

Manual 029

Production Measurement and Reporting Audit

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Alberta Energy Regulator

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Abbreviations

AER	Alberta Energy Regulator
<i>Directive 007</i>	<i>Directive 007: Volumetric and Infrastructure Requirements</i>
<i>Directive 017</i>	<i>Directive 017: Measurement Requirements for Oil and Gas Operations</i>
<i>Manual 011</i>	<i>Manual 011: How to Submit Volumetric Data to the AER</i>
ECF	effluent correction factor
GE	gas equivalent
GEF	gas equivalent factor
GIS	gas-in-solution
GOR	gas-oil ratio
<i>OGCR</i>	<i>Oil and Gas Conservation Rules</i>
S&W	sediments and water
WGR	water-gas ratio

Introduction

Manual 029: Production Measurement and Reporting Audit (Manual 029) is a resource document and tool for the Alberta Energy Regulator (AER) compliance staff and industry. Its purpose is to identify noncompliance events that could be detected during a measurement and reporting audit of facilities regulated by the AER.

AER Safety and Conduct

Safety is important to the AER. Compliance staff conduct their work in accordance with recognized standards of practice. Compliance staff may report unsafe operating conditions and practices to the licensee and to Alberta Workplace Health and Safety if necessary.

AER compliance staff may assess regulated activities at any time and operator personnel may be present during the AER compliance activities. During compliance activities, AER staff may request the operator to provide site and operational information and may inform the operator's representatives of AER requirements and processes. Compliance staff can also communicate any remedial or follow-up work that may be required.

Industry Compliance

Industry may use *Manual 029* as a guide for their compliance management systems; however, it is important to consider issues beyond the scope of this document. Efficient, safe, orderly, and environmentally responsible development of Alberta's energy resources is best achieved through the combined application of this manual with broader management and systems-based approaches.

The manual identifies many noncompliance statements, but it is not an exhaustive inventory. Each noncompliance statement is accompanied by references to relevant requirements from the energy resource enactments and AER directives. Noncompliance statements summarize what an auditor may look for and are not intended to include every aspect of the requirement. Accordingly, The manual should not be relied on in designing or implementing a compliance program, and the actual requirement should always be referred to understand the full extent of the requirement.

During compliance activities, AER staff may ask to access an operator's operations or controlled areas, inspect or test operational activities, and review all books, records, and documents that pertain to the measurement, accounting, and reporting of a facility's volumetric activities. An operator that interferes with or fails to assist the AER in the exercise of this authority may be guilty of an offence under the *Oil and Gas Conservation Act*, Part 13, section 93.

Compliance staff may use education, prevention, or enforcement when dealing with industry compliance issues.

How to Use this Manual

Manual 029 is organized into key technical areas, with each section containing related noncompliance statements and relevant regulatory references. However, all applicable regulatory requirements outlined in the identified AER directives may not be included in this document.

The effective identification of a noncompliance entails a review and understanding of the referenced requirements to ensure the correct application of the associated noncompliance statement.

Regardless of the type or scope of the compliance activities, AER staff may apply any section of this manual deemed relevant.

Noncompliance statements in the manual are structured as follows:

Manual #	Description
2.17	GIS inaccurately determined (<i>Directive 017</i> 4.3.5.1, 4.3.5.2)

- **Manual #** is the number used to categorize the noncompliance statements and does not relate to sections in Acts, Rules, or AER directives.
- **Description** is the noncompliance statement and associated requirements or rules.

Before 2016, the AER predetermined risk rating; however, under the *Integrated Compliance Assurance Framework* and *Manual 013: Compliance and Enforcement Program*, the AER no longer uses predetermined risk ratings. Therefore, historical risk ratings (high/low) do not appear in this manual. For more information, see [Compliance Assurance Program](#).

