

ROUGH OFFSHORE FACILITIES



ENVIRONMENTAL STATEMENT

2016

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FOREWORD

It has been another busy year for the Centrica Storage business. Following an extended maintenance period in August 2015, CSL informed the market in March 2016 that it was withdrawing its 47/8A installation from service while it conducted a review into the feasibility of its continued operations.

In June 2016 CSL announced that in the course of conducting the testing and verification works on the Rough wells an issue was identified leading to ceasing all injection and withdrawal operations pending further testing. Withdrawal operations recommenced in December 2016.

CSL carried out its first ever combined operations jack-up campaign in the Rough field for fabric maintenance work on the 47/3B installation. At the start of the campaign CSL set out its commitment of zero work related injuries. With up to 190 POB at peak and tens of thousands of construction hours CSL delivered on its commitment, a fantastic achievement.

Following the roll out the Culture of Care programme in 2015 CSL staff and core contractors attended Culture of Care workshops designed to create a common understanding of the culture we want to create in our organisation.

In 2015 the myHSES system was launched to record events and observations. There has been 250% increase in the number and quality of safety observations raised in 2016 compared to 2015, demonstrating that the Culture of Care is being embedded across all our sites and that we are actively engaged. These observations give us good quality data that enables us to focus on the areas where we need to do things differently.

CSL has put in place new processes and systems that will allow to build the organizational capability to sustain our HS&E culture in the years to come. CSL now have specialist investigation tools that help get to the root cause of accidents and incidents and allow CSL to learn more from these events and prevent them happening again.

Environmental responsibility is hugely important to us, and CSL contributed towards Centrica being identified as a global leader for action and disclosure on climate change by CDP, an international NGO reporting to investors representing around a third of the worlds invested capital. Centrica earned a position in the Climate A List which is comprised of the top 9% of companies who demonstrate leadership in combatting climate change.

Although the oil and gas industry is no stranger to peaks and troughs, our focus on environmental responsibility and safety can help work more efficiently. We must all play our part in making sure our operation remains safe and sustainable.



Greg McKenna
CSL Managing Director



GROUP ENVIRONMENT POLICY

At Centrica we are committed to understanding, managing and reducing the environmental and ecological impacts of our activities through innovation, technology and cultural change.

We are committed to:

- **Assessing**, understanding and managing our environmental risks and impacts, placing special emphasis on minimising major accident risks
- **Enabling** and encouraging our employees to help us achieve our environmental goals
- **Proactively** seeking ways to reduce our carbon emissions
- **Reducing** waste and using resources efficiently
- **Developing** renewable and low-carbon energy sources, products and services
- **Encouraging** our customers to move towards a low-carbon future by helping them make informed decisions about the use of our products and services
- **Working** with our suppliers and business partners to pursue responsible environmental practices
- **Publishing** regular performance reports and openly discussing our environmental performance with internal and external stakeholders

- **Continually** improving and setting measurable objectives and targets to prevent pollution and reduce our environmental impacts
- **Complying** with environmental legislation, regulations and other applicable requirements.

We will implement comprehensive environmental management systems that are routinely audited in all our businesses and attain certification to ISO14001 or equivalent in our exploration and production, power generation and servicing and installation operations. Our performance is reviewed regularly by the Centrica Executive Committee.



