



**Marathon Oil UK LLC  
2018  
Environmental Performance Report**



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# **1        PREFACE**

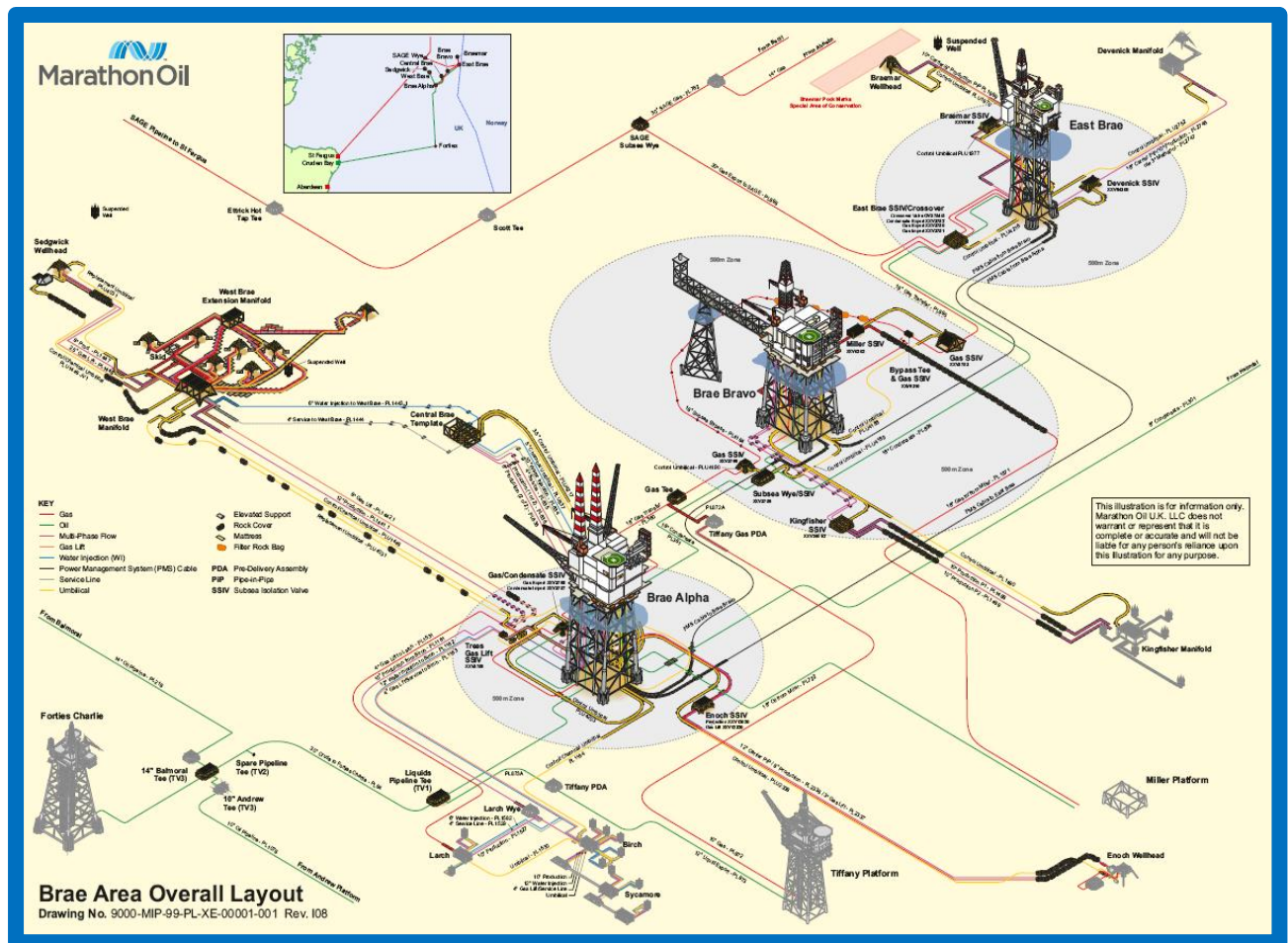
Marathon Oil UK LLC (Marathon Oil) is committed to environmental protection and places significant emphasis and resources on minimising wastes, emissions and other releases through its operations. Environmental performance indicators are a key part of Marathon Oil's corporate and operational performance commitments with targets designed to drive continuous improvement. This report summarises the 2018 environmental performance for Marathon Oil's UK offshore operations.

## 2 OVERVIEW OF OFFSHORE INSTALLATIONS

Marathon Oil operates three interconnected platforms in the UK sector of the central North Sea - Brae Alpha, Brae Bravo and East Brae. The Brae platforms lie some 220 km from the UK coast and 8 km west of the median line with Norway. These installations act as a regional hub for oil and gas production and export from various Marathon Oil operated and third party operated fields and subsea tiebacks as illustrated in the figure below. Oil (and natural gas liquids) from these fields is exported through the Marathon Oil operated Brae to Forties pipeline and onwards via the Forties Pipeline System to the Kinneil reception terminal on the Firth of Forth. Gas from the Brae area is piped to the St Fergus gas terminal via a tie-in to the Scottish Area Gas Evacuation (SAGE) pipeline system.

Power for the three Brae platforms is distributed via a field ring main and controlled by a Power Management System (PMS). The PMS controls the power generated on the Brae Alpha and Bravo platforms, and enables electricity to be supplied to the East Brae platform which has no main power generation facilities of its own.

Overview of the Brae Area



## **2.1 BRAE ALPHA**

The Brae Alpha platform located in Block 16/7a, is a single, integrated platform consisting of drilling rig, production, utility and accommodation facilities. Production commenced in July 1983. Brae Alpha topside facilities process produced fluids from the Marathon Oil operated South, Central and West Brae (including Sedgewick) Field reservoirs plus fluids from the Spirit Energy operated Birch, Larch and Sycamore (Trees) Field reservoirs. In 2007 Enoch, operated by Repsol Sinopec, was tied back to the Brae Alpha platform and brought online.

