



Hurricane

## **Hurricane Energy plc**

**Environmental Management System**

**Annual Public Statement**

**2014**



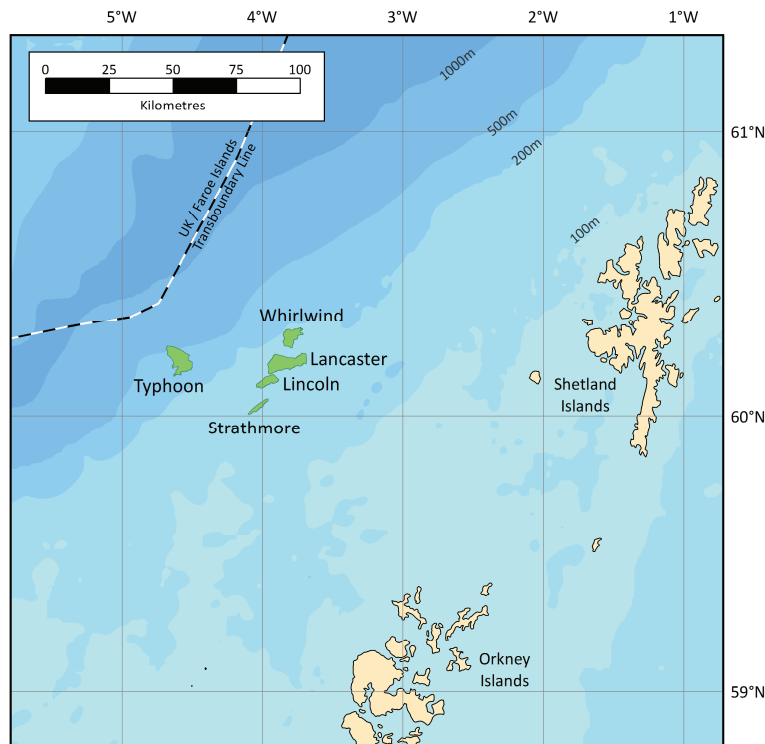
## 1 Introduction

This document presents Hurricane Energy plc’s (Hurricane) annual public statement for offshore operations in 2014, in line with the objectives of OSPAR Recommendation 2003/5 to Promote the Use and Implementation of Environmental Management Systems by the Offshore Industry, as implemented by the Department of Energy and Climate Change (DECC) in the UK. The OSPAR Recommendation requires all operators of seaward licences to have an accredited Environmental Management System (EMS), and also requires each offshore operator to produce an annual public statement covering all offshore operations undertaken in the previous calendar year.

## 2 Hurricane Energy plc

Hurricane is an oil and gas exploration company headquartered in the UK. The company specialises in exploring for and developing oil reserves from fractured basement reservoirs. Hurricane is the operator of three UK offshore licences (P.1835, P.1485 and P.1368) situated in Quadrants 204 and 205 to the west of Shetland. Hurricane’s operations have been primarily focussed on the “Greater Lancaster Area” (GLA) which consists of the Lancaster and Lincoln fields (Figure 2.1). Hurricane is also 100% licence owner for the Whirlwind, Strathmore and Typhoon prospects.

Figure 2.1 Hurricane field locations



To date, Hurricane has drilled three wells in the Greater Lancaster Area, including a sidetrack of an existing exploration well (Table 2.1). Each of these three wells also included well testing activities. Another well (Well 205/21a-5) has also been drilled, re-entered and tested in the nearby Whirlwind field. The most recent offshore operations took place over summer 2014 and comprised the Lancaster horizontal well (Well 205/21a-6), which is the subject of this annual public statement.

**Table 2.1 Summary of Hurricane drilling operations**

DECC well number	Well type	Well status	Surface location (ED50)	Water depth (m)	Date drilled
<b>Lancaster field</b> (Blocks 205/21a and 205/22a)					
205/21a-4	Exploration	Abandoned	60°11'17.610"N, 003°51'23.449"W	157 m	2009
205/21a-4Z	Appraisal (sidetrack)	Suspended	60°11'17.610"N, 003°51'23.449"W	157 m	2011
205/21a-6	Appraisal	Suspended	60°12'0.035"N, 003°51'45.365"W	147 m	2014
<b>Whirlwind field</b> (Blocks 205/21a and 205/22a)					
205/21a-5	Exploration	Suspended	60°17'1.620"N, 003°50'17.740"W	185 m	2011

All offshore operations are co-ordinated from the Hurricane offices in Godalming, Surrey and in Aberdeen (during actual operational periods).