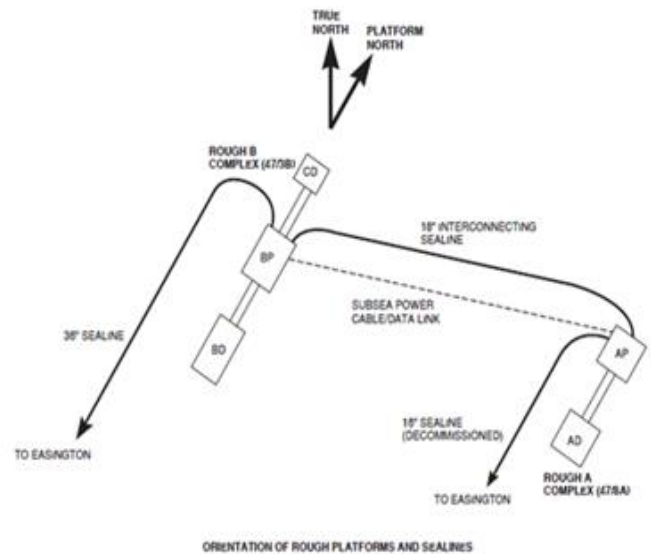
Iain Conn
Chief Executive
January 2015



OUR OPERATION

The Rough offshore gas storage field, located approximately 29 kilometres off the east coast of Yorkshire is the UK's largest facility for the storage of gas. The field is designed to meet peak winter demand by injecting gas supplied from Centrica Storage customers via the Easington onshore terminal into the Rough Field Reservoir approximately 300 meters below the seabed. This stored gas is then available to be produced back into the National Transmission System and is approximately 10% of the total gas supplied in the UK during the coldest winter day.

Rough Facilities Location Map



There are two platforms within the Rough Field, Rough 47/8 Alpha and 47/3 Bravo. The Alpha platform comprises two bridge-linked platforms, whilst the larger Bravo platform comprises three bridge-linked platforms. The platforms are approximately 2 kilometres apart and are designed to produce or inject gas via the reservoirs 30 wells.

During Injection, gas taken from the national transmission system is compressed at the Easington terminal and transferred to the offshore Bravo complex via a 36-inch subsea pipeline. On the Bravo two Rolls Royce Avon gas turbines drive two centrifugal compressors which force the gas under pressure down the wells into the storage reservoir.

During Production, the gas retrieved from the reservoir is essentially the same as that which was injected. However, the nature of the reservoir results in some contamination with water and indigenous hydrocarbons, necessitating treatment on the offshore platforms. Gas flows to the surface under reservoir pressure through the wells. Water and condensed hydrocarbons are removed by the offshore process prior to transmission via the 36-inch sea line to shore. The small quantities of produced water are discharged offshore and the condensed hydrocarbons are re-injected into the pipeline and carried ashore with the gas.

OUR ENVIRONMENTAL MANAGEMENT SYSTEM

CSL's environmental responsibilities are to understand, manage and reduce the environmental impact of our operations so as to protect the environment and its resources. The environmental management of operations in the oil and gas business are integrated within the health and safety as well as the business management activities. This integration ensures the maximum embedding of environmental responsibility into business practices.

Central to our management system is strong leadership, continuous enhancement and good performance baselines from which to measure and report improvements. We have been developing and embedding these principles across the business in our annual improvement plans. Delivery of these core principles is supported by processes integrated in our management system. Our environmental management activities have been certified to ISO14001¹ and we carry out regular internal audits to gauge progress alongside the external audits required for the ISO14001 certification.

This report summarises the performance and initiatives of CSL's operations in 2016 and the planned improvements in 2017 as required by OSPAR².

¹ ISO 14001 is an internationally recognised standard for environmental management systems

² OSPAR Recommendation 2003/5 to Promote the Use and Implementation of Environmental Management Systems by the Offshore Industry

