



BW Offshore Catcher (UK) Ltd, 2019 Environmental Statement

This document is part of BW Offshore's Management System, which holds the complete revision history and electronic versions of attachments.

<i>Document Owner:</i> HSE Manager	<i>Approval:</i> Asset Manager
	<i>Verification:</i> VP HSSEQ Fleet



Table of Contents

ABBREVIATIONS	3
1 Introduction	5
1.1 Purpose.....	5
2 Overview of Operations	6
3 BW HSE Policy UK	9
4 Environmental Performance	11
4.1 Oil in Produced Water.....	11
4.2 Chemical Use and Discharge	12
4.3 Waste	18
4.4 Atmospheric Emissions.....	18
5 Incidents	21
5.1 Unplanned Release – PON1.....	21
5.2 Regulatory Non-Compliance (NC)	21
6 Revision Summary	23
Figure 1: BW Catcher General Location Map.....	6
Figure 2: Catcher Area Development.....	7
Figure 3: Inputs to BW Catcher SEMS.....	10
Figure 4: BW Catcher SEMS Continual Improvement Model.	10
Figure 5: Produced water discharge in 2019.	11
Figure 6: Produced water re-injected in 2019.	12
Figure 7: Amount of chemical permitted and used during 2019.....	14
Figure 8: Amount of chemical permitted and used during 2019 (without NAPH23002A and PARA12200A).....	15
Figure 9: Amount of chemical permitted and discharged in 2019.	16
Figure 10: Amount of chemical permitted and used during 2019 (without NAPH23002A and NAPH23011A).....	17
Figure 11: BW Catcher fate of waste.....	18
Figure 12: BW Catcher Combustion Emissions.	19
Figure 13: BW Catcher CO₂ combustion emissions.....	20
Table 4-1: Chemicals with SUB warnings permitted in 2019.....	13
Table 5-1: PON1s submitted during 2019.....	21
Table 5-2: Non-compliances submitted during 2019.....	22

ABBREVIATIONS

BEIS	Department of Business, Energy & Industrial Strategy
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CH ₄	Methane
CHARM	Chemical Hazard and Risk Management
CNS	Central North Sea
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CRA	Chemical Risk Assessment
DSV	Dive Support Vessel
EIA	Environmental Impact Assessment
ESD	Emergency Shut Down
EU ETS	European Union Emissions Trading Scheme
FGL	Fulmar Gas Line
FPSO	Floating Production Storage and Offloading Vessel
FPV	Floating Production Vessel
HSE	Health, Safety and Environment
HP	High Pressure
ISO	International Standards Organisation
LAT	Lowest Astronomical Tide
LP	Low Pressure
MGO	Marine Gas Oil (Diesel)
MODU	Mobile Offshore Drilling Unit
NC	Non Compliance
NO _x	Nitrous Oxides
OCNS	Offshore Chemical Notification Scheme
OCR	Offshore Chemicals Regulations
ODP	Oil Discharge Permit
OPEPs	Offshore Pollution Emergency Plans
OPRED	Offshore Petroleum Regulator for Environment & Decommissioning
OIW	Oil in Water
OSD	Offshore Safety Directive
OSPAR	Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
PDN	Permitted Discharge Notification
PLO	Poses Little or No Risk
PLONOR	Poses Little or No Risk



PON	Petroleum Operations Notice
PPC	Pollution, Prevention and Control
SEGAL	Shell Esso Gas and Associated Liquids
SEMS	Safety and Environmental Management System
SO _x	Sulphur Oxides
STP	Submerged Turret Production
SSIV	Subsea Isolation Valve
SUB	Chemicals Rated for Substitution
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
VOC	Volatile Organic Compound



1 Introduction

1.1 Purpose

BW Offshore has one legal entity currently operating in the United Kingdom Continental Shelf (UKCS), BW Offshore Catcher (UK) Ltd, hereafter referred to as BWOCUK. BWOCUK is the Duty Holder / Operator of the BW Catcher Floating, Production, Storage and Offloading (FPSO) facility which is currently producing from the Catcher Area Fields (Premier Oil UK are the licence holder for the Catcher Field Area).

Under Recommendation 2003/5 of the Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) requires that all companies operating in the UKCS have systems and procedures in place to identify, monitor and control the environmental aspects associated with offshore activities.

BW Offshore's worldwide operations are certified to the international environmental management system standard, ISO 14001. Recertification of the BW Offshore ISO 14001 environmental management system was concluded in August 2017, followed by audits in Q3 2018 and Q3 2019. The next recertification audit is scheduled to take place during Q3 of this year.

Surveillance visits by the BW Offshore verifier are undertaken annually throughout the fleet.

This report provides information on BWOCUK's offshore operations and the environmental performance of these operations. For the purpose of this report, this includes all production activities in the United Kingdom Continental Shelf (UKCS).

This report has been made available on the BW Offshore website.

2 Overview of Operations

The Catcher Area Development is located in Block 28/9 of the central North Sea (CNS) c. 170 km southeast of Aberdeen and c. 100 km from the UK/Norway median line in water depths of c. 85 m Lowest Astronomical Tide (LAT) (Figure 1).

The BW Catcher FPSO has been contracted by Premier Oil UK to produce from three fields: Catcher, Varadero and Burgman. The three fields are tied back to the BW Catcher FPSO vessel located at c. 56°46'12.43" N and 00°42'46.93" E (WGS84) (Figure 2). The principal facilities include subsea facilities and a turret-moored and free weather-variant FPSO.

The FPSO is capable of processing up to 66,000 bbls of oil per day and has a maximum cargo storage capacity of 650,000 bbls. Therefore, at maximum capacity the FPSO offloads the processed crude oil to a shuttle tanker approximately once every 8 days. When offloading cargo, tank blanketing will normally use low pressure (LP) fuel gas, with this gas being recovered via the flare gas recovery package during filling of the cargo tanks between offloads. Initially, produced gas will be used for power generation and gas lift, with excess being exported into the Shell Esso Gas and Associated Liquids (SEGAL) system (Fulmar Gas Line (FGL) to St Fergus gas pipeline).

In normal operations, BW Catcher flaring will be restricted to high pressure (HP) flare purge gas only. The LP flare system includes a Vapour Recovery Package to recover purges and vents sent to the LP flare system. The LP flare will be lit, as required, in process upset or ESD conditions only. Produced water will be treated and then either re-injected or discharged under an Oil Discharge Permit (ODP) issued by BEIS.

