



BUMIARMADA

2017 UKCS Environmental Statement



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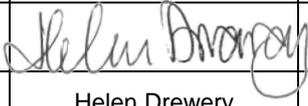
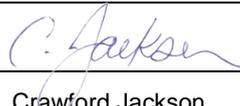


BUMIARMADA

2017 UKCS Environmental Statement

OPS-UKCS-KRK-ENV-RPT-0001

This document describes the environmental performance of the Armada Kraken FPSO in 2017

Rev	Date	Prepared	Reviewed	Approved
				
A0	20 Jun 2018	Helen Drewery	Crawford Jackson	Dave McLean

For full revision history see next page

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1.0 ABBREVIATIONS

BAB	Bumi Armada Berhad
BAUK	Bumi Armada UK
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
EMS	Environmental Management System
ETS	Emissions Trading Scheme
FPO	Floating Production and Operation
FPSO	Floating Production Storage and Offloading
GHG	Greenhouse Gas
HS&E	Health, Safety & Environment
HSSEQ	Health Safety Security Environment and Quality
OMS	Offshore Marine Services
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo Paris Convention
OSV	Offshore Support Vessel
PON1	Petroleum Operations Notice
mg/l	milligrams per litre
R&LE	Repair & Life Extension
SC	Subsea Construction
UKCS	United Kingdom Continental Shelf

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2.0 INTRODUCTION

This statement has been prepared to fulfil the regulatory requirement under the OSPAR recommendation 2003/5 to produce an annual public environmental statement. It represents an open and transparent representation of the Armada Kraken FPSO environmental performance for the year 2017.

2.1 BUMI ARMADA OVERVIEW

Bumi Armada Berhad (BAB) is a Malaysia-based international provider of offshore production and support services with a presence in over 17 countries, spread across five continents, supported by over 1,700 people from 49 nationalities.

Bumi Armada UK Limited (BAUK) is the UK arm of the FP[S]O Operations, which has been formed to operate the Armada Kraken FPSO on behalf of EnQuest.

Under the Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015 (SI 398/2015) BAUK has been appointed as the Installation Operator for the Armada Kraken FPSO and are the appointed Installation Operator under the Offshore Petroleum Licensing (Offshore Safety Directive) Regulations 2015 (SI 385/2015).

2.2 ARMADA KRAKEN FPSO

The Armada Kraken FPSO is based upon the conversion of the 2007 built Suezmax sized conventional trading tanker Prisco Alcor (Figure 1). As a trading tanker, the vessel was classed with DNV as 1A1 ICE-1A (for max draught of 15.4 m) Tanker for Oil ESP SPM EO VCS-2 CLEAN TMON NAUTICUS (new building)) and was built by Hyundai Heavy Ind. Co. Ltd. The vessel has undergone R&LE to strengthen the hull to withstand the expected conditions of the North Sea.

2.3 KRAKEN OPERATIONS

The Kraken Field is located in Block 9/2b in the southern part of the East Shetland Basin in the northern North Sea. This area is approximately 130 km east of the nearest landfall at Noss, the Shetland Islands and 44 km west of the UK/Norway trans-boundary median line (Figure 2). The development consists of the North, Central and South Kraken Fields which all lie within UK Block 9/2b. The field was initially discovered in 1985 with further appraisal carried out over the period 2007-2013. Oil recovery is a line-drive horizontal well water-flood development consisting of 14 production and 11 injection wells. The wells are tied back to the Armada Kraken FPSO from 4 production/injection drilling centres.

First oil from the Armada Kraken was achieved on the 23rd June 2017.

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Figure 1: Armada Kraken FPSO.

