



Foinaven FPSO

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ABBREVIATIONS

BAT	Best Available Techniques
BBLs	Barrels
BEIS	Department for Business Energy and Industrial Strategy
BOPD	Barrels of Oil Per Day
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CH ₄	Methane
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
EEMS	Environment and Emissions Monitoring System
EMS	Environmental Management System
EU ETS	European Union Emissions Trading System
FPSO	Floating, Production, Storage and Offloading
HSSE	Health, Safety, Security and Environment
ISO	International Organization for Standardization
NO _x	Nitrogen Oxides
N ₂ O	Nitrous Oxide
OIW	Oil in Water
OPPC	Oil Pollution Prevention and Control
OPEP	Oil Pollution Emergency Plan
PLANC	Permits, Licences, Authorisation and Consent
PON1	Petroleum Operation Notice 1
SO _x	Sulphur Oxides
UKCS	United Kingdom Continental Shelf
VOC	Volatile Organic Compound

1 INTRODUCTION

The Foinaven, Floating, Production, Storage and Offloading vessel (FPSO) is the host installation of the Foinaven Field. The Foinaven FPSO is located on the United Kingdom Continental Shelf (UKCS) 190 km west of the Shetland Islands predominantly in Blocks 204/24a and 204/19 in a water depth of 480 m. The Foinaven FPSO is owned and operated by Golar-Nor (UK) Limited a wholly owned subsidiary of Teekay Corporation (hereafter referred to as Teekay).

The Foinaven FPSO has an oil production capacity of 140,000 Barrels of Oil Per Day (BOPD) and a storage capacity of 202,000 barrels (BBLs).

Under the Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015, Teekay became the FPSO installation operator in place of Brit Oil Ltd, effective on the 1st of March 2017. Therefore, this Environmental Annual Statement outlines the environmental performance of the Foinaven FPSO for March to December 2017.

2 ENVIRONMENTAL MANAGEMENT SYSTEM

2.1 HSSE Policy

Teekay's commitment to the environment, as well as health, safety and security, are detailed within Teekay's policy statement, shown in Figure 2.1. Teekay's Health, Safety, Security and Environmental (HSSE) policy is a public commitment to conducting business in a manner that protects the health and safety of people and preserves the integrity of the environment.

The main goals of the policy are:

- No injury to personnel;
- No harm to the environment;
- No damage to equipment; and
- No security breaches.

2.2 EMS

Teekay's commitment to the highest levels of HSSE is achieved through the HSSE Management System, which contains an Environmental Management System (EMS) utilised to identify, assess and mitigate environmental risks and manage environmental performance of all its operations.

The EMS is an integral element of the HSSE Management System and is based on the principle, "plan, do, check and act". The EMS is designed to achieve the environmental goals of the prevention and elimination of pollution from offshore sources, the protection and conservation of the maritime area against other adverse effects of offshore activities and the continual improvement in environmental performance. Teekay produces an annual Sustainability Report which includes the status of its environmental performance.

The EMS is verified against the International Organization for Standardization (ISO) 14001 Standard for EMS including their North Sea Assets. Teekay ensures maintenance and compliance with ISO 14001. Environmental compliance is also managed through the development of an asset specific Permits, Licences, Authorisation and Consent (PLANC) Register and an Environmental Compliance Plan.



Health, Safety, Security and Environmental Policy

High quality HSSE performance is essential and valuable for the success of our business and employees. To achieve this, we have anchored HSSE as a line responsibility and we are committed to comply with all regulatory requirements and continuously improve performance. Our main goals are:

- No injury to personnel
- No harm to the environment
- No damage to equipment
- No security breaches

To achieve this, Teekay Offshore Production will:

- Ensure HSSE is everyone's responsibility
- Empower all employees to speak up and stop work if something is not safe
- Use our operational experience to maintain and continuously improve HSE performance
- Focus on major accident hazards and process safety to reduce risk
- Focus on hydrocarbon release prevention and reduction
- Minimize discharges, emissions and waste and their environmental effects
- Exercise sustainable corporate social responsibility wherever we operate
- Assess the security risk for our offices, FPSO's and ships, and implement prudent preventive actions
- Expect all contractors and subcontractors meet our HSSE expectations
- Proactively monitor, evaluate and report HSSE performance associated with our HSSE targets

Your work is never so urgent that you don't have time to do it safely.

Trondheim, November 24th 2016

A blue ink signature of Chris Brett, consisting of a stylized 'C' and 'B' followed by a flourish.

