Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

Our Ref: PPC/A/1088953/FWL/01
Your Ref:

If emailing, mark FAO: [redacted]

INEOS Chemicals Grangemouth Limited
No. 1 Inchyra Head Office
PO Box 21, Bo'ness Road
Grangemouth
FK3 9XH

FAO Company Secretary

04 July 2023

Dear [redacted]

FINAL WARNING LETTER: PPC/A/1088953/CON01/VAR01/FWL/01

POLLUTION PREVENTION AND CONTROL (SCOTLAND) REGULATIONS 2012 ("the Regulations")
Permit Reference Number: PPC/A/1088953
INEOS Chemicals Grangemouth Ltd ('ICGL')
SITE: KG Ethylene Plant

I refer to the flaring incident on 1 December 2022 at the KG ethylene plant. SEPA has investigated the incident and reviewed the investigation report which was provided by INEOS Chemicals Grangemouth Ltd ('ICGL') to SEPA on 10 January 2023.
The incident resulted in significant elevated flaring for over 5 hours at night with peak flaring exceeding 100tph on both elevated flares. The incident was initiated by nitrogen entering the propylene refrigeration system on Train 1 from Train 2 due to a failure to initially isolate Train 2 when it was shut down in September 2022. Had the isolation valve been closed the incident would not have occurred. The flaring was exacerbated by a malfunction on the ground flare system which prevented the ground flare loading up until 6 hours after the incident started.

Cont'd/……

Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Tel: 03000 99 66 99
www.sepa.org.uk

[redacted]
INEOS Chemicals Grangemouth Limited
Grangemouth

04 July 2023

Following our investigation, SEPA considers that the incident was preventable, and the failures identified below are unacceptable as they resulted in significant flaring and disturbance to the public. This was the sixth flaring incident in 2022 and reinforces the need for ICGL to secure compliance with the best available technique (BAT) for ground flare capacity as an urgent priority. SEPA's investigation found that in addition to the general BAT condition under Regulation 22 of the Regulations, the following conditions in Permit PPC/A/1088953 were breached which either led to or exacerbated the incident on the night of 1 December 2022:

Condition 2.4.1 - All necessary measures shall immediately be taken to prevent and reduce emissions in the event of an incident and limit the environmental consequences as a result.

Condition 4.5.6 - The KG ground flare must be used during all plant flaring operations to minimise noise emissions.

Conditions 3.7.1 and 3.7.2 – to identify and designate environmental critical equipment.

(i) Regulation 22 - General BAT Condition

Under Regulation 22(2) of the Regulations, it is a condition of the Permit that the operator must use the best available techniques for preventing or, where that is not practicable, reducing emissions from an installation. The root cause of the flaring incident on 1 December 2022 was a failure of ICGL Management to ensure the necessary resource and equipment was made available to operational staff and in place to complete the initial isolation of Train 2 in September 2022, some 2 months prior to the incident. This management failure caused a significant flaring incident in breach of the general BAT Condition under Regulation 22.

Procedural controls designed to ensure isolation in accordance with Site and Industry Standards could not be fully implemented by the Operations staff due to ICGL Management failing to provide the necessary equipment namely scaffolding to provide access to close a manual valve. This failure led to a deliberate deviation of procedures to falsely record that isolation of Train 2 had occurred when it had not. As a result, Train 2 isolation was not completed as required by the plant shutdown and nitrogen purging procedures prior to nitrogen purging. The valve in question known as valve 2 was left open for over 2 months prior to the flaring incident on 1 December 2022 with the necessary scaffolding not put in place until 22 November 2022.

Cont'd/……

[redacted] 04 July 2023
INEOS Chemicals Grangemouth Limited
Grangemouth

However, even then no action was taken to isolate the valve some 9 days prior to the incident even though positive isolation was planned to take place by 30 November 2022 but never occurred. Subsequently, preparations for additional nitrogen purging on Train 2 on the night of 1 December led to nitrogen entering Train 1 propylene refrigeration circuit via valve 2 which caused the flaring incident. The Operations staff involved assumed valve 2 was closed because the procedures had been signed off to that effect. Had valve 2 been isolated in September or after 22 November 2022 the incident would have been prevented.

