

**Notice of Proposed Directive Amendments**  
***Directive PNG036: Venting and Flaring Requirements***  
***Directive S-20: Saskatchewan Upstream Flaring and Incineration Requirements***

**Background**

The Ministry of Energy and Resources (ER) is seeking written comments on proposed amendments to *Directive PNG036: Venting and Flaring Requirements* (Directive PNG036) and *Directive S-20: Saskatchewan Upstream Flaring and Incineration Requirements* (Directive S-20). Directive PNG036 specifies venting and flaring requirements for oil and gas operations in Saskatchewan to protect public safety, property, and the environment. Directive S-20 outlines upstream oil and gas flaring and incineration performance, equipment spacing and set-back distance requirements.

**The Process**

ER is holding industry consultations on the proposed amendments to Directives PNG036 and S-20 from February 8 to March 1, 2022. Once this consultation period has concluded, ER will review feedback received in the preparation of final drafts of Directives PNG036 and S-20 to be brought forward for approval. The proposed amendments are expected to come into effect in the spring of 2022.

**Summary of Proposed Changes**

The proposed amendments aim to clarify the requirements of Directives PNG036 and S-20 and to remove overlap between them. Featured amendments include:

- Extension of Directive PNG036 to pipelines and associated facilities governed by *The Pipelines Act, 1998*;
- A new requirement in Directive PNG036 to document attempts to gain resident consent for flaring activities; and
- Updated exemption criteria for ER's Leak Detection and Repair requirements.

**Review of Amended Directives**

Appendix A contains a side-by-side outlining key amendments to Directive PNG036 and a draft of that amended directive. Appendix B contains a side-by-side outlining key amendments to Directive S-20 as well as a draft of that amended directive. Please direct any comments or questions about the proposed amendments to:

[ER.servicedesk@gov.sk.ca](mailto:ER.servicedesk@gov.sk.ca)

Attn: Mathew Jones, Resource Management, Energy Regulation Division

The deadline for submitting written comments is **March 1, 2022**.

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## APPENDIX A1: Key Changes to Directive PNG036

Section	Amendment & Explanation
<b>Introduction</b>	<ul style="list-style-type: none"> <li>New wording added to include pipelines and associated facilities governed by <i>The Pipelines Act, 1998</i>.</li> </ul>
<b>3. Governing Legislation</b>	<ul style="list-style-type: none"> <li>Inclusion of <i>The Pipelines Act, 1998</i> as a governing authority for this Directive;</li> </ul>
<b>4. General</b>	<ul style="list-style-type: none"> <li>New wording added to this section to apply to the entire Directive. Redundant wording has been eliminated from sections 5.2, 5.3, 8, and 9.2;</li> <li>Concentration limit for volatile organic compounds moved from Directive S-20 to this Directive. No changes to requirements;</li> <li>Added clarification of air dispersion modelling requirements from Directive S-20.</li> </ul>
<b>5.1 Associated Gas Venting Limit</b>	<ul style="list-style-type: none"> <li>Removed reference to oil wells and facility compliance by January 1, 2020. This provision is no longer needed as this date has passed.</li> </ul>
<b>5.2 Associated Gas Venting</b>	<ul style="list-style-type: none"> <li>This section, which contains sour gas limits, has been moved into section 4 to avoid repetitive wording</li> </ul>
<b>5.3 Associated Gas Flaring</b>	<ul style="list-style-type: none"> <li>Now section 5.2.</li> <li>ER now requires all licensees to document and report attempts to obtain consent from all impacted parties before an application will be considered to flare within 500 metres of those parties.</li> </ul>
<b>5.4 Discontinuation of Conservation</b>	<ul style="list-style-type: none"> <li>Now section 5.3.</li> </ul>
<b>7.1 Applicable Facilities</b>	<ul style="list-style-type: none"> <li>Moved the following wording from this section to section 7.2: <ul style="list-style-type: none"> <li>“Surveys must be completed at least two times per year and at least 90 days after a previous survey. New facilities that report first gas production after July 1<sup>st</sup> must complete at least one survey that year.”</li> </ul> </li> </ul>
<b>7.2 LDAR Program Requirements</b>	<ul style="list-style-type: none"> <li>The following bullet is added to the list of exemptions from LDAR program requirements: <ul style="list-style-type: none"> <li>“a pair of isolation valves on a transmission pipeline if no other equipment is located on the segment of the pipeline that may be isolated by closing the valves”.</li> </ul> </li> </ul>
<b>7.5 Records and Reporting</b>	<ul style="list-style-type: none"> <li>Name of this section changed from “Records” to “Records and Reporting”;</li> <li>This section amended to clarify that LDAR program reports must be submitted by April 1<sup>st</sup> of the year following the reporting year.</li> </ul>
<b>11.2 Notification to ER</b>	<ul style="list-style-type: none"> <li>Amendment clarifies that notification through IRIS must be made for temporary flaring and venting.</li> </ul>

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## Venting and Flaring Requirements

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Directive PNG036

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February 2022

Revision 3.0

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Governing Legislation:

Acts: *The Oil and Gas Conservation Act*

*The Pipelines Act, 1998*

Regulation: *The Oil and Gas Conservation Regulations, 2012*

Order: N/A

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**Record of Change**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
0.0	August 2018	Initial draft
1.0	December 2019	Approved first version
2.0	March 2020	Revised with LDAR requirements
3.0	February 2022	Clarification/alignment with Directive S-20; extension to pipelines and associated facilities governed by <i>The Pipelines Act, 1998</i> .

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## 1. Introduction

*Directive PNG036: Venting and Flaring Requirements* (Directive PNG036) sets out the requirements for venting and flaring from all oil and gas wells, facilities and pipelines associated with *The Oil and Gas Conservation Act* and *The Pipelines Act, 1998*.

The purpose of Directive PNG036 is to manage venting and flaring in a responsible manner to ensure the protection of human health, public safety, property and the environment and to prevent fire or explosion.

