



**Marathon Oil UK LLC  
2017  
Environmental Performance Report**

## CONTENTS

SECTION		PAGE
<b>1</b>	<b>PREFACE</b>	<b>3</b>
<b>2</b>	<b>OVERVIEW OF OFFSHORE INSTALLATIONS</b>	<b>4</b>
2.1	BRAE ALPHA	5
2.2	BRAE BRAVO	5
2.3	EAST BRAE	5
2.4	DRILLING	5
<b>3</b>	<b>ENVIRONMENTAL MANAGEMENT AT MARATHON OIL</b>	<b>6</b>
3.1	MOC HEALTH, ENVIRONMENT, SAFETY AND SECURITY BELIEFS	7
3.2	MOC LIFE CRITICAL EXPECTATIONS	8
3.3	HES&S POLICY DOCUMENT	9
<b>4</b>	<b>ENVIRONMENTAL PERFORMANCE</b>	<b>10</b>
4.1	OIL AND CHEMICAL SPILLS	10
4.2	PRODUCED WATER	11
4.3	CHEMICAL USE AND DISCHARGE	12
4.4	CARBON DIOXIDE EMISSIONS	14
4.5	WASTE DISPOSAL	16

# **1        PREFACE**

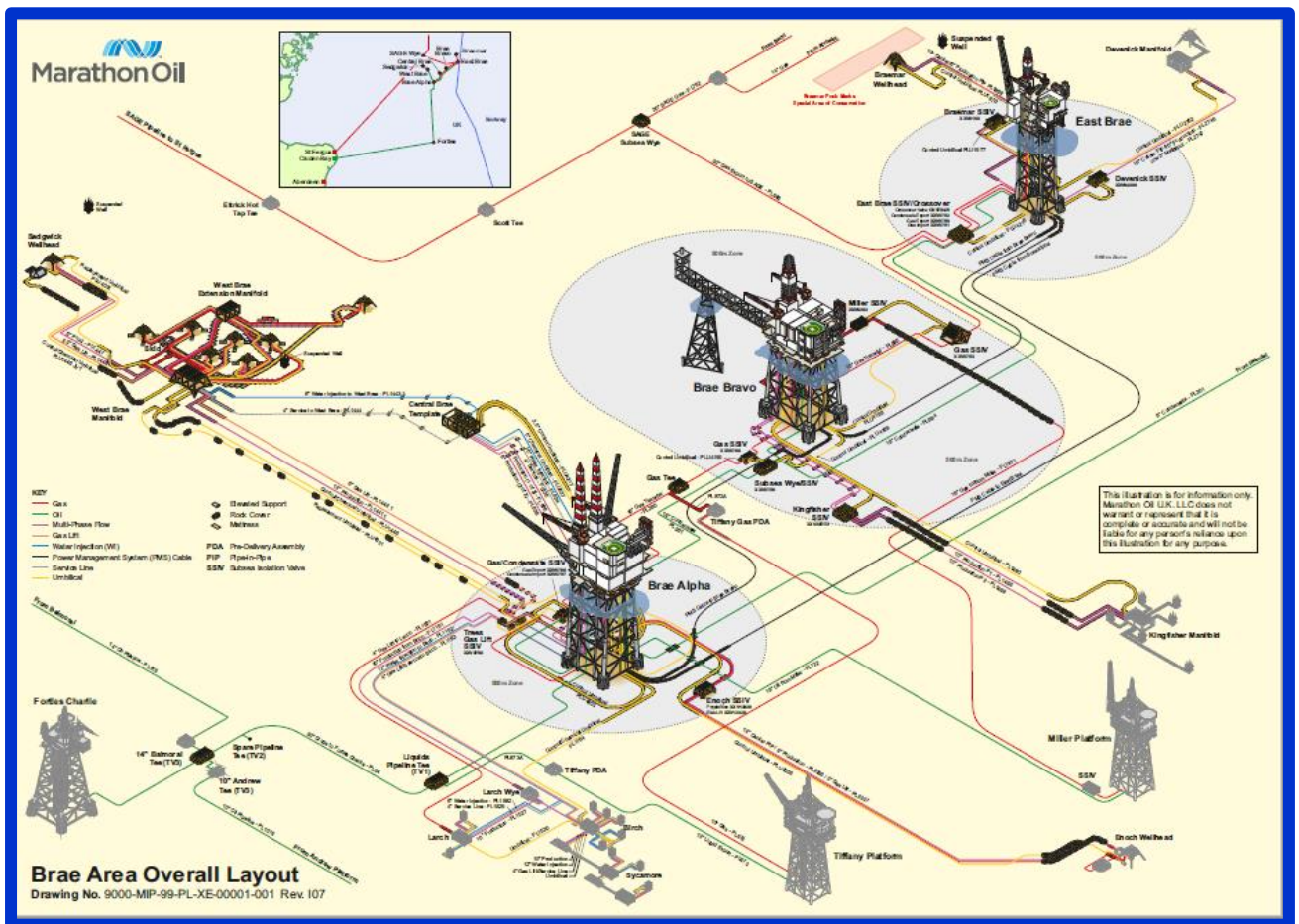
Marathon Oil UK LLC (Marathon Oil) is committed to environmental protection and places significant emphasis and resources on minimising wastes, emissions and other releases through its operations. Environmental performance indicators are a key part of Marathon Oil's corporate and operational performance commitments with targets designed to drive continuous improvement. This report summarises the 2017 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. However, as the 2017 Plugging and Abandonment (P&A) Campaign has progressed, the number of producing fields has reduced.

