

Marathon Oil UK LLC

2016

Environmental Performance Report



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1 **PREFACE**

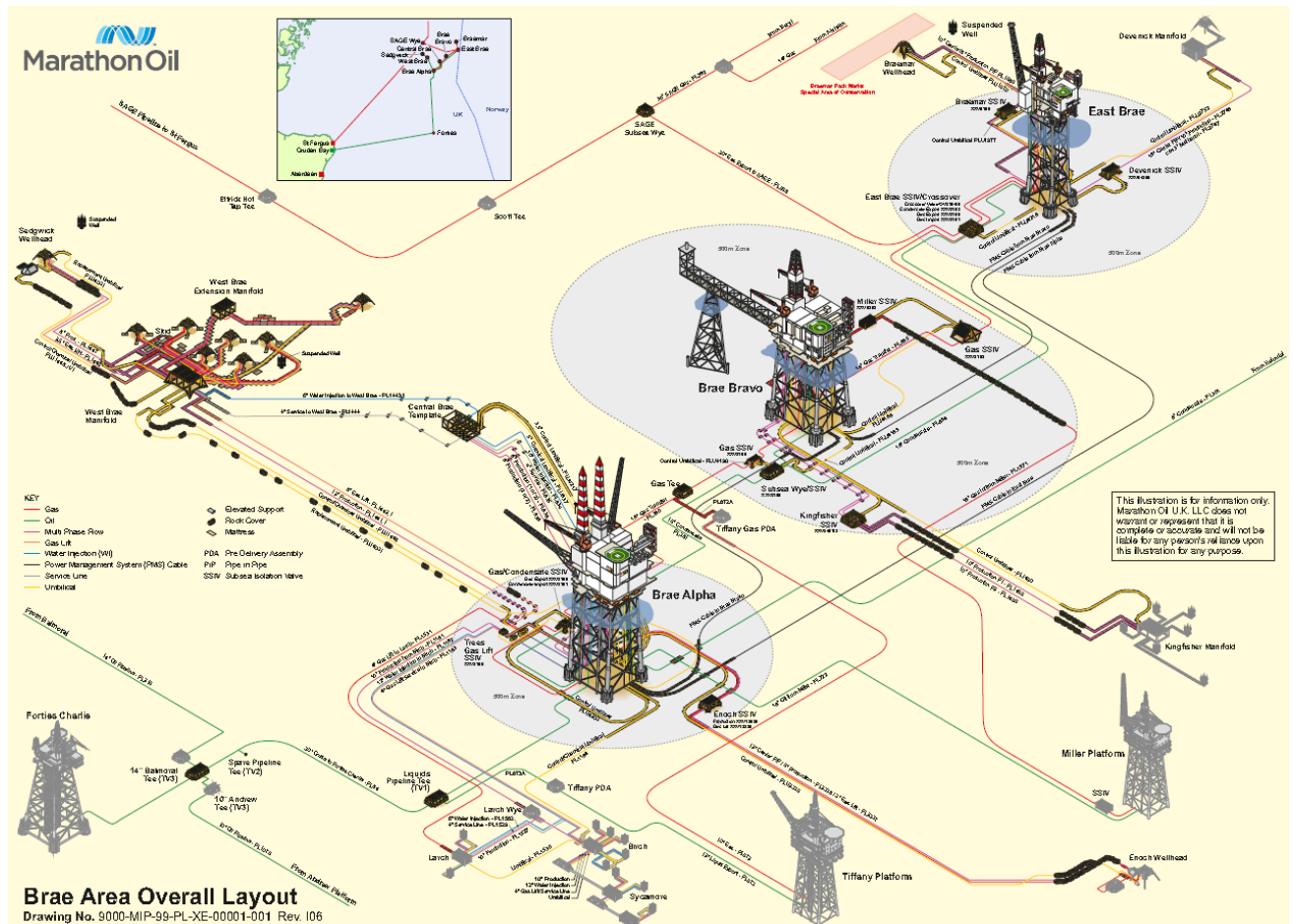
Marathon Oil UK LLC (Marathon Oil) is committed to environmental protection and places significant emphasis and resources on minimising wastes, emissions and other releases through its operations. Environmental performance indicators are a key part of Marathon Oil's corporate and operational performance commitments with targets designed to drive continuous improvement. This report summarises the 2016 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 Centrica 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 process produced fluids from the Marathon Oil operated North Brae, Central Brae, Beinn and Bracken Fields plus fluids from the Shell operated Kingfisher Field.

