2016

OSPAR Public Statement 2016

PERENCO

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Abbreviations

Abbreviations	
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CO_2	Carbon dioxide
EEMS	Environmental and Emissions Monitoring System
ETS	Emissions Trading Scheme
HQ	Hazard Quotient
MEG	Mono Ethylene Glycol
MW(th)	Megawatt Thermal
NOx	Nitrogen Oxides
NUI	Normally Unattended Installation
OCNS	Offshore Chemical Notification Scheme
OPPC	Oil Pollution Prevention and Control
OPRED	The Offshore Petroleum Regulator for Decommissioning & Environment
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PEC:NEC	Predicted Effect Concentration against No Effect Concentration
PLONOR	Pose Little Or No Risk
PUK	Perenco UK Limited
SEMS	Safety and Environmental Management System
SNS	Southern North Sea
SO_2	Sulphur Dioxide
UKCS	UK Continental Shelf

Executive Summary

This statement has been prepared to fulfil the Offshore Petroleum Regulator for Decommissioning & Environment (OPRED) requirement under the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) Recommendation 2003/5 to produce an annual public environmental statement.

The statement is an open and transparent representation of our environmental performances across our offshore assets for the 2016 calendar year. It provides performance information and describes the extent at which we are meeting our environmental targets as well as setting out future objectives.

The offshore data reported within this statement relates to six manned installations, thirty nine normally unattended installations (NUIs) and 14 subsea installations producing gas and liquids that are tied back through pipelines to the onshore gas terminals at Dimlington, Theddlethorpe and Bacton.

Environmental Performance

Total carbon dioxide emissions resulting from offshore power generation equalled 324,379 tonnes during 2016. In addition, a total of 6,685 tonnes of hydrocarbon gases were emitted into the atmosphere from our southern North Sea assets.

During 2016, twelve of our assets discharged, after treatment, oil in produced water to sea. The monthly flow-weighted average concentration of oil in produced water for the majority of our southern North Sea assets was below the consented limit (30 mg/l). However, this limit was exceeded at two of our assets (West Sole Alpha and Ravenspurn North, which includes produced water from the Johnston tie back).

The majority (92 percent) of chemicals used during production operations were rated as 'Pose Little or No Risk' (PLONOR). Only four chemicals identified as candidates for substitution were used in production operations, with a total use and discharge of 3,773 kg. In addition, chemicals were also used during well intervention operations at Tyne during 2016. The majority of the chemicals used (86 percent) and discharged (95 percent) during the Tyne well intervention operations were PLONOR. No chemicals identified as candidates for substitution were used or discharged during the Tyne well intervention operations.

The total waste generated from offshore production operations equalled 1,859 tonnes during 2016. Approximately 80 percent was recycled or otherwise managed, rather than being consigned to landfill. In addition, a total of 483 tonnes of waste was generated from project related operations during 2016, with approximately 73 percent recycled or otherwise managed, rather than consigned to landfall.

There were 23 hydrocarbon and chemical spills to the marine environment during 2016, of which 75 percent of were spilt chemicals.

1 Introduction

The OPRED requires all operators of offshore installations to produce a Public Statement to report their environmental performance under the OSPAR Recommendation 2003/5 to Promote the Use and Implementation of Environmental Management Systems by the Offshore Industry. These statements must be prepared on an annual basis (covering offshore installation activities carried out during the previous calendar year), made available to the public and copied to OPRED by 1st June of each year.

This report outlines Perenco UK Limited (referred to hereafter as 'PUK') environmental performance for its UK Continental Shelf (UKCS) operations during 2016. The report consists of the following:

- **Section 2:** describes PUK's activities in the UKCS during 2016;
- **Section 3:** provides a summary of PUK's ISO 14001-certified Safety and Environmental Management System (SEMS) that provides the framework for the control of the environmental impacts from production activities and lists the environmental objectives and targets set by PUK in 2016 and their current status;
- **Section 4:** summarises PUK's performance during 2016 in relation to the Environmental Policy, objectives and targets, and relevant legislative requirements;
- **Section 5**: outlines environmental objectives and targets for 2017.

2 2016 UKCS Operations

2.1 Production Assets

PUK has been an operator in the southern North Sea since September 2003. Offshore, PUK is responsible for seven installations that are classified as "manned" (Indefatigable 23A & 23C, Thames 28A (currently in a decommissioning phase and unmanned), Leman 27A, Cleeton, Ravenspurn North CPP, West Sole Alpha), 40 NUIs and 14 subsea installations producing gas and liquids that are tied-back through pipelines to the onshore gas terminals Dimlington, Theddlethorpe and Bacton.

From May 1st 2016, environmental permits and reporting responsibilities for the Garrow and Kilmar NUIs were transitioned to PUK from Alpha Petroleum Resources Limited.

Table 2.1 lists PUK's southern North Sea installations and Figure 2.1 shows their locations. All PUK-operated assets were producing during 2016, with the exception of Arthur, Bessemer, Bure O, Bure West, Gawain, M1, Thames, Tyne, Wollaston and Yare 'C'.

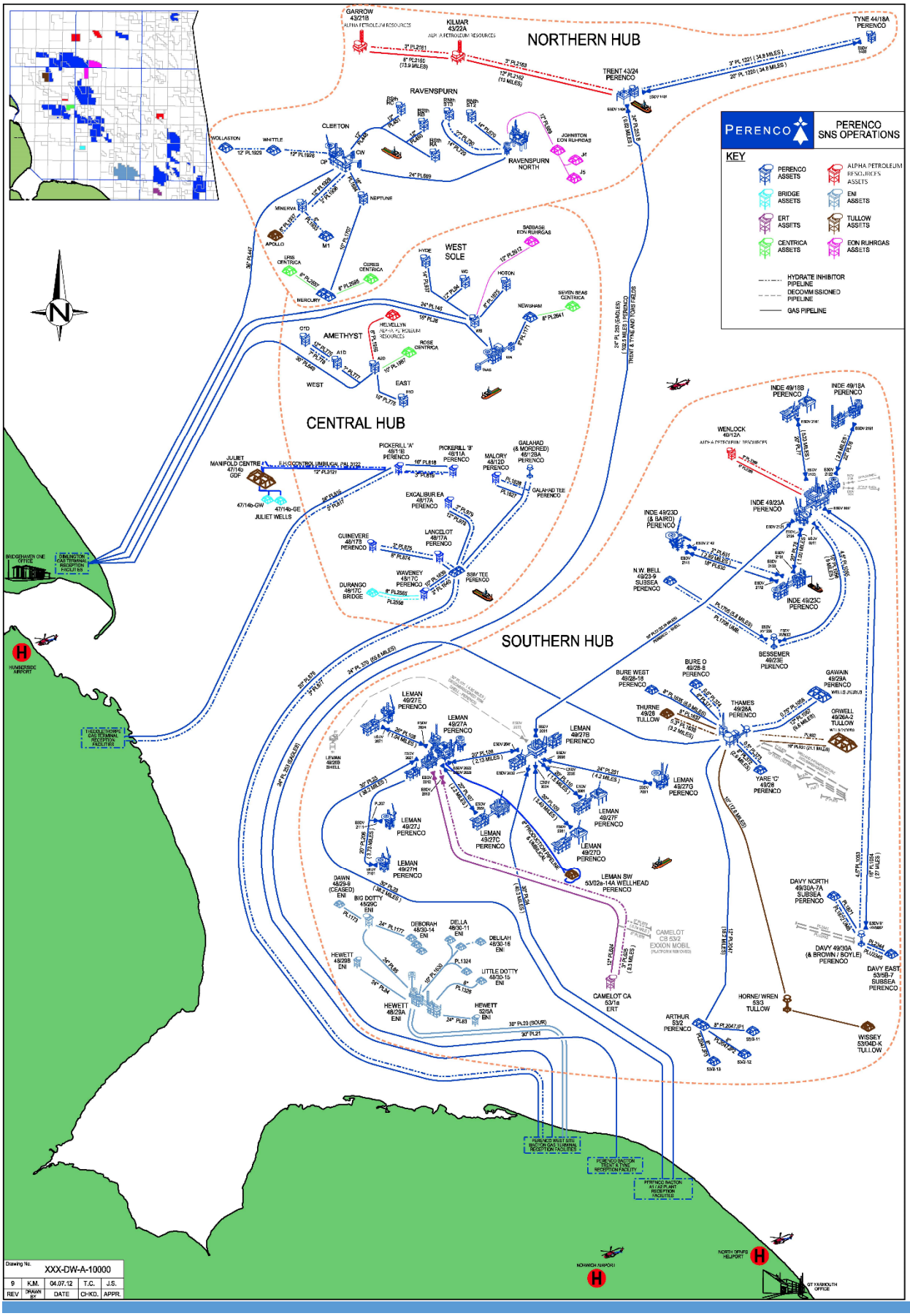
Table 2.1: PUK's Southern North Sea Installations

