ExxonMobil Chemical Limited Fife Ethylene Plant Beverkae House Mossmorran, Cowdenbeath Fife, KY4 8EP +44 (0)13 8373 7000 Tel +44 (0)13 8351 5253 Fax



31st January 2022

Scottish Environment Protection Agency, Edinburgh Office Silvan House, 231 Corstorphine Road, Edinburgh, EH12 7AT

Dear ,

Pollution Prevention and Control Act 1999 Permit PPC/A/1013494 Condition 4.3.12

Please find enclosed the flaring prevention and minimisation review as required under Condition 4.3.12 of PPC/A/1013494.

Significant improvements in further minimising required flaring rate and duration have been realised per the Best Available Technique Programme. As reported to SEPA the following demonstrable reductions were achieved during planned flaring in April and July, significantly exceeding the flare plan reductions communicated and agreed with SEPA in advance of the activity;

- 98% reduction in hours of elevated flaring (compared to 53% plan)
- 91% reduction in hours of higher rate elevated flaring (>20T/H) (compared to 59% plan)

These significant achievements were realised as a result of first-ever technical approaches to plant shut-down and start-up as well as a range of additional techniques detailed in the flare plan.

There were no significant unplanned elevated flaring events during the year. One report was submitted in February relating to a process upset which resulted in less than 80min of elevated flaring, averaging 16T/H.

Detailed progress updates on the Enclosed Ground Flare project have been communicated to SEPA on a monthly basis throughout 2021. The project remains focused on a December 2022 start-up.

As required by the permit, the following points are summarised in the following table;

- i) Progress against delivery of actions from the Fife Ethylene Plant BAT Evaluation (30-Apr-19),
- ii) The outcome of completed actions and
- iii) Any incorporation activities into plans or procedures

Please do not hesitate to get in contact if you require any further information.

Yours sincerely,



BAT Aspect	Action	Target Date	Status	Outcome
Use of Ground Flares	Continue targeted noise monitoring per agreed action plan with Specialist Consultant	Ongoing as Required	Ongoing	 Per Monitoring Plan (submitted to SEPA 23-Aug-19) a continuation of the targeted acoustic studies is being undertaken to; Better understand the relationships between noise and vibration associated with each flare and flow rates, wind direction, wind speed and low frequency noise Confirm the source(s) of flaring noise and variables affecting the flare noise profile Confirm the effectiveness of associated mitigative measures Establish levels of elevated flaring below which noise impacts are not anticipated to occur Noise monitoring and assessment continued throughout 2021 utilising the network of 5 permanent monitors deployed around the site and within surrounding communities. There were no significant elevated flaring vents through the year, so data capture and analysis focused on further establishing representative background noise trends. There was insufficient elevated flare tip. SEPA met with EM and their acoustic specialist in October 2021 to understand more about the work completed to date and available data. It is anticipated that these discussions will continue in 2022. Noise monitoring and assessment will continue throughout 2022. Data availability will be dependent on occurrence of elevated flaring, particularly at higher rates.
Prevent/ minimise flaring	Update start-up procedures to add specificity to rate/speed of start-up progression for key equipment (C-R-51, PGC, C-T-51/52 etc.)	31-Dec-19	Complete.	
Prevent/ minimise flaring	Apply new technology and conduct trial to improve and sustain	Scheduled Mar-20 Postponed due to COVID19	Complete.	Postponement of this activity was discussed with SEPA during the course of 2020 when the COVID19 pandemic prevented specialist vendors from entering the UK to conduct the trial. The work was rescheduled for 2021.

BAT Aspect	Action	Target Date	Status	Outcome
	cold flare vapouriser performance			The BAT Evaluation identified an opportunity to trial a novel cleaning method to improve and sustain cold flare vapouriser performance. The initiative was identified to potentially reduce plant start-up duration by up to 12 hours in some process upset scenarios. A specialist vendor completed a field trial of the technology in 2021. The trial concluded that the cleaning method was not effective. FEP will continue to monitor technology advances in this area and consider future trials where safe and appropriate to do so.
Prevent/ minimise flaring	Develop and implement a post- safepark flare minimisation procedure including associated training and implementation reviews	31-Dec-19	Complete	
Prevent/ minimise flaring	Conduct a technical review of R-C-01 and R-C-02 surge margins to determine minimum operating points. Implement if appropriate.	31-Dec-19	Complete	
Prevent/ minimise flaring	Install jumpover line from demethaniser bottoms line to reboiler inlet line to reduce reboiler start- up time	31-Dec-20 Postponed due to COVID19	Complete	Postponement of this activity was discussed with SEPA during the course of 2020 when the COVID19 pandemic prevented planned maintenance activities from taking place. The work was rescheduled for 2021. The BAT Evaluation identified that installation of a jumpover line from the demethaniser tower bottoms outlet line to the reboiler inlet line could reduce start-up duration by up to 2 hours in some process upset scenarios. The line was installed during a planned maintenance period in 2021. It was not identified to have a significant quantifiable improvement on planned start-up flaring. Minor follow-up work to install an associated full-range level transmitter has been identified for 2022.