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

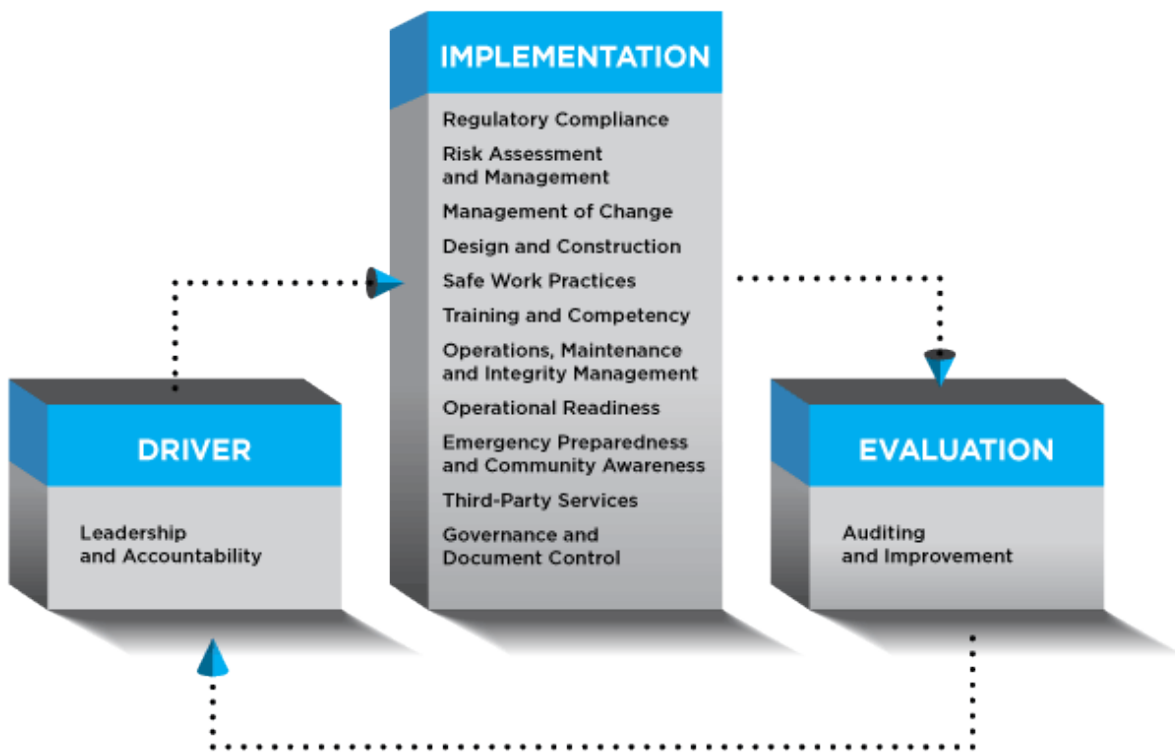
A multiple well plug and abandonment campaign commenced on the Brae Bravo platform in 2016.

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 2016.

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.

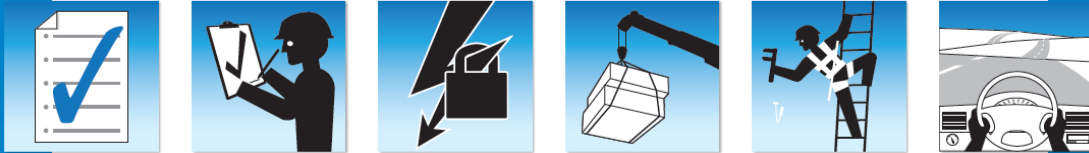
3.1 MOC HEALTH, ENVIRONMENT, SAFETY AND SECURITY BELIEFS



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**.

HESB16 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

4 ENVIRONMENTAL PERFORMANCE

This section summarises Marathon Oil's offshore environmental performance for 2016.

