



ENVIRONMENT  
AGENCY

## Permit with introductory note

Pollution Prevention and Control (England & Wales) Regulations 2000

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**Refinery**  
**Petroleum Limited**

[Redacted]

## Introductory note

### ***This introductory note does not form a part of the permit***

The main features of the installation are as follows.

Location: The installation is located [REDACTED] km to the northwest of [REDACTED]. The centre of the site is at National Grid Reference [REDACTED]. The site covers an area of [REDACTED] Ha. Four settlements are located within [REDACTED] metres of the installation boundary. [REDACTED] lies approximately 300 metres to the north [REDACTED] village approximately [REDACTED] metres to the southwest [REDACTED] approximately 750m to the northwest and [REDACTED] to the south east of the installation boundary.

The site is connected via a series of pipelines to [REDACTED] jetties on the north side of [REDACTED] waterway.

Operator: The site is a single-operator installation operated by [REDACTED] Limited.

Key activities: The purpose of the site is to process crude oil into its component parts to produce fuels and feedstocks for sale into various markets. The processing of crude oil involves a series of inter-linked processes, as follows:

- a) *De-salter* : Crude oil is pumped from the tank farm through a pre-heater into an electrical desalter at 116°C. Under the action of an electrostatic field, and in the presence of a chemical demulsifier, water and corrosive salts are removed from the crude oil. The aqueous stream is then cooled and discharged to the oily water sewer for treatment in the site's waste water treatment plant.
- b) *Crude distillation unit (CDU)*: The Crude Distillation operation is the initial process, which separates and recovers the relatively lighter components from crude oil feedstock in a series of distillations. The separation equipment for the lightest components is generally referred to as the Vapour Recovery section. The unit is also fed with minor by-product streams from other process units.
- c) *Vacuum distillation unit (VDU)*: The vacuum distillation unit is designed to process [REDACTED] m<sup>3</sup>/hr of crude residue, from either the crude distillation unit, storage, or a combination of both, and to produce by fractionation a vacuum gas oil suitable for feed to the Fluidised Catalytic Cracking Unit (FCCU). The products of this unit are hydrocarbon distillate feedstock for the FCCU and hydrocarbon residue for Fuel Oil blending.
- d) *Hydrotreaters*: There are 5 hydrotreaters on site which reduce the sulphur content of naphtha and distillate streams by converting the sulphur in the hydrocarbon to hydrogen sulphide in the presence of hydrogen gas and nickel-molybdenum or cobalt-molybdenum catalyst. The hydrogen sulphide is then easily removed from the hydrocarbon. Hydrotreaters are also used directly upstream of the Reformer and Isomerisation units to reduce the sulphur content of the feed into these units in order to avoid possible poisoning of the catalysts used within the units.
- e) *Merox units*: There are [REDACTED] units on site – one for treatment of LPG stream and another for gasoline. The units convert any mercaptans within the LPG and gasoline streams to disulphides, so reducing their odour and corrosivity. There is also a [REDACTED] Merox unit (commissioned but currently not operational) which further reduces the sulphur content of

naphtha which can then be used as gasoline blending stock. This unit will come on line at the end of 2007 in line with the requirements of the sulphur in fuels directive.

- f) *Isomerisation unit:* The isomerisation unit converts pentane and hexane within the naphtha stream into their various isomers. The end product is used as a high octane blend component for gasoline production. Naphtha is reacted with hydrogen in the presence of a catalyst. The hydrogen sulphide produced as a by-product is then removed from the isomerised product before it is cooled and sent to storage via a de-butaniser and drier.
- g) *Fluid Catalytic Cracking Unit (FCCU):* The FCCU unit breaks down the heavy complex and long chain hydrocarbons from the VDU to produce lighter oils and gases that can be used as LPG or gasoline blending. The main feedstock is vacuum gas oil although this may be supplemented by higher fractions from the CRU or VDU bottoms. The unit has a [REDACTED] [REDACTED] system and a final filter to abate emissions of particulate (catalyst) to air. The catalyst is thermally treated to remove any hydrocarbon/carbon deposited on its surface during the process before being recycled to the cracking unit.
- h) *Dimersol unit:* This unit converts some of the propane and propene fractions resulting from the FCCU into C6 dimates. These have a high octane value and are used for gasoline blending.
- i) *Alkylation unit:* This unit combines [REDACTED] with is [REDACTED] from the Butamer unit to form C7 and C8 branched hydrocarbons known as alkylate. The reaction is catalysed by hydrofluoric acid.
- j) *Selective Hydrogenation Unit:* The Butamer unit is used to increase the iso-butane content of the butane stream feedstock for the alkylation unit. The reaction section is a fixed bed catalytic process for the conversion of n-butane to iso-butane.
- k) *Amine recovery and sulphur recovery units (ARU and SRU):* The ARU and SRU work in combination to convert acid gas ( $H_2S/SO_2$ ) from refinery gas streams into elemental sulphur which is sold as a feedstock into the chemical industry. Acid gas from the various refinery processes is absorbed into [REDACTED] is then transferred to the ARU where the acid gas is removed under vacuum. The acid gas is then transferred to the SRU where the acid gas is converted to elemental sulphur by means of three sequential Claus reactors in the presence of [REDACTED] catalyst and steam.
- l) *Waste water treatment facility (WWTP):* All process water, surface water and ballast water at the site is treated in the on-site WWTP. The WWTP consists of equalisation basins to ensure that the feed to the WWTP is fairly consistent, API to remove oil and suspended solids from the feed, an aerated lagoon where aerobic bacteria further breakdown oil and nitrogen containing compounds, followed by a settling lagoon before discharge into [REDACTED] waterway.
- m) *Large Combustion Plant Directive (LCPD) combustion plant:* Most of the combustion units on site are subject to the LCPD due to DEFRA definition on aggregation of combustion units having a common windshield. There are [REDACTED] on site – [REDACTED] stack and [REDACTED] stack through which all combustion units with the exception of the [REDACTED] charge heater and a small [REDACTED] CHP plant discharge.
- n) *Jetty and Wayleave :* The site loads oil products on to ships and off-loads crude oil and ballast water from ships via a jetty on the [REDACTED] waterway. The jetty comprises [REDACTED] individual berthing points. The jetty is linked to the site (approximately [REDACTED] away) by [REDACTED] pipelines that are buried underground for most of their length.

Main environmental issues:

a) *Releases to air:*

The primary releases to air from the site are sulphur dioxide, oxides of nitrogen, particulate and volatile organic compounds. The sulphur dioxide arises from combustion of fuels (especially Refinery fuel oil) and the combustion of hydrogen sulphide gas streams recovered within the sour water strippers. Oxides of nitrogen and particulate result from the combustion processes on site, especially where refinery fuel oil (RFO) is used and to a lesser extent from refinery fuel gas (RFG). The volatile organic compound emissions are primarily fugitive emissions from tank vents.

b) *Releases to water:*

The main releases to controlled waters from the site are oils and greases, suspended solids, ammonia, phenol and sulphide. These are released in low concentrations within the site effluent into the [REDACTED] waterway. This body of water has been designated a Special Area of Conservation (SAC), so releases to the [REDACTED] have to be minimised as far as possible in order to protect this sensitive habitat.