## **2.2 BRAE BRAVO**

The Brae Bravo platform is a single, integrated platform consisting of drilling rig, production, utility and accommodation facilities and is also located in Block 16/7a, 10km north of Brae Alpha. Production from Brae Bravo commenced in April 1988. Brae Bravo topside facilities has processed produced fluids from the Marathon Oil operated North Brae, Central Brae, Beinn and Bracken Fields plus fluids from the Shell operated Kingfisher Field. A multiple well plug and abandonment (P&A) campaign, involving 28 wells, which commenced in 2017 on the Brae Bravo platform was completed in 2018. In December 2017 native production ceased from the platform and the final platform well was P&A'd in May 2018. Shell Kingfisher fluids continued to be produced back to the Brae Bravo platform until production ceased in July 2018. Conductor removal followed the P&A campaign and was completed in December 2018.

## **2.3 EAST BRAE**

East Brae is a single integrated platform consisting of drilling rig, production, utility and accommodation facilities located in Block 16/3a to the north of Brae Bravo. Production from East Brae commenced in December 1993. East Brae topside facilities process produced fluids from the Marathon Oil operated East Brae and Braemar Field reservoirs. In October 2012, Devenick, operated by TAQA, was tied back to the East Brae platform and brought online.

## **2.4 DRILLING**

During 2018 a side track of an existing Brae Alpha platform well was successfully completed and flowed to production following reactivation of one of the platform's drilling rigs. The planned side track of a second Brae Alpha platform well was unsuccessful following the identification of integrity issues with the donor well. The donor well was abandoned in accordance with regulatory and industry guidelines (OGUK Phase 2).

## **2.5 DECOMMISSIONING**

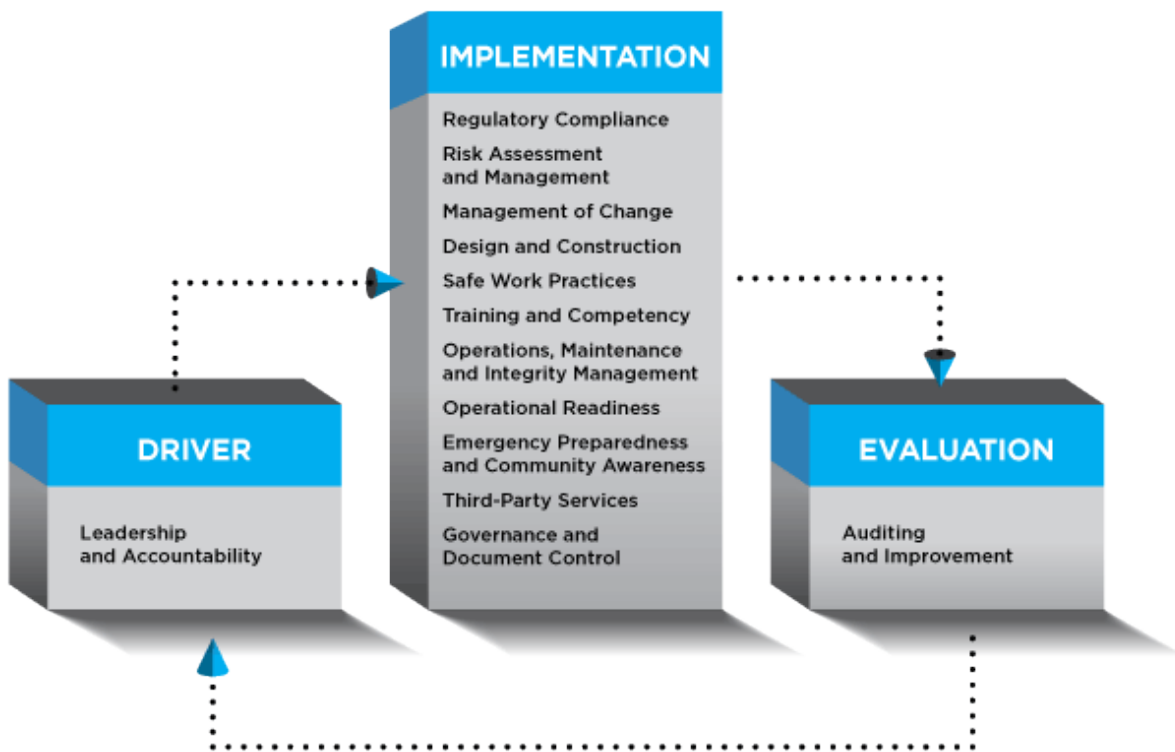
The decommissioning programme for the removal of the Brae Bravo platform topsides was approved in August 2018. To prepare for the removal of the topsides, the platform has been progressing with the "clean and make safe" scope in order to declare the platform hydrocarbon free. The topsides are due to be removed in 2021.

### 3 ENVIRONMENTAL MANAGEMENT AT MARATHON OIL

Marathon Oil have adopted the corporate Marathon Oil Company Health, Environment, Safety (HES) and Management of social responsibility system, the Responsible Operations Management System (ROMS) as the framework for the management of its operations.

ROMS incorporates any critical and regulatory requirements unique to the Organisation, Business Unit or function and is structured around 14 core elements that specify the global expectations required to consistently manage Health, Environment, Safety and Security (HES&S) risks, ensure operational integrity and drive continuous improvement across Marathon Oil's worldwide operations. They are aligned with the basic continuous improvement cycle of Plan-Do-Check/Correct-Review. Each element of ROMS is assigned to a member of Marathon's Senior Management Team.

#### ROMS Review Cycle



Marathon Oil's environmental management system (EMS) which sits under ROMS has been externally verified and aligns to the principals of the ISO 14001 standard for environmental management systems. The most recent external verification report was submitted to the Department for Business, Energy & Industrial Strategy (BEIS) in April 2018.