### 3 Environmental Management System

Hurricane is fully aware of the potential environmental implications of its business operations and takes its responsibilities towards safeguarding the environment very seriously. This ethos of responsibility is incorporated at a fundamental level within the Hurricane environmental policy and EMS which commit us to continually strive for improved environmental performance. Hurricane also actively seeks out contractors and suppliers who are keen to identify and reduce their own environmental impacts and those of any activities undertaken on behalf of Hurricane.

Hurricane considers compliance with all relevant environmental laws and regulations as the minimum standard for our operations and is enthusiastic about pursuing all practicable measures available to continually improve levels of environmental performance.

Hurricane operates an ISO 14001 certified EMS in accordance with the requirements of OSPAR Recommendation 2003/5. The EMS is subject to regular external review, and was last externally approved by NQA on 2 December 2013. The EMS identifies the significant environmental aspects of Hurricane offshore operations, outlines objectives for environmental performance and describes the management controls necessary to ensure that all operations are conducted in a responsible manner with respect to those issues. It is designed to cover all offshore drilling operations undertaken by, or on behalf of, Hurricane.

The EMS is regularly reviewed to ensure that it remains consistent with the scope of the Hurricane operations. The current scope of the EMS is summarised below:

- Offshore drilling operations, including well testing. The 2014 drilling and testing operations form the subject of this statement.
- Offshore seismic, geophysical and environmental surveys. No such operations were conducted in 2014 so this area is not discussed further in this statement.
- Office activities; office based activities are also managed under the EMS. As these are not covered under the scope of DECC guidance and reporting requirements, they are not discussed further in this statement.



### 3.1 Environmental policy

Following the principles of ISO 14001, Hurricane have developed an environmental policy (Figure 3.1) which outlines the company commitment, not only to comply with statutory regulations and codes of practice, but also to prevent pollution and strive for continual improvement in environmental performance. The environmental policy sets out the framework for the rest of the EMS.

Figure 3.1 Hurricane environmental policy



## Hurricane Energy plc

### Environmental Policy

Hurricane recognises its responsibility to the environment and will take positive steps to address the environmental impacts associated with our offshore operations.

We are committed to achieving continual improvement in our environmental performance, and regard compliance with the relevant laws and regulations as a minimum standard.

We will work with our employees, contractors and suppliers to identify and reduce the environmental impacts of our activities.

### Our Commitments

- All of our offshore operations shall be managed under our ISO 14001:2004 certified Environmental Management System
- We will involve our employees in maintaining the Environmental Management System, provide a clear feedback structure, establish appropriate operating practices and implement training programmes
- All our employees will be selected, trained and developed to carry out their duties safely, competently and with due care for the environment
- We will implement measures to prevent pollution to the environment, where reasonably practicable
- We will continually review all our business operations, in order to identify and minimise our environmental impacts
- We will consider the sustainability of required resources during the planning and execution of our offshore operations
- We will set appropriate environmental objectives, monitor progress in achieving them and report the results to the Board on a regular basis
- We will take environmental considerations into account in all our operations, ensure that our suppliers and contractors are aware of our policy, and encourage them to commit to good environmental practices

These commitments will be reviewed regularly and specifically prior to major operational activities. As measure of Hurricane's environmental performance, the fulfilment of these commitments will be monitored continually and communicated to both the Board and employees.

### Approved:

Position: Director of Environmental Issues  
Name: Nicholas Mardon Taylor

Position: Chief Executive Officer  
Name: Robert Trice

Signature: 

  
16<sup>th</sup> December 2014

Date: 16 December 2014



### 3.2 Environmental Aspects and Impacts

All activities undertaken by Hurricane which may interact with the environment have been documented in the Hurricane environmental aspects and impacts register. Each potential environmental interaction is assessed for its significance in order to identify those that require suitable management controls to avoid or minimise any adverse impacts. In order to ensure it is consistent with the current scope of Hurricane's operations, the environmental aspects and impacts register is reviewed and updated regularly and as part of planning prior to the commencement of every new operation.

In accordance with this approach, the Hurricane environmental aspects and impacts register for drilling operations was reviewed and updated as part of the planning process conducted for the Lancaster horizontal well to ensure it was appropriate to the scope of operations. This was done via an environmental workshop, undertaken by key members of the project team and independent environmental specialists who reviewed the aspects and impacts register for completeness with reference to the Lancaster operations. The workshop was also used to systematically identify the project specific potential impacts of the Lancaster horizontal well operations so that these could be thoroughly assessed and environmental control measures developed to manage them. Environmental control measures and commitments specific to this well were developed both during the workshop and throughout the planning process.