1 Schematic

Manual #	Description
1.1	Measurement schematic does not exist. (<i>Directive 017 1.9.1</i>)
1.2	Measurement schematic contents do not meet requirements. (<i>Directive 017 1.9.1</i>)
1.3	Measurement schematic content changes not updated monthly to the production accountant. (<i>Directive 017 1.9.2</i>)
1.4	Measurement schematic master copy not updated annually to reflect the changes or deletions or confirm no change. (<i>Directive 017 1.9.2</i>)
1.5	Measurement schematic not provided to the listed external parties upon request. (<i>Directive 017 1.9.4</i>)

2 Operations

Manual #	Description
2.1	Inaccurate header markers. (<i>Directive 017 6.4.4.3</i>)
2.2	Gas meter does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 1.7.1(ii), 4.1, 4.2, 5.5, 7.1.1</i>)
2.3	Injection/disposal measurement device does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 15.2.4</i>)
2.4	Test gas or effluent measurement device does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 6, 7</i>)
2.5	Test hydrocarbon liquid measurement device does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 6.4.4, 7.3.1, 12.2.4</i>)
2.6	Test water measurement device does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 7.3.1, 7.4</i>)
2.7	Delivery point hydrocarbon liquid measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 10.3, 14</i>)
2.8	Delivery point gas measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 1.7.2(i), 4.1, 9.3</i>)
2.9	Delivery point produced water measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 10.3, 15</i>)
2.10	Delivery point fresh/brackish water measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 15</i>)
2.11	Measurement device calibrated/proven inappropriately and/or not within the required frequency. (<i>Directive 017 2.5.1, 2.5.2, 2.5.4</i>)
2.12	Well measurement inappropriate for the battery. (<i>Directive 017 4.2.1, 4.2.2, 4.3, 6.2.2, 6.3.1, 6.5, 6.6, 7.1.1, 7.2.1, 7.3, 7.4, 7.5.2, 7.5.3, 7.5.4, 12.2, 12.3</i>)
2.13	Measurement of oil produced from a gas well inaccurate. (<i>Directive 017 6.2.3, 7.3</i>)
2.14	Inaccurate measurement of fuel gas. (<i>Directive 017 4.1, 4.2.2, 4.3.3.1, 4.3.5.2, 5.5.6, figure 5.15</i>)
2.15	Inaccurate measurement of vent gas. (<i>Directive 017 4.1, 4.2.2, 4.3.3.1, 4.3.5.1, 4.3.5.2</i>)
2.16	Inaccurate measurement of flare gas. (<i>Directive 017 4.1, 4.2.2, 4.3.3.1, 4.3.5.2</i>)
2.17	Inaccurate measurement of acid gas. (<i>Directive 017 11.2</i>)
2.18	GIS inaccurately determined. (<i>Directive 017 4.3.5.1, 4.3.5.2</i>)
2.19	GE inaccurately determined. (<i>Directive 017 7</i>)
2.20	WGR inaccurately determined and/or not to the required frequency. (<i>Directive 017 7</i>)
2.21	GOR inaccurately determined and/or not to the required frequency. (<i>Directive 017 4.3.5.4</i>)
2.22	Pressure correction inaccurately determined. (<i>Directive 017 6.3.2.2, 10.1.3, 14.5</i>)

2.23	Temperature correction inaccurately determined. (<i>Directive 017 6.3.2.1, 10.1.2, 14.4</i>)
2.24	ECF inaccurately determined and/or not to the required frequency. (<i>Directive 017 7</i>)
2.25	Hydrocarbon liquid blending factor inaccurately determined. (<i>Directive 017 14.3</i>)
2.26	Inaccurate inventory determination. (<i>Directive 017 14.7</i>)
2.27	Inaccurate proration testing procedures. (<i>Directive 017 6.4.4, 7.2.3, 7.3.1, 7.4.1, 12.2.4</i>)
2.28	Inappropriate liquid sampling and S&W procedures. (<i>Directive 017 12.1.5, 14.6, 14.8, appendix 3</i>)
2.29	Inaccurate gas chart quality and documentation. (<i>Directive 017 4.3.4.2</i>)
2.30	Inaccurate load fluid procedures. (<i>Directive 017 6.2.2, 10.3.4, 15.2.10</i>)
2.31	Gas and condensate composition and density not updated to the required frequency. (<i>Directive 017 8.4, table 8.3</i>)
2.32	Inaccurate measurement records. (<i>OCGR 12.030(1), (2); Directive 017 14.11</i>)

