Permitting Decisions- Variation (substantial)

We have decided to grant the variation for Saltfleetby Wellsites operated by Angus Energy Weald Basin No.3 Limited.

The variation number is EPR/BJ3107XB/V002.

The variation is required to install the following equipment at Saltfleetby well-site SFB:

- Gas processing (refining) plant; and
- Power generation equipment comprising four gas engines each at 2.17 MWth, identified as new medium combustion plant (MCP), to provide power to the gas processing plant. A fifth future booster engine of similar size has also been included.

Saltfleetby A and B (SFA and SFB) onshore production well-sites were established in 1999, producing natural gas, water and condensate. A pipeline transported hydrocarbons to the nearby Theddlethorpe Gas Terminal (TGT) for processing. Gas production at the installation was suspended in 2017 due to the closure of TGT.

Operations will be brought back into production status once the additional gas processing plant is installed and commissioned and the new gas export pipeline extension is installed to allow pumping of gas direct to the National Grid Transmission System (NTS).

The gas processing (refining) plant is defined by the following definitions in Part 2, Schedule 1 of the Environmental Permitting Regulations (EPR) 2016:

Section 1.2 Part A(1)(a) - Refining gas where this is likely to involve the use of 1,000 or more tonnes of gas in any 12-month period.

Section 1.2 Part A(1)(e)(i) - The loading, unloading, handling or storage of, or the physical, chemical or thermal treatment of crude oil.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of the decision-making process. It

- highlights key issues in the determination
- summarises the decision making process in the decision considerations section to show how the main relevant factors have been taken into account
- explains why we have also made an Environment Agency initiated variation
- shows how we have considered the consultation responses

Unless the decision document specifies otherwise, we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit and the variation notice.

Key issues of the decision

Noise impact assesssment

Noise impact assessment, November 2021

The application contained a noise impact assessment (NIA) which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS 4142:2014 to compare the predicted plant rating noise levels with the established background levels.

The Saltfleetby B site is in a rural area, with just a few residential properties and scattered farms in the vicinity. The nearest receptor is Newfoundland on Saddleback Road which is 400 m from the well-site.

The main sources of sound from the operational equipment are anticipated to be:

- Dewpoint control with condensate tower & glycol regeneration;
- Power generation package (×2); and
- Compression package (×3). A third future booster engine has also been included.

Specific sources are anticipated to operate continuously, 24-hours per day 7-days per week, and as such no provision was made for any day/night variation in levels.

The operator has proposed noise mitigation measures to reduce the noise impacts at sensitive receptors. This includes acoustic barriers adjacent to the power generation packages and acoustic enclosures for other plant. The barriers have been included in the model predictions.

The operator concluded that the sound from operation of the specified equipment at the site carries a low risk of adverse or significant impacts on receptors in the surrounding area at all times.

Based upon the information in the application we are not satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise noise and vibration and to prevent pollution from noise and vibration outside the site.

The assessment does not include tanker movements, which means that specific sound levels are underestimated at a number of nearby residential receptors. The operator confirmed that tanker movements were not included as these are restricted to removal of condensate or produced water which at a worst case would be a single movement in any one day during daylight hours which should not materially affect the conclusion of the assessment. We agree with this approach.

The assessment has overestimated the level of attenuation provided by the acoustic barriers.

Worst case scenarios have not been taken into account, which require separate assessments for the weekdays and weekends.

We conclude that there is a risk of significant adverse impacts at West Lane in the early morning during the week and the weekend.

Updated noise impact assessment, December 2021

An updated NIA was provided, dated December 2021 (received 17 December 2021). Mitigation is proposed in the form of acoustic barriers up to five metres high (para 6.1.1 of the assessment). Two of which will surround equipment which includes the generators and the gas conditioning plant, partially enclosing the equipment. The third barrier will be on the northeast site boundary. This is shown on drawing number 3793=AEL-PI-LAY-001, revision P3.

We confirmed that the acoustic barriers in the model are five metres above ground level at their location.

The noisiest items of equipment (power generation packages) are to be installed in the central part of the site, with the dewpoint control and compression equipment located in the south-east of the site, both surrounded by noise barriers. The ground flare is located in the north-east of the site surrounded by the perimeter noise barrier.

The assessment concludes that sound from the operation of the specified equipment at this site carries some risk of adverse impacts during the night at three locations along Saddleback Road, but a low risk of significant adverse impacts on receptors in the surrounding area at all times.

In order to avoid an adverse or significant adverse impact from the specific sources during the most sensitive periods (i.e. night-time), the planned mitigation will therefore be designed to achieve at least the predicted acoustic performance, to result in absolute external sound levels at identified receptors of 35 dB or lower.

The site will initially operate with only two compressor packages and only diesel power generators (which are substantially quieter than the fuel gas generators to be introduced later). This is likely to result in notably lower sound levels at the commencement of operations. Sound levels rising to the levels predicted in the NIA in the future will be a perceptually smaller change than their introduction from the existing sound climate.

There is also the opportunity to validate and verify predictions, and to implement additional noise control measures where appropriate, during the initial phase of the site operations where adverse impacts are less likely to occur.

We agree with the conclusions drawn, however these are dependant upon the site layout and proposed equipment sound power levels.

Updated sound power levels, February 2022

Our conclusions above were dependant upon the site layout and proposed equipment sound power levels.

We asked the operator to provide evidence to support the sound power levels stated in table 7 of their updated NIA. They also confirmed that the table 7 sound sources are based on actual proposed plant i.e. they are not indicative.

We concluded that there is a high level of uncertainty surrounding the source sound levels and performance of acoustic enclosures on site.

Updated noise impact assessment, February 2022

An updated NIA was provided, dated February 2022 (received 22 February 2022).

This assessment provides evidence for the sound power levels, performance of the acoustic enclosures and takes account of the changes to the site layout. This assessment supersedes previous assessments.

Mitigation is proposed in the form of three acoustic barriers up to five metres high. One partially enclosing the power generation packages, the second partially enclosing the compression packages and Joule Thomson skid, with the third along portions of the northeast boundaries where required. This was confirmed in para 6.1.1 of the assessment and illustrated as figure 2 (see below).

The assessment concludes that sound from the operation of the specified equipment at this site carries some risk of adverse impacts during the night at three locations along Saddleback Road, but a low risk of significant adverse impacts on receptors in the surrounding area at all times.

In order to avoid an adverse or significant adverse impact from the specific sources during the most sensitive periods (i.e. night-time), the planned mitigation will therefore be designed to achieve at least the predicted acoustic performance, to result in absolute external sound levels at identified receptors of 35 dB or lower.

We confirmed that the acoustic barriers in the model are five metres above ground level at their location. The height and location should be included in the noise management plan (NMP), see below.

Evidence has been provided to support the level of attenuation which will be provided by mufflers and enclosures. The minimum specification of these mitigation measures should be stated within the NMP, see below.

We concluded that the further evidence provided has substantially reduced the level of uncertainty surrounding the sound power levels of the sources on site. However, the compressor sound power level has not been used appropriately within the modelling and we find that there is a risk of significant adverse impacts at nearby residential properties. It is also not clear if any mitigation measures will be applied directly to the compressors.

Updated noise impact assessment, March 2022

An updated NIA was provided, dated 04 March 2022 (received 08 March 2022). This assessment supersedes previous assessments.

This assessment corrects the sound power levels from the compressors and includes the use of an acoustic enclosure surrounding the compressors and associated equipment.

It is proposed to enclose the G3512 compressor packages in a well-sealed enclosure designed and installed by a noise control specialist. Predicted external levels of 71 dB(A) at 1m and 64 dB(A) at 10m from the enclosure façade are identified as the design targets required to be met in order to result in the predicted levels outlined in the NIA. Acoustic performance of this level is considered likely to be feasible but cannot be assessed in full prior to detailed design. Design criteria have been calculated based on modelling predictions.

In addition to the compressor acoustic enclosure, there will be three acoustic barriers up to five metres high:

- Partially enclosing power generation packages;
- Partially enclosing the Joule-Thomson skid;
- Along portions of the north-east boundaries of the site where required.

The NIA confirms that mitigation will be designed and selected to achieve at least the predicted acoustic performance in-situ. Monitoring will be carried out upon installation of equipment to validate and verify these predictions. If it is not achieved then the operator confirms that larger, longer, or more absorptive barrier solutions can be adopted in order to meet the required acoustic performance.

The assessment concludes that sound from the operation of the specified equipment at this site carries some risk of adverse impacts during the night at three locations along Saddleback Road, but a low risk of significant adverse impacts on receptors in the surrounding area at all times.

In order to avoid an adverse or significant adverse impact from the specific sources during the most sensitive periods (i.e. night-time), the planned mitigation will therefore be designed to achieve at least the predicted acoustic performance, to result in absolute external sound levels at identified receptors of 35 dB or lower.

We agree with the conclusions drawn, that there is a risk of adverse impacts during the night at three locations along Saddleback Road. This is based on the design targets for the larger compressor enclosure being met and other mitigation measures are as specified in the NIA.

We confirm that the operator has proposed a large enclosure surrounding the G3512 compressor plant at the south end of the site. This has a design limit of 71 dB at 1 m from the enclosure. The pre-operational condition for a NMP includes this requirement.

Further NIAs have been included as two improvement conditions, to confirm the effectiveness of mitigation measures on site which includes a review of the acoustic design targets and sound reduction indices. These are required for the initial phase and full-scale operations.

Therefore, in line with the Noise Policy Statement for England (NPSE), the site should implement Best Available Techniques (BAT), which means that the level of noise is predicted to be low enough to enable permit determination.

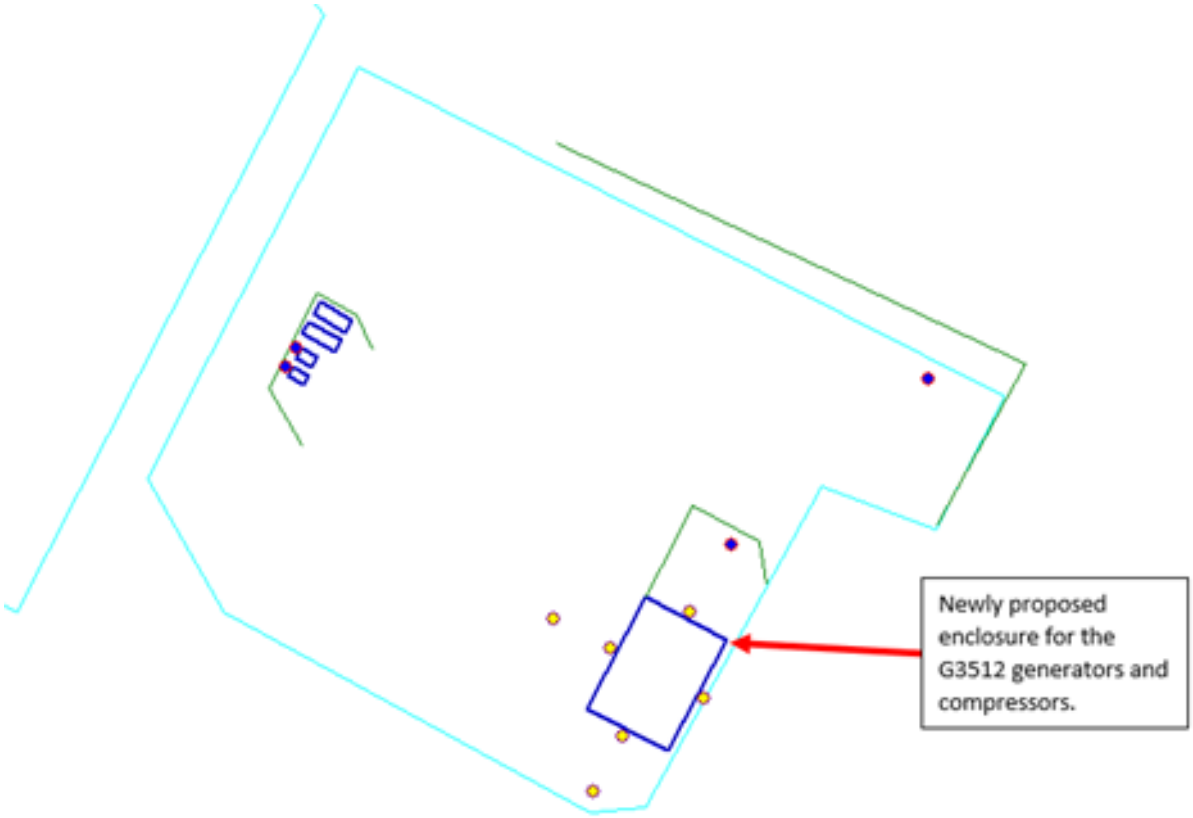
Mitigation measures can only be assessed by monitoring, after operations have begun. We have included improvement conditions requiring NIAs, see above. These will include a comparison between the initial and full-scale operations assessment and the model predictions. The comparison at the initial phase will be an indication of whether noise levels at full-scale are likely to cause pollution beyond the site boundary.