## **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**

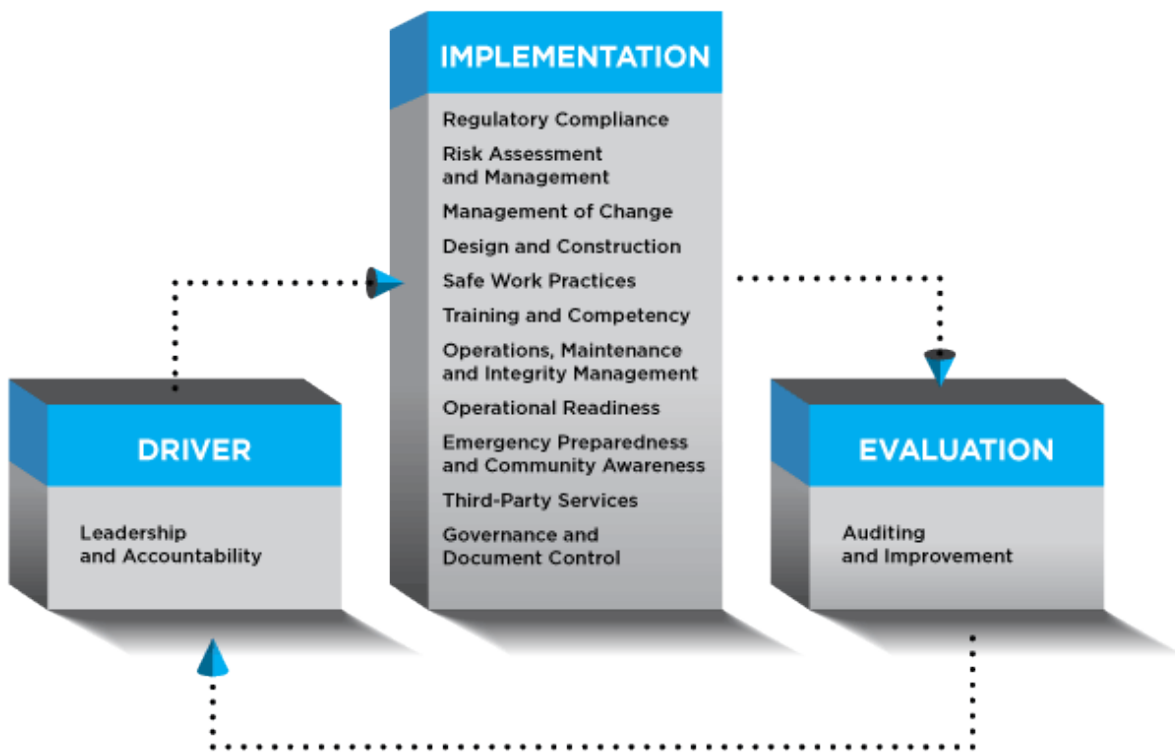
A multiple well plug and abandonment campaign continued on the Brae Bravo platform in 2017.