Overall environmental performance is continuously monitored and is subject to regular review at all levels within the organisation. On the Brae Platforms, the responsibility for day to day environmental performance lies with the respective Platform Managers.


Environmental objectives and targets are developed as part of the annual business review and planning cycle for the Brae Area. Marathon Oil sets key environmental performance indicators at the beginning of each year and progress against these is reviewed regularly, to ensure that no significant deviations from these indicators occur.

# LIFE CRITICAL EXPECTATIONS

### DRIVING

Follow safe driving practices when operating on-road vehicles


- I always wear a seat belt
- I never actively use a phone or mobile device while driving
- I am fit to operate my vehicle
- I drive in a safe manner, respecting motor vehicle laws



### HOT WORK

Control flammables and ignition sources


- I confirm 0% LEL at the location of the work
- I confirm combustibles and flammables are protected or at a safe distance from the work
- I confirm that energy sources are isolated and the work environment is prepared for hot work
- I utilize a Fire Watch when performing spark producing hot work outside of designated safe welding or burning areas



### CONFINED SPACE ENTRY

Obtain authorization before entering a confined space

- I never enter a confined space without authorization
- I confirm that energy sources are isolated prior to entry
- I confirm that initial and recurring atmospheric monitoring is conducted
- I confirm that an attendant is standing by and rescue provisions are in place



### EXCAVATION

Obtain authorization before initiating or entering an excavation

- I never excavate without a valid line locate
- I never enter an excavation until an Excavation Competent Person has performed an onsite review & protective measures are in place
- I confirm rescue provisions are in place when entering an excavation which:
  - Exceeds 4' in depth, has limited means of access or egress, and has potential to contain a hazardous atmosphere



### WORK AT HEIGHTS

Protect yourself from falls when working unprotected at or above 4'


- I use appropriate fall protection equipment
- I use sufficient anchor points
- I maintain 100% tie-off



### ENERGY ISOLATION

Verify isolation and zero energy before work begins

- I identify all hazardous energy sources associated with the task
- I confirm that hazardous energy sources have been isolated, locked, and tagged; following lock and key control requirements during the task
- I confirm that there is no residual or stored energy prior to starting the task



### MECHANICAL LIFTING

Plan lifting operations and control the area


- I confirm that lift equipment and rigging have been inspected and are fit for purpose
- I only operate equipment that I am qualified to use
- I establish and obey buffer and exclusion zones
- I never walk under a suspended load or lift loads over personnel



### LINE OF FIRE

Keep yourself and others out of the line of fire


- I establish and obey buffer and exclusion zones
- I position myself to avoid known hazards related to:
  - Dropped Objects
  - Pressure Release
  - Vehicles and Heavy Equipment
- I secure tools and work materials to prevent dropped objects



### SAFETY SYSTEM OVERRIDE

Obtain authorization before overriding or bypassing safety systems


- I use safety systems which apply to the task
- I obtain authorization before overriding or bypassing safety systems



### WORK AUTHORIZATION

Work with a valid Work Permit when required

- I identify activities necessitating a Work Permit including Hot Work, Confined Space Entry, and Excavation Entry where required.
- I never begin an activity requiring a Work Permit before confirming with the Permit Issuer that all conditions of the permit are in place



# LIFE CRITICAL EXPECTATIONS



DRIVING



HOT WORK



CONFINED  
SPACE ENTRY



EXCAVATION



WORK AT  
HEIGHTS



ENERGY  
ISOLATION



MECHANICAL  
LIFTING



LINE OF  
FIRE



SAFETY SYSTEM  
OVERRIDE



WORK  
AUTHORIZATION

# HES BELIEFS

Every worker has the right and obligation to **stop the job**

By carefully **planning each activity**, we will identify and mitigate risk on the jobsite

Through transparent **reporting, investigation, and sharing of events**, we can prevent recurrence

With **open, honest communication** we can drive continuous improvement throughout our operations

The **worker is more important than the work**; this will be obvious in our decisions and actions







**Health, Environment, Safety & Security Policy**

Marathon Oil in the UK is committed to being a responsible operator running a safe, clean and secure business. Our commitment to a high standard of Health, Environment, Safety and Security (HES&S) performance is supported by a Responsible Operations Management System (ROMS), which is the framework to drive continuous improvement and reduce operational risk. The goals of this framework are to promote safety and environmental protection and to ensure reliable operations and asset integrity.

Marathon Oil in the UK has high expectations of, and recognises the contributions made by, our team members, employees and contractors, at all levels of the organisation to the continuous improvement and adherence to our HES&S culture and performance.

This policy applies to the entirety of the UK business and supports our commitment to incident free operations. We shall:

- Comply with all applicable HES&S laws, regulations, Corporate Standards and other requirements.
- Maintain a risk assessment process that serves as a basis for determining appropriate operational controls to reduce HES&S risks and for developing priorities for management attention and action.
- Environmental protection including pollution prevention.
- Ensuring training and competency processes are in place that ensure work activities are performed and resourced competently.
- Plan and prepare to ensure that in the event of an incident all necessary actions are taken for the protection of the community, personnel, the environment, and assets.
- Report and investigate events to address underlying causes and prevent the likelihood of recurrence.
- Continual improvement of the management system to enhance the Company’s overall HES performance and provide a framework for setting objectives and targets and measuring performance.
- Proactively address HES&S risks associated with permanent and temporary process and non-process changes that impact the subsea, wellhead or surface facilities.
- Follow Safe Work Practices to conduct all operations in a safe and environmentally sound manner.

**James Edens**  
VP - Conventional  
**28 November 2018**



  
**Marathon Oil**  
**UK Leadership Charter**

To maximize the value of the UK Business, we commit to deliver Incident-Free Operations, Industry Leading Production Efficiency and Excellence in Execution:

1. We commit to **Incident-Free Operations** in all activities, for the benefit of ourselves, our co-workers and the environment.
2. We commit to deliver **Industry Leading Production Efficiency** by driving continuous improvement throughout our operations to consistently achieve industry leading performance.
3. We commit to **Excellence in Execution** in our operations and project delivery to maximize asset value.