(ii) Condition 2.4.1 - All necessary measures to prevent and reduce emissions

Condition 2.4.1 of the Permit requires all necessary measures shall immediately be taken to prevent and reduce emissions in the event of an incident and limit the environmental consequences as a result. The advanced control system ACS 1033 designed to reduce flaring during plant upsets by reducing furnace feed rate in the shortest time (30 minutes) was not used although available in the control room. Instead, a less effective measure was used namely feed controllers FC 51 and 52 which are the normal feed flow controller to the furnaces. This measure took over 2.5 hours to achieve the same furnace load reduction as ACS 1033 was designed to achieve in 30 minutes. The furnace shutdown system (SD1 trip) designed to remove furnaces safely and quickly and reduce plant feed rate to reduce flaring was also not used other than for 1 of the 4 furnaces taken off during the incident.

SEPA considers the ACS 1033 and SD1 trip systems to be necessary measures to prevent and reduce emissions in accordance with Condition 2.4.1. SEPA recognises the efforts and best endeavours made by the control room and the night shift staff involved in dealing with the incident on 1 December to reduce flaring. However, it is clear there was uncertainty around the use of certain measures such as ACS 1033 during an incident. Control room staff were not aware of ACS 1033 ever having been employed during an incident. It is also evident that using the SD1 trip to reduce plant feed is challenging for a shift due to the human resource this requires set against the number of technicians available per shift.
It is also clear the control room could do little to control the flaring once a safety relief valve lifted on the propylene refrigeration circuit to alleviate the high pressure caused by nitrogen in the system. This resulted in elevated flaring of over 100tph on each flare stack in addition to flaring from fractionation and cracked gas from the furnaces.
Cont’d/……

[redacted]
INEOS Chemicals Grangemouth Limited
Grangemouth

04 July 2023

The lack of effective measures to deal with this volume of flaring highlights the current lack of ground flare capacity at KG. The flaring volumes involved during the incident were over 100tph during the first hour and remained around this figure for another hour or so excluding the peak flaring which also occurred during this time as noted above. The breach of Condition 2.4.1 and the limitations of the current measures available highlights the major failure to comply with BAT for ground flare capacity at the site.

(iii) Condition 4.5.6 - Use of ground flare

Condition 4.5.6 of the Permit requires the KG Ethylene plant ground flare to be used during all plant flaring operations to minimise noise emissions. However, the ground flare flow control system failed to operate on demand at the start of the incident. This could have removed 50tph of elevated flaring based on its design capacity. Instead, around only 12.5tph was diverted to the ground flare initially as a result of the failure and it took over 6 hours using best endeavours to load up the ground flare to around 40tph.

(iv) Condition 3.7.1 and 3.7.2 - Identification and repair of Environmentally Critical Equipment

Condition 3.7.1 requires the Operator to identify and designate as environmentally critical any item of process plant or instrumentation that it relies on for prevention or limitation of pollution from the Installation. The operation of the ground flare flow control system is critical for the prevention and limitation of noise pollution. Prior to the incident, the plant management and control room were aware of a fault on the flow control system of the ground flare which occurred on 30 November 2022 at 3.02am. However, the fault with the system was not treated as urgent and prioritised for repair within 24 hours as an environmentally critical item. Instead, it was given a lower priority which could allow up to 30 days to complete the repair. The root cause of this was a failure to designate the ground flare flow control system including instrumentation and flow computer as environmentally critical equipment and ensure it was treated as a priority repair, in breach of condition 3.7.1. As a consequence, Condition 3.7.2, which requires environmental critical items to be kept on a register with a record of critical spares held was also breached in respect of the flow control system serving the ground flare. This was also evident in the fact that critical spares were not available based on the critical spares list held. The failure to identify the ground flare flow control system as environmentally critical equipment and ensure

[redacted]
INEOS Chemicals Grangemouth Limited
Grangemouth

04 July 2023

the availability of spares in order to prioritise its repair within 24 hours contributed to the incident as the control valve failed to operate on demand which exacerbated the flaring on the night of 1 December 2022.