Status Log of the permit		
Detail	Date	Response Date
Application E [REDACTED]	Duly made C [REDACTED]	
Additional Information Received	Response to Schedule 4 notice issued 8/12/06	[REDACTED]
	Response to Schedule 4 notice issued [REDACTED]	[REDACTED]
	Response to Schedule 4 questions issued [REDACTED]	[REDACTED]
	Response to Schedule 4 questions issued [REDACTED]	[REDACTED]
	Response to Schedule 4 questions issued [REDACTED]	[REDACTED]
	Historical data for water emission monitoring [REDACTED]	[REDACTED]
	Historical data for air emission monitoring [REDACTED]	[REDACTED]
	Information on metal and fluoride releases to water	[REDACTED]
	Annual VOC emissions	[REDACTED]
	e-mail detailing water testing methods	[REDACTED]
	e-mail regarding particulate testing capability	[REDACTED]
	Additional information on annual SO2 releases	[REDACTED]
Permit issued EP [REDACTED]	3 [REDACTED]	
Transfer Application A [REDACTED]	Duly made C [REDACTED]	
Permit transferred A [REDACTED]	[REDACTED]	

Other PPC permits relating to this installation		
Operator	Permit Number	Date of Issue
None		

Superseded or Partially Superseded Licences/Authorisations/Consents relating to this installation			
Holder	Reference Number	Date of Issue	Fully or Partially Superseded
[REDACTED] (UK) Limited	IPC authorisation A [REDACTED]	[REDACTED]	Fully superseded

Other existing Licences/Authorisations/Registrations relating to this site		
Holder	Reference Number	Date of issue
[REDACTED] Limited	Waste management licence [REDACTED]	[REDACTED]

End of Introductory Note

**Permit**

Pollution Prevention and Control  
(England and Wales) Regulations 2000

## Permit

Permit number

[REDACTED]

The Environment Agency (the Agency) in exercise of its powers under Regulation 10 of the Pollution Prevention and Control (England and Wales) Regulations 2000 (SI 2000 No 1973) hereby authorises

[REDACTED] Limited ("the operator"),

whose registered office is

[REDACTED]

company registration number [REDACTED]

to operate an installation at

[REDACTED] **REFINERY**

to the extent authorised by and subject to the conditions of this permit.

Signed

Date of transfer

 [REDACTED]	[REDACTED]
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[REDACTED] **Team Leader, National Permitting Service**

Authorised to sign on behalf of the Agency

# Conditions

## 1 Management

### 1.1 General management

1.1.1 The activities shall be managed and operated:

- (a) in accordance with a management system, which identifies and minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents and non-conformances and those drawn to the attention of the operator as a result of complaints; and
- (b) by sufficient persons who are competent in respect of the responsibilities to be undertaken by them in connection with the operation of the activities.

1.1.2 Records demonstrating compliance with condition 1.1.1 shall be maintained.

1.1.3 Any person having duties that are or may be affected by the matters set out in this permit shall have convenient access to a copy of it kept at or near the place where those duties are carried out.

### 1.2 Accident management plan

1.2.1 The operator shall:

- (a) maintain and implement an accident management plan;
- (b) review and record at least every 4 years or as soon as practicable after an accident, (whichever is the earlier) whether changes to the plan should be made;
- (c) make any appropriate changes to the plan identified by the review.

### 1.3 Energy efficiency

1.3.1 The operator shall:

- (a) take appropriate measures to ensure that energy is used efficiently in the activities;
- (b) review and record at least every 4 years whether there are suitable opportunities to improve the energy efficiency of the activities; and
- (c) take any further appropriate measures identified by a review.

### 1.4 Efficient use of raw materials

1.4.1 The operator shall:

- (a) take appropriate measures to ensure that raw materials and water are used efficiently in the activities;
- (b) maintain records of raw materials and water used in the activities;

- (c) review and record at least every 4 years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and
- (d) take any appropriate further measures identified by a review.

## **1.5 Avoidance, recovery and disposal of wastes produced by the activities**

1.5.1. The operator shall:

- (a) take appropriate measures to ensure that waste produced by the activities is avoided or reduced, or where waste is produced it is recovered wherever practicable or otherwise disposed of in a manner which minimises its impact on the environment;
- (b) review and record at least every 4 years whether changes to those measures should be made; and
- (c) take any further appropriate measures identified by a review.

## **1.6 Site security**

1.6.1. Site security measures shall prevent unauthorised access to the site, as far as practicable.

# **2. Operations**

## **2.1 Permitted activities**

2.1.1 The operator is authorised to carry out the activities specified in schedule 1 table S1.1 (the "activities").

## **2.2 The site**

2.2.1 The activities shall not extend beyond the site, being the land shown edged in red on the site plan at schedule 2 to this permit.

## **2.3 Operating techniques**

2.3.1 The activities shall, subject to the conditions of this permit, be operated using the techniques and in the manner described in the documentation specified in schedule 1 table S1.2, unless otherwise agreed in writing by the Agency.

2.3.2 No raw materials or fuels listed in schedule 3 table S3.1 shall be used unless they comply with the specifications set out in that table.

2.3.3 Waste shall only be accepted if:

- (a) it is of a type and quantity listed in schedule 3 table S3.2; and
- (b) it conforms to the description in the documentation supplied by the producer and holder.

2.3.4 Records shall be kept of all waste accepted onto the site.



## **2.4 Off-site conditions**

There are no off-site conditions under this section.

## **2.5 Improvement programme**

- 2.5.1 The operator shall complete the improvements specified in schedule 1 table S1.3 by the date specified in that table unless otherwise agreed in writing by the Agency.
- 2.5.2 Except in the case of an improvement which consists only of a submission to the Agency, the operator shall notify the Agency within 14 days of completion of each improvement.

## **2.6 Pre-operational conditions**

There are no pre-operational conditions in this permit.

## **2.7 Closure and decommissioning**

- 2.7.1 The operator shall maintain and operate the activities so as to prevent or where that is not practicable, to minimise, any pollution risk on closure and decommissioning.
- 2.7.2 The operator shall maintain a site closure plan which demonstrates how the activities can be decommissioned to avoid any pollution risk and return the site to a satisfactory state.
- 2.7.3 The operator shall carry out and record a review of the site closure plan at least every 4 years.
- 2.7.4 The site closure plan (or relevant part thereof) shall be implemented on final cessation or decommissioning of the activities or part thereof.

## **2.8 Site protection and monitoring programme**

- 2.8.1 The operator shall, within 2 months of the issue of this permit, submit a site protection and monitoring programme.
- 2.8.2 The operator shall implement and maintain the site protection and monitoring programme and shall carry out and record a review of it at least every 4 years.

# **3. Emissions and monitoring**

## **3.1 Emissions to water, air or land**

- 3.1.1 There shall be no point source emissions to water, air or land except from the sources and emission points listed in schedule 4 tables S4.1, S4.1a and S4.2.
- 3.1.2 The limits given in schedule 4 shall not be exceeded.
- 3.1.3 Total annual emissions from the emission points set out in tables schedule 4 S4.1 and S4.2 of a substance listed in schedule 4 tables S4.3a and 4.3b shall not exceed the relevant limit in those tables.

## **3.2 Transfers off-site**

- 3.2.1 Records of all the wastes sent off site from the activities, for either disposal or recovery, shall be maintained.

## **3.3 Fugitive emissions of substances**

- 3.3.1 Fugitive emissions of substances (excluding odour, noise and vibration) shall not cause pollution. The operator shall not be taken to have breached this condition if appropriate measures, including those specified in schedule 1 table S1.4, have been taken to prevent or where that is not practicable, to minimise, those emissions.
- 3.3.2 All liquids, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container.

## **3.4 Odour**

- 3.4.1 Emissions from the activities shall be free from odour at levels likely to cause annoyance outside the site, as perceived by an authorised officer of the Agency, unless the operator has used appropriate measures, including those specified in schedule 1 table S1.5, to prevent or where that is not practicable to minimise the odour.

## **3.5 Noise and vibration**

- 3.5.1 Emissions from the activities shall be free from noise and vibration at levels likely to cause annoyance outside the site, as perceived by an authorised officer of the Agency, unless the operator has used appropriate measures, including those specified in schedule 1 table S1.6, to prevent or where that is not practicable to minimise the noise and vibration.

## **3.6 Monitoring**

- 3.6.1 The operator shall, unless otherwise agreed in writing by the Agency, undertake the monitoring specified in the following tables in schedule 4 to this permit:
- (a) point source emissions specified in tables S4.1, S4.1a and S4.2;
  - (b) process monitoring specified in table S4.4.
- 3.6.2 The operator shall maintain records of all monitoring required by this permit including records of the taking and analysis of samples, instrument measurements (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data.
- 3.6.3 Monitoring equipment, techniques, personnel and organisations employed for the emissions monitoring programme specified in condition 3.6.1 shall have either MCERTS certification or MCERTS accreditation (as appropriate) unless otherwise agreed in writing by the Agency.
- 3.6.4 Permanent means of access shall be provided to enable sampling/monitoring to be carried out in relation to the emission points specified in schedule 4 tables S4.1, S4.2 and S4.3 unless otherwise specified in that schedule.

- 3.6.5 Within 6 months of the issue of this permit (unless otherwise agreed in writing by the Agency) the site reference data identified in the site protection and monitoring programme shall be collected and submitted to the Agency.