In leading by example, we will work collaboratively, develop our teams, seek opportunities to innovate and uphold the principles of *Living Our Values*.

Signed by the UK Leadership Team:

Safest, Most Reliable Operator - Maximising Value

  
**Marathon Oil** | LIVING OUR VALUES

## 4 ENVIRONMENTAL PERFORMANCE

This section summarises Marathon Oil's offshore environmental performance for 2018.

### 4.1 OIL AND CHEMICAL SPILLS

During 2018 there were nine unplanned releases of oil totalling 2.077 tonnes.

- Two of these unplanned releases of 0.926 and 1.097 tonnes respectively accounted for 97% of the total oil spilled.
  - An oil release of 0.926 tonnes occurred from the Brae Bravo platform during subsea conductor cutting abandonment operations. The activity was completed after a short duration and no further losses were encountered.
  - A lube oil release of 1.097 tonnes occurred over a period of several days from the Brae Bravo power turbine gearbox lube oil cooler. An integrity failure of the cooler resulted in a slow migration of lube oil in to the seawater cooling system, which in turn discharged to sea. The cooler was subsequently isolated by the insertion of valves to prevent a reoccurrence.
- The remaining seven unplanned releases, accounting for approximately 0.05 tonnes in total, were predominantly from the Brae Bravo platform where there was a programme of conductor cutting operations ongoing and an increase in diesel bunkering.

During 2018 there were seven unplanned releases of chemicals totalling 10.597 tonnes (**Note 1**).

- Two of these unplanned releases were > 2 tonnes.
  - A sodium chloride brine release of 2.456 tonnes occurred from the Brae Alpha platform. This was due to a leak in the drilling area open drain system allowing loss of containment to sea. This was rectified by fitting a clamp and an epoxy resin wrap.
  - A subsea hydraulic fluid (HW443ND) release of 2.499 tonnes occurred from the Brae Alpha platform. This was due to a release of hydraulic fluid from the West Brae Subsea hydraulic system due to an integrity failure from the valve actuators. A DSV was contracted to carry out repairs in March 2019 which has prevented further unplanned releases of subsea hydraulic fluid.
- The remaining five unplanned releases were primarily subsea hydraulic fluid (HW443ND) releases from the Brae Alpha platform West Brae Subsea hydraulic system. Additionally one unplanned release of barite occurred from the Brae Alpha platform during bunkering from a vessel.

**Note 1** – One of the unplanned releases of chemicals (subsea hydraulic fluid HW443ND) in 2018 continued on in to 2019 and was closed out in April 2019. The calculation of the 2018 total quantity of chemical released to sea from this PON 1 was from the onset of the release on 27 December 2018 until 31 December 2018. The remaining spill quantity will be included in the 2019 Environmental Performance Report.

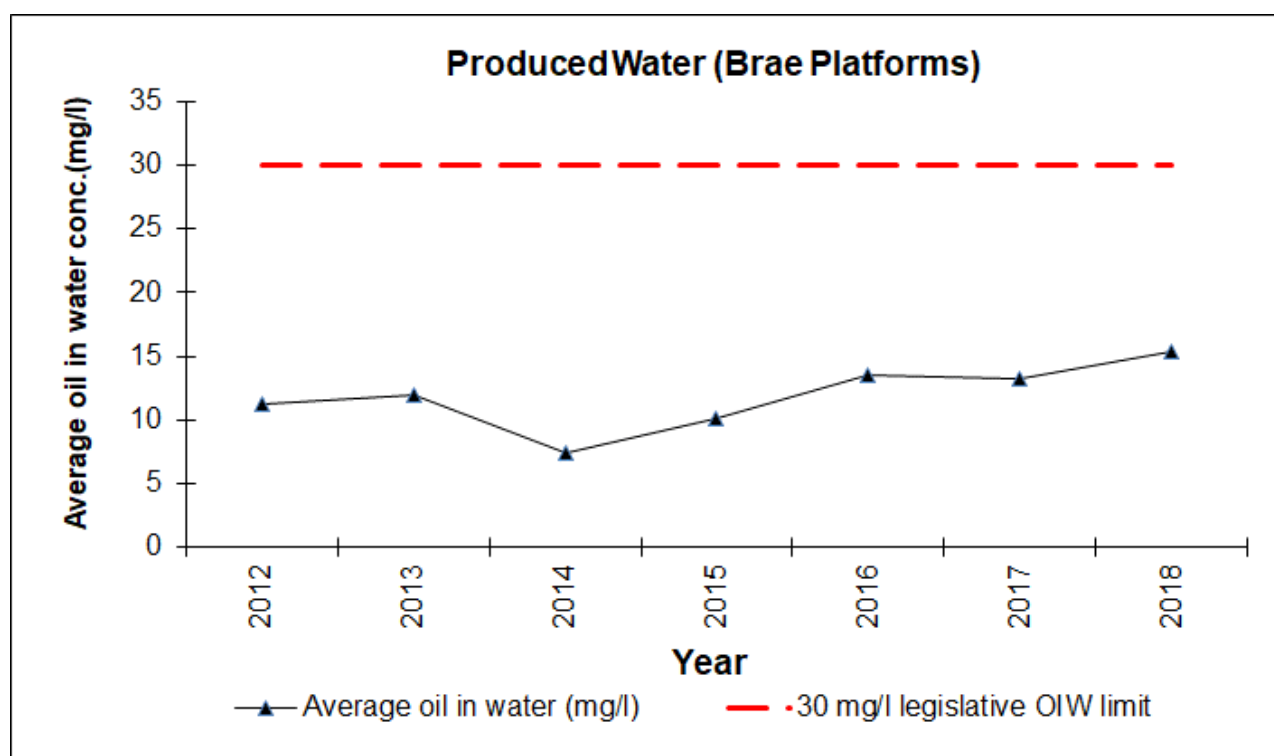
It was considered that these unplanned releases did not pose a significant environmental impact.