We have also included a pre-operational condition for a NMP to be in place prior to commissioning of the new plant. This condition requires the NMP to include the three five metre high acoustic barriers and acoustic enclosures as noise predictions are based on these (see above). It also includes the required minimum sound reduction indices of the enclosures (for the engines) and muffler (for the exhausts) and the design target for the large enclosure housing the G3512 compressor equipment. The performance of this enclosure will be checked through on site measurements required by the NIA improvement conditions.

The NMP should follow our template guidance at:

https://defra.sharepoint.com/:w:/s/Community821/EXYMgXx618lBhj5u-e7jo48BWkVs9LodY1gANwZ3oQ4kRg?e=8GeALU&CID=5F79586A-002A-42E6-9F38-C29A713166FF&wdLOR=c518D68D3-8BB7-4D20-B79D-F4C365EAE050

The modelled barriers in the NIA (all at five metres) are shown as green lines in the drawing below:



Permitting Decisions- Variation (substantial)

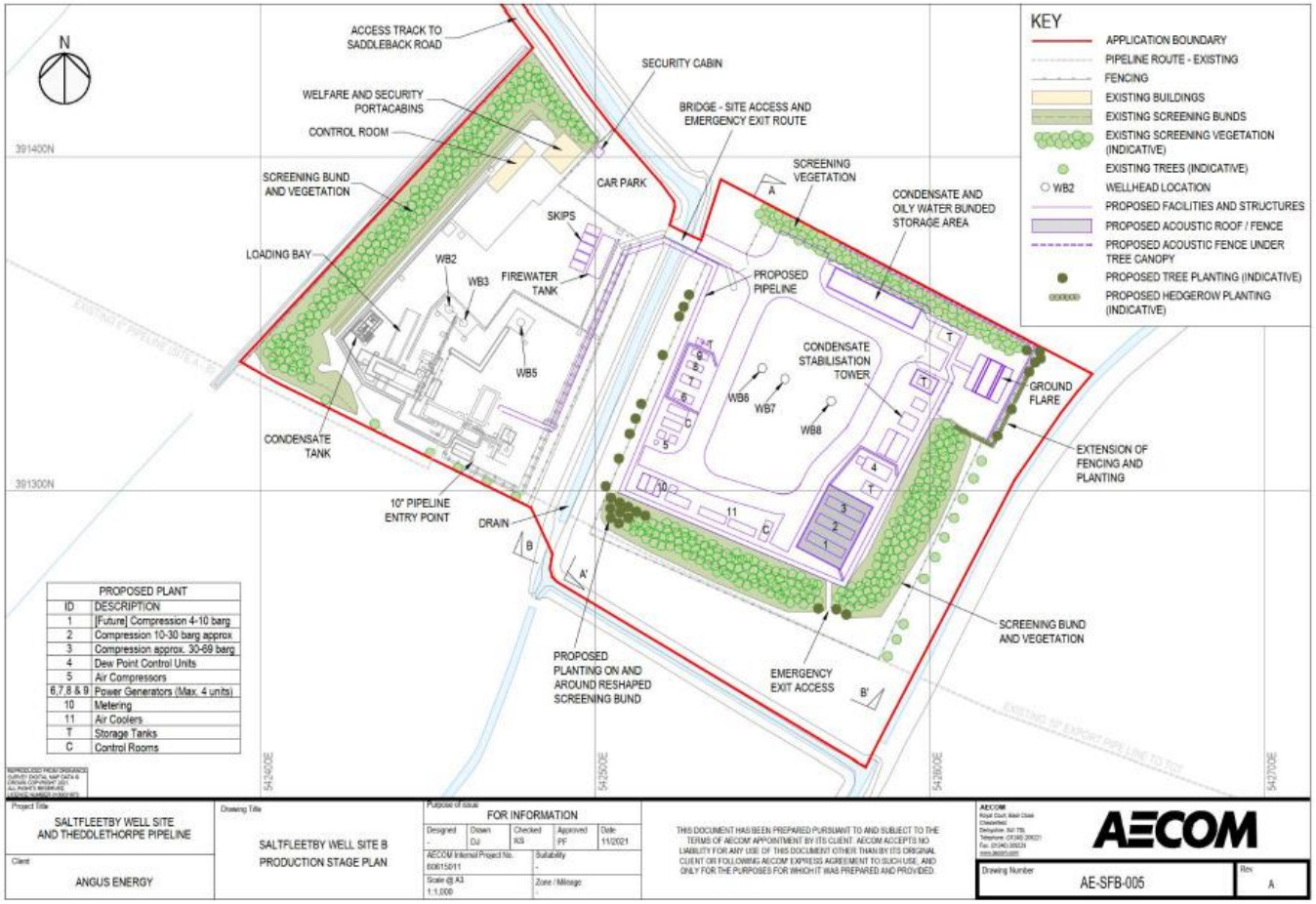


Figure 2: Proposed Site Layout (Production Phase) of the Saltfleetby B Wellsite

Permitting Decisions- Variation (substantial)

BAT Conclusions – refining of mineral oil and gas

We have reviewed the proposal for the gas refining activity against the best available techniques (BAT) Conclusions for the refining of mineral oil and gas industry sector published on 28 October 2014.

This section explains how we have reviewed and considered the techniques proposed by the operator for the operation and control of the gas refining activity. This review has been undertaken with reference to the decision made by the European Commission establishing BAT Conclusions for the refining of mineral oil and gas as detailed in document reference IEDC-7-1.

It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position. It also provides a justification for the inclusion of any specific conditions in the permit that are in addition to those included in our generic permit template.

We issued a Notice for further information on 12 August 2021 requiring the operator to provide information to demonstrate how the proposed gas refining operation will meet the standards described in the BAT Conclusions document.

The Notice also required that where the standards will not be met, the operator should provide the following information:

- Why the BAT standard is not applicable to those processes, or
- Justifies why an alternative technique will achieve the same level of environmental protection equivalent to the standard described in the BAT Conclusions.

Where the operator proposed that they were not intending to meet a BAT standard that also included a BAT Associated Emission Level (BAT AEL) described in the BAT Conclusions document, the Notice requested that the operator make a formal request for derogation from compliance with that AEL (as provisioned by Article 15(4) of the Industrial Emissions Directive (IED)). In this circumstance, the Notice identified that any such request for derogation must be supported and justified by sufficient technical and commercial information that would enable us to determine acceptability of the derogation request.

A response to the Notice was received from the operator on 17 September 2021. There was no request for a derogation.

We considered it was in the correct form and contained sufficient information for us to begin our review of the proposed gas refining activity, but not that it necessarily contained all the information we would need to complete that review.

We requested additional information as follows:

Information requested	**Response received**
Request for clarification on BAT Conclusions 4, 6, 37, 49 and 51 sent 29 September 2021	13 October 2021
Request for clarification on BAT Conclusion 49 sent 26 October 2021	08 November 2021
-	Bridging document received 01 December 2021 including amended BAT Conclusion 49
-	17 January 2022, BAT Conclusion 49 clarification.

In relation to BAT Conclusion 6 we agree with the operator in respect to their capability as recorded in the response to the Notice, and have set a pre-operational condition requiring the submission of a diffuse volatile organic compounds (VOC) monitoring plan. Their operational techniques will be updated so that the requirements of the BAT Conclusion are delivered.

Decision checklist regarding BAT Conclusions

BAT Conclusions for the refining of mineral oil and gas, were published by the European Commission on 09 October 2014. There are 58 BAT Conclusions.

This section provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the proposed gas refining activity. This section should be read in conjunction with the Consolidated Variation Notice.

The overall status of compliance with the BAT Conclusion is indicated in the table as:

NA Not applicable

CC Currently compliant

FC Compliant in the future

NC Not compliant

PC Partially compliant

Permitting Decisions- Variation (substantial)

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
General				
1	**In order to improve the overall environmental performance of the plants for the refining of mineral oil and gas, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:** i. commitment of the management, including senior management; ii. definition of an environmental policy that includes the continuous improvement of the installation by the management; iii. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; iv. implementation of procedures (a) Structure and responsibility (b) Training (c) Communication (d) Employee involvement (e) Documentation	FC	The operator confirmed that: They implement an EMS which has been developed to meet the requirements of the Environment Agency "Develop a Management System: Environmental Permit" guidance. An overview of the system is provided in Part 3 of the application and this includes: • Overview of the organisational structure which demonstrates the commitment of the Company including senior management to protecting the environment and to achieving continuous improvement of company environmental performance. • Copy of the corporate HSE policy • Overview of the EMS including:	1.1

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	(f) Efficient process control (g) Maintenance programmes (h) Emergency preparedness and response (i) Safeguarding compliance with environmental legislation v. checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see also the Reference Document on the General Principles of Monitoring) (b) corrective and preventive action (c) maintenance of records (d) independent (where practicable) internal and external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; vii. following the development of cleaner technologies; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; ix. application of sectoral benchmarking on a regular basis.		(a) Structure and responsibility (b) Training, development and Employee involvement (c) Communication arrangements including complaints management (d) Document management including records maintenance (e) Operational and process control (f) Maintenance management (g) Emergency and accident management (h) Audits and management review (i) Non-compliance and corrective action The EMS structure essentially incorporates a plan, do, check and act cycle which meets the requirements of criteria (i) to (ix) inclusive of this BAT Conclusion. Details of the specific operational controls and monitoring are provided in the Technical Plan received 17 September 2021. We have set a pre-operational condition for this plan to be resubmitted as it did not include the appropriate level of detail. The operator is FC with the requirements of this BAT Conclusion.	

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td></td><td>Applicability. The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have.</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>In order to use energy efficiently, BAT is to use an appropriate combination of the techniques given below.
<table><tr><th>Technique</th><th>Description</th></tr><tr><td>i. Design techniques</td><td></td></tr><tr><td>a. Pinch analysis</td><td>Methodology based on a systematic calculation of thermodynamic targets for minimising energy consumption of processes. Used as a tool for the evaluation of total systems designs</td></tr><tr><td>b. Heat integration</td><td>Heat integration of process systems ensures that a substantial proportion of the heat required in various processes is provided by exchanging heat between streams to be heated and streams to be cooled</td></tr><tr><td>c. Heat and power recovery</td><td>Use of energy recovery devices e.g.
• waste heat boilers
• expanders/power recovery in the FCC unit
• use of waste heat in district heating</td></tr></table></td><td>CC</td><td>The operator confirmed that:

The approach to energy management and efficiency is provided in the Resource Management Plan. The main considerations include:

• Design and selection of energy efficient equipment;
• Automated combustion control; and
• Process optimisation.

The current site operations are powered by electricity from the national grid. A small diesel generator will also be present on-site which is only activated as a back-up in the event of a power failure from the national grid.

In relation to the new processing operations, power generators will be installed in the southeast corner of the site. The generators will combust site produced natural gas products in order to produce electricity which will be used to meet on-site electricity demands. There will be no surplus electricity generation.

In addition to the above, once production has resumed and stabilised, the operator will review the viability of</td><td>1.2</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement		Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	ii. Process control and maintenance techniques			utilising any surplus power for hydrogen electrolysis to provide an additional export stream. The operator is CC with the requirements of this BAT Conclusion.	
	a. Process optimisation	Process optimisation. Automated controlled combustion in order to lower the fuel consumption per tonne of feed processed, often combined with heat integration for improving furnace efficiency			
	b. Management and reduction of steam consumption	Management and reduction of steam consumption. Systematic mapping of drain valve systems in order to reduce steam consumption and optimise its use			
	c. Use of energy benchmarking	Use of energy benchmark. Participation in ranking and benchmarking activities in order to achieve continuous improvement by learning from best practice			
	iii. Energy efficient production techniques and description				
	a. Use of combined heat and power.	System designed for the co-production (or the cogeneration) of heat (e.g. steam) and electric power from the same fuel			
	b. Integrated gasification combined cycle (IGCC).	Technique whose purpose is to produce steam, hydrogen (optional) and electric power from a variety of fuel types (e.g. heavy fuel oil or coke) with a high conversion efficiency			

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td>3</td><td>In order to prevent or, where that is not practicable, to reduce dust emissions from the storage and handling of dusty materials, BAT is to use one or a combination of the techniques given below:

i. store bulk powder materials in enclosed silos equipped with a dust abatement system (e.g. fabric filter);
ii. store fine materials in enclosed containers or sealed bags;
iii. keep stockpiles of coarse dusty material wetted, stabilise the surface with crusting agents, or store under cover in stockpiles;
iv. use road cleaning vehicles</td><td>NA</td><td>The installation does not store or handle any materials which could generate dust.