4.1 OIL AND CHEMICAL SPILLS

During 2016 there was one unplanned release of oil totalling 0.00043 tonnes.

- One unplanned release of diesel totalling 0.00043 tonnes took place on the Brae Alpha facilities. The diesel pump was stopped to prevent further discharge and no further releases occurred.

There was one unplanned release of chemicals totalling 0.585 tonnes.

- One unplanned release of subsea hydraulic fluid (HW443ND) totalling 0.585 tonnes took place on the Brae Alpha facilities. HW443ND is a water based hydraulic fluid. The cause of this incident was identified and remedial action was taken.

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

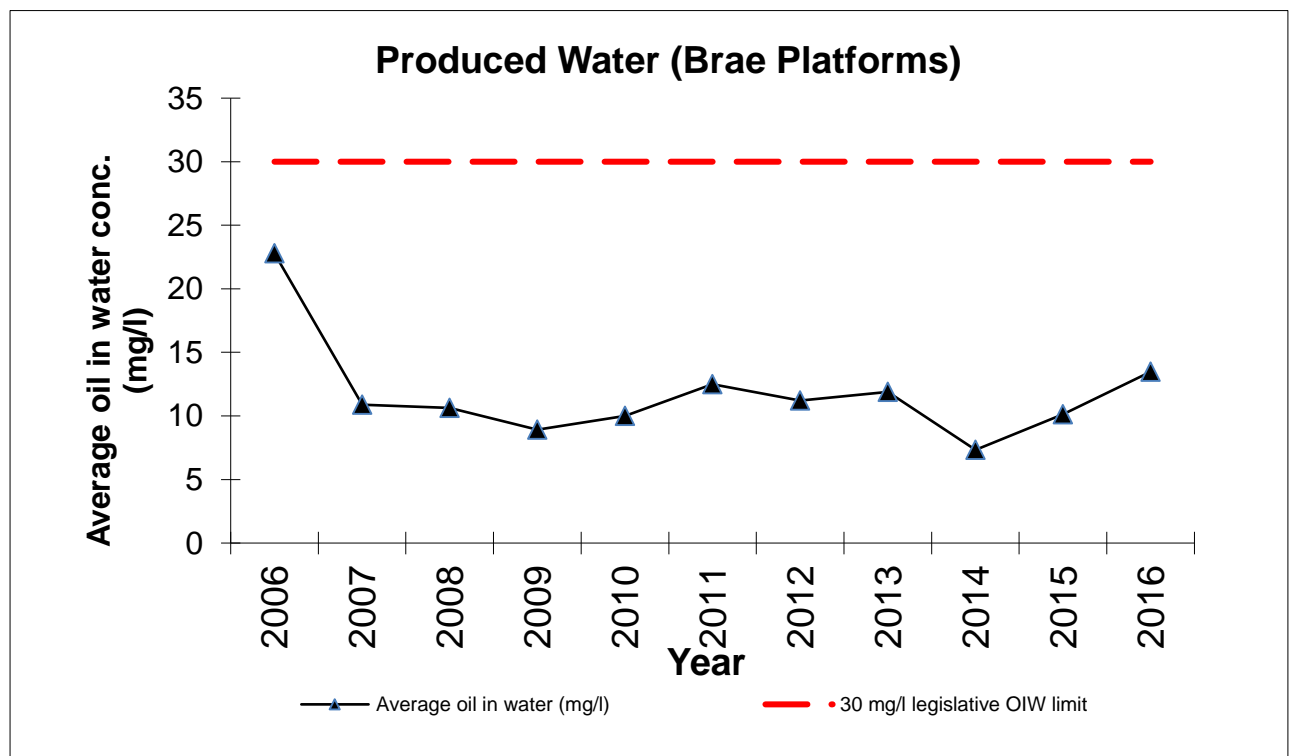
4.2 PRODUCED WATER

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 for the Brae Field in 2016 was 13 mg/l (see figure below). This represents a slight increase from 10 mg/l in 2015. This was mainly due to the return to production of the subsea Enoch well and lower temperatures encountered in the Trees separation train both of which posed water quality challenges. In total, 1,942,280 m3 of produced water and 26.2 tonnes of permitted oil was discharged in 2016, 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.

