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May 31, 2022

VIA ELECTRONIC FILING

puc.FilingCenter@puc.oregon.gov

Public Utility Commission of Oregon
Filing Center
201 High Street SE, Suite 100
P.O. Box 1088
Salem, Oregon 97301

Re: OPUC Docket No. RE 158
2021 Annual Meter Test and Certification Report

Attention Filing Center:

Enclosed for electronic filing is Idaho Power Company's 2021 Meter Test and Certification Report required by the Public Utility Commission of Oregon's Electric Utility Metering Policy adopted on July 20, 2000 and OAR 860-023-0015.

If you have any questions about this report, please contact Regulatory Analyst Zack Thompson at (208) 388-2982 or zthompson@idahopower.com.

Very truly yours,

Connie Aschenbrenner

Connie Aschenbrenner

CA/sg
Enclosure

IDAHO POWER COMPANY

2021 ANNUAL METER TEST AND CERTIFICATION REPORT

TABLE OF CONTENTS

Overview Statement

Idaho Power Company's advanced metering infrastructure ("AMI") meters record, display, read, and reset peak demand. In alignment with American National Standard Institute ("ANSI") C12.1 2014, the meters are subject to a random sampling and periodic in-service test plan. In alignment with ANSI standards, the Company has divided all meters in its Oregon service area into Homogenous Meter Groups ("HMG") by model and/or attribute.

Placing all the Oregon meters into HMG is consistent with ANSI standards and industry best practices. There are several meter maintenance programs currently being performed to validate meters in Oregon that are not required or addressed by ANSI or the Oregon Public Utility Commission Electric Utility Metering Policy as adopted on July 20, 2000[1]. A summary of meter validation programs being performed is provided in this report.

Management Review

The review of Idaho Power's metering policies, practices, and procedures, and the results of in-service meter maintenance and validations performed shows that the Company is in compliance with ANSI C12.1 2014 and the Commission's Electric Metering Policy.

Idaho Power Company's Electric Metering Test and Inspection Policy, approved by Order No. 21-227 in June 2021 and provided in Appendix A, outlines the procedures used to direct the electric metering test and verification programs. The standards, practices, and procedures for maintaining the accuracy of electric metering systems are based on acceptable national metering and quality standards and are maintained in compliance with applicable regulatory requirements and rules.

Idaho Power's metering practices and programs direct the surveillance of metering systems and customer service facilities. The results of the surveillance efforts are used to determine potential trends in the installed metering systems. Statistical information is then used to determine future maintenance and testing.

All test equipment used to test meter accuracy is traceable to the National Institute of Standards and Technology laboratory. Calibration standards are used to verify meter test equipment accuracy on a regularly scheduled interval of six months.

Significant Deficiencies

No significant deficiencies were identified by Idaho Power Company through testing or inspection programs in 2021.

Corrective Action Plans

No failed lots were identified by testing or inspection programs in 2021. Therefore, no corrective action plans ("CAP") were required.

[1] Idaho Power has not identified a docket number or Commission order number where the current policy was adopted. Based on its records, Idaho Power submitted the existing policy (the 2000 Policy) to the OPUC on or around October 5, 2000 and received OPUC approval that same month. Idaho Power has complied with this policy, which meets the requirements of Oregon Administrative Rule 860-023-0015 and the Commission's electric metering policy adopted on July 20, 2000.

Listing of Homogenous Meter Groups

Below is the listing of Idaho Power Company meters by HMG (Table 2 lists Oregon Meters). The list includes HMG model, technology, i.e., AMI, Non-AMI, and off-site meter reading ("OMR"). Idaho Power Company does not have any meters in periodic meter groups ("PMG").

Table 1. HMG Lot Name and Technology Type

HMG Lot Name	Technology Type
A1D	Non-AMI
A1D+	Non-AMI
A1RL+	AMI
A3	AMI
ALF	AMI
AXR-SD	AMI
AXS4	AMI
C1S	Non-AMI
C1SD	Non-AMI
C1SR	OMR
C1SX	AMI
CN1SX	AMI
C1SCT	Non-AMI
ION	AMI
KV2C	AMI
I210+	AMI
I210+RD	AMI

Table 2. Oregon HMG Lot Name and Technology Type

HMG Lot Name	Technology Type
A1D	Non-AMI
A1D+	Non-AMI
A1RL+	AMI
AXR-SD	AMI
KV2C	AMI
I210+	AMI

Metering Audits for Homogenous Meter Groups

1. Voltage readings on AMI three-phase meters are taken three times daily. Any missing voltage is investigated on-site.

2. Automated communication meters are verified in the field if reading errors are detected or communication fails for two consecutive days.

