

**Chrysaor
Exploration and
Production Ltd
OSPAR Report
2018**



CHRYSAOR

Introduction

The purpose of this report is to present Chrysaor Exploration and Production Limited environmental performance for 2018, as required by OSPAR Recommendation 2003/5. The report focuses on the 2018 environmental performance of Chrysaor's operated assets in the United Kingdom Continental Shelf (UKCS).

Chrysaor Company Structure

Chrysaor Exploration and Production Limited which operates, owns and manages a portfolio of Exploration & Production assets balancing near term development opportunity with production growth, combined with significant gearing to appraisal and exploration success.

Chrysaor Exploration and Production Limited operates its production installations through Chrysaor Limited (Lomond and North Everest installations) and Chrysaor North Sea Limited (Armada installation).

Environmental Management

Chrysaor is committed to conducting its operations in such a way as not to cause harm to the environment. This is enacted by its Health, Safety and Environmental Policy which is approved by the Chief Executive Officer.

Chrysaor has in place an Environmental Management System (EMS) certified to ISO standard 14001:2015. This is applied to manage the impacts of any activities, products and services on the environment. It provides a structured approach for continuous planning, implementing, reviewing and improving on environmental protection measures as well as working towards increasing environmental sustainability.

Health, Safety & Environment Policy



Chrysaor will conduct its operations in such a way as not to harm people and minimise any impact on the environment. Chrysaor is fully committed to continuously improving its health, safety and environmental performance by the successful implementation of this Policy.

Chrysaor commits it will:

- Ensure compliance with all applicable legislation and standards;
- Ensure an effective management organisation is in place and all personnel and contractors are aware of their health, safety and environmental responsibilities;
- Create a safe and healthy working environment for our employees, contractors and all other persons who could be affected by its activities;
- Identify, evaluate and control the risks and impacts associated with its activities, including where the potential exists for major accident events;
- Ensure that energy and resource management are an integral part of the business;
- Promote resource and energy conservation, waste minimisation and pollution prevention;
- Recognise and respond to employee and community concerns regarding the health, safety and environmental aspects of the company's operations;
- Ensure all employees and contractors are competent to perform their health, safety and environmental roles; and
- Achieve continuous improvement of its business processes through the implementation of its Core Values and Business Principles.

Chrysaor will ensure that the necessary resources are provided to fully support this Policy and will ensure that it is subject to audit and review as part of the Management System goal of continuous improvement in performance.



Phil Kirk
Chief Executive Officer

October 2018

UK Operations

Chrysaor has 100% equity interest in the Armada, Lomond and North Everest installations, where Chrysaor is the installation and well operator. Chrysaor also has non-operated equity in the Beryl Area, Buzzard, Elgin-Franklin, Erskine, J-Block and Schiehallion fields. This OSPAR Report will focus on the key environmental metrics associated with Chrysaor’s operated assets.



Greater Armada Area Commercial oil and gas production from the Greater Armada Area fields began in 1997. The Armada platform is situated in Block 22/5b of the central North Sea, approximately 250 km East of Aberdeen, with fields straddling blocks 16/29c, 16/29g, 22/4a, 22/5a and 22/5b. The Armada Hub consists of Drake, Hawkins and Fleming gas/condensate fields, with tiebacks from Seymour (Block 22/5b; developed 2004/2005) and Maria (Block 16/29a; developed 2006) in the UK Sector. In addition, the Armada platform accepts production from the Rev (developed 2007) and Gaupe (developed 2011) third party tiebacks which are located in the Norwegian Sector.



Gas is exported from Armada via the CATS (Central Area Transmission System) pipeline to Teesside, while the produced liquids are exported via the Forties Pipeline System to the Kinneil processing plant at Grangemouth.

Chrysaor successfully completed two side-tracks at the Maria field in 2018 using the Rowan Gorilla VII jack-up drilling rig. Further drilling work is planned at Armada, targeting the Hawkins and Seymour Horst fields throughout 2019.

Lomond The Lomond and Erskine fields are produced at the Lomond installation. The Lomond platform is situated in Block 23/21 in the central North Sea, 239 km from Peterhead and comprises a four-legged braced steel jacket consisting of a combined wellhead/production/living quarters platform. Lomond processes gas and condensate from the Lomond and Erskine fields. Gas and condensate from Chevron's Erskine development is imported via a multiphase pipeline to a dedicated Erskine Production Module (EPM) located on the Lomond platform main deck. First production of gas and condensates from the Lomond field was achieved in July 1993, with the EPM installed in 1997.



Gas and condensate are exported via infield pipelines to the CATS Riser platform at North Everest. Gas is then exported via the CATS pipeline to Teesside while condensate is exported via North Everest to the Forties Pipeline System then onwards to Kinneil for processing.