### 3.3 Environmental objectives and targets

A number of environmental objectives, with supporting targets and programmes, were set for the Lancaster horizontal well drilling and testing operations in 2014. These objectives were designed to help improve environmental performance and manage environmental impacts and can be summarised as follows:

- Strive for no oil spills to sea as a direct result of the Lancaster drilling and testing operations.
- Promote oil spill response preparedness through appropriate training and exercises.
- Ensure compliance with environmental legislation and the requirements of the regulator.
- Minimise the contribution of operations to global issues, particularly climate change.
- Minimise any interference caused to stakeholders, particularly fishermen.
- Promote environmental awareness during planning and execution of Lancaster drilling and testing operations.

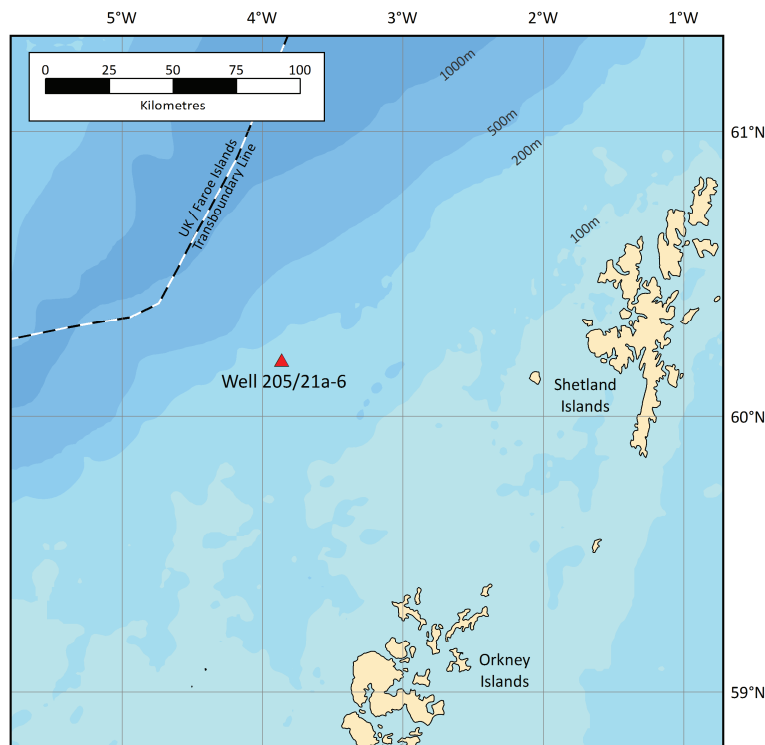
Project specific environmental control measures, designed to offset potential impacts of the operations, were then identified through the environmental workshop and subsequent communication between environmental advisors and project personnel during the planning process for the Lancaster horizontal well. These measures were included in the environmental assessment for the operations which was submitted to DECC for their review and approval as part of the consenting process (PON15B application). These measures were also checked against the work programmes, rig procedures and other operational documents in order to ensure that environmental commitments were followed through during the actual operations.

A series of environmental checklists were then developed, collating all legal obligations, mitigation measures and other environmental commitments in place for the operations. These were used as a checking tool by selected personnel on the drilling rig throughout operations to monitor that all relevant procedures were being followed and therefore control measures implemented.

## 4 Offshore activities and environmental performance 2014

During 2014, Hurricane's offshore activities consisted solely of drilling and well testing operations at Well 205/21a-6 (Lancaster horizontal well). The Lancaster horizontal well is located in Block 205/21a on the west of Shetland continental shelf, approximately 95 km to the west of the Shetland Islands (Figure 4.1).

As with previous Hurricane wells, the primary objective for this well was to reach the fractured granite Lewisian basement, where a 1 km horizontal section was drilled through several fault zones and the reservoir evaluated. Upon reaching the basement section hydrocarbons were encountered, the well was cleaned up and a successfully extended well test performed (hydrocarbons flowed to the surface and flared off) to establish the status of the reservoir and potential viability of a future development. After the well test, the well was suspended according to the Oil and Gas UK guidelines, with the wellhead left in place on the seabed.