Chris Brett
President

Rev. 2016-11-24

Figure 2.1 Teekay's HSSE Policy

3 ENVIRONMENTAL PERFORMANCE

Teekay has identified the following significant environmental aspects of its operations:

- Atmospheric emissions;
- Oil discharged in produced water and produced sand;
- Chemical use and discharge;
- Solid waste generation and disposal; and
- Oil and chemical spills.

Teekay routinely monitors and reports its performance in terms of environmental emissions and discharges as required by UK legislation and the internal HSSE Management System. This information is reported via the Environmental and Emissions Monitoring System (EEMS), which is a database of environmental information that is accessible to oil and gas operators and to the regulator, the Department for Business Energy and Industrial Strategy (BEIS).

3.1 Atmospheric Emissions

Atmospheric emissions generated by combustion activities are regulated by the European Union Emission Trading Scheme (EU ETS) 2005 and the Offshore Combustion Installations (Prevention and Control of Pollution) Regulations 2013. The main combustion processes on the FPSO are gas-fired engines used for power generation. These engines are fired on gas mixed with some diesel but have the capacity to operate on diesel only as a backup.

The flaring of gas on the Foinaven FPSO is restricted and only used for safety reasons. Teekay continually looks to identify opportunities to reduce emissions from its operations, such as improving the efficiency of the process and utility system in order to reduce the fuel burnt.

During the whole of 2017, FPSO combustion activities (fuel gas and diesel combustion for power generation purposes and process gas flaring for safety purposes) generated carbon dioxide (CO₂), nitrogen oxide (NO_x), sulphur oxide (SO_x), nitrous oxide (N₂O), carbon monoxide (CO), methane (CH₄) and non-methane Volatile Organic Compounds (VOC) emissions.

Figure 3.1 illustrates the annual trend of actual and permitted emissions resulting from combustion activities on the Foinaven FPSO in the whole of 2017. The total mass of non-CO₂ emissions was 3,555.7 tonnes, which is well below the permitted amount for each non-CO₂ emission. During Teekay’s operation of the FPSO from March to December 2017, 2698 tonnes of non-CO₂ emissions was produced. The total of each non-CO₂ emissions produced was well below the respective permitted amount.

There is no permitted amount of CO₂ emissions. In the whole of 2017, 166,802.6 tonnes of CO₂ was emitted, of which 130,277.5 tonnes was during Teekay’s operation of the FPSO (March to December 2017).

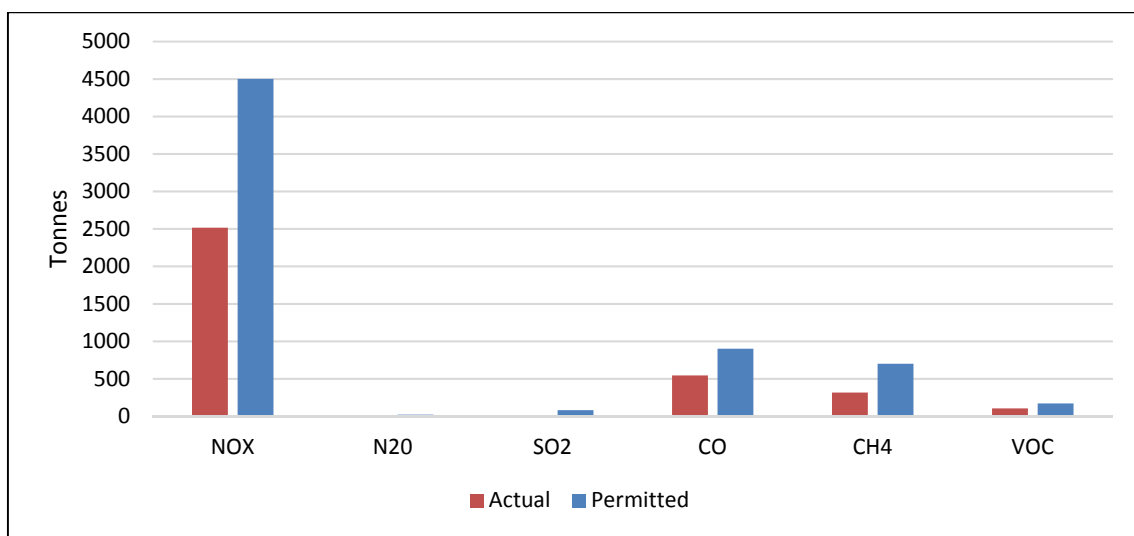


Figure 3.1 Non-CO₂ emissions for 2017

Figure 3.2 illustrates the percentage of the permitted emissions which were emitted in 2017. All emissions were well within the permitted thresholds.