This BAT Conclusion is not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
<tr><td>4</td><td>BAT is to monitor emissions to air by using the monitoring techniques with at least the minimum frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

<table>
<tr><th>Description</th><th>Unit</th><th>Minimum frequency</th><th>Monitoring technique</th></tr>
<tr><td rowspan="2">SO_X, NO_X and dust emissions</td><td>Catalytic cracking</td><td>continuous</td><td>Direct measurement</td></tr>
<tr><td>Combustion units ≥ 100MW ([3])

and calcining units</td><td>continuous</td><td>Direct measurement ([4])</td></tr>
</table>
</td><td>NA</td><td>The operator confirmed that:

Site combustion units have a combined rated thermal input of <20 MW.

The power generation units will be operated on a blend of export specification (commercial grade) natural gas and off-specification gas. The ratio will be confirmed during commissioning trials but is anticipated to be a blend of 60% commercial grade/40% off-specification grade. Off-specification gas will be that which does not meet the NTS specification criteria for export.

With respect to the compressor engines, it is proposed that the in the early phases of operation that these units will be operated using 100% export specification (commercial grade) natural gas. It is intended that at a later phase once the plant is commissioned and production operations are established that the compressors will also be operated in the long term on a blend of commercial grade and off specification gas.</td><td>NA</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
		Combustion units of 50 to 100 MW ([3])	continuous	Direct measurement or indirect monitoring		Article 2 (3) (o) of the medium combustion plant directive (MCPD) confirms that the directive does not apply to combustion plants firing refinery fuels alone or with other fuels for the production of energy within mineral oil and gas refineries. On the basis of the above, we have not set any monitoring requirements (or limits) for the combustion units/medium combustion plants (MCPs).	
		Combustion units < 50 MW ([3])	once a year and after significant fuel changes	Direct measurement or indirect monitoring			
		Sulphur recovery units (SRU)	continuous for SO2 only	Direct measurement or indirect monitoring ([6])			
	NH_3 emissions	All units equipped with SCR or SNCR	continuous	Direct measurement			
	CO emissions	Catalytic Cracking and combustion units >= 100MW ([3])	continuous	Direct measurement			
		Other combustion units	once every 6 months ([5])	Direct measurement			

BAT Conclusion Number	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	Metal emissions: Nickel (Ni) Antimony (Sb) Vanadium (V)	Catalytic cracking	once every 6 months and after significant changes to the unit ([5])	Direct measurement or analysis based on metals content in the catalyst fines and in the fuel			
		Combustion units ([8])					
	Polychlorinated dibenzodioxins / furans (PCDD/F) emissions	Catalytic reformer	once a year or once a regeneration, whichever is longer	Direct measurement			
	(1) Continuous measurement of SO2 emissions may be replaced by calculations based on measurements of the sulphur content of the fuel or the feed; where it can be demonstrated that this leads to an equivalent level of accuracy (2) Regarding SO_X, only SO_2 is continuously measured while SO_3 is only periodically measured (e.g. during calibration of the SO_2 monitoring system) (3) Refers to the total rated thermal input of all combustion units connected to the stack where emissions occur. (4) Or indirect monitoring of SO_X (5) Monitoring frequencies may be adapted if, after a period of one year, the data series clearly demonstrate a sufficient stability. (6) SO_2 emissions measurements from SRU may be replaced by continuous material balance or other relevant process parameter monitoring, provided appropriate measurements of SRU efficiency are based on periodic (e.g. once every 2 years) plant performance tests.						

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	(7) Antimony (Sb) is monitored only in catalytic cracking units when Sb injection is used in the process (e.g. for metals passivation) (8) With the exception of combustion units firing only gaseous fuel			
5	**BAT is to monitor the relevant process parameters linked to pollutant emissions, at catalytic cracking and combustion units by using appropriate techniques and with at least the frequency given below.** **Description** / **Minimum frequency** Monitoring of parameters linked to pollution emissions, e.g. O_2 content in flue-gas, N and S content in fuel or feed ([1]) / Continuous for O_2 content. For N and S content, periodic at a frequency based on significant fuel/feed changes. [(1)] N and S monitoring in fuel or feed may not be necessary when continuous emission measurement of NO_X and SO_2 are carried out at the stack.	CC	There are no catalytic cracking units installed at the installation. The operator confirmed that they will undertake periodic emissions monitoring at the combustion plants, therefore continuous monitoring of O_2 is not believed to be required. Section 4 of the Technical plan confirms that gas composition has been relatively stable throughout the 20-year life of the field. The typical gas composition was provided in table 4.1, with nitrogen at 3.43 Mole %. No sulphur has been detected in the gas. We have not set any monitoring requirements, refer to our assessment of BAT Conclusion 4 above. The operator is CC with the requirements of this BAT Conclusion.	3.5.1
6	**BAT is to monitor diffuse VOC emissions to air from the entire site by using all of the following techniques:** i. sniffing methods associated with correlation curves for key equipment; ii. optical gas imaging techniques;	FC	The operator confirmed that: The site will maintain a register of all relevant valves and vents. This will be subject to a programme of planned preventative maintenance and monitoring in accordance with a leak detection and repair (LDAR) inspection and monitoring programme. An outline LDAR plan is provided with the Schedule 5 response received 17 September 2021. The detailed	3.2

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	iii. calculations of chronic emissions based on emissions factors periodically (e.g. once every two years) validated by measurements. The screening and quantification of site emissions by periodic campaigns with optical absorption-based-techniques, such as differential absorption light detection and ranging (DIAL) or solar occultation flux (SOF) is a useful complementary technique. **Description**. See section 1.20.6, Annex 1.		list of valves and vents will be produced once detailed design and HAZOP processes are complete and the final LDAR plan will be available prior to the facility coming into operation. The LDAR monitoring approach will utilise a combination of: • Snoop tests; • Steady state monitoring; • Fixed gas monitoring on identified key items of plant; and • Sniff monitoring using handheld infrared or FID monitors at defined frequencies. They also confirmed that, an annual diffuse VOC emission survey will be conducted using an optical gas imaging camera to identify leaks on an annual basis. The annual survey frequency is assessed as acceptable based on the modern installation and commissioning standards required for the facility. An emission survey by the optical gas imaging camera will take place within two months after the successful commissioning of the process facility and first gas flow to validate the assessment. Any leaks detected by the optical gas imaging camera will be further assessed using an infra-red survey technique to assess and locate leaks. Any leak detected at a concentration in excess of 1,000 ppmv CH_4 (or equivalent) will be recorded (so-called 'qualifying leaks') and will form part of an annual emission estimate and logged for repair. Any leak detected at a concentration below 1,000 ppmv CH_4 or equivalent (that is, 'non-qualifying leaks') will also be	

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
			recorded, and logged for repair at an appropriate maintenance point, but will not feature in the site's annual emission estimate in line with the approach outlined in EN15446:2008 and BAT requirement to calculate chronic emissions. We have set a pre-operational condition requiring the submission of a diffuse VOC monitoring plan. Permit condition 4.2.2 requires annual reporting of the results of the monitoring and assessment undertaken. The operator is FC with the requirements of this BAT Conclusion.	
7	**In order to prevent or reduce emissions to air, BAT is to operate the acid gas removal units, sulphur recovery units and all other waste gas treatment systems with a high availability and at optimal capacity.** Special procedures can be defined for other than normal operating conditions, in particular: i. During start-up and shut-down operations. ii. during other circumstances that could affect the proper functioning of the systems (e.g. regular and extraordinary maintenance work and cleaning operations of the units and/or of the waste gas treatment system); iii. in case of insufficient waste gas flow or temperature which prevents the use of the waste gas treatment system at full capacity.	NA	The Operator confirmed that there is no acid gas removal, sulphur recovery units or other waste gas treatment units operated on the installation. We agree this BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td>8</td><td>In order to prevent and reduce ammonia (NH_3) emissions to air when applying selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR) techniques, BAT is to maintain suitable operating conditions of the SCR or SNCR waste gas treatment systems, with the aim of limiting emissions of unreacted NH_3.

Table 2 BAT- associated emission levels for ammonia (NH_3) emissions to air for a combustion process unit where SCR or SNCR techniques are used.

<table><tr><th>Parameter</th><th>BAT-AEL (monthly average mg/m^3)</th></tr><tr><td>Ammonia expressed as NH_3</td><td><5 - 15mg/Nm^3 ([1]) ([2])</td></tr><tr><td colspan="2">([1]) the higher end of the range is associated with higher inlet NO_X concentrations, higher NO_X reduction rates and the ageing of the catalyst

([2]) The lower end of the range is associated with the use of the SCR technique.</td></tr></table></td><td>NA</td><td>Not currently applicable in the UK

There is no SNCR or SCR employed at the installation.</td><td>NA</td></tr>
<tr><td>9</td><td>In order to prevent and reduce emissions to air when using a sour water steam stripping unit, BAT is to route the acid off-gases from this unit to an SRU or any equivalent gas treatment system.

It is not BAT to directly incinerate the untreated sour water stripping gases.</td><td>NA</td><td>Sour water stripping units are not operated on the installation.

We agree this BAT Conclusion is not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
</table>

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr>
<td>10</td>
<td>BAT is to monitor emissions to water by using the monitoring techniques with at least the frequency given in Table 3 (as below) and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Table 3 BAT – associated emission levels for direct waste water discharges from the refining of mineral oil and gas monitoring frequencies associated with BAT ([1])
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT – AEL (yearly average)</th><th>Monitoring ([2]) frequency and analytical method (standard)</th></tr>
<tr><td>Hydrocarbon oil index (HOI)</td><td>mg/l</td><td>0.1 – 2.5</td><td>Daily

EN 9377-2</td></tr>
<tr><td>Total suspended solids (TSS)</td><td>mg/l</td><td>5 - 25</td><td>Daily</td></tr>
<tr><td>Chemical oxygen demand (COD) (4)</td><td>mg/l</td><td>30 - 125</td><td>Daily</td></tr>
<tr><td>BOD 5</td><td>mg/l</td><td>No BAT - AEL</td><td>Weekly</td></tr>
<tr><td>Total nitrogen (5) expressed as N</td><td>mg/l</td><td>1 – 25 (6)</td><td>Daily</td></tr>
</table>
</td>
<td>NA</td>
<td>The operator confirmed that:

The site does not routinely generate or discharge wastewater.

There are no direct waste water discharges from the installation. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.

Whilst this BAT Conclusion is not relevant to the surface water discharges, the operator confirmed that:

Surface water is collected in the site perimeter drains which are kept isolated. If water accumulates in the drains, then samples are taken and quality is checked.

Discharge to surface water is permitted only if the criteria in the Surface Water Management Plan are met. Waters pass through an oil interceptor prior to discharge. Where water quality data is not met or there is a concern regarding the accumulated surface waters then the water will be removed by tanker and taken to an off-site treatment facility for disposal.

The permit has been updated to include the surface water drainage system as follows:

The surface water drainage system has been added to table S1.1 as a directly associated activity.

Table S3.2 has been added to include uncontaminated surface water discharges W1 to W3 (see below).</td>
<td>NA</td>
</tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	<table><tr><td>Lead, expressed as Pb</td><td>mg/l</td><td>0.005 – 0.030</td><td>Quarterly</td></tr><tr><td>Cadmium expressed as Cd</td><td>mg/l</td><td>0.002 – 0.008</td><td>Quarterly</td></tr><tr><td>Nickel, expressed as Ni</td><td>mg/l</td><td>0.005 – 0.100</td><td>Quarterly</td></tr><tr><td>Mercury, expressed as Hg</td><td>mg/l</td><td>0.0001 – 0.001</td><td>Quarterly</td></tr><tr><td>Vanadium</td><td>mg/l</td><td>No BAT - AEL</td><td>Quarterly</td></tr><tr><td>Phenol index</td><td>mg/l</td><td>No BAT - AEL</td><td>Monthly EN 14402</td></tr><tr><td>Benzene, toluene, ethyl benzene, xylene (BTEX)</td><td>mg/l</td><td>Benzene 0.001 – 0.050 No BAT – AEL for T, E, X</td><td>Monthly</td></tr><tr><td colspan="4">(1) Not all parameters and sampling frequencies are applicable to effluent from gas refining sites (2) Refers to a flow-proportional composite sample taken over period of 24 hours, or provided that sufficient flow stability is demonstrated, a time-proportional sample (3) Moving from the current method to EN 9377-2 may require an adaptation period (4) Where on-site correlation is available, COD may be replaced by TOC. The correlation between COD and TOC should be</td></tr></table>		A pre-operational condition has been added requiring an updated surface water management plan and a surface water monitoring plan. The submission for this condition was provided prior to the variation being issued and identified an additional release point W3 associated with SFA. We have included this in table S3.2.	