### 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.

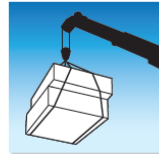
Environmental objectives and targets are developed as part of the annual business review and planning cycle for the Brae Area. Marathon Oil sets key environmental performance indicators at the beginning of each year and progress against these is reviewed regularly, to ensure that no significant deviations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



## Statement of HES&S Beliefs

1. We will conduct all aspects of our business in a **SAFE, CLEAN, SECURE, RESPONSIBLE** and cost effective manner.
2. Our **ATTITUDE, ACTIONS and EXPECTATIONS** will make it obvious that we consider health, safety, security and environmental stewardship first in every operation.
3. **ALL WORKERS** must communicate openly, honestly and often regarding health, environment, safety and security (HES&S) goals, issues and workplace hazards. Every worker has the right and obligation to stop a job if HES&S issues are not addressed.
4. **MANAGEMENT** will support the workers' efforts through their actions and priorities to improve HES&S by providing training, seeking input, assisting in investigations and sharing lessons learned across the organization.
5. By **PREPARING to WORK SAFELY** and in an **ENVIRONMENTALLY SOUND MANNER** we will reduce the inherent risks in our activities to an acceptable level before an activity is undertaken.
6. **HES&S SUGGESTIONS** will be respectfully and thoughtfully considered and feedback will be returned.
7. Incidents and near misses will be **REPORTED and INVESTIGATED** appropriately to determine cause, effect and preventive measures.
8. We will **LEARN and IMPROVE** from our observations and mistakes by openly communicating and seeking meaningful changes.
9. Working safely and in an environmentally sound manner is an **INDIVIDUAL CHOICE** that each of us must be committed to make continuously without failure.
10. Working safely and in an environmentally sound manner is a **CONDITION of EMPLOYMENT**.

HES916 7/2011



## Life Critical Expectations

Understanding and applying all Health, Environment, Safety, and Security (HES&S) and Operating Procedures are requirements to work at Marathon locations. While every task must be evaluated to identify hazards and risks, certain tasks performed incorrectly have a higher probability of serious injury or fatality. As employees and contractors of Marathon Oil Company, **WE WILL...**

**WORK SAFELY** by planning the work, assessing hazards, minimizing risk and communicating the plan before beginning work.

Obtain and utilize Safe Work **PERMITS** and Procedures when conducting Hot Work, Confined Space Entry, and all other permit required work activities.

Isolate, de-energize, lock out and tag out all **ENERGY SOURCES** as required when performing work.

Protect ourselves and others by taking effective precautions whenever working from **ELEVATED** locations.

Conduct overhead **LIFTING** operations according to lifting procedures and industry standards.

Follow safe **DRIVING** practices and avoid distractions while operating any vehicle.

These Life Critical Expectations are in line with our aim of ensuring everyone who works at Marathon goes home safely. Failure to work safely and follow Marathon's procedures in accordance with these minimum expectations will result in disciplinary action.

HG5917 7/2011





### **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**  
Regional Vice President UK  
**24 October 2017**

A handwritten signature in blue ink, appearing to read "James Edens".

## 4 ENVIRONMENTAL PERFORMANCE

This section summarises Marathon Oil's offshore environmental performance for 2017.

### 4.1 OIL AND CHEMICAL SPILLS

During 2017 there were two unplanned release of oil totalling 0.77006 tonnes.

- One unplanned release of oil from a crude booster pump cooler, totalling 0.00006 tonnes, took place on the Brae Alpha facilities. The cooler plates were replaced and no further releases occurred.
- One unplanned release of lube oil from a main oil line pump lube oil reservoir, totalling 0.77 tonnes, took place on the Brae Alpha facilities. The pump was shut down and no further releases occurred.

There were seven unplanned release of chemicals totalling 8.117 tonnes.

- Three separate unplanned releases of cooling medium containing a cocktail of three chemicals, totalling 0.69 tonnes, took place on the Brae Alpha facilities. Repairs were carried out and no further releases occurred.
- One unplanned release of subsea hydraulic fluid (HW443ND), totalling 0.995 tonnes, took place on the Brae Alpha facilities due to particle contamination within a control valve on a West Brae xmas tree. Following cycling of the valve no further release occurred.
- Two unplanned releases of methanol, totalling 0.13 tonnes, took place on the Brae Alpha facilities. One release of 0.13 tonnes from the methanol injection system on the West Brae template was subsequently repaired. The second release of 0.00138 tonnes was from the methanol injection x-over needle valve seal assembly within the West Brae manifold.
- One unplanned release of sodium chloride brine to the open drains system, totalling 6.3 tonnes, took place on the Brae Bravo facilities. Drilling cement and test lines had inadvertently not been reconnected post rig skidding operations. Post rig skid procedures were reviewed to avoid recurrence.