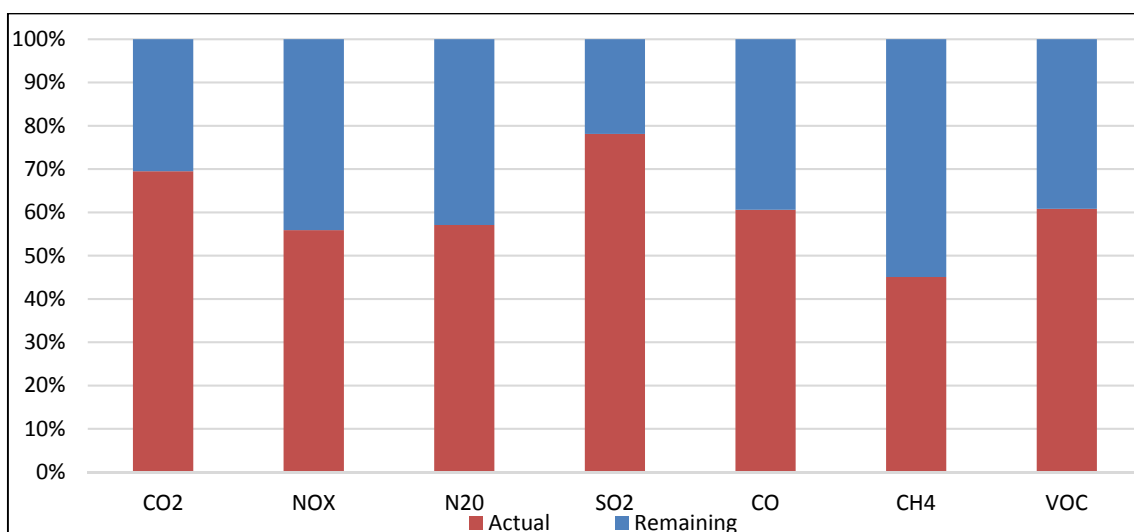


Figure 3.2 Permitted thresholds vs actual emissions for 2017

3.2 Oil Discharged in Produced Water

Oil and gas reservoirs have a natural water layer (called formation water) that, being denser, lies under the hydrocarbons. As reservoirs become depleted of oil and gas, seawater is usually injected into the reservoirs to support hydrocarbon recovery. Both formation and injected waters are eventually produced along with the hydrocarbons and, as an oil field matures, the volume of produced water tends to increase as the reservoir fills with injected seawater. The 'water cut' or amount of water in produced fluids from wells on mature assets can be >95 % by weight compared with the oil content.

On the Foinaven FPSO, produced water is separated from hydrocarbons in gravity separators and treated to remove as much oil as possible before it is discharged to sea. Due to traces of produced Oil in Water (OIW), the discharge to sea of produced water is strictly controlled by the Offshore Petroleum Activities (Oil Pollution Prevention and Control) (OPPC) Regulations 2005, which define the average oil content of the water that may be discharged.

Figure 3.3 illustrates OIW discharge for whole of 2017 to give an illustration of the annual trend. During Teekay's of operation FPSO (March to December 2017), the cumulative oil discharge was 32.99 tonnes, 65.25 % of the 50.62 tonnes annual oil discharge allowance. For each month in 2017, the average produced water quality was well within the regulatory limit of 30 mg/l.