3 Engineering

Manual #	Description
3.1	Delivery point hydrocarbon liquid measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 10.3, 14</i>)
3.2	Delivery point gas measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 1.7.2(i), 4.1, 9.3</i>)
3.3	Delivery point produced water measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 10.3, 15</i>)
3.4	Delivery point fresh/brackish water measurement device does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 15</i>)
3.5	Gas meter does not exist, is not installed or used correctly, or not in use. (<i>OGCR 7.004(1), 14.010, 14.011; Directive 017 1.7.1(ii), 4.1, 4.2, 5.5, 7.1.1</i>)
3.6	Injection/disposal measurement device(s) does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 15.2.4</i>)
3.7	Test gas or effluent measurement device(s) does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 6, 7</i>)
3.8	Test hydrocarbon liquid measurement device does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 6.4.4, 7.3.1, 12.2.4</i>)
3.9	Test water measurement device does not exist, is not installed or used correctly, or not in use. (<i>Directive 017 7.3.1, 7.4</i>)
3.10	Inappropriate well measurement for the battery. (<i>Directive 017 4.2.1, 4.2.2, 4.3, 6.2.2, 6.3.1, 6.5, 6.6, 7.1.1, 7.2.1, 7.3, 7.4, 7.5.2, 7.5.3, 7.5.4, 12.2, 12.3</i>)
3.11	GIS inaccurately determined. (<i>Directive 017 4.3.5.1, 4.3.5.2</i>)
3.12	GE inaccurately determined. (<i>Directive 017 7</i>)
3.13	WGR inaccurately determined and/or not to the required frequency. (<i>Directive 017 7</i>)
3.14	GOR inaccurately determined and/or not to the required frequency. (<i>Directive 017 4.3.5.4</i>)
3.15	Pressure correction inaccurately determined. (<i>Directive 017 6.3.2.1, 10.1.3, 14.5</i>)
3.16	Temperature correction inaccurately determined. (<i>Directive 017 6.3.2.1, 10.1.2, 14.4</i>)
3.17	ECF inaccurately determined and/or not to the required frequency. (<i>Directive 017 7</i>)
3.18	Hydrocarbon liquid blending factor inaccurately determined. (<i>Directive 017 14.3</i>)
3.19	Inaccurate fuel gas estimation. (<i>Directive 017 1.7.2(v), 4.2.2</i>)
3.20	Inaccurate vent gas estimation. (<i>Directive 017 1.7.2(vi), 4.2.2</i>)
3.21	Inaccurate flare gas estimation. (<i>Directive 017 1.7.2(vi), 4.2.2</i>)

3.22 Inaccurate flash gas estimation. (*Directive 017 7.5.2, 7.5.3.2*)

4 Production Accounting

Manual #	Description
4.1	Inappropriate application of GEF. (<i>Directive 017 7.3.1, 7.4.1, 7.4.4</i>)
4.2	Inappropriate application of WGR. (<i>Directive 017 7.3.1, 7.4.2</i>)
4.3	Inappropriate application of ECF. (<i>Directive 017 7.4.2, 7.4.4</i>)
4.4	Inappropriate application of GOR. (<i>Directive 017 4.3.5.4, 12.2.2</i>)
4.5	Inappropriate application of GIS. (<i>Directive 017 4.3.5.4, 6.5</i>)
4.6	Inappropriate application of blending factor. (<i>Directive 017 14.3</i>)
4.7	Inappropriate application of pressure correction. (<i>Directive 017 4.3.2, 10.1.3, 12.1.2, 14.5</i>)
4.8	Inappropriate application of temperature correction. (<i>Directive 017 4.3.2, 10.1.2, 12.1.1, 14.4</i>)
4.9	Gas and condensate composition and density not updated to the required frequency. (<i>Directive 017 8.4, table 8.3</i>)
4.10	Inaccurate determination of estimated hydrocarbon liquid production. (<i>Directive 017 6.5.1</i>)
4.11	Inaccurate determination of estimated gas production. (<i>Directive 017 6.5, 6.5.1, 7.3.2, 7.4.1, 7.4.2</i>)
4.12	Inaccurate determination of estimated water production. (<i>Directive 017 4.2, 6.4.4, 6.5, 6.5.1, 15.3</i>)
4.13	Inaccurate gas volume calculations. (<i>Directive 017 4, 7</i>)
4.14	Inaccurate well production hours reported. (<i>Directive 007 2.1.3; Directive 017, 4.3.3.1(8), 6.4.1</i>)
4.15	Inaccurate accounting and reporting of actual hydrocarbon liquid production. (<i>Directive 007 2.1.3; Directive 017 6.1–6.3, 6.5, 13.2.2</i>)
4.16	Inaccurate accounting and reporting of actual gas production. (<i>Directive 007 2.1.3; Directive 017 4.1–4.3</i>)
4.17	Inaccurate accounting and reporting of actual water production. (<i>Directive 007 2.1.3; Directive 017 15.1, 15.2</i>)
4.18	Inaccurate accounting and reporting of proration factors. (<i>Directive 007 2.3.1, Directive 017 3.1.4, 6.2.2.4, 7.4.2</i>)
4.19	Inaccurate accounting and reporting of load fluid. (<i>Directive 007 2.1.3(8), 2.1.4(10); Manual 011 appendix 8; Directive 017 6.2.2, 10.3.4, 15.2.10</i>)
4.20	Inaccurate accounting and reporting of metering differences. (<i>Directive 007 2.3; Directive 017 3.2</i>)
4.21	Inaccurate reporting of flare gas. (<i>Directive 007 2.1.3, 2.3; Directive 017 4.3.3.1(4), 12.2.2.1</i>)
4.22	Inaccurate reporting of vent gas. (<i>Directive 007 2.1.3, 2.3; Directive 017 4.3.3.1(4), 12.2.2.1</i>)
4.23	Inaccurate reporting of fuel gas. (<i>Directive 007 2.1.3, 2.3; Directive 017 4.3.3.1(4), 12.2.2.1</i>)
4.24	Inaccurate reporting of acid gas. (<i>Directive 007 2.3(27)</i>)
4.25	Inaccurate reporting of processing shrinkage. (<i>Directive 007 2.3(27); Directive 017 14.3</i>)
4.26	Inaccurate accounting and reporting of hydrocarbon liquid inventories. (<i>Directive 007 2.3.2; Directive 017 12.2.1.4, 14.8</i>)
4.27	Inaccurate accounting and reporting of water inventories. (<i>Directive 007 2.3.2; Directive 017 12.2.1.4, 14.8</i>)

