HS&E REPORT 2023



Health, safety and environmental reporting for the UK's offshore energy industry



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Contents

1	Forward	4
2	Key findings for 2022 compared with 2021	6
3	Environment	8
	3.1 Permitted discharges	8
	3.2 Atmospheric emissions	14
	3.3 Waste	16
	3.4 Unintentional releases	18
4	Safety	26
	4.1 Process safety	29
	4.2 Personal safety	32
	4.3 Health	34
	4.4 Aviation	42
5	Conclusion and look ahead	47



Foreword

Mark Wilson, Director HSE & Operations Offshore Energies UK

Welcome to Offshore Energies UK 2023 Health, Safety and Environment Report, which provides an overview of the offshore oil and gas sector's health, safety and environment (HSE) performance for 2022. Safe operations free of environmental releases is the goal of all of our member organisations and is a priority for the work that our members put into OEUK work groups and initiatives.

We work closely with our members, regulators and other stake holders to drive continuous improvement across all areas of HSE including operational risk management, human performance, and aviation safety. We connect members to better technology and new approaches to data management. Better technology helps amplify the weak signals that allow us to make a change before an incident occurs and helps organisations target safety initiatives.

During the reporting period there has been a significant challenge to the industry's overall 'licence to operate', with climate change remaining front and centre of the social discourse and political debate. This has continued into 2023. Avoiding serious incidents and major accidents is essential if we are to retain this social licence.

2022 was the safest year to work in offshore oil and gas since records began. UK lost time injury (LTI) rate continues to outperform our near neighbours within the basin. This reflects maturing safety management systems and the embedded culture of safety. There were zero workrelated fatalities again, a trend that has continued since 2016. Nevertheless, we must not become complacent. Hydrocarbon releases continue at an unacceptably high level and industry must continue to reduce these releases. Two of these releases



were major, meaning that there was the potential for significant escalation leading to loss of life. Causes of personal safety risk remain slips, trips and falls, followed by lifting and handling. OEUK continues to lead the implementation of the industry Process Safety Leadership Principles to ensure that the learnings from recent inspections and gap analysis lead to material changes to company policies and procedures.

During the reporting period, the maintenance backlog remained stubbornly flat, with performance varying widely from operator to operator. This data is more reliable than previous years as companies are aligning their reporting with OEUK backlog performance indicators and they are reporting these directly for analysis. Overall safety and environmental critical element (SECE) preventative and corrective maintenance backlog saw a 4% decrease in 2022 and a decrease of 43% for SECE preventative maintenance un-deferred to deferred. The latter shows that the backlog has been reviewed from a risk management perspective but it still persists. This year OEUK has analysed the management of maintenance backlog, published insights, and developed a strategy to address industry backlog.

The overall health of our workforce is an important focus. The OEUK Medical is internationally recognised as a benchmark assessment for offshore workers and it is increasingly used in other sectors as well. In 2022 over 150,000 medicals were conducted or overseen by OEUK-registered doctors. This was the most since medicals began and beats the previous peak in 2019. Overall health challenges for the workforce include high blood pressure and diabetes and could be related to the increasing weight/body mass index (BMI) of the workforce. Overall health and wellbeing will be a focus for OEUK in addition to traditional occupational health going forward. Mental health is also increasingly a focal area of concern. OEUK is involved in industry initiatives and remains closely aligned with our stakeholders. Statistical information is limited on offshore poor mental health incidents but records from the Marine and Coastguard Agency suggest that acute mental health incidents requiring medevacs are consistently low.

Helicopters flew for about 54,000 hours incidentfree in 2022, transporting 269,531 passengers. This decade without an accident demonstrates that the industry has learned lessons while globally the picture was very different – despite there being many factors common to both regions; and in some areas, such as commercial pressures, the UK is actually a more challenging environment. OEUK continues to take a central role in UK-specific aviation safety and compliance.

The key focus areas for the environment remained responding to oil spills and monitoring emissions better. These efforts were carried out through continuous collaboration with industry and regulatory bodies, ensuring minimal impact on operations. Analysis of the 2022 data indicates notable improvements in environmental performance by the industry. For instance, there were lower volumes of produced water discharged into the sea and with that came a year-on-year drop in the volume of oil discharged. The overall percentage of waste being reused or recycled rose to 66%, marking a significant decrease in waste disposal through other methods such as landfill.

Although the overall number of accidental releases was lower than in earlier years, there was a notable rise in the total mass of unintentional releases in 2021. However, it is important to note that the majority of these releases consisted of chemicals that pose little or no risk (PLONOR) to the marine environment.

Overall greenhouse gas (GHG) emissions from the production of oil and gas were down 24% and methane reduced by 45% compared with the 2018 baseline. The sector has also halved flaring and venting compared with 2018, demonstrating the sector's continuous commitment to decarbonisation. The reductions are in line with targets to reduce emissions over time as part of the North Sea Transition Deal. The industry committed to reduce emissions 10% by 2025; by 25% by 2027; and by 50% by 2030.