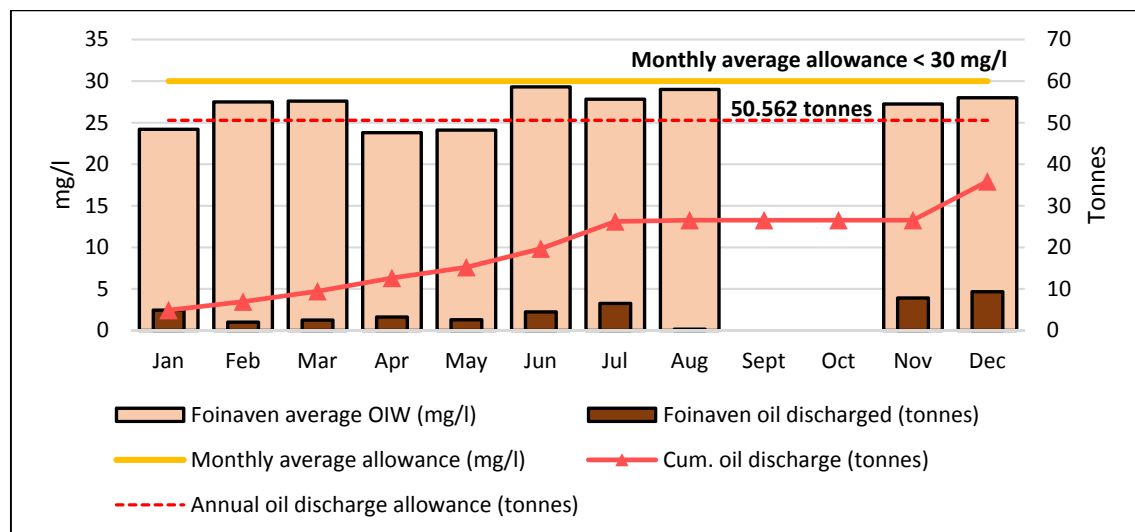


Figure 3.3 Foinaven oil in produced water discharges in 2017

3.3 Produced Sand

Sand in oil/water occurs due to the migration of sand induced by the flow of oil. After the OIW separation processes, produced sand may accumulate in some of the produced water systems. The produced sand system on the Foinaven FPSO utilises sand jetting and washing to remove water/oil from the sand surface before discharge, although traces of oil may remain on the sand. No direct regulatory limit exists for the quantity of dispersed oil on sand, however, its discharge to sea is strictly controlled by the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005. This sets a limit based on prior discharges and the use of Best Available Techniques (BAT), and is approved by the regulator.

Figure 3.4 illustrates the sand, and oil on sand discharges for the whole of 2017. For the months in which Teekay was the installation operator (March to December 2017), the cumulative sand discharge was 10.35 tonnes. The cumulative oil on sand discharge (between March and December 2017) was 0.073 tonnes, which is well below the annual 0.675 tonnes threshold approved by the regulator.

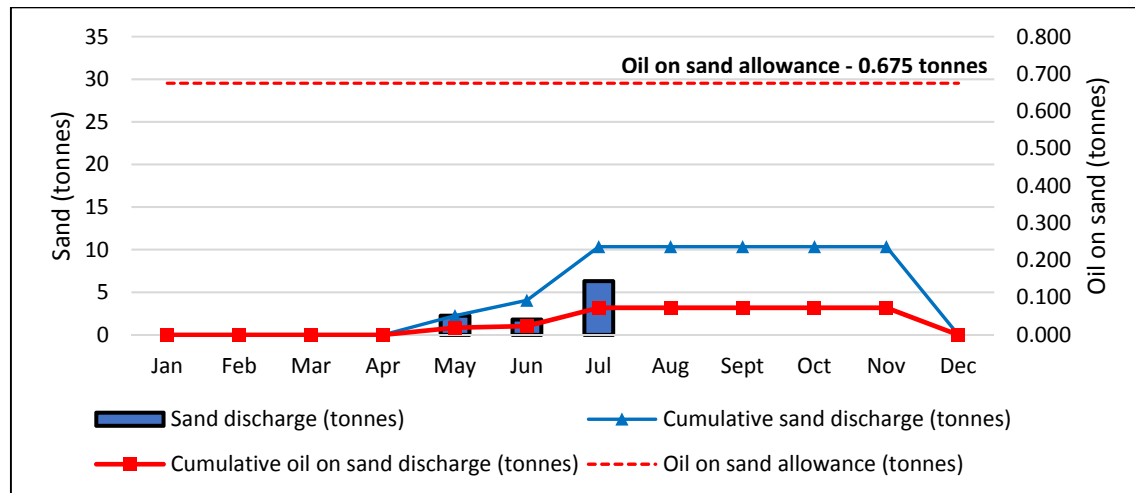


Figure 3.4 Foinaven sand and oil on sand discharges in 2017

3.4 Chemical Use and Discharge into the Marine Environment

All chemicals used offshore during oil and gas production must be approved by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS), and their use and discharge is controlled under the Offshore Chemicals Regulations 2002. All chemicals used must be risk assessed by the operator as part of the permitting process, and the use of any chemical which has hazardous properties (such as low biodegradability or high toxicity) requires additional justification. Teekay selects chemicals for use offshore with the environmental impact in mind and attention will be given to Substitution and other warnings, with an aim to avoid the use of such chemicals where possible, or seek an alternative where practicable.