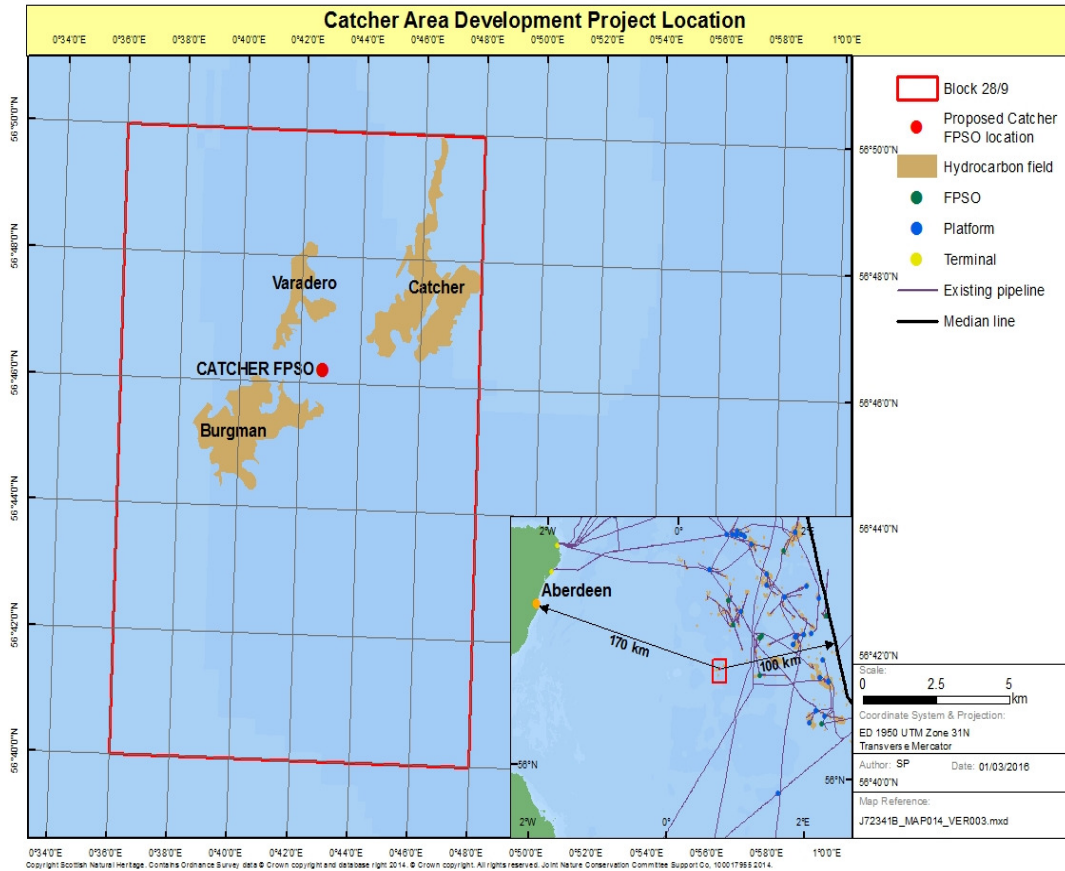


Figure 1: BW Catcher General Location Map

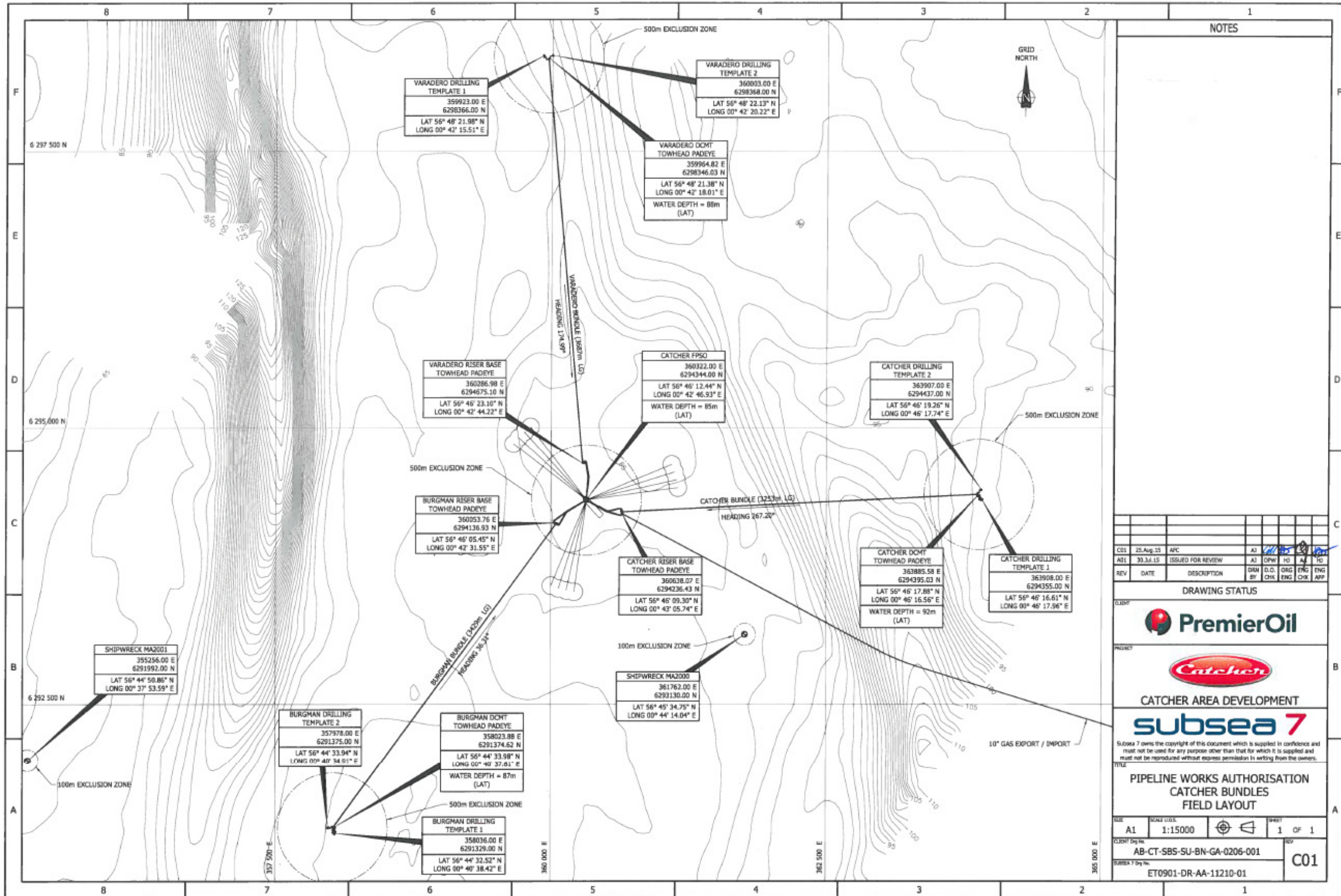


Figure 2: Catcher Area Development



The BW Catcher FPSO in field commissioning activities commenced following hook up in October 2017. The FPSO achieved First Oil on the 23rd December 2017. An interim performance test was successfully completed on the 6th January 2018. Client final acceptance performance test following commissioning was achieved in July 2018 with final acceptance certificate being issued in November 2018.

