Draft Directive [XXX]

Release date: [Month XX, 20XX]

Effective date: [Month XX, 20XX]

Requirements for Hydrocarbon Emission Controls and Gas Conservation in the Peace River Area

The Alberta Energy Regulator has approved this directive on [Month day, year].

[<*original signed by*>]

[Name]
[Title-Chair]

Contents

1 Introduction

1.1 Purpose of This Directive

This directive sets out the Alberta Energy Regulator's (AER) requirements for addressing odours and emissions generated by heavy oil and bitumen operations in the Peace River area of Alberta.

For the Peace River area, these requirements are intended to

- reduce hydrocarbon emissions that contribute to odours and

- increase the conservation of gas resources.

This directive includes requirements to

- eliminate routine and effectively eliminate nonroutine venting;
- reduce nonroutine flaring;
- conserve nearly all casing gas and tank-top gas;
- reduce fugitive emissions;
- minimize odours from truck loading, truck unloading, tank cleaning, and desanding activities; and
- participate in a regional ambient air monitoring program.

This directive applies to all AER-regulated facilities associated with heavy oil and bitumen operations in the Peace River area regardless of whether the facility is exempt from *Directive 056: Energy Development Applications and Schedules* licensing requirements. Where a conflict arises between the requirements in this directive and any other AER requirements, the requirements in this directive prevail unless otherwise directed by the AER.

Facilities in this area may also operate under an *Environmental Protection and Enhancement Act* (*EPEA*) approval, and the requirements in this document are in addition to, and separate from, *EPEA* approval requirements. Licensees must meet all applicable requirements.

The Peace River area, as defined in this directive, comprises the Three Creeks, Reno, Seal Lake, and Walrus areas (see Figure 1). Where heavy oil and bitumen facilities are built in close proximity to these defined areas, the AER may direct companies to comply with all or a part of these requirements.

This directive does not apply to AER-approved waste disposal facilities located in the Peace River area.

Questions on how to use this directive should be directed to XXXXX:

Phone: 403-XXX-XXXX
Fax: 403-XXX-XXXX

E-Mail:XXXXXXXX@aer.ca

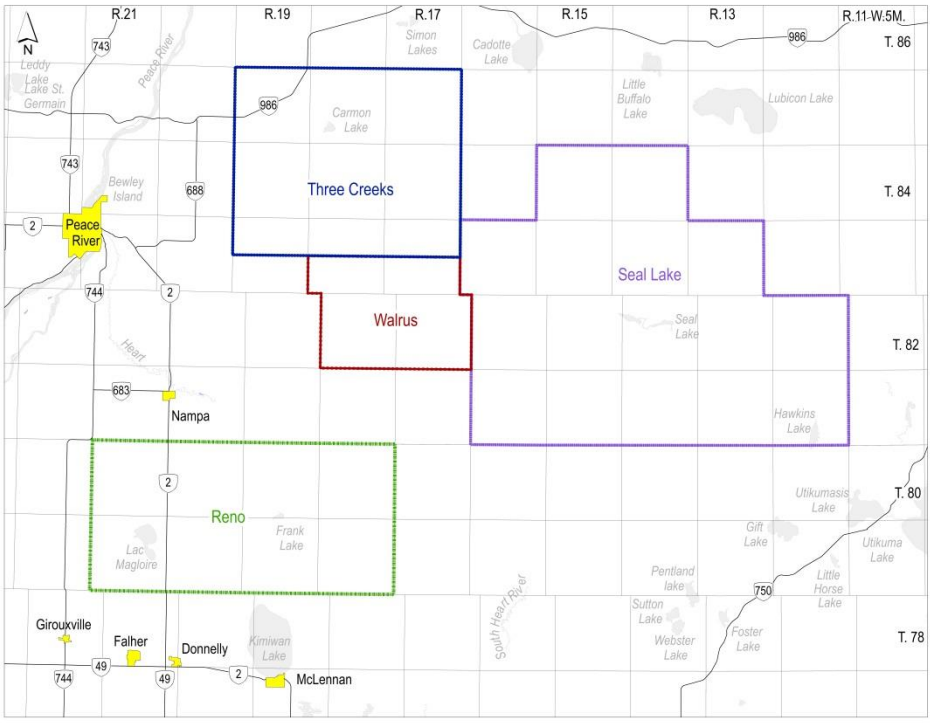

Figure 1. Map of the Peace River area as defined in this directive

1.2 AER Requirements and Compliance Assurance

The term "must" indicates an AER requirement for which compliance is required and which is subject to AER enforcement. The terms "recommends" or "expects" indicate recommended practices and are not subject to enforcement action.

Each AER requirement is numbered. Noncompliance with any requirement may result in a responsible duty holder (as specified in legislation—e.g., licensee, operator, company, applicant, approval holder, or permit holder) receiving a response in accordance with the AER's *Compliance Assurance Framework*. A list of noncompliance events is available from the AER website, www.AER.ca.