Questions on Directive PNG036 can be directed to the Ministry of Energy and Resources (ER) Service Desk at 1-855-219-9373 or [ER.servicedesk@gov.sk.ca](mailto:ER.servicedesk@gov.sk.ca).

## 2. Definitions

**Associated gas:** Gas produced from an oil well.

**Conservation:** Recovery of associated gas for use as fuel for production facilities, other useful purposes (e.g. power generation), sale or beneficial injection into an oil or gas pool.

**Emergency flaring or venting:** Emergency flaring or venting occurs when safety controls within the facility are enacted to depressurize equipment to avoid possible injury or property loss resulting from explosion, fire or catastrophic equipment failure. Examples of possible causes include pressure safety valve overpressure and emergency shutdown.

**Equipment component:** A component of equipment that comes into contact with hydrocarbons and that has the potential to emit fugitive emissions.

**Flaring:** The combustion of gas in a flare or incinerator.

**Non-associated gas:** Gas produced from a gas well.

**Non-routine flaring or venting:** Intermittent and infrequent flaring or venting. There are two types: planned and unplanned.

**Planned flaring or venting:** Flaring or venting where the operator has control over when and for how long it will occur and also has control over release rates. Planned flaring or venting results from the intentional depressurization (purging) of processing equipment or piping systems. Planned flaring or venting may occur during pipeline blowdowns, equipment depressurization, start-ups, facility turnarounds, and well tests.

**Unplanned flaring or venting:** Emergency or upset operational activities closely associated with protecting the integrity of the facility and protecting safety. The operator has no control over when these activities will occur. There are two types: upset and emergency.

**Upset flaring or venting:** Upset flaring or venting occurs when one or more process parameters fall outside the allowable operating or design limits and flaring or venting is required to aid in bringing the production back under control. Upset flaring or venting may occur due to the

production of off-spec product; the formation of hydrates; loss of electrical power; process upset; or operator error.

### 3. Governing Legislation

The requirements in this Directive are authorized under and supplemented by:

- *The Oil and Gas Conservation Act*
- *The Pipelines Act, 1998*
- *The Oil and Gas Conservation Regulations, 2012*
- *The Oil and Gas Emissions Management Regulations*

Associated Directives:

- *Directive PNG001: Facility Licence Requirements*
- *Directive PNG017: Measurement Requirements for Oil and Gas Operations*
- *Directive PNG032: Volumetric, Valuation and Infrastructure Reporting*
- *Directive S-01: Saskatchewan Upstream Petroleum Industry Storage Standards*
- *Directive S-20: Saskatchewan Upstream Flaring and Incineration Requirements (Directive S-20)*

### 4. General

In addition to specific requirements set out in the following sections, no venting or flaring activities from any source may:

- cause off-lease odours; or
- cause an exceedance of the *Saskatchewan Ambient Air Quality Standards* administered by the Ministry of Environment.

No person shall vent any volume of gas that:

- contains H<sub>2</sub>S in a concentration greater than 10 mol/kmol as measured at the source; or
- contains H<sub>2</sub>S in a concentration greater than 0.01 mol/kmol as measured at the lease edge.

Licensees are required to conduct air dispersion modelling at a well or facility, in accordance with the *Saskatchewan Air Quality Modelling Guideline* when:

- the gas being flared contains H<sub>2</sub>S in a concentration greater than 10 mol/kmol as measured at the source;
- ordered by ER.

ER may specify a limit for concentration of volatile organic compounds or other air contaminants that can be emitted into the air, where or when in the opinion of ER it is necessary to do so to protect the environment, property or the public safety.

Investigations may occur as part of an ER inspection or may be triggered by public complaint(s) raised regarding any venting or flaring activity. After investigation ER may require the licensee to:

- conduct an air quality investigation;
- install air quality monitoring equipment;
- conduct an air dispersion model;

- attempt to eliminate the air contaminants at their source;
- implement good housekeeping to minimize fugitive emissions;
- implement a reduced venting or flaring limit;
- flare the gas by means of alternate closed-flame combustion equipment;
- conserve the gas;
- shut-in the well or facility; or
- conduct any combination, of the aforementioned requirements.

## **5. Oil Well and Oil Facility Venting and Flaring Requirements**

The following sub-sections apply to associated gas from oil wells and oil facilities.

### **5.1 Associated Gas Venting Limit**

Oil wells and oil facilities that vent and flare a combined volume of gas greater than 900 cubic metres (m<sup>3</sup>)/day must flare all non-conserved volumes of gas unless the gas is vented to avoid serious risk to human health or safety arising from an emergency situation.

In the course of properly operating equipment according to the manufacturer's instructions, gas may be vented from:

- the seals of a centrifugal compressor or from the rod packings and distance pieces of a reciprocating compressor;
- pneumatic pumps and pneumatic controllers; or
- flashing losses and breathing losses from storage tanks operating at low pressures.

### **5.2 Associated Gas Flaring**

Oil wells and oil facilities may flare in excess of 900 m<sup>3</sup>/day. Flaring activity of any volume must meet the requirements set out in Directive S-20.

If flared volumes are greater than 900 m<sup>3</sup>/day and the flare is within 500 metres (m) of an occupied dwelling, public facility, or urban centre the gas must be conserved. The flare may be permitted if the following is obtained:

- consent from occupant or residence within 500 m; or
- approval from ER.

Licensees must document attempts to obtain consent from all impacted parties before an application will be considered.

### **5.3 Discontinuation of Conservation**

Licensees must notify ER prior to discontinuing conservation. If applicable, the licensee must complete a facility licence amendment that reflects the operational changes.

## **6. Gas Well and Gas Facility Venting and Flaring Requirements**

The following sub-sections apply to gas wells and gas facilities.



## 6.1 Gas Venting

Venting from a gas well or gas facility, including gas plants, is not permitted unless it is an emergency and a reasonable level of precaution has been taken to protect human health, public safety, property and the environment and to prevent fire or explosion.