Installation	UKCS Block	Type	Status in 2016
Amethyst A1D	47/14	NUI	Produced
Amethyst A2D	47/14	NUI	Produced
Amethyst B1D	47/15	NUI	Produced
Amethyst C1D	47/14	NUI	Produced
Arthur	53/2	Subsea	No production *
Bessemer	49/23	NUI	No production
Bure O	49/28	Subsea	No production *
Bure West	49/28	Subsea	No production *
Cleeton	42/29	Manned	Produced
Davy	49/30	NUI	Produced
Davy East	53/5	Subsea	Produced
Davy North	49/30	Subsea	Produced
Durango	48/21	Subsea	Produced
Excalibur	48/17	NUI	Produced
Galahad	48/12	NUI	Produced
Gawain	49/29	Subsea	No production *
Guinevere	48/17	NUI	Produced
Hoton	48/07	NUI	Produced
Hyde	48/06	NUI	Produced
Indefatigable 18A	49/18	NUI	Produced
Indefatigable 18B	49/18	NUI	Produced
Indefatigable 23A	49/23	Manned	Produced
Indefatigable 23C	49/23	Manned	Produced
Indefatigable 23D	49/23	NUI	Produced
Lancelot	48/17	NUI	Produced
Leman 27A	49/27	Manned	Produced
Leman 27B	49/27	NUI	Produced
Leman 27C	49/27	NUI	Produced
Leman 27D	49/27	NUI	Produced
Leman 27E	49/27	NUI	Produced
Leman 27F	49/27	NUI	Produced
Leman 27G	49/27	NUI	Produced

Installation	UKCS Block	Type	Status in 2016
Leman 27H	49/27	NUI	Produced
Leman 27J	49/27	NUI	Produced
Leman SW	53/02	Subsea	Produced
M1	47/04	Subsea	No Production
Malory	48/12	NUI	Produced
Mercury	47/09	Subsea	Produced
Minerva	47/03	NUI	Produced
N.W. Bell	49/23	Subsea	Produced
Neptune	47/04	NUI	Produced
Newsham	48/07	Subsea	Produced
Pickerill A	48/11	NUI	Produced
Pickerill B	48/11	NUI	Produced
Ravenspurn North CPP	43/26	Manned	Produced
Ravenspurn North ST2	43/26	NUI	Produced
Ravenspurn North ST3	42/30	NUI	Produced
Ravenspurn South A	42/30	NUI	Produced
Ravenspurn South B	42/30	NUI	Produced
Ravenspurn South C	42/30	NUI	Produced
Thames 28A	49/28	Manned	No production *
Trent	43/24	NUI	Produced
Tyne	44/18	NUI	No production*
Waveney	48/17	NUI	Produced
West Sole Alpha	48/06	Manned	Produced
West Sole Bravo	48/06	NUI	Produced
West Sole Charlie	48/06	NUI	Produced
Whittle	42/28	Subsea	Produced
Wollaston	42/28	Subsea	No production
Kilmar	43/22	NUI	Produced
Garrow	43/21	NUI	Produced
Yare 'C'	49/28	Subsea	No production *

*Undergoing decommissioning.

Figure 2.1: PUK's Southern North Sea Installations



2.2 Other Offshore Operations

In addition to production operations, PUK undertook the following offshore projects in the Southern North Sea during 2016:

- **Tyne South Platform Well Intervention Campaign:** Deployment of the Seafox 1 (Jack-up barge) to plug and abandon five platform wells (1st May 2016 – 31st August 2016):

- **Ravenspurn ST2 Drilling Campaign:** Deployment of drilling rig (Rowan Gorilla VII) to drill (43/26a-E12) at the Ravenspurn North ST2 Platform (15th November 2016 – present).

- **Ravenspurn South Pipeline Operation:** Replacement of cable PL4062 (30th September 2016 – 31st December 2016).

- **Thames Decommissioning Programme:** The Thames Platform dismantling phase (4th January 2016 – present).

- **Project Radicle:** Removal and bypassing of compression on Ravenspurn North and Cleeton. The gas is currently free flowing to Dimlington where it is recompressed to National Grid pressures (December 2015 – October 2016).

Inde Gas Compression Rationalisation Project (IGCR): The objective of the Inde Gas Compression Rationalisation Project is to have a minimum compression facility on Inde 23A and transfer the compression duty to the spare capacity of the on-shore LAPS compression at Bacton (2015 to present).

This OSPAR Public Statement only includes data reported via the online Environmental and Emissions Monitoring System (EEMS) during 2016. Some of the operations listed above are still ongoing and are due to be completed in 2017. Therefore emissions related to these operations will be detailed in the 2017 OSPAR Public Statement, as data are reported via EEMS on completion of the operations. The exception to this is waste data which is reported via EEMS on an annual basis and therefore waste data from all operations undertaken in 2016 have been included in this OSPAR Public Statement.

3 PUK Safety and Environmental Management System

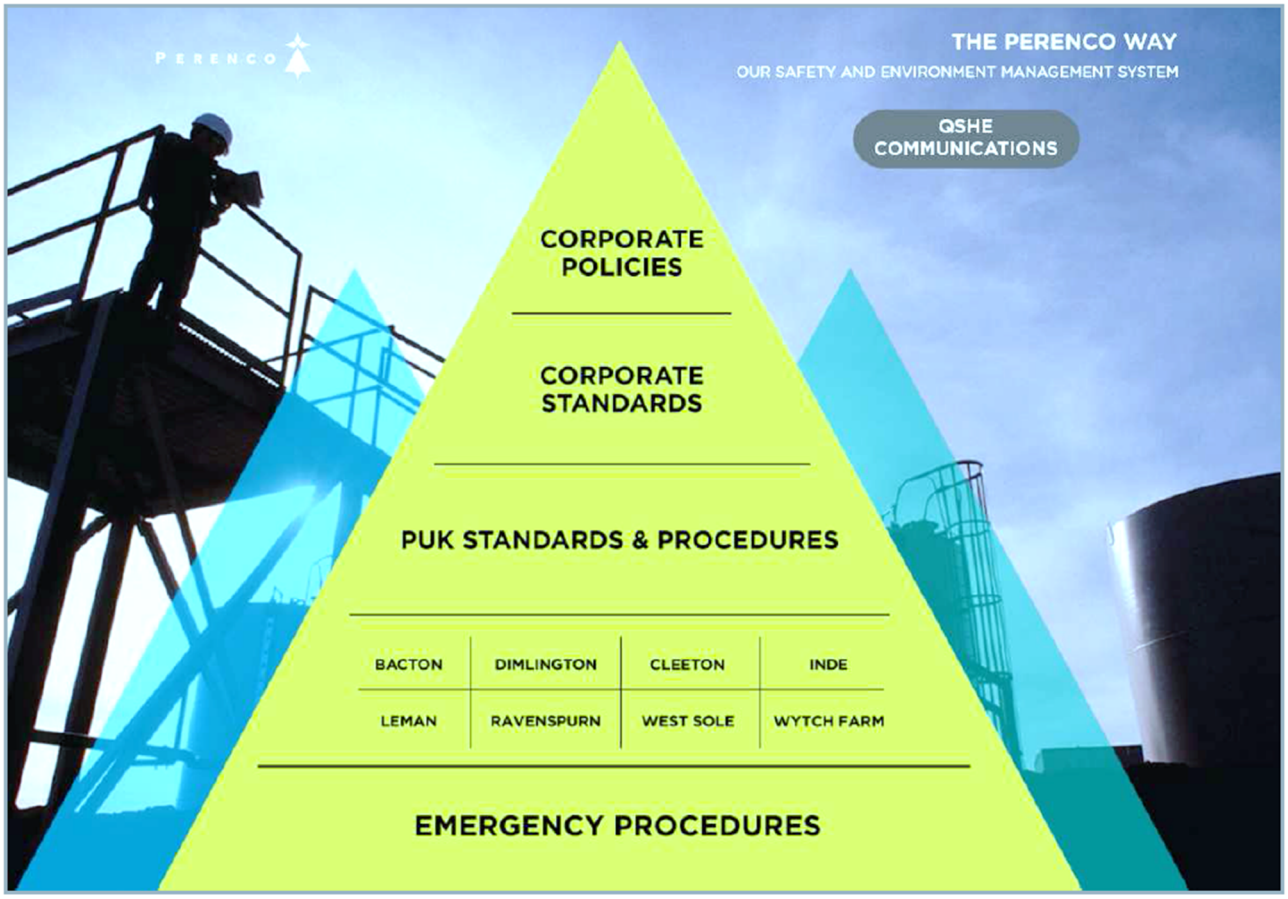
PUK operate under a SEMS, certified to ISO 14001. The PUK SNS SEMS provides a uniform approach to every element of operations across SNS assets. With regards to health, safety, security and environmental management the purpose of the SEMS is to ensure that, as far as reasonably practicable, all of the installation's activities are undertaken in accordance with PUK commitment to its QSSHE Policies and compliance with all relevant statutory provisions applicable to offshore operations within SNS.