We hope you find this report both interesting and informative and we are very grateful to our members for their valued contribution.

Any queries should be directed to OEUK HSE & Operations Director, Mark Wilson, at mwilson@oeuk.org.uk.



2. Key findings

Environment

Permitted discharges to sea

- Produced water discharged to sea down by **11%**.
- Mass of oil discharged to sea down by 7%.
- Total chemicals discharged to sea rose by 28% but were still lower than previous years and show a long-term improvement.

Atmospheric emissions

- Overall GHG emissions fell **24%** compared with 2018 (base year).
- Flaring and venting halved.
- Methane emissions fell **45%**.

Waste

- Total waste generated by offshore activities rose 8%.
- Total waste reused or recycled reached two thirds of overall waste.
- Total waste disposed of by other routes, including landfill, fell 45%.

Unintentional oil and chemical releases

• Although the total number of unintentional releases fell from previous years, the total mass of releases increased.

%

24%

45

Safety

Process safety

- There were two major hydrocarbon releases. The number of ROGI reportable incidents rose 10% from the previous year, with 225 recorded. Although this is an increase from 2020, it is less than previous years.
- The total number of dangerous occurrences reported fell **22%** to the lowest level recorded.
- 2022 performance saw overall SECE preventative maintenance (PM) & corrective maintenance (CM) backlog fall **4%**.

Personal safety

- For the sixth year running there were no work-related fatalities.
- The Lost time injury rate is the lowest for years in the UK at 0.27/ mn worked hours but should be seen in the context of more RIDDOR reportable injuries.
- Bone fractures, strains/sprains and lacerations continue to account for majority of accident outcomes with hands and fingers.

Aviation safety

- UK Helicopter aviation remains one of the safest in the world, with another year of accident- free operations.
- Flying hours dropped almost **10,000 to 54904**.

Health

Medevac

- There were 337 medevacs carried out by the Coastguard. This is rising, affecting 0.87% of the offshore population, from 0.43 in 2017 and the highest rate in the last five years.
- Cardiac incidents were the common reason for medevac at 27%.

Medicals

- There was a significant jump in the number of medicals conducted: 150,550 up from 111,612.
- Blood pressure problems accounted for one in five of all failed medicals. Next commonest cause was diabetes at 15%. BMI/Weight accounted for a tenth.





3. Environment

The UK Continental Shelf (UKCS) oil and gas exploration and production sector is always endeavouring to improve its environmental sustainability and operational efficiency, as is evident from consecutive OEUK reports. Over recent years, the industry has greatly improved the efficiency of its production, lowering the operational costs while mitigating environmental risks. But as the basin matures, it becomes progressively harder to maintain production. Sustained cooperation with industry, government bodies, regulators and stakeholders is essential if these challenges are to be addressed and sustainable practices adopted.

3.1 Permitted discharges

The Offshore Petroleum Regulator for Decommissioning Environment and (OPRED), part of the Department for Energy Security and Net Zero (DESNZ), regulates the industry's offshore emissions and discharges. UKCS operators must apply for a permit for emissions to air or discharges to sea, and these must be reported to OPRED through Environmental the Emissions Monitoring System (EEMS). As part of the permit application, companies must assess the potential environmental effects and any mitigation measures.

The emissions and discharges that are monitored include: produced water; chemicals; drill cuttings; GHG emissions; natural gas that is flared and vented; and waste generated by upstream oil and gas operations.

Produced water

When oil and gas are produced, water within the hydrocarbon reservoir is also brought to the surface. Produced water contains small amounts of substances from the reservoir rock. These include dispersed oil, dissolved organic compounds, naturally occurring radioactive matter (NORM) and chemicals such as polymers injected to increase production. The composition of produced water is determined by the reservoir geology, maturity and stage of production life.

Produced water is separated from the hydrocarbons before either being re-injected into the reservoir to maintain production; or treated and discharged to sea. Produced water represents a significant waste stream from oil and gas production and a permit is required under the Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 for both overboard discharge and reinjection.

Produced water volumes

The total amount of produced water discharged in the UKCS follows the general trend of production and has therefore mostly declined since 2012 (see Figure 1).

Only 107mn m³ of produced water were discharged to sea in 2022, down from 120mn m³, a year-on-year decrease of 11%. The amount of produced water re-injected to the subsurface rose 4%, from 76mn m³, to 79mn m³. Reinjecting produced water is perceived as the best way to eliminate the environmental impact of produced water.



Figure 1: Total produced water discharged to sea and re-injected versus production

Dispersed oil in produced water

As shown in Figure 2 around 1,900 tonnes of dispersed oil were discharged to sea with produced water in 2022, making up 0.001% of the total mass of produced water. The total mass of oil discharged dropped 7%.