Gas lift has been commissioned on the Catcher, Burgman and Varadero production wells, however the wells of Varadero Template 2 are to be drilled during 2020 with the subsea tie-ins to be completed as well, and so further commissioning on these wells will be required. The remaining systems yet to be commissioned are limited to boilers operating on fuel gas, which is also expected to occur during 2020.

3 BW HSE Policy UK

BW Offshore is focused on protecting the environment in line with our stated commitment to reduce our impact to a level that is as low as reasonably practicable. This involves ongoing assessment, monitoring and reporting on environmental impacts.

The BWOCUK Safety and Environment Management System (SEMS) exists to provide a systematic approach to the management of Health, Safety and Environment (HSE) issues in order to protect people and the environment and comply with UK legislation.

BW Offshore considers that HSE have equal status with other primary business objectives and are of strategic importance. Safe working practices and due consideration of environmental impact are vital to the overall efficiency and continued success of the business. The HSE policy forms the basis for the SEMS and is presented below.

POLICY STATEMENT

BW Offshore is committed to prioritizing Health, Safety and Environment (HSE) matters in all its operations. We shall continually improve our HSE performance and strive to prevent harm to People, the Environment and Property as we firmly believe that all incidents can be prevented

In order to achieve our commitment, BW Offshore shall:

- Ensure Major Accident Hazards are effectively managed throughout the lifecycle of our assets
- Ensure a robust risk management process is in place to identify and mitigate all operational risks
- Plan our operations in a way that minimize environmental impact and prevents pollution
- Fulfil all compliance obligations
- Register faithfully and analyze all incidents and near misses
- Encourage proactive participation from all personnel on HSE matters to identify needs for training and development
- Set objectives and targets for HSE performance, monitor and communicate the performance to all personnel and stakeholder
- Enhance HSE performance through continual improvement initiatives
- Promote stop and ask without consequences
- Fulfil its duty of care towards anyone associated with BW Offshore name
- Ensure all our people, and our contractors have the competencies required to safely undertake their role and responsibilities
- Communicate internally and externally with the workforce, relevant stakeholders and interested parties on all aspects of HSE Policy

The SEMS was developed in order to meet the requirements of The Offshore Installations (Offshore Safety Directive) (Safety Case) Regulations 2015 and Offshore Installations (Safety Case) Regulations 2005, in particular the contents of Schedules 2 and 3.

The BW Offshore SEMS uses the existing processes and procedures contained within the BW Offshore Integrated Management System, and is therefore an integral part of the BW Offshore Management System, although specific to the operations of BW Offshore. The processes and procedures, which are required to meet the UK Relevant Statutory Provisions, are contained within the SEMS (

Figure 3).

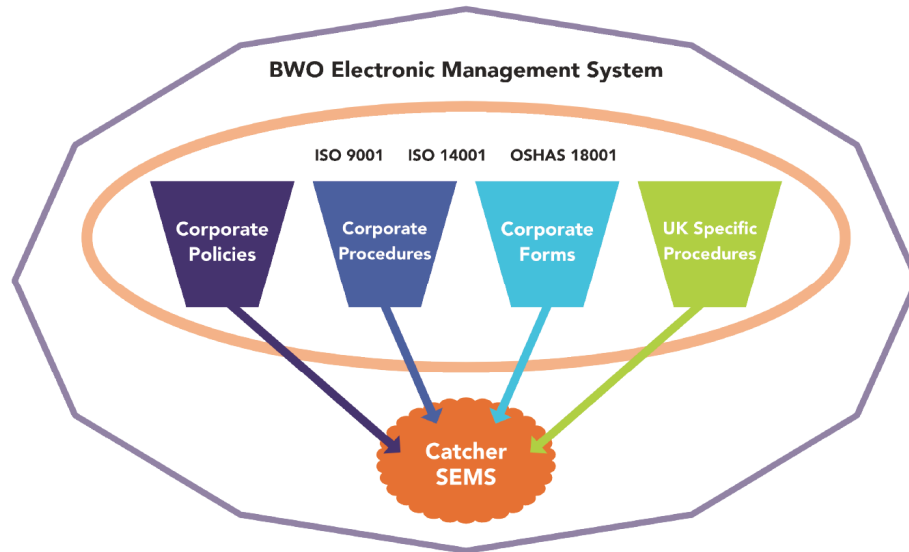


Figure 3: Inputs to BW Catcher SEMS.

The purpose of the SEMS is to provide a framework for the management of all hazards and associated risks generated through the operation of the BW Catcher FPSO.

The basic principal applied within the SEMS is one of continual improvement in the management of risk, both environmental and health and safety related. In order to achieve this the SEMS utilises the Plan, Do, Check and Act model (

Figure 4).

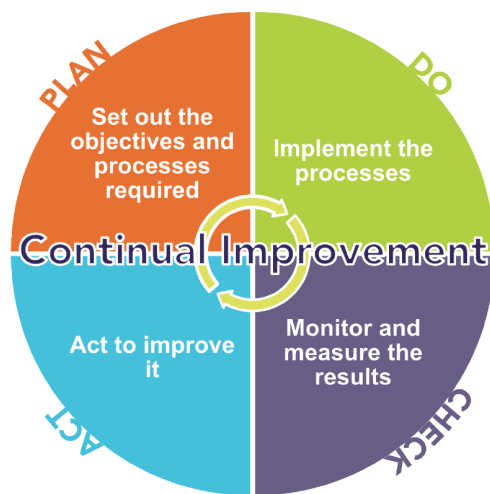


Figure 4: BW Catcher SEMS Continual Improvement Model.

4 Environmental Performance

Environmental performance 2019 for the BW Catcher FPSO is detailed in the following sub-sections.

4.1 Oil in Produced Water

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 2019 Oil Discharge Permit (OLP/570) held by BWOCUK allows the BW Catcher FPSO to discharge produced water, provided the hydrocarbon concentration is within the limit set out in the permit.

The amount of produced water discharged in 2019 is outlined in Figure 5.

Month	Produced water discharged (m ³)	Days on stream	Average OiW (mg/L)	Oil discharged (tonnes)
January	8,978.80	11	10.13	0.0910
February	18,256.90	27	3.29	0.0600
March	17,887.40	29	6.61	0.1183
April	6,861.40	11	5.45	0.0374
May	126.40	1	0.65	0.0001
June	0.00	0	0.00	0.0000
July	0.00	0	0.00	0.0000
August	0.00	0	0.00	0.0000
September	0.00	0	0.00	0.0000
October	0.00	0	0.00	0.0000
November	41,221.00	6	18.23	0.7514
December	19,520.00	1	18.44	0.3599
Total	112,851.90	86	-	1.4181

Figure 5: Produced water discharge in 2019.

BW Catcher FPSO was permitted to discharge a total of 660,103.7 m³ of produced water. The total volume of produced water discharge to sea during 2019 was 112,851.90 m³. The average concentration of oil discharged in produced water is below the permitted OiW average of 25 mg/L.