Production chemicals include:

- Corrosion inhibitors;
- Scale inhibitors;
- Hydrogen sulphide inhibitors;
- Biocides to prevent microbial souring of reservoirs; and
- Deoilers and demulsifiers to help separate oil from produced water.

Teekay is committed to compliance with Offshore Chemical Regulations 2002 (as amended) as a minimum. Teekay utilises a Chemical Management Strategy, taking a pro-active approach in the management of chemical issues, relating to chemical usage and discharge and creating annual plans to minimise the use and discharge of chemicals.

Figure 3.5 illustrates the total Foinaven FPSO chemical usage for the whole of 2017. Chemical usage was 1,601,793 kg for the entire year, 28 % of the permitted amount. For the whole of 2017, 462,129 kg, (28.85 %) of the chemical usage was discharged. During Teekay's operation of the

FPSO (March to December 2017), the total chemical usage was 1,430,344 kg, and the total chemical discharge was 455,769 kg.

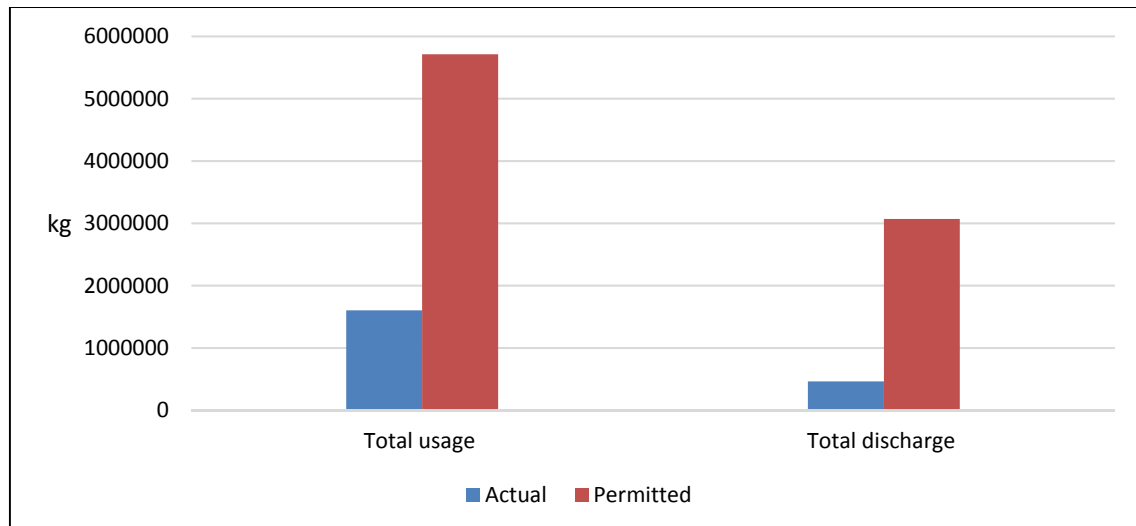


Figure 3.5 Permitted vs actual, chemical usage and discharge in 2017

Figure 3.6 and Figure 3.7 show the percentage distribution of the individual chemicals used and their discharge respectively.