SEMS includes PUK, SNS and site specific processes and procedures through which the local business is delivered. The SEMS framework comprises 15 key components which together provide a roadmap to safe, environmentally responsible and reliable operations.

Each of the 15 Perenco standards sets out high level targets which shall be complied with, a set of actions to be implemented, along with supporting information to provide guidance on implementation.

SEMS is accessible through the PUK intranet and is a web based application which provides a single point of access to all SEMS information including business processes, procedures and information portals. Refer to Figure 3.1 below.

Figure 3.1: PUK's SEMS

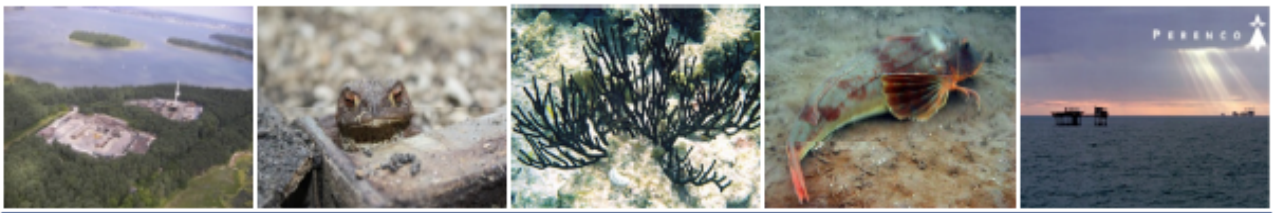


These business processes and procedures describes in more detail how PUK achieves conformance with the Perenco Standards.

3.1 The Environmental Policy

PUK's Environmental Policy is presented in Figure 3.2 below. It informs the definition of our significant environmental impacts that are the focus of our environmental management activities.

Figure 3.2: PUK's Environmental Policy



Perenco UK Environmental Policy

Perenco's Environmental Goals are no damage to the environment and to minimise our emissions. Maintaining an efficient and effective environmental management system that meets the requirements of ISO14001 will assist to deliver our environmental goals and assess and mitigate the environmental risks of our operations.

Perenco UK is committed to integrating environmental management into its oil and gas exploration, production and processing operations and managing, with due diligence, its footprint on marine and coastal environments and on local communities.

We recognise that our activities have impacts on the environment. Perenco UK Senior Management are committed to ensure that protection of the environment is firmly embedded in the Company's culture and will endeavour to influence suppliers and contractors in a similar strategic manner.

Our offshore and onshore activities have been reviewed for significance of their environmental impacts. In order to minimise these impacts, concerning our activities, we shall:

- Comply with all applicable environmental legislation and other requirements.
- Ensure that all employees and contractors are competent to carry out tasks in an environmentally responsible manner and ensure that a continuous professional development strategy remains core to our business goals.
- Maintain the integrity of our facilities to prevent accidental discharges of pollution substances.
- Adopt best practice and economically viable technologies to minimise our impacts and improve our energy efficiency.
- Set annual performance targets with support plans.
- Perform regular audits of all our activities, using the results to drive environmental improvements.
- Maintain emergency response plans and undertake regular emergency drills and exercises to test our capability to respond quickly and effectively to any environmental incidents.
- Report and investigate all incidents, taking appropriate measures to prevent their occurrence.
- Maintain and enhance the ecological environment through management and monitoring.

We are committed to continual improvement of our environmental management system to enhance our environmental performance. This Policy will be communicated to all employees, contractors and suppliers and will be made available to all interested parties.

Endorsed by:

Date: October 2016

3.2 Progress against 2016 Environmental Objectives and Targets

PUK's significant routine environmental aspects and associated objectives and targets for their offshore operations during 2016 are presented in Table 3.1, along with the current status.

Table 3.1: Environmental Objectives and Targets for 2016

Aspect	Objective	Status
Emissions of Carbon Dioxide (CO_2)	Retain CO_2 emissions within allocations set for permitted installations	Partially achieved – achieved on two of the five permitted installations
Emissions of Hydrocarbon (HC) Gases	Identify opportunities for the reduction in HC venting	The process is ongoing
Emissions of Other Combustion Products	Monitor and where reasonably practicable reduce oxides of nitrogen (NO_x) emissions from relevant combustion equipment	The process is ongoing
Discharge of Oil in Produced Water	Ensure the monthly average concentration of oil discharged in produced water does not exceed the platform allowance	Partially achieved – achieved on ten of the thirteen installations
Discharge of Production Chemicals	Reduce the use and/or discharge of production chemicals that carry substitution warnings	Achieved - No chemicals carrying substitution warnings were used
Hydrocarbon and Chemical Spills to Sea	<10 reportable spills (N.B. Any spill to sea, irrespective of size, is reported to the regulator, BEIS)	Not achieved - a total of 25 reportable spill events

4 Environmental Performance Summary

PUK monitor and report on atmospheric emissions, the discharge of oil in produced water, the use and discharge of chemicals, the disposal of waste and spill incidents. This section presents the information that was reported via the online Environmental and Emissions Monitoring System (EEMS) for operations during 2016.

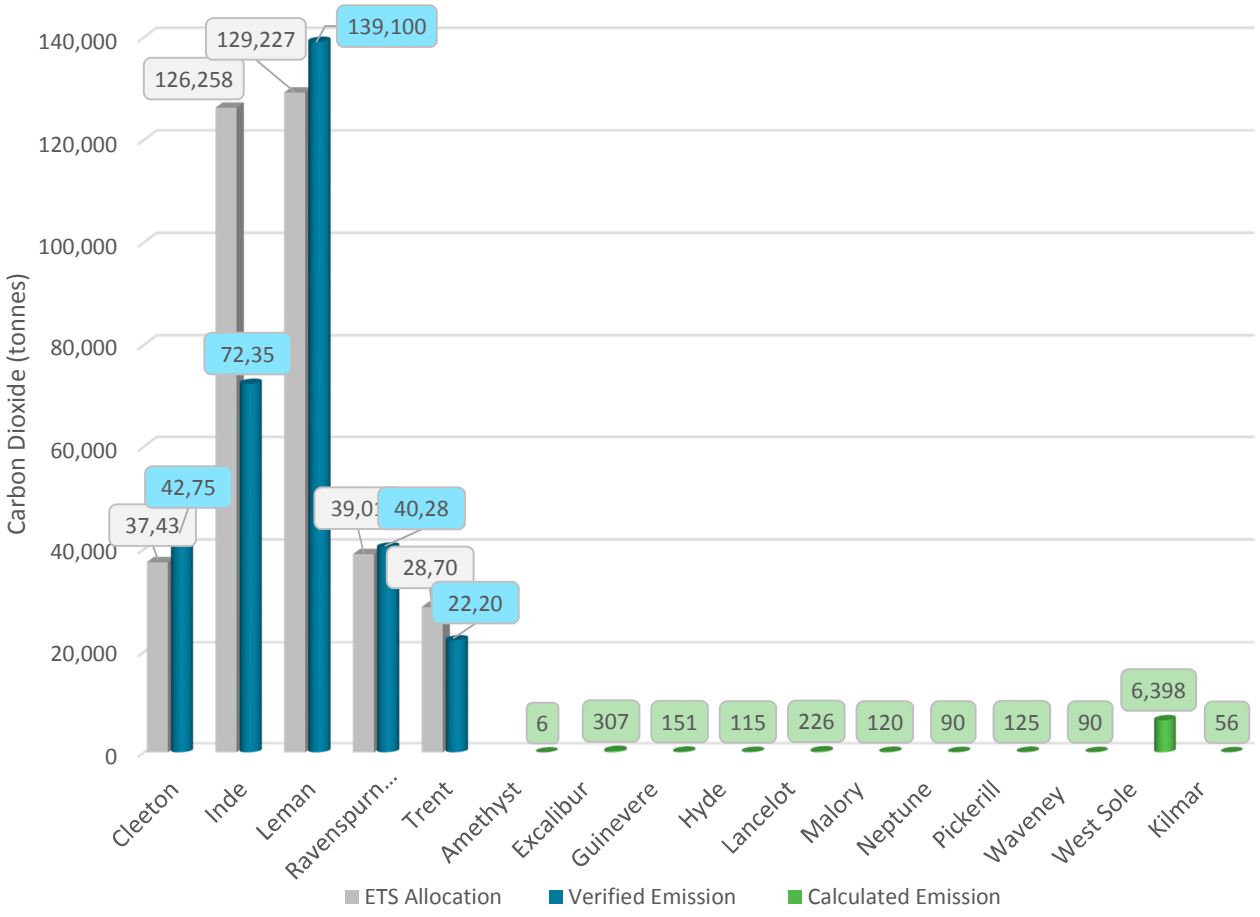
4.1 Atmospheric Emissions

4.1.1 Production Operations

Carbon dioxide (CO_2) emissions from five of our manned offshore installations are subject to control under the Greenhouse Gases Emissions Trading Scheme (ETS) Regulations 2012 (as amended). The assets that have an allocation for CO_2 emissions include Cleeton, Inde, Leman, Ravenspurn North and Trent and we seek to ensure that our emissions are within these allocation limits.