### **3.7 Monitoring for the purposes of the Large Combustion Plant Directive**

- 3.7.1 All LCP monitoring required by this permit shall be carried out in accordance with the provisions of Annex VIII of the Large Combustion Plant Directive.
- 3.7.2 If the monitoring results for more than 10 days a year are invalidated within the meaning set out in Schedule 4, the Operator shall:
- (a) within 28 days of becoming aware of this fact, review the causes of the invalidations and submit to the Agency for approval, proposals for measures to improve the reliability of the continuous measurement systems, including a timetable for the implementation of those measures; and
  - (b) implement the approved measures.
- 3.7.3 Continuous measurement systems on emission points from the LCP shall be subject to quality control by means of parallel measurements with reference methods at least once every calendar year.
- 3.7.4 Unless otherwise agreed in writing by the Agency in accordance with condition 3.7.5 below, the operator shall carry out the methods, including the reference measurement methods, to use and calibrate continuous measurement systems in accordance with the appropriate CEN standards.
- 3.7.5 If CEN standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall be used, as agreed in writing with the Agency.
- 3.7.6 Where required by a condition of this permit to check the measurement equipment the operator shall submit a report to the Agency in writing, within 28 days of the completion of the check.

## 4. Information

### 4.1 Records

4.1.1 All records required to be made by this permit shall:

- (a) be legible;
- (b) be made as soon as reasonably practicable;
- (c) if amended, be amended in such a way that the original and any subsequent amendments remain legible, or are capable of retrieval; and
- (d) be retained, unless otherwise agreed in writing by the Agency, for at least 6 years from the date when the records were made, or in the case of the following records until permit surrender:
  - (i) the site protection and monitoring programme.

4.1.2 Any records required to be made by this permit shall be supplied to the Agency within 14 days where the records have been requested in writing by the Agency.

4.1.3 All records required to be held by this permit shall be held on the site and shall be available for inspection by the Agency at any reasonable time.

### 4.2 Reporting

4.2.1 A report or reports on the performance of the activities over the previous year shall be submitted to the Agency by 31 January (or other date agreed in writing by the Agency) each year. The report(s) shall include as a minimum:

- (a) a review of the results of the monitoring and assessment carried out in accordance with this permit against the relevant assumptions, parameters and results in the assessment of the impact of the emissions submitted with the application;
- (b) where the operator's management system encompasses annual improvement targets, a summary report of the previous year's progress against such targets;
- (c) the annual production/treatment data set out in schedule 5 table S5.2;
- (d) the performance parameters set out in schedule 5 table S5.3 using the forms specified in table S5.4 of that schedule; and
- (e) details of any contamination or decontamination of the site which has occurred.
- (f) the total annual emissions from, and total amount of energy input to, each Large Combustion Plant in accordance with the requirements of the Annex VIII(B) of the LCPD.

- 4.2.2 Within 28 days of the end of the reporting period the operator shall, unless otherwise agreed in writing by the Agency, submit reports of the monitoring and assessment carried out in accordance with the conditions of this permit, as follows:
- (a) in respect of the parameters and emission points specified in schedule 5 table S5.1;
  - (b) for the reporting periods specified in schedule 5 table S5.1 and using the forms specified in schedule 5 table S5.4 ; and
  - (c) giving the information from such results and assessments as may be required by the forms specified in those tables.
- 4.2.3 The operator shall, unless notice under this condition has been served within the preceding 4 years, submit to the Agency, within 6 months of receipt of a written notice, a report assessing whether there are other appropriate measures that could be taken to prevent, or where that is not practicable, to minimise pollution.
- 4.2.4 All reports and notifications required by the permit shall be sent to the Agency using the contact details supplied in writing by the Agency
- 4.2.5 A summary report of the waste types and quantities accepted onto the site shall be made for each quarter during which the total amount accepted exceeds 100 tonnes of non-hazardous waste or 10 tonnes of hazardous waste. It shall be submitted to the Agency within one month of the end of the quarter and shall be in the format required by the Agency.
- 4.2.6 The results of reviews and any changes made to the site protection and monitoring programme shall be reported to the Agency, within 1 month of the review or change.4.3.

### **4.3 Notifications**

- 4.3.1 The Agency shall be notified without delay following the detection of:
- (a) any malfunction, breakdown or failure of equipment or techniques, accident, or fugitive emission which has caused, is causing or may cause significant pollution;
  - (b) the breach of a limit specified in the permit;
  - (c) any significant adverse environmental effects.
- 4.3.2 Any information provided under condition 4.3.1 shall be confirmed by sending the information listed in schedule 6 to this permit within the time period specified in that schedule.
- 4.3.3 Prior written notification shall be given to the Agency of the following events and in the specified timescales:
- (a) as soon as practicable prior to the permanent cessation of any of the activities;
  - (b) cessation of operation of part or all of the activities for a period likely to exceed 1 year; and
  - (c) resumption of the operation of part or all of the activities after a cessation notified under (b) above.
- 4.3.4 The Agency shall be given at least 14 days notice before implementation of any part of the site closure plan.

- 4.3.5 Where the Agency has requested in writing that it shall be notified when the operator is to undertake monitoring and/or spot sampling, the operator shall inform the Agency when the relevant monitoring is to take place. The operator shall provide this information to the Agency at least 14 days before the date the monitoring is to be undertaken.
- 4.3.6 The Agency shall be notified within 14 days of the occurrence of the following matters, except where such disclosure is prohibited by Stock Exchange rules:
- (a) any change in the operator's trading name, registered name or registered office address;
  - (b) any change to particulars of the operator's ultimate holding company (including details of an ultimate holding company where an operator has become a subsidiary); and
  - (c) any steps taken with a view to the operator going into administration, entering into a company voluntary arrangement or being wound up.
- 4.3.7 Where the operator has entered into a direct participant agreement in the emissions trading scheme which covers emissions relating to the energy consumption of the activities, the operator shall notify the Agency within one month of:
- (a) a decision by the operator to withdraw from or the Secretary of State to terminate that agreement.
  - (b) a failure to comply with an annual target under that agreement at the end of the trading compliance period.

### **Notification of closure of Large Combustion Plant**

- 4.3.8 From 1 January 2008 the operator shall inform the Agency in writing of the intended closure of any LCP, giving as much notice as possible before closure.

## **4.4 Interpretation**

- 4.4.1 In this permit the expressions listed in schedule 7 shall have the meaning given in that schedule.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Table S1.1 listed activities (continued)**

Activity listed in Schedule 1 of the PPC Regulations	Description of specified activity	Limits of specified activity
S1.2 A1 (g)	Refining mineral oil – secondary operations – oil movements and blending	From receipt of feed, through blending (where necessary) to feed, intermediate and product storage including: petroleum gases, white oils, gas oils/ black oils, crude oil/ slops.
S1.2 A1 (h)	The loading, unloading or other handling of, the storage of, or the physical, chemical or thermal treatment of crude oil;	From receipt of crude to operation of crude distillation unit including: (i) jetty operations (ii) Crude distillation unit [redacted] (iii) Crude storage (max. storage capacity – [redacted] kTe)
S1.2 A(1) (k)	Odourising natural gas or liquefied petroleum gas where that activity is related to a Part A activity.	From feed to unit to discharge for storage or export (max. throughput capacity – [redacted] year)
S4.2 A(1) (a)(v)	Producing inorganic chemicals such as non-metals, metal oxides, metal carbonyls or other inorganic compounds such as calcium carbide, silicon, silicon carbide, titanium dioxide.	Removal of sulphur from aqueous waste stream by use of : (i) amine recovery unit (max. throughput capacity – [redacted] Te/year) (ii) sour water stripper and incinerator (max. throughput capacity – [redacted] Te/year) (iii) waste water stripper and incinerator (max. throughput capacity – [redacted] Te/year) (i) Hydro-desulphurisation unit (max. throughput capacity [redacted] Te/year) and [redacted] MW(th) charge heater [H19]. (ii) Sulphur recovery unit (25Te sulphur/day max. throughput capacity) (iii) [redacted] stripper incinerator [redacted] year (iv) sulphur storage prior to export (max. storage capacity – [redacted] Te)
S5.3 A1 (a)	Treatment of hazardous waste (other than by incineration or landfill) in a facility with a capacity of more than [redacted] tonnes per day.	Treatment of sludge within aerated lagoon.
S5.3 A(1) c) (i)	Treatment of non-hazardous waste in a facility with a capacity of more than [redacted] tonnes per day by biological treatment	Removal of oil and other chemicals from process water by action of aerobic bacteria within aerated lagoon
S5.3 A(1) c) (ii)	Treatment of non-hazardous waste in a facility with a capacity of more than [redacted] tonnes per day by physico-chemical treatment.	From formation of waste water stream, discharge into site drainage systems to discharge of effluents to Milford Haven waterway.