BWOCUK utilises a produced water re-injection system which when online injects a portion or the full amount of the produced water back into the reservoir as opposed to discharging it overboard.

Figure 6 overleaf outlines the amount of produced water re-injected during 2019.

Month	Produced water re-injected (m ³)	Days on stream	Average OiW (mg/L)
January	0.00	0	0.00
February	0.00	0	0.00
March	0.00	0	0.00
April	16,808.60	18	8.16
May	33,068.20	29	3.75
June	44,099.10	27	6.22
July	46,841.60	29	6.50
August	37,130.60	23	6.81
September	56,447.70	27	7.86
October	67,252.60	30	11.90
November	18,333.30	8	10.79
December	6,873.00	5	3.37
Total	326,854.70	196	-

Figure 6: Produced water re-injected in 2019.

4.2 Chemical Use and Discharge

Various chemicals are used offshore during production operations.

During production operations, chemicals such as scale solvers, 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 to process hydrocarbons offshore must, in line with the Offshore Chemical Regulations 2002 (as amended), first be registered by the Centre for Environment, Fisheries and Aquatic Sciences (Cefas). The chemicals are subject to robust environmental risk assessment and once registered, their use is controlled and monitored through a permit granted by OPRED.

Under the Offshore Chemical Notification Scheme (OCNS), chemicals are ranked according to the assessed hazard to the environment and are given a lettered heading E, D, C, B or A, with E representing the lowest and A the highest hazard category.

Using the Chemical Hazard and Risk Management (CHARM) model, a colouring band is used to show which chemicals pose the highest environmental hazard. These bands are Gold, Silver, White, Blue, Orange or Purple with Gold representing the lowest hazard and Purple the highest.

Some chemicals are regarded as PLONOR (PLO), which means that they have been determined to Pose Little Or NO Risk to the environment.

Any chemicals that carry substitution (SUB) warnings or which pose a risk to the marine environment (determined using criteria from the OPRED) have been justified in the Chemical Risk Assessment (CRA) document that accompanies the production permit.

BW Offshore, its contractors and chemical suppliers work on a continuous basis to find suitable alternatives to replace the products with SUB warnings.



4.2.1 BW Catcher Chemical Use and Discharge 2019

Three chemicals with substitution warnings (SUB) were permitted for use on BW Catcher in 2019, and these are detailed in Table 4-1.

Chemical name	Supplier	Status	Replacement status
CORR11389A	ChampionX (Champion Technologies Ltd)	Used and discharged	Not replaced
PermaClean PC-98 PLUS	ChampionX (Champion Technologies Ltd)	Used and discharged	No longer operationally required
PermaFloc PC-306	ChampionX (Champion Technologies Ltd)	Used and discharged	Replaced with RoQuest FS

Table 4-1: Chemicals with SUB warnings permitted in 2019.

Thirty-five chemicals were permitted for use, with 27 being used and discharged on BW Catcher during 2019. These uses are representative of chemical use quantities required to process hydrocarbons that are produced at BW Catcher.

1,739,100 kg of chemicals were used in 2019 and of those 123,976 kg discharged during operations in 2019.

Figure 7 shows the amount of chemicals permitted for use and used during 2019, however due to the scale of use for two of the chemicals, they have been removed from Figure 8 in order to view the other chemicals in greater detail.

Figure 9 shows the amount of chemicals permitted for discharge and discharged during 2019, however due to the scale of use for two of the chemicals, they have been removed from Figure 10 in order to view the other chemicals in greater detail.

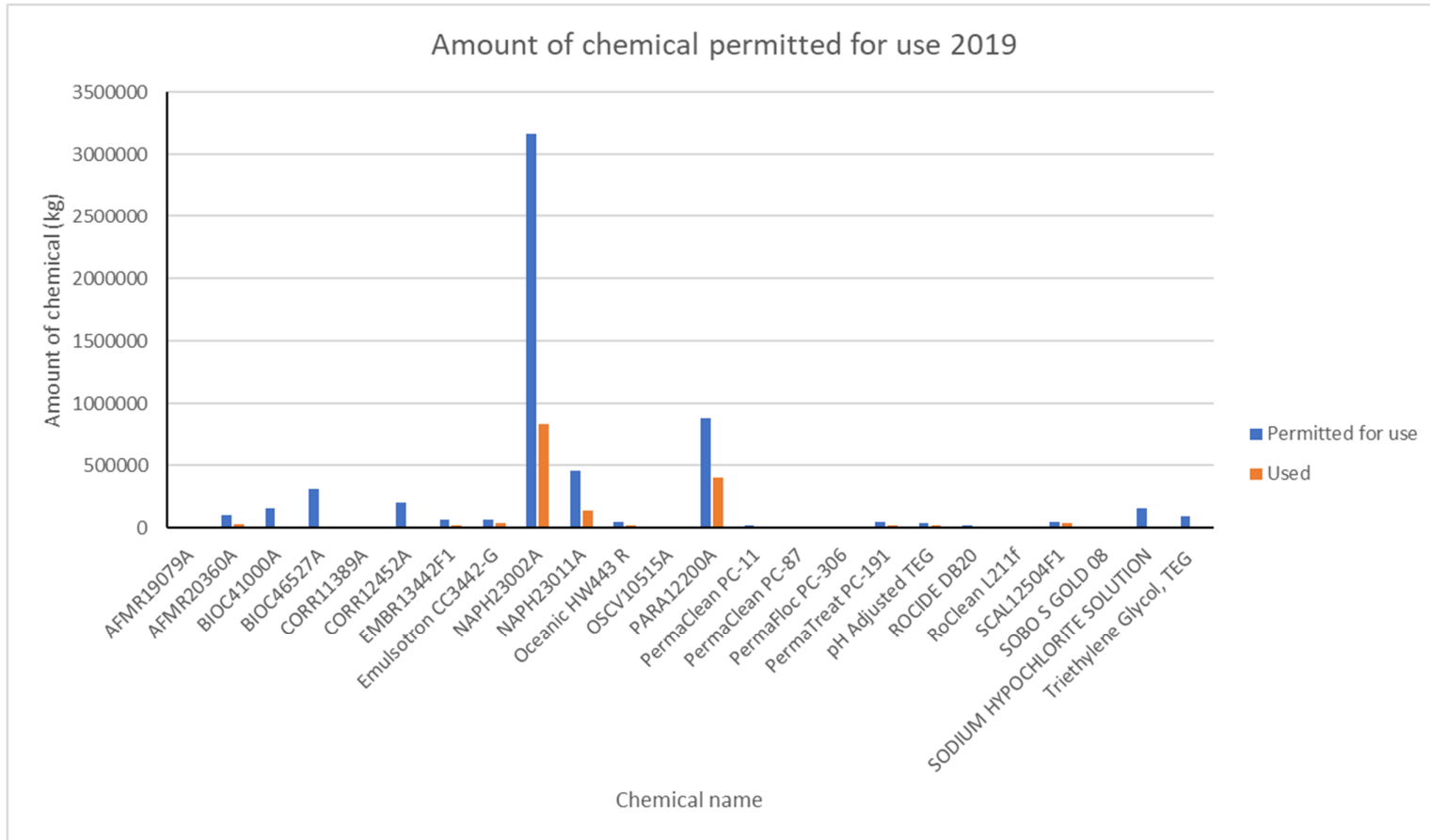


Figure 7: Amount of chemical permitted and used during 2019.