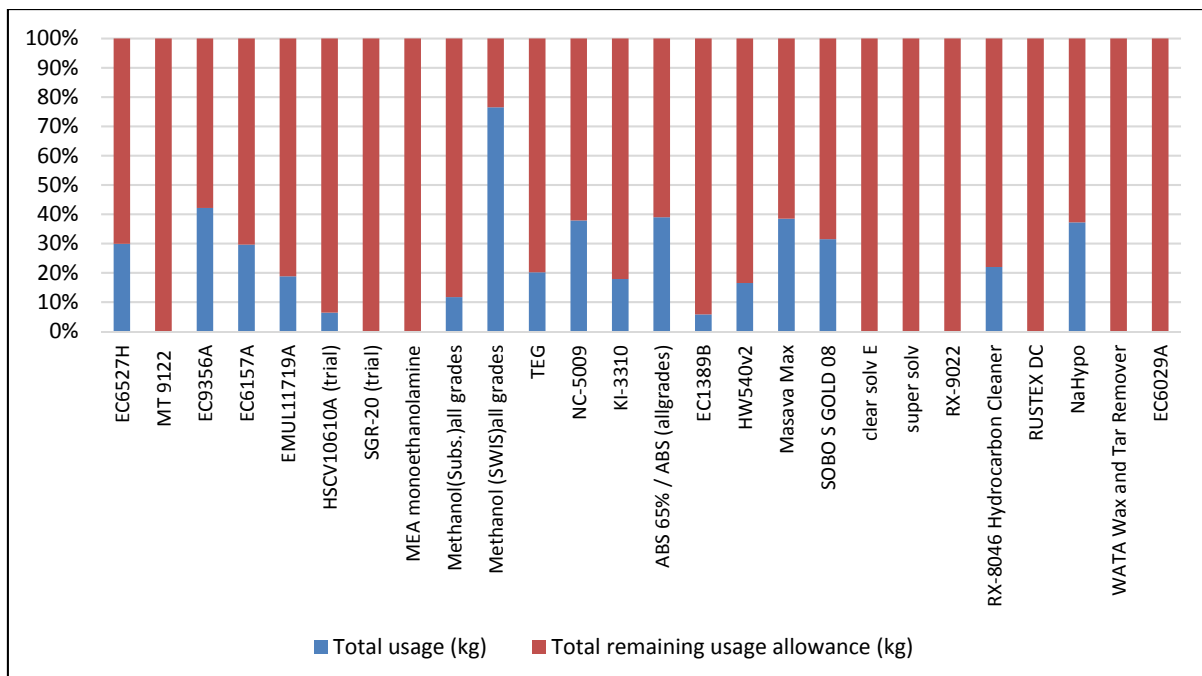


Figure 3.6 Chemical usage vs permitted in 2017

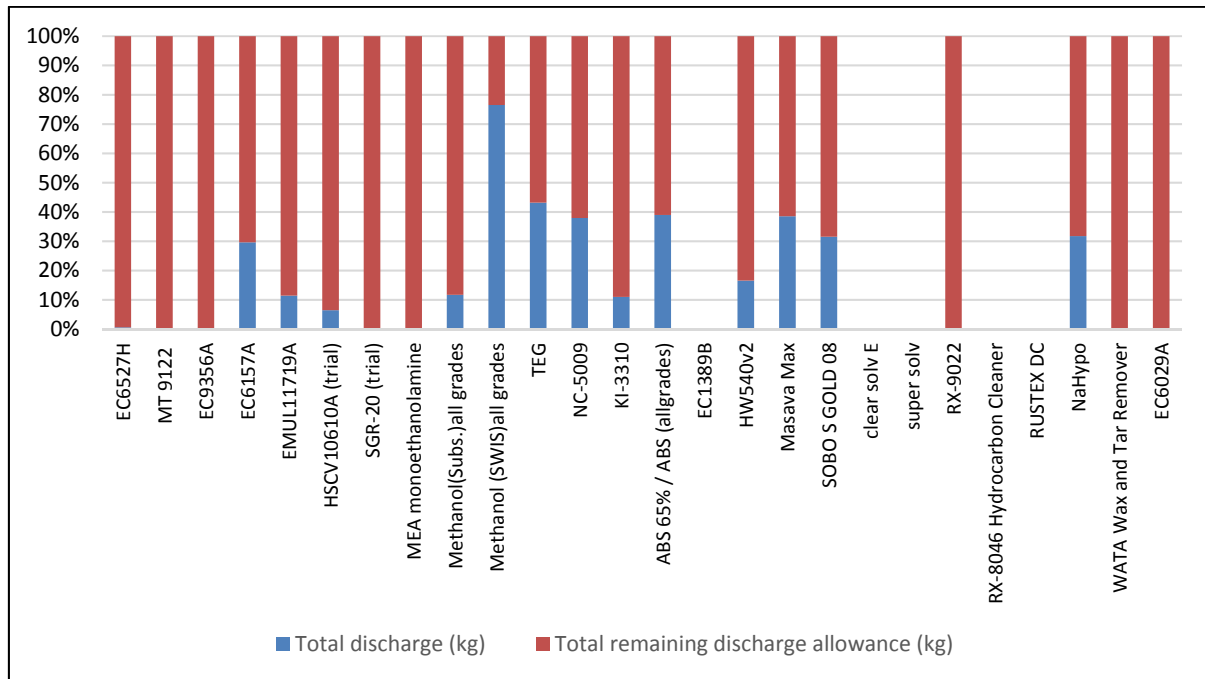


Figure 3.7 Chemical discharge vs permitted discharge 2017

3.5 Solid Waste Generation and Disposal

Teekay must ensure that the segregation, transportation and eventual disposal of wastes generated during their offshore operations are managed in accordance with legislative requirements. The Environmental Protection Act 1990 introduced the ‘Duty of Care’ with which all waste producers must comply. Hazardous waste that might be harmful to human health or the environment (known as Special Waste in Scotland) is governed by specific legislation, which includes strict handling and disposal requirements. Teekay implements its waste management procedure to manage all wastes and ensure adherence to respective legislation.