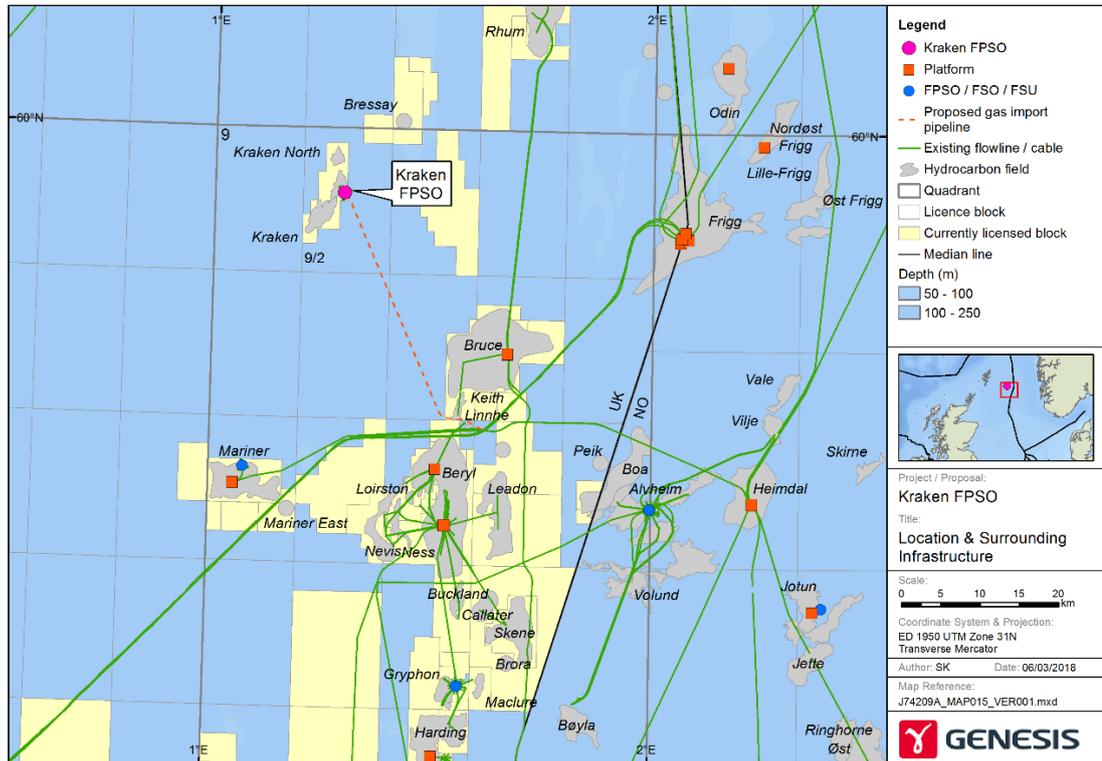


Figure 2: Location of Kraken on the UKCS.

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3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

BAUK implements and operates an integrated Health, Safety and Environment Management System (HS&E MS) which has been accepted and endorsed by the Board, and embedded in the overall business culture. The HSE MS is an integral part of the overall management system. It is laid down in policies, procedures, standards and work instructions. Its general purpose is to prevent BAUK activities from putting people, the environment, property or the reputation of the company at risk. The Bumi Armada HSSEQ Policy is shown in (Figure 3).

The Environment Management System (EMS) has been verified against the requirements of the OSPAR 2003/5 criteria.


BUMIARMADA

HEALTH, SAFETY & ENVIRONMENTAL PROTECTION POLICY

Bumi Armada Berhad, BAB, is committed to operating our business with the objective of zero harm to our people, the public and the environment.

To achieve this objective, BAB is committed to conducting our business in the most responsible manner, delivering the highest achievable standards of Health, Safety and Environmental, HSE, performance via comprehensive management systems and activities that:

- Promote visible HSE leadership commitment;
- Provide a governance framework for HSE activities, including compliance with regulatory, flag state, classification and contractual requirements and BAB mandatory business processes;
- Identify, reduce and manage our major accident risk levels to As Low As is Reasonably Practicable, ALARP, throughout the asset lifecycle, by providing suitable design, technical, and operational asset integrity processes;
- Minimize occupational injury and ill health to all employees, contractors, and visitors to all our premises and facilities and provide opportunities for learning through effective incident investigation;
- Reduce our impact on the environment and the communities in which we operate through pollution prevention, waste and emission minimization, and the reduction of natural resource consumption, by applying Best Available Technology, BAT, practices;
- Provide the necessary resources, training and levels of competency to maintain and improve our HSE performance;
- Demonstrate our capability to plan for, respond to, and recover from any HSE emergency or crisis situation;
- Investigate all incidents thoroughly such that we identify and implement effective corrective and preventive actions;
- Monitor and report our HSE performance against Key Performance Indicators, KPIs, throughout BAB as a means of ensuring continual improvement.

This Policy underpins BAB's Mission, Vision and Core Values, is applicable throughout BAB companies and will be the basis on which we work with our contractors, joint venture and O&M partners and their subcontractors. In addition, this Policy shall be applied in conjunction with other Corporate HSSEQ Policies, in particular those covering Quality, Security, Major Accident Prevention and Asset Integrity Management.