Figure 4.1 shows PUK's verified and calculated CO_2 emissions from fuel combustion associated with production operations for 2016, together with the corresponding EU ETS allowance (where relevant).

Figure 4.1: Carbon Dioxide Emissions from Fuel Combustion Associated with Production Operations



During 2016 a total of 324,379 tonnes of CO_2 were emitted to the atmosphere from all of our southern North Sea assets. Three of our offshore installations, which are subject to control under the Greenhouse Gases ETS, (Cleeton, Leman and Ravenspurn North) had emissions of CO_2 that were greater than their allocated EU ETS allowance). The Ravenspurn North CO_2 emissions were narrowly (3.25 percent) over the EU ETS allocation. The 2016 EU ETS allocation for Cleeton was too small. During 2015, the Cleeton asset went into partial cessation and as such lost 50 percent of its EU ETS allocation for 2016. During 2016, the K300 HP compressor

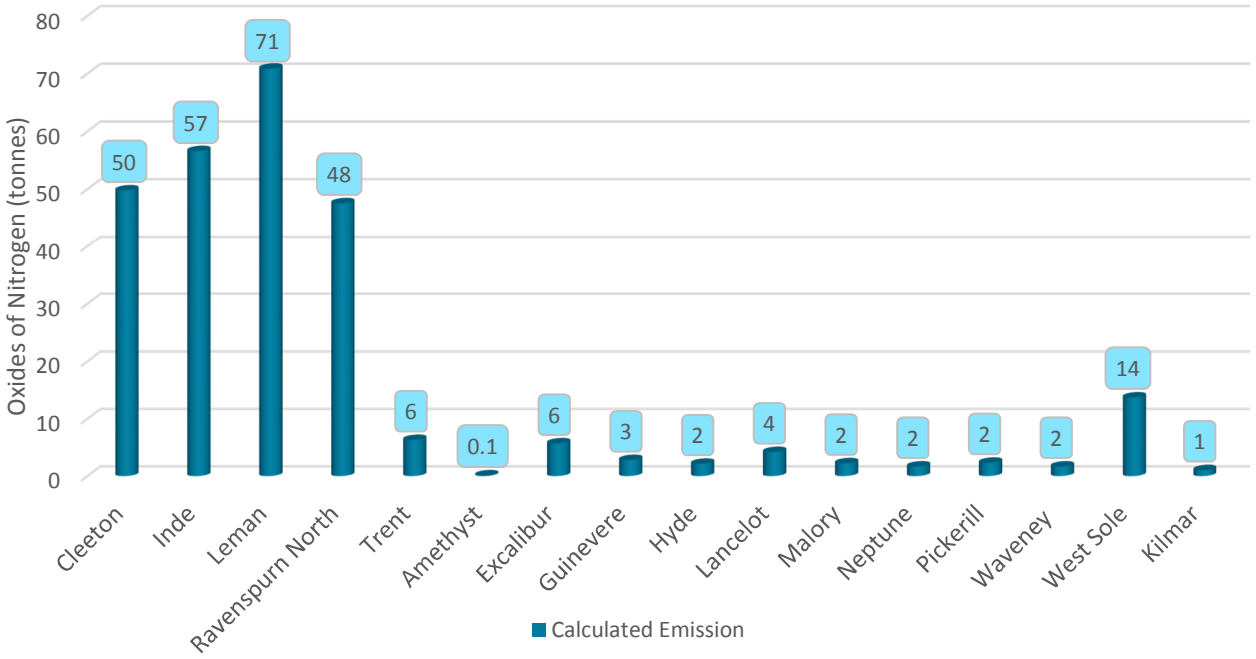
on Inde 23A went offline and as a consequence, the Inde production was routed to Leman. This increased Leman's CO_2 emissions above the EU ETS allocation with a greater flow rate through Leman compression.

The environmental impacts of concern attributable to combustion processes also include the emissions to atmosphere of Nitrogen Oxides (NOx). These have the potential to cause health impacts, and also contribute to acid rain. Offshore receptors are broadly insensitive to the amounts of NOx that are emitted from the combustion of gas. The southern North Sea assets; Ravenspurn North, Cleeton, Trent, Indefatigable and Leman have an installed capacity exceeding 50 MW (th) and are subject to regulatory controls under the Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2013.

During 2016 the NO_x emissions from these five installations was 231 tonnes, which is approximately 0.5 % of the total NO_x released from the offshore Oil & Gas industry during 2015. The small proportion of total loading from the offshore oil and gas industry means that the environmental effects of the NO_x emissions from PUK's southern North Sea assets are minimal and the cost of retrofitting NO_x emission combustion equipment is prohibitive in the circumstances of declining oil fields and ageing assets.

Figure 4.2 presents the calculated NO_x emissions from fuel combustion associated with production operations during 2016.

Figure 4.2: Nitrogen Oxide Emissions from Fuel Combustion Associated with Production Operations

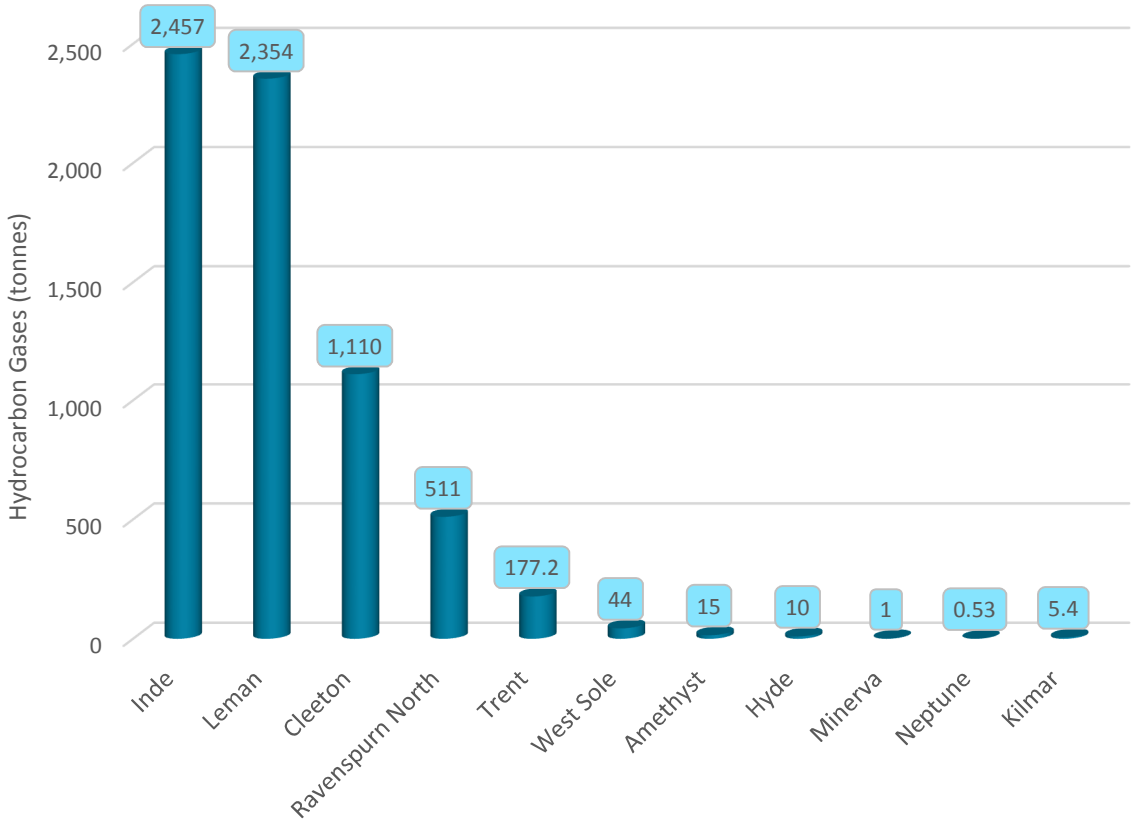


4.1.2 Emissions of Hydrocarbon Gases

The venting of hydrocarbon gases is subject to regulatory control as part of our production licences issued under the Energy Act of 1976.

The loss of gas to the atmosphere results from both routine and upset conditions. PUK monitor and report the amounts released and this is summarised in Figure 4.3.