BW Offshore Catcher (UK) Ltd, 2019 Environmental Statement

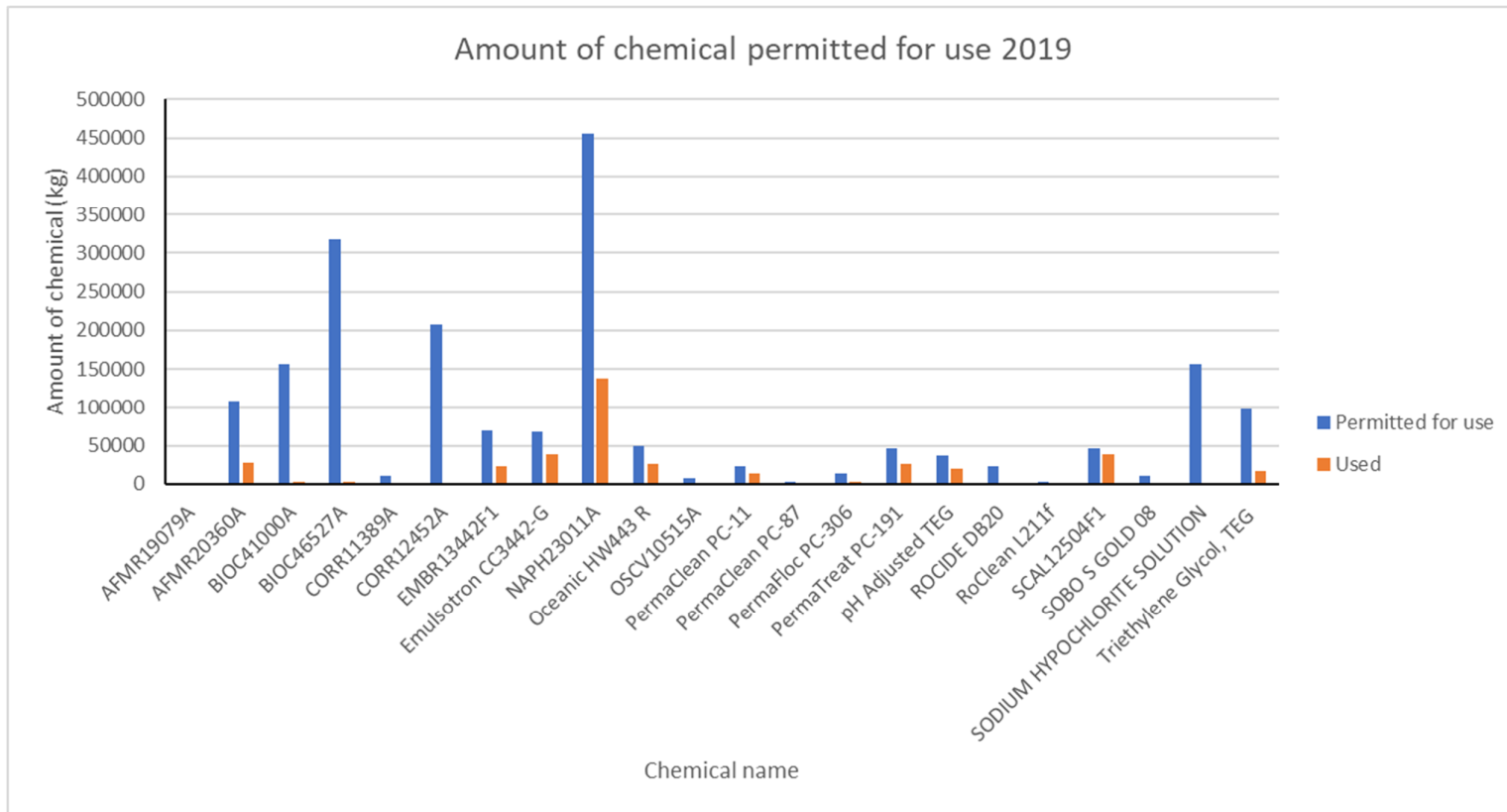


Figure 8: Amount of chemical permitted and used during 2019 (without NAPH23002A and PARA12200A).