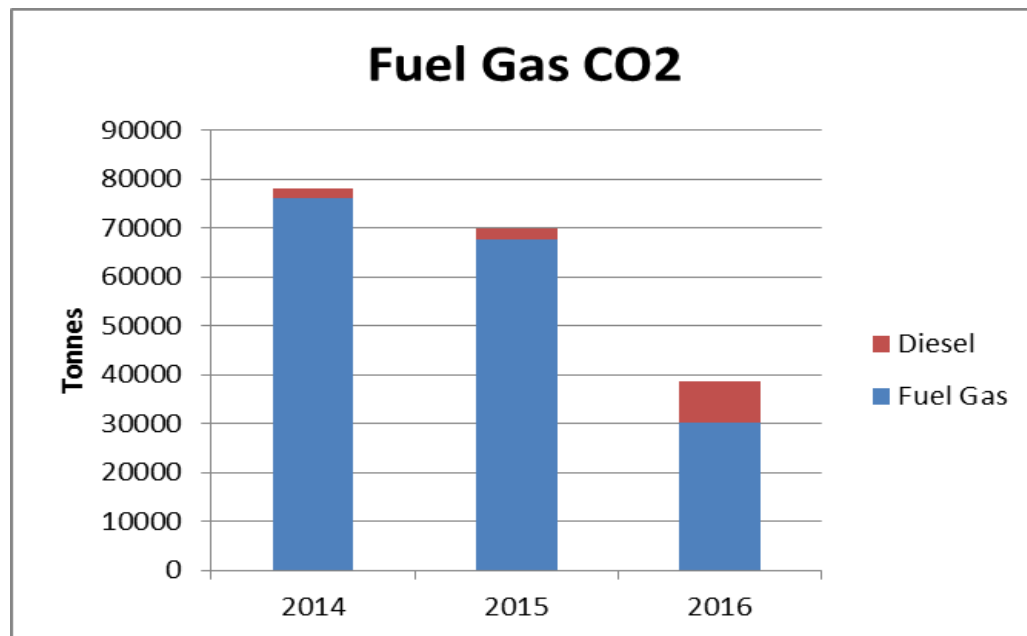
OUR PERFORMANCE

The environmental impacts of our operation are well regulated in the areas in which we operate. The environmental performance of our current activities is presented below in relation to Regulatory compliance.

ATMOSPHERIC EMISSIONS

There is no qualifying combustion equipment on the 47/8A installation therefore exempt from the EU Emissions Trading Scheme and Environmental Permit. The majority of CO₂ emissions originate from the gas-fired turbines for the injection process and power generation on the 47/3B installation. The majority of diesel is used for power generation during the planned annual shutdown, firewater pumps and cranes.

Carbon dioxide emitted from the 47/3B installation as part of the EU Emissions Trading Scheme



The injection process is the main cause of fuel gas demand and performance is shown below. As the injection operation was reduced in 2016 as explained in the foreword, associated carbon dioxide emissions were also reduced. Carbon dioxide emissions from diesel for power generation increased due to the length of the shutdown period when the installation was gas free during the jack-up campaign.

YEAR	VERIFIED EMISSIONS TOTAL (tCO ₂)	F1 FUEL GAS tCO ₂	F2 DIESEL tCO ₂	ANNUAL INJECTION Mscm
2014	78084	76159	1924	2394
2015	69845	67773	2071	2232
2016	38726	30266	8460	879

OIL DISCHARGED

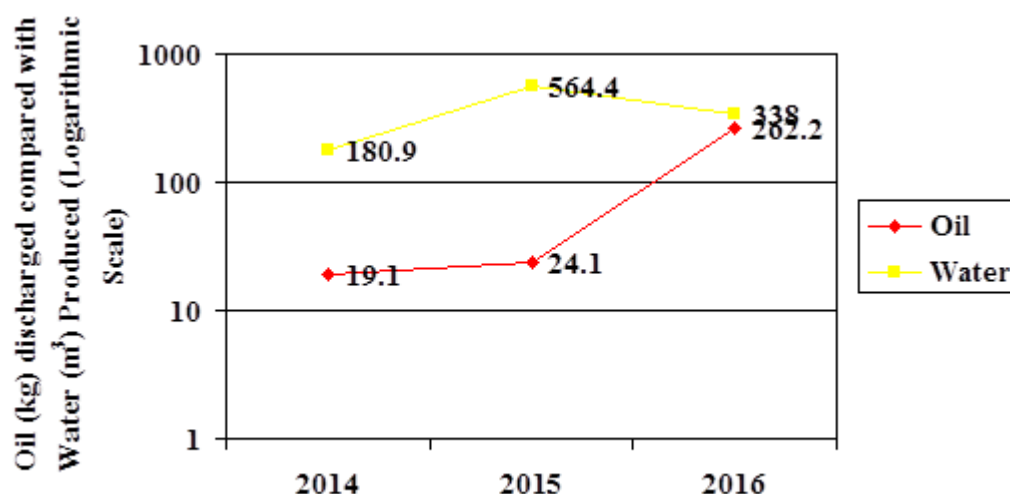
Oil discharged to sea from our operations is associated with the water that is extracted from the reservoir with the hydrocarbons and treated on the facilities prior to discharge to sea. These discharges are controlled under OSPAR and national legislation to a monthly average concentration of 30 mg/l and a 2 tonnes annual tonnage permit limit on each platform.

2016 Discharge to sea

Platform	Produced water m3	Oil discharged kg
47/8A	0	0
47/3B	338	262.2

Due to the unique operation of the Rough field produced water is only observed for approximately 3 months of the year. As the 47/8A installation was withdrawn from service, discharges to sea in 2016 were only from the 47/3B installation.