Upon request by the AER, a licensee must produce those documents, records, or plans required to be completed by this directive and any additional documentation needed by the AER to assess compliance with the regulatory requirements in this directive. The AER recommends that all documentation be kept on file for the life of the well and all the facilities associated with it.

2 Routine and Nonroutine Venting

2.1 Objective

To eliminate routine venting and to effectively eliminate[1] nonroutine venting of casing gas and tank-top gas from heavy oil and bitumen operations in the Peace River area.

2.2 Requirements

1) Unless otherwise directed by the AER, licensees that produce heavy oil and bitumen must capture and flare, incinerate, or conserve all casing gas and tank-top gas.

2) Licensees must implement suitable and functional controls to prevent nonroutine venting.

3 Limitations on Nonroutine Flaring

3.1 Objective

Reduce nonroutine flaring associated with heavy oil and bitumen operations in the Peace River area.

3.2 Requirements

3) Licensees must reduce nonroutine flaring of casing gas and tank-top gas during emergency or upset situation at conserving facilities.

4) Starting January 1, 2018, a licensee's nonroutine flaring volumes must not exceed 3 per cent of its total gas production volumes in any calendar year. Fuel gas used for pilots or flare system purge is excluded from this calculation.

$$Per\ cent\ nonroutine\ flaring = \frac{total\ annual\ gas\ flared\ at\ all\ conserving\ facilities}{total\ annual\ gas\ production\ at\ all\ conserving\ facilities} \times 100$$

5) As part of a licensee's annual performance report (see section 8), a licensee must submit an inventory of its heavy oil and bitumen facilities in the Peace River area for the preceding calendar year. The inventory must indicate which facilities are conserving facilities, including the licence numbers, surface locations, and facility IDs used for volumetric submissions to Petrinex. Unless otherwise directed by the AER, the listed conserving facilities must be the same as those facilities used in the calculation described in requirement 4.

The licensee must comply with the solution gas flaring limitations in section 2.11 of *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting* during facility upsets and outages, except for the allowance for venting.

[1] A rare unforeseeable emergency event may occur, resulting in short-term nonroutine venting. The requirements detailed in this directive provide for the elimination of nonroutine venting to the extent reasonably practical given that total elimination is not possible.

4 Gas Conservation

4.1 Objective

Increase the conservation of casing gas and tank-top gas being produced from heavy oil and bitumen operations located in the Peace River area.

4.2 Requirements

6) Unless otherwise set out in a gas conservation plan that has been accepted by the AER, all licensees of existing heavy oil and bitumen operations must achieve a cumulative gas conservation rate of 95 per cent for their heavy oil and bitumen operations in the Peace River area. A licensee's gas conservation rate is calculated on a calendar-year basis as follows:

$$Percent\ gas\ conservation\ rate = \frac{total\ gas\ production - (total\ gas\ flared + total\ gas\ vented)}{total\ gas\ production} \times 100$$

7) Notwithstanding requirement 6), licensees that do not have existing heavy oil or bitumen operations in the Peace River area must meet the 95 per cent gas conservation rate for their first battery within 12 months of the on-production date of the battery unless otherwise directed by the AER.

5 Fugitive Emissions

5.1 Objective

Reduce fugitive emissions from heavy oil and bitumen operations located in the Peace River area through frequent inspections and the prompt repair of leaks and improve transparency through the reporting of actions related to the detection and repair of these leaks.

The requirements in this section apply to all sites once they begin meeting requirement 1.

5.2 Requirements

5.2.1 Fugitive Emissions Management Program

8) A licensee must develop, document, and implement a fugitive emissions management program (FEMP). This program must outline the procedures and plans that will be used to meet the requirements set out in this directive. The basic elements of this program and references to the respective sections of the directive that set out the requirements for these elements are shown in Figure 2. Licensees must make their FEMP available to the AER upon request.