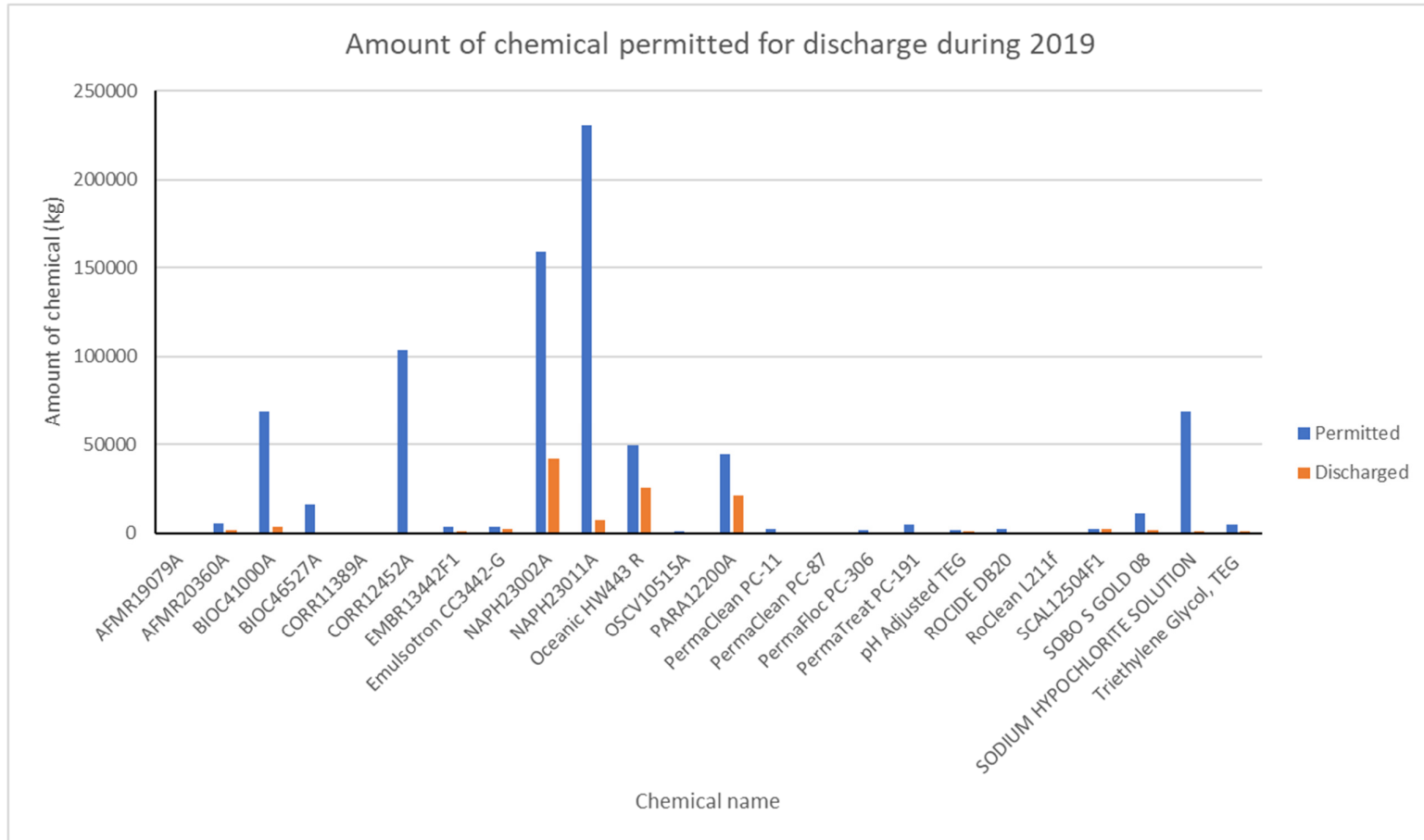


Figure 9: Amount of chemical permitted and discharged in 2019.

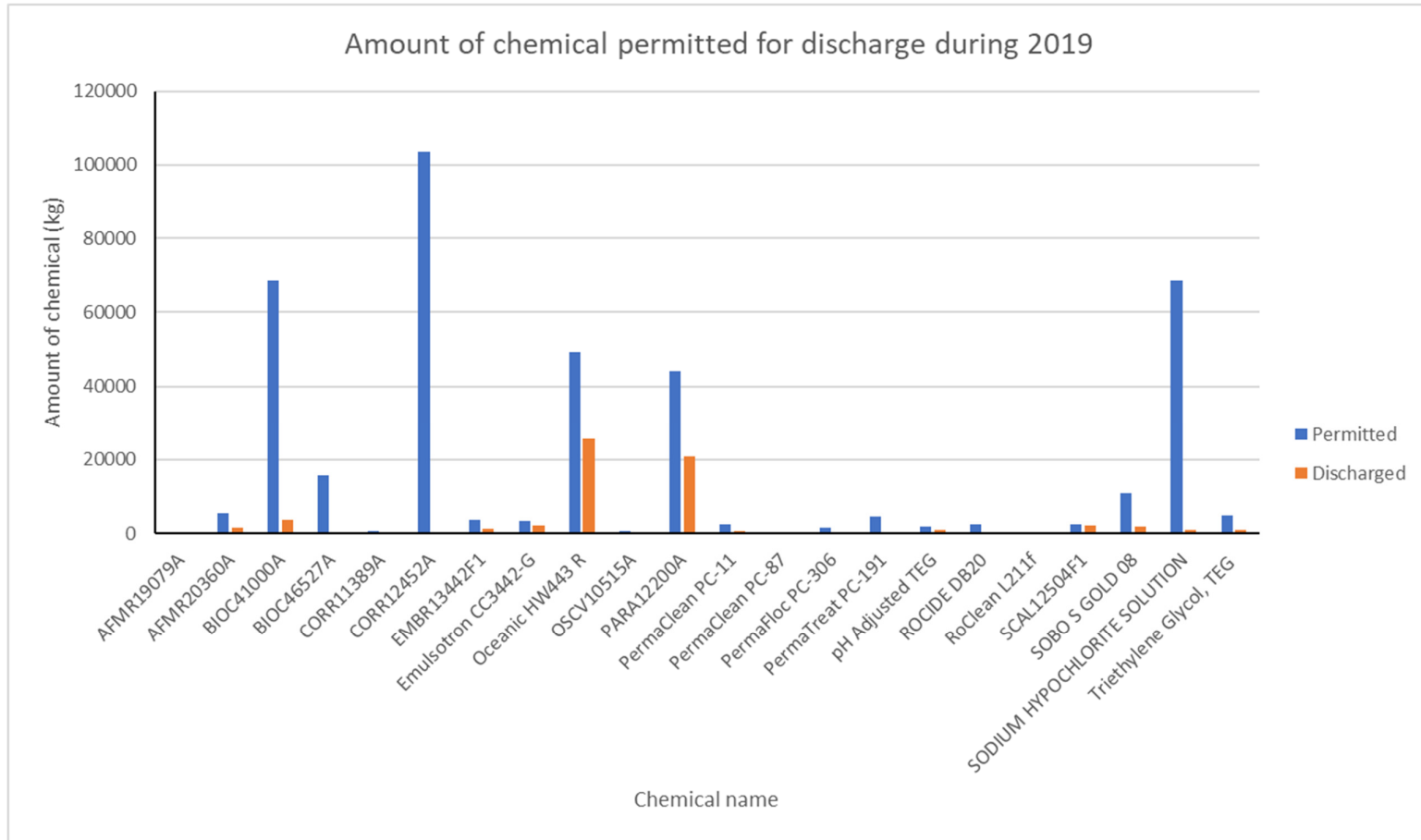


Figure 10: Amount of chemical permitted and used during 2019 (without NAPH23002A and NAPH23011A).

4.3 Waste

Waste is generated from offshore operations and is transported onshore for re-use, recycling, treatment or disposal.

Production installation waste is segregated into categories before back-loading. As much waste as possible is sent for recycling. This includes wood, scrap metals, paper/cardboard, glass and plastics.

Waste that cannot be recycled is sent to landfill. Certain types of waste that are harmful to the environment (Special Waste) are sent ashore to be processed and disposed of by licensed handlers in accordance with the relevant legislation.

BW Offshore target areas where the amount of waste generated can be further reduced. On the BW Catcher FPSO, E-reps have been established and are actively involved in continuous awareness raising, monitoring and reduction of waste initiatives.

4.3.1 BW Catcher FPSO Waste 2019

A total of 205.6 tonnes of waste was disposed of from the BW Catcher FPSO in 2019 via their waste management contract. Of the total waste produced, 60% was recycled, 15.9% was waste to energy, 0.5% was incinerated and 23.6% was landfilled (Figure 11). These represent an increase of 5% on recycling (also in waste to energy ~2% and incineration ~0.3%), but also a reduction of ~7.4% on waste sent to landfill compared to the previous year's figures.