**Figure 4.1 Location of Well 205/21a-6 (Lancaster horizontal well)**

The following sections summarise the environmental performance for the Lancaster drilling and testing operations in 2014, using information submitted to the Environmental Emissions Monitoring System (EEMS) and other data sources.

#### 4.1 Accidental discharges

##### 4.1.1 Oil or chemical spills

The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (OPPC Regulations) stipulate that any oil or chemical spill within 500 m of a drilling rig or fixed platform must be reported. In the event of such a spill, an electronic PON1 form must be submitted to DECC and other relevant authorities informing them of the incident.

Hurricane identified a series of preventative measures to reduce the risk of any oil or chemical spills, which were submitted to DECC for their review and approval in the environmental assessment for the Lancaster horizontal well operations. These measures were worked into the work programmes where appropriate, particularly for the well test. These were also subsequently summarised in an environmental checklist to help provide a final check of their implementation. These included inspection, certification and testing of the well test equipment before commissioning, commissioning during daylight hours to make leak detection easier and the use of high efficiency burners to minimise drop out.

Previous spill incidents were also considered as part of a planning and review of well test procedures, equipment and contractors in readiness for the well test operations. Hurricane communicated regularly with all offshore personnel to stress the importance of reporting spills to sea of any size in order to meet legal requirements and to help ensure they could be learned from and new practices developed to help prevent future incidents.

Despite this, two incidents were recorded during the Lancaster operations, both of which occurred during extended well testing activities. These are summarised in Table 4.1. Electronic PON1 (ePON1) forms were submitted to DECC and the other relevant authorities to notify them of these incidents. In both cases the spills were small enough to be dealt with by the rig itself and any sheens caused by oil releases dispersed over a short period of time. Investigations were held by the well test contractor to formally identify the root cause of these incidents and document corrective and preventive actions, so that the lessons learned could be used to help prevent similar incidents occurring in the future.

**Table 4.1 Summary of oil or chemical release incidents during Hurricane 2014 offshore operations**

Date of spill	Spill quantity	Spill type	Source of spill	Cause of spill	Spill response
16 June 2014	10 kg	Crude oil	Flare drop out during well test	Failure of a transfer pump in the well test area.	Well shut in until the transfer pump could be repaired or a new pump installed.
18 June 2014	10 kg	Crude oil	Flare drop out during well test	Intermittent flaring due to high flow rate.	Well shut in to prevent further drop out and to allow an additional burner head to be opened.

The initial incident was due to a leak in the surface transfer pump seals. The well was shut in whilst replacement parts and a new pump were sourced and sent out to the rig. The second spill to sea was caused by intermittent flaring, arising due the high flow rate achieved and the use of two burner heads. Two burner heads had been selected to sustain burning from the most likely range of anticipated flow rates, but the maximum flow rate achieved was at the upper limit of these rates. The well was shut in as soon as the issue was identified, and then a third burner head was opened and the ignition system re-checked. With this set up in place, no further issues were encountered once testing re-commenced.

Hurricane strongly emphasises prevention over response with regard to oil spills during both planning and execution of offshore operations. Therefore, a variety of preventative measures were identified for these operations to help minimise the risk of both small and large spills. Basic training in the impacts of oil spills and the project specific control measures to be followed to prevent spills was also provided to all rig personnel involved in the operations. However, in order to respond swiftly and effectively in the unlikely event of a large oil spill during the operations, Hurricane also arranged a series of response measures, such as completing a relief well plan and arranging access to a capping device. Several oil spill response exercises were conducted before and during operations to ensure familiarity of personnel with their response responsibilities. In concert with this approach, relevant Hurricane personnel have also undertaken comprehensive oil spill response training, in accordance with DECC training guidelines.

## 4.2 Planned emissions and discharges

### 4.2.1 Reservoir oil discharges

The OPPC Regulations prohibit the discharge of oil into the sea, other than in accordance with the terms of a permit issued to cover such discharges (an "OPPC permit", now known as an "Oil Discharge Permit"). Hurricane obtained consent for a number of different oil bearing discharges during the 2014 Lancaster horizontal well drilling and testing operations, as discussed below.

In terms of the sequence of operations, an OPPC permit was first required for the discharge of reservoir oil on drill cuttings, generated by drilling the 12¼" well section through the oil bearing Commodore sandstone formation. It was anticipated that sandstone drill cuttings returned to the rig at this point would be contaminated to some extent with crude oil from the reservoir. Similarly, drilling the final 8½" horizontal section of the well through the target Basement granite formation was expected to result in the generation of oil contaminated drilling fluids. Therefore an OPPC permit application was submitted to cover the discharge of these substances to sea.