Comparison of total oil discharged against water produced



In 2016 produced water was discharged between January and May, with the exception of January the monthly oil concentration limit of 30mg/l was exceeded as reported in the OPPC non-conformances highlighted below.

OPPC NON CONFORMANCES

47/3B

There were 37 breaches of the daily 100mg/l oil in water concentration limit between February and May which were submitted as one ongoing OPPC non-conformance report as recommended by BEIS.

These breaches occurred towards the end of the production season when we draw deeper into the reservoir. The composition of the liquid changes to a waxy material which the oily water separator in its current configuration, has difficulty separating. The polishing filters were regularly changed out to improve the quality of the effluent however the consent limits could not be achieved at the high initial concentrations

There were breaches of the February, March, April and May monthly oil in water concentration limit as a result of the daily breaches.

CHEMICAL USE AND DISCHARGE

Chemicals are used for a variety of functions in the extraction of oil and gas such as corrosion and hydrate inhibition, turbine wash and deck cleaners. Chemical use and discharge is controlled by OSPAR. As part of the OSPAR recommendations we as Operators are encouraged to replace any chemicals which pose a particular potential for harm to the marine environment with less potentially harmful chemicals.

On an annual basis all Operators are required to notify the Regulator of progress made in reducing or phasing-out the discharges of offshore chemicals that are, or contain, substances that have been identified for priority action or identified as candidates for substitution.

KI-3145 (pipeline) is a combined hydrotest chemical designed to scavenge oxygen and mitigate corrosion due to bacterial activity and fluid top-ups are required to re-instate annuli fluid levels. As this chemical has a substitution warning it has been replaced with environmentally friendly alternatives.

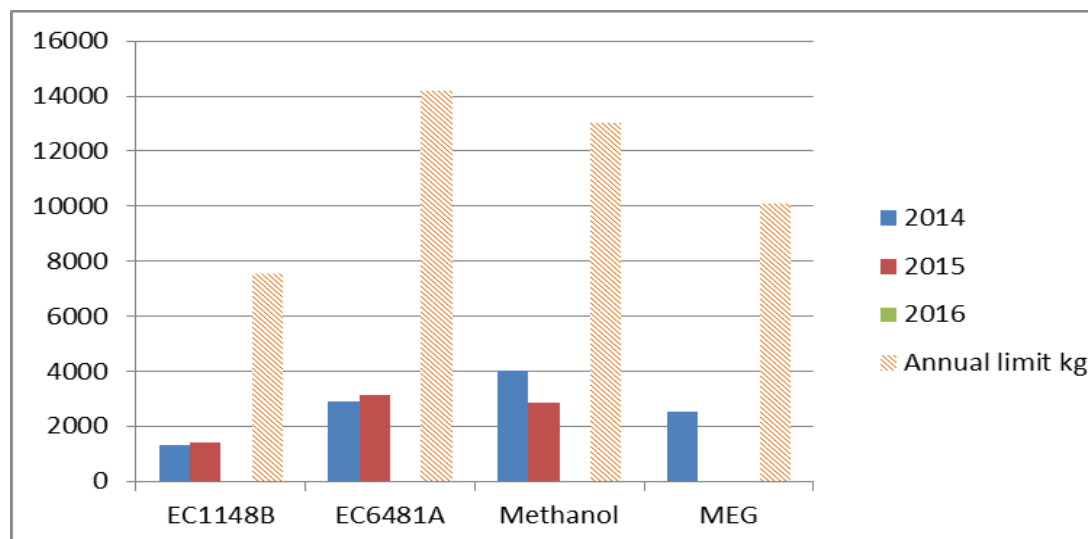
Corrosion Inhibitors EC1148B and EC6637A and hydrate inhibitor EC6481A and methanol are chemicals used for the wet gas operation and are received at the Terminal for disposal and therefore not discharged to sea.