OSPAR Recommendation 2001/1 (as amended by OSPAR Recommendation 2011/8) for the Management of Produced Water from Offshore Installations limits individual installations to an average dispersed oil-in-water concentration of 30 milligrams/litre (mg/l). In 2022, the average concentration across industry was 18.2 mg/l, slightly up from 17.3 mg/l. At such low concentrations, it is quickly broken down by naturally occurring bacteria.



Figure 2: Oil discharged to sea with produced water

NORM in produced water

Radium and many other radionuclides occur naturally in seawater and have done so for millions of years. The UKCS rock strata contain radionuclides of the uranium and thorium decay series, some of which dissolve into the water in the reservoir. These materials do not have a significant impact on the marine environment or human health.

Discharges of NORM are regulated by permit. These oblige the operator to notify the relevant environment agency if the concentration of Ra-226 is greater than 0.1 Becquerels (Bq)/ml. Figure 3 shows the activity and concentration of NORM discharged to sea by isotope. The total NORM activity (Pb-210, Ra-226, Ra-228) discharged to sea was 37% higher year on year. How much NORM is discharged depends on the reservoir conditions and the volume of produced water discharged. The average Ra-226 concentration and the average total NORM concentration remain consistently and significantly below the 0.1 Bg/ml limit.



Figure 3: NORM discharged in produced water

Chemicals

The offshore oil and gas industry uses chemicals look for and to produce hydrocarbons. But it may only use as much as is needed for these operations, in order to avoid waste and to ensure responsible environmental performance. OPRED must permit all discharges before they take place and operators must constantly review the volume and the types of chemicals they use. Chemicals that may be used and discharged have first to be registered with the Centre for Environment, Fisheries and Aquaculture (CEFAS) Offshore Science's Chemical Notification Scheme (OCNS). The OCNS

applies the OSPAR Harmonised Mandatory Control (HMCS), developed Scheme OSPAR Decision 2002/2 through (as amended by OSPAR Decision 2005/1) and its supporting recommendation. The OSPAR HMCS contains a list of chemicals that it considers 'pose little or no risk' (PLONOR) to the environment, as well as those for which there is a substitution warning (SUB) where a less environmentally hazardous alternative exists and should be used instead if practicable. The UK approach to reporting chemical discharges is based on a "worstcase" scenario rather than actual quantities released.



Figure 4:



Mass of chemicals discharged

As shown in Figure 4, just over 78,000 tonnes of chemicals were discharged to sea in 2022, up 28% year on year, which is less than in previous years.

Figure 5 shows the amount of chemicals discharged to sea by operation against overall production. In 2022, it was equivalent to 159 tonnes/mn boe produced.

Drilling activities accounted for 59.5% (~46,500 tonnes) of the total amount while 40% (~31,000 tonnes) was associated with production. The remaining 0.5% (~400 tonnes) came from pipeline chemicals.

The amount of drilling chemicals discharged to sea increased by 55% in the past year. This was due to a change in activity type, rather than any change in overall activity. But the amount of chemicals discharged remains lower than previous years. Drilling fluids and cement, which are important for safety and well control, account for the bulk of the chemicals discharged.

Although UKCS production has been in overall decline since 2000, the use of production chemicals has tracked a more gradual slope as the basin's increasing maturity means more chemicals are needed to improve recovery rates. The amount of production chemicals discharged in 2022 rose ~16,000 tonnes year on year.

Chemicals used for pipeline maintenance are designed to prevent corrosion or the build-up of scale. The amount discharged slightly increased to ~400 tonnes in 2022 and accounted for 0.5% of the total. Pipeline



Figure 5: Total chemicals discharged by operation type

works will fluctuate from year to year and chemical discharge will largely reflect this.

Composition of chemicals discharged

Last year, 71% of chemicals discharged to sea from offshore oil and gas operations were designated PLONOR and 9% were SUB chemicals. Operators are obliged to phase out, the use of all SUB chemicals as soon as practicable and not later than January 1, 2026 according to the OSPAR Recommendation 2006/3 (as amended by OSPAR Recommendation 2019/02). The volume of SUB chemicals discharged to sea went up 3% year on year. Figure 6 shows the total volume of chemicals discharged to sea by their classification and Figure 7 breaks this down further by type of operation.

Drill cuttings

Drill cuttings are fragments of rock broken off during well drilling. They are brought to the surface by, and mixed with, the drilling fluids which surround the wellbore and are either water- or oil-based, depending on the geology or on safety and environmental factors. The cuttings are disposed of according to the type of drilling fluid.

Water-based fluid drill cuttings pose a lower environmental hazard and are generally permitted for discharge to sea. Oil-based fluid cuttings may only be discharged to sea after the oil-on-cuttings content has been



Figure 7: Total chemicals discharged by classificiation type

reduced to less than 1% of the total mass.

Whether these are oil or water-based, operators must conduct stringent environmental assessments as part of the processing purpose, in order to determine the risks that the discharged cuttings might pose.