Once drilling was complete, OPPC approval was also needed for the well testing operations, with hydrocarbon discharges expected in association with both the well test cleanup and subsequently in produced water during the well test itself. Oil discharges from these various sources during the 2014 offshore operations are summarised in Table 4.2. A total of approximately 61 kg of reservoir oil overall was discharged during 2014.

**Table 4.2 Oil discharges under OPPC permit during Hurricane 2014 offshore operations (Well 205/21a-6)**

Well 205/21a-6	Source of oil			
	Oil on cuttings (Commodore Sands) (kg)	Oil on cuttings (Basement) (kg)	Oil in drilling mud (Basement) (kg)	Well test (clean up and produced water) (kg)
Estimated discharge	247.8	2.97	19.2	263.3
Actual discharge	2.9	33	2.4	1.2

### OPPC Non compliance

After the operations were complete it became apparent during post well analysis and reporting that a non-compliance with the conditions of the OPPC permit had occurred. This related to the permitted conditions for the discharge of oil associated with drill cuttings from the 8.5" basement well section. Based on an understanding of the rock and oil





characteristics, it was estimated that a maximum of 2.97 kg of reservoir oil would be discharged in association with the returned drill cuttings. This quantity was submitted to DECC for its approval as part of the OPPC application.

As part of monitoring and analysis for oil discharges, initial retort analysis of drill cutting samples was conducted offshore, with samples also collected and shipped onshore for further gas chromatography (GC) analysis. This sampling was conducted in accordance with specific conditions given in the OPPC permit approval. From the results of this GC analysis, it was calculated that the quantity of oil discharged to sea with the drill cuttings had exceeded that estimated in the OPPC permit application resulting in a non-compliance. A total of around 33 kg of oil had been discharged rather than the 2.97 kg originally estimated in the application. DECC were informed of this error as soon as possible after its discovery and they advised that no further action was required due to the minor and isolated nature of the discrepancy.

Improved understanding of the Lancaster granite characteristics derived from these operations, including the concentration of minor fractures, the porosity of the rock, and how changeable these are across the formation, will be used to develop better estimates of the anticipated oil on cuttings concentration in future operations. Hurricane will also provide relevant offshore personnel with clear guidance on how drill cuttings samples should be taken during future operations, to minimise the possibility of hydrocarbon contamination during sampling, storage and transport. Sampling will be monitored as part of the environmental checks undertaken as part of the EMS implementation offshore.

#### 4.2.2 Drilling discharges

No oil based drilling fluids were used during these operations; therefore all drill cuttings generated were potentially suitable for discharge at sea. As is typical for mobile drilling operations, the upper sections of the Lancaster horizontal well were drilled without a marine riser in place. As a result, a total of 370 tonnes of drill cuttings were discharged directly at the seabed from these sections (Table 4.3). These drilling discharges tend to accumulate in a pile several metres high directly around the wellbore, declining in depth with distance from the discharge point. The discharge gets thinner and patchier with increased distance from the well as it becomes dispersed by local seabed currents, with the seabed returning to normal within a few hundred metres.

The marine riser provides a continuous closed circuit between the well and the drilling rig. As such once it was in place (after the 26" section was drilled) all drill cuttings were circulated up the riser and returned to the drilling rig. The drilling mud was recovered from the cuttings as far as possible and the cuttings discharged at the sea surface. In total 391 tonnes of cuttings were discharged in this fashion. These discharges become widely dispersed by currents and do not result in any noticeable accumulation on the seabed.

**Table 4.3 Summary of drill cuttings discharges from 2014 operations**

Well section	Drilling discharges	
	Drill cuttings (tonnes)	Discharge location
36" section	135.00	Seabed
26" section	235.00	Seabed
17½" section	171.00	Surface
12¼" section	121.00	Surface
8½" section	99.00	Surface
<b>Total</b>	<b>761.00</b>	--

#### SERPENT

Hurricane has developed a productive relationship with the Scientific and Environmental ROV Partnership Using Existing Industrial Technology (SERPENT) based at the UK National Oceanography Centre (NOC) in Southampton. SERPENT collaborate with offshore operators in order to undertake remotely operated vehicle (ROV) surveys during drilling operations, gathering video, still images, seabed and water samples to determine the extent of environmental disturbance associated with drilling discharges. Marine biologists from SERPENT have now made eight separate visits to Hurricane Energy's drilling locations over the course of four campaigns in the Lancaster and Whirlwind fields, covering all stages in the drilling process. This has helped improve the understanding of local seabed habitats, increase awareness of marine biodiversity in the area and help strengthen the wider industry understanding of drilling impacts.