4.28	Inaccurate accounting and reporting of hydrocarbon liquid dispositions. (<i>Directive 007 2.1.3, 2.3.3; Directive 017 6.6, 10.2.1</i>)
4.29	Inaccurate accounting and reporting of gas dispositions. (<i>Directive 007 2.3.3; Directive 017 1.7.2, 4, 7</i>)
4.30	Inaccurate accounting and reporting of water dispositions. (<i>Directive 007 2.3.3; Directive 017 6.6, 10.2.1, 15.2.1, 15.2.2.4</i>)
4.31	Inaccurate accounting and reporting of hydrocarbon liquid receipts. (<i>Directive 007 2.2.1, 2.3; Directive 017 1.7, 6, 10.2.1</i>)
4.32	Inaccurate accounting and reporting of gas receipts. (<i>Directive 007 2.2.1, 2.3; Directive 017 1.7, 4, 10.1.1</i>)
4.33	Inaccurate accounting and reporting of water receipts. (<i>Directive 007 2.2.1, 2.3; Directive 017 1.7, 10.1.1, 15</i>)
4.34	Inaccurate production accounting records. (<i>OGCR 12.030(1), (2); Directive 007 3</i>)

5 System Infrastructure Data

Manual #	Description
5.1	Inappropriate linked well types for the battery. (<i>Directive 007 2.1.1(5); Directive 017 1.10, 4.2.1, 6.2.2, 7.1</i>)
5.2	Inaccurate facility subtype. (<i>Directive 007 2.2.2(20); Manual 011 table 2</i>)
5.3	Inaccurate well status. (<i>Directive 007 2.1; Directive 017 4.2.2, 4.3.3.2, 6.2.2.1, 6.2.3.1, 7.1</i>)
5.4	Inappropriate well measurement for the battery. (<i>Directive 017 4.2.1, 4.2.2, 4.3, 6.2.2, 6.3.1, 6.5, 6.6, 7.1.1, 7.2.1, 7.3, 7.4, 7.5.2, 7.5.3, 7.5.4, 12.2, 12.3</i>)

6 Approval

Manual #	Description
6.1	No approval when required. (<i>Directive 017 5.2, 5.3.3, 5.4.3, 5.5.5, 5.6.3</i>)

7 Audit Trail

Manual #	Description
7.1	Inadequate production audit trail. (<i>OGCR 12.030(1), (2); Directive 017 4.3.3, 6.3.3, 11.5, 14.1, 14.10, 14.11, 15.1</i>)