LEON HARLAND
 Executive Director / Chief Executive Officer
 Date: 25 May 2018

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BAB-CORF-HPO-HSE-POL-0001

Figure 3: Bumi Armada HSE Policy.

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4.0 ENVIRONMENTAL PERFORMANCE

The environmental statistics presented in this document cover the period from 13th February 2017 when the Armada Kraken FPSO arrived on station at the Kraken Field on the UKCS, through the commissioning period until first oil on the 23rd June and until the end of December 2017.

4.1 DISCHARGES TO SEA

During normal production, water is produced when extracting hydrocarbons from the reservoir. Despite treatment, produced water still contains traces of oil and as such, produced water discharge is controlled via a permitting system managed by the UK regulatory authority, OPRED. The Oil Discharge Permit held by BAUK allows us to discharge produced water provided the hydrocarbon concentration is within the limit set out in the permit.

Discharges to sea include chemicals used in offshore production operations. During production operations, chemicals such as scale inhibitors, corrosion inhibitors, demulsifiers and biocides are used to assist with the separation of oil and water, prevent damage to infrastructure such as pipelines and to prevent 'souring' of the reservoir. Any chemical used offshore during oil and gas production must be approved by the Centre for Environment, Fisheries and Aquaculture Science (Cefas). The use and discharge of production chemicals is controlled under the Offshore Chemical Regulations 2002 (as amended).

BAUK, its contractors and chemical suppliers work on a continuous basis to use environmentally acceptable alternatives where possible in our operations through the chemical management process.

4.2 SPILLS

Given the nature of our activities, there is always a risk that accidental spills may occur. All spills to sea, regardless of volume, must be reported to OPRED via a Petroleum Operations Notice (PON1).

A number of processes are in place to prevent unplanned releases and these include planned maintenance of equipment, asset integrity inspections, activity risk assessment, area inspections, procedural controls and training and competency for individuals. BAUK also internally record and investigate any unpermitted releases of hydrocarbons or chemicals. This helps improve our understanding of the root causes and identify actions to prevent similar incidents occurring in the future.

4.3 ATMOSPHERIC EMISSIONS

Atmospheric emissions arise during offshore production operations predominately as a result of fuel combustion for power generation, boilers and gas flaring activities. Atmospheric emissions generated by these activities are regulated by the Greenhouse Gas Emissions Trading Scheme (ETS) and the Offshore Combustion Installation (Prevention and Control of Pollution) Regulations 2013.

4.4 WASTE MANAGEMENT

Armada Kraken operations consume natural resources and other material which generate a range of wastes. BAUK ensures that the segregation, transportation and eventual disposal of waste is managed in accordance with legislative requirements. BAUK works closely with its onshore waste management contractors to identify recycling routes for as much of its waste as possible and conducts regular audits to evaluate waste management practices.

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5.0 DISCHARGES TO SEA

BAUK aims to minimise the environmental impact of the discharge of produced water. Produced water treatment removes the majority of hydrocarbons and solids present in the produced water stream. All our waste water is treated and monitored prior to discharge.

5.1 OIL IN WATER

As produced water contains traces of hydrocarbon, the Offshore Petroleum Activities (Oil Pollution, Prevention & Control) Regulations 2005 (as amended) sets the daily permitted average oil content of produced water at 30 mg/l. Figure 4 shows the average oil concentration of produced water for each discharge route on the Armada Kraken FPSO for 2017. All routes demonstrated yearly average oil concentrations that sit below the 30mg/l legal limit. Figure 5 shows the volume of produced water discharged via each discharge route in 2017. Figure 6 shows the quantity of oil discharged in produced water via each discharge route in 2017.