Figure 8 shows an increase of cuttings from oil and water-based fluids discharged to sea in 2022.

3.2 Atmospheric emissions

The process of producing, treating and exporting hydrocarbons causes atmospheric emissions of various substances, including GHG which add to climate change. The UK industry has committed to reduce these emissions as part of the North Sea Transition Deal. Key findings from OEUK's *Emissions Report 2023*¹ shows that the UK offshore oil and gas industry has achieved

¹www.oeuk.org.uk/product/emissions-report-2023/



Figure 8: Total drill cuttings discharged to sea in relation to well count

a reduction in production emissions for the third consecutive year.

The report estimates that emissions fell to the equivalent of 14.28mn tonnes CO₂e in 2022, 24% less than 18.9mn tonnes in 2018. The sector has also halved flaring and venting and cut methane emissions by 45% compared with 2018, demonstrating a continuous commitment to decarbonisation. The reductions are in line with the sector's targets under the NSTD, in which the industry committed to reduce emissions 10% by 2025, 25% by 2027, and 50% by 2030. So far, operational improvements, process optimisation and the decommissioning of older assets have been the main factors. Forecasts also suggest the basin will meet the NSTD targets for 2025 and 2027, but further action will be needed in order to reach 50% by 2030.

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3.3 Waste

Like any other industry, oil and gas production generates waste that must be disposed of. Waste originates at various points in the life cycle and can be solid or liquid, hazardous or non-hazardous. Waste that is classified as hazardous only presents a risk to the environment if it is incorrectly managed. Modern disposal and recycling techniques, such as engineered landfill, incineration and recovery of waste oils, may also improve environmental performance.

Waste needs segregation and appropriate storage on offshore installations before transport to shore for processing by a licensed waste contractor. As landfill is costly and unsustainable in the long term, operators sort waste in order to maximise reuse and recycling.

The total amount, as well as the form of waste generated, varies from year to year depending on how much exploration, production, maintenance and decommissioning work there has been.

As shown in Figure 9, total waste rose by 8% last year to~139,000 tonnes compared with ~129,000 tonnes. Although the amount has increased this year, the overall percentage of waste being reused or recycled reached 66% meaning for the first time to date the amount

of waste being disposed of by other routes, including landfill, has significantly decreased (*see Figure 10*). 2022 saw a 45% reduction of waste disposed of by other routes from 2021.

While waste from operational and drilling activities has generally continued to decline from previous years, the amount of waste generated from decommissioning has increased, as shown in Figure 11. This is due to an increase in activity throughout 2022. The vast majority of waste from decommissioning activities in 2022 came from scrap metal, most of which was either re-used or recycled (*see Figure 12*).

It is worth noting that as the basin matures the industry faces a significant challenge in managing the increasing volume of decommissioning waste. Dismantling and disposing of platforms and other infrastructure creates substantial amounts of waste. Consequently, finding effective methods for recycling and re-using decommissioned materials becomes crucial to alleviate the environmental impact by reducing the burden on landfills and marine ecosystems but also conserving valuable resources leading to a more sustainable approach in the oil and gas industry.





Figure 9: Waste generated by offshore activity

Figure 10: Comparison of waste routes by year





Figure 11: Waste generated by offshore activity type

3.4 Unintentional releases

Unintentional oil and chemical releases are reduced by managing the plant, process and people that could cause them. Maintenance programmes ensure the integrity of equipment; the provision of multiple physical barriers, such as downhole safety valves, closed drains and bunding, and staff training and competence management all play their part. OEUK forums and work groups give the floor to members who can share experiences and any lessons that have been learned.

Despite these efforts, some unintentional releases to sea still occur. Safety legislation requires leaks of hydrocarbons or chemicals – generally those with the potential to cause significant harm to the safety of personnel – to be reported to the Health and Safety Executive (HSE). Environmental regulations go further. Any and every hydrocarbon or



Figure 12: Types of waste generated by offshore activity 2022

chemical release that reaches the marine environment, regardless of its size or its potential to cause harm, must be reported to OPRED in the form of a Petroleum Operations Notice 1 (PON1).

Furthermore, every offshore installation has an oil pollution emergency plan (OPEP), approved by OPRED, which sets out arrangements for responding to incidents to minimise the effect of releases. The plan takes into consideration the type of oil produced at the installation; the well-flow rates and the inventory; possible scenarios for releases; environmental sensitivities; and the possibility of any large oil release reaching the shoreline and if so, where.



Overview from 2012-22

The following analysis is based on the PON1 dataset from 2022 provided by OPRED . Further analysis has been carried out to categorise PON1 data from this period, both by product type released and by hazard category.

As shown in Figure 13, the amount of chemicals and oil unintentionally released to the marine environment has varied over the last ten years. This reflects the sensitivity of this data to rare but high-mass events. The largest single oil release in 2022 was 12 tonnes, while the largest chemical release was 356 tonnes, which was a PLONOR

chemical.