Figure 4.3: Hydrocarbon Gas Emissions Associated with Production Operations



During 2016 a total of 6,685 tonnes of hydrocarbon gases were emitted into the atmosphere from our southern North Sea assets. PUK will continue to investigate potential opportunities to reduce CO_2 and other gaseous emissions from all of our installations.

4.1.3 Other Operations

Of the other offshore projects undertaken in 2016, as listed in Section 2.2, none required atmospheric emissions to reported via EEMS.

4.2 Discharge of Oil Regulated under OPPC Regulations

The discharge of oil is subject to control under the Oil Pollution Prevention and Control (OPPC) Regulations 2005 (as amended).

4.2.1 Production Operations

After treatment, oil in produced water was discharged from 12 of our operated assets in the southern North Sea. The volume of produced water discharged from each asset during 2016 is presented in Figure 4.4 and the monthly flow-weighted average concentration of oil in produced water for each asset, along with the consented limit, are presented in Figure 4.5. Please note, there are produced water re-injection systems at Cleeton, Leman and Amethyst. During 2015, Cleeton was over its monthly flow weighted average concentration for oil in produced water before being converted to 100 percent re-injection.

Figure 4.4: Discharged Produced Water

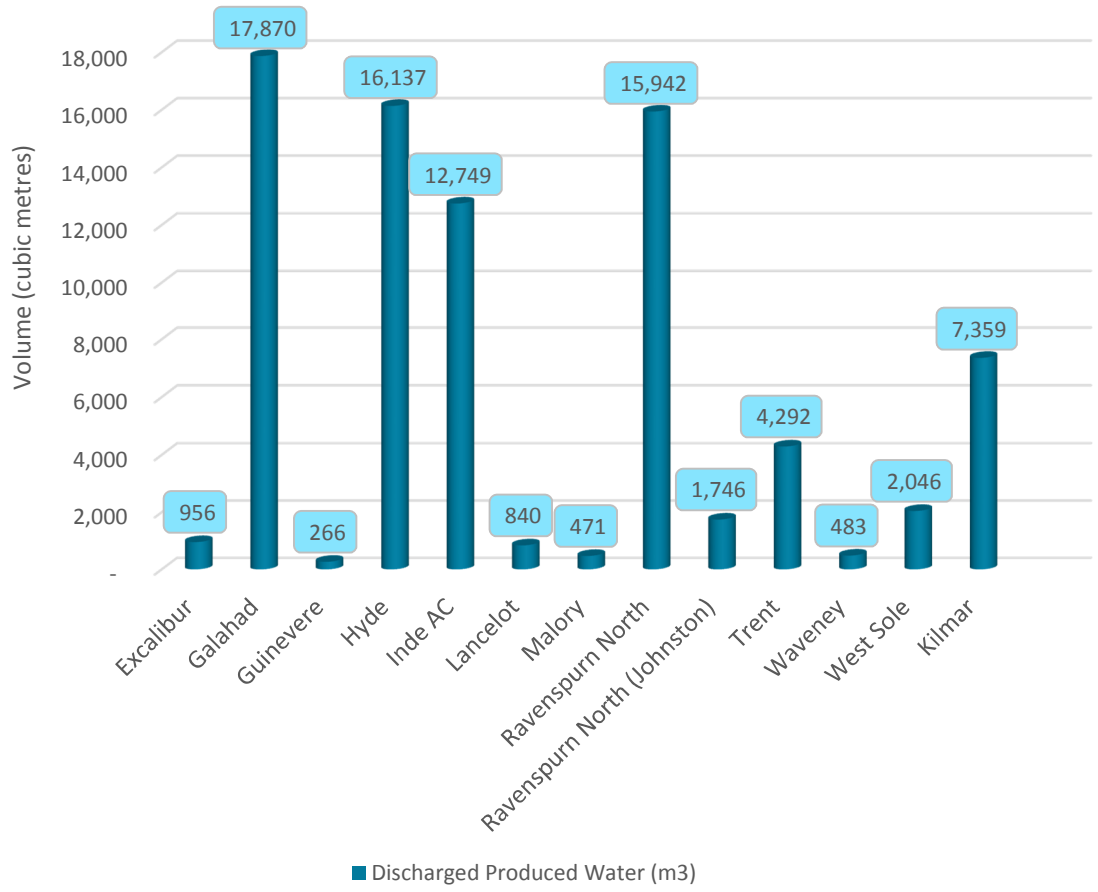
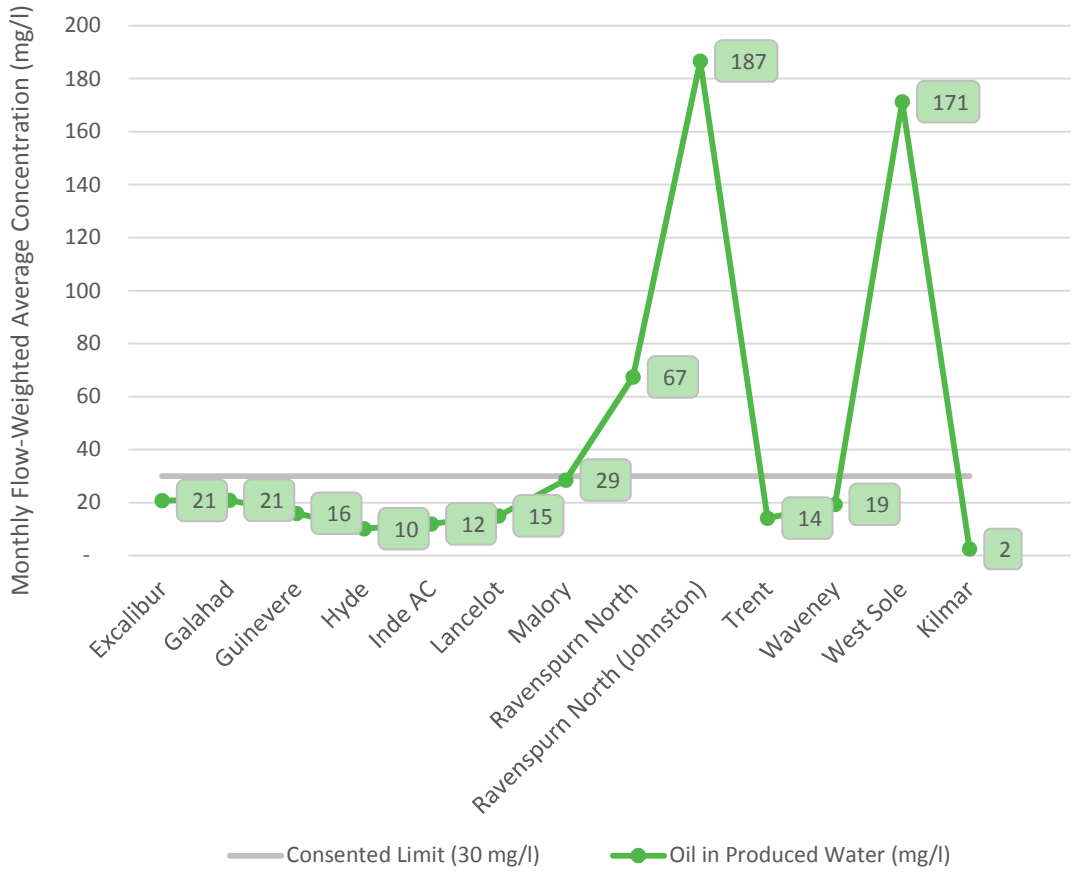


Figure 4.5: Monthly Flow-Weighted Average Concentration of oil in Produced Water



During 2016, the monthly flow-weighted average concentration of oil in produced water for the majority of our southern North Sea assets was below the consented limit (30 mg/l). However, this limit was exceeded at two of our assets (West Sole Alpha and Ravenspurn North, which includes produced water from the Johnston tie back). The reason for this exceedance is provided below.

Ravenspurn North

The Ravenspurn North installation has two produced water steams; one associated with Johnston and the other with Ravenspurn North. Cumulative discharge of hydrocarbons from these produced water streams account for approximately 55 percent of total hydrocarbons discharged with produced water for all of PUK's southern North Sea assets. PUK is aware that for the majority of months during 2016 the oil in produced water concentration for both streams was significantly higher than the permitted limit increasing the monthly average above the consented 30 mg/l.

When PUK acquired the Ravenspurn North installation (1st November 2012) the average oil in produced water concentration was 545 mg/l. The TORE wash system was brought online at the end of 2014 and the intent was to improve efficiency of the hydrocarbon-produced water separation.

The Ravenspurn North stream receives water from the Ravenspurn North platform wells and the ST2/ST3 NUI platforms. During the shutdown last year, the oily water treatment vessel was cleaned out and new filtration installed. This reduced the average oil in water concentration below 9 mg/l for the remaining months of the year (October – December).

The Johnston coalescer is oversized for the amount of water and therefore does not operate effectively. When possible the produced water from Johnston is processed through the Ravenspurn North system. A

new system is to be installed by the end of quarter three 2017, which will handle all the produced water from the Ravenspurn North hub and improve the oil in produced water content.