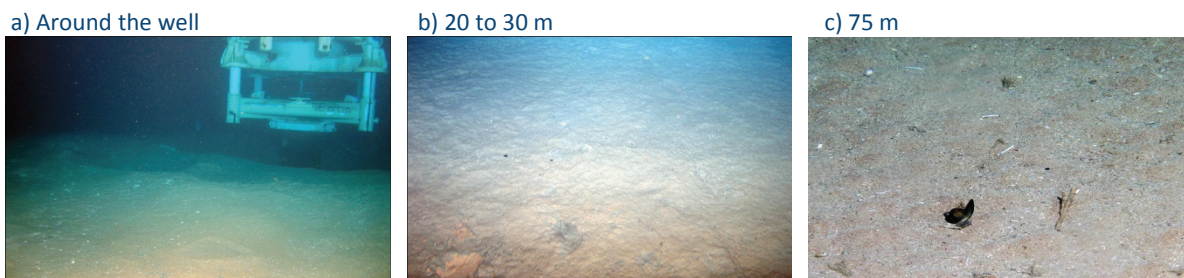
SERPENT made two visits to the Transocean Sedco 712 drilling rig during the 2014 drilling operations; once before drilling and once after. Utilising the rig remotely operated vehicle (ROV) during downtime, SERPENT gathered detailed





observations and seabed imagery from the area around the well to determine the extent of seabed disturbance. The post-drilling survey observed that, directly around the well, the seabed was covered in a mound of discharged cuttings, estimated to be up to 2 m tall, mixed with fine mud (Figure 4.2). By around 30 m distance from the well, the coverage of discharged material had declined to approximately 5 to 10 cm in depth. By around 75 m distance from the well, the seabed became unaffected and typical coarse sediment types were present. The greatest extent of cuttings accumulation was to the northeast of the well.

**Figure 4.2 Examples of variation in drilling discharges with distance from well (post well ROV survey)**



As SERPENT have also had the opportunity to return to previous Hurricane drilling locations over several visits, it has been possible to observe changes in seabed disturbance over time. Evidence of recovery around these has been observed in terms of both a reduction in the total area of seabed affected by drilling discharges and an increase in the biodiversity of seabed communities present.

Images gathered of different animals present in the Lancaster field by SERPENT are shown in Figure 4.3. The monitoring data acquired through the SERPENT collaboration will help to facilitate a clearer, industry wide understanding of the effects of drilling on seabed communities, and help guide the development of effective mitigation measures.

**Figure 4.3 Imagery of seabed animals gathered from the Lancaster field**



#### 4.2.3 Chemical use and discharge

Chemical use and discharge during offshore operations is controlled by the Offshore Chemicals Regulations 2002, as amended (OCR regulations). These regulations introduced the OSPAR Harmonised Mandatory Control Scheme for the use of chemicals offshore. Within this scheme, all chemicals are ranked according to a hazard quotient (HQ) calculated using the Chemical Hazard and Risk Management model (CHARM). The HQ ranking is divided into six colour bands from least to most hazardous (gold, silver, white, blue, orange and purple).

There are some chemicals to which the CHARM model cannot be applied, eg inorganic substances. In such cases, chemicals are assigned a grouping under the Offshore Chemical Notification Scheme (OCNS) based on their toxicity characteristics (A to E, E being the least hazardous). Chemicals which are environmentally benign in seawater are termed as 'Poses Little or NO Risk' (PLONOR). All PLONOR products are given an 'E' rating (least hazardous).

A summary of chemicals regulated under the OCR Regulations used and discharged during offshore operations at the Lancaster horizontal well are presented in Table 4.4. Not all chemicals approved for use in the operations were actually required, some were identified for contingency in case downhole conditions required them. Chemicals are categorised according to either their HQ colour band or OCNS ranking. The majority of chemicals used and discharged were classified as PLONOR and/or were ranked in the least environmentally hazardous categories. No legal non-compliances were encountered in relation any of the permitted chemical use and discharge during the Hurricane 2014 offshore operations.