<b>Directly associated activities</b>		
Flaring of gases	Burning of sour and sweet gases at flares	Hydrocarbon gas recovery compressor, flare headers, knock-out pots and flare stacks and any ancillary equipment.
Auxilliary boilers	Combustion unit to generate steam for use on site.	All fuel supply lines to combustion units to discharge of steam for use elsewhere on site.
Road, rail and ship loading	Loading of hydrocarbon products for export from site	All associated line work for charging road, rail and ship. Vapour recovery unit on road loading facility.
Cooling water systems	Systems used for cooling.	All cooling water systems including storage, pipelines and equipment, to discharge to ETP.
Lagoons	The holding or temporary storage of water, effluents or oil-based liquids for settling (sedimentation) or other purposes	The feed point to the lagoon(s), the lagoon(s) and its drainage point.
Surface water drainage	Collection and handling of surface waters within installation	Handling and storage of site drainage until discharge to the site wastewater treatment system or to discharge off-site.
Water treatment	All water treatment activities	From formation of waste water stream, discharge into site drainage systems to discharge of effluents to Milford Haven waterway.

<b>Table S1.2 Operating techniques</b>		
<b>Description</b>	<b>Parts</b>	<b>Date Received</b>
Application	As detailed in Appendix E – Detailed process description within the Application.	██████████
Response to Schedule 4 Notice dated 21 November 2006	Nov06 response part 1 – details on road loading VRU	██████████

**Table S1.3 Improvement programme requirements**

Reference	Requirement	Date
IC1	<p>A written procedure shall be submitted to the agency detailing the measures to be used so that monitoring equipment, personnel and organisations employed for the air emissions monitoring programme shall have either MCERTS certification or accreditation in accordance with condition 3.6.3. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the procedure.</p> <p>The procedure shall be implemented by the operator from the date of approval in writing by the Agency</p>	██████████
IC2	<p>A written report shall be submitted to the Agency for approval detailing an assessment into the adequacy of the protection of controlled waters from contamination from the waste compound on site. Where improvement measures are identified, the report shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	Report by 31/12/2007
IC3	<p>A written plan shall be submitted to the Agency for approval detailing the work to be undertaken to achieve MCERTS accreditation for effluent flow to release point W1 by 31 December 2008.</p> <p>Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	Plan ██████████ Install by ██████████
IC4	<p>A written plan shall be submitted to the Agency for approval detailing the measures be taken to ensure necessary monitoring and infrastructure is in place at the installation to allow the Operator to demonstrate compliance against an hourly bubble limit for sulphur dioxide from 1 January 2009. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency</p>	Plan by ██████████ Upgrades by ██████████ limit applies from ██████████
IC5	<p>A written plan shall be submitted to the Agency for approval detailing the work to be undertaken to carry out Leak Detection and Repair across all plant and pipework at the refinery installation. The plan shall include work necessary to bring the LDAR monitoring status at the installation to Tier 1, Tier 2 and Tier 3 versus the American Petroleum Institute protocol by end of 2012 or an equivalent methodology as agreed with the Agency. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	Plan by 3 ██████████ Tier 3 completed by 3 ██████████
IC6	<p>A noise management plan shall be submitted to the Agency, detailing the measures to be used to control emissions of noise and shall be accordance with Appendix 4 (noise management plan) of Horizontal Guidance Note H3 (Horizontal Noise Guidance Part 2). The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	██████████
IC7	<p>A written report shall be submitted to the Agency giving details of any hydrocarbon-containing wastes that are currently disposed of to landfill or treated prior to landfill in a mixing pit. The report shall include a proposed plan and programme, for approval by the Agency, for the introduction of any techniques necessary to ensure the following in relation to the above wastes:</p> <ul style="list-style-type: none"> <li>(a) prevention or reduction of waste arisings,</li> <li>(b) recovery and/or recycling of any wastes that do arise, and</li> <li>(c) disposal of any wastes for which recovery is technically and economically impossible is carried out in a way that avoids or reduces any impact on the environment.</li> </ul> <p>Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	██████████

**Table S1.3 Improvement programme requirements (contd.)**

Reference	Requirement	Date
IC8	<p>A written plan shall be submitted to the Agency for approval detailing the measures to be taken to install a 24-hour flow proportional sampling device on the discharge from the effluent treatment plant to the Milford Haven waterway. The plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	<p>Plan by [REDACTED] Install by [REDACTED]</p>
IC9	<p>A written report shall be submitted to the Agency for approval detailing the methodology used, results and conclusions of measurements to determine the quantity of fugitive releases from the rail loading operations on site. Measurements should be taken for a range of products which are loaded at the facility. Where fugitive emissions are shown to be significant with respect to odour thresholds at sensitive receptors, then an assessment shall be made of the measures needed to install a vapour recovery system on the rail loading facility. Where appropriate the report shall contain a time-tabled plan for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	[REDACTED]
IC10	<p>A written report shall be submitted to the Agency for approval setting out a detailed assessment of the source and quantity of benzene emissions to air from the site. The most significant sources of benzene emissions from the site should be identified and a time-tabled plan proposed for actions to reduce the emissions of benzene from these sources. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	[REDACTED]
IC11	<p>A written procedure shall be submitted to the agency detailing the measures to be used so that monitoring equipment employed for the CEMS monitoring shall have either MCERTS certification or accreditation in accordance with condition 3.6.3. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the procedure.</p> <p>The procedure shall be implemented by the operator from the date of approval in writing by the Agency</p>	[REDACTED]
IC12	<p>A written report shall be submitted to the Agency detailing the results of regular cadmium and mercury monitoring of discharges to controlled waters from W1 for a period of 6 months. The data submitted within the report shall be appropriate to enable the Agency to set emission limit values for mercury and cadmium. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency</p>	[REDACTED]
IC13	<p>A written report shall be submitted to the Agency for approval detailing the measures required to enable continuous measurement of the H<sub>2</sub>S content of Refinery fuel gas (RFG). The continuous measurement system should give an indication of the efficiency of the amine treatment units on site. The report shall include a time-tabled plan for completion of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	<p>[REDACTED] Upgrade by [REDACTED]</p>
IC14	<p>A written plan shall be submitted to the Agency for approval detailing the method to be used to obtain, update and validate oxides of nitrogen (NO<sub>x</sub>) emission factors for all relevant plant the refinery installation. The plan shall demonstrate how the NO<sub>x</sub> factors will be used in the calculation of NO<sub>x</sub> emissions. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	[REDACTED]
IC15	<p>A written plan shall be submitted to the Agency for approval detailing the measures to be taken to replace the use of Refinery Fuel Oil on site with Natural gas. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	<p>Plan by [REDACTED] Fuel transfer complete by [REDACTED]</p>

