electrical device on that meter
    b. Power at the meter and the pump is NOT the only electrical device on that meter
    c. Pump is not electrically powered (Alternative Power Source)
    d. Temporary Inactive until a measuring device is installed and/or a well test is performed
    e. Nonuse Variance - Inactivity confirmed by operable TFM readings
2. For Well Users granted a "Nonuse Variance", monthly TFM readings shall be submitted annually on Form 6 – Water Use Reporting Form documenting such non-use. Well Users must also further document that the TFM remains operable.

6.7. Meter Test Variances

6.7.1. Calibration Coefficient on TFM

1. As discussed in Section 4.2, totalizing flow meters that demonstrate accuracy between 5% and 10% qualify for a Variance to use a Correction Factor. The Variance request is part of the Form 3.1 required as part of the Meter Test. The Correction Factor must also be used to determine diversions from the well.

6.7.2. PCC Test - Water Level Variance

1. As discussed in Section 5.2.2, if the water level cannot be accessed, the Well User may apply for a Variance to relieve that requirement on the test.

6.7.3. PCC Test - System Stabilization

1. There may be other conditions that prevent the stabilization of the system without significant impact to the determination of a PCC that may warrant a Variance.

6.8. Conditions that Prohibit a Variance

1. Systems or conditions that prohibit the use of a Variance include, but are not limited to:
    a. Measurement device that measures water from separate sources including surface and/or groundwater, but provides only a total measurement of all flows;
    b. Measurement device is inoperable due to being intentionally damaged or destroyed.

c. Any request or condition that would subjugate or otherwise diminish the intent of the Rules to require accurate measurement of flow.

6.9. Special Variances - Limited to Specific Basins

6.9.1. Republican Rules - Interim Measurement Program

1. For wells in the Republican Rules, an interim measurement program is intended to be a means of obtaining a reasonably accurate estimate of groundwater withdrawals during the time that an approved measurement method is inoperable due to mechanical failure (or other reasons) or that fails verification. The interim water measurement methodologies that the State Engineer may approve may include, but are not limited to:
   a. The use of a sprinkler hour clock in conjunction with the most recent flow meter verification test results.
   b. The use of a Power Conversion Coefficient, which can be used regardless if the system is compound or complex.
   c. An estimation of the amount of water pumped for irrigation purposes based upon the assumption that the crop's full irrigation requirement was met during the time the meter was inoperable.
2. Should the use of an interim water measurement program become necessary, the well owner/user shall immediately notify Staff of the inoperable measurement device. Immediately after notification, the owner shall request in writing a variance to allow an interim water measurement program, including the following documentation on page 1 of Form 3.1:
   a. The interim water measurement method to be utilized.
   b. The interim water measurement method date of first use.
   c. A reading of the TFM's register on the date the interim water measurement method is first used.
   d. The reason for and duration of the requested interim water measurement method.
   e. If PCC will be used as the alternate method of measurement, the well owner must provide staff with the power meter number and reading (on the date the interim water measurement method is first used).

6.9.2. South Platte Rules - Existing Device Variance

1. TFMs that are subject to the South Platte Rules and were installed prior to December 31, 2013 (Effective Date) showing stable measurements that are greater than ±8% but no more that ±15% of an independent field measurement(s) made by a Qualified Well Tester using calibrated test equipment may be granted a variance by the Division Engineer provided:

a. The TFM is installed in a plumbing configuration existing prior to the Effective Date of the Rules, as evidenced by documentation (i.e. affidavit) submitted by applicant supporting the variance request and approved by Division Engineer

b. A Qualified Well Tester must perform an initial certification test demonstrating that the flow measured by such TFM is more than ±8% but no more than ±15% of an independent field measurement using calibrated test equipment. The Qualified Well Tester must also calculate a Correction Factor based upon this initial test.

c. A Qualified Well Tester must perform a second certification test of the TFM at a date more than one year but less than two years subsequent to the date of the initial certification test for the TFM. This second certification test must demonstrate that the flow measured by such TFM is no more than ±15% of an independent field measurement using calibrated test equipment. In addition, the Correction Factor calculated based upon this second certification test must be within 4% of the Correction Factor calculated based upon the initial certification test.

d. Subsequent certification tests for the TFM shall be performed within four years of the date of the initial certification test and each subsequent certification test (other than the second certification test), as provided for in the Rules. These subsequent certification tests must demonstrate that the flow measured by such TFM is no more than ±15% of an independent field measurement using calibrated test equipment, and the Correction Factors calculated based upon such subsequent certification tests must remain within 4% of the Correction Factor for the initial test. If these conditions are not met, the Division Engineer may cancel the variance, and the TFM may not be used until certified to be within Accurate or Acceptable Operating Condition under the South Platte Rules or until a subsequent variance is granted.