In the course of properly operating equipment according to the manufacturer's instructions, gas may be vented from:

- the seals of a centrifugal compressor or from the rod packings and distance pieces of a reciprocating compressor;
- pneumatic pumps and pneumatic controllers; or
- flashing losses and breathing losses from storage tanks operating at low pressures.

## 6.2 Gas Flaring

Flaring at a gas well or gas facility, excluding gas plants, is not permitted unless it is an emergency and a reasonable level of precaution has been taken to protect human health, public safety, property and the environment and to prevent fire or explosion.

Gas plants are approved to flare as per the conditions on the facility licence.

## 7. Gas Facility Leak Detection and Repair (LDAR) Requirements

For the purpose of limiting leaks from equipment components at applicable facilities, licensees must establish and carry out:

- an LDAR program that satisfies the requirements of Section 7.2; or
- an alternative LDAR program that satisfies the requirements of Section 7.3.

### 7.1 Applicable Facilities

LDAR surveys must be completed at applicable gas facilities that produce or receive, or are expected to produce or receive, a combined volume of more than 60,000 m<sup>3</sup> of gas annually.

Applicable gas facilities are determined by facility subtype and include the subtypes listed in the table below:

Facility type	Facility subtype codes	Frequency
Multi-Well Gas Batteries	361, 362, 363, 364	Semi-annually
Single-Well Gas Batteries	351	Semi-annually
Sweet Gas Plants	401	Semi-annually
Sour Gas Plants	402, 403, 404, 405	Semi-annually
Straddle and Fractionation Plants	406, 407	Semi-annually
Gas Gathering Systems	621	Semi-annually

## 7.2 LDAR Program Requirements

Surveys must be completed at least two times per year and at least 90 days after a previous survey. New facilities that report first gas production after July 1<sup>st</sup> must complete at least one survey that year.

Eligible leak detection instruments must be operated and maintained in accordance with the recommendations, if any, of its manufacturer. Licensees must conduct a leak survey on all equipment components using one of the following eligible leak detection instruments:

- a gas-imaging camera that is designed to detect pure methane gas emitted at a rate of 1.0 gram per hour or less under controlled laboratory conditions. When using gas-imaging cameras, the licensee should:
  - be within 1.5 to 3 metres from the equipment being surveyed, depending on the size and accessibility of the equipment, except tank tops; or
  - be at the minimum distance required to view tank-top components.
- an organic vapour analyzer that detects hydrocarbon gases at a concentration of 500 parts per million (ppm) when used in accordance with the United States Environmental Protection Agency's (EPA) Method 21.

Equipment components that are exempt from LDAR are:

- those used on a wellhead at a site where there is no other wellhead or equipment except for gathering pipelines or a meter connected to a wellhead;
- a pair of isolation valves on a transmission pipeline if no other equipment is located on the segment of the pipeline that may be isolated by closing the valves; and
- those that would pose a serious risk to human health or safety by undergoing an inspection.

A person that conducts leak surveys must have proper training and experience in:

- the operation and maintenance of the leak detection instruments;
- leak survey procedures; and
- data collection and reporting.

## 7.3 Alternative LDAR Program Requirements

An alternative LDAR program must have an equivalent fugitive emissions reduction outcome as the LDAR program in section 7.2.

The alternative LDAR program must address:

- the operation of leak detection instruments (if applicable);
- the inspection of leaks; and
- the repair of leaks detected.

ER must be notified and provided with supporting documents prior to conducting an alternative LDAR program. If ER is not satisfied with the outcomes of the alternative LDAR program, a standard LDAR program may be required.

## **7.4 Repair**

If a leak is detected at a facility during a leak survey, the leak must be repaired:

- within 30 days of detection;
- if the repair requires the facility to be shut down, at the next turnaround for the facility; or
- immediately if the leak contains sour gas or causes off-lease odours.

If repairs are not possible within 30 days, licensees must keep a record of justification for late repair and the repair schedule.

A gas release detected during a leak survey is not considered a leak if it is found in a concentration of less than 500 ppm.

## **7.5 Records and Reporting**

Records from all surveys must be kept for five years that contain the information outlined in Appendix 1. Once annually the licensee must submit a report containing the results of the LDAR program for all facilities for that year. If an alternative program is used, the licensee must also confirm the effectiveness of the program.

Reports must be submitted by April 1<sup>st</sup> of the following year.

## **8. Venting of Non-combustible or Inert Gas Mixtures**

Releases of inert gases such as nitrogen, carbon dioxide and water vapour from upstream petroleum industry equipment, or produced from wells may not have sufficient heating value to support combustion. These gases may be vented to atmosphere subject to the following requirement:

- the gas does not contain an H<sub>2</sub>S concentration greater than 0.01 mol/kmol.

Alternatives to venting gas include flaring with sufficient fuel gas to ensure destruction of odorous compounds.

## **9. Temporary Well Flaring and Venting**

Temporary well flaring and venting activities include well testing, well cleanup, and well completions.

### **9.1 Temporary Flaring**

ER recommends licensees evaluate opportunities to use existing gas gathering systems prior to commencing well testing, well cleanup, or well completions. If using existing gas gathering systems is not possible, licensees must flare all gas if combustion can be sustained.

## 9.2 Temporary Venting

If combustion cannot be sustained, temporary venting is allowed subject to the following conditions:

- the gas does not contain an H<sub>2</sub>S concentration greater than 0.01 mol/kmol; and
- the gas does not contain free hydrocarbon liquid.

## 10. Non-routine Requirements

Non-routine flaring or venting may be carried out where a reasonable level of precaution has been taken to protect human health, public safety, property and the environment and to prevent fire or explosion.

All non-associated gas must be shut-in during facility outages.

ER requires notification of non-routine flaring or venting events as described in section 11.

### 10.1 Unplanned Non-routine

Licensees should evaluate and consider options to minimize non-routine flaring or venting during upsets and emergencies at oil and gas facilities.