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	elaborated on a case-by-case basis. TOC monitoring would be the preferred option because it does not rely on the use of very toxic compounds (5) Where total-nitrogen is the sum of the total Kjedahl nitrogen (TKN), nitrates and nitrites (6) When nitrification/denitrification is used, levels below 15 mg/l can be achieved			

<table>
<tr>
<td>11</td>
<td>In order to reduce water consumption and the volume of contaminated water, BAT is to use all of the techniques given below.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>i. water stream integration</td><td>Reduction of process water produced at the unit level prior to discharge by the internal reuse of water streams from e.g. cooling, condensates, especially for use in crude desalting</td><td>Generally applicable for new units. For existing units, applicability may require a complete rebuilding of the unit or the installation</td></tr>
<tr><td>ii. water and drainage system for segregation of contaminated water streams</td><td>Design of an industrial site to optimise water management, where each stream is treated as appropriate, by e.g. routing generated sour water (from distillation, cracking, coking units, etc.) to appropriate pre-treatment, such as a stripping unit</td><td>Generally applicable for new units. For existing units, applicability may require a complete rebuilding of the unit or the installation</td></tr>
<tr><td>iii. segregation of non-contaminated water streams (e.g. once-through cooling, rain water)</td><td>Design of a site in order to avoid sending non-contaminated water to general waste water treatment and to have a separate release after possible reuse for this type of stream</td><td>Generally applicable for new units.

For existing units, applicability may require a complete rebuilding of the unit or the installation</td></tr>
<tr><td>iv. prevention of spillages and leaks</td><td>Practices that include the utilisation of special procedures and/or temporary equipment to maintain</td><td>Generally applicable</td></tr>
</table>
</td>
<td>CC</td>
<td>The operator confirmed that:

Details of water management techniques are provided in the Resource Management Report and indicative BAT is demonstrated by:

Minimising water use, checks will be made on water consumption as part of the site EMS. Management arrangements and leaks will be reported and repaired as soon as practicable.
Process water is generated as a by-product of the three phase separation process which removes produced water from the gas stream. This material is removed by tanker from site for off-site treatment, recycling and disposal.
Surface water run-off from the site will be directed to the site perimeter drain which is lined with an impermeable plastic geo-membrane and flows towards a sump. The drain will be subject to daily inspection and when necessary, collected material will removed by tanker from site to an appropriately permitted site for treatment, recovery or disposal.

The operator is CC with the requirements of this BAT Conclusion.</td>
<td>1.3.1</td>
</tr>
</table>

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td></td><td><table><tr><td></td><td>performances when necessary to manage special circumstances such as spills, loss of containment, etc</td><td></td></tr></table></td><td></td><td></td><td></td></tr>
<tr><td>12</td><td>In order to reduce the emission load of pollutants in the waste water discharge to the receiving water body, BAT is to remove insoluble and soluble polluting substances by using all of the techniques given below.<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>i. Removal of insoluble substances by recovering oil</td><td>See Section 1.21.2, Annex 1.</td><td>Generally applicable</td></tr><tr><td>ii. Removal of insoluble substances by recovering suspended solids and dispersed oil</td><td>See Section 1.21.2, Annex 1.</td><td>Generally applicable</td></tr><tr><td>iii. Removal of insoluble substances including biological treatment and clarification.</td><td>See Section 1.21.2, Annex 1.</td><td>Generally applicable</td></tr></table></td><td>NA</td><td>The operator confirmed that:

No discharge of process waste-water takes place at the site. Produced water will be removed from site by road tanker to an appropriately licenced off-site treatment facility. Refer to BAT Conclusion 10 above.

We agree this BAT Conclusion is not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	BAT – associated emission levels – see Table 3			
13	**When further removal of organic substances or nitrogen is needed, BAT is to use an additional treatment step as described in Section 1.21.2 (see Annex 1).**	NA	The operator confirmed that this BAT Conclusion is not applicable with reference to BAT Conclusion 12 above. We agree this BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA

14	**In order to prevent or, where that is not practicable, to reduce waste generation, BAT is to adopt and implement a waste management plan that, in order of priority, ensures that waste is prepared for reuse, recycling, recovery or disposal.**	FC	The operator confirmed that: Details of waste avoidance, recovery and disposal is provided in the Waste Management Plan in section 5 of the application. Indicative BAT is demonstrated through: • Potentially hazardous waste materials produced at the site during side-track or maintenance activities will be collected in dedicated storage drums/containers to prevent cross contamination. Such materials will be collected by an appropriately licenced waste carrier for transfer off-site to a licenced facility for treatment, recovery or disposal. Such materials are generally associated with maintenance activities and will comprise waste lubricants, oils and oil-contaminated materials. It is unlikely that halogenated organic or similar wastes with environmental sensitivity will be produced at the site. • At times where improvement (e.g. work-over), remediation or restoration activities generate a wider range of waste materials, site storage arrangements will be reviewed and appropriate storage containers, enclosed skips and drums will be arranged suitable for the materials generated at that stage. Materials will be removed to appropriately licenced facilities for treatment, recovery or disposal if they can't be re-used on site. • The site is underlain with a geo-membrane and higher risk areas are covered with an impermeable surface to prevent penetration of spillages into the underlying ground. Spillages will be removed promptly in accordance with defined site procedures and	1.4.1

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
			materials will either be removed from site to an appropriately permitted site for treatment, recovery or disposal. • Surface run-off areas and, if necessary, fire-water will flow towards the geo-membrane lined perimeter drain for collection. The collected waters will be removed from site by tanker to an appropriately permitted site for treatment, recovery or disposal. The waste management plan did not contain the level of detail required. A pre-operational condition has been added requiring an updated plan. The operator is FC with the requirements of this BAT Conclusion.	

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td>15</td><td>In order to reduce the amount of sludge to be treated or disposed of, BAT is to use one or a combination of the techniques given below.

<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>i Sludge pretreatment</td><td>Prior to final treatment (e.g. in a fluidised bed incinerator), the sludges are dewatered and/or de-oiled (by e.g. centrifugal decanters of steam dryers) to reduce their volume and to recover oil from slop equipment.</td><td>Generally applicable</td></tr><tr><td>ii Reuse of sludge in process units</td><td>Certain types of sludge (e.g. oily sludge) can be processed in units (e.g. coking) as part of the feed due to their oil content.</td><td>Applicability is restricted to sludges that can fulfil the requirements to be processed in units with appropriate treatment</td></tr></table></td><td>NA</td><td>The operator confirmed that:

The site will only produce small amounts of sludge generated during maintenance cleaning of the condensate and produced water tanks. This material would be removed by tanker for off-site recycling/recovery.

We conclude that no sludge is routinely produced. Sludge is only produced during non-routine tank cleaning operations which are carried out periodically.

This BAT Conclusion is not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
</table>

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td>16</td><td>In order to reduce the generation of spent solid catalyst waste, BAT is to use one or a combination of the techniques given below.

<table><tr><th>Technique</th><th>Description</th></tr><tr><td>i. Spent solid catalyst management</td><td>Scheduled and safe handling of the materials used as catalyst (e.g. by contractors) in order to recover or reuse them in off-site facilities. These operations depend on the type of catalyst and process</td></tr><tr><td>ii. Removal of catalyst from slurry decant oil</td><td>Decanted oil sludge from process units (e.g. FCC unit) can contain significant concentrations of catalyst fines. These fines can be separated prior to the reuse of decant oil as a feedstock.</td></tr></table></td><td>NA</td><td>Solid catalytic treatment is not undertaken as part of the relevant activities carried out in the installation.

This BAT Conclusion is not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
</table>

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td>17</td><td>In order to prevent or reduce noise, BAT is to use one or a combination of the techniques given below:

i. Make an environmental noise assessment and formulate a noise management plan as appropriate to the local environment;
ii. Enclose noisy equipment/operation in a separate structure/unit;
iii. Use embankments to screen the source of noise;
iv. Use noise protection walls;</td><td>FC</td><td>Refer to Key issues section (noise impact assessment (NIA)) of this document.

We have included improvement conditions for the NIA to be validated at initial phase and full-scale operations. A pre-operational condition also requires a noise management plan (NMP) to be in place prior to commissioning of the gas refining activities.

The operator is FC with the requirements of this BAT Conclusion.</td><td>3.4.1</td></tr>
<tr><td>18</td><td>In order to prevent or reduce diffuse VOC emissions, BAT is to apply the techniques given below.

<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>I. Techniques related to plant design.</td><td>i. Limiting the number of potential emission sources
ii. Maximising inherent process containment features
iii. Selecting high integrity equipment
iv. Facilitating monitoring and maintenance activities by ensuring access to potentially leaking components</td><td>Applicability may be limited for existing units</td></tr>
<tr><td>II. Techniques related to</td><td>i. Well defined procedures for construction and assembly</td><td>Applicability may be</td></tr>
</table>
</td><td>CC</td><td>The operator confirmed that the proposed process utilises:

a. Pressure containment pipework and vessels that will be rated to 600 pound flange rating (1440 psi) which exceeds the maximum pressures that could be experienced due to the wells.

b. Pipework which is designed and constructed to national industry standards. Pipework is carefully chosen to provide maximum protection from all forms of damage or impact and all intersections are fitted with shut-off valves which can be used to isolate parts of the system in the event of a leak or fire. All pipelines</td><td>3.2.1</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	plant installation and commissioning	ii. Robust commissioning and hand-over procedures to ensure that the plant is installed in line with the design requirements.	limited for existing units		will be inspected in accordance with a 24 monthly statutory inspection regime. c. Pressure vessels will be designed to recognised industrial standards. All pressure vessels will be inspected in accordance with statutory inspection requirements. The new plant will be installed and commissioned by the technical supplier in accordance with a commissioning plan. This will include training of site operators in respect of the ongoing operation, monitoring and maintenance of the plant. Handover of the plant from the Technical Supplier will not occur until the staff training is completed and the commissioning plan criteria have been met. The site will maintain a register of all relevant valves and vents. This will be subject to a programme of planned preventative maintenance and monitoring in accordance with a LDAR inspection and monitoring programme. (See response to BAT Conclusion 6 above). We have set an improvement condition requiring a report on the commissioning of the facility. The operator is CC with the requirements of this BAT Conclusion.	
	III. Techniques related to plant operation	Use of a risk-based leak detection and repair (LDAR) programme in order to identify leaking components, and to repair these leaks. See table 1.20.6 under BAT 6	Generally applicable			
19 and 20	**Hydrofluoric acid alkylation process**			NA		NA

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td>21</td><td>Sulphuric acid alkylation process</td><td>NA</td><td rowspan="3">These processes are not part of the relevant activities carried out in the installation.

These BAT Conclusions are not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
<tr><td>22</td><td>Base oil production process</td><td>NA</td><td>NA</td></tr>
<tr><td>23</td><td>Bitumen production process</td><td>NA</td><td>NA</td></tr>
<tr><td colspan="2">BAT conclusions 24 to 27 for the fluid catalytic cracking process</td><td>NA</td><td>Catalytic cracking processes are not part of the relevant activities carried out in the installation.

These BAT Conclusions are not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
<tr><td>28</td><td>Catalytic reforming process</td><td>NA</td><td rowspan="3">These processes are not part of the relevant activities carried out in the installation.

These BAT Conclusions are not applicable to the relevant activities carried out at this installation.</td><td>NA</td></tr>
<tr><td colspan="2">BAT Conclusions 29 to 32 for coking processes</td><td>NA</td><td>NA</td></tr>
<tr><td>33</td><td>Desalting process</td><td>NA</td><td>NA</td></tr>
<tr><td colspan="5">Combustion units</td></tr>
<tr><td>34</td><td>BAT 34. In order to prevent or reduce NO_X emissions to air from the combustion units, BAT is to use one or a combination of the techniques given below.