The PL781 Lomond export pipeline to North Everest replacement project commenced during Q1 2018, as a result of a pipeline blockage. During this time the Erskine Field was shut in with operations re-starting when the new pipeline was commissioned in Q3 2018.

North Everest Located in Block 22/10a, 145 km east of Scotland, North Everest commenced production in 1993. The North Everest installation is bridge linked to the CATS Riser Platform. North Everest is a combined wellhead/production/accommodation platform processing gas and condensate from the, North Everest field, South Everest subsea wellheads (located 7.1km South of the North Everest production platform) and Everest East Expansion (EEE) wells (located 6.8km North East of the installation).



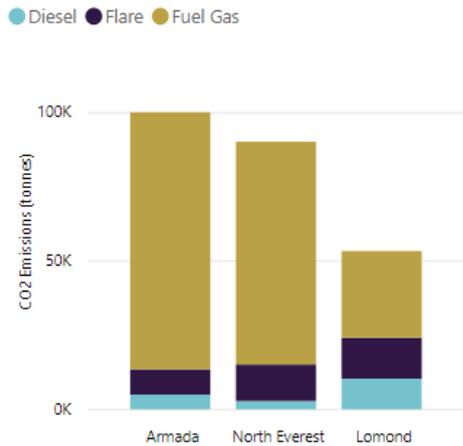
Condensate is exported via the Forties Pipeline System to the Kinneil processing plant at Grangemouth and the gas is exported via the CATS pipeline to Teesside.

Environmental Performance

Atmospheric Emissions

The main source of atmospheric emissions from Chrysaor operations are from the combustion of fuels (gas and diesel) for power generation, compression of gas and pumping of oil for transportation along export pipelines to the shore. Emissions from the combustion of diesel used in back-up generators constitutes a small amount of total atmospheric emissions. Flaring emissions are associated with routine maintenance activities, equipment and plant trips, shut-down and start-up activities.

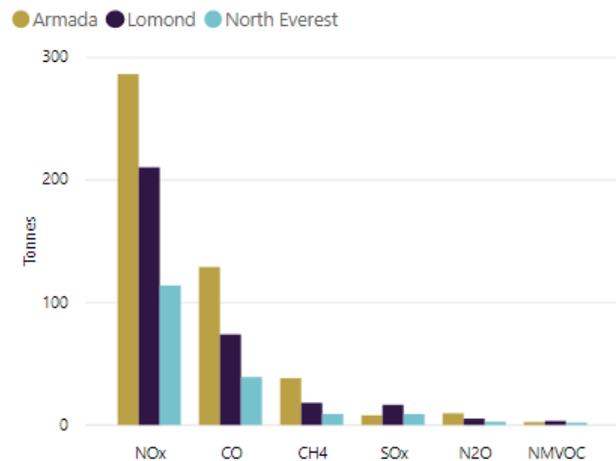
CO2 Emissions 2018



The emission of Carbon Dioxide (CO₂) is governed by the European Union Greenhouse Gas Emissions Trading System (EU ETS) which is currently in the third phase, running from 2013 to 2020. In 2018, Chrysaor operated assets (Armada, Lomond, and North Everest) emitted 243,889 tonnes of CO₂.

The Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2013 (PPC) regulate atmospheric emissions (with the exception of CO₂) from offshore oil and gas facilities. Armada, Lomond and North Everest hold PPC permits, with specific limit values for Methane (CH₄), Sulphur Oxides (SO_x), Nitrous Oxides (NO_x) Carbon Monoxide (CO) and non-methane volatile organic compounds (NMVOC). The quantity of emissions is calculated based on the total diesel and fuel gas use on each of the installations.

Total PPC Emissions 2018



Discharges to Sea

Oil Discharges

The OSPAR Commission recommendations are regulated through the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended) (OPPC).

Water produced alongside oil and gas operations, known as produced water, contains dispersed oil which is treated to permitted levels prior to discharge to the marine environment. The Armada and North Everest platform have single discharge points of produced water discharge, while the Lomond platform has two permitted discharge points, one associated with Lomond fluids and one for the Erskine fluids.

The quantity of oil discharge to sea under permitted conditions for 2018 is illustrated for all installations in relation to the total permitted quantity. The quantity of oil discharged is dependent upon the volume of produced water discharged and its associated concentration.