The sharp decrease in oil concentration between 2006 and 2007, shown below, was due to the installation of new advanced produced water treatment facilities and a change in the oil in water analysis method prescribed by the regulator (BEIS).



FACILITY	Average Oil in Produced Water concentration (mg/l)	Total Oil Discharged in Y2016 (Tonnes)	Total Produced Water Discharged in Y2016 (m3)
BRAE ALPHA	16.7	20.80	1,242,586
BRAE BRAVO	7.3	4.89	670,565
EAST BRAE	16.4	0.48	29,129
TOTAL BRAE	13.5	26.17	1,942,280

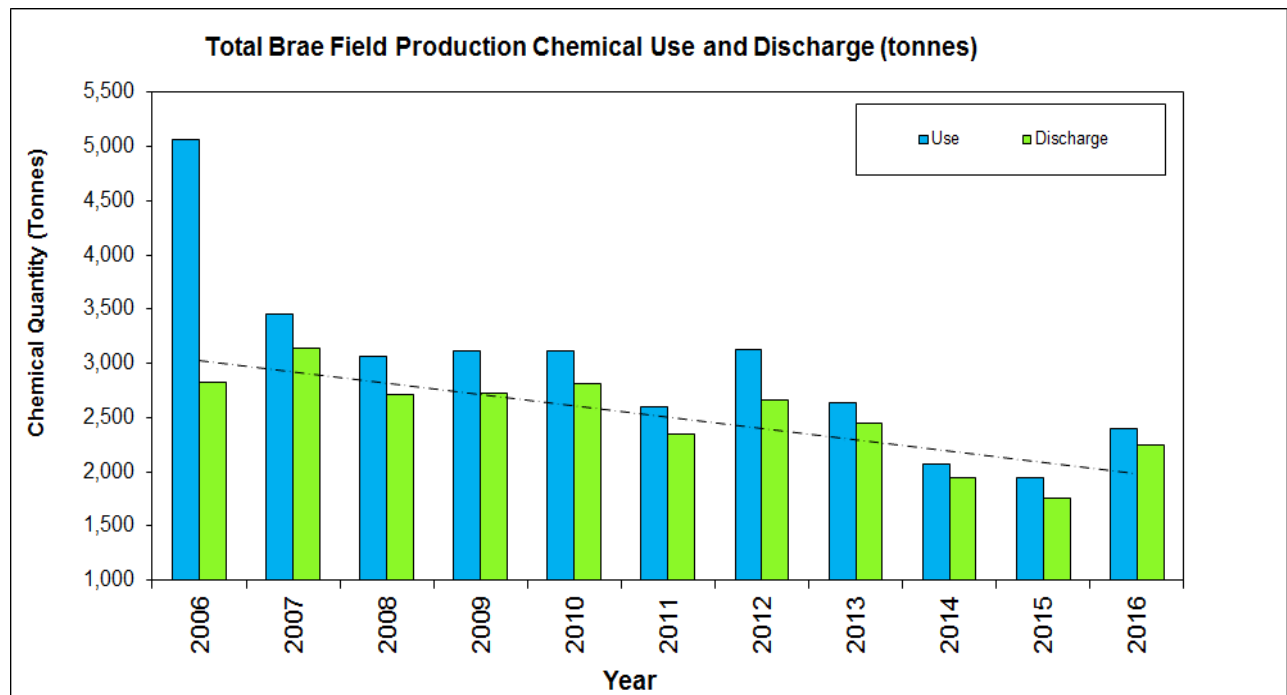
4.3 CHEMICAL USE AND DISCHARGE

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.