e. An alteration to the plumbing configuration, including relocation of the TFM, may result in the Division Engineer cancelling the variance, and the TFM may not be used until certified to be within Accurate or Acceptable Operating Condition under the South Platte Rules or until a subsequent variance is granted.

f. The Division Engineer may, at his or her discretion and in accordance with 37-92-502 (6) C.R.S. and South Platte Rule 3.6, field inspect the plumbing configuration for the TFM or test equipment to confirm that the discrepancy between the flow as measured by the TFM and as measured using calibrated test equipment may fairly be attributed to the plumbing configuration, and that the error introduced by the plumbing configuration cannot be remedied by a simple relocation of the TFM to a more suitable location within the plumbing configuration.

6.10. **Other Information**

6.10.1. Form 4 – User Information

1. The Well User must report the installation of a TFM using Form 4 in the Rio Grande basin.

6.10.2. Form 6.1 – Water Use Data

1. If required by the Rules or an approved Variance, water use data must be submitted using one of the following methods:
    a. Form 6.1 – Water Use Reporting Form
    b. DWR Sheet associated to water commissioner's Diversion Record Spreadsheet
    c. DWR online reporter/bulk upload tool.
    d. Other method as approved by the Division Engineer. A request must be made to the Division Engineer in writing either providing an example of such submittal or describing in detail how the submittal will be made.
2. Replacement or Augmentation plans submitting individual well diversions or meter readings as part of monthly or annual accounting, in a format approved by the Division Engineer, do not need to duplicate submittals under this Standard. Data that should be included in this report includes:
    a. Meter Serial Number
    b. Well WDID (unique Division of Water Resources Structure Identifier)
    c. Meter Reading
    d. Meter multiplier
    e. Date of Meter Reading
    f. Type of Meter Reading (Actual, Estimated, Calculated, Corrected, Total Diversion, Other)

7. *Well Tester Certification Process*

7.1. General

7.1.1. Authorization

1. In addition to the standards for measurement, testing and reporting discussed in the previous sections, the Rules adopted by the State Engineer also address the certification of persons as being a "qualified well tester" or "approved" by the State Engineer to test totalizing flow meters and/or determine the Power Conversion Coefficient as an alternative measurement method.

7.2. Rule Citations

7.2.1. Division 1 - South Platte River

1. Rule 2.1.15: "'Qualified Well Tester' means a person who is currently certified by the State Engineer as qualified to determine the accuracy of a TFM and perform a Power Conversion Coefficient test on a Well."

7.2.2. Division 1 - Republican River

1. Rule 16.4.A.12: "'Qualified Well Tester' means a person who is currently certified by the State Engineer as qualified to determine the accuracy of a TFM and perform a PCC test on a Well."

7.2.3. Division 1 - Designated Basin

1. Policy 95-3 related to Rule 8 of the Rules and Regulations for the Management and Control of Designated Ground Water (2 CCR 410-1), paragraph 2.1.7: "'Field certified' means to verify that a flow meter is in accurate working condition under field conditions when installed or to verify that testing procedures approved by the Commission are properly adhered to when determining a power coefficient. These procedures are to be conducted under the supervision of an individual or entity annually approved for field certification by the Colorado Division of Water Resources."

7.2.4. Division 2 - Arkansas River

1. Rule 3: "All wells within the scope of these rules shall...be equipped with a totalizing flow meter...or be rated to determine a power coefficient." Rule 3.1.2: "As a minimum, totalizing flow meters shall be: properly verified in the field to be in accurate working condition under the supervision of an individual or entity approved annually by the State Engineer to do such tests when installed..." Rule 3.2: "As a minimum, power coefficients shall: be determined utilizing rating procedures approved by the State Engineer and conducted under the supervision of an individual or entity annually approved by the State Engineer to do such tests..."

7.2.5. Division 3 - Rio Grande

1. Rule 2.1.4: "'Qualified Well Tester' means a person or entity who is annually certified by the State Engineer as qualified to determine the accuracy of a flow meter, perform a power conversion coefficient test on a Well..."

7.3. Well Tester Certificate

7.3.1. Certificate Types

1. A Certified Well Tester may be certified to test Totalizing Flow Meters (TFM Certificate) and/or determine a Power Conversion Coefficient (PCC Certificate).