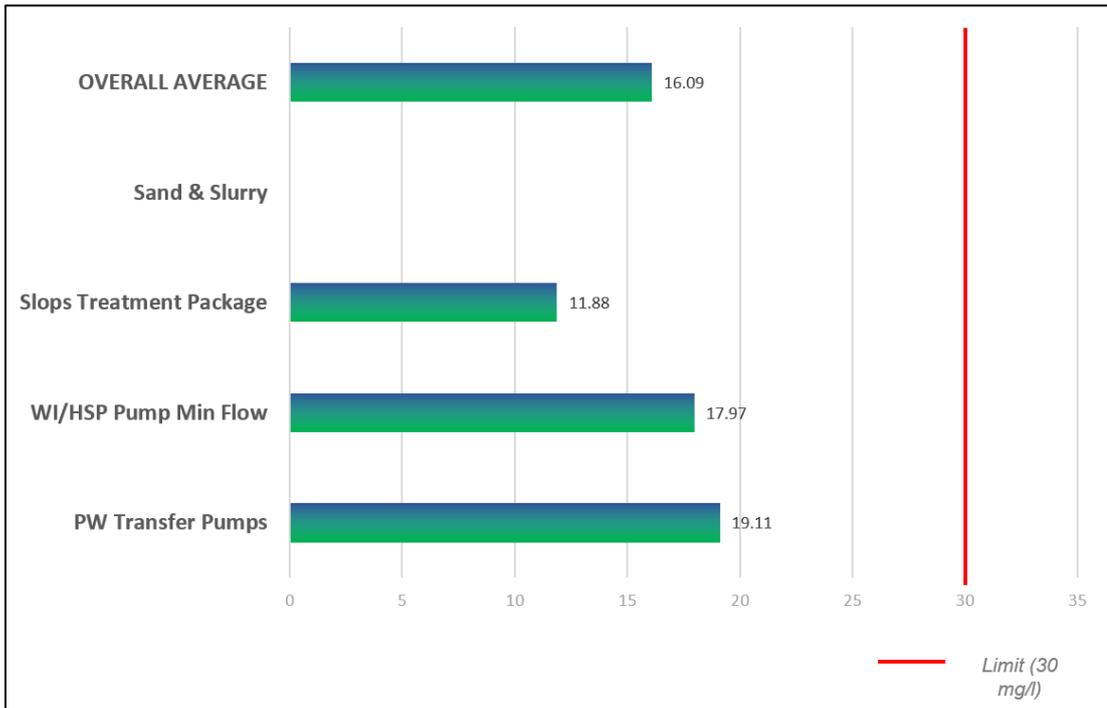


Figure 4: Average oil concentration in produced water by discharge route (mg/l) in 2017.

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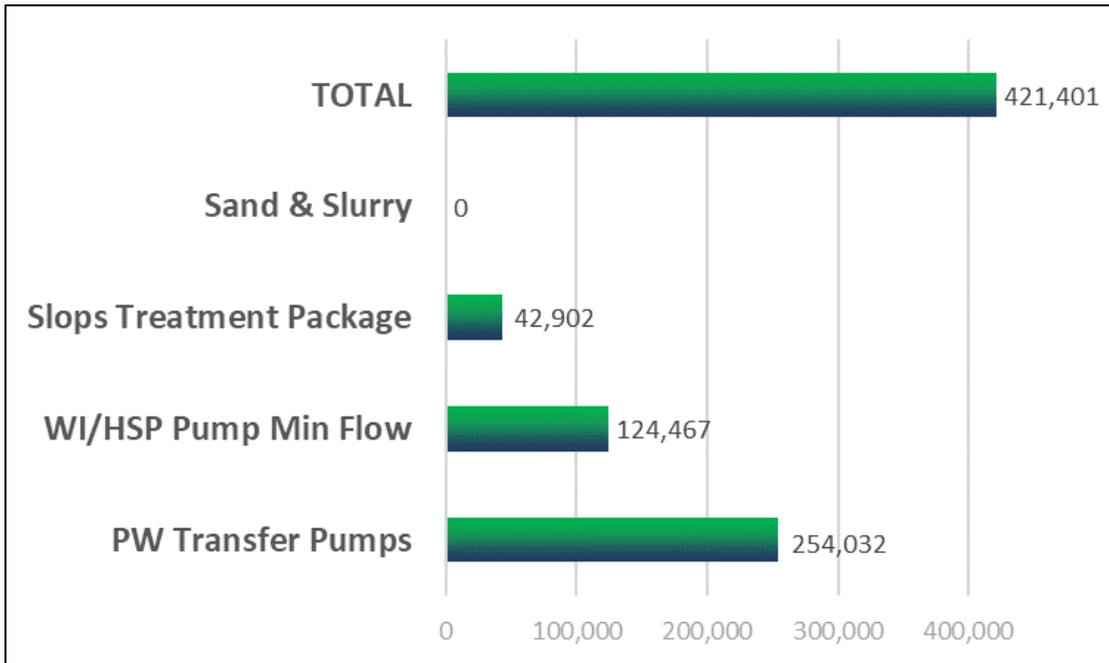


Figure 5: Volume of produced water discharged to sea via each discharge route (m³) in 2017.