I. Primary or process-related techniques, such as:
<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr></table></td><td>CC</td><td>The operator confirmed that:

The site will utilise:

• 3 gas compressor units
• 2 gas fuelled generator units
• 2 diesel back-up generators.</td><td>2.3.1</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	i. Selection or treatment of fuel				The combined thermal input of the main engines are 8.68 MWth (4 x 2.17) at 100% capacity or 6.76 MWth at 75% capacity. The back-up generators will be used for start-up and shut-down, each with a thermal input of approximately 1 MWth. With respect to NOx control, the following techniques will be employed: • The combustion units will utilise produced gas as fuel source as an alternative to liquid fuel. • Low emission compressor units have been selected. • Optimisation of combustion control will be managed via an electronic engine management system that provides continuous computer controlled adjustments of parameters such as engine timing, air flow and cooling water temperatures. NOx emission levels on combustion units will be < 95 mg/Nm^3 at reference conditions and as such no secondary/end-of pipe solutions are required. The 95 mg/Nm^3 NOx emission is less than the BAT AEL limit of 100 mg/Nm^3 for new plant set out in table 10 of this BAT Conclusion. We have not set any limits as there are no monitoring requirements, refer to our assessment of BAT Conclusion 4 above.	
	(a) Use of gas to replace liquid fuel	Gas generally contains less nitrogen than liquid and its combustion leads to a lower level of NO_X emissions. See section 1.20.3, Annex 1.	The applicability may be limited by the constraints associated with the availability of low sulphur gas fuels, which may be impacted by the energy policy of the Member State			
	(b) Use of low nitrogen refinery fuel oil (RFO) e.g. by RFO selection or by hydrotreatment of RFO	Refinery fuel oil selection favours low nitrogen liquid fuels among the possible sources to be used at the unit. Hydrotreatment aims at reducing the sulphur, nitrogen and metal contents of the fuel. See section 1.20.3, Annex 1.	Applicability is limited by the availability of low nitrogen liquid fuels, hydrogen production and hydrogen sulphide (H_2S) treatment capacity (e.g. amine and Claus units)			
	ii. Combustion modifications					

BAT Conclusion Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	(a) Staged combustion: • air staging • fuel staging	See section 1.20.2, Annex 1.	Fuel staging for mixed or liquid firing may require a specific burner design		The operator is CC with the requirements of this BAT Conclusion.	
	(b) Optimisation of combustion	See section 1.20.2, Annex 1.	Generally applicable			
	(c) Flue-gas recirculation	See section 1.20.2, Annex 1.	Applicable through the use of specific burners with internal recirculation of the flue-gas. The applicability may be restricted to retrofitting external flue-gas recirculation to units with a forced/induced draught mode of operation			
	(d) Diluent injection	See section 1.20.2, Annex 1.	Applicable for gas turbines where appropriate inert diluents are available			
	(e) Use of low-NO_X burners (LNB)	See section 1.20.2, Annex 1.	Generally applicable for new units taking into account, the fuel-			

BAT Conclusion Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
			specific limitation (e.g. for heavy oil). For existing units, applicability may be restricted by the complexity caused by site-specific conditions e.g. furnaces design, surrounding devices. In very specific cases, substantial modifications may be required. The applicability may be restricted for furnaces in the delayed coking process, due to possible coke generation in the furnaces. In gas turbines, the applicability is restricted to low hydrogen content fuels (generally < 10 %)			
	II. Secondary or end-of-pipe techniques, such as: **Technique** / **Description** / **Applicability**					

BAT Conclusion Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	i. Selective catalytic reduction (SCR)	See section 1.20.2, Annex 1.	Generally applicable for new units. For existing units, the applicability may be constrained due to the requirements for significant space and optimal reactant injection			
	ii. Selective non-catalytic reduction (SNCR)	See section 1.20.2, Annex 1.	Generally applicable for new units. For existing units, the applicability may be constrained by the requirement for the temperature window and the residence time to be reached by reactant injection			
	iii. Low temperature oxidation	See section 1.20.2, Annex 1.	The applicability may be limited by the need for additional scrubbing capacity and by the fact that ozone generation and the associated risk management need to be properly addressed.			

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)

		The applicability may be limited by the need for additional waste water treatment and related cross-media effects (e.g. nitrate emissions) and by an insufficient supply of liquid oxygen (for ozone generation). For existing units, the applicability of the technique may be limited by space availability
iv. SNO_X combined technique	See section 1.20.4, Annex 1.	Applicable only for high flue-gas (e.g. > 800 000 Nm3/h) flow and when combined NO_X and SO_X abatement is needed

BAT- associated emission levels: See Table 9, Table 10 and Table 11

Table 9 BAT-associated emission levels for NO_X emissions to air from a gas turbine

Parameter	Type of equipment	BAT-AEL (1) (monthly average) mg/Nm^3 at 15% O_2

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)

NOx, expressed as NO_2	Gas turbine (including combined cycle gas turbine – CCGT) and integrated gasification combined cycle turbine (IGCC))	40 - 120 (existing gas turbine)
		20 - 50 (new turbine) (2)

(1) BAT-AEL refers to combined emissions from the gas turbine and the supplementary firing recovery boiler, where present
(2) For fuel with high H_2 content (i.e. above 10%), the upper end of the range is 75 mg/Nm^3

Table 10 BAT- associated emission levels for NOX emissions to air from a gas-fired combustion unit, with the exception of gas turbines

Parameter:	Type of combustion	BAT-AEL (monthly average) mg/Nm^3
NOx, expressed as NO_2	Gas firing	30 - 150 for existing unit (1)
		30 - 100 for new unit

(1) For an existing unit using high air pre-heat (i.e. > 200 C) or with H2 content in the fuel gas higher that 50% the upper end of the BAT-AEL range is 200 mg/Nm^3

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td></td><td>Table 11 BAT –associated emission levels for NO_X emissions to air from a multi-fuel fired combustion unit with the exception of gas turbines

<table><tr><th>Parameter:</th><th>Type of combustion</th><th>BAT-AEL (monthly average) mg/Nm^3</th></tr><tr><td>NO_X expressed as NO_2</td><td>Multi-fuel fired combustion unit</td><td>30 -3—for existing unit (^{1}) (^{2})</td></tr><tr><td colspan="3">(1) For existing units < 100 MW firing fuel oil with a nitrogen content higher that 0.5% (w/w) or with liquid firing > 50% or using air preheating values up to 450 mg/Nm^3 may occur
(2) The lower end of the range can be achieved by using the SCR technique</td></tr></table>
The associated monitoring is in BAT 4.</td><td></td><td></td><td></td></tr>
<tr><td>35</td><td>In order to prevent or reduce dust and metal emissions to air from the combustion units, BAT is to use one or a combination of the techniques given below.

I. Primary or process-related techniques, such as:<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr><tr><td colspan="3">Selection or treatment of fuel</td></tr><tr><td>(a) Use of gas to replace liquid fuel</td><td>Gas instead of liquid combustion leads to</td><td>The applicability may be limited by the constraints</td></tr></table></td><td>CC</td><td>The operator confirmed that:

With respect to dust and metal control, the following techniques will be employed:

• The combustion units will utilise produced gas as the fuel source, as an alternative to liquid fuel.
• Low emission compressor units have been selected.
• Optimisation of combustion control will be managed via an electronic engine</td><td>2.3.1</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
		lower level of dust emissions See section 1.20.3, Annex 1.	associated with the availability of low sulphur fuels such as natural gas which may be impacted by the energy policy of the Member State		management system that provides continuous computer controlled adjustments of parameters such as engine timing, air flow and cooling water temperatures. No secondary/end-of pipe solutions are required.	
	(b) Use of low sulphur refinery fuel oil (RFO) e.g. by RFO selection or by hydro-treatment of RFO	Refinery fuel oil selection favours low sulphur liquid fuels among the possible sources to be used at the unit. Hydrotreatment aims at reducing the sulphur, nitrogen and metal contents of the fuel See section 1.20.3, Annex 1.	The applicability may be limited by the availability of low sulphur liquid fuels, hydrogen production and the hydrogen sulphide (H_2S) treatment capacity (e.g. amine and Claus units)		It is unlikely that dust or metals would be present in emissions from the combustion of produced gas. Emissions of dust and metals from the combustion of diesel will be minimal as only small quantities will be required for start-up and shut-down. We have not set any limits as there are no monitoring requirements, refer to our assessment of BAT Conclusion 4 above. The operator is CC with the requirements of this BAT Conclusion.	
	Combustion modifications					
	(a) Optimisation of combustion	See section 1.20.2, Annex 1.	Generally applicable to all types of combustion			

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	(b) Atomisation of liquid fuel: Use of high pressure to reduce the droplet size of liquid fuel. Recent optimal burner designs generally include steam atomisation — Generally applicable to liquid fuel firing II Secondary or end-of-pipe techniques, such as: **Technique** / **Description** / **Applicability** i. Electrostatic precipitator (ESP) — See section 1.20.1, Annex 1. — For existing units, the applicability may be limited by space availability ii. Third stage blowback filter — See section 1.20.1, Annex 1. — Generally applicable			

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)

iii.	Wet scrubbing	See section 1.20.1, Annex 1.	The applicability may be limited in arid areas and in the case where by-products from treatment (including e.g. waste water with a high level of salt) cannot be reused or appropriately disposed of. For existing units, the applicability of the technique may be limited by space availability
iv.	Centrifugal washers	See section 1.20.1, Annex 1.	Generally applicable

Table 12 BAT – associated emission levels of dust emissions to air from a multi-fuel fired combustion unit with the exception of gas turbines

Parameter	Type of combustion	BAT-AEL (monthly average) mg/Nm^3
Dust	Multi-fuel firing	5 – 50 for existing unit ([1]) ([2])
		5 – 25 for new unit < 50 MW

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td></td><td>(1) The lower end of the range is achievable for units with the use of end-of-pipe techniques
(2) The upper end of the range refers to the use of a high percentage of oil burning and where only primary techniques are applicable
The associated monitoring is in BAT 4.</td><td></td><td></td><td></td></tr>
<tr><td>36</td><td>In order to prevent or reduce SO_X emissions to air from the combustion units, BAT is to use one or a combination of the techniques given below.

I. Primary or process-related techniques
<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>i. Use of gas to replace liquid fuel</td><td>See section 1.20.3, Annex 1.</td><td>The applicability may be limited by the constraints associated with the availability of low sulphur fuels such as natural gas, which may be impacted by the energy policy of the Member State</td></tr><tr><td>ii. Treatment of refinery fuel gas (RFG)</td><td>Residual H2S concentration in RFG depends on the treatment process parameter, e.g. the amine-scrubbing pressure.</td><td>For low calorific gas containing carbonyl sulphide (COS) e.g. from coking units, a converter may be required prior to H_2S removal</td></tr></table></td><td>CC</td><td>The operator confirmed that:

With respect to SOx control, the following techniques will be employed:

• The combustion units will utilise produced gas as the fuel source, as an alternative to liquid fuel.
• Low emission compressor units have been selected.
• Optimisation of combustion control will be managed via an electronic engine management system that provides continuous computer controlled adjustments of parameters such as engine timing, air flow and cooling water temperatures.

No secondary/end-of pipe solutions are required.

It is unlikely that SOx would be present in emissions from the combustion of produced gas. Section 4 of the Technical plan confirms that gas composition has been relatively stable throughout the 20 year life of the field. The typical gas composition was provided in table 4.1,</td><td>2.3.1</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
		See Section 1.20.3, Annex 1.			with nitrogen. No sulphur has been detected in the gas. Emissions of SOx from the combustion of diesel will be minimal as only small quantities will be required for start-up and shut-down. We have not set any limits as there are no monitoring requirements, refer to our assessment of BAT Conclusion 4 above. The operator is CC with the requirements of this BAT Conclusion.	
	iii. Use of low sulphur refinery fuel oil (RFO) e.g. by RFO selection or by hydrotreatment of RFO	Refinery fuel oil selection favours low sulphur liquid fuels among the possible sources to be used at the unit. Hydrotreatment aims at reducing the sulphur, nitrogen and metal contents of the fuel. See Section 1.20.3, Annex 1.	The applicability is limited by the availability of low sulphur liquid fuels, hydrogen production and the hydrogen sulphide (H_2S) treatment capacity (e.g. amine and Claus units			
	II. Secondary or end-of-pipe techniques					
	Technique	**Description**	**Applicability**			
	i. Non-regenerative scrubbing	Wet scrubbing or seawater scrubbing. See Section 1.20.3, Annex 1.	The applicability may be limited in arid areas and in the case where the by-products from treatment (including e.g. waste water with high level of salts) cannot be reused or			

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)

		appropriately disposed of. For existing units, the applicability of the technique may be limited by space availability

Table 13 BAT – associated emission levels for SO_2 emissions to air from combustion unit firing refinery fuel gas (RFG), with the exception of gas turbines

Parameter	BAT-AEL (monthly average) mg/Nm^3
SO2	5 – 35 (1)
(1) In the specific configuration of RFG treatment with a low scrubber operative pressure and with refinery fuel gas with an H/C molar ratio above 5, the upper end of the BAT-AEL range can be as high as 45 mg/Nm3	

The associated monitoring is in BAT 4.