### 10.2 Planned Non-routine

Licensees should evaluate and consider the implementation of appropriate measures to reduce associated gas flaring. Measures to be considered include:

- delivering associated gas to a nearby gas plant that is not on turnaround;
- scheduling maintenance at related oil facilities to coincide with the gas plant turnaround;
- communicating with well, battery and gas plant operators to ensure that planned non-routine associated gas flaring and venting are minimized; and
- curtailment of oil production to reduce associated gas production.

### 10.3 Records

The licensee must maintain a log of flaring and venting events and respond to public complaints in order to comply with reporting requirements. The logs must:

- Include information on complaints related to flaring and venting events and include how these complaints were investigated and addressed;
- Describe each non-routine flaring and venting incident and any changes implemented to prevent future non-routine events of a similar nature from occurring;
- Include the date, time, duration, gas source, H<sub>2</sub>S concentration and volumes for each incident; and
- Be kept for a minimum of 12 months.

Flaring and venting records must be made available to ER upon request.

## **11. Notification Requirements**

Licensees must notify ER and occupants of a dwelling, public facility, or urban centre located within 500 m that temporary or non-routine flaring or venting will occur, as detailed in the following sub-sections.

If a new dwelling or public facility is constructed or relocated within 500 m of an existing facility, the licensee must provide information to the new occupants about flaring or venting operations.

### **11.1 Notification to Public**

Notification must be given to occupants of dwellings, public facilities, and urban centres within 500 m:

- 48 hours prior to commencement of planned non-routine flaring and venting events; or
- 48 hours following unplanned non-routine flaring and venting events.

Alternative notification requirements may be agreed upon between licensees and occupants within 500 m.

### **11.2 Notification to ER**

Notifications must be given to ER through the Integrated Resource Information System (IRIS) for all temporary and non-routine flaring and venting events that last longer than 4 hours in duration:

- 48 hours prior to commencement of planned non-routine flaring and venting events; or
- 48 hours following unplanned non-routine flaring and venting events.

## **Appendix 1**

Records from all surveys must be kept that contain the following information:

- Facility ID;
- Survey unique identifier (optional);
- Date of survey;
- Name of person conducting the survey;
- Name of third party survey company (if applicable);
- Type of leak detection instrument used;
- Equipment components surveyed;
- Equipment components exempt (if applicable); and
- If a leak is detected:
  - Leak unique identifier (optional);
  - Equipment component leaking;
  - Location of component;
  - H<sub>2</sub>S concentration;
  - Leak repaired (yes or no);
  - Date of repair (if applicable);
  - Repair method (if applicable);
  - Leak repair confirmation method (if applicable); and
  - If unable to repair within 30 days, justification and future repair information.
- If no leak is detected:
  - Indicate if a gas release was detected less than 500 ppm.

## APPENDIX B1: Key Changes to Directive S-20

**NOTE:** the proposed amendments Directive S-20 include organizational and formatting changes to bring it in line with other ER Directives. As a result, the section numbering of Directive S-20 has been altered. Key changes to Directive S-20 with reference to their existing and proposed sections are outlined below:

Existing Section Reference	New Section Reference	Amendment/Explanation
<b>1. Introduction</b>		<ul style="list-style-type: none"> <li>Has been updated/simplified to align with Directive PNG036;</li> <li>Paragraphs 2 and 3 re: “flare pits” have been moved to section 4, “General Requirements”;</li> </ul>
<b>1.1 Applicable Wells and Facilities</b>  <b>1.2 Phase In Period</b>	<b>1.1 Applicable Wells and Facilities</b>	<ul style="list-style-type: none"> <li>Sections 1.1 and 1.2 have been combined into a single section dealing with the application of Directive S-20 to wells and facilities. The “phase-in” provisions of the existing section 1.2, including obtaining an exemption to current operating requirements for flares and incinerators relating to wells and facilities licensed prior to July 1, 2012, that did not meet the requirements of section 2.2.1 of S-01 (version 2002) are no longer necessary. ER is of the opinion that licensees had the opportunity to apply for exemptions and that any remaining flares or incinerators that did not meet the requirements of section 2.2.1 of S-01 (version 2002) are non-compliant and, as a result will be required to upgrade to Directive S-20 requirements. As is the case now, ER expects that flares and incinerators installed after July 1, 2012 will be compliant with Directive S-20. Also, flares or incinerators at wells and facilities licensed prior to that date need only upgrade to Directive S-20 requirements under particular circumstances or if asked to do so by ER;</li> <li>Second paragraph of existing section 1.1 has been re-worded; ER has no definition of “valid public complaint”. ER investigates all public complaints and determines a suitable course of action;</li> <li>Deleted paragraph 3 of existing section 1.1, the content of which is captured throughout other sections of this Directive;</li> </ul>
<b>NEW</b>	<b>2. Governing Legislation</b>	<ul style="list-style-type: none"> <li>A standard feature of other ER Directives, this section clarifies authorizing legislation and other ER Directives supporting the requirements of Directive S-20;</li> </ul>
<b>5. Glossary</b>	<b>3. Definitions</b>	<ul style="list-style-type: none"> <li>Moved to beginning to match current directives format and changed name of section to “Definitions”;</li> <li>Changed “mol/kilomole” to “mol/kmol” and “moles per kilomole” to “mol/kmol”;</li> <li>Deleted definitions not used in the Directive as follows: “and”, “[xxx]”, “fugitive emissions”, “internal combustion engine exhaust”, “natural gas booster compressors”, “oil and gas site”, “opacity”, “or”, “primary production facility”, “primary liner”, “storage area”, “storage facility”, “S-01”,</li> </ul>