Although the number of PON1s submitted has fallen each year since 2016, the total mass of chemicals and oil released in 2022 has increased.

Unintentional oil releases

In 2022, there were 188 unintentional oil releases on the UKCS, involving 33 tonnes of oil released to the marine environment. To put this into context, in the same year, about 1,900 tonnes of oil were discharged to sea in produced water, under permit. This means that unintentional oil releases represented 1.7% of the total oil that entered the sea.



Figure 13: Unintentional chemical and oil releases by mass

Source: OPRED, 2023

The average annual reported unintentional oil release size has varied since 2012, from a low of 0.05 tonnes in 2021 to a high of 2.1 tonnes in 2012. Infrequent but large releases form a big part of these annual totals, such as has been seen in 2020 (*see Figure 14*).

The overall number of releases has stayed relatively stable over the period, averaging around 250/year, with a range between 165 and 315, but the mass of releases varies much more widely. The total number of releases in 2022 is slightly higher than in 2021 but still lower than previous years.

Releases by oil type

Determining the oil product type is key to effective spill response as it will affect the way in which it will behave in the marine environment under a variety of conditions.

Diesel and light oils will be rapidly broken up by wind and wave action if released and then evaporate. Heavier hydrocarbon releases will be monitored and appropriate clean-up operations will take place, as determined in the installation's OPEP. This may include allowing the oil to break up in open water, to be digested by naturally occurring oildegrading bacteria; the mechanical recovery of oil at sea; and the use of dispersants. If



Figure 14: Unintentional oil releases by count and mass



Figure 15: Percentage of unintentional oil releases by product type 2022

none of these approaches is possible the operator may actively protect sensitive areas of shoreline and also collect and recover any oil that does come ashore.

Crude oil accounted for just under 58% of the total mass of oil released in 2022 (*see Figure 15*). The most common type of release by number of incidents reported was for a hydraulic oil leak, but the mass is less than 3% of the total oil released.

Unintentional chemical releases

In 2022, 731 tonnes of chemicals were accidentally released in 133 incidents on the UKCS (*see Figure 16*).

As noted earlier, most offshore chemicals are diluted and the reporting of releases by mass is not representative of the relative quantities of potentially environmentally harmful substances released to sea. In many cases, the largest single component of the chemicals accidentally released to sea is the water used as a solvent.



Figure 16: Unintentional chemical releases by count and mass

Releases by chemical hazard class and source

The chemical PON1 data were assigned hazard classes to show with greater clarity the potential impact on the marine environment. The CEFAS OCNS data 5 were used to produce the classifications detailed below.

In 2022, ~87% (635 tonnes) of all unintentional chemical releases on the UKCS fell into the low or PLONOR categories, while just 0.2 tonnes of the mass released were ranked as high hazard, or 0.03% of the total; and 54 tonnes of substances or 7.4%, were unattributable (*see Figure 17*). Table 1 provides the hazard ranking used to categorise unintentional chemical releases.

Although the number of incidents has fallen

steadily since 2018, last year saw the highest mass of chemicals accidentally released since 2012 (*see Figure 18*). This can be attributed to three significant releases that added up to 550 tonnes.

Using historical data on the sources of releases, operators can decide where to target their efforts. However, the information included in the PON1 database does not go very far in this regard. In addition, one-off but high-mass releases distort the data, making it hard to determine trends. Finally, the masses reported released are the worst-case estimates for each incident and so the true amount released is likely to be less.

Table 1:Hazard ranking used to categorise unintentional chemical releases

Hazard Ranking	Components
PLONOR	All those products for which PON1s were submitted that have been designated PLONOR status.
Low	OCNS groups D and E, gold and silver as the lowest ecotoxicity groupings. This excludes products that have official PLONOR rankings.
Medium	OCNS groups B and C as medium ecotoxicity groupings.
High	OCNS group A, as the highest ecotoxicity grouping.
Unattributable	All those products for which sufficient description is not given and therefore cannot be classed in this model.



Figure 17: Percentage of total mass of chemical releases by hazard 2022

Figure 18: Total mass of chemical releases by hazard



4. Safety

Safety performance has never been as important as it is today, where the energy security of the UK and Europe has geopolitical ramifications. While there has been significant headway in terms of delivering the energy transition, as acknowledged in section 3, the industry's licence to operate could be cancelled by one serious process safety event.

The industry is focusing on the overall health, wellbeing and safety of individuals at work.

Promoting good mental health and managing stress will help make the UK offshore oil and gas sector an attractive place to work whilst helping to drive improved safety performance.

Offshore installations are superbly equipped to deal with offshore health and safety incidents, with trained medics and wellequipped sickbays, vital when weather conditions do not allow rapid evacuation. The provision of defibrillators has improved the



chances of survival for those who have had a heart attack. The routine medical screening of offshore workers is also crucial in limiting the health risks at offshore locations.