Table 14 BAT- associated emission levels for SO_2 emissions to air from multi-fuel fired combustion units, with the exception of gas turbines and stationary engines

Parameter	BAT-AEL (monthly average) mg/Nm^3

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	SO_2 | 35 - 600 The associated monitoring is in BAT 4.			
37	**In order to reduce carbon monoxide (CO) emissions to air from the combustion units, BAT is to use a combustion operation control.** Description: See section 1.20.5, Annex 1. **Table 15 BAT – associated emission levels for carbon monoxide emissions to air from combustion unit** **Parameter** | **BAT- AEL (monthly average) mg/Nm^3** Carbon monoxide expressed as CO | ≤ 100 Associated monitoring is in BAT 4.	CC	The operator confirmed that: With respect to CO control, combustion will be optimised and managed via an electronic engine management system that provides continuous computer controlled adjustments of parameters such as engine timing, air flow and cooling water temperatures. The power generation units will be operated on a blend of export specification (commercial grade) natural gas and off-specification gas (refer to BAT Conclusion 4 above). CO emission levels are expected to be < 100 mg/Nm^3. We have not set any limits as there are no monitoring requirements, refer to our assessment of BAT Conclusion 4 above. The operator is CC with the requirements of this BAT Conclusion.	2.3.1

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
38	**In order to reduce emissions to air from the etherification process, BAT is to ensure the appropriate treatment of process off-gases by routing them to the refinery fuel gas system.**	NA	Etherification processes are not carried out at the installation. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA
39	**In order to prevent upset of the biotreatment, BAT is to use a storage tank and an appropriate unit production plan management to control the toxic components dissolved content (e.g. methanol, formic acid, ethers) of the waste water stream prior to final treatment.**	NA	This process is not carried out at the installation. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA
40	**In order to reduce emissions to air of chlorinated compounds, BAT is to optimise the use of chlorinated organic compounds used to maintain catalyst activity when such a process is in place or to use non-chlorinated catalytic systems.**	NA	This process is not carried out at the installation. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA
41	**In order to reduce sulphur dioxide emissions to air from the natural gas plant, BAT is to apply BAT 54.**	CC	Refer to BAT Conclusion 36. The operator is CC with the requirements of this BAT Conclusion.	2.3.1
42	**In order to reduce nitrogen oxides (NO_X) emissions to air from the natural gas plant, BAT is to apply BAT 34**	CC	Refer to BAT Conclusion 34. The operator is CC with the requirements of this BAT Conclusion.	2.3.1

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
43	**In order to prevent emissions of mercury when present in raw natural gas, BAT is to remove the mercury and recover the mercury-containing sludge for waste disposal.**	NA	The operator confirmed that: As per the typical gas composition shown in table 4.1 of the Technical Plan, mercury is not expected to be present in the produced gas. Section 4 of the Technical plan confirms that gas composition has been relatively stable throughout the 20 year life of the field. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA
44	**In order to prevent or reduce waste water flow generation from the distillation process, BAT is to use liquid ring vacuum pumps or surface condensers.** **Applicability**. May not be applicable in some retrofit cases. For new units, vacuum pumps, either in or not in combination with the steam ejectors, may be needed to achieve a high volume (10 mm Hg). Also, a spare should be available in case the vacuum pump fails.	NA	The operator confirmed that no distillation processes take place. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA
45	**In order to prevent or reduce water pollution from the distillation process, BAT is to route sour water to the stripping unit.**	NA	See BAT Conclusion 44.	NA

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
46	In order to prevent or reduce emissions to air from distillation units, BAT is to ensure the appropriate treatment of process off-gases, especially incondensable off-gases, by acid gas removal prior to further use. **Applicability**. Generally applicable for crude and vacuum distillation units. May not be applicable for standalone lubricant and bitumen refineries, with emissions of less than 1 t/d of sulphur compounds. In specific refinery configurations, applicability may be restricted, due to the need for e.g. large piping, compressors or additional amine treating capacity.	NA	See BAT Conclusion 44.	NA
47	**In order to reduce emissions to air from the products treatment process, BAT is to ensure the appropriate disposal of off-gases, especially odorous spent air from sweetening units, by routing them to destruction, e.g. by incineration.** **Applicability**. Generally applicable to products treatment processes where the gas streams can be safely processed to the destruction units. May not be applicable to sweetening units, due to safety reasons.	NA	The operator confirmed that there are no sweetening units. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA
48	**In order to reduce waste and waste water generation when a products treatment process using caustic is in place, BAT is to use cascading caustic solution and a global management of spent caustic, including recycling after appropriate treatment, e.g. by stripping.**	NA	The operator confirmed that there are no products treatment processes using caustic. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA

49	**In order to reduce VOC emissions to air from the storage of volatile liquid hydrocarbon compounds, BAT is to use floating roof storage tanks equipped with high efficiency seals or a fixed roof tank connected to a vapour recovery system.** **Description**. High efficiency seals are specific devices for limiting losses of vapour e.g. improved primary seals, additional multiple (secondary or tertiary) seals (according to quantity emitted). **Applicability**. The applicability of high efficiency seals may be restricted for retrofitting tertiary seals in existing tanks.	CC	The operator confirmed that: The condensate and produced water are stored in dedicated fixed roof tanks as shown on drawings 3793-AEL-PR-PFD-001 and 3793-AEL-PR-PFD-002. There are four tanks in total, two each for condensate and produced water. One tank is intended to be in operation with the second on standby for offloading. The tanks are of standard design, fabricated for the project. They are not fitted with a mechanical vapour recovery system as the production process virtually eliminates all vapours from the liquids. The storage tanks are connected to the flare so that any gas that enters the tanks can be captured and safely combusted. Under normal operations the production process eliminates almost all vapours. In certain process upset conditions (i.e. equipment failure) gas could conceivably enter the tanks and the connection to the flare eliminates the overpressure risk. Also for safety reasons as the flare has a permanently lit pilot system and the tanks are periodically drained to trucks for offsite shipment, a permanent gas blanket.is maintained on the tanks. Due to the very low quantity of gas, options to recover gas from the tanks are limited. Options that were considered are: A) Full vapour recovery system; and B) Recover to the flare and use as a pilot fuel. Option A – A full vapour recovery system would need to recirculate the gas into a main stream elsewhere in	2.3.1

			the plant, which would necessitate the recovered stream being compressed to a higher pressure. This would require a major modification to the current system with an extensive increase in mechanical equipment, power consumption and additional piping hardware. Given the extremely low quantity of residual gas in the liquid leaving the production process the vapour recovery system is considered a sub-optimal solution as it creates an unnecessary increase in energy consumption and waste. Option B – Routing gas to a flare is described as incineration of hazardous waste in the permit. In this instance the gas is being used as a portion of the pilot fuel. The flare has a requirement for continuous pressure to avoid flame-back into the low- and high-pressure flare headers as well as a requirement for the permanent pilot light for swift ignition in emergencies. The precise data for each use in Nm^3/h and kg/h was provided. The volume of gas displaced from the water and condensate is very small, and in fact is barely sufficient to cover even the pilot light requirement of 1.88 kg/h (1.7 Nm^3/h). In summary: The main process in designed to minimise gas vapours at the storage tanks by extracting the highest practical amount of gas from the liquids before they are transferred to storage. The stabilised condensate in the storage tanks does not generate any gas vapours at atmospheric pressure. All gas extracted from the liquids is intended to be utilised on site as fuel gas for power generation, pilot lights or gas purge blankets. There is a permanently	

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
			manifolded system to route and measure extracted gas to the different utilities. Gas vented at tanks is very low quantities predominately consisting of a gas blanket maintained as an anti-explosion protection Gas vented at tanks will be utilised and combusted in the flare to ensure a positive pressure is maintained on this low-pressure flare header as recommended by the manufacturer for safe operation. The use of site extracted gas (i.e. from the process) as the fuel gas for site utilities eliminates the need for import of propane or similar gas and avoids traffic movements associated with such import. Not installing a vapour recovery system avoids higher operating energy requirements and additional waste production. The operator is CC with the requirements of this BAT Conclusion.	

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td>50</td><td>In order to reduce VOC emissions to air from the storage of volatile liquid hydrocarbon compounds, BAT is to use one or a combination of the techniques given below.

<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>i. Manual crude oil tank cleaning</td><td>Oil tank cleaning is performed by workers entering the tank and removing sludge manually</td><td>Generally applicable</td></tr><tr><td>ii. Use of a closed-loop system</td><td>For internal inspections, tanks are periodically emptied, cleaned and rendered gas-free. This cleaning includes dissolving the tank bottom. Closed-loop systems that can be combined with end-of-pipe mobile abatement techniques prevent or reduce VOC emissions</td><td>The applicability may be limited by e.g. the type of residues, tank roof construction or tank materials</td></tr></table></td><td>CC</td><td>The operator confirmed that:

The site will employ a closed loop system whereby the tanks will be periodically emptied, cleaned and left gas-free prior to internal inspection.

The operator is CC with the requirements of this BAT Conclusion.</td><td>2.3.1</td></tr>
</table>

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr>
<td>51</td>
<td>In order to prevent or reduce emissions to soil and groundwater from the storage of liquid hydrocarbon compounds, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>i. Maintenance programme including corrosion monitoring, prevention and control</td><td>A management system including leak detection and operational controls to prevent overfilling, inventory control and risk-based inspection procedures on tanks at intervals to prove their integrity, and maintenance to improve tank containment. It also includes a system response to spill consequences to act before spills can reach the groundwater. To be especially reinforced during maintenance periods</td><td>Generally applicable</td></tr>
<tr><td>ii. Double bottomed tanks</td><td>A second impervious bottom that provides a measure of protection against</td><td>Generally applicable for new tanks and</td></tr>
</table>
</td>
<td>CC</td>
<td>The operator confirmed that:

i. Maintenance programme including corrosion monitoring, prevention and control:
• Level detection including alarms and overfill protection on the storage tanks;
• Tanks which are protected against over and under pressurisation;
• Welded and/or flanged connections on the tanks and associated pipework to reduce the likelihood of leaks;
• Shut off valves and chokes on each tank to control the flow of fluid into/out of the tank;
• Supervised tanker loading operations with pre-use checks on hoses and hose fittings to avoid detachment during loading operations;
• A condensate tank which is equipped with a system that will detect water build-up in the tank and will facilitate draining of the water without significant release of the condensate;
• Integrity testing prior to initial operation of each tank to ensure no leaks;
• Routine tank and containment bund inspections to confirm no leaks are present and that operational controls remain effective;
• Each tank and associated pipework, valves and monitoring/alarms systems will be subject to a preventative maintenance schedule in accordance with manufacturers recommendations – this will include integrity checks using an appropriate technique at the recommended frequency;</td>
<td>1.1

2.3.1

3.2.3</td>
</tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	<table><tr><td></td><td>releases from the first material</td><td>after an overhaul of existing tanks (1)</td></tr><tr><td>iii. Impervious membrane liners</td><td>A continuous leak barrier under the entire bottom surface of the tank</td><td>Generally applicable for new tanks and after an overhaul of existing tanks ([1])</td></tr><tr><td>iv. Sufficient tank farm bund containment</td><td>A tank farm bund is designed to contain large spills potentially caused by a shell rupture or overfilling (for both environmental and safety reasons). Size and associated building rules are generally defined by local regulations</td><td>Generally applicable</td></tr><tr><td colspan="3">(1) Techniques ii and iii may be generally applicable where tanks are dedicated to products that require heat for liquid handling (e.g. bitumen) and where no leak is likely because of solidification</td></tr></table>		• Operating a site surface drainage system which is kept isolated during normal operations and ensures any spillages external to containment bunds are retained on-site and removed by tanker for off-site disposal; and • Development, testing and implementation of an emergency spills procedure including maintaining appropriate spills control equipment/stocks. ii Double bottomed tanks: The tanks proposed for condensate and produced water storage are not double bottomed tanks – the proposed tanks will be situated on raised pedestals within a concrete lined containment bunded area which means that any leak would be visible to operators. We do not consider double bottomed tanks represent BAT in the UK. iii An impervious membrane liner is beneath the facility. iv Sufficient tank farm bund containment with inspection and maintenance. Containment bund areas will be concrete lined and capable of containing 110% capacity of the volume of the largest single tank or contain 25% of the of the total volume where more than one tank is contained in a containment area. BAT is to use one or a combination of techniques.	

