Manual **014**

Alberta Energy Regulator

Liquid Classification and Well Status Fluid Type Determination for Oil and Gas Wells

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1 Introduction

1.1 About This Manual

This manual clarifies the AER's existing process for classifying liquids and determining well status fluid type. Licensees should consult this manual to ensure they receive the expected liquid classification and well status fluid type.

1.2 How to Use This Manual

The process is described in tabular format, followed by a flowchart. All parameters cited in this manual are expected to be used with valid, representative liquid analyses. This process applies only to oil and gas wells and does not cover in situ bitumen operations. Classifying produced well liquids and determining well status fluid type are two distinct and sequential processes. Each process takes into account the relevant definitions in the *Oil and Gas Conservation Act* and *Oil and Gas Conservation Rules*.

2 Classifying Produced Liquids

During the classification process, the properties of the liquid are examined to determine whether it is condensate (i.e., gas) or oil. Requirements for submitting liquid analyses can be found in the *Oil and Gas Conservation Rules* under section 11.070. The AER will classify liquids independently of well production volumes.

2.1 Parameters for Liquid Classification

Density is the primary characteristic when determining whether a liquid is classified as gas or oil. The AER uses high and low liquid density thresholds to classify the liquid as either condensate (gas) or oil. If a liquid's density (table 1) at stock tank conditions is between 780 and 800 kilograms per cubic metre (kg/m^3), a second set of characteristics is used to classify the liquid (table 2). Refer to *Directive 017: Measurement Requirements for Oil and Gas Operations* for definitions of stock tank conditions. The parameters in table 2 should be considered in sequence (i.e., only consider C30+ mass fraction if absolute viscosity does not yield a definitive result).

Table 1. Liquid classification primary characteristics

	Condensate	Indeterminate	Oil
Liquid density (kg/m^3)	<780	780–800	>800

Table 2. Liquid classification secondary characteristics

	Condensate	Indeterminate	Oil
Absolute viscosity (millipascal-seconds [mPa·s])	<1.5	1.5–2.2	>2.2
C30+ mass fraction	<0.01	0.01–0.03	>0.03

If after considering the C30+ mass fraction, it is still not possible to classify the liquid, the AER may request additional clarification, samples, or studies from the licensee submitting the analysis.

