Shell U.K. Limited

Mossmorran Fractionation Plant

Permit Variation

PPC/A/1013495

Contents

How to use this form

Purpose of the document - This document is intended to demonstrate transparency of the determination process to all interested parties. It should record all significant issues, decisions made, actions taken, and rationale for the approach adopted. It should be sufficiently detailed to demonstrate that all legal requirements were adhered to and provide the basis for defending any appeal.

Language used – You should use non-technical language as far as practicable, avoiding unexplained acronyms and technical terms. While aiming to be comprehensive, it must also be as brief as possible, consistent with the overriding need for clarity and accuracy. Officers should bear in mind that much of the document may be available publicly under the Freedom of Information Act etc.

Timely recording of information - Completion of the various forms should be done on a progressive basis rather than at the end of the process.

Level of detail - Officers should use their professional judgement as to the level of detail required which will depend on the complexity of the process. Officers must consider why the information is required and ensure appropriate detail is included. Each table is designed to be expanded as text is added and will obviously allow the insertion of additional rows where necessary

Applicability of any Section - Do not delete whole sections of the form unless directed to do so. If something is not applicable to your determination please record this on the form and give a justification if appropriate indicating you have considered the issue and not just missed it.

1 Non-Technical Summary of Determination
Provide a non-technical summary of the process and determination
Changes to the permit to reflect updates to flaring management on Site following a detailed technical review. This will have the effect of cutting air and CO_2 emissions, with minimal noticeable offsite impact. **Additionally, taking the opportunity to correct some minor errors in the permit.**
Glossary of Terms
BAT - Best Available Techniques BREF – Best Available Techniques Reference Document BAT-C – Best Available Technique Conclusions ELV – Emission Limit Value CO – Coordinating Officer

2 External Consultation and SEPA's response	
Is Public Consultation Required? (if no delete rows below)	**No**
Is PPC Statutory Consultation Required? (if no delete rows below)	**No**
Discretionary Consultation required? (if yes provide justification and details below, otherwise delete row)	**Yes**
Due to historic public interest in flaring from the Mossmorran complex, a Discretionary Consultation will be carried out.	
Enhanced SEPA Consultation required? (if yes provide justification and details below, otherwise delete row)	**No**
"Off site" consultation required (if yes provide justification and details below, otherwise delete row)	**No**
Transboundary Consultation required? (if yes provide justification and details below, otherwise delete row)	**No**
Is Public Participation Consultation Required? (if yes provide justification and details below, otherwise delete rows below)	**No**

3 Administrative determinations
Determination of the Schedule 1 Activity
No change
Determination of the Stationary Technical Unit to be permitted
No change
Determination of Directly Associated Activities
No change
Determination of Site Boundary
No change

4 Introduction and Background

4.1 Historical Background to the activity and variation

Flaring from the FNGL site does not take place continuously and is primarily only necessary to safely turn large pieces of equipment on and off. The elevated flare system is also a critical safety system to allow the plant to shutdown rapidly in an emergency. The Site has elevated and ground flares available to it, but historically (until mid-2023) primarily used only the elevated system for the flaring required for the safe maintenance of the plant. This was due to the neighbouring ExxonMobil plant, utilising the ground flares for day to day operations until that point. In 2024 the plant flared 589 tonnes of gas (excluding fuel gas).

The FNGL ground flares were built in the 1980s and despite ongoing maintenance now require upgrading to modern control standards, or replacement. Shell initially pursued the option of a new Enclosed Ground Flare (EGF) and this was included as a requirement in their PPC Permit by SEPA.

The EGF route has been revisited in the light of escalating construction costs and design issues on other Sites with similar equipment. The Site has also been proactively managing their flaring to reduce the amount flared.

In late 2024 the Site switched to single ground flare operation to cut the amount of fuel gas used. This has resulted in a $C0_2$ saving of 4,700 tonnes per year. A full Best Available Technique (BAT) assessment was then carried out to assess the best route for flaring management at the Site. This concluded that a mode of flaring described as "*Ground Flare Maintenance Flaring Only Mode*" would provide the maximum benefits from using the ground flares to prevent community disturbance, while also minimising the $C0_2$ emissions from this activity (a further reduction of 5150 tonnes of $C0_2$ per year). Under this mode the ground flares are usually deactivated (consuming no pilot gas fuel) and can be activated quickly by the Site if required. A decision making tool has been developed, which assesses the benefits of activating one or two ground flares to deal with an unexpected occurrence on the Site. This factors in the amount of gas to be flared and the duration of the outage, with regular reviews of this decision. It is expected that this will result in three days of ground flare use per year. For planned maintenance activities it is expected that the ground flare(s) will be used for four days per year.