Existing Section Reference	New Section Reference	Amendment/Explanation
		<p>“shallow gas operation”, “upstream facility” and “venting”;</p> <ul style="list-style-type: none"> <li>Removed the phrase “free water knock-outs” from the definition of “flame type equipment”. There is no flame on this equipment.</li> </ul>
<b>2. General Air Emission Control Requirements</b>	<b>4. General Requirements</b>	<ul style="list-style-type: none"> <li>Section title changed to “General Requirements”;</li> <li>Paragraphs 1, 3, 5, and 7 of the existing section 2 are removed and will be captured, with necessary modification, in Directive PNG036;</li> <li>Substituted reference to Saskatchewan Ambient Air Quality Standards (SAAQS) with reference to air quality standards specified in Directive PNG036;</li> <li>Moved general requirements paragraphs from existing section 3.1 to proposed new section 4 to join the other general requirements. Section 3.1 is deleted, and the subsequent sections are re-numbered</li> </ul>
<b>3. Flaring and Incineration Performance Requirements</b>	<b>5. Flaring and Incineration Performance Requirements</b>	<ul style="list-style-type: none"> <li>Section re-worded in places to improve clarity. No changes to requirements;</li> <li>Updated reference from “API-RP-521: Guide for Pressure-Relieving and Depressuring Systems, Section 4: Selection of Disposal Systems” to “<i>ANSI/API Standard 521: Guide for Pressure-Relieving and Depressuring Systems</i> and <i>API Standard 537: Flare Details for Petroleum, Petrochemical, and Natural Gas Industries</i>”.</li> </ul>
<b>3.1 Heating Value and Exit Velocity for Flares</b>	<b>5.1 Heating Value and Exit Velocity for Flares</b>	<ul style="list-style-type: none"> <li>Removed reference to <i>The Clean Air Act</i>, which was repealed in 2015;</li> <li>Substituted reference to Saskatchewan Ambient Air Quality Standards (SAAQS) with reference to air quality standards specified in Directive PNG036;</li> <li>Added general statement regarding exit velocity to ensure that wind does not extinguish flame.</li> </ul>
<b>3.2 Minimum Residence Time and Exit Temperatures for Incinerators</b>	<b>5.2 Minimum Residence Time and Exit Temperature for Incinerators</b>	<ul style="list-style-type: none"> <li>Removed references to Alberta;</li> <li>Substituted reference to Saskatchewan Ambient Air Quality Standards (SAAQS) with reference to air quality standards specified in Directive PNG036;</li> <li>Removed statements related to ER requiring information upon request for approvals, which is now covered in the new section 4, “General Requirements”.</li> </ul>
<b>3.5 Stack Design</b>	<b>5.5 Stack Design</b>	<ul style="list-style-type: none"> <li>Removed reference to Alberta and to other technical sources;</li> <li>Substituted reference to Saskatchewan Ambient Air Quality Standards (SAAQS) with reference to air quality standards specified in Directive PNG036;</li> </ul>
<b>3.6 Liquid Separation</b>	<b>5.6 Liquid Separation</b>	<ul style="list-style-type: none"> <li>Updated technical reference from API-RP-521 to ANSI/API Standard 521;</li> <li>Removed statement “effective date of this directive...” given that section 1.1 now stipulates that all flare and incinerator</li> </ul>



Existing Section Reference	New Section Reference	Amendment/Explanation
		separators in facilities must conform to this Directive.
<b>3.8 Backflash Control</b>	<b>5.8 Backflash Control</b>	<ul style="list-style-type: none"> <li>Deleted the sentence “Licensees must provide information on backflash controls to ER upon request if ER determines that there is a concern with the equipment or controls.” This statement is now covered under section 2, “General Requirements”.</li> </ul>
<b>3.9 Flare and Incinerator Spacing Requirements</b>	<b>5.9 Flare and Incinerator Spacing Requirements</b>	<ul style="list-style-type: none"> <li>Deleted information about spacing requirements to avoid duplicating the existing spacing requirements of <i>Directive S-01: Saskatchewan Upstream Petroleum Industry Storage Standards</i>. A reference to Directive S-01 has been added to new section 5.9.</li> <li>Mention of fire hazard management and observance of the applicable fire laws has been generalized and moved into proposed new section 5.10, “Compliance with Fire Laws and Fire Bans”.</li> </ul>
<b>3.10 Compliance with Fire Bans</b>	<b>5.10 Compliance with Fire Laws and Fire Bans</b>	<ul style="list-style-type: none"> <li>Section re-named “Compliance with Fire Laws and Fire Bans”;</li> <li>Features a general requirement to manage fire hazards and operate in accordance with applicable fire laws, whatever those might be. Also includes a link to the Government of Saskatchewan website to access information on fire bans.</li> </ul>

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## Saskatchewan Upstream Flaring and Incineration Requirements

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Directive S-20

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February 2022

Revision 2.0

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Governing Legislation:

Act: *The Oil and Gas Conservation Act*

Regulation: *The Oil and Gas Conservation Regulations, 2012*

Order: N/A

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**Record of Change**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
0.0	July 1, 2011	Original
1.0	November 2015	Update to facilitate implementation of IRIS in 2015
1.1	December 2019	Update to include recent contact information
2.0	January 2022	Update to align with Directive PNG036

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## 1. Introduction

This Directive provides upstream oil and gas flaring and incineration performance, equipment spacing and set-back distance specifications of the Saskatchewan Ministry of Energy and Resources (ER).

Questions on this Directive can be directed to the ER Service Desk at 1-855-219-9373 or [ER.servicedesk@gov.sk.ca](mailto:ER.servicedesk@gov.sk.ca).

### 1.1 Applicable Wells and Facilities

The standards specified in this Directive apply to flare and incinerator systems associated with wells and facilities licensed or approved under *The Oil and Gas Conservation Act* (OGCA) and/or *The Oil and Gas Conservation Regulations, 2012* (OGCR).

Flares or incinerators installed at wells or facilities licensed on or after July 1, 2012, must meet the requirements of this Directive, as amended from time to time. Flares or incinerators installed at wells or facilities licensed prior to July 1, 2012, must upgrade to this Directive, if:

- The flaring or incinerator system is being upgraded as a part of the normal upgrade process of the well or facility;
- The facility licence undergoes an amendment (e.g. a battery is upgraded to a gas plant);
- A single well battery (a licensed well) is upgraded to a multi-well battery;
- Gas sent to the flare or incinerator has hydrogen sulphide (H<sub>2</sub>S) equal to or greater than 10 mol/kmol as measured at the source;
- The flare or incinerator system is non-compliant with the regulatory requirements that existed prior to this Directive; or
- Instructed to do so by ER.