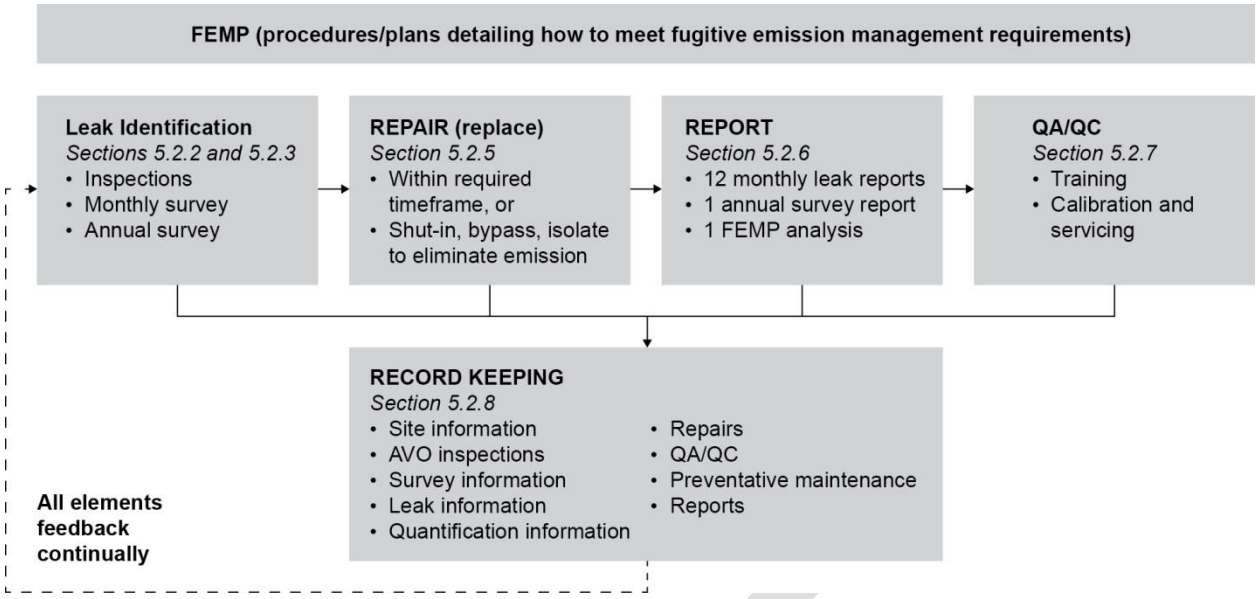

Figure 2. Elements of a fugitive emissions management program

5.2.2 Inspections and Surveys

9) A licensee must develop, document, and implement plans to accurately identify leaking components.

10) The licensee must include in its FEMP a detailed description of how inspections and surveys are conducted, including, for example, the distance from the base of a tank when a hydrocarbon leak-imaging infrared camera is being used.

5.2.2.1 Unscheduled Inspections

11) A licensee must immediately conduct an inspection

a) upon becoming aware of a possible leak,

b) in response to an odour complaint, or

c) as directed by the AER.

It is recommended that when licensees become aware that a pressure-relief device has been activated, the component be checked to ensure that the component has reseated properly. Licensees should consider putting in place measures to detect when pressure-relief devices have been activated where these situations are not apparent.

It is recommended that licensees inspect for leaks following any maintenance or servicing activities that could have introduced a leak.

5.2.2.2 Weekly Audio/Visual/Olfactory Inspections

12) A licensee must conduct weekly audio/visual/olfactory (AVO) inspections. The AVO inspections must be conducted inside and outside of each active process building, around all process units, and along all aboveground piping. AVO inspections should check for

    a) stains, wet areas, or dripping around thief hatches, pressure vacuum valves, and gauge board assemblies on storage tanks;

    b) frosting or sweating of valves and pressure-relief devices connected to vent lines;

    c) visible vapour or steam plumes from components;

    d) normally closed valves connected to vents or open-ended lines that are not fully closed during normal operations;

    e) components that have been temporarily removed for inspection, maintenance, or other purposes and not put back in place afterwards;

    f) unlit pilots on fired equipment (e.g., tank heaters and line heaters) and unlit flares;

    g) odours inside buildings and downwind of piping, process equipment, and storage tanks;

    h) sounds indicative of a leak; and

    i) other reasonable indications of a leak.

Acceptable proof of the AVO inspections can take the form of an addition to existing operator check sheets or preventative-maintenance forms that show when an AVO inspection was done.

5.2.2.3 Monthly Surveys

13) A licensee must conduct a monthly survey of targeted components, and there must be a minimum of 7 days between monthly surveys.

14) Mandatory targeted components are those components that must always be checked and cannot be removed from the targeted component list. Monthly surveys must include the following mandatory targeted components:

    a) tank-top components (e.g., thief hatches, pressure vacuum relief valves, and gauge board assemblies),

    b) flare igniter or pilot (ensure it is lit), and

    c) compressor seals.

15) A licensee must add a component to its list of targeted components for individual sites

    a) when directed by the AER,

    b) if a component has led to a public odour complaint, or

c) if a component has been found to be leaking two or more times in the preceding three consecutive months.

16) A licensee must add a component to its list of targeted components for all its sites

a) when directed by the AER, or

b) where a component at multiple sites exhibit either high leak volumes or have a high frequency of leaking.

Components added to a list of targeted components by the licensee can be removed on a per-site basis if one of the following conditions is met:

- the component has been replaced or
- the component has gone three consecutive monthly surveys without leaking.