4.2 Description of activity

The Fife Natural Gas Liquids (FNGL) Plant operated by Shell U.K. Limited, and the Fife Ethylene Plant (FEP) operated by ExxonMobil Chemical Limited are permitted as a single PPC installation. As the two plants are operated by separate operators, they have separate permits.

Natural Gas Liquids (gasoline, ethane, propane, and butane) are pumped along a pipeline to the FNGL plant from the St Fergus Gas Plant at Peterhead (also operated by Shell U.K. Limited). At the FNGL plant three separate modules carry out identical processes to separate the ethane, propane, and butane.

Ethane is forwarded to the adjacent FEP, where it is converted to ethylene by steam cracking.

The products from the installation are transported by pipeline or road tanker, predominantly to the Braefoot Bay marine terminal operated by Shell U.K. Limited and ExxonMobil Chemical Limited near Aberdour in Fife, from where it is shipped to other locations. Some of the propane and butane produced is forwarded to the adjacent Avanti Gas facility who supply gas for heating. The Avanti Gas facility is not part of the PPC installation and does not carry out any PPC activities.

4.3 Outline details of the Variation applied for

The Variation application is to remove the requirement for a new EGF to be built and to allow the Site to operate in "*Ground Flare Maintenance Flaring Only Mode*". There are also a set of minor corrections to the permit that have been identified by both Shell and SEPA.

4.4 Guidance/directions issued to SEPA by the Scottish Ministers under Reg.60 or 61.

The Environmental Protection (exclusion of information from registers) (Scotland) Direction 2007. This requires plans of the Site to be kept securely and not placed on the public register.

4.5 Identification of important and sensitive receptors

The Mossmorran Installation (FNGL and FEP) is located in Fife close to a number of communities including Cowdenbeath, Lochgelly, Auchtertool and Crossgates. Closer to the site there are a number of houses, farms and businesses.

The closest watercourse to the site is the Dronachy Burn which runs along the north side of the installation and receives emissions from both plants. The Dronachy Burn flows into the Raith Lake, which is used as a trout fishery (not currently active), and then onto the Firth of Forth in the area of Kirkcaldy Sands. The Dronachy Burn also flows through the Auchtertool Linn wildlife site, a wooded gorge containing swamp areas. There are a number of other woodland areas in the vicinity, for example, Calais Muir, Humble Wood, Moss Easy and Townhill Muir.

5 Key Environmental Issues

5.1 Summary of significant environmental impacts

Significant reduction in air emissions due to the reduction in fuel gas used to keep the ground flares on standby.

5.2 Emissions to Air

Point Source emission to air:

Significant additional reduction in fuel use for the ground flares as operation reduces from one to occasional, with an estimate of only seven days use per year (four days for planned work and three days for unplanned events). This amounts to a saving of 5150 tonnes of $C0_2$ per year. In addition, there will be minor reductions in NOx and other air pollutants from the Site. When put into the context that the Site flared 589 tonnes of hydrocarbons in 2024 the amount of fuel used is disproportionately high.

Fugitive emissions to air:

No change anticipated.

Odour:

No change anticipated.

5.3 Emissions to Water

Point Source Emissions to Surface Water and Sewer:

N/A

Point Source Emissions to Groundwater:

N/A

Fugitive Emissions to Water:

N/A

5.4 Noise

The ground flares do not generate any perceptible noise at the closest identified receptors and transferring their flaring load to the elevated flare is not expected to do so either. This is because the levels are considerably below those that would be audible at the receptor locations (primarily Lochgelly).

Shell have submitted a noise report, which includes monitoring near the base of the elevated flare stack during the trial period and at other nearby receptors, to confirm this. The Report was inconclusive regarding noise impact from the small amount of flaring that took place during the trial. This flaring totalled 3.16 tonnes over an eight hour period and coincided with a period of high winds, so the monitoring is difficult to interpret.

The permit already contains Conditions 5.1.3 to 5.1.5 which require the creation of a noise report from the fixed monitors in the vicinity of the Site in the event of Major Flaring (defined as equal to or greater than 15 tonnes per hour for a continuous duration equal to or greater than 60 minutes) and these are considered sufficient to provide additional data in the event of a prolonged flaring event.

Additionally, no Complaints were received by SEPA or Shell in relation to the flaring trial. This also sits within the context of long term operation in this mode when FEP utilised the ground flares for the majority of the past 20 years.