Teekay is working to reduce the amount of waste generated offshore, especially of hazardous wastes such as oil-contaminated rags and other similar items. Wherever possible, wastes are recycled or reused.

Figure 3.8 shows the percentage of waste generated on the Foinaven FPSO that was not landfilled in the whole of 2017; on average 20 % of the generated waste was landfilled. In 2017, 209.54 tonnes of waste was generated, with 182.17 tonnes generated during Teekay’s operations of the FPSO from March to December 2017. Figure 3.9 shows that 70 % of the waste generated was recycled, with 20 % being sent to landfill and 5 % of the waste turned into energy.

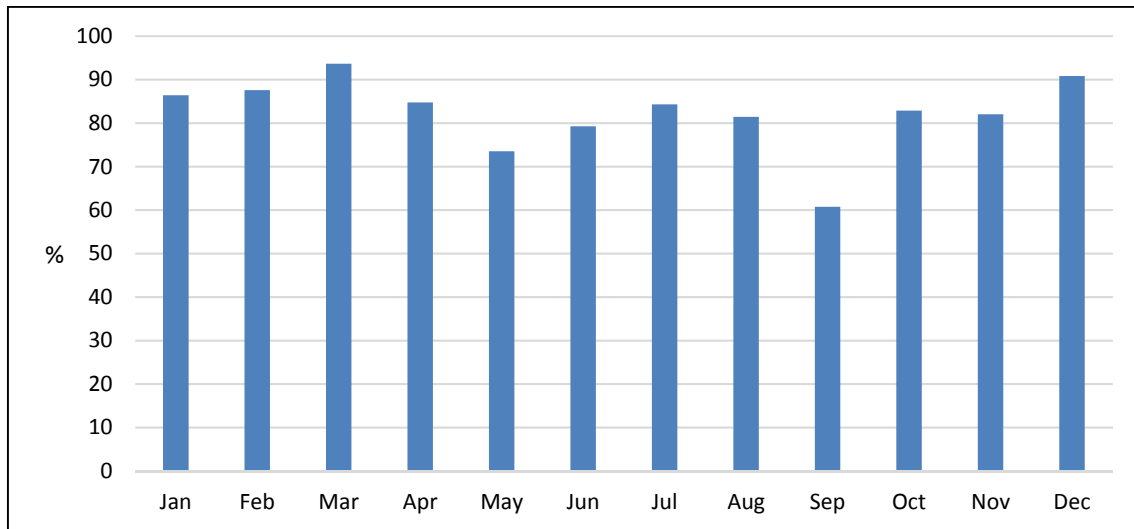


Figure 3.8 Waste segregation in 2017

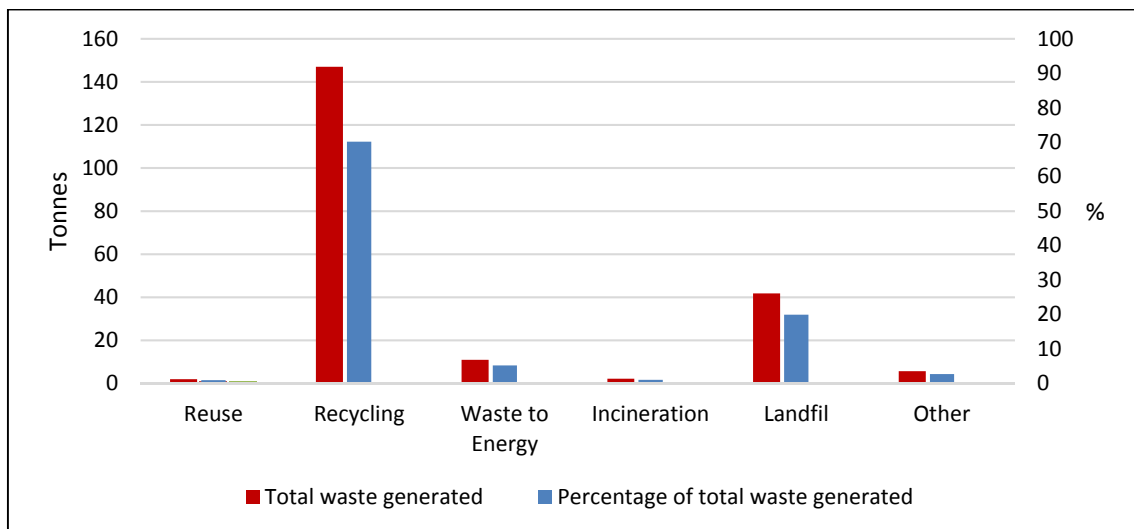


Figure 3.9 Waste disposal in 2017

3.6 Accidental Releases of Oil and Chemicals and Non-Compliant Events

All discharges to the sea other than those authorised by the OPPC permit, must be reported to the relevant authorities, regardless of volume. These reports are made on a PON1 (Petroleum Operations Notice 1) form, and include notification of accidental releases of oils and chemicals to the sea, and permitted discharge notifications which report higher amounts of oil discharged to sea under an OPPC permit (>1 tonne in any 12-hour period), or unusual sheens which have the potential to cause environmental impact or affect other users of the sea.