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
			The operator is CC with the requirements of this BAT Conclusion.	

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr>
<td>52</td>
<td>In order to prevent or reduce VOC emissions to air from loading and unloading operations of volatile liquid hydrocarbon compounds, BAT is to use one or a combination of the techniques given below to achieve a recovery rate of at least 95 %.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>Vapour recovery by:

i. Condensation

ii. Absorption

iii. Adsorption

iv. Membrane separation

v. Hybrid systems</td><td>See section 1.20.6, Annex 1.</td><td>Generally applicable to loading/unloading operations where annual throughput is

> 5 000 m^3/yr. Not applicable to loading/unloading operations for sea-going vessels with an annual throughput < 1 million m^3/yr (1)</td></tr>
<tr><td colspan="3">(1) A vapour destruction unit (e.g. by incineration) may be substituted for a vapour recovery unit, if vapour recovery is unsafe or technically impossible because of the volume of return vapour</td></tr>
</table>
Table 16 BAT- associated emission levels for non-methane VOC and benzene emissions to air from loading and unloading operations of volatile liquid hydrocarbon compounds
<table>
<tr><th>Parameter</th><th>BAT-AEL (hourly average) (1)</th></tr>
<tr><td>NMVOC</td><td>0.15 - 10g/Nm^3 (2) (3)</td></tr>
</table>
</td>
<td>CC</td>
<td>The operator confirmed that:

It is not expected or anticipated that venting of natural gas from the produced water will occur as dissolved methane will be separated from the produced water. Therefore this BAT conclusion is not applicable to produced water loading and unloading operations.

In respect of condensate production, based on a peak production of 28,000 bbl per annum, export should not exceed 5,000 m^3/yr. The condensate tank will be fitted with dry break coupling connection and arrangements for back venting during loading of road tankers back to the bulk storage tank for containment. This will allow a vapour recovery rate of at least 95%.

A limit on throughput of 5,000 m^3/year has been included in table S1.1 of the permit.

The operator is CC with the requirements of this BAT Conclusion.</td>
<td>1.1

2.3.1

3.2</td>
</tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	Benzene ([3]) <1 mg/Nm^3 (1) Hourly values in continuous operation expressed and measured according to Directive 94/63/EA (2) Lower value achievable with two-stage hybrid systems. Upper value achievable with single-stage adsorption or membrane system (3) Benzene monitoring may not be necessary where emissions of NMVOC are at the lower end of the range.			
53	**In order to reduce emissions to water from visbreaking and other thermal processes, BAT is to ensure the appropriate treatment of waste water streams by applying the techniques of BAT 11.**	NA	Visbreaking or other thermal processes are not carried out at the installation. This BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA
54	**In order to reduce sulphur emissions to air from off-gases containing hydrogen sulphides (H_2S), BAT is to use all of the techniques given below.** **Technique** / **Description** / **Applicability** i. Acid gas removal e.g. by amine treating — See section 1.20.3, Annex 1. — Generally applicable ii. Sulphur recovery unit (SRU), e.g. by Claus process — See section 1.20.3, Annex 1. — Generally applicable	NA	There are only trace quantities of H_2S present in the incoming gas streams and no acid gas removal, SRU or TGTU processing steps are required. Section 4 of the Technical plan confirms that gas composition has been relatively stable throughout the 20 year life of the field, with the typical gas composition provided in table 4.1. The H_2S composition is zero in this table. We agree this BAT Conclusion is not applicable to the relevant activities carried out at this installation.	NA

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)

iii. Tail gas treatment unit (TGTU)	See section 1.20.3, Annex 1.	For retrofitting existing SRU, the applicability may be limited by the SRU size and configuration of the units and the type of sulphur recovery process already in place
(1) My not be applicable for stand-alone lubricant or bitumen refineries with a release of sulphur compounds of less than 1 t/d		

Table 17 BAT-associated environmental performance levels for a waste gas sulphur (H_2S) recovery system

	BAT-associated environmental performance level (monthly average)
Acid gas removal	Achieve hydrogen sulphides (H2S) removal in the treated RFG in order to meet gas firing BAT-AEL for BAT 36
Sulphur recovery efficiency ([1])	New unit: 99.5 – > 99.9 % Existing unit: ≥ 98.5 %
(1) Sulphur recovery efficiency is calculated over the whole treatment chain (including SRU and TGTU) as the fraction of sulphur in the feed that is recovered in the sulphur stream routed to the collection pots. When the applied technique does not include a recovery of sulphur (e.g. seawater scrubber) it refers to the sulphur removal efficiency, as the % of sulphur removed by the whole treatment chain	

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
	The associated monitoring is described in BAT 4.			

55	**In order to prevent emissions to air from flares, BAT is to use flaring only for safety reasons or for non-routine operational conditions (e.g. start-ups, shutdown).**	CC	The operator confirmed that: As identified in section 4.3.2 of the Technical Plan, during normal processing operations, the flare qualifies as a safety device and is utilised for emergencies and non-routine operations such as start-up and shut-down. Gas sent to the flare will be minimised as much as possible by: • Recirculating gas through the process where possible; and • Each item of plant has its own gas bleed point which facilitates the removal of residual gas in the process to the flare. Each bleed point can be operated individually which means there is the potential of isolating and venting sections of the pipeline as necessary, depending on the situation. A pilot light will be lit constantly to ensure that in the unlikely event of an emergency or process upset, the gas being diverted to the flare can be immediately combusted. The Environment Agency will be notified by the operator in the event that flare operation to combust waste gas is required, this will include recording the volume of gas combusted and estimating the emissions generated. The flare will be operated and monitored in accordance with the flare operation and bridging documents received 23 November and 01 December 2021 respectively.	2.3.1

<table>
<tr><th>BAT Conclusion Number</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th><th>Relevant permit condition(s)</th></tr>
<tr><td></td><td></td><td></td><td>The operator is CC with the requirements of this BAT Conclusion.</td><td></td></tr>
<tr><td>56</td><td>In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use the techniques given below.

<table><tr><th>Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>i. Correct plant design</td><td>See section 1.20.7, Annex 1.</td><td>Applicable to new units.

Flare gas recovery system may be retrofitted in existing units</td></tr><tr><td>ii. Plant management</td><td>See section 1.20.7, Annex 1.</td><td>Generally applicable</td></tr><tr><td>iii. Correct flaring devices design</td><td>See section 1.20.7, Annex 1.</td><td>Applicable to new units</td></tr><tr><td>iv. Monitoring and reporting</td><td>See section 1.20.7, Annex 1.</td><td>Generally applicable</td></tr></table></td><td>CC</td><td>The operator confirmed that:

The details of techniques employed for selection and use of the flare are detailed in section 4.3 of the Technical Plan and the Flare BAT Assessment Report. Information provided includes techniques to be employed covering:

• Plant and flare design requirements
• Plant management arrangements
• Process monitoring arrangements

In an email received 09 December 2021, the operator confirmed that there are no plans to monitor combustion temperature in the existing ground flare system.

Flame monitoring equipment does not come as standard in the flare package as all performance criteria have been calculated to confirm adequate combustion efficiency by the manufacturer.

The inlet manifolding allows for automatic selection of different configuration of burner heads subject to changes in inlet pressure. It is this option that ensures combustion efficiency across a wide range of flow-rates.</td><td>2.3.1</td></tr>
</table>

BAT Conclusion Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	Relevant permit condition(s)
			The manufacturers engineering document confirms flare performance across the full spectrum of anticipated rates and calculates combustion efficiency at over 99% across them. The operator has committed to providing a method for calculating emissions from the flare. We have secured this with a pre-operational condition in the permit. During normal operations at the facility there is no gas routed to flare. All on-specification gas is routed to pipeline for sales. The operator is CC with the requirements of this BAT Conclusion.	
	BAT Conclusions for integrated emission management **BAT Conclusions 57 and 58**	NA	These BAT Conclusions are not applicable to the relevant activities carried out at this installation.	NA

Permitting Decisions- Variation (substantial)

Decision considerations

Standard rules criteria check

The application meets the criteria for the standard rules SR2018 No 7 applied for; however in this case the medium combustion plant directive (MCPD) does not apply. Refer to Operating techniques for combustion plant below.

Confidential information

A claim for commercial or industrial confidentiality has not been made.

Identifying confidential information

We have not identified information provided as part of the application that we consider to be confidential.

Consultation

The consultation requirements were identified in accordance with the Environmental Permitting (England and Wales) Regulations (2016) and our public participation statement.

The application was publicised on the GOV.UK website.

We consulted the following organisations:

- Food Standards Agency (FSA)
- East Lindsey District Council (Planning & Environmental Health)
- Lincolnshire County Council (LCC) (Planning & Environmental Health)
- National Grid
- Health & Safety Executive (HSE)
- Public Health England (PHE) / Director of Public Health (became the UK Health Security Agency (UKHSA) 01 October 2021)
- Mineral Planning Authority (MPA)
- Oil & Gas Authority (OGA)

The comments and our responses are summarised in the consultation responses section.

The regulated facility

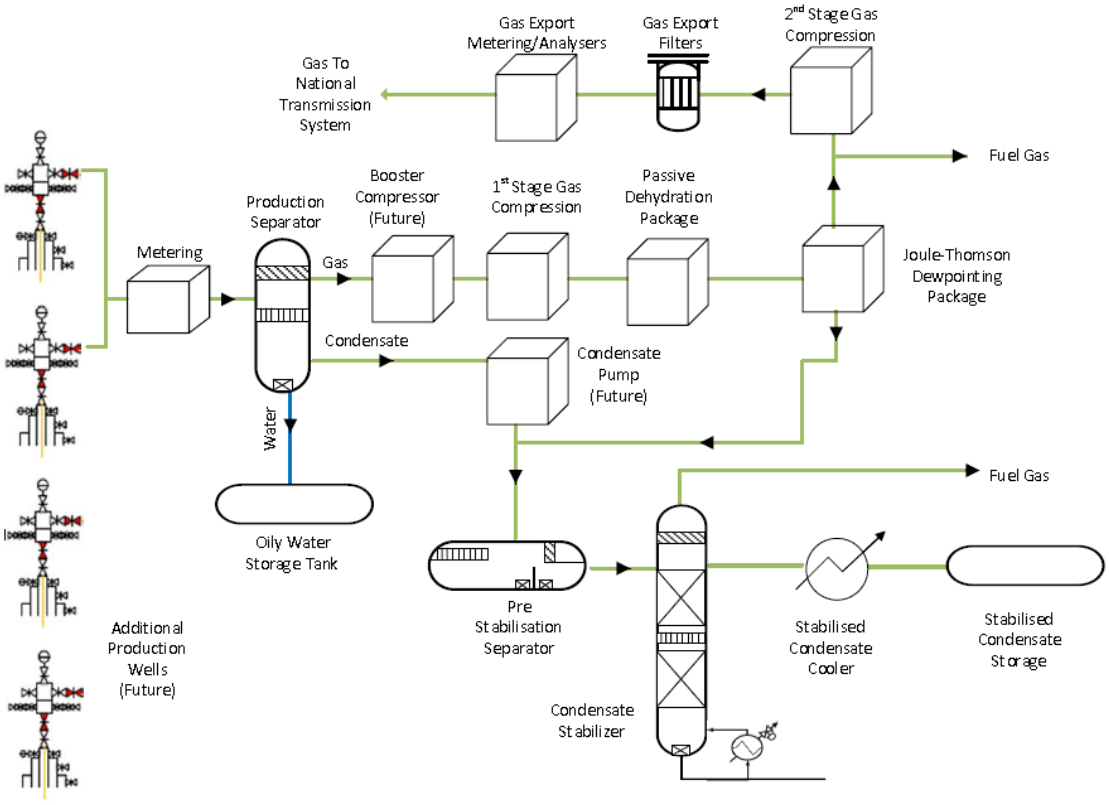
We considered the extent and nature of the facilities at the site in accordance with RGN2 ‘Understanding the meaning of regulated facility’, Appendix 2 of RGN2 ‘Defining the scope of the installation’ and Appendix 1 of RGN 2 ‘Interpretation of Schedule 1’.