3. Transformer-rated irrigation meter monthly billing kilowatts ("kW") are compared to the connected horsepower ("Hp") (kW = (Hp x .746) x .75) monthly. Deviations are investigated onsite.

4. All Large Customer Data Collection ("LCDC") primary distribution service level meter sites are validated in the field at least annually. A random selection of meters are also tested annually. Additional meters registering a load of 1 – 10MW are tested every 4 years and meters registering a load of over 10MW are tested every 2 years.

5. Transmission level intertie metering is validated annually and meters are tested as specified in the intertie contract.

Inspections and Tests for Homogenous Meter Groups

The statistical summary of inspections performed on HMG and associated defects, if applicable, are provided in Table 3 below, and a statistical summary specific to Oregon is provided in Table 4 on page 5.

Table 3. HMG Statistical Summary – Idaho Power's total service area

Manufacturer	Lot Name	Population	Sample Size	Number Tested	Average Sample Weighted Average	Standard Deviation	Sample Maximum	Sample Minimum	Number of Meters +/- 2%	Number of Uniquely Defective Meters Excluded	Number of Uniquely Defective Meters Excluded due to Manufacturer Defects	Excluded Meters	ANSI Z1.9 Conclusion	Number of Meters Below 98%	Number of Meters Exceeding 102%
Elster	A1RL+	165	15	15	99.97	0.074	100.14	99.87	0	0	0	0	P	0	0
Elster	A1D+	76	7	7	99.95	0.046	100.04	99.89	0	0	0	0	P	0	0
Asea Brown Boveri	A1D	37	5	5	100.01	0.073	100.21	99.95	0	0	0	0	P	0	0
Elster	A3	4	3	3	99.96	0.04	99.99	99.93	0	1	0	0	P	0	0
Landis & Gyr	ALF	439800	200	200	100	0.06	100.41	99.81	0	0	0	0	P	0	0
Landis & Gyr	AXR-SD	19374	100	100	100.009	0.05	100.12	99.8	0	0	0	0	P	0	0
Landis & Gyr	AXS4	552	35	35	99.97	0.04	100.07	99.87	0	1	0	0	P	0	0
Schlumberger	C1S	85	7	7	100.04	0.09	100.22	99.87	0	0	0	0	P	0	0
Schlumberger	C1SD	14	3	3	100.11	0.18	100.32	100	0	0	0	0	P	0	0
Schlumberger	C1SCT	4	3	3	100.01	0.06	100.06	99.95	0	0	0	0	P	0	0
Schlumberger	C1SR	365	20	20	100.04	0.11	100.19	99.83	0	0	0	0	P	0	0
Schlumberger	C1SX	18083	100	100	100.01	0.16	100.33	99.05	0	1	0	0	P	0	0
Schlumberger	CN1SX	47	5	5	100.03	0.02	100.07	100	0	0	0	0	P	0	0
ACLARA	I210+	59377	150	150	99.88	0.12	100.11	99.64	0	0	0	0	P	0	0
ACLARA	I210+RD	21666	100	100	100.01	0.05	100.14	99.87	0	0	0	0	P	0	0
Square D	ION	63	7	7	100.02	0.02	100.04	99.98	0	0	0	0	P	0	0
ACLARA	KV2C	47698	150	150	100.024	0.81	109.87	99.58	1	0	0	0	P	0	1