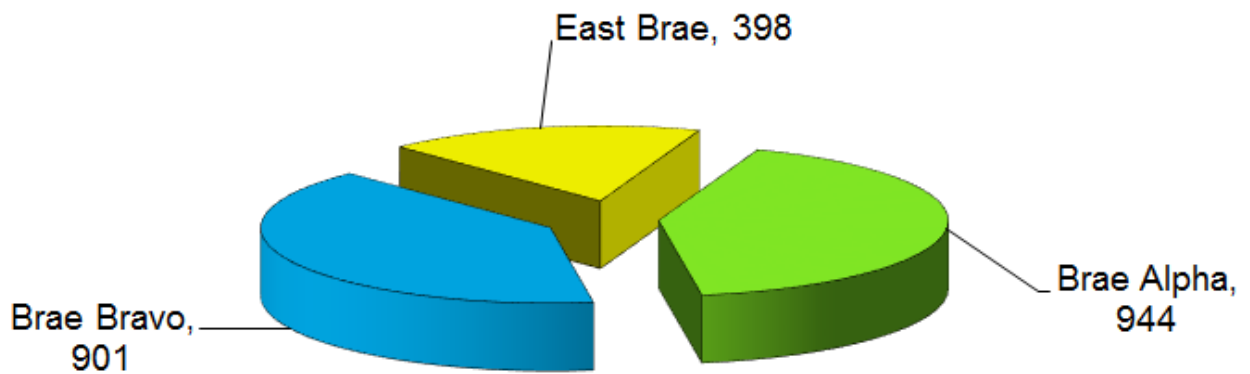
OSPAR recommendations require the phase out of any chemicals which carry substitution warnings, i.e. those chemicals that are considered to be harmful. Marathon Oil were committed to a programme of systematic reduction/removal of all chemicals carrying a substitution warning by the end of 2016 unless their use is required on technical and/or safety grounds. Over the last five years Marathon Oil has reduced the number of chemicals carrying a substitution warning from the Brae Field chemical permits by 62%. Only 2% of the total quantity of chemicals discharged from the Brae platforms during 2016 carried substitution warnings.

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 increased by 28% in 2016 compared to 2015. This was due to the large quantities of sodium chloride brine used in the Brae Bravo well plug and abandonment campaign. Sodium chloride brine is classed as a PLONOR chemical (poses little or no risk to the environment).



**Production Chemical Discharge by Platform in 2016
(tonnes)**



FACILITY	Chemicals Used (Tonnes)	Chemicals Discharged (Tonnes)
BRAE ALPHA	1,056	944
BRAE BRAVO	922	901
EAST BRAE	421	398
TOTAL BRAE	2,398	2,243