We have added the gas processing facilities which are defined by the following definitions in Part 2, Schedule 1 of the Environmental Permitting (England and Wales) Regulations (EPR) 2016:

Section 1.2 Part A(1)(a)	Refining gas where this is likely to involve the use of 1,000 or more tonnes of gas in any 12-month period.
Section 1.2 Part A(1)(e)(i)	The loading, unloading, handling or storage of, or the physical, chemical or thermal treatment of crude oil.

The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.

Process flow



The site

The operator has provided plans which we consider to be satisfactory.

These show the extent of the site of the facility.

The plan is included in the permit.

Site condition report

The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive.

Waste management plan

The operator has provided an updated waste management plan (WMP) which we consider is not satisfactory.

It would appear that the operator wishes to include the bulk of the detail within the WR11 submission rather than the WMP. We do not support this approach as it removes control from the permit as it cannot be incorporated into the operating techniques table. It is also a misuse of the WR11 notification process as this is generally about protection of groundwater rather than waste management.

We would expect to see a WMP which includes a full waste management matrix for all activities. This would include details of the types of waste, projected volumes, classifications, disposal routes and final destinations of any waste materials that may be produced. The summaries that have been included within sections 4.2, 4.3 and 4.4 lack detail and also include incorrect waste codes.

We would also expect the WMP to include a list of fluids and chemicals that are likely to be used during drilling activities. There is currently very little detail other than some safety data sheets in the appendices.

The storage arrangements set out within section 4.5 are questionable and provide no reassurance that the waste will be handled in a manner that prevents pollution. There's little information with regards to containment bunds other than stating that existing infrastructure will be used. We require assurance that they are fit for purpose by reference to their intended compliance with CIRIA C736.

Surface water discharges have been referenced as having a tertiary lining system. We require assurance that the existing liner is fit for purpose and that the containment is in line with current guidance.

Standard rules permit 2015 No1 may be used as a guide to the minimum amount of detail that we would expect to see in a WMP.

We have set a pre-operational condition to address the deficiencies.

Nature conservation, landscape, heritage and protected species and habitat designations

We have checked the location of the application to assess if it is within the screening distances we consider relevant for impacts on nature conservation, landscape, heritage and protected species and habitat designations. The application is within our screening distances for these designations.

We have already assessed the application (EPR/DB3504XY/A001) and its' potential to affect sites of nature conservation, landscape, heritage and protected species and habitat designations identified in the nature conservation screening report as part of the permitting process, refer to emergency flare assessment below.

We consider that the application will not affect any site of nature conservation, landscape and heritage, and/or protected species or habitats identified.

We have not consulted Natural England.

The decision was taken in accordance with our guidance.

Environmental risk

We have reviewed the operator's assessment of the environmental risk from the facility.

Noise impacts

Refer to Key issues section (NIA) of this document.

Odour impacts

The applicant identified the odour sources as follows:

- tanks and pipework;
- material and waste storage;
- fugitive releases in close proximity to the well-heads during side-track or work-over activities if required.

The impact assessment identified a number of control measures that are in place to minimise odour.

No cold venting is proposed from the new activities as the various process vents are routed to the flare and the condensate storage tank is designed to operate under slight vacuum (refer to the response provided for BAT Conclusion 49 above).

The impact assessment report was however, developed to cover both the existing equipment currently allowed under the existing permit which is not proposed to change as a result of this application as well as the new proposed plant and associated operations to ensure it covered all potential impact from the site. The specific item in the impact assessment (E5) relates to cold venting during an emergency, which is specific to the existing permitted equipment which includes a cold vent on the test separator. This vent would only operate if the high high pressure trip on the separator was triggered, which is very unlikely to occur. This would only occur where the high pressure trip fails to trigger plant isolation resulting in over pressurisation of the vessel.

We are satisfied with the measures in place; however there is provision in the permit for the submission of an odour management plan should it be required.

Emergency flare impact assessment

The assessment was based on a maximum annual operation of 876 hours. The flare unit will be used as a safety device for short, infrequent periods of time.

The proposed replacement flare is significantly smaller than the flare previously assessed. The total capacity of the original flare was 7,667 Nm^3/hour, with that of the proposed flare being 5,000 Nm^3/hour. The larger flare was evaluated at the time of the permit application (EPR/DB3504XY/A001) and the permit was issued 03 October 2016. We concluded that it did not have the potential to cause a significant impact on human health and ecological receptors. As this proposal is a betterment in terms of design and releases, we have not carried out any further assessment.

We have included measures in the permit to ensure that if operation of the flare were to exceed 876 hours/year then an assessment of the impact would be required. This requirement is set out in table S4.3 (Performance parameters). The previous limit in table S3.4 (Process monitoring) has also been amended from 7,667 Nm^3/hour to 5,000 Nm^3/hour and moved into table S3.1.

The operator's risk assessment is satisfactory.

Climate change

The operator confirmed that the site is located within a 3a Flood Zone, which is an area having a high probability of flooding (1 in 100 year or greater probability of river flooding or a 1 in 200 or greater annual probability of sea flooding in any year).

Based on the flooding risk, we have included the standard climate change permit condition and adapted it to refer to a climate change adaptation improvement condition that we have included. Whilst these requirements are generally just applicable to new bespoke permits, this variation is to add new gas processing facilities, which is more akin to a new application rather than a variation to the existing facilities. This is substantiated by the application fee which is based on the charge for a new application.

Operating techniques

Refer to Key issues section in this document: BAT Conclusions – refining of mineral oil and gas.

We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility.

The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.

Operating techniques for combustion plant

The operator applied for the standard rules permit SR2018 No 7, for new, low risk, stationary Medium Combustion Plant between 1 to less than 20 MWth (in operation on or after 20/12/2018). This is to authorise five x 2.17 MWth MCPs fired on a gas mixture comprising 60% commercial grade and 40% off-specification grade. The off-specification grade is defined as refinery fuel gas (RFG).

Article 2 (3) (o) of the medium combustion plant directive (MCPD) confirms that the directive does not apply to combustion plants firing refinery fuels alone or with other fuels for the production of energy within mineral oil and gas refineries.

On this basis we have not set any limits or monitoring requirements for the MCPs.

Noise management

We consider that the activities carried out at the site have the potential to cause noise that might cause pollution outside the site. Refer to Key issues section (NIA) of this document.

We have set a pre-operational condition requiring the submission of a NMP prior to commissioning of the gas refining activities.

The approved plan will be incorporated into the operating techniques, table S1.2.

Updating permit conditions during consolidation

We have updated permit conditions to those in the current generic permit template as part of permit consolidation. The conditions will provide the same level of protection as those in the previous permit.

Changes to the permit conditions due to an Environment Agency initiated variation

We have varied the permit as stated in the variation notice.

We have removed improvement conditions IC1 to IC4 as they have been superseded and so are no longer relevant.

Raw materials/fuels

We have specified a sulphur content not exceeding 0.1% w/w for the diesel used for the back-up generators.

Pre-operational conditions

Pre-operational conditions are required for the new gas refining activities.

Based on the information in the application, we consider that we need to include the following pre-operational conditions.

Commissioning plan required.

Noise management plan - refer to the appropriate sections of this document.

Waste management plan - refer to the appropriate sections of this document.

Technical plan - refer to the appropriate sections of this document.

Surface water management and surface water monitoring plans - refer to the appropriate sections of this document.

BAT Conclusion 6 requiring a diffuse VOC monitoring plan - refer to the appropriate sections of this document.

CIRIA compliant bund required for the condensate separator.

Improvement programme

Based on the information on the application, we consider that we need to include an improvement programme.

We have included an improvement programme to ensure that the appropriate controls are in place for:

Commissioning of the gas refining activity.

Climate change adaptation - refer to the appropriate section of this document.

Noise - refer to the appropriate sections of this document.

Emission limits

No emission limits have been set, refer to ‘Operating techniques for Combustion plant’ section of this document.

Monitoring

Monitoring has changed as a result of this variation.

The monitoring requirements for the emergency flare in table S3.1 have been removed as they no longer apply to the new flare.

Process monitoring requirements for the emergency flare have been moved into table S3.1.

Reporting

We have amended reporting in the permit to include gas production and operation of the emergency gas flare.

Management system

We are not aware of any reason to consider that the operator will not have the management system to enable them to comply with the permit conditions.

The decision was taken in accordance with the guidance on operator competence and how to develop a management system for environmental permits.

Previous performance

We have assessed operator competence. There is no known reason to consider the applicant will not comply with the permit conditions.

We have checked our systems to ensure that all relevant convictions have been declared.

No relevant convictions were found. The operator satisfies the criteria in our guidance on operator competence.

Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit variation.

Paragraph 1.3 of the guidance says:

“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Consultation Responses

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public, and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section

Response received from East Lindsey District Council, Assistant Director of Planning, reference N/158/01992/21/IC.
Advised that we also consult with Lincolnshire County Council (LCC) and the Environmental Protection Team at East Lindsey District Council. We have already consulted with the Environmental Protection Team at East Lindsey District Council. We consulted with LCC [Note 1] 28 September 2021.
Note 1: We were also a statutory consultee on the planning application for this gas refining plant, including power generation equipment, being determined by LCC. In order to implement the changes, the operator requires both planning permission and a variation to the environmental permit. The pollution control and planning regimes are intended to be complementary. We are only able to take into account those issues, which fall within the scope of the EPR. In our role of statutory consultee to LCC, we made comments about the noise impacts.

Response received from UK Health Security Agency (UKHSA) (previously PHE), Principal Environmental Public Health Scientist, dated 04 October 2021.
No issues raised.

Representations from individual members of the public

Response received from individual members of the public	
Planning permission	
The planning application submitted to Lincolnshire County Council (LCC) referred to a sidetrack, which included a well test and clean-up. It was suggested that this would take two weeks, with an interval of two-three weeks between completion of drilling and the start of well testing. It was presumed that the planning consent was granted on the basis that this well test would be done. The company asserted in its investor Q&A session 29 September 2021 (printed on its website under “Media”) that they were no longer planning to conduct a well test/clean-up. Clarification as to whether there are any safety or other issues involved in this decision, and if so, whether the operator has informed the Environment Agency and the other relevant regulatory authorities.	The Environment Agency are concerned with the management of extractive wastes from borehole drilling operations for the purpose of exploration, well workovers and decommissioning. The management of waste generated from the drilling of a side-track well from an existing borehole is included within these activities. Waste generated during well clean-up or testing activities must be handled safely and in line with the requirements of the sites environmental permit (ref: EPR/JB3107XB). Other aspects of a wells operation such as safety are the responsibility of other regulatory bodies such as the Health & Safety Executive (HSE) and do not directly fall within the Environment Agency’s remit.
That the proposed variation to the permit reflects the planning permissions and permitted development previously obtained.	The variation application is consistent with the planning application.
That the application to vary an existing permit relates to a prior approval application approved 11 June 2020 reference N/158/00504/20 (LCC PL/0052/20) to construct a gas processing plant and planning application approved 7 August 2020 reference N/180/00971/20 (LCC PL/0060/20) to install and operate a gas pipe-line connecting Saltfleetby to the National Grid at Theddlethorpe. No significant variation to the approved variation has been identified	We have consulted with LCC and the MPA, refer to consultation section of this document.

and as a consequence LCC and the Mineral Planning Authority (MPA) do not wish to comment further.	
Operator competence Concerned about **staff** competence and safety.	Refer to 'Management system' section of this document.
Noise Concerned about noise.	Refer to Noise impacts in the 'Environmental Risks' section of this document.
Consultation Concerned that they were not informed.	Our consultation requirements were identified in accordance with the Environmental Permitting (England and Wales) Regulations (2016) and our public participation statement. The application was publicised on the GOV.UK website.
Water quality Concerned about the impact on local bore-hole water.	No discharge of process waste water takes place at the site. Produced water will be removed from site by road tanker to an appropriately licenced off-site treatment facility.
Operation That they were informed that the process would take a few weeks; however this variation is for the long-term.	Our assessment of the operation is addressed throughout this document.
Light pollution Concerned about light pollution.	Pollution from light is primarily a concern for considering visual impacts and as such covered by the planning process. It was not considered to be a significant issue in the planning decision.
Traffic Concerned about traffic.	Refer to Noise impacts in the 'Environmental Risks' section of this document.

That the application is fully supported due to the UK dependency on imported gas during a substantial period of prices rises and providing local employment.	-