Table 4. HMG Statistical Summary – Idaho Power's Oregon service area

Manufacturer	Lot Name	Population	Sample Size	Number Tested	Average Sample Weighted Average	Standard Deviation	Sample Maximum	Sample Minimum	Number of Meters +/- 2%	Number of Uniquely Defective Meters Excluded	Number of Uniquely Defective Meters Excluded due to Manufacturer Defects	Excluded Meters	ANSI Z1.9 Conclusion	Number of Meters Below 98%	Number of Meters Exceeding 102%
Elster	A1RL+	165	15	2	99.89	0.000	99.89	99.89	0	0	0	0	P	0	0
Elster	A1D+	76	7	1	99.95	0.000	99.95	99.95	0	0	0	0	P	0	0
Asea Brown Boveri	A1D	37	5	3	100.01	0.010	100.02	100.00	0	0	0	0	P	0	0
Landis & Gyr	AXR-SD	19374	100	11	93.73	0.040	100.06	99.92	0	0	0	0	P	0	0
ACLARA	I210+	59377	150	1	99.88	0.000	99.88	99.88	0	0	0	0	P	0	0
ACLARA	KV2C	47698	150	7	99.96	0.060	100.05	99.87	0	0	0	0	P	0	0

Uniquely Defective Meters

Within in-service random sample meter testing performed in seventeen (17) HMG (6 HMG in Oregon), there were three (3) uniquely defective meters found in Idaho sample meter tests for 2021. No uniquely defective meters were found in Oregon. Table 5 below lists the uniquely defective meters.

Table 5. Uniquely Defective Meter Summary

Manufacturer	Lot Name	Meter Serial Number	Test Date	Failure Code	Pass/Fail	Full Load	Light Load	Weighted Average	Corrective Action
Landis & Gyr Systems Inc.	AXS4	86849081	1/31/2022	DEAD	Fail	0%	0%	0%	Retired, dead meter
Schlumberger	C1SX	41778518	8/31/2021	IPLS	Fail	0%	0%	0%	Retired, untestable, no test pulse out of optical pipe at the top of the meter, no optical port to use as a backup for testing
Elster	A3	7216463	4/19/2021	IPLS	Fail	0%	0%	0%	Retired, untestable, no test pulse out of the optical port.

Metering Hazards and Defects

Idaho Power did not identify any metering hazards or defects through testing, inspection programs, or audits in 2021.

2021 Inspections/Tests and Targeted CAP Retirements

Of the seventeen (17) HMG lots tested in 2021 (6 HMG lots in Oregon), no deficiencies were detected. All lots passed ANSI testing with no meter groups required a CAP.

Metering Standard Practice Changes

Idaho Power Company's metering practices and procedures for maintaining the accuracy of electric meters and metering systems remain the same in accordance to accepted national metering and quality standards and are maintained in compliance with applicable regulatory requirements and rules.

Multi-State Metering Programs

Idaho Power Company meters in all states are audited as listed in "Metering Audits for Homogenous Meter Groups."

Qualified Meter Technicians

Idaho Power has assigned one journeyman meter technician and one meter technician apprentice to the operational area covering its Oregon service area.

Policy Changes Requiring Commission Approval

Changes to Idaho Power Company's Metering Test and Inspection Policy were filed in June 2021 in Docket No. UM 2154. The Policy revision aligns with current industry testing methods and practices while ensuring system validation through statistical analysis. The Policy was adopted by Commission Order No. 21-227 at its public meeting on July 13, 2021 with an effective date of July 14, 2021. The Policy is provided in Appendix A.

There are no policy changes requiring Commission approval at this time.

Appendix A:
Idaho Power Company
Meter Test and Inspection Policy
June 2021

Table of Contents

Meter Test and Inspection Policy

PROCEDURAL REQUIREMENTS FOR MAINTAINING THE ACCURACY OF IDAHO POWER COMPANY'S ELECTRIC METERS, STANDARDS, AND STANDARDIZING EQUIPMENT

1. Scope

a) This document provides an overview of the practices and policies implemented by Idaho Power Company (Company) to ensure metering accuracy and correct customer billing within the Company's service area in Idaho and Oregon. This policy aligns to industry best practices and to the requirements of the Oregon Public Utility Commission (OPUC or Commission) OAR 860-023-0015 regulation related to electric meter testing and verification programs, maintenance of watt-hour standards and standardizing equipment.

2. General

a) No meter or metering device shall be placed in service, or be allowed to remain in service, that has an incorrect meter constant, is mechanically or electrically defective, incorrectly connected, installed, or applied; or is outside acceptable accuracy levels. No device shall be placed on or in a meter or meter circuit that could adversely affect the accuracy or performance of the meter or meter circuit.