BAT Aspect	Action	Target Date	Status	Outcome
Prevent/ minimise flaring	Undertake test of utilising H2 supply to reduce converter start-up to determine effectiveness	31-Dec-20 Postponed due to COVID19	Closed	Postponement of this activity was discussed with SEPA during the course of 2020 when the COVID19 pandemic prevented planned maintenance activities from taking place. The work was rescheduled for 2021. The BAT Evaluation identified an opportunity to utilise stored hydrogen which could reduce start-up duration by up to 4 hours in some process upset scenarios. A test was proposed to coincide with a planned start-up event utilising temporary hydrogen units. Due to rearrangement of the planned plant start-up and shutdown due to COVID, a temporary hydrogen supply could not be secured for the planned plant start-up (the vendor was unable to support due to high H2 demand across the UK). Data from the planned start-up confirms that temporary hydrogen units would not have had any impact on plant start-up duration. While use of an alternate hydrogen source remains an opportunity to reduce duration, there are no upcoming opportunities to test this opportunity. No further action is proposed on this activity. In line with site policies for continuous environmental improvement it may be reconsidered in future if opportunity arises or conditions change.
Flare design	Replace elevated flare tip technology with best-available at the next feasible opportunity	31-Dec-20 Postponed due to COVID19. Existing Elevated Flare Tip ceased to be used beyond 7 th May 2021.	Closed	The timing of the replacement of the elevated flare tip in 2020 was affected by factors beyond ExxonMobil's control – namely the impact of the global COVID19 Pandemic. FEP sought and was granted an extension by SEPA to continue use of the existing flare tip until 7th May 2021 in order for a safe maintenance window that minimises episodes and volumes of flaring to be negotiated with upstream. The existing flare tip was taken out of service prior to the 7 th May 2021 and the replacement flare tip, recognized as best available technology to minimise noise was brought into operation in line with the plant start-up which occurred from late June. There was no significant elevated flaring during the planned plant start-up and no subsequent elevated flaring to enable quantification of the benefit achieved from replacement of the elevated flare tip.

BAT Aspect	Action	Target Date	Status	Outcome
Prevent/ minimise flaring	Implement sustainable training program using cold end console dynamic simulator	31-Dec-21	Closed	 The console dynamic simulator is a novel development that provides opportunity for console technicians to simulate and experience dynamic plant start-up, increasing their responsiveness and familiarity and allowing start-ups to be executed more consistently. A comprehensive training plan has been developed that will encompass the following simulated scenarios which relate to flaring; PGC trip, statistically the most common major machine trip and which shares similar response/de-escalation actions to the other major machines Loss of SHP steam header, to provide good decision making about when trigger points are met Two experienced operations personnel are delivering the training over 10+ shifts. Recovery Console trainees have been prioritised for training. The training program is expected to remain evergreen with refresher training occurring periodically. Training is being recorded and monitored through the sites training department. It was estimated that this initiative could reduce plant start-up by up to approximately 2 hours in some scenarios. It is not possible to quantify the benefits of the current training due to other influencing factors including improved start-up procedures and the variability of each event and its associated plant conditions.
Prevent/ minimise flaring	Pursue existing Steam Team strategy including targeted 2020 repair program to increase leak responsiveness	31-Dec-22	In Progress	 The Steam Leak Management Procedure outlines the requirements for identification and mitigation of steam leaks identified at FEP to ensure: All steam, boiler feed water, and steam condensate leaks on site are uniquely identified. Repair of steam leaks not impinging on hydrocarbon equipment are adequately prioritized for repair. This work is an ongoing activity and is progressing to meet desired steam leak response rate by 31-Dec-22.
Prevent/ minimise flaring	Conduct technical review to determine requirements for reinstating boiler air preheaters	31-Dec-22		No further update.

BAT Aspect	Action	Target Date	Status	Outcome
Prevent/ minimise flaring	Conduct technical review to determine feasibility of re- routing PGC discharge to fuel	31-Dec-23		No further update.
Prevent/ minimise flaring	Conduct technical review to determine feasibility of re- routing ejector from Q-T-01 overheads to fuel	31-Dec-23		No further update.
Flare design	Increase capacity of, and accessibility to, ground flare technology that minimises amenity impact	31-Dec-23	Completion targeted for 31-Dec-22	Detailed progress updates on the Enclosed Ground Flare project have been communicated to SEPA on a monthly basis throughout 2021. The project remains focused on a December 2022 start-up.
Flare design (ground flare)	Refer to Shell FNGL BAT Evaluation	-		
Reliability (ground flare)	Refer to Shell FNGL BAT Evaluation	-		
Suppression of noise (ground flare)	Refer to Shell FNGL BAT Evaluation	-		
Visual Impact (ground flare)	Refer to Shell FNGL BAT Evaluation	-		