**Table S1.3 Improvement programme requirements (contd.)**

Reference	Requirement	Date
IC16	<p>A written procedure shall be submitted to the Agency detailing the measures to be used so that monitoring equipment, personnel and organisations employed for the water emissions monitoring programme shall have either MCERTS certification or accreditation in accordance with condition 3.6.3. Current monitoring methods shall be reviewed to ensure that they are in line with a recognized CEN, ISO, BS or Institute of Petroleum standard testing procedure. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the procedure.</p> <p>The procedure shall be implemented by the operator from the date of approval in writing by the Agency.</p>	██████████
IC17	<p>A written plan shall be submitted to the Agency for approval detailing the measures to be taken to achieve a sulphur recovery unit availability of at least 99.5% (excluding unit heat up time) as a monthly average. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	Plan by 3 ██████████
IC18	<p>A written report shall be submitted to the Agency for approval detailing a cost benefit analysis of installing a second SRU train at the site. The analysis shall detail the costs and additional tonnes of sulphur abated as a result of the installation of a second SRU train which is capable of 99.5% sulphur recovery. The second SRU train should be such that the overall % sulphur recovery efficiency of the combined SRU at the site is in excess of 99%.</p> <p>The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	██████████
IC19	<p>A written report shall be submitted to the Agency for approval detailing an assessment of the need for and the feasibility of installing secondary containment or leak detection facility for the underground pipelines that connect the site to the jetty area. Where areas for improvement are identified a time-tabled plan for the installation of individual measures required shall be included within the report.</p> <p>The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	Report by ██████████
IC20	<p>A written plan shall be submitted to the Agency for approval detailing the measures to be taken to reduce the emissions to controlled water to the BAT levels of ammoniacal nitrogen (as N) - 5mg/l, oil - 5mg/l, phenol - 0.5mg/l and suspended solids - 30mg/l. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	Plan by 2 ██████████
IC21	<p>A written report shall be submitted to the Agency for approval detailing an assessment into the temperature of the effluent discharge from W1 and its effect on the temperature of the ██████████ waterway. The extent of the mixing zone should be identified. Where the temperature of the effluent is shown to increase the temperature of the ██████████ waterway beyond the mixing zone to above ██████████ C then a time-tabled plan shall be included for measures to be taken to reduce the temperature of the final effluent. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of this report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	██████████
IC22	<p>A written report shall be submitted to the Agency for approval detailing an assessment of the feasibility of installing low NOx burners or ultra low NOx burners in the crude furnaces and boilers on site. Where appropriate the report shall contain dates for the installation of such burners. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report.</p> <p>The plan shall be implemented by the operator from the date of approval in writing by the Agency.</p>	██████████

**Table S1.3 Improvement programme requirements (contd.)**

Reference	Requirement	Date
IC23	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to achieve a reduction in the sulphur dioxide mass emission from the FCCU regenerator of at least 50%. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	Plan by [REDACTED] Installation by [REDACTED]
IC24	A written report shall be submitted to the Agency for approval detailing a cost benefit analysis of techniques to reduce the NOx emissions from the FCCU. Where techniques that would be considered BAT are identified, the report shall contain dates for the installation of such techniques. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	[REDACTED]
IC25	A written report shall be submitted to the Agency for approval detailing a cost benefit analysis of techniques to reduce the particulate emissions from the FCCU. Where techniques that would be considered BAT are identified, the report shall contain dates for the installation of such techniques. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	[REDACTED]
IC26	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to recover gases which would otherwise be flared. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	Plan by [REDACTED] Installation by [REDACTED]
IC27	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to achieve continuous measurement of sulphur dioxide, oxides of nitrogen and particulate content of the emissions to air from the FCCU. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	Plan by [REDACTED] Installation by [REDACTED]
IC28	A written plan shall be submitted to the Agency for approval detailing the measures to be taken to achieve continuous measurement of sulphur dioxide of the emissions to air from the SRU. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	Plan by [REDACTED] Installation by [REDACTED]
IC29	A written plan shall be submitted to the Agency for approval detailing the results of a survey of hard-standing, kerbing and secondary containment for raw material, intermediate, product and waste storage areas and the measures to comply with the requirements of section 2.2.2 of TGN S 1.02 and the Agency's Containment policy for Hazardous substances. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	[REDACTED]
IC30	A written report shall be submitted to the Agency detailing the results of measures and studies undertaken to quantify the sulphur dioxide output from the refinery installation due to burning of vacuum distillation unit (VDU) off-gases in combustion/incineration plant. The report shall also include a full technical and economic BAT assessment of the techniques available to prevent or, if that is not possible, reduce this source of sulphur dioxide emissions arising from the burning of VDU off gases. Where appropriate, the report shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the report. The plan shall be implemented by the operator from the date of approval in writing by the Agency.	Report by [REDACTED] Installation by [REDACTED]

**Table S1.3 Improvement programme requirements (contd.)**

Reference	Requirement	Date
IC31	<p>A written plan shall be submitted to the Agency for approval detailing the measures to be taken to cease burning of sour water stripper off-gases from 0100 waste water stripper, 0400 sour water stripper and 2200 sour water stripper in combustion plant at the installation and to ensure that their sulphur content is recovered via the sulphur recovery unit. Where appropriate the plan shall contain dates for the implementation of individual measures. The notification requirements of condition 2.5.2 shall be deemed to have been complied with on submission of the plan.</p> <p>The plan shall be implemented by the operator from the date of approval by the Agency.</p>	<p>Plan by [REDACTED] Installation by [REDACTED]</p>

**Table S1.4 Appropriate measures for fugitive emissions**

Measure	Dates
<p>The operator shall carry out a managed LDAR programme for testing potential sources of fugitive emissions of VOCs from operational plant at the installation, as described in the response to IC5 within Table S1.3. The operator shall complete repairs and/or carry out other actions to prevent, or where that is not possible, minimise continued emissions from those sources.</p>	<p>As agreed in response to IC5</p>

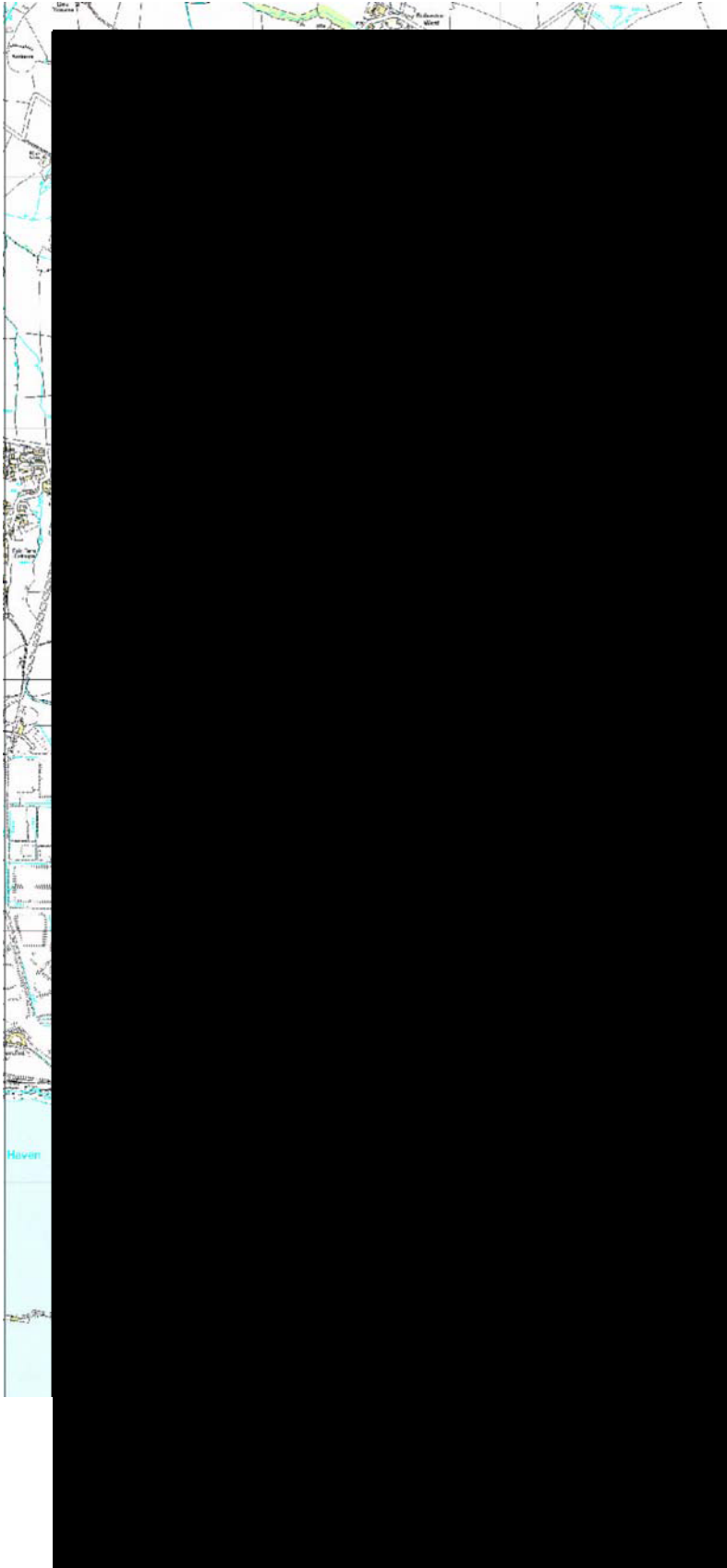
**Table S1.5 Appropriate measures for odour**