2.1 Test Loads and Test Equipment

a) For meters, the full load test current shall be approximately 100% +/- 3% of the meter nameplate test current at unity power factor and light load test current shall be approximately 10% +/- 3% of the meter nameplate test current at unity power factor. Power factor tests current shall be approximately 100% +/- 3% of the meter nameplate test current at approximately 50% lagging power factor. Meters used with external current transformers shall use full load test current of 100% +/- 3% of meter nameplate test current or 100% +/- 3% of the secondary current rating of the transformer. The light load test for meters used with current transformers shall be equal to 10% of the selected full load value. All meter accuracy testing will be performed with appropriate equipment with accuracy traceable to the National Institute of Standards and Technology (NIST).

2.2 Compliance

a) The practices and procedures outlined in this document ensure meters and metering systems accurately measure, register, and record the energy used by customers. These policies are founded on national metering standards and are reviewed and maintained in accordance with applicable regulatory requirements.

b) The Company's meter testing and verification program shall be reported by jurisdictional area. Homogenous Meter Groups and associated sampling programs and reporting shall include jurisdictional area meters only.

3. Definitions

Acceptance Quality Limit (AQL)—The AQL is the quality level that is the worst tolerable product average when a continuing series of lots is submitted for acceptance sampling.

Homogeneous Meter Group (HMG)—A lot or population of metering devices from which a random sample is selected that, as far as practicable, consists of metering devices of the same basic type of model designation, have the same general construction, produced by the same manufacturer, and have the same relationship of parts.

Laboratory Standard—Standard meters that are used to verify the accuracy of working standards. The standards in the laboratory are the basic reference standards and the transport standards.

NIST—National Institute of Standards and Technology, United States Department of Commerce.

Periodic Meter Group (PMG)—A group of metering systems tested, inspected, and verified in a specific year that are on the same test frequency in a Periodic Meter Test Program.

Periodic Meter Test Program—An established scheduled pattern of meter site verifications where each site will be selected according to the utility's designated regular time-interval.

Portable Field Standard— A portable watt-hour meter used as a standard to calibrate the Company's billing meters and is traceable to NIST. The portable field standard is used for testing in-service meters at their installed location.

Reference Standards—Laboratory Standards with which the accuracy of the watthour is maintained in the laboratory.

Sample Meter Test Program—An established random pattern of testing meters belonging to a Homogeneous Meter Group whereby each meter has an equal opportunity to be selected for testing each year.

Sampling Plan—A specific plan which states the sample size(s) to be used and the associated criteria for accepting the lot.

Shop Standard— A watt-hour meter used as a standard to calibrate the Company's billing meters and is traceable to NIST. The shop standard is used exclusively in the Company's Meter Test Facility to test meters removed from service.

Transport Standards— Laboratory Standards of the same nominal accuracy class as the basic reference standards of a laboratory. Such standards are regularly intercompared with the basic reference standards to maintain a history of behavior. The main purpose of the transport standard is to establish traceability from outside the utility and transfer traceability within the utility.

Uniquely Defective Meter—A meter selected for random sampling with accuracy performance characteristics greater than + 5% resulting from unique physical experience or unique electrical experience and is not representative of other in-service meters in its HMG.

4. References

a) This document references the following documents:

(1) ANSI C12.1-2014 *Code for Electricity Metering* shall be used as a guide to establish acceptable performance criteria testing programs and standardized equipment.

(2) ANSI Z1.9-2003 (R2018) *Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming* shall be used as a guide for the In-Service Random Sampling Plan.

(3) ANSI Z1.4-2003 (R2018) Sampling Procedures and Tables for Inspection by Attributes shall be used for acceptance testing of new meters.

(4) *Oregon Administrative Rule 860-023-0015.*

(5) IEEE C57.13-2016, *IEEE Standard Requirements for Instrument Transformers.*

(6) The Company's *Metering Quality System Manual* shall be used to communicate and implement metering policies, standards and procedures internal to the Company.

5. Standards and Standardizing Equipment

5.1 The Meter Test Facility

a) The Company maintains a Standards Test Facility that is responsible for certification of all portable watt-hour standards used within the Company. The Standards Test Facility is available at all times, by appointment, during business hours for inspection or use by Commission's representatives.