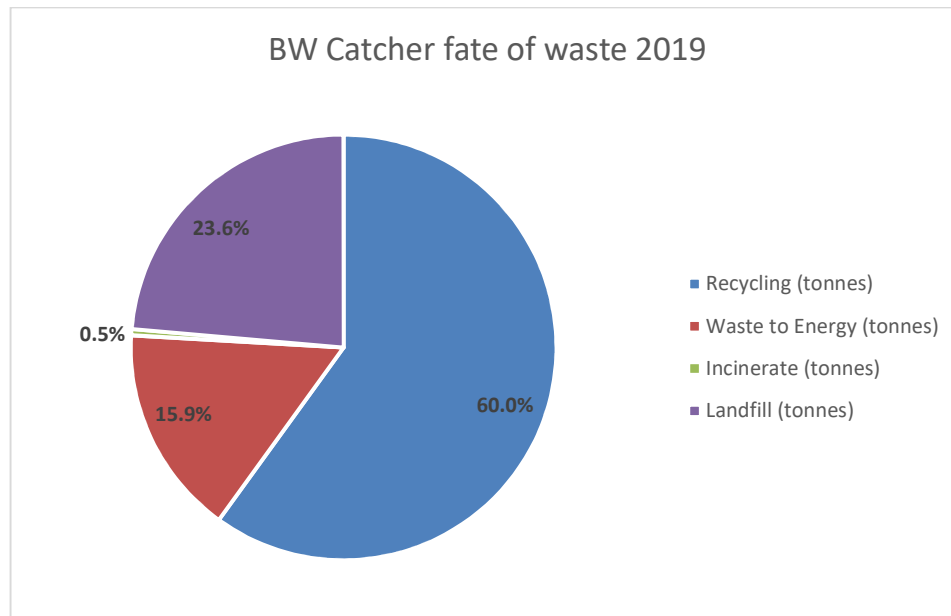


Figure 11: BW Catcher fate of waste.

4.4 Atmospheric Emissions

Atmospheric emissions arise during offshore drilling and production operations predominantly as a result of fuel combustion for power generation and gas flaring activities.

4.4.1 BW Catcher Atmospheric Emissions 2019

The BW Catcher FPSO is regulated under the Pollution, Prevention and Control (PPC) Regulations as a large combustion installation. As such, the installation has set limits on atmospheric emissions of nitrous oxides (NO_x), sulphur oxides (SO_x), carbon monoxide (CO), methane (CH₄) and volatile organic compounds (VOCs).

Figure 12 shows the combustion emissions (excluding CO₂) for 2019. All emissions were within limits set by BEIS in the BW Catcher PPC Permit.

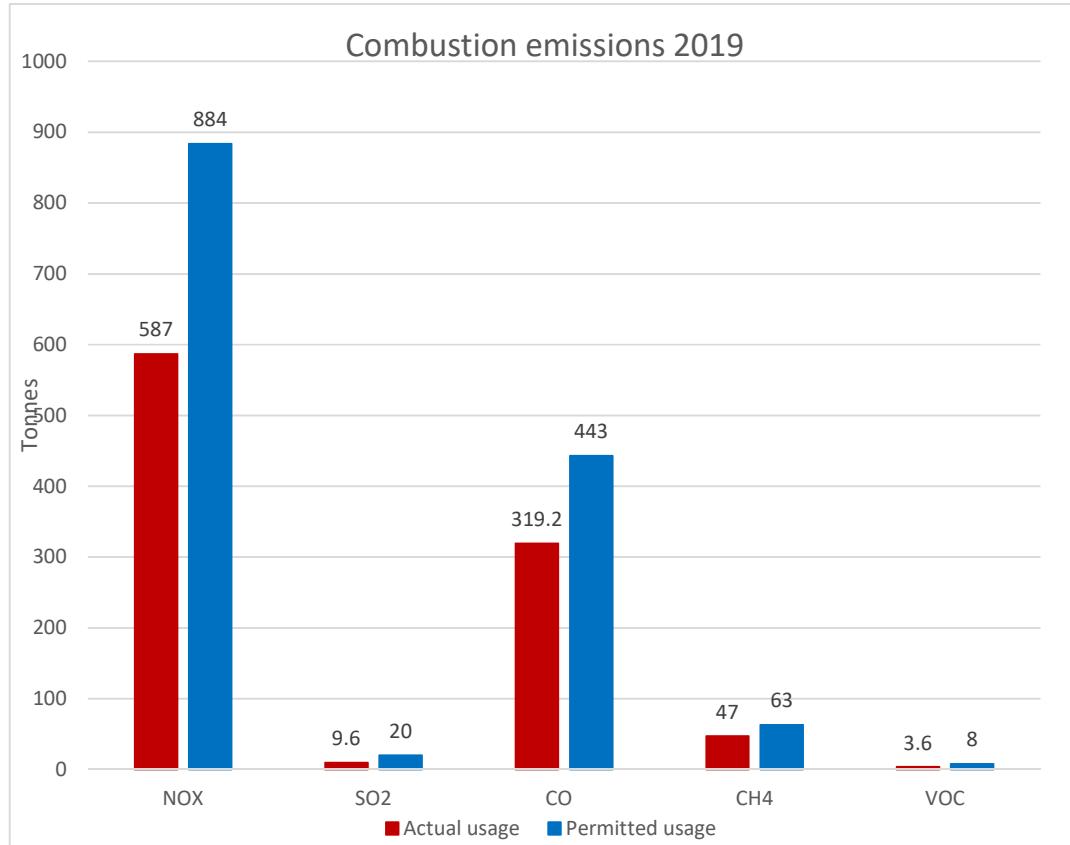


Figure 12: BW Catcher Combustion Emissions.

BW Catcher FPSO is also regulated under the European Union Emission Trading Scheme (EU ETS) Regulations, which regulate CO₂ emissions for combustion sources, such as turbines and flaring.

CO₂ emissions are presented in Figure 13 and breakdown per combustion sources.

During 2019, 139,494.46 tonnes of CO₂ were emitted from combustion activities on BW Catcher FPSO. During normal operations, BW Catcher FPSO runs with two turbines on and as can be seen in Figure 13 the primary source of fuel is from fuel gas (all produced gas would be used as fuel with excess gas being exported), however the turbines can also run on diesel.

The BW Catcher boilers are currently running on diesel. They are yet to be commissioned on fuel gas. Once commissioned on fuel gas they are expected to be more efficient.

The flaring amount for 2019 is 9,326.32 tonnes, which is below the permitted amount of 13,315.2 tonnes.