## 4.2 PRODUCED WATER

The discharge of produced water in the UK is regulated by the Offshore Petroleum Activities (Oil Pollution Prevention and Control) (Amended) Regulations 2011.

Marathon Oil continues to operate well below the legislative 30mg/l monthly average limit for concentration of oil in produced water discharged and has done so throughout the reporting period.

The average oil in water concentration of the discharged produced water for the Brae Field in 2018 was 15 mg/l (see figure below). This represents a small increase from 13 mg/l in 2017, due to a relative increase in production efficiency on Brae Alpha and the absence of a lower oil in water concentration contribution of the produced water from the gas condensate Brae Bravo platform in the run up to its Cessation Of Production in 2018. In total, 2,276,655 m<sup>3</sup> of produced water and 35 tonnes of permitted oil was discharged in 2018, the largest producer being the Brae Alpha platform. This is due to the nature of the reservoirs that are produced to Brae Alpha which bring high produced water volumes.



FACILITY	Flow Weighted Average Oil in Produced Water Concentration (mg/l)	Total Oil Discharged (Tonnes)	Total Produced Water Discharged (m <sup>3</sup> )
BRAE ALPHA	15.4	34.55	2,242,481
BRAE BRAVO	20.6	0.11	5,192
EAST BRAE	10.9	0.32	28,982
<b>TOTAL BRAE</b>	<b>15.4</b>	<b>34.98</b>	<b>2,276,655</b>

### 4.3 CHEMICAL USE AND DISCHARGE

The use and discharge of chemicals in the UK is regulated under the Offshore Chemical Regulations 2002 (amended 2011) and enforces a number of OSPAR requirements.

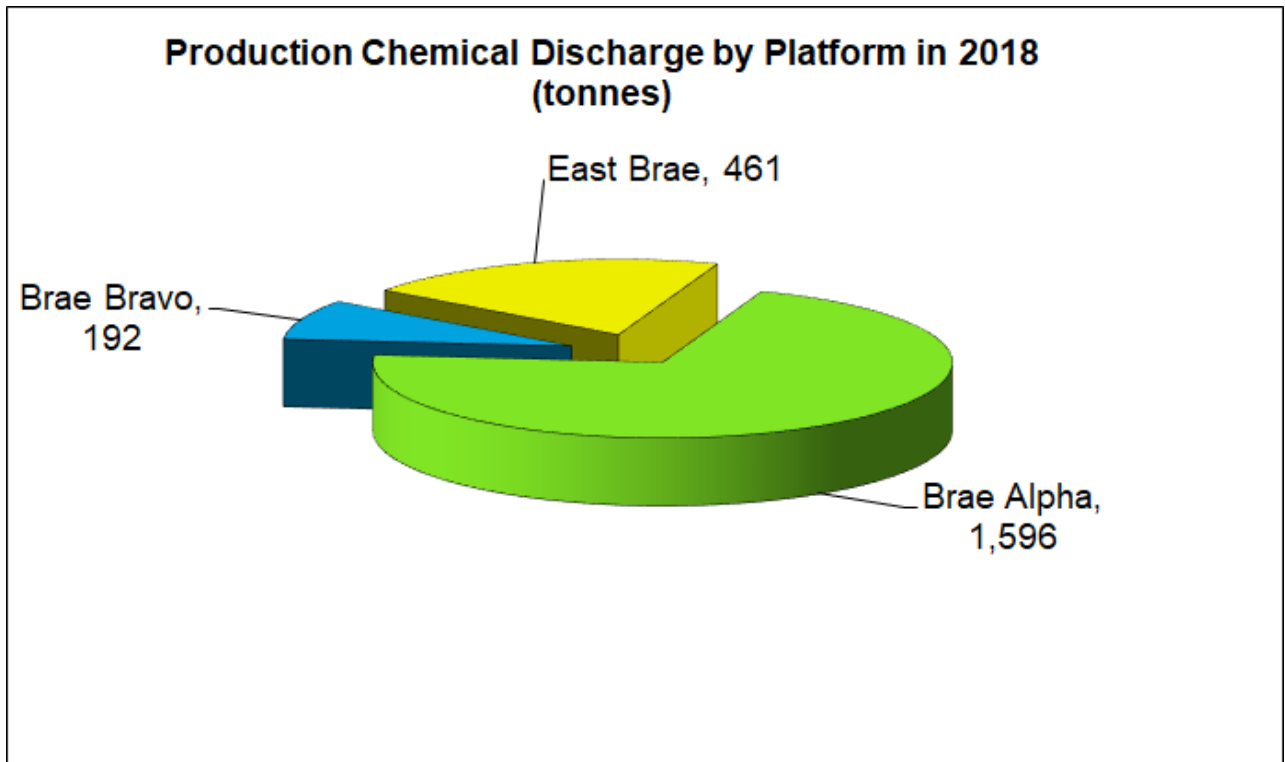
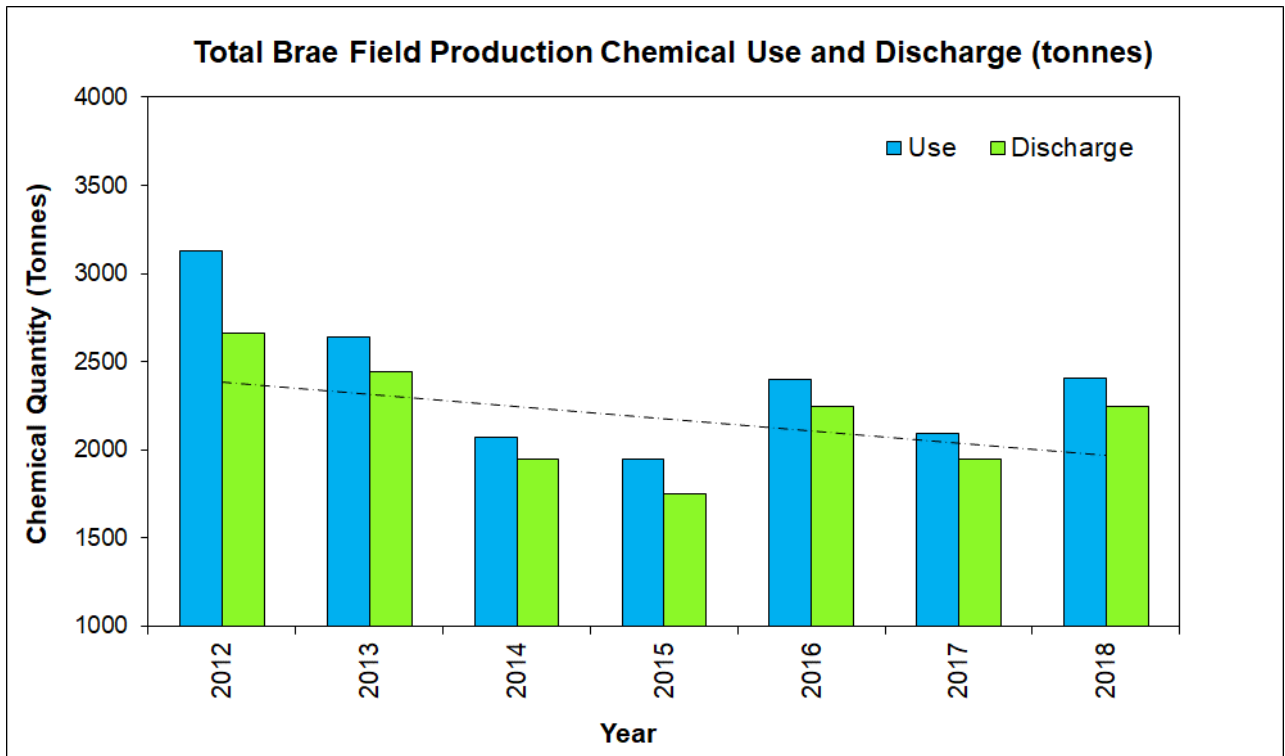
OSPAR recommendations require the phase out of any chemicals which carry substitution warnings, i.e. those chemicals that are considered to be harmful to the environment. Marathon Oil were committed to a programme of systematic reduction/removal of all chemicals carrying a substitution warning by the end of 2016 unless their use is required on technical and/or safety grounds. Over the last six years Marathon Oil has reduced the number of chemicals carrying a substitution warning from the Brae Field chemical permits by 17%. Only 3% of the total quantity of Production chemicals discharged from the Brae platforms during 2018 carried substitution warnings. These chemicals have been risk assessed in order to allow their continued use beyond December 2016 and efforts for replacement detailed in the annual Technical Justification Report where appropriate.