5.2 Certified Standards

a) The Company will follow a chain of intermediate steps between the national standard and watthour meters as outlined in ANSI C12.1-2014. It is the responsibility of the Company to establish and maintain the traceability of watthour standards to the NIST, or an approved testing laboratory that is traceable to NIST. The method used by the Company to ensure traceability to NIST is summarized as follows:

(1) The Company's "Transport Standard" will be compared annually with the NIST or an approved testing laboratory that is traceable to NIST.

(2) The Company's "Reference Standard" will be compared twice annually to the "Transport Standard."

(3) All "Portable Field Standards" and "Shop Standards" will be compared a minimum of once per year to the "Reference Standard."

(4) All Company "tested" meters will have test results traceable to a "Portable Field Standard" or "Shop Standard" that was used for the test.

(5) Meter tests conducted by a qualified independent meter test lab will be required to submit traceability of the standards used annually to the Company.

(6) Each Transport, Reference, Portable Field, or Shop standard shall be accompanied at all times by a certificate or calibration card signed or initialed by the person responsible for the calibration giving the date and results of the last calibration of the instrument. The Company shall keep any superseded certificates or calibration cards on file for at least 5 years.

5.3 Accuracy Requirements for Standards

a) The accuracy requirements for the Company's Reference Standard and Field/Shop standards are as follows:

(1) Reference standards shall not exceed a percent error more than +/- 0.02% at unity Power Factor and at 50% Power Factor.

(2) Field/Shop standards shall not exceed a percent error more than +/- 0.05% at unity Power Factor and at 50% Power Factor.

6. Meter Testing and Inspection Plans

a) The Company follows an annual in-service performance testing plan in accordance with ANSI C12.1-2014. The purpose of conducting in-service performance testing is to ensure an acceptable degree of metering accuracy and performance throughout the service life of the Company's meters.

b) Test records are maintained in the Customer Relations and Billing (CR&B) database for all in-service meters and retained for a minimum of two years following retirement. Analysis of test results shall be made annually to determine if action is needed to address specific metering equipment or metering groups.

c) All meters tested with an as-found error greater than 0.5% will be immediately removed from service and retired. A meter is defined as conforming if the as-found average accuracy is within 100 +/- 0.5% registration. The method used to determine the percentage registration is Method 1 found in ANSI C12.1-2014. The test results for Uniquely Defective Meters will be identified and withheld from the Homogeneous Meter Group Sample Testing analysis. Any meters withheld from the

analysis as Uniquely Defective Meters will be reported to the Oregon Public Utilities Commission in the annual Meter Test and Certification report.

6.1 New Metering Device Acceptance

a) The Company will document and implement material standards for metering related equipment. All new meters and instrument transformers shall be 100% tested by the manufacturer prior to being shipped to the Company. The manufacturer's testing facility shall meet the requirements of this Meter Test and Inspection Policy. Certified test data will be provided to the Company upon receipt of the equipment. The Methods and Materials department within Idaho Power Company will analyze the test data to ensure accuracy specifications are met.

   (1) Quality assurance testing of new meters will be conducted in accordance with ANSI Z1.4-2003 (R2018) *Sampling Procedures and Tables for Inspection by Attributes* with General Inspection Level II, AQL of 2.5, and Double Sampling Plan for Normal Inspection.

   (2) This testing of new shipments is performed to determine the acceptability of the devices as delivered from the manufacturer.

   (3) Accuracy testing will be performed in accordance with ANSI C12.1-2014 section 5.0.3.2.

   (4) Meter test accuracy results must be 100% +/- 0.5% for both full load and light load before meters are accepted and placed in service.

   (5) The determination of percentage registration is per Method 1 found in section 5.1.4.1 in ANSI C12.1-2014.

   (6) A minimum sample size will be selected based on the number in a shipment or production lot.

   (7) Determination of acceptability will be performed in accordance with ANSI Z1.4-2003 (R2018) section 10.1.2.

6.2 In-Service Random Sample Test Plan

a) A statistical sampling plan will be used for in-service performance testing of:

   (1) Self-contained single- and three-phase meters.

   (2) Instrument transformer rated meters not covered by a Periodic Interval Plan.

b) The Company will follow the principles of statistical sampling found in ANSI Z1.9-2003 (R2018) *Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming*. This standard will be used to determine the quantities of

meters tested each year and acceptability criteria. Each meter in a HMG will have the same probability of being selected for testing.

c) Under this plan:

(1) Meters are divided into HMGs by manufacturer and model designation.