5.2.2.4 Annual Surveys

17) An independent third-party survey of all site components must be conducted annually to verify the effectiveness of a licensee's FEMP.

18) There must be a minimum of 7 days between an annual and a monthly survey. There must be a minimum of six months between annual surveys.

5.2.3 Leak Detection Equipment

19) A licensee must use reliable and appropriate leak detection techniques or equipment when conducting inspections and surveys.

For monthly and annual surveys, the following applies:

Hydrocarbon leak-imaging infrared cameras must be capable of detecting a methane leak rate of approximately 1.0 gram per hour.

When using hydrocarbon leak-imaging infrared cameras, the licensee should

- be within 6 metres for all components (tank tops can be viewed at further distances but should be at the minimum distance required to view tank-top components, usually not greater than 30 metres from the base of the tank);
- inspect components perpendicular to the wind direction;
- use an appropriate lens to monitor tank-top components (a fixed lens of 70 millimetres or more should be used on tank tops when viewing from distances approaching 30 metres);
- view at multiple angles; and
- account for interference from sunlight, precipitation, wind, and ambient temperatures.

Organic vapour analyzers, if used, must be able to detect hydrocarbon gases at a concentration of 500 ppm when used in accordance with US EPA Method 21.

Other techniques or equipment that provide an equivalent leak detection capability are permissible, but a licensee must demonstrate equivalence to the satisfaction of the AER on request.

If more than one technique is used, it will be considered a leak if any method determines it is a leak.

5.2.4 Quantification of Leak Rates

20) A licensee must quantify leak rates if

    a) a leak is not repaired or leaking component not replaced within 24 hours, or

    b) a leak is detected during the annual survey.

21) The single point measurement uncertainty must not be greater than 25 per cent. Leak-rate measurement methods may include flow capture and metering systems (e.g., calibrated bags, turbine meters, ultrasonic gas flow meters, diaphragm meters, rotameters, and optical flow meters), velocity traverses, tracer tests, or remote sensing techniques. The methods used to quantify leaks must be documented and provided to the AER on request.

22) A licensee may only use engineering estimates of leak rates for sources of leaks that have demonstrable safety issues or technical challenges (e.g., tank-top fittings), unless otherwise specified by the AER. The basis of all estimates must be documented.

5.2.5 Repairs

23) A licensee must start addressing the leak (e.g., repair, shut-in, bypass, isolate, or eliminate) immediately upon detection.

24) A leak must be repaired immediately if the source of a leak is a failed pilot or ignitor on a flare stack.

25) For any equipment that is in service, the leak must be repaired or leaking component replaced

    a) within 24 hours of identification, if

        i) the leak rate is greater than 0.20 cubic metres per hour;

        ii) the leak is causing, or has the potential to cause, off-lease odours, regardless of the leak rate; or

        iii) the leak rate is not quantified.

    b) within 120 hours of identification, if

i) the leak rate is less than or equal to 0.20 cubic metres per hour (rate must be confirmed by quantification within 24 hours) and

ii) the leak is not causing, or does not have the potential to cause, off-lease odours.

26) Within 24 hours of a leak having been repaired and put back into service, a licensee must confirm that the component is no longer leaking.

27) If a leak is not immediately repaired, a licensee must have a method to clearly identify the leak for subsequent repair and repair confirmation. The licensee's identification method must be documented and provided to the AER on request. The AER recommends that a licensee use physical tagging to identify leaks for repair and that the tags be removed once the integrity of the repair has been confirmed.

5.2.6 Reporting

5.2.6.1 Monthly Leak Reports

28) A licensee must submit a monthly leak report that covers all of its sites and must

a) include all leaks detected by monthly surveys and all other inspections,

b) be submitted to the AER at XXX@aer.ca using the form in Appendix 2,

c) be submitted by the 18th of the month (or next business day) following the month of the monthly inspection, and

d) be certified by management that the information they contain is true, accurate, and complete.

5.2.6.2 Annual Survey Reports

29) A licensee must submit one annual survey report that covers all of its sites and must be

a) submitted to the AER at using the form in Appendix 3,

b) attached to the annual FEMP analysis report, and

c) certified by management that the information it contains is true, accurate, and complete.

5.2.6.3 Annual FEMP Analysis Report

30) A licensee must submit one annual FEMP analysis report that covers all of its sites and must

a) contain the information listed in Appendix 4 and

b) be submitted to the AER as part of the annual performance report (see section 8) by March 31 of the year immediately following the report reference year.

5.2.7 Quality Assurance/Quality Control Program

31) A licensee must have a quality assurance/quality control (QA/QC) program that includes the following elements:

5.2.7.1 Training

32) A licensee must develop and implement an effective training program on the procedures and the equipment necessary to complete monthly surveys.

To be considered effective a licensee's training program should include training on

- the use, calibration, and maintenance of equipment used to detect leaks and to quantify leak rates,
- survey procedures and component identification, and
- desktop training, field training, and periodic refresher courses.