Teekay takes its responsibility to prevent accidental discharges of oil and chemicals to sea very seriously. Procedures are in place to prevent spills and to ensure that hydrocarbons remain securely within the process system on all FPSOs. Teekay has government approved Oil Pollution Emergency Plans (OPEPs) in place for all offshore installations.

During 2017, there were eight instances of accidental releases and subsequent PON1 notifications. As illustrated by Figure 3.10, during the period from March to December 2017, in which Teekay transitioned into installation operators of the Foinaven FPSO, they were five PON1s issued. The PON1s were a result of two chemical release incidents, which occurred in May and June, and three oil release incidents occurring in July, August and November.

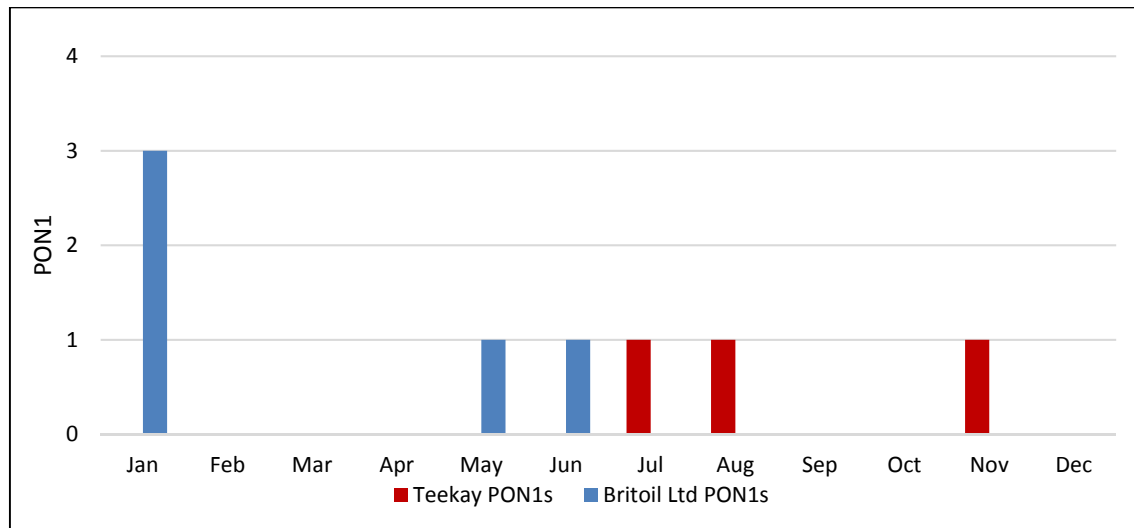


Figure 3.10 Foinaven PON1s by responsible party in 2017

4 CONCLUSIONS

Teekay is committed to minimising impacts to the environment from offshore operations. Through the regular review of environmental performance, and the setting and delivery of environmental objectives that are appropriate to environmental risks, Teekay shall continue to improve environmental performance.

Teekay plan to deliver the following key environmental objectives in 2018:

- To improve the quality of housekeeping and process safety to reduce the risk of environmental incidents;
- To reduce the likelihood of accidental discharges to the sea;
- To raise crew awareness of environmental permits in place across Foinaven; and
- To ensure compliance with environmental regulations.