BW Offshore Catcher (UK) Ltd, 2019 Environmental Statement

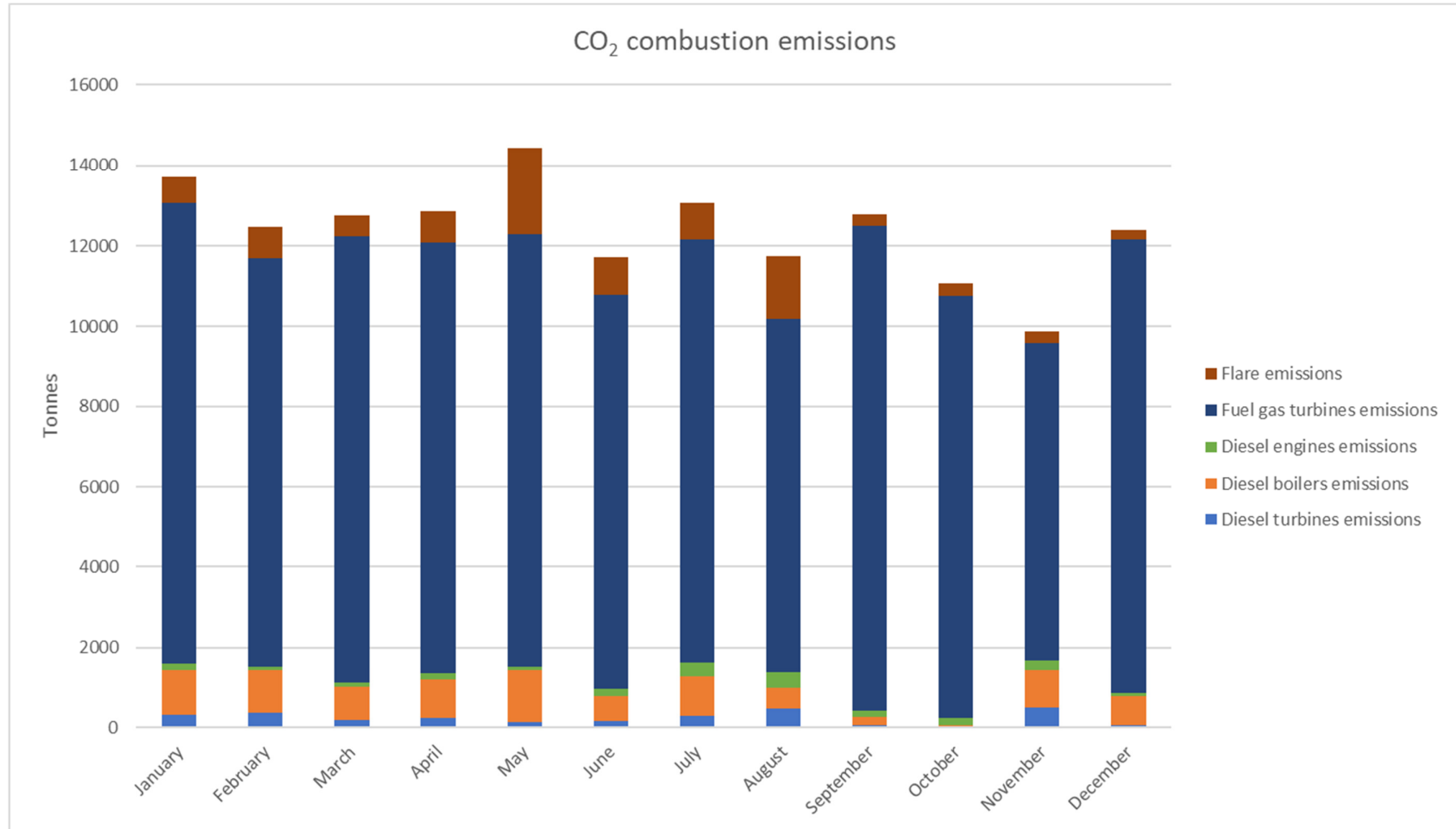


Figure 13: BW Catcher CO₂ combustion emissions.

5 Incidents

BWOCUK strive to prevent the unplanned release of hydrocarbons and chemicals, however, on occasion accidental releases do occur. All unplanned releases of hydrocarbons and chemicals to sea from offshore oil and gas installations and pipelines, regardless of size, are reported to OPRED and other statutory agencies via the Petroleum Operations Notice 1 (PON1) form. Permitted Discharge Notifications (PDN's) are also submitted using PON 1 forms when permitted discharges are in breach of conditions / limits associated with the installations Oil Discharge Permit.

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, routine audits, procedural controls and training and competency for individuals interacting with process plant. Oil Pollution Emergency Plans (OPEPs) approved by OPRED are in place covering the installation. The plan is exercised on a regular basis and followed in the event that an unplanned release does occur, to ensure that the incident is reported in a timely fashion and that contingency and mitigation measures are in place.

5.1 Unplanned Release – PON1

During 2019, three Petroleum Operation Notices No.1 (PON1s) were submitted to the regulator for unplanned releases from BW Catcher FPSO, these are outlined in **Error! Reference source not found.** below.

Name/ Description	Regulator tracking number	Release Type	Release Quantity (tonnes)	OPRED Status
STP bilge hazardous open drain tank	PON1/8703	Hazard open drain fluid	0.001	Open
Overflow of Hazardous open drain tank resulting in minor spill of oily fluid to sea	PON1/9143	Oily water	0.0171	Closed
Spill of Oily Water Mix	PON1/9154	Oily water	0.0001	Open

Table 5-1: PON1s submitted during 2019.

5.2 Regulatory Non-Compliance (NC)

Nine non-compliances were raised in relation to environmental legislation, permit condition breaches and other PONs during 2019, described in Table 5-2 overleaf. In addition, one non-compliance was closed out in 2019 that related to an event in 2018 regarding the annual PPC NO_x allowance being exceeded.



Name/ Description	Regulator tracking number	Release Type	Release Quantity (tonnes)	OPRED Status
PPC Permit Non-compliance - Annual NOx allowance exceeded	PPCNCF/180014	Atmospheric Emissions		Closed
OCR Non-compliance - Use of Emulsotron CC3442G instead of EMBR13442C	OCRNCF/190001	Demulsifier	not quantified	Closed
Primary white Nav Lights not adequate for visibility conditions. Primary whites not sync'd. Subsidiary reds not sync'd.	PON10/190008	N/A	N/A	Closed
Heli-deck Netting Panel	PON2/19013	N/A	N/A	Closed
OCR Non-compliance - Oceanic HW443R	OCRNCF/ 190027	N/A	N/A	Closed
OPPC Non-compliance - OIW >100mg/l (208 mg/l)	OPPCNCF/190145	N/A	N/A	Closed
F-Gas Leak from Accommodation AC 17/05/2019	FGas/003/2019	R134a	228kg (326.04 tCO2e)	Open
Mini ROV stuck by tether on mooring cluster 1. Could not be retrieved from the FPSO. Therefore umbilical cut.	PON2/19066	N/A	N/A	Closed
OPPC Non-Compliance - Sample point being used for PWRI that is not on the permit.	OPPC/190353	N/A	N/A	Closed
F-Gas Leak from Accommodation AC	FGas/006/2019	N/A	N/A	Open

Table 5-2: Non-compliances submitted during 2019.



6 Revision Summary

Rev.	Date	Document owner to summarise key changes in the document
A	21/05/2020	Issued for Review
00	27/05/2020	Issued for Use