Periodic audits of survey work should be considered as a method of evaluating the effectiveness of the training program.

5.2.7.2 Calibration and Servicing Requirements

33) All equipment used to detect leaks and to quantify leak rates must be operated, serviced, and calibrated in accordance with manufacturer's specifications and recommended practices.

5.2.8 Record Keeping

34) A licensee must retain a complete record of all surveys, inspections, leak detection and quantification results and procedures, leak repairs, quality assurance and quality control programs, and reports. The information that a licensee must retain is contained in Appendix 5.

35) A licensee's records must be

a) retained for at least five years,

b) made available to the AER on request, and

c) accessible by the AER at the local field office or another nearby site.

6 Truck Loading and Unloading, Tank Cleaning, and Desanding

6.1 Objective

Implement measures to minimize odours from truck loading and unloading, tank cleaning, and desanding activities.

6.2 Requirements

36) The licensee must implement suitable and functional controls for emissions that have the potential to cause, or are causing, off-lease odours when

a) loading and unloading fluids from upstream petroleum industry facilities by truck and

b) cleaning and desanding storage tanks.

Emission controls may include

- scrubbers,
- flares and incinerators,
- pressurized trucks, and
- operational procedures.

37) The thresholds described in the *Alberta Ambient Air Quality Objectives and Guidelines* (AAAQO) must not be exceeded outside the lease boundary.

38) All licensees operating within the Peace River area must meet these requirements as of January 1, 2018. The AER expects licensees to work towards meeting these requirements in the interim.

39) A licensee must develop, document, implement, and retain an emission controls program for truck loading, truck unloading, tank cleaning, and desanding that ensures that emissions controls are suitable and functional, in the opinion of the AER.

This program should identify and describe

- compounds that have the potential to cause off-lease odours or AAAQO exceedances;
- methodologies and analyses used to determine the compounds with the potential to cause off-lease odours or AAAQO exceedances;
- emission controls installed and implemented, including their effectiveness;
- criteria used to select suitable emission controls;
- maintenance and monitoring procedures of emission controls; and
- activities or actions taken to continuously improve the emissions control program.

40) The emission controls program for truck loading, truck unloading, tank cleaning, and desanding must be made available to the AER upon request.

7 Ambient Air Monitoring

7.1 Objective

To establish an ambient air monitoring program in the Peace River area that provides credible and comprehensive data to permit the identification and appropriate response to odour- and emission-related issues from heavy oil and bitumen operations.

7.2 Requirement

41) Unless otherwise directed by the AER, licensees operating in the Peace River area must participate in a regional ambient air monitoring program coordinated by the Alberta Environmental Monitoring, Evaluation and Reporting Agency, such as the Peace River Area Monitoring Program or other successor program.

8 Annual Performance Report

8.1 Objective

Licensees report consistent and relevant information on progress related to meeting the regulatory outcomes specified in this directive.

8.2 Requirements

42) All Peace River area operators must submit the following information about the previous calendar year to the AER prior to March 31 at XXX@aer.ca:

a) Routine Venting

i) Progress related to installing controls to meet requirement 1).

ii) The types of controls installed in order to eliminate routine venting.

b) Nonroutine Venting

i) Progress related to installing controls to meet requirement 2).

ii) The types of control installed in order to effectively eliminate nonroutine venting.

c) Nonroutine Flaring

i) Summary of the nonroutine flaring percentage at conserving facilities for the previous calendar year. The data should include a breakdown of nonroutine flaring at each facility and a cumulative total for the entire company.

ii) A list of facilities that will be conserving gas by January 1 of the next calendar year.

iii) Information on whether these nonroutine flaring requirements are met during the interim years of 2016 and 2017.

d) Gas Conservation

i) For existing licensees, progress related to meeting AER-approved gas conservation targets.

ii) Details on how much gas was produced on a monthly basis at the heavy oil and bitumen operations and on how much was conserved by each conservation method (e.g., onsite power generation).

iii) Information on any challenges and successes related to conserving gas.

e) Fugitive Emissions

i) The annual FEMP analysis report (see section 5.2.6.3).

f) Truck Loading and Unloading, Tank Cleaning, and Desanding

i) Emission control equipment installed and operating practices implemented to minimize odours from truck loading and unloading, tank cleaning, and desanding activities.

ii) Identify any changes to the emissions control program.

iii) For the 2016 and 2017 interim years, provide information on progress related to meeting these truck loading and unloading, tank cleaning, and desanding requirements.

8.3 Continuous Improvement

It is recommended that licensees continually improve their operations by evaluating the effectiveness of their operations in meeting the regulatory objectives of this directive to control odours and emissions in the Peace River area. Licensees are encouraged to document the operational improvements they make and to present them as part of their annual report.