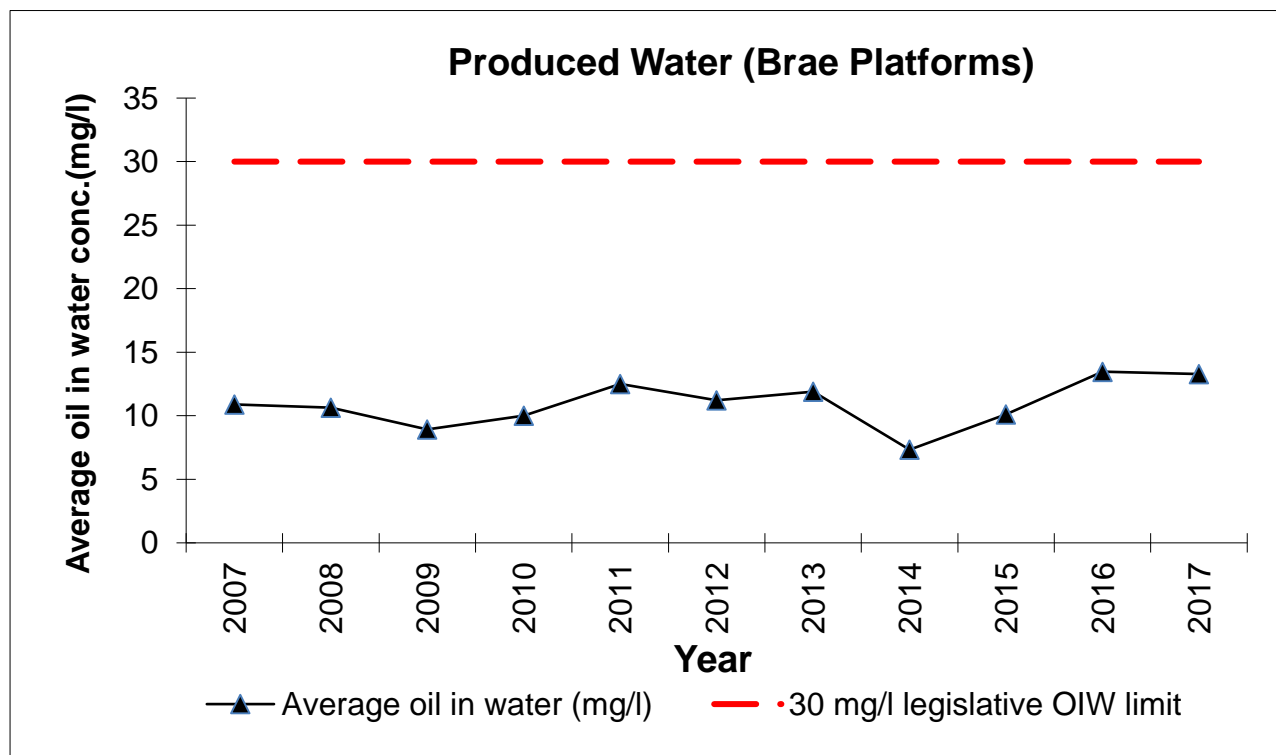
It was considered that these unplanned releases did not pose a significant environmental impact.