**Table 4.4 Chemical use and discharge quantities from Hurricane 2014 operations**

Category	Number of chemicals	Used (kg)	Discharged (kg)
Gold	18	50,118.19	45,414.91
OCNS D	2	3,725.00	3,255.00
OCNS E	30	2,525,066.00	2,439,210.60
<b>Total</b>	<b>50</b>	<b>2,578,909.19</b>	<b>2,487,880.51</b>

Certain chemical components are marked with a 'substitution warning' (SUB) as they are listed on the OSPAR list of chemicals for priority action or due to characteristics such as high toxicity or poor biodegradation potential. The UK National Plan has set interim targets for these chemicals to be replaced with more environmentally friendly products, with priority given to those with the highest toxicity. Where technically possible, Hurricane actively seeks to minimise the number of chemicals with substitution warnings to be used when planning each offshore operation. In total, 50 chemical products were ultimately used during the operations at Lancaster, of which three had substitution warnings; KWIK-SEAL, SAFE-CIDE and ULTRAHIB. These three products were primary chemicals used as part of the WBM system for drilling the deeper sections of the well. Only ULTRAHIB had received a substitution warning at the time of the Lancaster horizontal well operations, the other two chemicals have subsequently received SUB warnings. These products are discussed below.

For the short-term, it is anticipated that future offshore activities that may be undertaken by Hurricane will consist of further exploration and appraisal drilling. As a different selection of chemicals may be required from one well to the next, it is very difficult to manage the ongoing use of specific chemicals or schedule the replacement of less environmentally favourable chemicals. However, Hurricane will continue to encourage drilling contractors to look for suitable alternatives in future drilling operations.

#### Base oil discharges to sea ("Condition 5")

The discharge of base oil is covered by the Offshore Chemical Regulations rather than the OPPC regulations. Therefore any base oil discharges must be permitted via the PON15B application (now Chemical Permit application). Base oil was required during the Lancaster operations as part of testing the suspension plugs placed across the well upon. Using base oil reduces the weight of the fluid in the well and facilitates appropriate inflow testing of the suspension plugs. The oil was captured on the rig and returned to shore, along with any base oil contaminated slops. However, as a result of cleaning the drill pipe, some water (approximately 40 m<sup>3</sup>) became contaminated with base oil. This resulted in approximately 1.2 kg of dispersed base oil being discharged to sea, which was in accordance with the quantity permitted via the PON15B application.

#### 4.2.4 Waste management and disposal

As an oil and gas operator, Hurricane records the amount and disposal route of any waste generated and disposed of in the UK. Under the relevant environmental legislation, waste generated during exploration activities must be segregated and stored appropriately for disposal onshore. Waste is typically segregated and recorded according to the following categories:

- Group I is special waste such as oils, paints, surplus chemicals etc.
- Group II is general waste including domestic waste. Segregated materials, such as scrap metal, plastics, wood, paper and cardboard, are recycled.
- Group III is hazardous waste including asbestos, clinical and explosive materials.
- Group IV is waste from drilling (eg contained low toxicity oil base mud (LTOBM) contaminated cuttings). Referred to as 'backloaded' cuttings.
- Group V waste is Naturally Occurring Radioactive Material (NORM) from mineral scales which build up in processing equipment and pipe work (generally from production installations only).

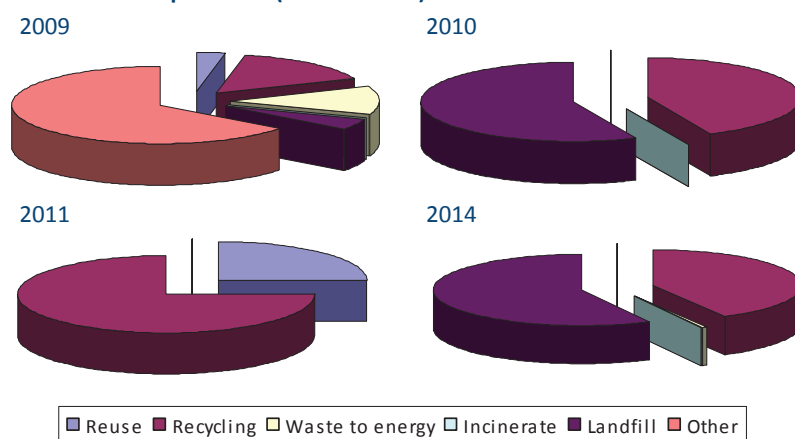
A total of approximately 655 tonnes of waste was generated during Hurricane's offshore operations in 2014. The types, quantities and disposal methods for waste generated during these operations are shown in Table 4.5. As only water base drilling muds were used during operations, all drill cuttings generated were discharged to sea. Therefore, no cuttings were returned to shore as Group IV waste.