Appendix 1 Glossary

casing and tank-top gas	Gas produced from the well casing is referred to as casing gas, and gas given off from the heavy oil while in production tanks is referred to as solution or tank-top gas.
component	A component is defined as a device that has the potential to leak. Components include the following: valves, connectors, compressor seals, pump seals, actuator seals, pressure-relief devices, flow meters, pressure regulators, sampling connections, instrument fittings, engine and compressor crankcase vents, sump and drain tank vents and covers, blowdown system vents and open-ended valves and lines, thief hatches, pressure vacuum relief valves, and gauge board assemblies.
conservation	The recovery of solution gas for use as fuel for production facilities, sale, beneficial injection into an oil or gas pool, or other useful purposes (e.g., power generation).
conserving facility	Conserving facilities must be designed to operate at a minimum conservation efficiency of 95 per cent and must recover casing gas and tank-top gas for use as fuel for production facilities, sale, beneficial injection into oil or gas pool, or other purposes (e.g., power generation).
control	Equipment, mechanism, technique, procedure, or device used to guide performance or manage an activity or process.
control, functional	A control that is useful, functioning, working, operating, in service, or otherwise performing for the appropriate amount of time to fulfil its purpose, task, or regulatory requirement.

control, suitable A control that is designed, constructed, maintained, and operated such that it effectively fulfills its function for an activity in relation to a specific AER requirement and meets all applicable regulatory standards or requirements (e.g., AER *Directive 060*, Canadian Standards Association, *Safety Codes Act*). In the case of emissions with the potential to cause off-lease odours, a suitable control is one that is able to safely manage odorous emissions at a well or facility so that they do not cause off-lease odours. In most cases, this would entail equipment designed to a point source control efficiency of at least 95 per cent for the odorous compounds it is meant to control. In the case of nonroutine venting, a suitable controls is one that is able to safely manage product flow and pressures while preventing venting from a well or facility.

crude bitumen A naturally occurring viscous mixture, mainly of hydrocarbons and heavier than pentane, that may contain sulphur compounds and that, in its naturally occurring viscous state, will not flow to a well.

fugitive emission A fugitive emission is defined as an unintentional release of hydrocarbons to the atmosphere. Fugitive emissions may result from equipment component leaks, wear and tear, improper assembly, inadequate material specifications, manufacturing defects, damage during use or installation, corrosion, and fouling.

Fugitive emission sources also include

- leakage into engineered vent systems,
- improper seating of pressure-relief devices and purge gas valves, and
- gas consumption in excess of design parameters for pneumatic devices that use hydrocarbon as the supply medium.

The following emission sources are not included as part of these requirements:

- area-based sources such as ponds or pits, and
- exhaust from burners, engines, flare stacks, combustors, or incinerators.

heavy oil Crude oil with a density of 900 kg/m^3 or greater.

leak

A leak is defined as a fugitive emission that results from the loss of hydrocarbon past a component at a rate in excess of a manufacturer's design specifications or health, safety, or environmental standards, whichever is more stringent, or as otherwise directed by the AER.

In the absence of quantifying the leak rate, in relation to the above, a component is leaking and in need of repair or replacement if

- the emissions can be seen or detected using a hydrocarbon leak-imaging infrared camera, or
- the emissions produce a hydrocarbon screening value of 500 ppm or greater using an organic vapour analyzer in accordance with U.S. EPA Method 21.

nonroutine venting and flaring

"Nonroutine" applies to intermittent and infrequent flaring, venting, and incineration. There are two types of nonroutine flaring: planned flaring and unplanned flaring (see *Directive 060*).

oil battery

A system or arrangement of tanks or other surface equipment or devices receiving the effluent of one or more wells for the purpose of separation and measurement prior to the delivery to market or other disposition.

venting

The intentional controlled release of uncombusted gas.

Appendix 2 Monthly Leak Report Form

MONTHLY LEAK REPORT: LICENSEE INFORMATION			
Licensee:		**Survey Month (MM/YY):**	
		Date Submitted (DD/MM/YY):	
Number of Sites:		**Number of Sites with Detected Leaks:**	
Manager Responsible*:		**Were monthly surveys conducted at all sites? (Yes/No)**	
Licensee Representative for Inquiries:		**Phone Number:**	

MONTHLY LEAK REPORT: INFORMATION ON LEAKING SITES						
License* **	**Surface Location (LSD-SECT-TWP-RG-MER)**	**Monthly Survey**		**Number of Leaks Identified Through facility inspections****	**Number of Leaks not Addressed within Required Timeframes**	**Comments on Leaks not Addressed Within Required Timeframes**
		Number of Leaking Targeted Components	**Number of Leaking Non - Targeted Components**			

*** By submitting this report, on behalf of the Licensee, you are declaring the information contained in this report to be true, accurate, and complete.**