The vast majority of Production chemicals used and discharged in the Brae Field (97%) fall within Offshore Chemical Notification Scheme (OCNS) categories Gold and E which are least hazardous to the environment.

Total Production chemical discharges in the Brae Field were 2,249 tonnes in 2018 representing an increase of 16% compared to 2017. This was due to improved Brae Alpha production efficiency in 2018 compared to 2017 when an extended planned shutdown and prolonged export pipeline outage curtailed production. Additionally, a reassessment of some critical chemical applications and the chemical requirements for key projects contributed to the increased discharge.

The total quantity of chemicals discharged during the Brae Bravo Plug and Abandonment campaign was 292 tonnes. 95% of the chemicals discharged were categorised as PLONOR (pose little or no risk to the environment). Less than 1% of the chemicals discharged carried substitution warnings.

The total quantity of chemicals discharged during the 2018 Brae Alpha platform drilling campaign was 13 tonnes. This represents only 1.3% of the quantity of chemicals used during the campaign. The use of a disposal well significantly reduced the quantity of chemicals discharged to the marine environment. 96% of the chemicals discharged were categorised as PLONOR, and none of the chemicals discharged carried substitution warnings.



## PRODUCTION CHEMICALS

<b>FACILITY</b>	<b>Chemicals Used (Tonnes)</b>	<b>Chemicals Discharged (Tonnes)</b>
<b>BRAE ALPHA</b>	1,731	1,596
<b>BRAE BRAVO</b>	196	192
<b>EAST BRAE</b>	477	461
<b>TOTAL BRAE</b>	2,404	2,249

## PLUG AND ABANDON CAMPAIGN CHEMICALS

<b>FACILITY</b>	<b>Chemicals Used (Tonnes)</b>	<b>Chemicals Discharged (Tonnes)</b>
<b>BRAE BRAVO</b>	2,083	292

## DRILLING CAMPAIGN CHEMICALS

<b>FACILITY</b>	<b>Chemicals Used (Tonnes)</b>	<b>Chemicals Discharged (Tonnes)</b>
<b>BRAE ALPHA</b>	992	13