## 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 2017 was 13 mg/l (see figure below). This has remained the same as 2016 produced water quality despite a 21 % increase in the total volume of produced water discharged. In total, 2,356,547 m<sup>3</sup> of produced water and 31.3 tonnes of permitted oil was discharged in 2017, 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	Average Oil in Produced Water concentration (mg/l)	Total Oil Discharged in Y2017 (Tonnes)	Total Produced Water Discharged in Y2017 (m3)
BRAE ALPHA	15.0	28.38	1,890,020
BRAE BRAVO	5.9	2.58	437,821
EAST BRAE	12.8	0.37	28,706
<b>TOTAL BRAE</b>	<b>13.3</b>	<b>31.33</b>	<b>2,356,547</b>

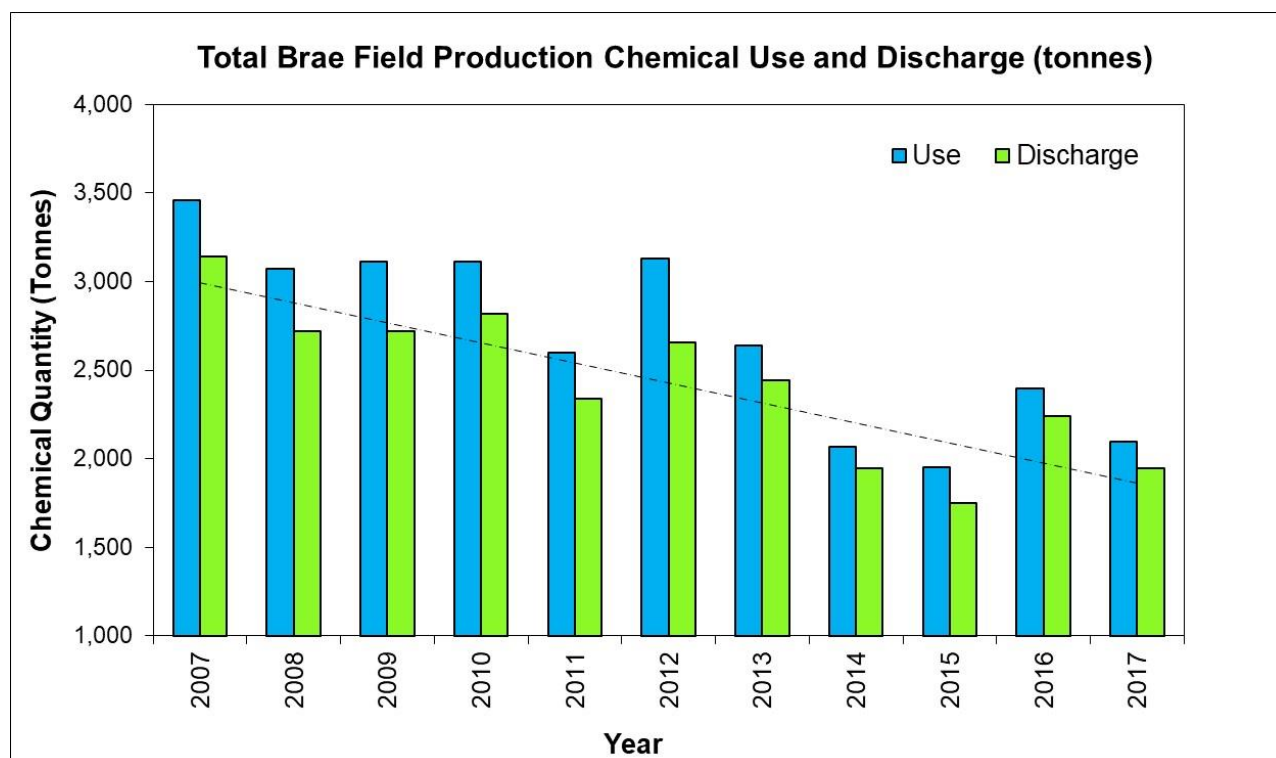
### 4.3 CHEMICAL USE AND DISCHARGE

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.