Measure	Dates
<p>The operator shall maintain and implement the odour management plan submitted with the application.</p> <p>The operator shall review the plan annually and record at least once a year or as soon as practicable after a complaint (whichever is the earlier), whether changes to the plan should be made and make any appropriate changes to the plan identified by a review.</p>	<p>From permit issue</p>

**Table S1.6 Appropriate measures for noise**

Measure	Dates
<p>The operator shall maintain and implement the noise management plan agreed with the Agency in response to IC6.</p> <p>The operator shall review the plan annually and record at least once a year or as soon as practicable after a complaint (whichever is the earlier), whether changes to the plan should be made and make any appropriate changes to the plan identified by a review.</p>	<p>[REDACTED]</p>

# Schedule 2 - Site plan



## Schedule 3 - Waste types, raw materials and fuels

**Table S3.1 Raw materials and fuels**

Raw materials and fuel description	Specification
Refinery fuel gas (RFG)	Less than [REDACTED] sulphur (daily average)
Refinery fuel (all fuels for LCP and other combustion plant)	Equivalent to 1% sulphur or less taking all fuels into account across all combustion plant

**Table S3.2 Permitted waste types and quantities to be imported to site for treatment within Effluent treatment plant**

Maximum quantity	Description
No limit set	
Waste code	Description
16 07 08*	Wastes containing oil from ships including ballast water and slop oil.



## Schedule 4 – Emissions and monitoring

**Table S4.1 Point source emissions to air – emission limits and monitoring requirements**

Emission point ref. & location	Source	Parameter	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
A1 (North stack, ██████████ ██████████)	FCCU	Sulphur dioxide	██████████ Dec 2010) ██████████ Nm <sup>3</sup>	Average over sampling period	Quarterly spot (Note 2)	BS6069-4.4:1993
				Hourly mean	Continuous (Note 1)	
		Oxides of nitrogen (as NO <sub>2</sub> )	██████████ g/Nm <sup>3</sup>	Average over sampling period	Quarterly spot (Note 2)	ISO 10849: 1996
				Hourly mean	Continuous (Note 1)	
		Particulate PM <sub>10</sub>	██████████ mg/Nm <sup>3</sup>	Average over sampling period	Quarterly spot (Note 2)	BS EN 13284-1
				Hourly mean	Continuous (Note 1)	
Carbon monoxide	██████████ mg/Nm <sup>3</sup>	Average over sampling period	6-monthly spot	ISO 12039		
A2 (North stack primary flue) ██████████ level	Waste water stripper, 1600 incinerator.	Sulphur dioxide	2 ██████████ until 31 <sup>st</sup> Dec 2015) No release thereafter	Monthly average	Continuous (Note 4, Note 3)	ISO 10849: 1996
██████████ 110 metres above ground	Alkylation unit, VDU, Naphtha ultraformer.	Sulphur dioxide	No limit set	Average over sampling period	6-monthly spot (Note 3)	ISO 10849: 1996
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Average over sampling period	6-monthly spot (Note 3)	ISO 10849: 1996
		Particulate PM <sub>10</sub>	No limit set	Average over sampling period	6-monthly spot (Note 3)	BS 3405:1983
		Carbon monoxide	100mg/Nm <sup>3</sup>	Average over sampling period	6-monthly spot (Note 3)	ISO 12039
██████████	Waste water stripper, alkylation unit, VDU, Naphtha ultraformer	Sulphur dioxide	██████████ Nm <sup>3</sup> (until 31 <sup>st</sup> Dec 2015) then No limit set	Hourly mean	Continuous (Note 1)	BS6069-4.4:1993
				Average over sampling period	Annual spot (Note 1)	
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Hourly mean	Continuous (Note 1)	ISO 10849: 1996
				Average over sampling period	Annual spot (Note 1)	
		Particulate PM <sub>10</sub>	No limit set	Hourly mean	Continuous (Note 1)	BS EN 13284-1
				Average over sampling period	Annual spot (Note 1)	
Carbon monoxide	██████████ mg/Nm <sup>3</sup>	Average over sampling period	Annual spot	ISO12039		

**Table S4.1 Point source emissions to air – emission limits and monitoring requirements (continued)**

Emission point ref. & location	Source	Parameter	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
A4 (South stack) [REDACTED]	Boilers	Sulphur dioxide	No limit set	Average over sampling period	Quarterly spot (Note 3)	BS6069-4.4:1993
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Average over sampling period	Quarterly spot (Note 3)	ISO 10849: 1996
		Particulate PM <sub>10</sub>	No limit set	Average over sampling period	Quarterly spot (Note 3)	BS 3405:1983
		Carbon monoxide	250mg/Nm <sup>3</sup>	Average over sampling period	6-monthly spot (Note 3)	ISO 12039
A5 (South stack) 110 [REDACTED]	Naphtha hydrotreater, Distillate and Naphtha Ultraformers	Sulphur dioxide	No limit set	Average over sampling period	6-monthly spot (Note 3)	BS6069-4.4:1993
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Average over sampling period	6-monthly spot (Note 3)	ISO 10849: 1996
		Carbon monoxide	No limit set-	Average over sampling period	6-monthly spot (Note 3)	ISO 12039
[REDACTED]	Sour water stripper incinerator	Sulphur dioxide	[REDACTED] Dec 2015). No release thereafter	Monthly average	Continuous (Note 4, Note 3)	BS6069-4.4:1993
[REDACTED]	Crude furnaces	Sulphur dioxide	No limit set	Average over sampling period	Quarterly spot (Note 3)	BS6069-4.4:1993
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Average over sampling period	Quarterly spot (Note 3)	ISO 10849: 1996
		Particulate PM <sub>10</sub> (Note 3)	No limit set	Average over sampling period	Quarterly spot (Note 3)	BS 3405:1983
		Carbon monoxide	[REDACTED] mg/Nm <sup>3</sup>	Average over sampling period	6-monthly (Note 3)	ISO 12039

**S4.1 Point source emissions to air – emission limits and monitoring requirements (continued)**

Emission point ref. & location	Source	Parameter	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
[REDACTED]	Boilers, Naphtha Hydrotreater, Distillate and Naphtha Ultraformers, Sour water stripper incinerator and crude furnaces	Sulphur dioxide	[REDACTED] mg/Nm <sup>3</sup> (until 31 <sup>st</sup> Dec 2015) then	Hourly mean	Continuous (Note 1)	BS6069-4.4:1993
			No limit set	Average over sampling period	Annual spot (Note 1)	
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Hourly mean	Continuous (Note 1)	ISO 10849: 1996
				Average over sampling period	Annual spot (Note 1)	
		Particulate PM <sub>10</sub>	No limit set	Hourly mean	Continuous (Note 1)	BS EN 13284-1
Average over sampling period	Annual spot (Note 1)					
Carbon monoxide	[REDACTED] mg/Nm <sup>3</sup>	Average over sampling period	Annual spot (Note 1)	ISO12039		
100 [REDACTED]	Hydro-desulphurisation unit, Sour water stripper incinerator, Sulphur recovery unit, isomerisation unit.	Sulphur dioxide	[REDACTED] mg/Nm <sup>3</sup>	Average over sampling period	6-monthly	BS6069-4.4:1993
		Oxides of nitrogen (as NO <sub>2</sub> )	[REDACTED] g/Nm <sup>3</sup>	Average over sampling period	6-monthly	ISO 10849: 1996
		Carbon monoxide	[REDACTED] mg/Nm <sup>3</sup>	Average over sampling period	6-monthly	ISO 12039
		Sulphur trioxide	No limit set	Average over sampling period	6-monthly	BS6069-4.4:1993
[REDACTED]	SRU	Sulphur dioxide	[REDACTED] hr (until 31 <sup>st</sup> Aug 2015) then 1 [REDACTED]	Hourly mean	Continuous (Note 5)	BS6069-4.4:1993
[REDACTED]	CHP plant	Sulphur dioxide	No limit set	Average over sampling period	6-monthly	BS6069-4.4:1993
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Average over sampling period	6-monthly	ISO 10849: 1996
		Carbon monoxide	No limit set	Average over sampling period	6-monthly	ISO 12039
[REDACTED]	Flares	Sulphur dioxide, Oxides of nitrogen, Carbon monoxide, particulate	No monitoring required during normal operation			
[REDACTED]	Road loading vapour recovery unit	VOC	No limit set	Average over sampling period	6-monthly	BS EN 13526:2001