Portable flares or incinerators used during drilling, servicing, turn-around or tests and located and used on the sites for less than one year are exempt from the requirements of this Directive, except for applicable equipment spacing. At any time, ER may require the licensee to shut-down portable flares and incinerators, if in the opinion of ER environmental or public safety concerns are present.

## 2. Governing Legislation

The requirements outlined in this Directive are authorized under and supported by:

- The OGCA
- The OGCR
- Associated Directives
  - *Directive S-01: Saskatchewan Upstream Petroleum Industry Storage Standards*
  - *Directive PNG001: Facility Licence Requirements*
  - *Directive PNG036: Venting and Flaring Requirements*

## 3. Definitions

**0.01 mol/kmol:** Means 0.1% or 10 parts per million (ppm).

**10 mol/kmol:** Means 1% or 10,000 ppm.

**Acid gas:** Means gas that is separated in the treating of solution or non-associated gas that contains H<sub>2</sub>S, total reduced sulphur compounds, and/or carbon dioxide (CO<sub>2</sub>).

**Associated gas:** Means gas that is produced from an oil reservoir. This may apply to gas produced from a gas cap or in conjunction with oil.

**Edge of the lease:** Means:

- perimeter fence;
- at the lease berm;
- at the edge of the lease; or
- whichever is the lesser of the three.

**Flame type equipment:** Means open flame equipment, other heating device or electrical device that has open ignition and/or it could potentially cause a fire or explosion. For the purpose of equipment spacing, flame type equipment includes, but is not limited to, steam boilers, dehydrators, generators, heaters, treaters, diesel engines without automatic air shut offs and heated water tanks on a skid.

**Non-associated gas:** Gas produced from a gas pool (i.e., not associated with oil or bitumen reservoirs or with production).

**Non-routine flaring, incinerating:** Intermittent and infrequent events such as planned maintenance, process upsets, and emergencies that result in flaring or incinerating.

**Licensee:** Means licensee of the well or facility.

**Produced products:** Means upstream oil and gas products (unrefined), byproducts, wastes and materials contaminated with produced products. They include, but are not limited to, crude oil, condensate, drilling fluids, drilling waste, frac fluids, frac sands, liquid petroleum gas, oily byproduct, produced water, produced sand and any other material contaminated with produced products.

**Process equipment:** Means any non-flame type equipment used in the upstream petroleum recovery or treatment process such as amine tank, pop tank, scrubber, sweetener and separator. Process equipment generally does not have a permanent footing.

**Routine flaring, incinerating** Applies to continuous flaring, venting, and incinerating.

**Separator:** Means an apparatus for separating liquid and gas at the surface as they are produced from a well.

**Sour gas:** Means natural gas, including solution gas, containing H<sub>2</sub>S.

**Storage:** Means holding of material produced, generated and used by the upstream petroleum industry for a period of time until the products, byproducts or wastes are transported, treated or disposed.

**Specified:** Means written or verbal requirements provided by appropriately authorized or delegated person.

**Sulphur emissions:** For the purposes of this Directive, includes all air emissions of sulphur-containing compounds, including SO<sub>2</sub>, H<sub>2</sub>S, and total reduced sulphur compounds (e.g., mercaptans). Sulphur emissions from flare stacks are expected to be primarily in the form of SO<sub>2</sub>, with minor amounts of other compounds.

**Tank:** Means a device designed to contain materials produced, generated and used by the upstream petroleum industry which is constructed of impervious materials that provides structural support.

**Treater:** Means an apparatus for separating oil, gas and water at the surface as they are produced from a well.

#### **4. General Requirements**

The use of flare pits and earthen pits as storage receptacles in the production operation of wells and facilities are strictly prohibited in Saskatchewan. Flare pits may be used during the drilling of a well, if approved. For questions regarding flare pits, contact the respective ER Field Office.

Flare, incinerators, and other gas combustion systems, including those using sour gas as a fuel for production or process equipment, must be designed, maintained, and operated so that emissions do not exceed the air quality standards specified in Directive PNG036.

The licensee shall install a vapour recovery unit to prevent the emission of volatile gases from storage devices and associated processing equipment at a facility or well site when H<sub>2</sub>S is equal to or greater than 10 mol/kmol as measured at the source of emission or 0.01 mol/kmol as measured at the edge of the lease. Other methods to control sour gas emissions at a licensed facility or well site may be approved by ER upon request.

ER may require the licensee to modify or replace existing flares or incinerators, if in the opinion of ER, the operation is resulting in off-lease odours, associated complaints or continuous or frequent visible black smoke.

Equipment and controls design information, operating limits and procedures, or any other information about the flare or incinerator system must be provided to ER upon request.

#### **5. Flaring and Incineration Performance Requirements**

These requirements apply to flares and incinerators used in all upstream oil and gas systems, including the associated separation equipment, piping and controls. This Directive identifies ER requirements and is not a substitute for comprehensive engineering design codes and guidelines.

Licensees must ensure that a professional engineer, certified technician, certified engineering technologist or registered engineering technologist is responsible for the design or review of flare and incinerator systems, including separation, related piping, and controls, and for the specification of safe operating procedures.

Licensees must ensure that operating procedures that define the operational limits of flare or incinerator systems are documented and implemented, and that these procedures meet the design requirements. Flare and incinerator systems must be operated within operational ranges and type of service specified by the designing or reviewing engineer, technician, or technologist. If this equipment is used for emergency shutdowns, this must be considered in the design.

If a licensee is using a flare or incinerator that has not previously been field tested, the licensee must be able to provide actual monitoring data to show that performance specifications can be met. Field testing of newly designed equipment is not allowed unless there are acceptable and backup combustion systems to ensure that any sweet, sour, or acid gas is properly combusted.

