JOSOP 603 – flaring and venting Standard

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1.0 Purpose, Objectives and Scope

1.1 Purpose

The OE expectations require that processes are in place to conserve natural resources, to inventory all emissions, releases, and wastes. To mitigate and manage significant potential risks and impacts to human health and the environment associated with these emissions, releases, and wastes. In line with these OE expectations, this Flaring and Venting Standard has been developed to support JO Operations.

1.2 Objectives

The objective of Standard is that JO operations are conducted without continuous associated gas flaring and venting.

1.3 Scope

It covers activities related to continuous associated gas flaring and venting up to the point of crude oil custody transfer or until the crude oil enters a facility not within JO premises.

2.0 Requirements

- **Capital Project Design Requirements**

  Flare and vent elimination – All new projects and facilities shall be designed and operated without continuous associated gas flaring or venting unless it is demonstrated that meeting this requirement is infeasible.

  KPC has set a goal of 1% or less gas flaring from total production by 2012 and JO to eliminate continuous flaring by end of 2016.

  Existing Operating Requirements

  1. **Associated Gas Recovery Plan (AGRP)** – A baseline AGRP shall be prepared and updated annually as part of the business planning process.
  2. **Flare and Vent Elimination** – All production operations shall be conducted without continuous associated gas flaring or venting unless it is demonstrated that meeting this requirement is infeasible.

- **De minimis Flaring and Venting Volume Thresholds**

  The following items are excluded from the flare and vent elimination requirement:

  - Onshore flaring of associated gas volumes less than 50,000 standard cubic feet per day (scfd) per flare point.
  - Onshore venting of associated gas volumes less than 2,500 standard cubic feet per day (scfd) per vent point from low pressure vessels or equipment.

2.1 Exclusions

The following items are excluded from the Associated Gas Recovery Plan and flare and vent elimination requirements:

- Flaring or venting for time periods of less than 30 days during equipment failures or to relieve system pressures to eliminate unsafe operating conditions.
- Venting/purging for equipment maintenance.
- Flaring or venting of associated gas used for instrumentation.
- Combustion of associated gas to maintain flare pilots.
- Flaring of associated gas necessary to purge air from flare stacks.
- Venting of associated gas from crude oil that has been previously flashed through pressure release to atmospheric conditions such that the only emissions occur from breathing and working losses.
- Venting of associated gas from floating roof tanks
- Flaring or venting during drilling operations
- Flaring or venting during the first year of production for a new project. It is recommended that alternatives to flaring and venting be evaluated if the quantity of associated gas produced during that period can be utilized.
- Flaring or venting demonstrated to be infeasible on the basis of technical, environmental, safety or commercial ground as prescribed in the GUG EPS Feasibility Evaluation Protocol. Flaring is preferable to venting, so if it is infeasible to eliminate a venting source, the feasibility of capturing and flaring the gas should be evaluated.

3.0 Terms and Definitions

• *Associated gas flaring* – Any flaring associated with oil production or condensate storage that occurs because of a temporary or permanent lack of adequate gas processing facilities to meet gas production levels, including:

- *Continuous flaring* – Flaring of gas that is associated with crude oil production or condensate storage and that is not utilized for on- or off-site energy needs, recovered for local or international gas markets, or re-injected, for a period of 30 days or longer.

- *Non-continuous flaring* – Flaring of gas streams resulting from releases lasting less than 30 days, including but not limited to releases of this duration or shorter from well testing, equipment maintenance, startups and shutdowns.

• *Associated gas venting* – The controlled release of unburned gas which is produced in association with oil production or condensate storage directly to the atmosphere for gas disposal or for safe facility operation. Venting includes gas purges and the release of casing head and flashing tank vent gas, but excludes fugitive gas releases from piping and equipment leaks.

- *Continuous venting* – Venting of gas that is associated with crude oil production or condensate storage for a period of 30 days or longer. Continuous venting includes periodic or intermittent venting which continues on a regular basis for a period of 30 days or longer (e.g., the periodic release of casing head gas, flashing gas from fixed roof tank vents, etc.), even if gas is not continuously flowing through the vent.

- *Non-continuous venting* – *Venting* of gas streams resulting from releases of less than 30 days.