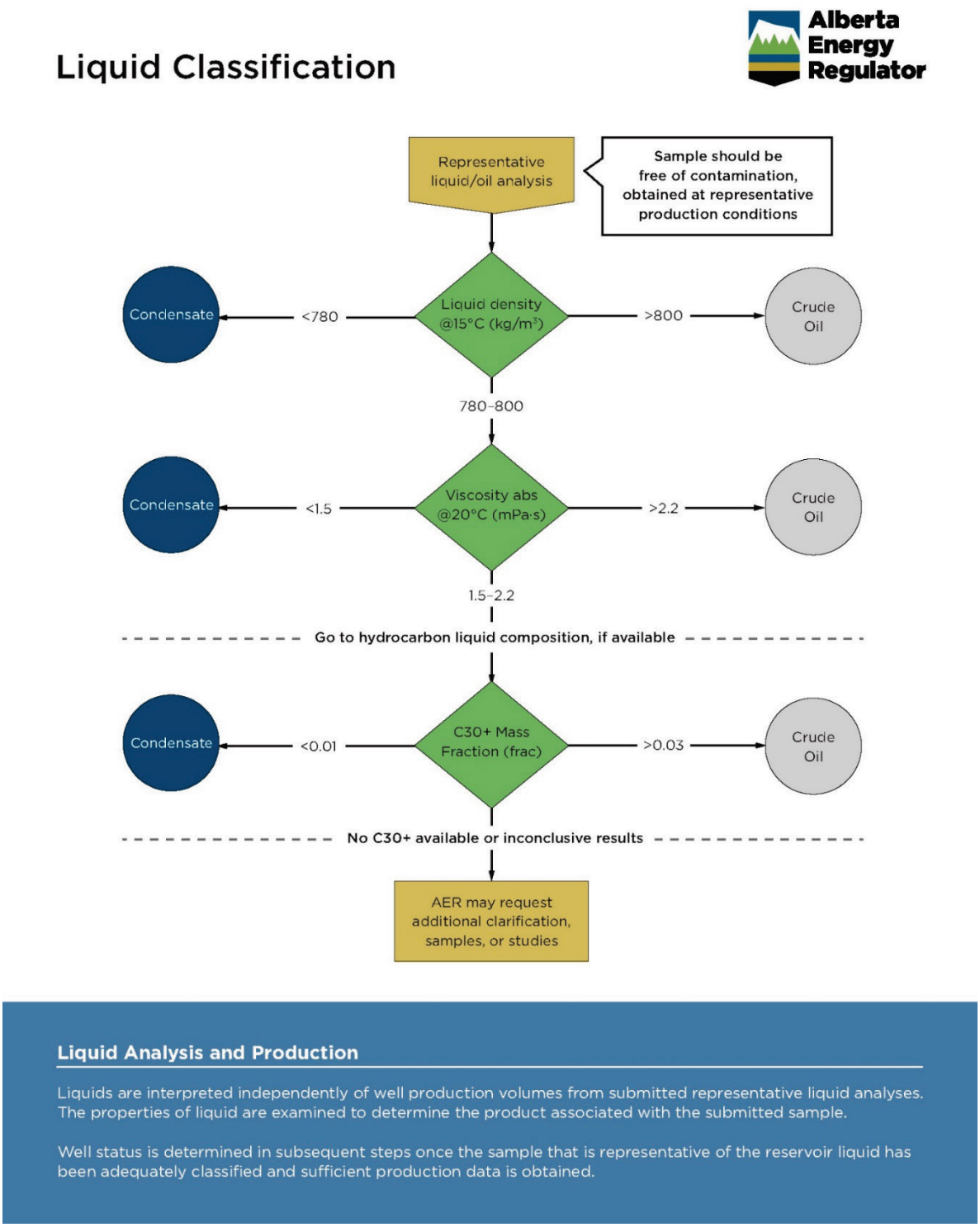

Figure 1. Flowchart for liquid classification

3 Determining Well Status Fluid Type

The well status fluid type is determined after fluid samples have been classified and after sufficient production hours have been logged to achieve a stabilized oil production rate and a stabilized gas-oil ratio (GOR). A well's production should follow a predictable trend and be free of completion effects or other interference. A certain amount of tolerance on production rate and GOR is provided in the tables below to account for special circumstances and unusual production characteristics. In general, stabilized oil rates and a stabilized producing GOR are indicative of a well's true production and are typically free from conflicting operational factors.

3.1 Sufficient Production Data

Well status fluid type can only be finally determined after sufficient production hours have been logged and once a valid and representative fluid analysis has allowed liquids to be classified. Horizontal stimulated wells may require up to nine months of production to accurately determine well status.

3.2 Parameters for Determining Well Status Fluid Type

The AER will determine the well status fluid type once the liquid has been classified and sufficient stable production data has been obtained.

Table 3. Wells producing only gas or condensate or both

	Gas fluid type	Oil fluid type
All circumstances with no oil production	Always	Never

Table 4. Vertical, deviated, or open-hole horizontal wells producing any quantity of oil

	Gas fluid type	Oil fluid type
Stabilized daily oil production rate (m^3/d)	<2	>2
Stabilized GOR (m^3/m^3), when daily oil production rate <2m^3/d	>1800	<1800
Supporting pools, offsets, analogies	Part of a gas pool or trend	Part of an oil pool or trend

The AER may review the well status fluid type for vertical, deviated, or open-hole horizontal wells after three months of production.

Table 5. Horizontal stimulated wells producing any quantity of oil

	Gas fluid type	Oil fluid type
Stabilized daily oil production rate (m^3/d)	<5	>5
Stabilized GOR (m^3/m^3), when daily oil production rate <5m^3/d	>5000	<1800
Supporting offsets, analogies	Part of a gas trend	Part of an oil trend[1]

[1] without significant solution gas

The AER may review the well status fluid type for horizontal stimulated wells after nine months of production.

3.3 Well Status Changes

Some oil well GORs are expected to increase due to decreasing oil production rates over the life of a well. These wells will generally continue to be classified as oil if the well status fluid type has been previously determined. Gas wells that begin to produce significant quantities of oil (>5 m^3/d on average and ≤1800 GOR) will be reviewed for a potential change to oil status.