In addition to oil in produced water, oil on sand / scale was also discharged from the Ravenspurn North installation during 2016, as presented in Table 4.1. This is a similar quantity to that reported in 2015 within the permitted amount.

Table 4.1: Discharge of Oil from Sand and Scale

Operation	Quantity of Sand/Scale Discharged (tonnes)	Quantity of Oil on Sand / Scale Discharged (tonnes)	Average Concentration (mg / kg)
Schedule 6a Online Sand / Scale at the Ravenspurn North Platform	3.224	0.002	620.35

West Sole Alpha

The discharged oil in produced water concentration at West Sole Alpha was significantly higher than the permitted amount, exceeding the monthly average over the consented 30 mg/l for the months January to July during 2016.

This was not unexpected as we were aware that the produced water separator on West Sole was not designed to meet the permitted 30 mg/l. Since 2015, PUK have undertaken a series of inspection and maintenance work on the produced water separator to try and resolve the problem. In addition, in early 2016, water clarification trials were carried out by Clariant Oil Services UK to determine if the addition of a chemical would be a solution. The following conclusions were drawn:

- The additions of HYTREAT 12773K & CORRTREAT 7368 gave an increase in fluid turbidity and in some cases foaming. This did not give any information on overall water quality in terms of oil content;
- The performance of the de-oiler, FLOCTREAT 3958D, could not be accurately assessed during bottle testing due to the increase in turbidity of the test fluid, with and without the presence of the de-oiler. Additionally, the samples tested were not fully representative of the fluids that would be treated in the system due to lack of a sample point upstream of the separator V3000 where chemical injection would take place;
- It is possible that FLOCTREAT 3958D may have a positive impact on water quality and OIW content, however its impact was difficult to ascertain during bottle testing;
- A third product, CORRTREAT 709 was not included in the test programme as it would not have been possible to carry out any kind of qualitative comparison due to the high turbidity of the test fluid.

The water clarification trails proved unsuccessful, therefore, in mid-2016, PUK made a decision to bypass the separator and send the liquids (condensate / produced water) directly to the Dimlington Terminal for separation, treatment and onward disposal. The West Sole Alpha oil discharge permit has therefore been surrendered.

4.2.2 Other Operations

None of the offshore projects undertaken in 2016, (as listed in Section 2.2) resulted in the discharge of oil regulated under the OPPC Regulations.

4.3 Discharge of Chemicals

The use and discharge of chemicals is subject to control under the Offshore Chemicals Regulations 2002 (as amended). This requires regulatory approval following an assessment of the predicted environmental impacts of any proposed discharges. In addition, only chemicals that have been registered by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) may be used.

All chemical products that are used offshore undergo a hazard assessment, using the Chemical Hazard and Risk Management (CHARM) model, to calculate the ratio of Predicted Effect Concentration against No Effect Concentration (PEC:NEC). This is expressed as a Hazard Quotient (HQ), which is converted to a colour banding (Purple, Orange, Blue, White, Silver and Gold, in order of environmental hazard level (highest to lowest)) and used to rank the product.

Products not applicable to the CHARM model (i.e. inorganic substances, hydraulic fluids or chemicals used only in pipelines) are assigned an Offshore Chemical Notification Scheme (OCNS) grouping, A - E. Group A includes products considered to have the greatest potential environmental hazard and Group E the least.

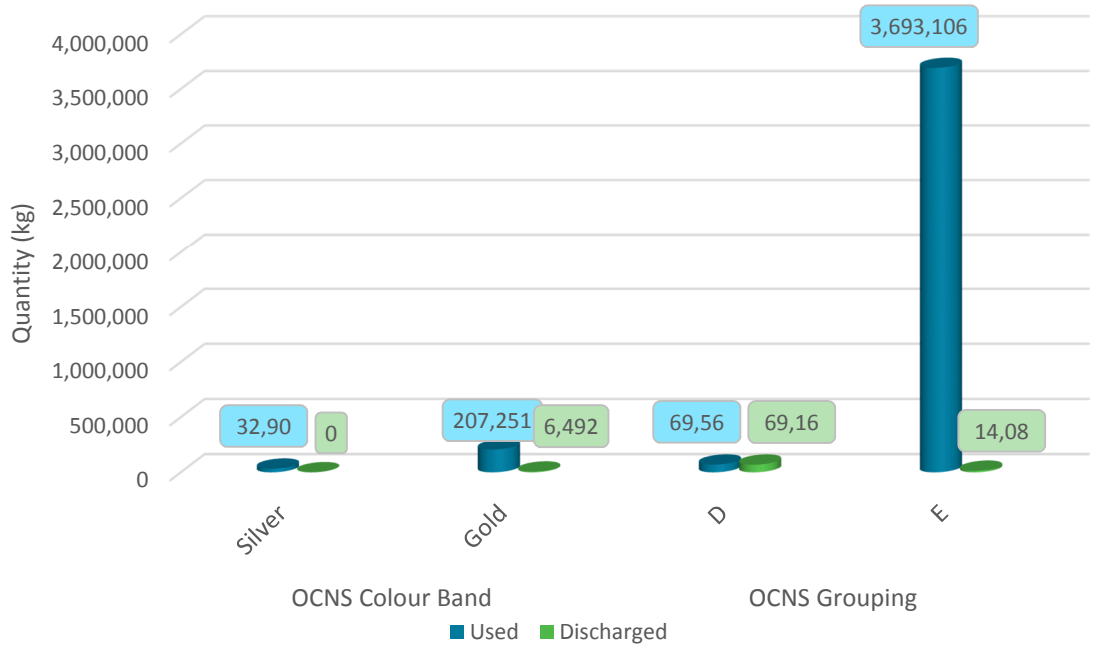
In addition to the OCNS colour bands and groupings, OSPAR identifies chemicals considered to Pose Little or No Risk to the environment as 'PLONOR' and those considered harmful to the environment as 'candidates for substitution'. We actively seek to select chemicals without a substitution warning, however there are instances where a lack of a suitable alternative for technical or safety reasons, may mean that chemicals with substitution warnings need to be used.

4.3.1 Production Operations

Gas production required only a limited range of production chemicals, mainly for the purposes of hydrate inhibition, corrosion control and separation of liquid hydrocarbons. The use of production chemicals is permitted at the Amethyst, Cleeton, Hyde, Kilmar, Inde, Leman, Lancelot, Pickerill, Ravenspurn North, Thames, Trent, and Tyne, West Sole Alpha, West Sole Bravo and West Sole Charlie installations. The Thames and Tyne platforms are undergoing decommissioning but still require chemical allowances for maintenance chemicals.

Figure 4.6 presents a breakdown of the total chemicals used and discharged for all of our production operations in the southern North Sea by OCNS colour band / grouping.

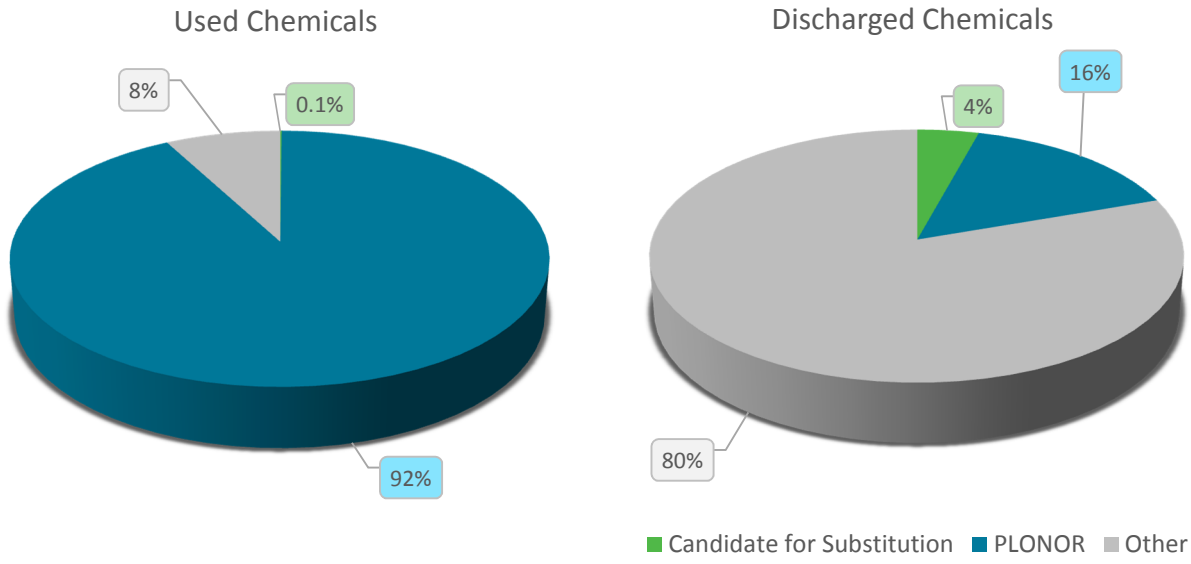
Figure 4.6: Chemicals Used and Discharged in Production Operations



Chemical use for gas production is dominated by the need for hydrate inhibition. Mono Ethylene Glycol (MEG) is routinely used for this purpose. It is a PLONOR chemical and it is usually recovered, recycled or reused unless its salinity precludes this in which case it is discharged offshore with the associated corrosion inhibitor with which it is dosed. Modelling indicates that this discharge presents a negligible risk to the environment. MEG accounted for approximately 51 percent of all chemicals used and one percent of all chemical discharged during production in 2016.