(2) Samples are selected annually from each HMG.

(3) The determination of sample size is based on Variability Unknown, Standard Deviation Method with Double Specification Limits, General Inspection Level II, and AQL of 2.5.

(4) Table B-3 in ANSI Z1.9-2003 (R2018) is used to determine the maximum allowable percent nonconforming and used to determine whether the HMG exceeds the threshold criteria.

6.3 Periodic Interval Test Plan

a) A Periodic Interval plan is used for testing in-service meters installed at Large Industrial customer locations that have an average peak demand over 1 MW. This plan ensures correct metering accuracy for the Company's largest customers that have high consequence for failure. Accuracy testing is performed in conjunction with the inspection, maintenance, and verification program used to identify defective metering equipment which helps determine future maintenance and testing needs.

b) Under this plan:

(1) In-service meters for Large Industrial Customers with an average peak demand greater than 10 MW are tested once every two-years.

(2) In-service meters for Large Industrial Customers with an average peak demand between 1 MW to 10 MW are tested once every four years.

6.4 Additional In-Service Meter Testing

a) Any meter removed from service will be tested prior to being reinstalled. Metering devices removed from service may be retired without a test per ANSI C12.1-2014.

b) Energy Imbalance Market Sites—Meters associated with the Energy Imbalance Market will be tested every twenty-four months or as required by the California Independent System Operator (ISO).

c) Co-Generation and Small Power Production:

(1) In-service meters for CSPP projects with Nameplate Capacity greater than 10 MW are tested once every two years.

(2) In-service meters for CSPP projects with Nameplate Capacity between 1 MW to 10 MW are tested once every four years.

(3) In-service meters for CSPP projects with Nameplate Capacity less than 1 MW will be tested in accordance with the Company's random sampling meter testing policy, unless other contract requirements apply.

d) Intertie Testing—Intertie testing will be conducted on a pre-determine frequency agreed upon by operating utilities.

6.5 In-Service Metering System Inspection, Maintenance, and Verification

a) The Company ensures metering system safety, proper installation, security, and billing validation through an inspection, maintenance, and verification program. A visual inspection will be performed on all self-contained and transformer rated meter installations when tested to verify proper:

(1) Component location, condition, connection, and grounding

(2) Safety and security

Additionally, all transformer rated metering installations will be inspected within 90 days of new installation or completion of construction or at the time of any metering component change.

b) All primary distribution, substation, and transmission service-level metering sites are validated in the field annually. For new installations, an inspection and validation will be performed prior to the first billing. The inspection and validation will verify proper:

(1) Meter circuit location

(2) Voltage magnitude and transformer ratio

(3) Current magnitude and transformer ratio

(4) Phase angle and power factor

(5) Component application, condition, connection, and grounding

(6) Load registration

(7) Registration values and multipliers

(8) Billing system values and multipliers

(9) Safety and security

(10) Load profile recorder accuracy

c) The Company's CR&B database will be used as the system of record for validations. A site that has not been validated in six months will trigger an automated report to ensure that validations occur annually at a minimum.

7. Accuracy

7.1 Meter and Instrument Transformer Accuracy

a) All new meters and instrument transformers shall meet the requirements of ANSI C12.1-2014 *Code for Electricity Metering and IEEE 57.13 -2016, IEEE Standard Requirements for Instrument Transformers* as demonstrated by the manufacturer.

b) All new meters and instrument transformers shall be 100% tested by the manufacturer or the Company before being placed into service.

c) Meter test results must be 100% +/- 0.5% for both full load and light load before meters are accepted and placed in-service. Test records will be maintained for all new and in-service meters including the previous and current test results.

d) Meters used for primary service level accounts will be 100% tested by the Company prior to installation.

e) Any meter that is not or cannot be tested as scheduled will be assigned a failure cause code. Meters with errors in registration in excess of 0.5% shall be considered failed and will be reportable by manufacture model, failure date and cause code.

f) The standard accuracy class for instrument transformers is 0.3% or better. No instrument transformer with a transformer correction factor or ratio correction factor greater than +/- 0.3% will be accepted and placed in service.

g) Instrument transformer accuracy tolerance is based on the correction factor of the equipment being used to determine accuracy. Typically, 100% +/- 5%. No instrument transformer shall be placed in service, or allowed to remain in service, if it shows evidence of physical damage, discolored terminals due to overload, change in texture or resiliency of insulation, or arc tracking on the insulation or bushing.