*ANSI/API Standard 521: Guide for Pressure-Relieving and Depressuring Systems* and *API Standard 537: Flare Details for Petroleum, Petrochemical, and Natural Gas Industries*, as well as applicable fire safety codes, electrical codes, CSA standards, and mechanical engineering standards, are all recommended references for the design of gas combustion systems.

Licensees must comply with Saskatchewan safety regulations with respect to the design of pressure vessels and piping systems and the design of equipment and operating procedures.

## **5.1 Heating Value and Exit Velocity for Flares**

The combined net or lower heating value of gas, including make-up fuel gas, directed to a flare must not be less than 20 mega joules per cubic metre (MJ/m<sup>3</sup>), except as noted below:

- If existing flare stacks have an established history of stable operation and compliance with air quality standards specified in Directive PNG036, licensees are allowed to maintain the current heating value provided it is not less than 12 MJ/m<sup>3</sup>. Licensees are expected to support claims that existing flare stacks have operated satisfactorily over time.
  - If flare stacks have a history of flame failure, odour complaints, and/or exceedances of air quality standards specified in Directive PNG036, licensees must operate with a combined flare gas heating value of not less than 20 MJ/m<sup>3</sup>.
- The combined net or lower heating value of acid gas plus make-up fuel gas directed to existing or new flares must not be less than 12 MJ/m<sup>3</sup> under any circumstance.
- Sour gas plant emergency systems must be configured to ensure that the flared gas heating value is not less than 12 MJ/m<sup>3</sup> and the air quality standards specified in Directive 36 are met.
  - ER recommends that 20 MJ/m<sup>3</sup> heating value be maintained for non-routine flaring but recognizes that short duration emergency flaring with a gas heating value of less than 20 MJ/m<sup>3</sup> may occasionally occur.

If a flare requires fuel make-up, it must be designed and specified by a qualified technical professional. Equipment controls must be installed, and operating procedures must be documented to ensure minimum fuel gas make-up during routine and non-routine operating



conditions. Facilities must be operated in compliance with specified minimum fuel gas make-up requirements.

The flare system must have sufficient exit velocity and/or be equipped with wind guards to prevent wind from extinguishing the flame. The flare tip diameter must be properly sized for the anticipated flaring rates.

## **5.2 Minimum Residence Time and Exit Temperature for Incinerators**

Incinerators must provide a minimum residence time of 0.5 seconds at maximum flow rate or greater as required for complete combustion of heavier gases.

- Incinerators must be operated without visible flame.
- If the gas contains less than 10 mol/kmol of H<sub>2</sub>S as measured at the source and the unsupplemented heating value of the gas is 20 MJ/m<sup>3</sup> or greater, no minimum residence time is required.

Incinerators must operate with a minimum exit temperature of 600°C.

- For combustion of gases with less than 10 mol/kmol of H<sub>2</sub>S as measured at the source and an unsupplemented heating value of 20 MJ/m<sup>3</sup> or greater, no minimum exit temperature or temperature monitoring is required.
- For combustion of gases with greater than 10 mol/kmol of H<sub>2</sub>S, the facility must be designed to automatically shut down if the exit temperature of the incinerator drops below either 600°C or the required temperature to meet the air quality standards specified in Directive PNG036, whichever is higher.
  - For combustion of gases with greater than 50 mol/kmol of H<sub>2</sub>S, the incinerator must also be equipped with process temperature control and recording.
  - All violations, together with measures taken to prevent recurrence, must be immediately reported by the licensee to the appropriate ER Field Office.

Any enclosed combustion technology not meeting the above requirements (minimum exit temperature and minimum residence time) must submit third-party verified conversion efficiency test results to ER for approval.

Test programs and submissions must be provided by a qualified person and must include:

- Inlet gas parameters, including flow rates and composition;
- Stack gas exit parameters, including temperature and composition;
- Material and energy balance calculations;
- A mass-weighted conversion efficiency value representative of the exit conditions;
- Discussion of the variation of measured and calculated results, depending on sampling location across the stack;
- Discussion of extending test results to other inlet conditions, including discussion of inlet limitations for H<sub>2</sub>S concentration and inlet gas flow rate;
- Temperature monitoring and reporting; and
- Any other information required by ER.

Licensees using incinerators must be able to provide details about the conversion efficiency of the equipment. Any of the following are considered acceptable evidence of compliance with this requirement:

- Conversion efficiency for incinerator is 99% or greater, based on one of the following:
  - the manufacturer's third-party-verified conversion efficiency test results, provided that the tests were conducted under conditions representative of the facility design, or
  - actual field measurements of conversion efficiency from the operating facilities following start-up.
- Any other evidence acceptable to ER

If conversion efficiency is less than 99%, the incinerator will be considered to operate as a flare and must meet all requirements for flares, including stack height.

### **5.3 Smoke Emissions**

Routine gas combustion must not result in continuous or repeat black smoke emissions over a consecutive period of six minutes. Any smoke emissions that may result in public concern must immediately be reported to the appropriate ER Field Office.

### **5.4 Ignition**

Acid gas and sour gas flares and incinerators must have reliable systems to ensure continuous ignition of any gas that may discharge to the device.

- At all wells and facilities (excluding gas plants) where the gas contains more than 10 mol/kmol of H<sub>2</sub>S, a pilot or automatic ignition device must be installed on flares and incinerators for continuous (e.g., sour water or condensate tank flash-gas) and intermittent (e.g., emergency depressuring) sources.
- At gas plants where gas contains more than 0.01 mol/kmol of H<sub>2</sub>S, pilots and automatic ignition must be installed on flares and incinerators.
- If repeat failures have occurred or off-lease odours or other impacts have resulted from failure to ensure ignition of sour gas, regardless of H<sub>2</sub>S content, ER may require installation of:
  - both pilots and automatic ignition, and/or
  - flame failure detection and alarms.

Manual flare and incinerator ignition subject to good fire safety practices will be accepted for non-routine purposes where:

- no continuous gas flow exists, and
- no automatic relieving systems are connected to the stack.