**Table S4.1 Point source emissions to air – emission limits and monitoring requirements (continued)**

Emission point ref. & location	Source	Parameter	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
15 [redacted] level	Auxiliary boiler	Sulphur dioxide	No limit set	Average over sampling period	Annual spot	BS6069-4.4:1993
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Average over sampling period	Annual spot	ISO 10849: 1996
		Particulate PM <sub>10</sub>	No limit set	Average over sampling period	Annual spot	BS EN 13284-1
		Carbon monoxide	No limit set	Average over sampling period	Annual spot	ISO 12039
[redacted] level	Auxiliary boiler	Sulphur dioxide	No limit set	Average over sampling period	Annual spot	BS6069-4.4:1993
		Oxides of nitrogen (as NO <sub>2</sub> )	No limit set	Average over sampling period	Annual spot	ISO 10849: 1996
		Particulate PM <sub>10</sub>	No limit set	Average over sampling period	Annual spot	BS EN 13284-1
		Carbon monoxide	No limit set	Average over sampling period	Annual spot	ISO 12039
[redacted] ground level)	Local exhaust ventilation for Rail loading facility	VOC	No limit set	Average over sampling period	6-monthly spot	Calculation based upon rail tanker loading rate and hydrocarbon vapour pressure.
[redacted]	Storage tanks	VOC	No limit set		No monitoring required	
[redacted]	Storage tanks	VOC	No limit set		No monitoring required	
[redacted]	Refining process	VOC, sour gas	No Benzene to be vented No Class A VOC to be vented		No monitoring required	
A10 (HDS flare), A11 [redacted]	Flares	SO <sub>2</sub>	1.8Te SO <sub>2</sub> /hour equivalent			During periods of flaring

Note 1: Monitoring requirement effective as from [redacted] and/or annual spot sampling of combined flue/stack [redacted]  
 Note 5: to be calculated from the continuous sulphur measurement of the tail gas entering [redacted] from the SRU

Note 4: Emissions to be calculated based on sulphur input to waste water stripper incinerator.

**Table S4.1a Point source emissions to air – emission limits and monitoring requirements**

Emission point ref. & location	Source	Parameter	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
[redacted]	Site operations	Sulphur dioxide	Bubble [redacted] Nm3	Hourly mean	Continuous (Note 3)	As agreed in response to IC4

Note 3: Reporting requirement effective as from 1<sup>st</sup> January 2009

**Table S4.2 Point Source emissions to water (other than sewer) – emission limits and monitoring requirements**

Emission point ref. & location	Parameter	Source	Limit (incl. unit)	Reference Period	Monitoring frequency	Monitoring standard or method	
[REDACTED] waterway	Temperature	Effluent Treatment Plant	[REDACTED]	Hourly average	Continuous		
	Flow		[REDACTED] m <sup>3</sup> /day	Weekly average of Daily flow	Daily		
	pH		[REDACTED]	24-hour proportional sample*			[REDACTED] [REDACTED]
	Ammonia		[REDACTED]				MH006# (Ion-selective electrode)#
	Phenols		[REDACTED]				MH151# (ASTM D1783)
	COD		[REDACTED]		24-hour flow proportional sample*	Weekly	MH246#
	Sulphides		[REDACTED]				MH109# (Chemet ampoule R-9510)
	Fluorides		[REDACTED] l				MH077# (Ion selective electrode)
	Cyanides		[REDACTED]				MH033# (Chemet ampoule R-3810)
	Suspended solids		[REDACTED]				MH184# (ASTM D1888)
	Copper		[REDACTED] /l		24-hour flow proportional sample*	Quarterly	ICP-AES technique
	Nickel		[REDACTED] l				
	Iron		[REDACTED] mg/l				
	Zinc		[REDACTED] 5µg/l				
	Arsenic		No limit set				
	Chromium		No limit set				
	Lead		No limit set				
	Mercury and its compounds expressed as Mercury (Total Hg)		No limit set				Atomic fluorescence
Cadmium and its compounds, expressed as cadmium (Total Cd)	No limit set				ICP-AES technique		
[REDACTED]	Oil	Impounding basin	[REDACTED] mg/l	Spot	3- hourly samples during emergency discharge	MH136 (IP426)#	
W3 to St. [REDACTED]	Oil	Tank 711 via East weir	[REDACTED] mg/l	Spot	Weekly	MH136 (IP426)#	
[REDACTED]	Oil	Groundwater	[REDACTED] mg/l	Spot	Annual	MH136 (IP426)#	

\* Daily/weekly spot sampling until installation of 24-hour proportional sampler in line with IC8

# Note that test methods quoted are internal [REDACTED] refinery test methods, subject to review under IC16

**Table S4.3(a) Annual limits for installation**

Substance	Medium	Limit (including unit)
Sulphur dioxide (2008 – 2010 inclusive)	Air	tonnes/year
Sulphur dioxide (2011 – 2015 inclusive)	Air	tonnes/year
Sulphur dioxide (2016 onwards)	Air	tonnes/year
Oil	Water	/tonne of feedstock

**Table S4.3(b) LCPD Annual limits (Excluding start up and shut down except where otherwise stated).**

Substance	Medium	Limit (including unit)	Release Points
Particulate matter, Sulphur dioxide and Oxides of nitrogen	Air	Assessment year	LCP NERP Limit
			Limit defined in UK NERP <sup>a</sup>

<sup>a</sup> or such other limit for that year as has been approved by the Agency following notification by the operators to the Agency on form TO1N, as referred to in schedule 5, table S5.4.

**Table S4.4 Process monitoring requirements**

Emission point reference or source or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method	Other specifications
Refinery fuel oil monitoring	Sulphur content	Daily	Not applicable	Average of spot samples taken
SRU efficiency	% sulphur recovered	Hourly	Not applicable	As agreed with the Agency
Detailed SRU performance evaluation	% sulphur recovered at each stage	Every 2 years	Not applicable	As agreed with the Agency

# Schedule 5 - Reporting

Parameters, for which reports shall be made, in accordance with conditions of this permit, are listed below.

<b>Table S5.1 Reporting of monitoring data</b>			
<b>Parameter</b>	<b>Emission or monitoring point/reference</b>	<b>Reporting period</b>	<b>Period begins</b>
Emissions to air (spot sample) – SO <sub>2</sub> Parameters as required by condition 3.6.1.	A1, A2, A3, A4, A5, A6, A7, A8, A9, A15, A16.	Annually	██████████
Emissions to air (continuous) – SO <sub>2</sub> Parameters as required by condition 3.6.1.	A8A	Quarterly	██████████
Emissions to air (hourly bubble) – SO <sub>2</sub> Parameters as required by condition 3.6.1.	North stack, South stack, HDS stack, CHP stack	Quarterly	██████████
Emissions to air (continuous) – SO <sub>2</sub> Parameters as required by condition 3.6.1.	North stack primary flue, North stack secondary flue, South stack	Quarterly	██████████
Emissions to air (spot sample) – SO <sub>2</sub> Parameters as required by condition 3.6.1.	North stack primary flue, North stack secondary flue, South stack	Annually	██████████
Emissions to air (spot sample) - NO <sub>x</sub> Parameters as required by condition 3.6.1.	A1, A3, A4, A5, A7, A8, A9, A15, A16.	Annually	██████████
Emissions to air (continuous) - NO <sub>x</sub> Parameters as required by condition 3.6.1.	North stack primary flue, North stack secondary flue, South stack	Quarterly	██████████
Emissions to air (spot sample) – NO <sub>x</sub> Parameters as required by condition 3.6.1	North stack primary flue, North stack secondary flue, South stack	Annually	██████████
Emissions to air (spot sample) – PM <sub>10</sub> Parameters as required by condition 3.6.1.	A1, A3, A4, A7, A15, A16.	Annually	██████████
Emissions to air (continuous) – PM <sub>10</sub> Parameters as required by condition 3.6.1.	North stack primary flue, North stack secondary flue, South stack	Quarterly	██████████
Emissions to air – carbon monoxide Parameters as required by condition 3.6.1.	A1, A3, A4, A5, A7, A8, A9, A15, A16.	Annually	██████████
Emissions to air – volatile organic compounds Parameters as required by condition 3.6.1.	A13, A18.	Annually	██████████
Emissions to water – oil, phenol, COD Parameters as required by condition 3.6.1	W1, W2, W3, W4	Quarterly	██████████
Emissions to water – flow, temperature Parameters as required by condition 3.6.1	W1	Quarterly	██████████
Emissions to water – pH Parameters as required by condition 3.6.1	W1	Quarterly	██████████
Emissions to water – suspended solids Parameters as required by condition 3.6.1	W1	Quarterly	██████████
Emissions to water – ammonia Parameters as required by condition 3.6.1	W1	Quarterly	██████████
Emissions to water – sulphides, fluorides, cyanides Parameters as required by condition 3.6.1	W1	Quarterly	██████████
Emissions to water – iron, nickel, copper, zinc, arsenic, chromium, lead Parameters as required by condition 3.6.1	W1	Quarterly	██████████
Emissions to water – cadmium, mercury Parameters as required by condition 3.6.1	W1	Quarterly	██████████