****Inspections can include routine AVO inspections, inspections triggered by off-lease odour complaints and AER inspections.**
***** One license per site, with facility taking priority over well license**

Appendix 3 Annual Survey Report Form

ANNUAL SURVEY REPORT: LICENSEE INFORMATION			
Licensee:		**Survey Year:**	
		Date Submitted (DD/MM/YY):	
Number of Sites:		**Number of Sites with Detected Leaks:**	
Manager Responsible* :		**Were annual surveys conducted at all sites? (Yes/No)**	
Licensee Representative for Inquiries:		**Phone Number:**	

ANNUAL SURVEY: INFORMATION ON LEAKING SITES				
License **	**Surface Location (LSD-SECT-TWP-RG-MER)**	**Number of Leaks Identified Through Annual Survey**	**Number of Leaks not Addressed within Required Timeframes**	**Comments on Leaks not Addressed Within Required Timeframes**

*** By submitting this report, on behalf of the Licensee, you are declaring the information contained in this report to be true, accurate, and complete.**

**** One license per site, with facility taking priority over well license**

Please be advised that this information is being collected as a result of the implementation of *Decision 2014 ABAER 005: Report on Recommendations on Odours and Emissions in the Peace River Area* and will form part of the public record. As per *Decision 2014 ABAER 005*, the information provided by operators in this report will be made available to the public and may be attributed to the specific operator or licensee providing it. Any personal information contained in your response will be collected, used, and disclosed in accordance with the *Freedom of Information and Protection of Privacy Act.*

Appendix 4 Annual FEMP Analysis Report

The annual FEMP analysis report must contain the following sections and information:

1) Monthly Leak Reports Summary

This summary includes all leaks detected by monthly surveys and inspections. Inspections can include routine AVO inspections, inspections triggered by off-lease odour complaints, and AER inspections.

Include a summary table giving information by month and year of the following:

- Number of sites and number of sites with leaks detected
- Number of leaks of targeted components
- Number of leaks of non-targeted components
- Number of leaks identified through inspections
- Number of leaks not addressed within required timeframes
- Comments on repairs not completed within required timeframes

2) Annual Survey Report

This is the summary report referred to in section 5.2.6.2.

3) Annual Survey Data

This data is from all components and includes leak information from the annual survey.

- Number of leaks by component type.
- Number of components (see below) by component type (estimate or actual).
- Leak frequency by component type.
- Leak volumes for each component type together with method of quantification (e.g., high-flow sampler, flow meter, etc.).

4) Summary of monthly leaks from Record Keeping

This data is from all leaks reported throughout the year except the annual survey report.

- Number of leaks by component type.
- Leak frequency by component type.
- Number of leaks attributed to off-site odours.
- Number of leaks by leak identification method (e.g., AER inspection, operator inspection,

operator survey).

- Number of leaks not addressed within required timeframes by component type.
- Leak volumes by method of quantification (e.g., high-flow sampler, flow meter) for all leaks not addressed within 24 hours.

5) Performance of Fugitive Emissions Program

   a) Discussion of trends shown in monthly reports.

      i) Leaks increasing, decreasing, or remaining relatively unchanged

      ii) Leaks by component type as recorded in

         - monthly surveys
         - annual surveys

      iii) Differences observed between monthly and annual surveys

      iv) Will the targeted component list be modified, and if so, what modifications will be made and why?

   b) What changes will be made to routine AVO and other inspections?

   c) Rank-order sites according to the number of leaks detected and the numbers of repeat leaks. Discuss the results (e.g., why certain sites are higher than others)

6) Plans for Further Fugitive Emissions Reductions

   a) How will preventative maintenance programs be adjusted?

   b) What design changes will be made?

   c) What are the plans to address sites that have greater leak numbers, greater leak volumes or greater repeat leaks (see 5(b) above)?

Component Counting

Component inventories may be developed either by applying representative component schedules to each major process unit or equipment package, including the yard piping, or by an in-field inspection of individual process units and areas.

While component inventories may be derived from process diagrams, this method frequently underestimates component numbers due to the lack of detail on most process diagrams. This is especially true for fittings (e.g., connectors and valves less than 2 nominal pipe size) and any third-party packages (e.g., compressor units, heaters, and scrubbers).

When counting each component, it is important to also record the percentage of the time that it is out of service (i.e., there is zero gauge pressure on both sides of the component). This information can be used to adjust leak frequencies accordingly.