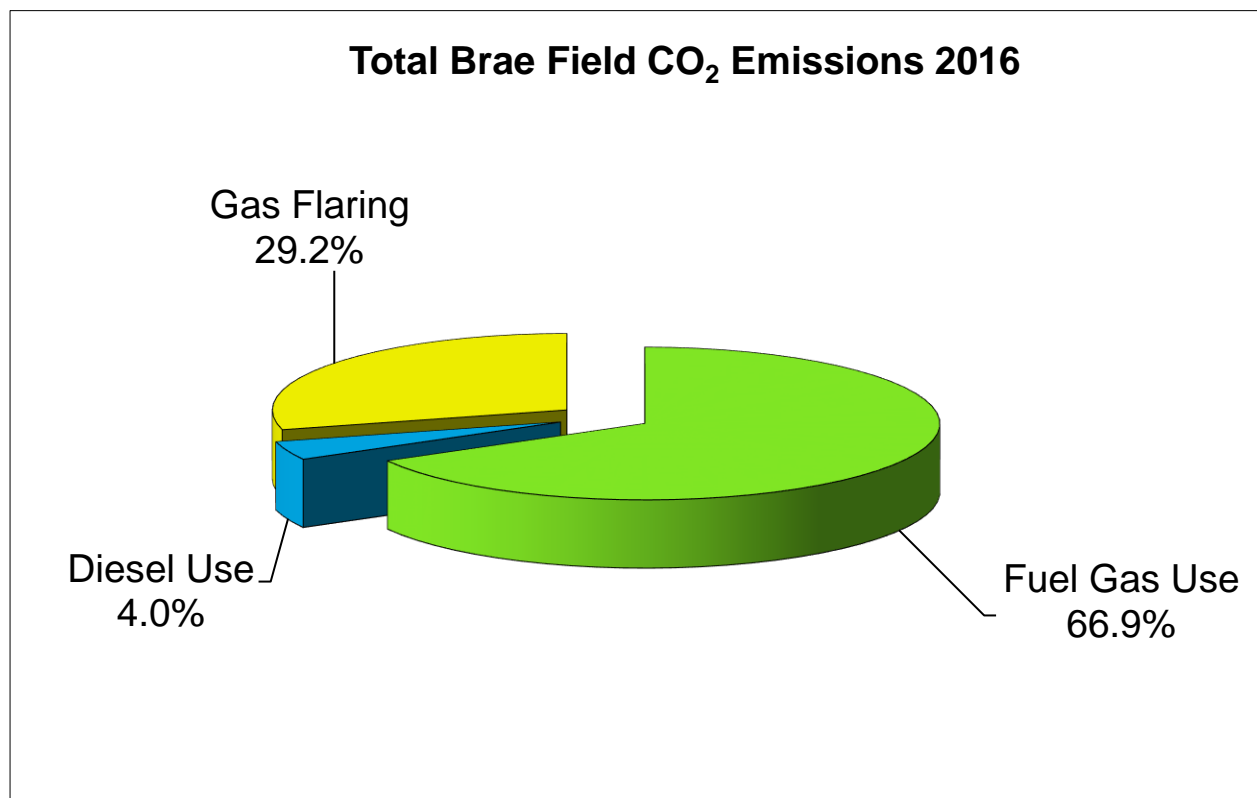
4.4 CARBON DIOXIDE EMISSIONS

Carbon dioxide (CO₂) 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 2016 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.

562,000 tonnes of CO₂ were emitted from the Brae platforms in 2016. This represents a decrease of 10% from the 2015 CO₂ emissions in line with the Brae Alpha Platform being shut down in Q1 2016.



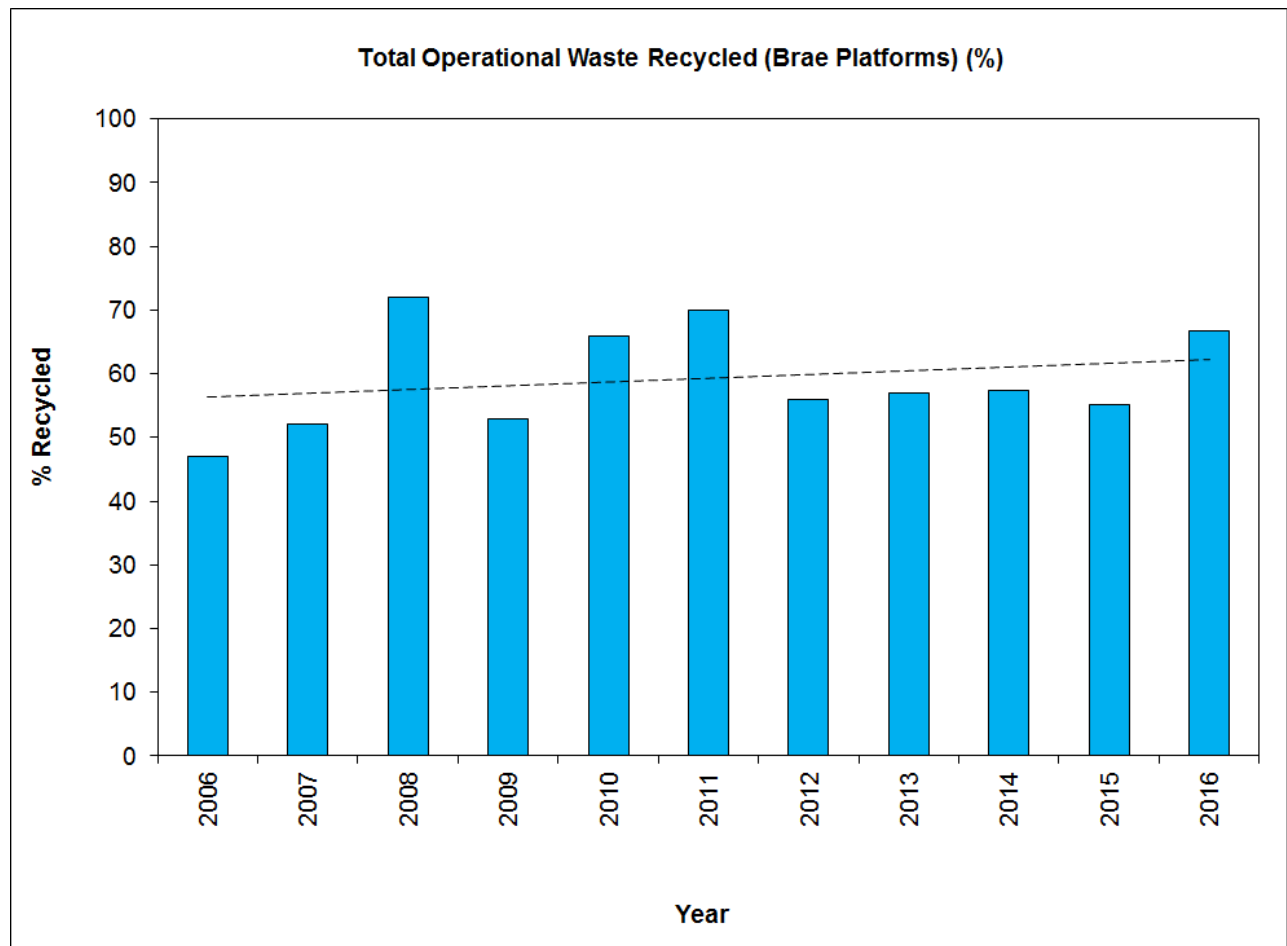
FACILITY	TOTAL CO2 EMISSIONS		
	Fuel Gas Use (Tonnes)	Diesel Use (Tonnes)	Gas Flaring (Tonnes)
BRAE ALPHA	107,248	9,319	67,986
BRAE BRAVO	205,487	12,711	59,747
EAST BRAE	63,063	167	36,088
TOTAL BRAE	375,798	22,197	163,821