#### 4.4 EMISSIONS TO AIR

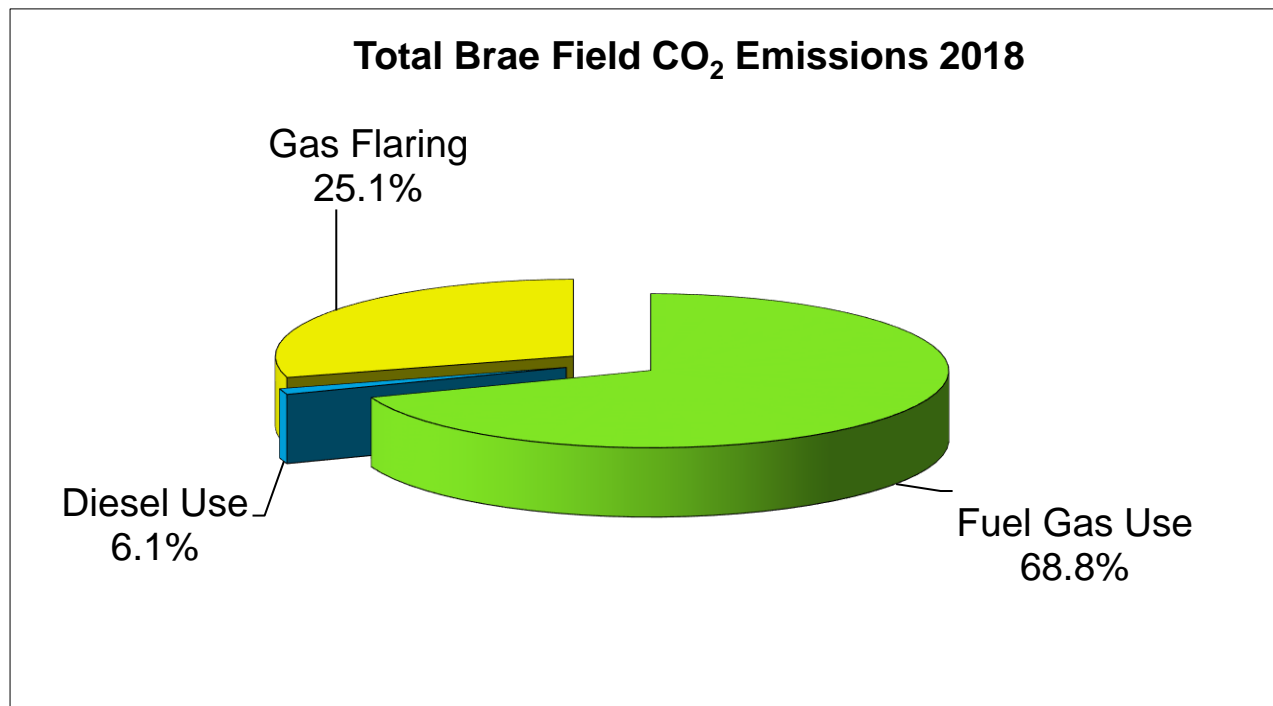
Carbon dioxide (CO<sub>2</sub>) is the largest atmospheric emission from the Brae Field, being produced by the combustion of natural gas and diesel and also from process gas flaring for safety purposes. The largest sources of these emissions are the gas turbines followed by the flares and these are regulated under The Greenhouse Gas Emissions Trading Scheme (ETS) Regulations 2012.

A key energy efficient feature of the Brae Field is the power sharing ring main. Alpha and Bravo supply power to East Brae which allows the installation to have no energy generating facilities of its own thus improving the energy efficiency of the field overall. Gas turbines are used to drive compression on Brae Bravo and East Brae and dual fuel (gas or diesel) turbines are used to drive power generators on Brae Alpha and Brae Bravo.

In 2018 Marathon Oil continued to operate in an energy efficient manner by consolidating the energy efficient changes from 2009 onwards and by continuing to minimise the power requirements within the Brae Field using the power ring main between the three platforms.

497,301 tonnes of CO<sub>2</sub> were emitted from the Brae platforms in 2018. This represents a decrease of 17% from the 2017 CO<sub>2</sub> emissions. This decrease in emissions was primarily due to the decommissioning of the Brae Bravo platform during 2018, with the associated reduction in emissions from combustion equipment and flaring.

Under the Offshore combustion Installations Pollution Prevention and Control Regulations 2013 (PPC), we are also regulated for the emissions of other components, i.e. Nitrogen Oxides (NO<sub>x</sub>), Sulphur Oxides (SO<sub>x</sub>), Carbon Monoxide (CO), Methane (CH<sub>4</sub>), and Non Methane Volatile Organic Compounds (VOC) from combustion equipment.



## 2018 CO<sub>2</sub> Emissions

FACILITY	TOTAL CO <sub>2</sub> EMISSIONS		
	Fuel Gas Use (Tonnes)	Diesel Use (Tonnes)	Gas Flaring (Tonnes)
BRAE ALPHA	122,714	2,497	66,162
BRAE BRAVO	153,800	27,994	19,568
EAST BRAE	65,464	78	39,024
<b>TOTAL BRAE</b>	<b>341,978</b>	<b>30,569</b>	<b>124,754</b>