**Table 4.5 Waste generated during Hurricane offshore operations in 2014**

Waste category	Reuse (kg)	Recycling (kg)	Waste to energy (kg)	Incinerate (kg)	Landfill (kg)	Other (kg)	Total (kg)
Group I	0	249,272	1,990	0	361,070	0	612,332
Group II	0	26,280	0	0	16,215	0	42,495
Group III	0	0	0	0	0	0	0
Group IV	0	0	0	0	0	0	0
Group V	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>275,552</b>	<b>1,990</b>	<b>0</b>	<b>377,285</b>	<b>0</b>	<b>655,227</b>

The majority of the waste material generated was designated as Group 1 special waste (Table 4.6), which was comprised of sludges, liquids and tank washings (176 tonnes), miscellaneous waste (147.5 tonnes), oils (69 tonnes) and used drums/containers (0.5 tonnes). Over half of all this waste had to be sent to landfill due to its nature (mostly solid residues from oily slop treatment). There was also large proportion of miscellaneous special waste. The majority of the sludges, tank washings and other liquids consisted of water which is ultimately discharged to sewer after being treated appropriately onshore.

The remainder of the waste generated was classified as general waste. Overall, 58% (377 tonnes) of waste had to be sent to landfill with only 42% (275.6 tonnes) recycled and no wastes reused. In comparison with the most recent previous offshore operations, conducted in 2011, a much lower quantity of waste was generated on that occasion and the wastes involved were almost all recycled or reused (Figure 4.3). However, this was a much shorter operation which involved only a very brief period of drilling and a well test. Much less waste (which was also easier to deal with in nature) was generated as a result.

**Figure 4.3 Comparison of waste disposal routes from Hurricane offshore operations (2009 to 2014)**

Spot checks of waste segregation and storage were made by Hurricane and its well management company throughout the operations and high standards were maintained. Waste was also checked before being transported onshore to ensure wastes were properly separated. The rig contractor (Transocean) had their own waste reduction initiatives in place and were committed to following the waste management hierarchy (reduce, reuse, recycle). In future, Hurricane will continue to work with sub-contractors to ensure waste reduction is emphasised wherever possible and appropriate segregation and storage procedures continue to be followed.

#### 4.2.5 Atmospheric emissions

The main atmospheric emissions generated during Hurricane's offshore operations in 2014 comprised of combustion emissions from the drilling rig and the extended well test at the Lancaster horizontal well. The total atmospheric emissions generated from these are shown in Table 4.6.

The total diesel fuel consumption of the drilling rig was approximately 782 tonnes, producing approximately 3,726 tonnes of CO<sub>2</sub> equivalents. During the extended well test, a total of 2,211.8 tonnes of hydrocarbons were flared off; 2,185 tonnes of oil and 26.8 tonnes of gas. The resulting emissions generated equated to approximately



9,341 tonnes of CO<sub>2</sub> equivalents. The final quantity of oil and gas flared was approximately 1,500 tonnes lower than that originally estimated during planning for consent application purposes. Through the constant monitoring of downhole equipment it was possible for Hurricane to accurately identify when sufficient information had been gathered, avoiding further flaring of hydrocarbons and generation of atmospheric emissions.

**Table 4.6 Atmospheric emissions from the 2014 offshore operations**

		Sedco 712 fuel consumption	Extend well test	
			Oil	Gas
<b>Consumption (tonnes)</b>		<b>782.00</b>	<b>2,185.00</b>	<b>26.80</b>
<b>Emissions (tonnes)</b>	CO <sub>2</sub>	2,502.40	6,992.00	75.07
	CO	6.49	39.33	0.18
	NO <sub>x</sub>	28.46	8.08	0.03
	N <sub>2</sub> O	0.17	0.18	0.00
	SO <sub>2</sub>	3.13	13.11	0.00
	CH <sub>4</sub>	0.09	54.63	1.21
	VOC	0.94	54.63	0.13
	<b>Total CO<sub>2</sub> equivalents<sup>1</sup></b>	<b>3,725.93</b>	<b>9,236.24</b>	<b>104.37</b>

Note: Total CO<sub>2</sub> is not a sum of all emission values given in Table 4.6, it represents the contribution to climate change of all gaseous emissions by converting them into tonnes of CO<sub>2</sub> before giving a final total.