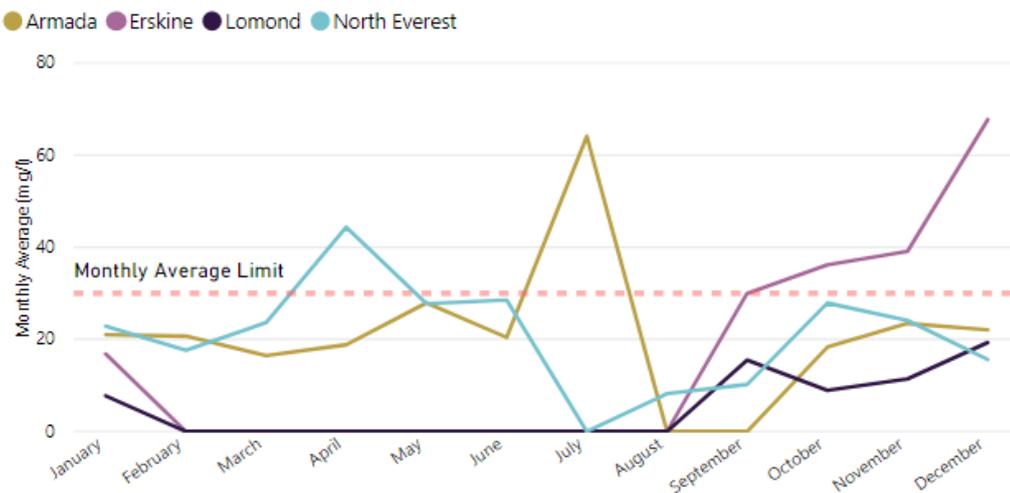
Armada exceeded the monthly average limit (>30mg/l) in July which corresponded with bringing the newly side-tracked Maria well online for the first time.

The Lomond field oil in water has remained within specification throughout 2018.

For the Chevron operated Erskine field, post completion of the PL781 bypass work the oil in water levels have been >30mg/l. This is caused by slugging through the process system and plant instability associated with platform trips. Chrysaor have been working with Chevron on Erskine produced water improvement solutions throughout 2018 and this effort continues into 2019.

The North Everest installation exceeded the monthly average limit in April, since then a chemical optimisation trial has resulted in the discharged produced water oil content being consistently <30mg/l.

Oil in Produced Water Performance 2018



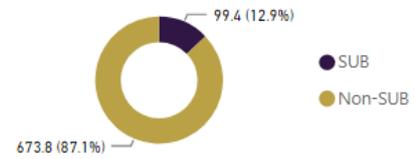
Chemical Discharges

Chemical use for offshore production operations is regulated under the Offshore Chemicals Regulations 2002 (as amended). A substitution warning is assigned to a chemical if a component appears on the OSPAR prescribed list for priority action, or if the component fails to meet set criteria with respect to persistence, bioaccumulation potential or toxicity.

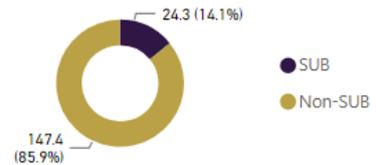
Each platform holds a separate chemical permit which includes justification for the use of chemicals which hold a substitution warning. The use (tonnes) of substitution versus non-substitution chemicals has been presented, with the percentage contribution to total use also provided.

Chrysaor carry out frequent reviews of chemical requirements with our chemical suppliers and strive to reduce the number of chemicals that are flagged for substitution.

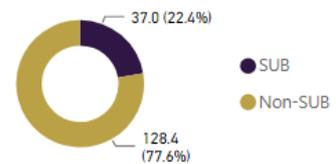
Armada



Lomond

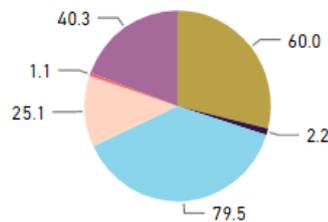


North Everest

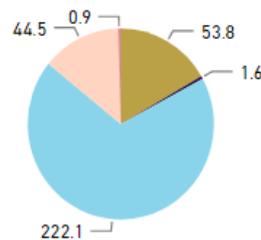


Waste

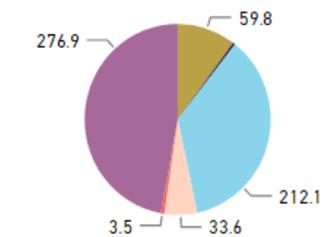
Armada



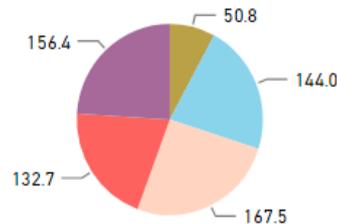
North Everest



Lomond



RGVII



● Waste to Energy ● Reuse ● Recycle ● Other ● Landfill ● Incinerate

Waste is categorised as hazardous or non-hazardous, dependant on whether the waste has one or more constituent specified in Annex III of the EU revised Waste Framework Directive (WFD, European Directive 2008/98/EC).