**Table S5.2: Annual production/treatment**

<b>Parameter</b>	<b>Units</b>
Road and other transport fuels	tonnes
Non-transport / heating fuels	tonnes
Chemical / petrochemical feedstocks	tonnes
Bitumen / petcoke / other heavy-end products	tonnes

**Table S5.3 Performance parameters**

<b>Parameter</b>	<b>Frequency of assessment</b>	<b>Units</b>
Crude oil and other oil import (i.e. feedstock)	Annually	tonnes
Water usage	Annually	Tonnes/tonne feedstock
Energy usage (electrical)	Annually	MWh/tonne feedstock
Energy usage (all fuels)	Annually	MJ/tonne feedstock
Total effluent flow to water	Annually	m <sup>3</sup> /tonne feedstock
Total release of oil to water per tonne of feedstock	Annually	g oil/ tonne feedstock





# Schedule 6 - Notification

These pages outline the information that the operator must provide.

Units of measurement used in information supplied under Part A and B requirements shall be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

If any information is considered commercially confidential, it should be separated from non-confidential information, supplied on a separate sheet and accompanied by an application for commercial confidentiality under the provisions of the PPC Regulations.

## Part A

Permit Number	
Name of operator	
Location of Installation	
Time and date of the detection	

<b>(a) Notification requirements for any malfunction, breakdown or failure of equipment or techniques, accident, or fugitive emission which has caused, is causing or may cause significant pollution</b>	
<b>To be notified within 24 hours of detection</b>	
Date and time of the event	
Reference or description of the location of the event	
Description of where any release into the environment took place	
Substances(s) potentially released	
Best estimate of the quantity or rate of release of substances	
Measures taken, or intended to be taken, to stop any emission	
Description of the failure or accident.	

<b>(b) Notification requirements for the breach of a limit</b>	
<b>To be notified within 24 hours of detection unless otherwise specified below</b>	
Emission point reference/ source	
Parameter(s)	
Limit	
Measured value and uncertainty	
Date and time of monitoring	
Measures taken, or intended to be taken, to stop the emission	

Time periods for notification following detection of a breach of a limit	
Parameter	Notification period

(c) Notification requirements for the detection of any significant adverse environmental effect	
To be notified within 24 hours of detection	
Description of where the effect on the environment was detected	
Substances(s) detected	
Concentrations of substances detected	
Date of monitoring/sampling	

**Part B - to be submitted as soon as practicable**

Any more accurate information on the matters for notification under Part A.	
Measures taken, or intended to be taken, to prevent a recurrence of the incident	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission	
The dates of any unauthorised emissions from the installation in the preceding 24 months.	

<b>Name*</b>	
<b>Post</b>	
<b>Signature</b>	
<b>Date</b>	

\* authorised to sign on behalf [REDACTED] Limited

## Schedule 7 - Interpretation

"*accident*" means an accident that may result in pollution.

"*annually*" means once every year.

"*application*" means the application for this permit, together with any additional information supplied by the operator as part of the application and any response to a notice served under Schedule 4 to the PPC Regulations.

"*authorised officer*" means any person authorised by the Agency under section 108(1) of The Environment Act 1995 to exercise, in accordance with the terms of any such authorisation, any power specified in section 108(4) of that Act.

"*BS*" means British Standard

"*bubble limit*" average concentration of release from all qualifying emission points on site.

"*calendar monthly mean*" means the value across a calendar month of all validated hourly means.

"*CEMS*" means Continuous Emission Monitors

"*DSD*" means Dangerous Substances Directive.

"*emissions to land*", includes emissions to groundwater.

"*FCCU*" means fluidised catalytic cracking unit.

"*feedstock*" means hydrocarbon raw material brought on to site for processing within the installation.

"*fugitive emission*" means an emission to air, water or land from the activities which is not controlled by an emission limit.

"*groundwater*" means all water, which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

"*hourly bubble limit*" means the average concentration of emissions across all stacks.

"*ISO*" means International Standards Organisation

"*land protection guidance*", means Agency guidance "H7 - Guidance on the protection of land under the PPC Regime: application site report and site protection monitoring programme".

"*large combustion plant*" or "*LCP*" is a combustion plant or group of combustion plants discharging waste gases through a common windshield or stack, where the total thermal input is 50 MWth or more, based on gross calorific value.

"*Large Combustion Plant Directive*" means Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants.

"*LDAR*", means Leak Detection and Repair, a managed scheme and programme for testing potential sources of fugitive emissions, from operational plant at the installation, and repairing or carrying out other actions to prevent, or where that is not possible, minimise continued emissions from those sources. The LDAR programme at the installation shall be consistent with the requirements of the Institute of Petroleum (Energy Institute) Protocol.

"*LPG*" means Liquid Petroleum Gas

"*MCERTS*" means the Environment Agency's Monitoring Certification Scheme.

"*Natural gas*" means naturally occurring methane with no more than 20% by volume of inert or other constituents.

"*National Emission Reduction Plan*" (NERP) is the plan issued by Defra in accordance with Article 4.6 of the Large Combustion Plants Directive and associated guidance

"*notify without delay*" and "*notified without delay*" means that a telephone call can be used, whereas all other reports and notifications must be supplied in writing, either electronically or on paper.

"*PPC Regulations*" means the Pollution, Prevention and Control (England and Wales) Regulations SI 2000 No.1973 and words and expressions used in this permit which are also used in the Regulations have the same meanings as in those Regulations.

"*quarter*" means a calendar year quarter commencing on 1 January, 1 April, 1 July or 1 October.

"*Sector Guidance Note*" means IPPC Sector Guidance Note on Gasification, Liquefaction and Refining Activities, IPPC S1.02.

"*site protection and monitoring programme*" means a document which meets the requirements for site protection and monitoring programmes described in the Land Protection Guidance.

"*SRU*" means sulphur recovery unit.

"*SRU performance evaluation*" means measurement of process stream compositions, overall and inter-stage material balances, calculation of overall and inter-stage recovery efficiency, performance check of key equipment items [reaction furnaces, condensers, reheaters, converters, incinerator], key analyser performance checks and recommendations for unit performance improvements.

"*Waste code*" means the six digit code referable to a type of waste in accordance with the List of Wastes (England) Regulations 2005, or List of Wastes (Wales) Regulations 2005, as appropriate, and in relation to hazardous waste, includes the asterisk.

"*year*" means calendar year ending 31 December.

Where a minimum limit is set for any emission parameter, for example pH, reference to exceeding the limit shall mean that the parameter shall not be less than that limit.

Unless otherwise stated, any references in this permit to concentrations of substances in emissions into air means:

- (a) in relation to emissions from combustion processes, the concentration in dry air at a temperature of 273K, at a pressure of 101.3 kPa and with an oxygen content of 3% dry for liquid and gaseous fuels, 6% dry for solid fuels; and/or
- (b) in relation to emissions from non-combustion sources, the concentration at a temperature of 273K and at a pressure of 101.3 kPa, with no correction for water vapour content

END OF PERMIT