Production Chemical Usage in 2016

47/8A

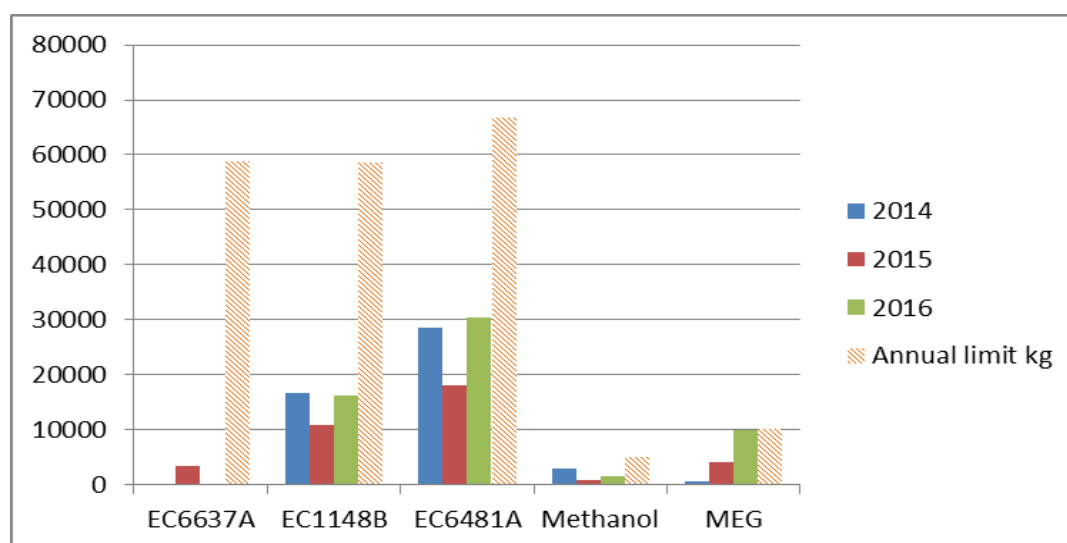
Chemical	Function Group	HQ/OCNS Ranking	Used kg	Discharge kg	Annual limit kg
EC1148B	Corrosion Inhibitor	Gold	0	0	7500
EC6481A	Gas Hydrate Inhibitor	Gold	0	0	14165
Methanol	Gas Hydrate Inhibitor	E	0	0	13000
KI-3145	Corrosion Inhibitor	Blue	0	0	29
MEG	Gas Hydrate Inhibitor	E	0	0	10092

As the 47/8A installation was withdrawn from service there were no production chemicals used in 2016.



47/3B

Chemical	Function Group	HQ/OCNS Ranking	Used kg	Discharge kg	Annual limit kg
EC6637A	Corrosion Inhibitor	Gold	0	0	58750
EC1148B	Corrosion Inhibitor	Gold	16198	0	58600
EC6481A	Gas Hydrate Inhibitor	Gold	30302	0	66800
Methanol	Gas Hydrate Inhibitor	E	1462	0	5000
MEG	Gas Hydrate Inhibitor	E	9879	0	10100



Note EC1148B and EC6637A Corrosion Inhibitors, EC6481A hydrate inhibitor and methanol are chemicals used for the wet gas operation and are received at the Terminal for disposal and therefore not discharged to sea

SPILLS TO SEA

PON1's

47/8A

There were four hydrocarbon spills to sea from the 47/8A installation (0.001kgs maximum) in 2016. The actions of either maintenance of equipment or changes to processes or procedures have been carried out to prevent a recurrence of these events. None of the environmental events had the potential to result in a major environmental incident and would be short term and localised at the point of discharge.

A PON1 is in place for a hydraulic oil release from the AP Fire Water Pump when the unit is started up. The firewater pump cannot be taken out of service for repair as it would impose a significant health and safety risk to personnel. The hydraulic oil has been replaced with a biodegradable synthetic substitute. The PON1 remains open and is updated fortnightly as agreed with BEIS.

47/3B

There were two sightings of a sheen off the CD jacket (0.2 kgs maximum oil discharged for the two sightings) which were reported as one ongoing PON1. This sheen has been observed over previous years during the production season. CSL continues to work to establish the source.

There were three oil spills to sea from the 47/3B (0.09 kgs) in 2016. The actions of either maintenance of equipment or changes to processes or procedures have been carried out to prevent a recurrence of these events. None of the environmental events had the potential to result in a major environmental incident and would be short term and localised at the point of discharge.