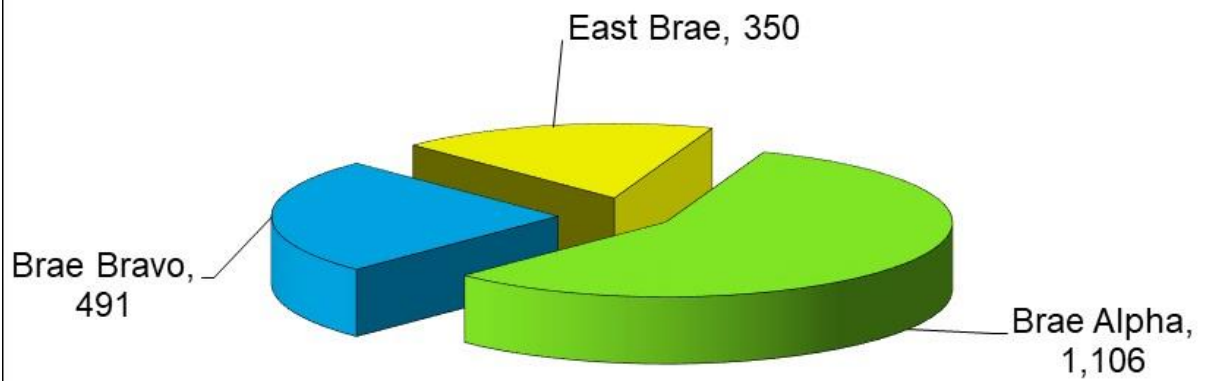
OSPAR recommendations require the phase out of any chemicals which carry substitution warnings, i.e. those chemicals that are considered to be harmful to the environment. Marathon Oil were committed to a programme of systematic reduction/removal of all chemicals carrying a substitution warning by the 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 54%. Only 2.8% of the total quantity of chemicals discharged from the Brae platforms during 2017 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 chemicals used and discharged in the Brae Field (98%) fall within Offshore Chemical Notification Scheme (OCNS) categories Gold and E which are least hazardous to the environment.

Production chemical discharges in the Brae Field decreased by 13% in 2017 compared to 2016. This was due to the P&A Campaign on Brae Bravo, which progressively reduced production rates and associated chemical dosing requirements.



**Production Chemical Discharge by Platform in 2017  
(tonnes)**



<b>FACILITY</b>	<b>Chemicals Used (Tonnes)</b>	<b>Chemicals Discharged (Tonnes)</b>
<b>BRAE ALPHA</b>	1,215	1,106
<b>BRAE BRAVO</b>	510	491
<b>EAST BRAE</b>	370	350
<b>TOTAL BRAE</b>	2,095	1,947