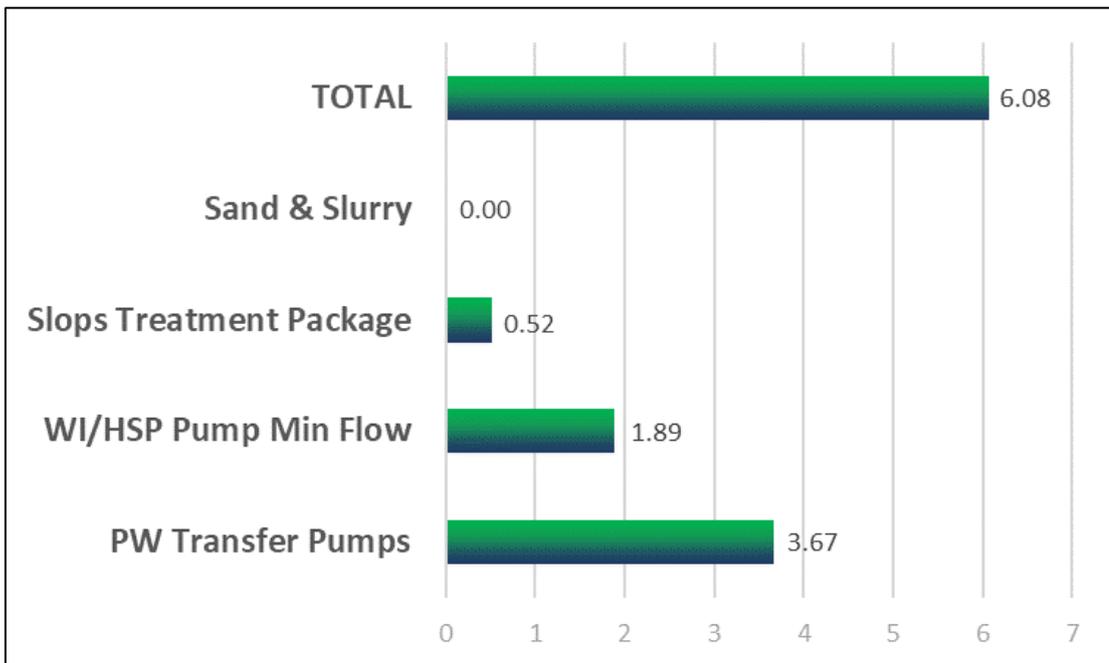
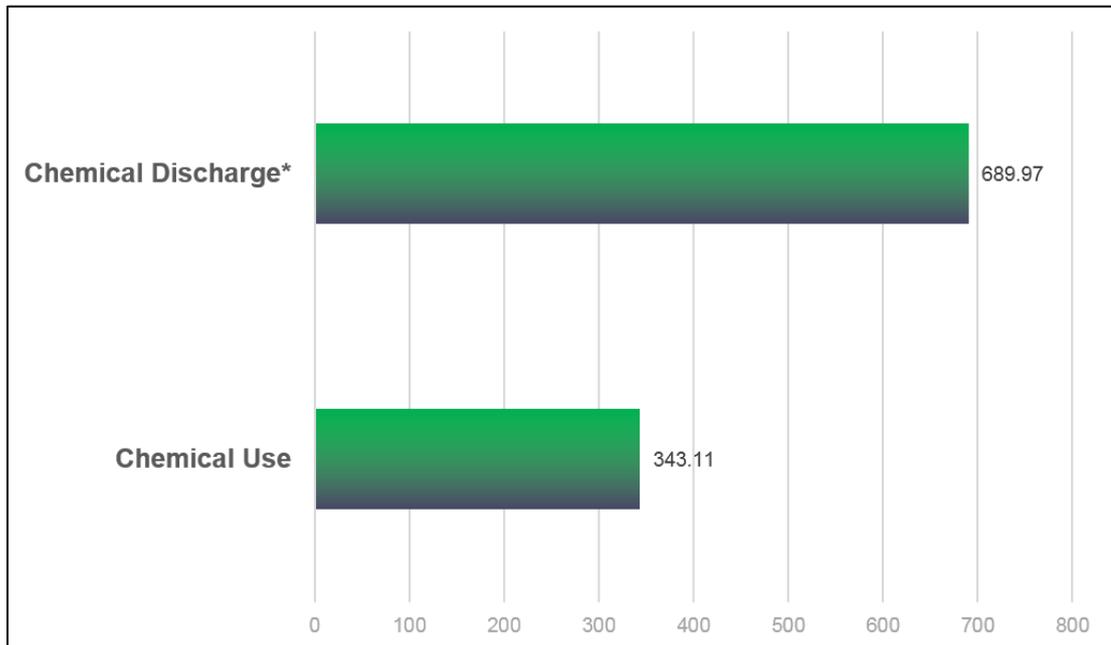