Transporting people to and from installations, whether for routine work or in response to emergencies, is predominantly done by helicopter. Managing the thousands of landing and take-off events from helidecks is an integral part of safe operations. These interfaces of management systems, equipment, and teams require constant vigilance to ensure that all parts of the system work in harmony, ensuring flight safety at all times.

The following sections outline the key performance indicators that combine to give an overview of the safety performance across the sector in 2022.



Figure 20: RIDDOR reportable hydrocarbon releases (not including EU Offshore Directive releases)







Source: Health and Safety Executive, 2023





Figure 22: Major hydrocarbon releases (including EU Offshore Directive releases)

4.1 Process safety

Hydrocarbon releases remain the biggest single risk but other categories of risks which can also cause harm in a single event. These can include dropped objects, structural damage, or release of dangerous substances. To manage all of these events with a common management system, based on the most robust management principles, promotes Process Safetv OEUK the Leadership Principles (PSLP). These eight principles have been signed and adopted by industry leaders and regulatory stakeholders (see Figure 19). They include a commitment to publish process safety performance information.

Hydrocarbon releases

The Health & Safety Executive (HSE) collated data on hydrocarbon releases (HCR). The figures relate to events where hydrocarbons posed the primary risk, rather than a pipeline or an explosion. Reports may only identify the primary cause of the risk.

The HSE classifies incidents as minor; significant; or major. Even a minor release may cause serious injuries to anyone in the immediate vicinity, if not a multiple casualty event; or it could lead to a significant escalation. A significant release is one with the potential to cause serious injuries or even kill personnel within the vicinity and to escalate, for example, causing structural damage. A major HCR has the potential, if ignited, to cause multiple casualties; or a rapid escalation affecting, for example, other



Figure 23: Total number of dangerous occurrences

modules, the temporary refuge, or escape routes.

There were 77 HCRs in 2022 (see Figure 21) with just 52 solely reportable to the HSE as required by the RIDDOR legislative categorisations (see Figure 20). Under both measures, the HCR numbers fell to the lowest on record. The three-year averages continue a steady downward trend. However, there were two major HCR releases in 2022 (see Figure 22), both with the potential for doing serious damage to the respective installation; and with significant chances of escalation owing to the nature of the release. This is an annual rise and the HCRs should cause concern, as they both highlight the abiding dangers of oil and gas production.

Other reportable process safety incidents

In 2022 there was a 22% year-on-year decline in number of dangerous the occurrences reported (see Figure 23). Excluding the HCRs, consistently the largest category of reportable incidents, the next commonest process safety-related occurrences were dangerous dropped objects; well-related incidents reported under the 'other' category in Figure 24 below; and fires and explosions. These incidents did not, for various reasons, escalate into high hazard process events but they might have. Therefore, continued vigilance on process safety should extend beyond HCRs to all categories of risk.

Figure 24: Process safety dangerous occurrences by type 2022



Maintenance backlog as a process safety indicator

There are many process safety indicators (PSIs) measuring the health of the systems and barriers that protect people and plant on installations. Maintenance backlog is largely acknowledged to be one metric. Maintenance backlog is all the maintenance work that a company's maintenance management systems expect the company to carry out by a due date but was not. The maintenance of safety and environmental critical elements, be they preventative and assurance tasks that confirm the on-going availability and performance of equipment, or corrective repairs to reinstate the equipment to intended functionality, is obviously important. Zero safety-critical maintenance should be the obvious target. But in practice there will be delays in executing maintenance tasks. Spare parts may not be available; or an appropriate process shutdown to safely execute the tasks might take time. These delays should be competently risk-assessed as part of any deferment to ensure that the time taken to execute is reasonable and the risk the delay poses is ALARP.

Before 2019, maintenance backlogs were an area of concern for the HSE. Typically, these concerns were addressed by HSE directly with individual duty-holders. Examples included the Maintaining Safe Operations (MSO) inspections in 2015/2016: regulatory interventions ensuring that low oil prices did not feed through into less maintenance activity.

There was a significant reduction in offshore personnel on installations in 2020 owing to the restrictions imposed by Covid-19. As a result, the maintenance backlog rose steeply the following year. The HSE, OEUK and industry formed a Maintenance Backlog Reduction Task Finish Group (MBRTFG) to target a reduction in backlog hours.

Overall, SECE preventative maintenance and corrective maintenance backlog fell 4%. SECE preventative maintenance records also shifted, with 43% moving from the undeferred category to the deferred. The backlog has been risk assessed but it still exists.

Safety & Environmental Critical Element (SECE) backlog

OEUK has this year worked with industry to further understand the challenges of the maintenance backlog and to develop guidance for the sharing of good practice. This has been formalised into a Principles of Process Safety Leadership – Maintenance Backlog Reduction – Strategy Document which describes how OEUK will interact with industry to enable backlog reduction across the industry.