### **5.5 Stack Design**

Flares and incinerators must meet or exceed all the applicable stack design requirements listed below:

- Flare and incinerator stacks must be designed so that the maximum radiant heat intensity at ground level does not exceed 4.73 kilowatts per square metre (kW/m<sup>2</sup>).
  - Ground-level radiant heat determinations for flares can be based on calculation procedures outlined in ANSI/API Standard 521, or any other method acceptable to ER. Incinerators must be operated without visible flame. Exceptions to this requirement will

be considered by ER upon request, provided an equivalent level of safety can be ensured.

- In such cases licensees must restrict access to the area where the radiant heat intensity could be exceeded and must ensure that this area is free of combustible materials and vegetation. Access restrictions must include appropriate warning signs and the area must be clearly marked.
- Appropriate procedures must be in place when it is necessary to work within the area where the radiant heat intensity could be exceeded.
- Flares and incinerators located within a distance of 5 times the height of any neighbouring buildings (on-site and off-site) must have a height of at least 2.5 times the height of the highest building. Where this is not possible, stack height may be based upon calculated radiant heat and proper dispersion, not on distance to buildings, after consultation with ER.
  - The foregoing does not apply to devices for destruction of trace vent gases, such as those emitted from gas dehydrators.
- Flare stacks for acid or sour gas containing more than 10 mol/kmol of H<sub>2</sub>S must have a minimum height of 12 m above ground level.
- Flare stacks and incinerators must have sufficient height to provide adequate plume dispersion to comply with air quality standards specified in Directive PNG036 for sulphur dioxide (SO<sub>2</sub>).
  - Proper stack heights must be used to minimize fuel consumption. If the use of supplemental fuel gas is proposed, all other options must be investigated first. Fuel gas usage and amounts must be justified.
- Interconnecting lines to the flare or incinerator must be secured to prevent whipping or flailing.

## **5.6 Liquid Separation**

Entrained liquids in a flare or incinerator stream may reduce combustion efficiency and contribute to increased emissions of total reduced sulphur compounds, hydrocarbons, and products of incomplete combustion. Proper gas-liquid separation facilities adequate to protect the pipeline system or gas combustion system must be used.

The terms knockout, knockout drum, scrubber, and separator are used interchangeably. These requirements apply to all these devices.

- Design information on flare and incinerator system liquid separation equipment must be submitted upon request to ER.
- Liquid separation equipment must be provided in both temporary (including well test) and permanent flare and incinerator systems to prevent the carryover of liquid hydrocarbons, water, or other liquids.
- Flare and incinerator separators must be designed in accordance with good engineering practice to remove droplets of 300 to 600 micron diameter and larger (refer to ANSI/API Standard 521). Designs must be based on the lowest density hydrocarbon liquids that could be released to the flare or incinerator system.
- The flare and incinerator separators or knockout drums must be designed to have sufficient holding capacity for liquid that may accumulate, as a result of upstream operations, such as hydrocarbon carryover, liquid slugs, and line condensation.

- Flare and incinerator separators in facilities must be equipped with high-level alarms that can be responded to by the licensee prior to liquid carryover, in addition to liquid level indication.
- High-level alarms and facility shutdowns must be installed on all flare and incinerator separators where liquid streams are directed to the separator for storage or where free liquids are contained in continuously combusted streams.
- Flare and incinerator separator high-level alarms must be connected to facility alarm panels and/or semi-attended facility alarm call-out systems if the facilities are so equipped.
- Well test vessels receiving production from oil wells must be equipped with a high-level shutdown, unless attended 24-hours a day and procedures for monitoring liquid levels are in place.
- Flare and incinerator separators or knockout drums used for liquid storage must be designed, installed, and spaced in accordance with Directive S-01.

### **5.7 Exceptions to Separator Requirements**

ER does not require independent flare or incinerator separators in situations where the only vessels connected to the flare or incinerator are production separators equipped with a high-level shutdown (HLS) or equivalent devices or with a system that prevents liquids from entering the flare or incinerator.

The following limitations apply to this exception:

- The HLS must be configured to shut down and block in, but not depressure, the battery. The HLS trip level must be set so that adequate vapour-liquid separation is not impaired at maximum liquid level and vapour flow rates.
- If liquid carryover involving spills occurs around the flare or incinerator or if black smoke is formed, licensees must install adequately sized flare or incinerator separators.

### **5.8 Backflash Control**

Inadequately purged flare or incinerator systems may have sufficient oxygen present to support combustion. Backflash may occur when the linear velocity of the combustible mixture of gas and air in the system is lower than the flame velocity.

- Licensees must take precaution to prevent backflash using appropriate engineering and operating practices, such as:
  - installation of flame arresters between the point of combustion and the flare or incinerator separator, or
  - provision of sufficient flare header sweep gas velocities (i.e., purge or blanket gas) to prevent oxygen intrusion into the flare or incinerator system.
- Check valves are not an acceptable form of backflash control.
- Safe work procedures must be in place to ensure complete purging of oxygen from flare or incinerator systems prior to ignition.

### **5.9 Flare and Incinerator Equipment Spacing and Set-back Distances**

Refer to Directive S-01 for flare and incinerator equipment spacing and setback distances.

### **5.10 Compliance with Fire Laws and Fire Bans**

Licensees must maintain areas surrounding flares and incinerators to minimize fire hazards and operate in accordance with applicable provincial and local fire legislation, regulations and bylaws, including fire bans. Information on fire bans in Saskatchewan can be obtained from [www.saskatchewan.ca](http://www.saskatchewan.ca).

### **6. ER Field Office Contacts**

Flaring and incineration inquiries, notifications, or complaints may be directed to the applicable ER Field Office listed below:

Estevan	General Inquiry	(306) 637-4541
Kindersley	General Inquiry	(306) 463-5400
Lloydminster	General Inquiry	(306) 825-6434
Swift Current	General Inquiry	(306) 778-8252