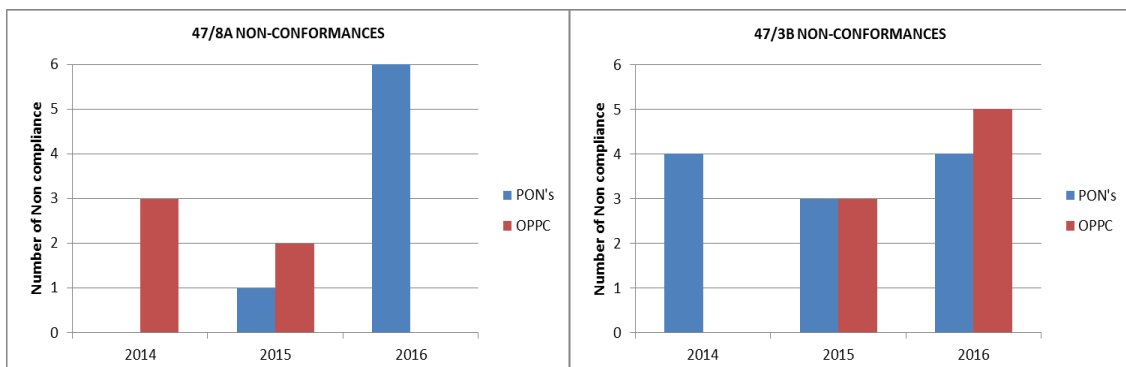
PON10's

47/8A

A PON10 was raised for the failure of the main Navigation Aid Light (15Nm) on the North West corner of the 47/8A installation.

At CSL we have an event recording system which allows us to trend incident types and investigation results allows us to identify the root causes of events and address these within our improvement planning.

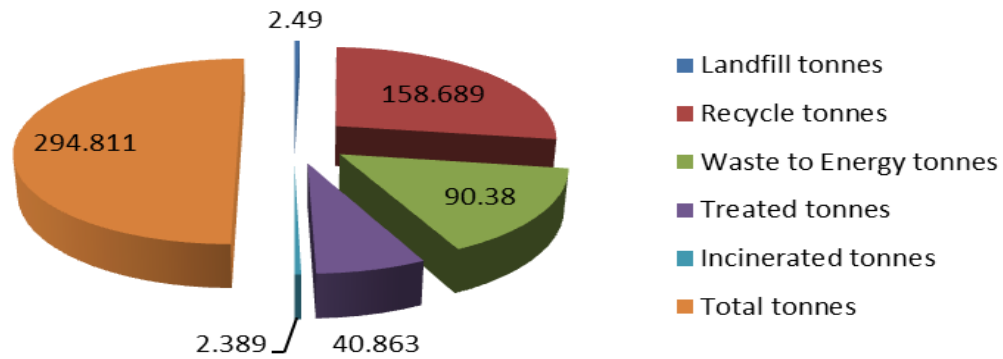
PON's and OPPC non-conformances



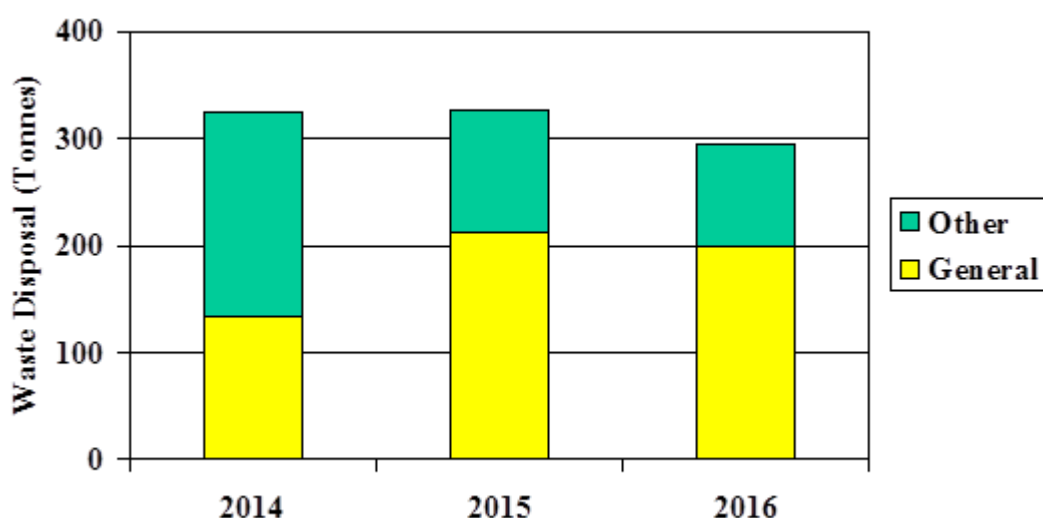
WASTE GENERATED FOR ONSHORE DISPOSAL

Waste produced from Offshore operations is transported Onshore for disposal. Reuse and recycling is maximised through waste segregation both on and offshore minimising the volume of waste sent to landfill.