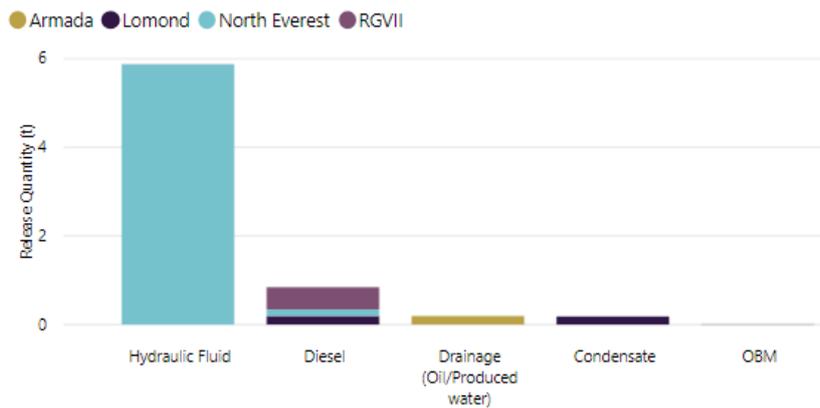
The final fate of the waste from the installations are presented in tonnes. These fates are: waste to energy, reuse, recycle, other, landfill and incinerate.

Hazardous waste includes: bulk liquid wastes, process sludges, oily rags, used chemicals, paints, batteries, fluorescent light tubes and electronic equipment. Non-Hazardous waste includes: packaging, galley waste, scrap metal and wood.

Unplanned Releases and Regulatory Non-Compliances in 2018

Chrysaor had 19 oil or chemical unplanned releases to sea during 2018 that were reportable PON1s. Of these releases, one release was greater than 1 tonne (5.9 tonnes), this was a water based hydraulic fluid (Oceanic HW443 R) release from the East Everest Expansion (EEE) development Subsea Control Module (SCM). A subsea campaign to replace the SCM at the EEE subsea template was successfully completed in 2018.

Sources and Types of PON1 Releases

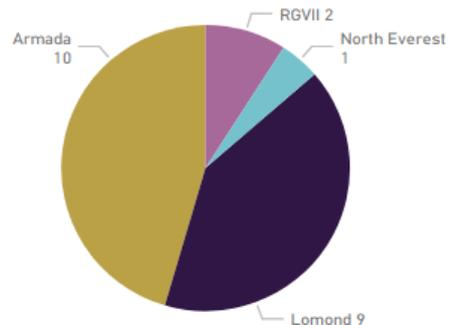


The reduction in the number of unplanned releases was made a priority as part of the HSEQ Management Review, with improvement initiatives being developed into the asset’s HSEQ plans. This included the commencement of the Lomond diesel ring main replacement and an all asset review and update to Chrysaor diesel bunkering operations.

There were 22 non-conformances associated with the produced water systems, either related to the temporary failure of metering devices, exceedance of the monthly average (30mg/l) limit or individual sample (100mg/l) limit.

On Armada, the notable causes of oil in water non-conformances were associated with chemical interference during well start-up, as well as during process restarts where topside arrival temperatures affected separation. Chrysaor have identified that oil in water readings are elevated when carrying out scale-squeeze operations, this appears to be due to a chemical interference, this has led to the reporting of a number of samples >100mg/l. Chrysaor are currently engaging with the regulator to seek approval for an alternative oil in water method for use during scale treatment operations.

OPPC Non-Compliances



Frequent plant restarts have contributed to majority of the oil in water non-compliances on Lomond (3 for Lomond discharges; 6 for Erskine discharges). An oil in water improvement project was initiated in 2018 and has focused on plant optimisation, chemical optimisation, replacement of the hydrocyclone liners and procedural changes related to sampling and record keeping. The output of this has resulted in oil in water improvements, but further optimisation opportunities are being investigated.

Status of Objectives for 2018

The primary objective for 2018 was to recertify the Environmental Management System to the international recognised ISO14001:2015 Standard. This was successfully achieved, with the scope of certification expanded to cover all operated activities.

Objectives for 2019

The Chrysaor HSEQ 2019 Plan sets a number of focus and improvement areas, those specifically related to environmental performance include:

- Development of an Energy Management Strategy;
- Atmospheric Stack Sampling at Armada;
- Emissions reduction feasibility studies on all three platforms for 2020 implementation
- Safety and Environmental Representatives role development;
- Diesel ring-main replacement work on Lomond;
- Energy Savings Opportunity Scheme (ESOS) Phase II; and,
- Produced water improvement project at the Lomond installation.