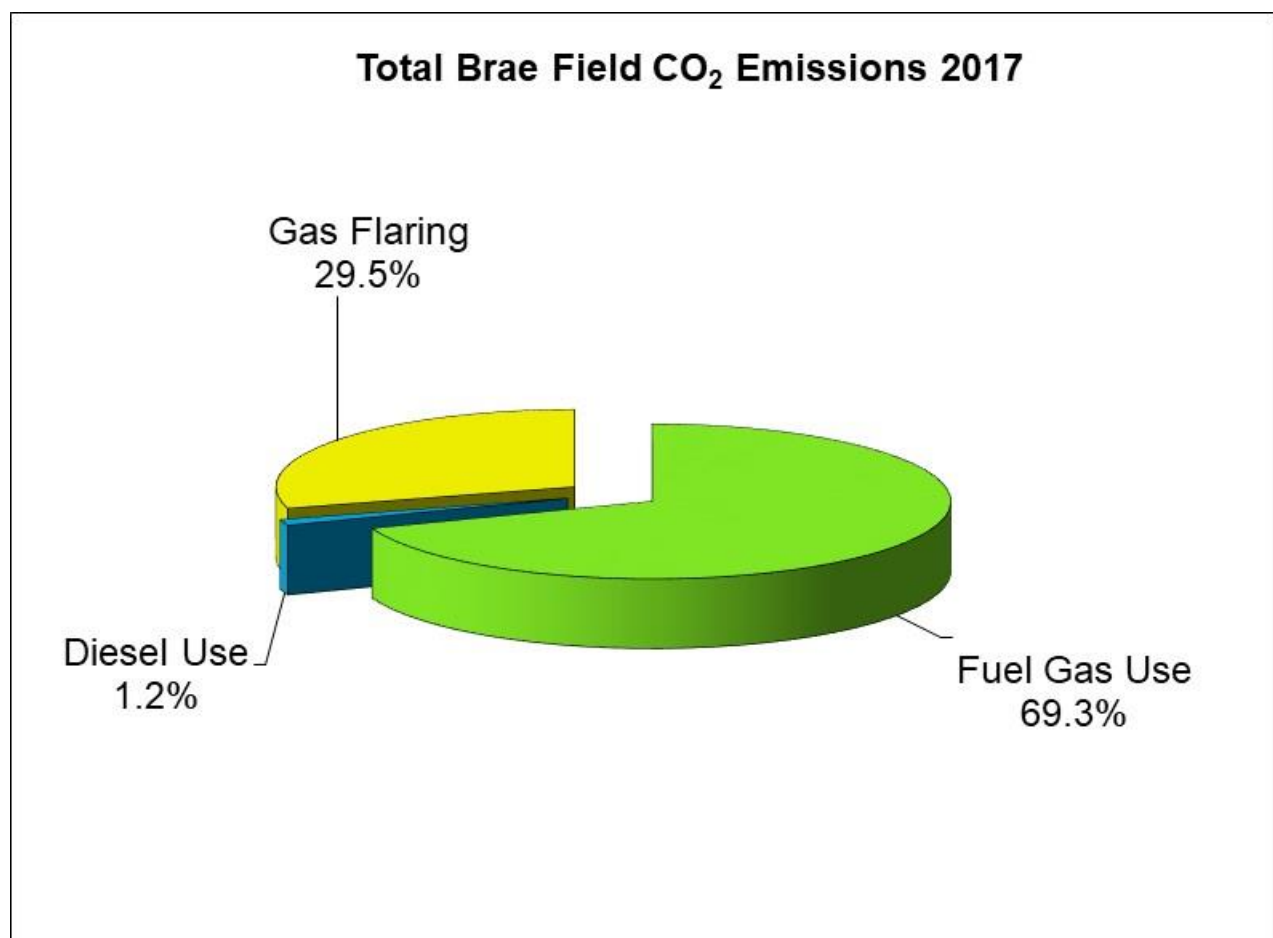
#### 4.4 CARBON DIOXIDE EMISSIONS

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 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 2017 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.

598,000 tonnes of CO<sub>2</sub> were emitted from the Brae platforms in 2017. This represents an increase of 6% from the 2016 CO<sub>2</sub> emissions in line with the Brae Alpha Platform being shut down in Q1 2016.



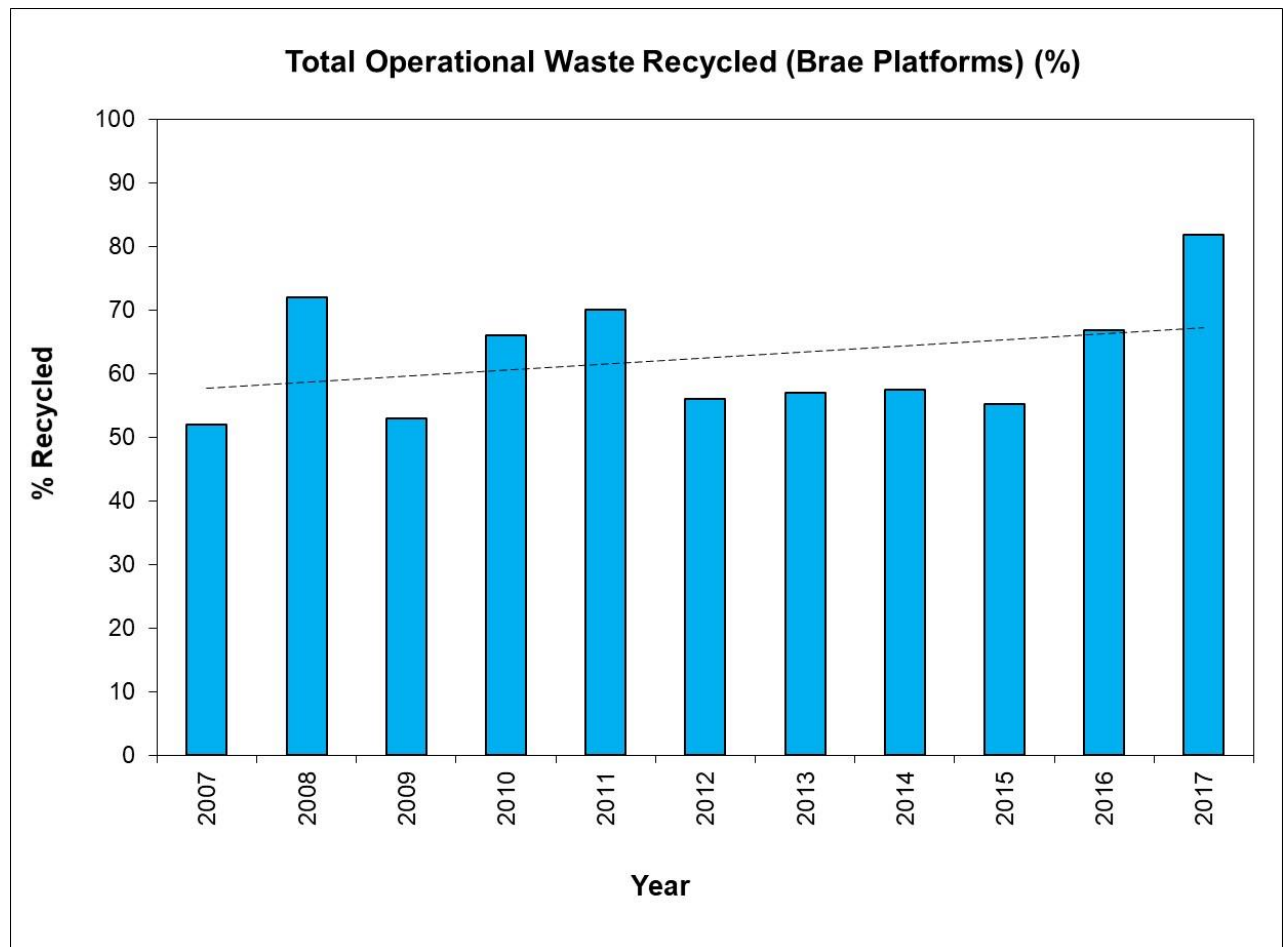
FACILITY	TOTAL CO2 EMISSIONS		
	Fuel Gas Use (Tonnes)	Diesel Use (Tonnes)	Gas Flaring (Tonnes)
BRAE ALPHA	137,205	5,408	67,160
BRAE BRAVO	213,100	1,828	52,321
EAST BRAE	63,907	85	56,754
<b>TOTAL BRAE</b>	<b>414,212</b>	<b>7,321</b>	<b>176,235</b>