## 2018 NON CO<sub>2</sub> Emissions

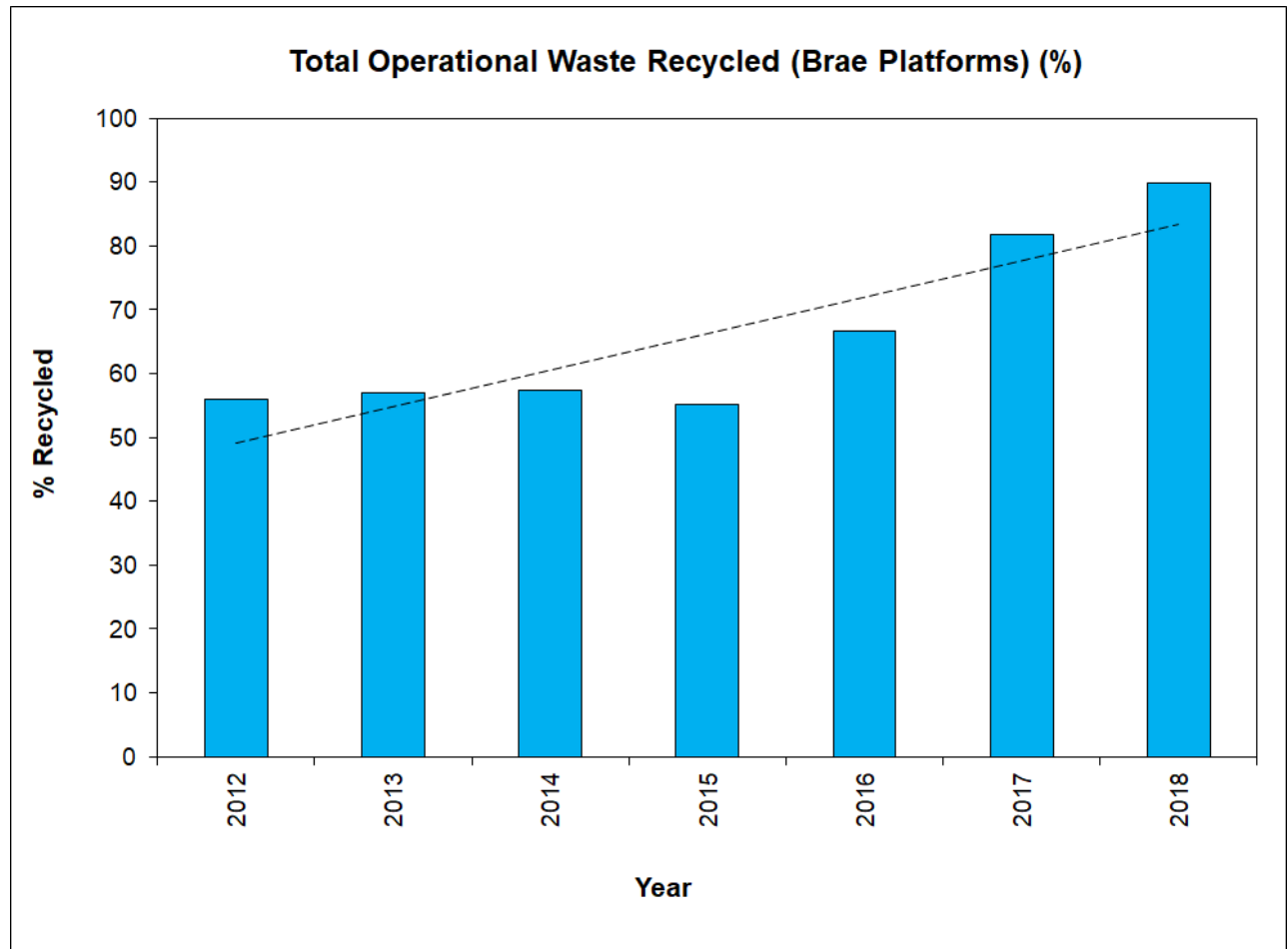
FACILITY	TOTAL NON CO <sub>2</sub> EMISSIONS				
	NOx (Tonnes)	SOx (Tonnes)	CO (Tonnes)	CH <sub>4</sub> (Tonnes)	VOC (Tonnes)
BRAE ALPHA	576	7	349	53	2
BRAE BRAVO	1,133	40	390	58	6
EAST BRAE	348	1	153	23	1
<b>TOTAL BRAE</b>	<b>2,057</b>	<b>48</b>	<b>892</b>	<b>134</b>	<b>9</b>

## 4.5 WASTE DISPOSAL

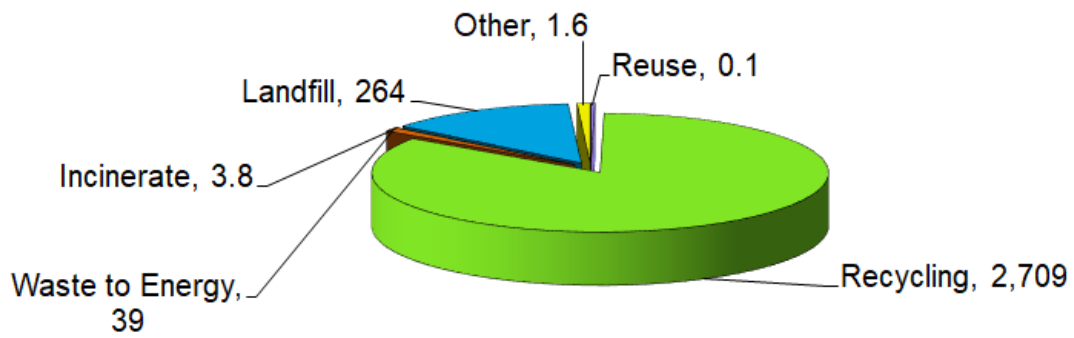
Marathon Oil's aim is to minimise waste produced and reduce dependence on landfill; as such there are robust arrangements in place for the segregation and management of these wastes. Waste is disposed of in line with the waste hierarchy.

The total quantity of operational waste generated across the Brae platforms in 2018 was 3,018 tonnes. This represented an increase of 98 tonnes from the 2017 figure. During 2018 there was an improvement in waste recycled which increased from 84 to 90%. This was due to a large quantity of metal conductors recovered from the Brae Bravo wells during the pre-decommissioning works, which were taken onshore and recycled (2211 tonnes).

During 2018 Marathon Oil undertook onshore skip audits at the waste management contractor's yard to assess how well offshore personnel segregate waste to be sent to landfill. Overall performance was good with 97% of waste produced being segregated correctly. This is an improvement from 95% in 2017. These audits are useful in identifying the composition of the waste produced and opportunities for minimisation.



### Total Brae Field Operational Waste Disposal Routes in 2018 (Tonnes)



FACILITY	WASTE STREAMS						
	Reuse	Recycling	Waste to Energy	Incinerate	Landfill	Other	Totals
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
<b>BRAE ALPHA</b>	0.0	218.5	14.2	0.7	138.2	0.6	372.2
<b>BRAE BRAVO</b>	0.1	2377.7	11.7	2.5	60.9	1.0	2453.8
<b>EAST BRAE</b>	0.0	113.2	13.2	0.6	65.0	0.0	192.0
<b>TOTAL BRAE</b>	0.1	2709.4	39.1	3.8	264.1	1.6	3018.0