Figure 6: Quantity of oil in produced water discharged to sea via each discharge route (tonnes) in 2017.

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5.2 CHEMICAL USAGE

Total chemical use and discharge by the Armada Kraken FPSO in 2017 is shown in Figure 7. In 2017 chemical discharge exceeded chemical use as the preservation chemicals used in various pipelines were discharged via the Armada Kraken FPSO during the commissioning process. This was expected and was approved via the Armada Kraken Chemical Production Permit.



**Note that this includes the STP buoy and pipeline installation chemicals discharged via the Kraken during commissioning.*

Figure 7: Total chemical use and discharge to sea in 2017 (tonnes).

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6.0 SPILLS

As spills at sea can have consequences for the marine environment, BAUK work to minimise the risk with a focus on prevention. BAUK has an approved oil pollution emergency plan (OPEP) in place.

6.1 NUMBER OF SPILLS

All spills to the marine environment, regardless of their volume, must be reported to OPRED via a Petroleum Operations Notice (PON1). It can be seen from Figure 8 that two PON1s were submitted to OPRED during 2017.

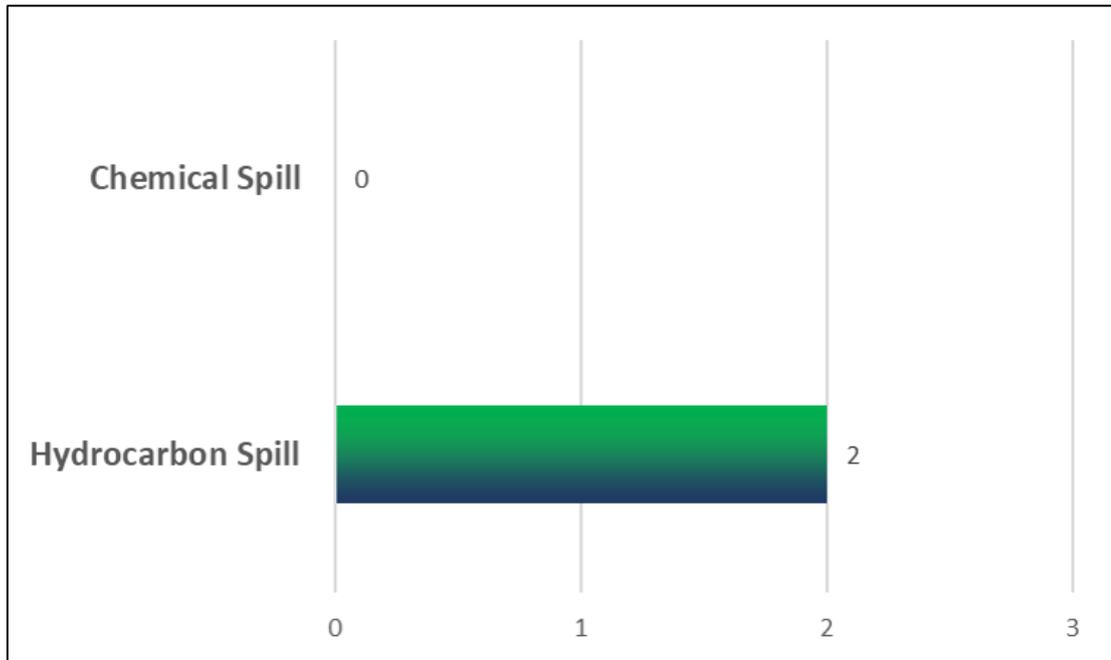


Figure 8: Number of spills (PON1) during 2017.