Figure 4.7 presents the percentage of the total chemicals used and discharged that were identified as candidates for substitution or as PLONOR.

Figure 4.7: Percentage of Chemicals Used and Discharged in Production Operations Identified as PLONOR and ***Candidates for Substitution***



During 2016, the majority of the chemicals used in production operations were PLONOR. Only four chemicals identified as candidates for substitution were used in production operations, with a total use and discharge of 3,773 kg.

PUK is continuing to reduce chemical use at our southern North Sea production assets, focusing on phasing out the use and discharge of chemicals with substitutional warnings.

4.3.2 Other Operations

During 2016 as part of the Tyne decommissioning programme, PUK carried out Well Interventions to plug and abandoned the five Tyne Platform wells. The Seafox 1 Jack-Up barge was used to support the operations with chemicals being used and discharged during the campaign.

Figure 4.8 presents a breakdown of the total chemicals used and discharged for all of our Well Intervention operations in the southern North Sea by OCNS colour band / grouping.

Figure 4.8: Chemicals Used and Discharged in Well Intervention Operations

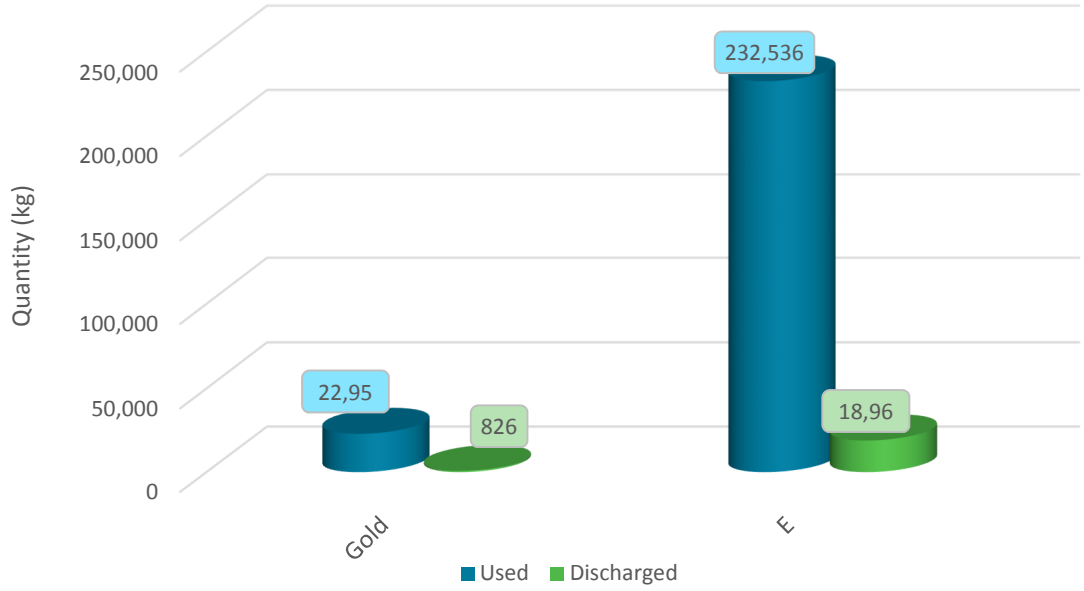
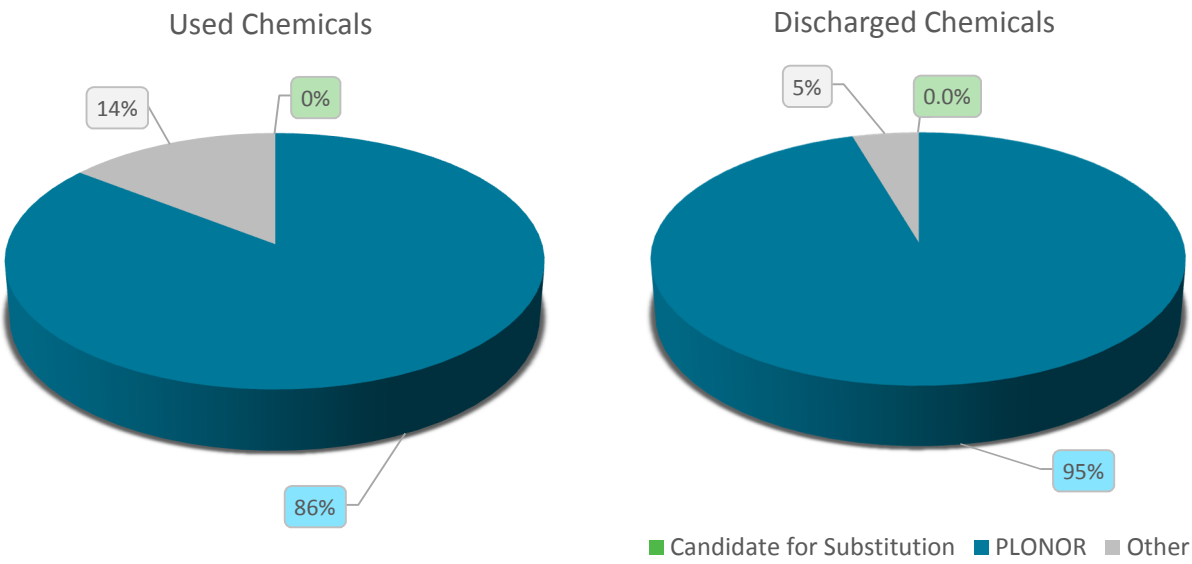


Figure 4.9 presents the percentage of chemicals used and discharged during Well Intervention operations that were identified as candidates for substitution or as PLONOR. A total of 255,489 kg of chemicals were used and 19,787 kg of these chemicals were discharged during other operations.

Figure 4.9: Percentage of Chemicals Used and Discharged in Well Intervention Operations Identified as PLONOR and Candidates for Substitution



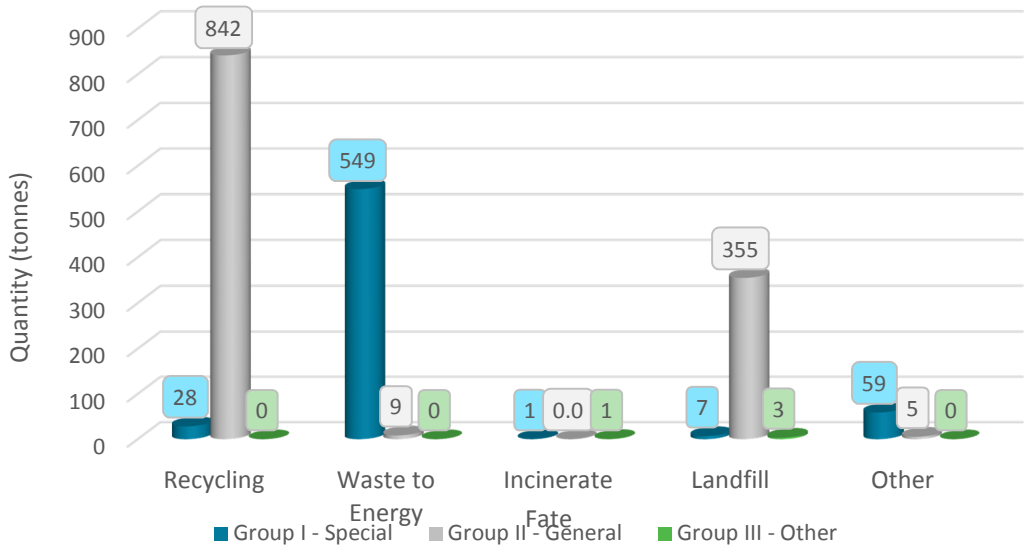
The majority of the chemicals used and discharged during the Tyne Well Intervention operations were PLONOR. No chemicals identified as candidates for substitution were used or discharged.

4.4 Waste

4.4.1 Production Operations

During 2016, waste was generated during production operations at 22 of our offshore southern North Sea assets. Figure 4.10 presents the fate of each waste category for offshore production operations. None of the waste generated from the production operations was reused.