7.3.2. Term

1. The Certificate expires December 31 of the year following the year in which the tester is certified. (A Certificate must be renewed annually to stay current.)

7.3.3. Conditions

2. The Certificate may, at the sole discretion of the Program Manager, contain conditions deemed necessary to address any concerns regarding the tester's performance.

7.4. Obtaining a Certificate

Applicant must submit a "Well Tester Certification Registration[3]" and then successfully pass both a Written Exam and Field Exam for both the TFM Certificate and PCC Certificate.

7.4.1. Application

1. Any competent person eighteen years of age or older or otherwise legally emancipated may apply to become a Certified Well Tester.

2. Any person under the age of eighteen may apply to become a Certified Well Tester provided the application includes a notarized affidavit from a legal guardian whereby the guardian accepts responsibility for any failure of the Applicant to comply with applicable statutes, rules, or regulations.

7.4.2. Written Exam

1. There is no fee to take the Written Exam.

[3] http://water.state.co.us/groundwater/GWAdmin/UseAndMeasurement/Pages/default.aspx

2. Upon receipt of the "Well Tester Certification Registration", Applicant will be provided with the contact information of a State Tester. (Self-study material is maintained on the DWR website[3].)

3. Applicant is responsible for contacting the assigned State Tester to schedule a Written Exam, which must be taken in person and proctored by a State Tester. While every effort will be made to accommodate Applicant's schedule, the time and location of the Written Exam is subject to the approval of the State Tester.

4. In order to provide consistency and minimize the opportunity for bias in the examination process, the Written Exam will be forwarded to and graded by the Program Manager. Applicants must attain a minimum grade of 80% to pass the Written Exam. The Program Manager will communicate the test results to both the Applicant and State Tester who proctored the exam.

7.4.3. Group Field Exam

1. There is no fee to take the Group Field Exam.

2. Once there are a sufficient number of Applicants that have passed the Written Exam to warrant a group Field Exam, Applicants will be notified of the date and location of the Field Exam. Applicants who cannot attend the Field Exam will have to wait until another Group Field Exam can be organized, which may be many months. While there is no cost associated with the Group Field Exam, Applicant should be aware that there is a fee to extend the term of a Certificate, as discussed in Section 7.5.

3. In order to facilitate the testing of applicants participating in a Group Field Exam associated with the initial certification process, the Test Meter may be provided by the State Tester.

7.5. Extending the Term of a Certificate

7.5.1. Application

1. A Certified Well Tester (Applicant) may apply to extend the Term of their Certificate by submitting a "Well Tester Field Exam Application[4]" and passing an individual Field Exam.

2. The Individual Field Exam must be completed within the 12 month period immediately preceding the current Certificate expiration date. The term of the Certificate may be extended an unlimited number of times. An expired Certificate cannot be extended or renewed.

3. In order to perform the Field Exam, a State Tester must also rate the TFM/PCC being tested. Pursuant to §37-80-110(1)(i), C.R.S., the cost for the State Engineer to perform such a rating is seventy-five dollars ($75). If Applicant wants to extend

[4] ibid.

both a TFM and PCC Certificate, Applicant must schedule the Field Exam at a single well that needs both a TFM and PCC rating. If Applicant fails to complete both tests during a single field visit, the second test will require an additional $75 fee.

4. Payment of the Field Exam is due in advance and is required regardless of whether Applicant passes or fails the Field Exam.

5. In the event Applicant does not pass the Field Exam, the test conducted by the State Tester will be relied upon to certify the accuracy of the PCC or meter tested, establish a Correction Factor or require repair/replacement of the meter.

7.5.2. Individual Field Exam

1. Once the Field Exam fee has been collected, Applicant will be contacted by a State Tester to schedule the Field Exam.

2. The location of the Field Exam is the responsibility of Applicant. Applicant must arrange to conduct the TFM Test, PCC Test or both that will be evaluated during the Field Exam at a well or wells of Applicant's choosing. While every effort will be made to accommodate Applicant's schedule, the date and time of the Field Exam will be set by the State Tester.

   To be clear, Applicant must either own the well being tested or contract with the owner of the well to conduct the tests and bear all costs associated with conducting the tests.

3. The test well must be a suitable installation for the type of test being conducted. Well installations where the determination of flow is based on a measurement method other than a TFM or PCC may NOT be used as the well for a Field Exam.

4. Applicants taking an individual Field Exam must provide their own Test Meter for the exam.

5. If Applicant successfully completes the Field Exam, Applicant will receive a new certificate with the expiration date extended by one year. The results of the Meter and/or PCC Test performed during the Field Exam may be relied upon to certify the accuracy of the PCC or meter tested, establish a Correction Factor or require repair/replacement of the meter.