6.2 MASS OF SPILLS

Figure 9 details the mass of the spills from the Armada Kraken FPSO reported via PON1s and reported to OPRED in 2017. The total quantity of hydrocarbons accidentally released to sea from the Kraken FPSO in 2017 was 0.16 tonnes.

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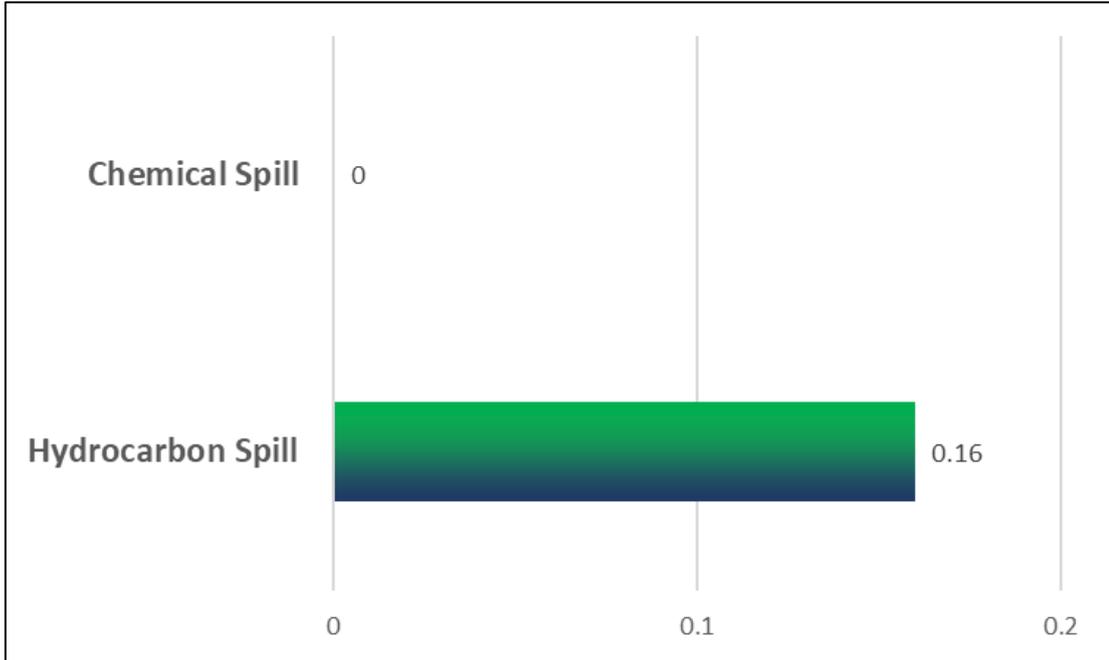


Figure 9: Mass of spills (PON1) during 2017 (tonnes).

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7.0 ATMOSPHERIC EMISSIONS

The Armada Kraken operation uses energy during the extracting, processing and exporting of oil. BAUK manages energy consumption efficiently to reduce the emissions from Armada Kraken operations. Figure 10 provides the detail of the verified Armada Kraken Greenhouse Gas (GHG) 2017 emissions expressed as a CO₂ equivalent (CO₂e). In 2017, the Armada Kraken FPSO produced 106,728 CO₂e tonnes.