The following are recommended practices for compiling an inventory of components based on standard component classifications:

- **Compressor seals**: A reciprocating compressor is deemed to have one seal associated with each compressor cylinder regardless of whether it is a single or tandem seal. A centrifugal compressor has two seals if the shaft penetrates both ends of the compressor housing, or one seal if the shaft penetrates only one end of the housing. Other components on the compressor and on any associated cooler must be accounted for separately (e.g., valves, connectors, pressure-relief valves, open-ended valves and lines, and gas-operated instruments).
- **Connectors**: Each threaded, flanged, or mechanical connection, including tubing connections, is counted as a single connector. Welded or backwelded connections are not counted.

Some types of components may have more than one set of connections. For example, a union may have three sets of connecting surfaces (two end connections and a centre connection), a nipple or reducer may have two (one at each end), and tees may have three (one at each end). If all three connection points on a union are threaded, then a union would be classified as having three connectors. A union that has welded end connections would be counted as having only one connector.

- **Valves**: This category accounts for leakage from around the valve stem and from the valve body. The end connections and any leakage past the valve seat are counted separately (see connectors and open-ended valves or lines).
- **Pressure-relief valve**: Generally, a pressure-relief valve that discharges directly to the atmosphere or through a vent system is counted. However, if the valve discharges to a control device (e.g., flare or thermal oxidizer), or has a rupture disk installed upstream along with a monitoring system to indicate when the rupture disk has failed, then the valve is not counted.

  The connection on the upstream side of the valve is counted as a separate component. The connection on the downstream side is also counted if the relief valve is connected to a control device.
- **Pressure regulators:** If the regulator discharges directly to the atmosphere or through a vent system, it is counted. However, if the regulator discharges to a control device (e.g., flare or thermal oxidizer), it is not counted. The connections upstream and downstream of the regulator are counted as separate components.
- **Open-ended valves or lines**: Each valve in hydrocarbon service that has hydrocarbon fluid on

one side and is open to the atmosphere on the other (either directly or through a line) is counted as an open-ended valve or line. If the open side of the valve is fitted with a properly installed cap, plug, blind flange, or second closed block valve, or is connected to a control device, then it is no longer considered to be open-ended (i.e., there is zero leak potential).

A drain valve that discharges into the top of an underground storage tank is considered an open-end line.

The valve stem and body, and the connector on the process side of the valve are counted as separate components.

- **Sampling System:** The individual parts of a sampling system should be counted as separate components. Thus, an open-ended line that is used for routine sampling would be counted as both a sampling system and an open-ended line.

Appendix 5 Record Keeping Information

For each site, a licensee must record, and retain for a period of 5 years, the following information:

1) Site Information
    a) Licence number
    b) Site name (if applicable)
    c) Location by legal land description (LSD-SEC-TWP-RG-MER)
    d) Site type (e.g., thermal, cold heavy oil production)
    e) Number of production tanks
    f) Number of components by component type (estimated or actual; see "Component Counting" section in Appendix 4)
2) AVO Inspections
    a) Date of inspection
3) Survey Information
    a) Name and contact information of person conducting survey
    b) Contractor name of survey staff (if applicable).
    c) Date of surveys
    d) Duration of survey
    e) Environmental conditions during survey (e.g., wind speed, ambient temperature)
    f) Targeted component identification and tracking process
4) Leak information
    a) Date and time the emission/odour was first detected
    b) Where the odour was detected (if applicable; i.e., on lease or off lease)
    c) How leak was detected (monthly/ annual survey, public complaint, odour detected, AVO inspections, AER inspection)
    d) Date and time of leak detection
    e) Environmental conditions (e.g., wind speed, ambient temperature)
    f) Method of leak detection used (e.g., thermal camera)
    g) Location of leak

h) Component type (e.g., connector, block valve, control valve, thief hatch, PVRV, pressure-relief device, pump seal, compressor seal, regulator, pneumatic device, pilot/ignitor failure, flow meters, pressure regulators, sampling connections, instrument fittings, engine and compressor crankcase vents, sump and drain tank vents and covers, blowdown system vents and open-ended valves and lines, thief hatches and gauge board assemblies, etc.) and style (e.g., gate valve, ball valve)

i) Is it a mandatory targeted component (e.g., thief hatches/PVRVs, PSVs, gauge board assemblies, unlit flare stack, compressor seals)?

5) Quantification Information

a) Quantified emission rate (m^3/hr) from each leak if required under section 6

b) Method of quantification

6) Repair

a) Date and time leak addressed (repaired, shut-in, bypassed, isolated or eliminated)

b) Was leak addressed within required timeframe?

c) Date and time repair verified

d) Name and contact information of repair personnel

e) General comments on repairs completed outside of required timeframes.

7) QA/QC

a) Calibration details for all equipment used for leak detection and quantification

b) Details on QA/QC programs (e.g., training)

8) Preventative Maintenance Programs

a) Details on preventative maintenance programs

9) Reports

a) A copy of the current FEMP

b) Original third-party annual comprehensive survey reports

c) Monthly leak reports

d) Annual survey reports

e) Annual FEMP analysis reports