6. If Applicant does not successfully complete the Field Exam, one of the following actions will be required:

   a. Applicant may request a re-test, which may be allowed at the sole discretion of the Program Manager. If allowed, Applicant must reapply to extend their Certificate, including the payment of another Field Exam fee.

   b. At the sole discretion of the Program Manager, Applicant may be offered terms that would avoid suspension of their Certificate under a specific Conditional Approval, discussed in Section 7.6.1.

c. If the Program Manager determines a re-test or Certificate with Conditional Approval are not appropriate, Applicant's Certificate will be immediately suspended, as discussed in Section 7.6.2.

7.6. **Limitation/Revocation of a Certificate**

7.6.1. Conditional Approval

1. In circumstances where the Division Liaison, in consultation with the Program Manager, identifies the need to limit the terms or conditions under which a Well Tester conducts Meter Tests or PCC Tests, the Division Liaison may request the Well Tester comply with such terms and conditions. The terms and conditions must be provided to the Well Tester in writing; email notification is a sufficient form of written notification. Failure to comply with the request may subject the Well Tester Certificate to suspension or revocation, if the concerns so warrant.

7.6.2. Suspension

1. Pursuant to §24-4-104, C.R.S., upon a "full investigation" should the State Engineer find that the conduct of the Certified Well Tester constitutes "a deliberate and willful violation" of the Certificate terms and expectations, the State Engineer or a duly authorized agent of the State Engineer may suspend a Certificate. Any communication of such suspension, verbal or written, will be considered to have initiated the suspension. Certificate suspension may be pursued for the following reasons, including but not limited to:
   a. Failure to comply with this Standard in the submission of measurement tests;
   b. Repeated or egregious computation or procedural errors in submitted measurement tests;
   c. Failure to pass a Field Exam; or,
   d. Submitting falsified information, including signing meter test forms related to tests not actually performed by the signer.
2. Commensurate with the suspension, the State Engineer or his or her agent must also initiate proceedings to revoke the Certificate, as discussed in Section 7.6.3.

7.6.3. Revocation

1. A Certificate may be revoked. To do so, the State Engineer must petition the Hearing Officer for the State Engineer to initiate proceedings to revoke the Certificate pursuant to Division of Water Resources Procedural Regulations, 2 CCR 402-5, and §§ 24-4-104 & 105, C.R.S. The Certified Well Tester will be given the opportunity to contest the petition and participate in the proceedings.

7.7. Field Exam Criteria

1. The criteria upon which a Field Exam is evaluated is the same for both Group and Individual Field Exams.

2. Field Exams are proctored by a State Tester.

3. Applicant must demonstrate competence in each of the areas identified below in the presence and under the evaluation of, but without any assistance from, a State Tester:

   a. Applicant must demonstrate a thorough understanding of the physical constraints associated with making a reliable flow measurement of existing Rules, guidelines, policies and protocols in determining the correct method of testing and methods of measurement allowed, including installation restrictions and the system conditions that disqualify the use of a PCC Test.

   b. Applicant must demonstrate the ability to correctly operate the Test Meter.

   c. Applicant must demonstrate the ability to correctly apply mathematical relationships to the data collected and perform the associated calculations.

   d. Applicant must demonstrate the complete and proper reporting of the test, including a photograph showing the testing equipment setup that is digitally date stamped with the date of the test. Applicant must be able to explain and correctly report whether or not a correction factor must be applied to the reported meter readings and, if so, whether or not the Applicant is required to notify the well owner regarding that determination.

   e. Applicant's determination of the PCC or installed meter's accuracy is within ±10% of the accuracy determined by the State Tester.

7.8. State Tester, Division Liaison and Program Manager

1. A State Tester, Division Liaison or Program Manager must be, at a minimum, a "Qualified Well Tester" as a condition of their employment and are, therefore, not subject to the certification process described herein.

7.9. Testing Equipment

1. Applicants seeking to obtain or extend the term of a Well Tester Certificate must use a Test Meter that meets the terms and conditions specified in this Standard to pass the associated Field Exam. (See Sections 1.3.18, 1.3.19 and 3.2)

2. Applicants seeking to obtain a Well Tester Certificate under Section 7.4.2 may use a state owned Test Meter to pass the group Field Exam.

3. A Certified Well Tester seeking to extend the term of his or her Certificate must provide the Test Meter used for the exam; they may not rely upon state owned equipment.