Figure 4.10: Fate of Each Waste Group for Production Operations



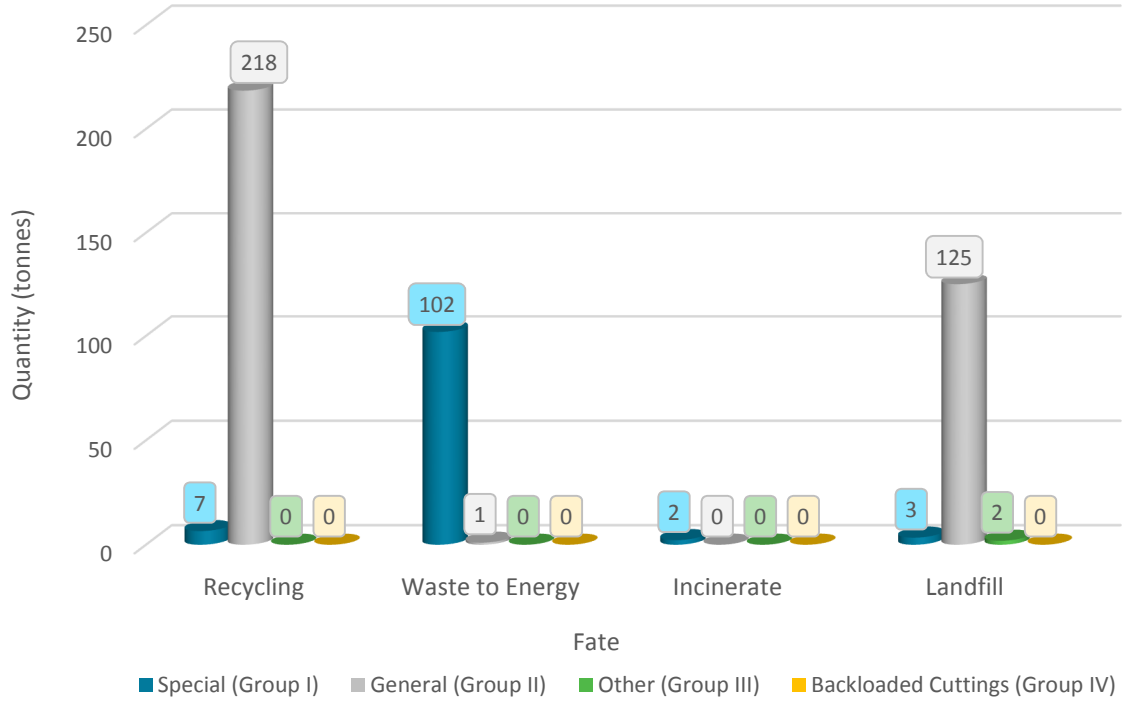
PUK assets generated a total of 1,859 tonnes of waste from offshore production operations in 2016. Approximately 80 percent was recycled or otherwise managed, rather than being consigned to landfill. Only 7 tonnes of the 644 tonnes of special waste was sent to landfill. The quantity of waste recorded as 'other' was sent for treatment or noted as being general or special waste.

4.4.2 Projects

During 2016, the Seafox 1 (Jack-up barge) was contracted to plug and abandon five platform wells at the Tyne South Platform. In addition, the Rowan Gorilla VII (drilling rig) was contracted for the Ravenspurn ST2 drilling campaign, which will finish in 2017.

Figure 4.11 presents the fate of each waste group for drilling and other operations during 2016. None of the waste generated from drilling and other operations was reused.

Figure 4.11: Fate of Each Waste Group for Drilling and Other Operations



A total of 483 tonnes of waste was generated from drilling and other operations during 2016. Approximately 73 percent was recycled or otherwise managed, rather than consigned to landfill. Approximately 3 tonnes of special waste was sent to landfill.

4.5 Hydrocarbon and Chemical Spills to Sea

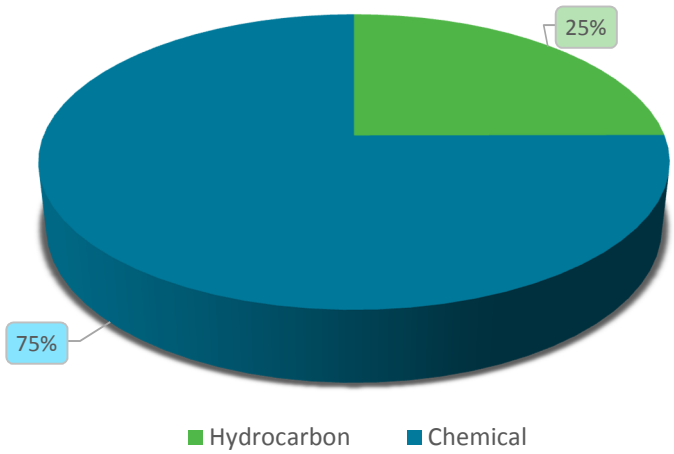
The Oil Pollution and Control Regulations apply to hydrocarbon and chemical spills to sea and these have to be reported and are subject to detailed investigation to ascertain the cause and prevent recurrence. A total of 25 oil and chemical release incidents were reported during 2016. Brief details of the hydrocarbon and chemical release incidents are provided in Table 4.2. Figure 4.12 shows the majority of substances spilt were chemicals (75 percent).

Table 4.2: Hydrocarbon and Chemical Spills to Sea

Location	Date	Description	Hydrocarbon (kg)	Chemical (kg)
Bessemer North West Bell	20/05/16	Loss of hydraulic chemical from fitting connection.	-	605
	16/01/16	Loss of hydraulic chemical from manifold small bore fittings.	-	582.4
Cleeton Platform	14/10/16	Loss of entrained lube oil from the utility system.	0.001	-
	20/01/16	Small loss of entrained mineral oil from the utility system.	0.00000016	-
Guinevere Platform	25/09/16	Loss of diesel.	0.005	-
Hyde Platform	10/07/16	Loss of diesel.	0.23	-
Inde AC Platform	04/02/16	Loss of diesel from pinhole leak in bunkering hose.	0.005	-
Inde AQ Platform	04/10/16	Loss of diesel from pinhole leak in bunkering hose.	0.005	-
Inde AT Platform	04/01/16	Loss of condensate from pinhole leak in the pipework.	0.002	-
	12/04/16	Loss of hydraulic fluid from manifold small bore fittings.	0.005	-
Inde CD Platform	23/07/16	Loss of diesel from pinhole leak.	0.05	-
Leman BT Platform	16/11/16	Loss of hydraulic fluid from manifold small bore fittings.	0.0286	-
Leman H Platform	27/10/16	Loss of hydraulic fluid from manifold small bore fittings.	0.0005	-
Leman South subsea well	25/08/16	Loss of hydraulic chemical from valve failure	-	5
Pickerill B Platform	18/06/16	Loss of hydraulic fluid from manifold small bore fittings.	0.07	-
Ravenspurn North CPP Platform	13/10/16	Loss of diesel.	0.0000178	-
	31/10/16	Loss of hydraulic fluid – solenoid valve failure.	-	37.5
Ravenspurn North ST2 Platform	08/03/16	Loss of hydraulic fluid – E7 SSSV kerotest valve leaking at stem level.	0.005	-

Location	Date	Description	Hydrocarbon (kg)	Chemical (kg)
Ravenspurn South C Platform	20/03/16	Loss of hydraulic fluid from manifold small bore fittings.	0.00000006	-
Tyne Platform	06/06/16	Loss of condensate from transfer hose open to the environment.	0.00015	-
	19/07/16	Release of oil base mud / annular fluid from temporary pump during well abandonment operations.	-	0.004
	26/06/16	Loss of hydraulic fluid from valve failure.	0.005	-
West Sole WC Platform	14/10/16	Loss of gas hydrate inhibitor chemical from valve failure.	-	10
Total			0.41	1,240

Table 4.12: Overview of Substances Spilt (as a Percentage of the Total Amount Spilt)



5 Environmental Objectives and Targets for 2017

Based on PUK's planned UKCS operations for 2017, PUK has developed environmental objectives and targets for 2017, as shown in Table 5.1.

Table 5.1: Environmental Objectives and Targets for 2017

Aspect	Objective
Emissions of Carbon Dioxide (CO_2)	Retain CO_2 emissions within allocations set for permitted installations
Emissions of Hydrocarbon (HC) Gases	Identify opportunities for the reduction in HC venting
Emissions of Other Combustion Products	Monitor and where reasonably practicable reduce oxides of nitrogen (NO_x) emissions from relevant combustion equipment
Discharge of Oil in Produced Water	Ensure the monthly average concentration of oil discharged in produced water does not exceed the platform allowance
Discharge of Production Chemicals	Reduce the use and/or discharge of production chemicals that carry substitution warnings
Hydrocarbon and Chemical Spills to Sea	<10 reportable spills (N.B. Any spill to sea, irrespective of size, is reported to the regulator, BEIS)