h) The accuracy of electronic billing data for primary service level metering will be verified against actual meter readings twice each year. The permissible variance for validation shall be < (2 X meter constant). The meter load profile time will be verified to within +/- 2 minutes monthly.

i) All instrument transformer meter installations shall be verified upon initial installation, test, component change, or configuration change. Verification shall include; safety, security, energy diversion, compliance with standards, physical

condition (including distribution system), proper registration (through billing), voltage, load (readings vs. registration), instrument transformers and programming.

j) All self-contained meter installations shall be verified upon initial installation, test, or component change. Verification shall include; safety, security, energy diversion, compliance with standards, physical condition (including distribution system), proper registration (through billing), voltage, load (readings vs. registration), instrument transformers and programming.

8. Security

a) The following are measures taken by the Company to ensure metering system security:

(1) The Company will maintain adequate documented procedures to ensure and verify the physical security of metering installations through; control of sealing devices, control of change authority, control of audit trail and control of record retention.

(2) The Company will maintain adequate procedures to ensure and verify the information technology security of metering installations through; control of access, control of change authority, control of audit trail, and control of record retention.

(3) The Company will maintain adequate procedures to ensure and verify the security of metering records physical or electronic through; control of access to records, control of change authority, control of audit trail, and control of record retention.

(4) The Company uses a Two-Way Automatic Communication System (TWACS) based AMI system that provides daily reads. Processes have been established to notify personnel of non-communicating meters that may have been tampered with. Upon notification of a non-communicating meter, an order for a field employee to perform an investigation is created.

(5) Meter programming password protection will be maintained in accordance with the Company's Data Security Policy.

(6) Meter Data Systems will be maintained in accordance with the Company's Data and Cyber Security Policy.

9. Revenue Protection

a) The following measures are used by the Company to ensure revenue validation:

9.1 Energy Consumption Investigations

a) The Company will maintain “High/Low” thresholds on each account triggering consumption investigation and/or manual override.

9.2 Energy Diversion Program and Enforcement

a) The Company will maintain a training program covering detecting, reporting and disposition of Energy Diversion.

b) The Company will maintain documented procedures for reporting and disposition of Energy Diversion.

c) The Company will maintain a system of recording and reporting of Energy Diversion.

9.3 Primary Service Level Metering Evaluation

a) Meter information will be downloaded daily to minimize risk of lost data.

b) Meter data will be validated for each billing period. Validation shall include; outages, missing intervals, peak consumption, power factor and historic use comparison.

c) Site visits and validations will be accomplished at least annually. A site that has not been validated in six months will trigger an automated report that is used to ensure that validations occur annually at a minimum. Visits will incorporate an inspection and verification of the metering system.

d) Revenue meters utilizing MV90 communication are verified in the field within one business day if reading errors are detected or daily communication fails.

9.4 Other Revenue Protection Measures

a) The Company has established Sarbanes–Oxley (SOX) controls specific to metering that provide revenue protection. Controls are reviewed and certified quarterly to ensure they have not failed.

b) Voltage readings on AMI three-phase meters are taken daily. Any site with a phase voltage below 100VAC will show up on an automated report that is used to generate outage notifications.

c) Transformer-rated irrigation monthly billing usage is compared to the connected horsepower and validation notes for the site. Deviations from expected load to true load result in the creation of an order for a service investigation.

d) The Company has an effective training program for field and billing personnel to detect abnormal usage amounts. The CR&B database has automated triggers for

abnormal usage on all customers and meters billed through MV90 have their current usage compared to their historic usage at each billing period.

10. Corrective Action

a) The test results from Sample Testing will be analyzed and reported annually. The weighted average values of the as found test results (method 1 of ANSI C12.1-2014) will be used to determine whether the HMG exceeds the Threshold Criteria.

b) If the Threshold Criteria is exceeded for a HMG, the Company will follow one of the prescribed methods in ANSI C12.1-2014 section 5.0.3.4.4. Any discovered problems with quality or accuracy will be acted upon immediately by performing one or a combination of the following:

   (1) Rejecting nonconforming new meter purchases and working with manufacturer for resolution.

   (2) Implementing an accelerated testing program.

   (3) Splitting meter groups into two or more subgroups.