- *Existing facilities and projects* – Capital projects in CPDEP Phase 3 or later as of Jan 1, 2008.

- *New facilities and projects* – Capital projects in CPDEP Phase 2 or earlier as of Jan 1, 2008, and thus is required to comply with capital project requirements. New facilities and projects become existing facilities and projects upon completion of commissioning.

- *Onshore* – Land, enclosed seas, lakes, rivers, canals, and wetlands.

4.0 Emergency Flare

New flare installation is allowed only to be used in upset and emergency conditions.

4.1 Flare Efficiency

While manufacturers are able to design flares with ever improving combustion efficiencies under test conditions, the difficulty of guaranteeing flare efficiency in the field is well-recognized. Factors such as crosswind velocities, the heating value of the flared stream, and exit velocities, among others, all contribute to the variability of the actual combustion efficiency. Therefore, this standard recommends suitable design characteristics and guidance for operation that are considered to lead to efficient and stable flaring.

Proper design and operation of flare systems, leading to optimum flare combustion efficiency, includes consideration of the following:

- Minimize risk of pilot blowout through installation of a reliable flare tip with a pilot that is appropriate for the meteorological conditions of the area.
    - Ensure sufficient exit velocity and/or provide wind guards for low/intermittent velocity flare streams.
    - Ensure use of a reliable ignition system.
- Minimize liquid carryover and entrainment in the gas flare stream by ensuring that a suitable liquid separation system is in place.
- Minimize flame liftoff and/or flame lick (not applicable for sonic flow flare designs).
- Maximize combustion efficiency by proper control and optimization of flare fuel/air/steam flow rates to ensure the correct ratio of assist stream to flare stream.
- Design flaring to ensure a low-volume purge gas requirement, be smokeless, and have low radiation flames. Smokeless design achieves improved combustion efficiency (less than 20% of opacity). Smokeless flare operation can be achieved through improved design of flare tip and air or steam assist feature.
- Ensure that the heating value of flared gas is sufficiently high to maintain efficient and stable combustion. Where viable, additional gas may be required to raise the heating value adequately.
    - Gases with heating values below about 300 Btu/ft3 (11.2 MJ/m3) are prone to inefficient combustion. If possible, these gases should be combined with higher heating value streams before flaring.

- Gases with heating values from about 300 Btu/ft3 (11.2 MJ/m3) to 800 Btu/ft3 (30 MJ/m3) are susceptible to inefficient combustion under high wind conditions. Flares for these gases should be located to minimize wind impacts and/or equipped with wind guards to protect the flare tip, and should be designed to ensure sufficient stack exit velocity to provide stabilization against the wind.

- Implement proper burner maintenance and replacement programs.

4.2 Gas Leakage

The leakage of gas to the flare system from isolation valves and emergency release devices can be minimized by proper installation and maintenance of these devices.

4.3 Metering

To be consistent with best practice flares and vents subject to the requirements of this standard should be continuously metered. Meters can be placed either at the flare header or at each of the gas sources to determine the volumetric flow to the flare. Flow measurement devices used to determine flare gas volumes should have an accuracy of +/- 5% over the anticipated range of flow rates. These meters should be calibrated at least annually.

5.0 Required Records

The following records should be submitted to EHS Division:

- Continuous associated gas flaring volumes.
- Continuous associated gas venting volumes.
- Continuous associated gas flaring volumes less than 50,000 standard cubic feet per day (scfd) per flare point.
- Continuous associated gas volumes venting less than 2,500 standard cubic feet per day (scfd) per vent point from low pressure vessels or equipment.
- Flare performance

6.0 References

The following is a complete list of the documents referenced by this standard:

Table 1. Document List

Title	File Name
Global Upstream and Gas - Flaring and Venting Environmental performance Standard	flaring and venting 2010\FV EPS - DRAFT Final.doc
Allowable air pollutants emission rates from fixed sources	KEPA-Appendix 20

7.0 Document Control

Table 1. Document History

Version Number	Date	Notes
Dr Suha Yasin	7-11-2010	First draft
Mark Chichester	2-12-2010	Review first draft
Dr Suha Yasin	5-12-2010	Review Second draft
Sati Al-Otaibi	19-12-2010	Review
Dr Suha Yasin	20-12-2010	Final draft
JO OELT	29-12-2010	Approved