2016 Waste for 47/3B and 47/8A



Category	Reuse (t)	Recycling (t)	Waste to Energy (t)	Incinerate (t)	Landfil (t)	Other (t)	Total (t)
Group I - Special							
Chemical / Paints	0.000	0.000	0.993	0.000	0.200	6.731	7.924
Drums / Containers	0.000	1.260	0.305	1.003	0.000	0.231	2.799
Oils	0.000	0.000	6.531	0.050	0.000	5.155	11.736
Misc Special Waste	0.000	9.086	1.240	0.000	1.380	15.860	27.566
Sludges / Liquids / Tank Washing	0.000	0.000	33.375	0.200	0.000	11.400	44.975
Sub Total	0.000	10.346	42.444	1.253	1.580	39.377	95.000
Group II - General							
Chemical / Paints	0.000	0.060	0.232	0.000	0.000	0.005	0.297
Drums / Containers	0.000	0.063	0.000	0.000	0.000	0.000	0.063
Scrap Metal	0.000	55.021	0.000	0.000	0.000	0.000	55.021
Segregated Recyclables	0.000	45.480	0.200	0.925	0.890	1.320	48.815
General Waste	0.800	46.919	46.919	0.180	0.020	0.000	94.838
Sludges / Liquids / Tank Washing	0.000	0.000	0.585	0.000	0.000	0.000	0.585
Sub Total	0.800	147.543	47.936	1.105	0.910	1.325	199.619
Group III - Other							
Asbestos	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Radioactive Materials (exc.NORM)	0.000	0.000	0.000	0.000	0.000	0.161	0.161
Clinical	0.000	0.000	0.000	0.031	0.000	0.000	0.031
Explosives	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub Total	0.000	0.000	0.000	0.031	0.000	0.161	0.192
Grand Total	0.800	157.889	90.380	2.389	2.490	40.863	294.811



There was a 32 tonne reduction in waste generated for the Rough field on 2015, a great achievement as CSL carried out fabric maintenance work on the 47/3B installation.

2016 ENVIRONMENTAL IMPROVEMENT PLAN PERFORMANCE

In 2016 CSL delivered against the targets and initiatives to improve environmental performance, both as a result of our operations and in support of the wider communities. The table below shows the status of the Offshore initiatives.

	Initiative	Status
Risk Management – Environmental Integrity	Develop a management process for Environmentally Critical Equipment across the operational assets	The focus of this initiative was on a management process for identifying the potential for major environmental incidents (MEI) from Major Accident Hazards in line with the Offshore Safety Directive Regulations. The process concluded there were no MEI's
Carbon/Energy Management	Review the current performance metrics and trends including the development of a carbon intensity metric for the operational activities	A process was developed and populated to calculate a carbon intensity across the Rough field to include injection and production operations
Management System	Roll out the plan developed in 2015 for transition to the revised ISO14001:2015 standard	Completion of actions from the findings of the gap analysis are being progressed to timescales that will allow transition to be achieved in 2018
Awareness and Training	Delivery of environmental awareness activities across all the CSL assets aimed at improving understanding and engagement with environmental issues pertinent to the Business operations	An environmental communications plan was delivered which included awareness on World Environment Day, aspects and impacts and permits across the assets and the role of the Regulator

2017 ENVIRONMENTAL IMPROVEMENT PROGRAMME

Our annual planning cycle includes the identification of areas for improvements from business plans, audits (internal and external) and long term strategies for business development including HSE. This process encourages continual improvement in environmental management and performance, better data gathering and understanding the process variability. The objectives can be facility or operation specific. The 2017 objectives are detailed below.

	Initiative
Risk Management – Environmental Integrity	Develop a management process for Environmentally Critical Equipment across the operational assets at environmental permit level (non-MEI compliance)
Regulatory	Develop a Stack Monitoring Plan to align with the Large Combustion Plant BREF for approval by BEIS
Management System	Continue the plan for transition to the revised ISO14001:2015 standard in 2018