Other Permit Breaches

The investigation also found that ICGL had failed to notify a previous incident on 11 January 2022 where the ground flare had tripped during flaring following an incident the previous day on 10 January 2022, in breach of Condition 2.4.2. This incident led to a subsequent change in operation due to modifications made to the ground flare flow control system in June 2022. The latter change in operation should also have been notified to SEPA under Regulation 45. Failure to comply with regulation 45(1) is an offence under regulation 67(1)(c). SEPA will require to follow up the plant modification made in June 2022 in order to verify the operation of the ground flare flow control scheme and its ability to handle fluctuating flows during a plant trip.

SEPA's investigation also found that records relating to previous incidents in 2022 were not available as required by the Permit. Condition 2.2.2 of the permit requires records made in compliance with the Permit to be kept for 5 years and Condition 2.2.4 requires records relevant to operations or maintenance to be kept at the Permitted Installation for at least one year.

Finally, in relation to each of the above breaches of a permit condition, SEPA considers ICGL to have breached Condition 2.4.4 which requires the Operator to notify any breach of a condition of the permit. In addition, Regulation 52 places a duty on ICGL to give notice to SEPA of any breach of a condition of the Permit.

Conclusion

In accordance with Regulation 67(1) it is an offence for a person (a) to fail to comply with or to contravene a condition of a permit, (c) to fail to comply with regulation 45(1), and (h) intentionally to make a false entry in any record required to be kept under a condition of a permit. SEPA has considered the enforcement options available and in accordance with SEPA' Enforcement Policy, which seeks to secure compliance with the appropriate legislation using the least formal enforcement action available, SEPA has decided to issue ICGL with a Final Warning Letter in relation to this incident.

Cont'd/……

[redacted]
INEOS Chemicals Grangemouth Limited
Grangemouth

04 July 2023

However, the failings identified confirm the incident was preventable and highlight the current lack of ground flare capacity at KG to effectively handle the flaring volumes which can occur. This reinforces the need for the site to have a minimum ground flare capacity of 100tph for the gas compositions in order to effectively reduce and remove flaring quickly during an incident. This failure to use the best available technique for ground flare capacity at KG continues to mean local communities are not being afforded the highest and most effective protection required under the Law.

In order to address the root causes and prevent a repetition of the incident, ICGL should:

1. Conduct a review of the management system and arrangements for plant isolations to include the following and report the outcome to SEPA by 31st August 2023:
    a. Review the management of isolations to ensure realistic work schedules are planned with the right work priority and matching resource including managing competing demands to ensure compliance with standards 44-A-027 and A-01-017.
    b. Review existing reporting systems to ensure a positive organisational culture is in place which recognises and acts on work pressures on operational and maintenance teams.
    c. Clearly identify and record on the isolation procedures the job roles appointed to formally authorise deviations from the isolation procedures.
    d. The KG Plant isolation procedures require to be reviewed to ensure they are well designed, clear, concise and contain up to date instructions.
    e. Review and ensure clear identification of isolation valves on the plant and these are recorded on P&IDs.
    f. Provision of good access to isolation points including lighting.
    g. Effective checking and supervision of isolation work arrangements.
    h. Effective communication including in logs at handovers.
    i. Effective compliance checking arrangements of procedural compliance.

2. Review the equipment and spares required for the ground flare and its control systems to function on demand and ensure they are designated as environmentally critical in compliance with Conditions 3.7.1. and 3.7.2 with spares readily available. This review needs

[redacted]
INEOS Chemicals Grangemouth Limited
Grangemouth

04 July 2023

to ensure the equipment priority will ensure repairs are treated as priority 1 where necessary to prevent a repeat of the incorrect priority being applied as occurred on 30 November 2022.

3. Review the use of ACS 1033 during plant upsets to ensure instructions and training are provided to give assurance to the control room to employ the system as required by Conditions 2.4.1 and 2.4.2.
4. Review the use of furnace shutdown systems during plant upsets to ensure instructions and adequate resource is available to ensure compliance with Conditions 2.4.1 and 2.4.2.

I must advise you that this letter constitutes a final warning. Any further/continued contraventions of the above legislation are likely to result in enforcement action being taken against you by SEPA. Such enforcement action could include the submission of a report to the Procurator Fiscal recommending prosecution, and such a report may include the incident(s) referred to in this letter.

Yours sincerely

[redacted]

[redacted]

[redacted]

CC: [redacted]@ineos.com