3.4 Verifying produced liquids for Volume Gas Well Liquid status wells

For gas wells set to Volume Gas Well Liquid (VGWL) status by the initial reporting of liquids, licensees can follow the liquid classification process flow chart (figure 1) to confirm the liquid type via representative fluid analysis. Once the liquid classification is confirmed, licensees can then follow the well status fluid type process flow chart (figure 2) to determine whether their wells require reclassification to oil or will remain as a gas well. Contact the AER for further clarification.

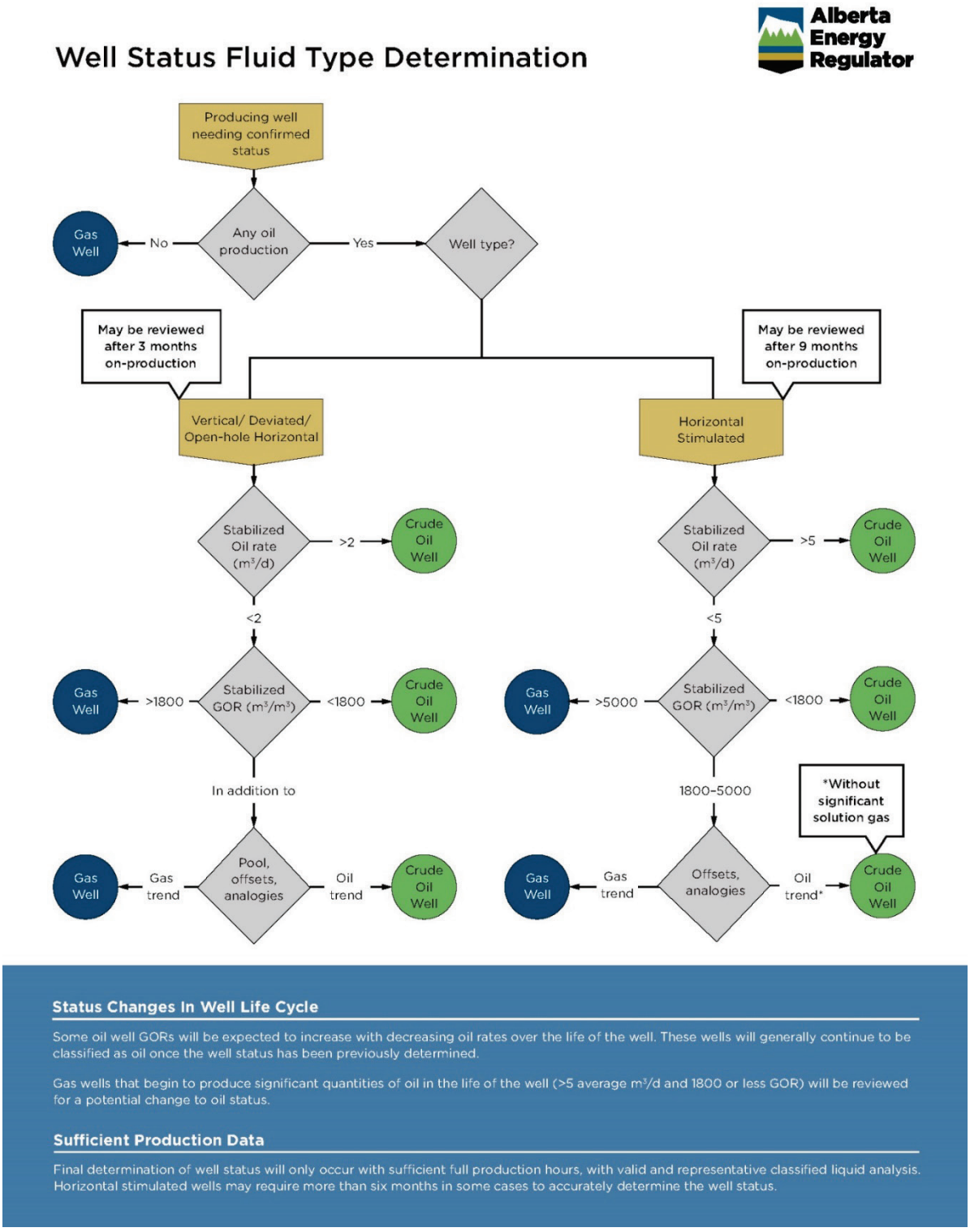

Figure 2. Flowchart for well status fluid type determination