## 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.

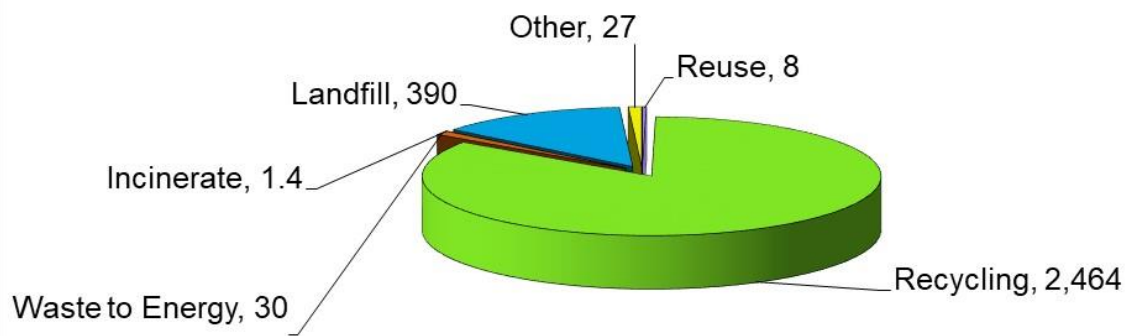
Since 2012 waste produced across the Brae Field has remained relatively constant. During 2017 there was a significant improvement in waste recycled which increased from 67 to 84%. This was due to a large quantity of metal tubulars recovered from the Brae Bravo during the P&A Campaign which were taken onshore and recycled (1809 tonnes).

During 2017 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 95% of waste produced being segregated correctly. These audits are useful in identifying the composition of the waste produced and opportunities for minimisation.





### Total Brae Field Operational Waste Disposal Routes in 2017 (Tonnes)



FACILITY	WASTE STREAMS						
	Reuse	Recycling	Waste to Energy	Incinerate	Landfill	Other	Totals
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
<b>BRAE ALPHA</b>	0.1	361.2	7.8	0.8	181.4	5.3	556.7
<b>BRAE BRAVO</b>	0.0	2045.9	13.3	0.4	134.5	20.4	2214.5
<b>EAST BRAE</b>	8.2	56.7	8.8	0.2	74.1	1.3	149.3
<b>TOTAL BRAE</b>	8.3	2463.8	29.9	1.4	390.0	27.0	2920.5