   (4) Implementing a retirement plan.

c) Corrective Action Plans will be documented and submitted to the Oregon Public Utilities Commission in the annual Meter Test and Inspection report. The plan shall address corrective action measures, costs, schedules, and impacts to customers and revenue. In the event that a HMG, as part of In-Service Meter Testing, fails for a second time, the HMG shall be removed from service within four years.

11. Record Keeping

a) Records will be maintained for all laboratory and field test standards by serial number. Records will be maintained for the life of the equipment plus five years.

b) Test records will be maintained for all meters and auxiliary transformers for the life of the equipment plus two years.

c) Inspection and verification records are maintained for primary delivery rate customer's accounts for three years.

d) All energy diversion investigations will be recorded, and the records will be maintained for three years.

e) The record of the most recent accuracy test of each instrument transformer is maintained for at least as long as the instrument transformer is in service plus three years. The record of each instrument transformer includes the manufacturer's name

or trademark, type, and serial number. Each instrument transformer placed in service will be marked with the same information.

f) The record of the most recent accuracy test of each watt-hour meter is maintained for at least as long as the instrument transformer is in service plus three years. Accuracy record of each watt-hour meter includes the following:

(1) Date of test;
(2) Reason for test;
(3) Reading and accuracy of meter as found and as left;
(4) Identification of person who performed the test; and
(5) Identification of equipment used to test meter.

g) The record of each watt-hour meter includes the following:

(1) Manufacturer and date received in inventory, along with any testing data provided by the manufacturer that is used by the entity for acceptance testing of the meter;
(2) Manufacturer serial number or Company's identification number;
(3) Date and location of present or most recent installation;
(4) Date and type of last major repair, or of final disposition; and
(5) Nameplate data, which includes:

i) Form designation or circuit description;
ii) "Watt-hour meter" or other description;
iii) Manufacturer's name or trademark;
iv) Manufacturer's type;
v) Electrical current class;
vi) Rated voltage;
vii) Number of wires;
viii) Frequency;
ix) Test amperes;
x) Watt-hour meter constant; and
xi) Watt-hour meter test constant (if applicable).

12. Meter Tests Requested by Customers

a) If a customer requested that a meter that serves their account be tested for accuracy, the Company shall test the customer's meter, in accordance with OAR 860-021-0130.

13. Treatment of Inaccurate Metering Data

a) Upon discovery that a meter serving a customer is outside acceptable OPUC limits as defined in OAR 860-021-0130, the Company shall correct the metering error. The Company shall direct its billing department to adjust customer bills according to the

corrected metering data and reimburse customer for all overcharges as defined in OAR 860-021-0135.

14. Meter Quality System Management

14.1 Internal Audit

a) The Company will schedule and conduct audits of the Meter Quality System to determine the extent of compliance with regulatory requirements for metering and for effectiveness of policies, internal standards, practices and procedures.

b) The Company will conduct audits of the effectiveness of corrective and preventative action plans implemented as a result of nonconformance with regulatory or Meter Quality System requirements.

14.2 Annual Meter Management Review

a) Management will review the results of internal audits and develop corrective and preventative action plans for any nonconformity to regulatory and/or Meter Quality System requirements.

b) Management will review the effectiveness of the Meter Quality System and develop action plans for continuous quality improvement.

c) The Company will review the currency of this Meter Test Policy annually to ensure that it is up to date with national and state regulations, standards, and guidelines.

15. Annual Metering Certification Report to the Oregon Public Utility Commission

a) The Company will complete annually a metering certification report to the Commission as required by Section S of the OPUC's Electric Utility Metering Policy.

b) The Annual Metering Certification Report will contain the information required in Section S of the OPUC's Electric Utility Metering Policy for the entire company and for Oregon only.

16. Review/Revision History

Document Updated	Revisions	Reviewed By
May 2022	Annual Management Review of Revised Meter Policy Completed.	Lewis McKillop
June 2021	Revised Policy filed in Docket No. UM 2154 on June 24, 2021 after reviewing the February 5, 2021 Policy with Commission Staff.	Jon Axtman
February 2021	Updated Policy filed in Docket No. UM 2154 on February 5, 2021.	Jon Axtman
October 2000	Original Policy submitted to the Oregon Public Utilities Commission on October 5, 2000.	