The Site's elevated flare tip was replaced in 2022 with a low noise version, and efforts continue to reduce and minimise site flaring further. This is achieved through good maintenance and operational practices and SEPA will continue to focus on these aspects.

5.5 Resource Utilisation

Water use

N/A

Energy use and generation

N/A

Raw Materials Selection and Use

N/A

5.6 Waste Management and Handling

Waste Minimisation

N/A

Waste Handling

N/A

Waste Recovery or Disposal

N/A

5.7 Management of the site

Environmental Management System

Updates will be made to Site procedures to ensure the following:

1. Ground flares are regularly inspected and maintained ready to use.
2. Tests are conducted twice per year to restart the ground flares so that staff retain this competency.
3. A decision making tool is available to the appropriate staff to make consistent decisions around using the ground flares in the event of an unexpected maintenance issue.
4. Work will continue of flare minimisation and wider emission reduction efforts across the Site.

Accidents and their Consequences

There will be no change to the plans for handling accidents, which have always relied on the elevated flare system to safely shutdown the plant.

Closure

N/A
5.8 Site Condition report
N/A
5.9 Monitoring
Air
N/A
Water
N/A
Soil and Groundwater
N/A
Waste
N/A
5.10 Consideration of BAT and compliance with BAT-Cs if appropriate
The Site completed a thorough review of flaring in April 2025, which identified that the upgrade and use of the ground flares for key maintenance activities represented the best balance between community protection (from primarily minor light impact) and reduction in $C0_2$ emissions. SEPA has a duty under Part 4 of the Climate Change (Scotland) Act 2009 to give significant weight to $C0_2$ emissions in all its work and therefore accept the Conclusions of the Report as BAT for this Site. Recent Inspection work of the ground flares has demonstrated that they are in a stable condition, following significant maintenance activity and reduced use over the last five years. SEPA therefore has confidence that the units will be available in the short term (2-3 years). In order to ensure that the ground flares remain available in the medium to long term Conditions will be inserted into the permit to require regular inspections, maintenance and training in the use of the ground flares. The elevated flare system was upgraded in 2022 with the installation of a low noise flare tip, which is considered to be BAT. Additionally, wider work to focus on flare minimisation across the Site will be required. The Site has already implemented the two additional recommendations of the BAT review to cut an additional 470 tonnes of $C0_2$ per year. Alongside this work, maintenance scheduling changes to reduce the number of shutdowns, and improvements to the site fuel system to allow the use of ethane as a fuel rather than requiring it to be flared have been made.

6 Other Legislation Considered	
Nature Conservation (Scotland) Act 2004 & Conservation (Natural Habitats &c.) Regulations 1994	
Is there any possibility that the proposal will have any impact on site designated under the above legislation? If yes, provide information on the action and justification below:	**No**
Is there any other legislation that was considered during determination of the permit (for example installations that may be impacted by the requirements of legislation involving Animal By Products, Food Standards, Waste, WEEE regulations etc). If yes, provide information on the legislation, action and justification below:	**No**

7 Environmental Impact Assessment and COMAH

How has any relevant information obtained or conclusion arrived at pursuant to Articles 5, 6 and 7 of Council Directive 85/337/EEC on the assessment of the effects certain public and private projects on the environment been taken into account?
N/A
How has any information contained within a safety report within the meaning of Regulation 7 (safety report) of the Control of Major Accident Hazards Regulations 1999 been taken into account?
The Site flaring system is primarily there for safe shutdown of the plant in the event of a significant issue. The elevated flare system is unchanged by this variation and so continues to provide this vital safety role.

8 Details of the permit

Do you propose placing any non standard conditions in the Permit?	**Yes**
Do you propose making changes to existing text, tables or diagrams within the permit?	**Yes**

Outline the changes required and provide justification below:

Proposed Condition Number:	**Proposed Change:**	**Justification:**
Interpretation of Terms	Insert new term: “Flare Screening Tool” means the spreadsheet, submitted as Appendix C of Variation Application VAR04 on 31 October 2025, that calculates high pressure (HP) flaring rates and uses a dynamic decision tree based on factors such as duration and intensity of Flaring to determine whether ground flare utilisation is required and whether one or both ground flares should be brought into operation.	New terms required to define when the ground flares should be used going forward.
1.1.5 (c)	Replaced by: c) A continually oil contaminated drainage system (COC) that collects surface water from process areas and comprises treatment by a Tilted Plate Interceptor (TPI) prior to discharge into the accidentally oil contaminated drainage system.	Correction of a minor error.
1.2.1 & 1.2.2	Replaced by: 1.2.1 The permitted installation to which this Permit applies ("the Permitted Installation") is:- 1.2.1.1 The part of the Installation which comprises the Stationary Technical Unit described in Paragraphs 1.1.4.1 to 1.1.4.2, where the activities described in Paragraphs 1.1.3.2 and 1.1.3.4 are carried out, together with the Directory Associated Activities described in Paragraph 1.1.5. The location of the Permitted Installation on the Site is delineated in blue on the Site Plan. 1.2.2 For the purposes of this Permit, the Activities described in Paragraph 1.1.3.2 and 1.1.3.4 and the Directly Associated Activities	Update to numbering referenced in the Conditions.

	described in Paragraph 1.1.5. shall be known together as the Permitted Activities.	
Table 2.1	Updated to incorporate new Conditions 4.3.11 and 4.3.12 and to remove expired one off Report references.	Remove expired Conditions and insert new requirements.
Tables 2.1 and 2.2	Moved location.	Moved Tables to correct numbering of Tables within Schedule 2.
2.5.1.4	Replaced with: The quantities of material losses and wastes generated within the Permitted Installation;	Correction of a minor error.
2.7.5	Replaced with: The operator shall monitor the groundwater at the site for the relevant hazardous substances specified in table 2.3 at the frequency specified in table 2.3, the purpose of which shall be to identify groundwater contamination associated with the activities specified in Table 2.3 by those relevant hazardous substances. Each assessment shall be recorded and reported to SEPA. The first assessment shall be completed by 28 February 2020. The assessment shall include interpretation of the results with reference to previous monitoring undertaken (including the site and where applicable baseline reports) and operations at the permitted installation and details of corrective actions that are required to protect groundwater and remedy any contamination that has occurred as a result of permitted activities.	Correction of a minor error.
4.3.8	Replaced by: High Pressure (HP) Flaring from the installation shall take place preferentially on the ground flares, when determined by the Flare Screening Tool.	Specifying when the ground flares should be used.
4.3.11	New Condition: By the end of each February the Operator shall prepare and submit to SEPA a report including; a) A review of possible improvements to minimise the number and/or impact of Flaring events, with any proposals for improvement and timescales for implementation. b) Details of progress to date associated with any improvement plans specified in previous reports. c) Details of any work undertaken during the previous 12 months to minimise the number and/or impact of Flaring events. d) Details of any work undertaken during the previous 12 months to inspect and maintain the ground flares.	Requirement to report on Site wide flaring minimisation work and inspection, training and maintenance of the ground flares to ensure they are available when needed.

	e) Details of planned inspection and maintenance activities planned for the ground flares in the coming year. f) Details of the maintenance strategy for each ground flare over the coming 5 years. g) Details of training on ground flare activation and decision making over the past 12 months.	
4.3.12	New Condition: By 31 December 2026 the Operator shall complete and provide to SEPA a feasibility study for upgrading obsolete ground flare ignition and control systems. The report shall include proposals and timelines for implementing any identified improvements.	Report to specify the detailed upgrade work required to bring the ground flare control and ignition system up to modern standards.
4.3.13	New Condition: The Operator shall carry out the improvements identified in the feasibility study submitted under Condition 4.3.12 by 31 December 2027.	Reasonable timeframe to install the upgrades identified under Condition 4.3.13.
Table 4.1	Replaced with corrected version	Correction of a minor error.
Table 4.2	Footnote deleted	No longer applicable.
Table 4.4	Replaced with corrected version	Correction of a minor error.
Table 4.6	Replaced with corrected version	Correction of a minor error.

9 Emission Limit Values or Equivalent Technical Parameters/Measures

Are you are dealing with either a permit application, or a permit variation which would involve a review of existing ELVs or equivalent technical parameters?	**No**

10 Peer Review

Has the determination and draft permit been Peer Reviewed?	**Yes**

11 Final Determination

Issue of a Permit - Based on the information available at the time

Issue a Permit – Based on the information available at the time of the determination SEPA is satisfied that

- The applicant will be the person who will have control over the operation of the installation/mobile plant,
- The applicant will ensure that the installation/mobile plant is operated so as to comply with the conditions of the Permit,
- The applicant is a fit and proper person (specified waste management activities only),
- Planning permission for the activity is in force (specified waste management activities only),
- That the operator is in a position to use all appropriate preventative measures against pollution, in particular through the application of best available techniques.
- That no significant pollution should be caused.