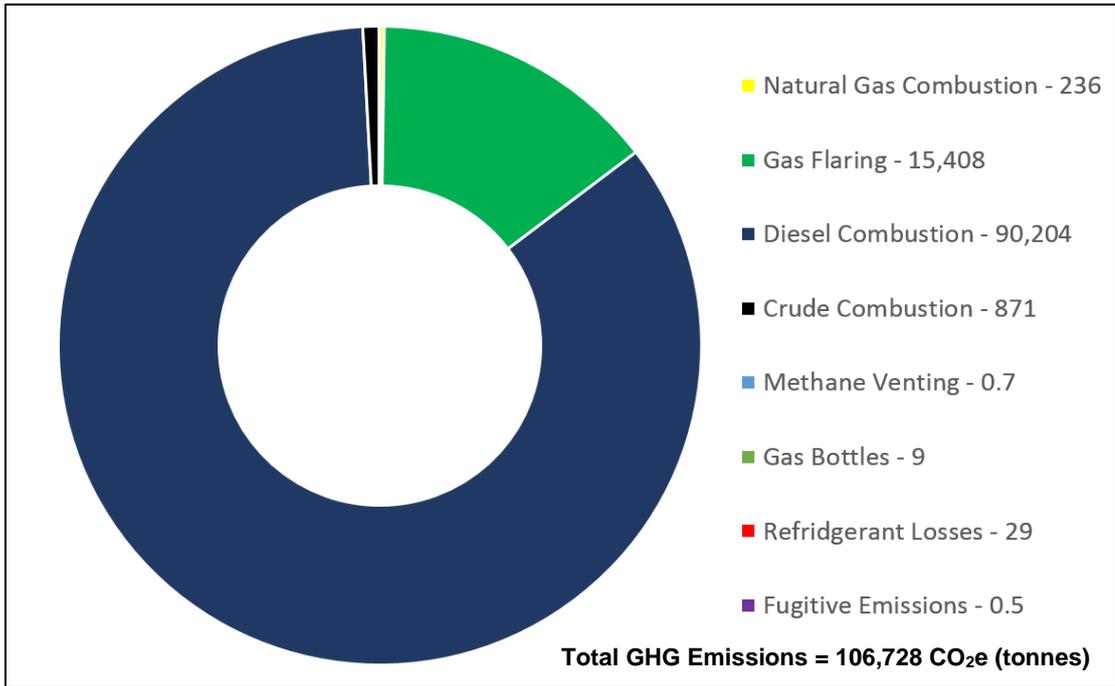


Figure 10: Armada Kraken GHG emissions CO₂ equivalent (tonnes).

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8.0 WASTE MANAGEMENT

Armada Kraken operations consume natural resources and other material which generates a range of wastes. BAUK manages waste according to the waste management hierarchy – Remove, Reduce, Reuse and Recycle. BAUK seeks to minimise the quantity of waste disposed to landfill. Figure 11 shows the destination of waste that was generated by the Armada Kraken FPSO in 2017. The total quantity of waste generated by the Armada Kraken FPSO in 2017 was 352 tonnes.

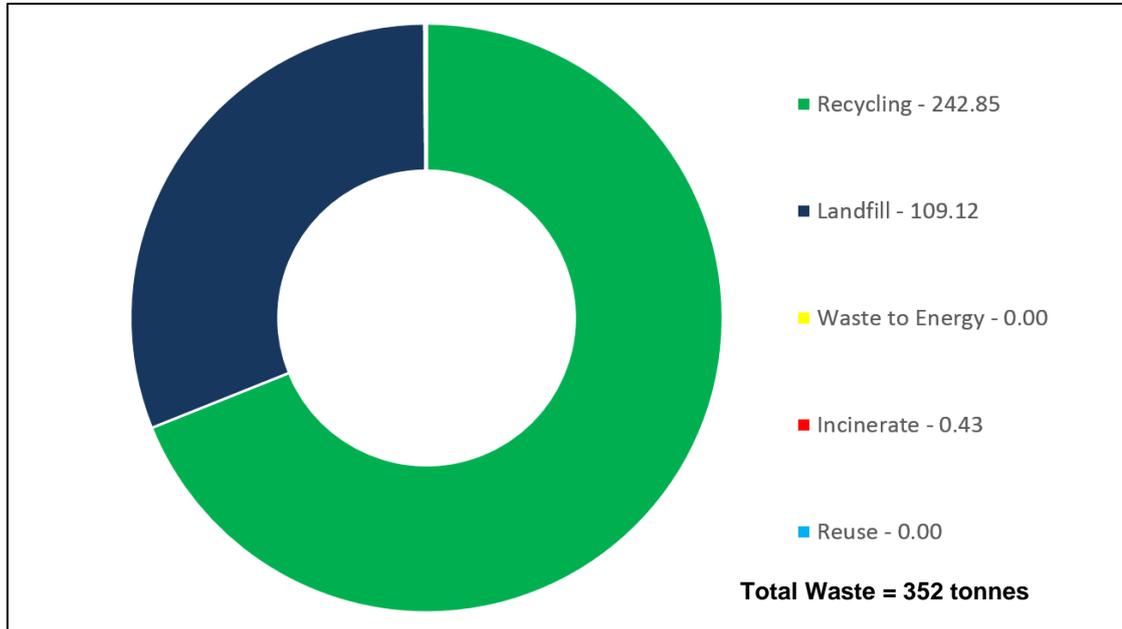


Figure 11: Armada Kraken operational waste 2017 (tonnes).