4.2 Personal safety

Legally reportable injuries in the UK fall into two categories: those that result in seven or more days off work; and specified injuries

Figure 25: SECE maintenance backlog



Source: Offshore Energies UK, 2023



and fatalities. For 2022 and beyond these two categories will be reported as a single number of RIDDOR reportable injuries (see Figure 26). The number of reportable injuries increased in 2022 and is a strong indication that continued attention to personal safety is required. But there were no work-related fatalities, extending the run to seven years. Aviation statistics are reported separately within this report.

Reportable injuries by type

RIDDOR reported accident numbers peaked above 100 in 2018, then dropped in 2020 to 58 accidents in the year. Since 2020 there has been a gradual creep upwards of accidents, from 64 in 2021 to 72 in 2022. Bone fractures, strains/sprains and lacerations continue to account for majority of accident outcomes, with hands and fingers being the most frequently injured parts of the body.

Lost time injury frequency comparison

The UK offshore oil and gas industry's performance compares favourably with other European offshore sectors, based on the lost-time injury (LTI) frequency data from the International Association of Oil and Gas Producers (IOGP). LTI is an industry standard

Source: Health and Safety Executive, Vantage POB, 2023

700 250 Over-three-day/over-seven-day iniuries 600 Major / specified injury 200 Over-three/over-seven-day injury rate 500 Injury rate per 100,000 workers Specified injury rate 150 400 300 100 200 50 100 12009^{,10} 2010,17 2017,72 A 2072,73 1 100k 05 1 1005-06 12006-01 1,100^{6,09} 2073 2018 1007 2015 2076 . 2078 2019 1003.04 2020 2017 2027 2022 ° S

Figure 26: RIDDOR reportable injuries

*Period of reporting changed from fiscal to calendar year **The 2022 figure shows only the total number of RIDDOR reportable accidents (not sub-categorised) due to a change in reporting by the HSE. Number of injuries

definition used to benchmark performance across different countries and companies. It is designed to give companies an insight into injury trends and predict future performance. The geographical comparison demonstrates that the UK has returned to a low level for LTIs following a spike last year. The UK recorded an LTI frequency of 0.27/mn working hours.

There is a mixed picture in relation to personal safety in 2022: zero fatalities, while the LTI rate is the lowest for years in the UK, despite the number of RIDDOR reportable injuries going up.

Figure 29: Lost time injury rate UK vs other European offshore sectors

4.3 Health

A suite of occupational health-related legislation regulates the offshore working environment to control risks to health. This has traditionally resulted in a focus on occupational health and hygiene, but other aspects of health and wellbeing, such as mental health, are rising up the corporate priorities.

OEUK medical examinations

All persons working offshore are examined at least once every two years by a medical professional before travelling offshore. The registered examining doctors who conduct assessments in line with the OEUK medical



Figure 27: RIDDOR reportable injuries by type 2022

Source: Health and Safety Executive, 2023



standard, help to ensure that the personal risk of becoming ill offshore is assessed, along with their fitness for the work they will be undertaking. In 2022, medical health assessments could result in four certification outcomes for the examinee: unrestricted, limited duration, restricted, or failed. The proportion of outcomes is demonstrated in Table 2 below.

Between November 2021 and October 2022, a total of 150,550 OEUK medicals were conducted globally, with the lowest percentage of failures in over a decade, at 0.87%. In this same period, 48,541 'Fit to

Train' (FTT) medicals were conducted, with 1.5% failing, which is consistent with previous years.

The OEUK medical examinations are an industry requirement for travel offshore in the UK. It is worthy of note that increasingly these medicals are being used as the offshore medical of choice in other jurisdictions and across offshore energies such as in offshore wind operations around the world. The recognition demonstrates the trust and integrity of examinations based on decades of learning.



Figure 28: RIDDOR reportable injuries by cause 2022

Source: Health & Safety Executive, 2023

Reasons for restricted certificates

The below figure shows the number and reasons for failed, restricted or limited OEUK medical certificates conducted globally between November 2021 and October 2022.

Commentary regarding restricted certificates

Restricted certificates are issued by the examining doctor when they are unable to issue a standard certificate of fitness, but the examinee is suitable for application for operator approval. A limited duration certificate may be issued while awaiting reports expected to confirm information on fitness for example, or when more frequent review of a worker is thought appropriate. A number of factors contribute to a restricted, limited, or failed medical result. The above chart shows that blood pressure and diabetes are the most significant causes. Cardiac and medication issues are particular problems for the 50-59 age group, and weight/BMI is the commonest cause among the under-30s.