4.5 WASTE DISPOSAL

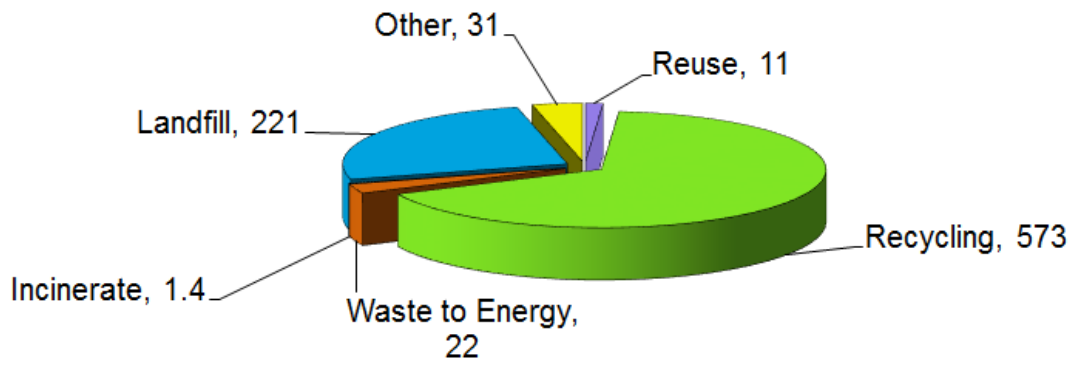
Marathon Oil's aim is to minimise waste produced and reduce dependence on landfill; as such there are robust arrangements in place for the segregation and management of these wastes. Waste is disposed of in line with the waste hierarchy.

Since 2012 waste produced across the Brae Field has remained relatively constant. During 2016 there was a significant improvement in waste recycled which increased from 55 to 67%.

During 2016 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. These audits are useful in identifying the composition of the waste produced and opportunities for minimisation.



Total Brae Field Operational Waste Disposal Routes in 2016 (Tonnes)



FACILITY	WASTE STREAMS						
	Reuse	Recycling	Waste to Energy	Incinerate	Landfill	Other	Totals
	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)	(Tonnes)
BRAE ALPHA	7.0	230.7	11.1	1.3	115.3	3.6	369.0
BRAE BRAVO	3.7	122.5	9.2	0.1	84.1	27.4	247.1
EAST BRAE	0.0	220.1	1.7	0.0	21.4	0.0	243.2
TOTAL BRAE	10.8	573.4	22.0	1.4	220.8	31.0	859.3