Table 2:Examining doctors statistics

Year	Total number of medicals conducted	Number of medicals failed	Percentage medicals failed
2010	56,850	784	1.38%
2011	59,900	665	1.11%
2012	93,219	1,284	1.38%
2013	113,006	1,333	1.18%
2014	118,597	1,285	1.08%
2015	111,651	1,125	1.01%
2016	99,104	1,125	1.14%
2017	110,688	1,339	1.21%
2018	127,474	1,298	1.02%
2019	146,479	1,463	1.00%
2020	111,647	1,082	0.97%
2021	111,612	1,074	0.96%
2022	150,550	1,308	0.87%













Figure 31: Reason for limited-duration OEUK medical certificates (Nov 2021 - Oct 2022)

Reasons for limited duration certificates

The below figure shows the number and reasons for limited OEUK medical certificates conducted globally between November 2021 and October 2022B

Blood pressure and diabetes are areas of concern, as is weight/BMI.

Medevacs

Despite the rigorous Offshore Energies UK medical, health issues offshore are inevitable and in 2022 there were 337 medevacs carried out. This is a doubling in five years, to 0.87% of the offshore population from 0.43% in 2017. It is the highest rate in the last five years. Trained medics and medical facilities are normal offshore, and onshore 'topside doctors' can visit and provide appropriate medical treatment and care until patients can be returned to shore. Minor issues can be treated on the installation without recourse to onshore treatment. Individuals whose health is poor but not in need of

Figure 32: Proportion of medevac and general offshore population by age group



urgent attention may return ashore on the next scheduled flight. Where treatment is a matter of urgency, the emergency services including the HM Coastguard search-andrescue helicopters evacuate people. There was a 29% increase in medevac flights in 2022 which suggests that there may be an over reliance on the Coastguard in situations that are not acute. Discussions on this topic are held in the Topside Medical Forum.

The proportion of those evacuated from offshore installations for medical reasons largely follows the profile of the general offshore population (*see Figure 32*). Cardiac conditions are the most significant reason,

as shown in Figure 33, followed by injuries and acute abdominal conditions. This is consistent with previous years. Infectious diseases were just 3%, down from 11% in 2021, reflecting the residual Covid-19 testing regimes that were withdrawn during 2022. In early 2023, OEUK published the lessons learned from the industry response to the pandemic, in order to allow members to prepare for future pandemics. OEUK continues to gather intelligence on Covid-19 strains as part of the work we carry out on industry.





Figure 34: Altered mental health category as a percentage of total medevacs



Source: Offshore Energies UK, MCA, 2023



Altered mental state evacuations

Figure 34 below left shows the occasions where the Coastguard search-and-rescue helicopters have had to attend an emergency related to an altered mental state. It is not possible to link these definitively to mental health episodes, hence the phrase 'altered mental state'.

Mental health

There is a narrative that poor mental health is increasing in the general population but the baseline statistics remain stable. One in four people will be diagnosed with a common mental health condition in any year. Offshore workers are working while coping with some of these common mental health conditions. Some recent studies suggest that by its very nature - away from home, isolated from traditional support networks and so on - offshore work can have a negative effect on mental health. Within the offshore population, there are few instances of medical evacuation owing to altered mental states and have not changed year on year. Similarly, suicide at offshore workplaces remains very rare, with just three incidents recorded by Police Scotland in 10 years. Nevertheless, the duty on employers to protect the health and safety of their workforce is clear. The workforce is better informed and overall social concerns add to the moral imperative not to put people at risk. OEUK continues to engage and contribute, with the industry bodies leading on these issues, in particular Step Change in Safety and the International Association of Drilling



Contractors.

Figure 35: North Sea flying hours across fleets

4.4 Aviation

Helicopters are the primary means of transporting workers offshore. They are also the primary means of evacuation in an emergency. As such the safe operation of offshore helicopter services is critical to for the industry. Up to 19 passengers and two pilots travel in a single airframe, which presents a major hazard risk. Offshore helicopter services continue to deliver safe operations in the UK, which should be regarded as exceptional performance. But there are regional and global pressures on the industry that demonstrate that it is vital

Table 3: Helicopter types

that we work hard to maintain and improve aviation safety.

Helicopter types

Heavy and medium twin-engine helicopters have been used for commercial air transport on the UKCS for more than 20 years. This reflects the high safety standards: two pilots and engine redundancy are vital for safe operations in the UKCS. The number of airframes has remained relatively steady between 2021 and 2022, while flight hours have decreased 15% (see Figure 35) and airframe availability has been hit by global

Туре	Weight class	Introduced	In fleet 2022
Leonardo AW139	Medium	2005	15
Leonardo AW169	Medium	2020	2
Airbus H175	Medium	2016	18
Sikorsky S92	Heavy	2005	32



Figure 36: Average flying hours per airframe across all operators





Figure 37: Aviation performance indicator trends (all fleets)



Figure 38: Aviation performance indicator trends Airprox and RTB (all fleets)





supply chain challenges.

The average age of the fleet is going up visibly and contracting practices in the UKCS have made it hard for commercial helicopters to invest in new airframes, the exception being a slight swing between AW139s to H175s. The Sikorsky S92 remains the workhorse of the fleet but it too is aging, leading to more work for maintenance teams.

Helicopter performance indicator trends

The overall number of occurrences requiring precautionary returns to base (RTB) are down over the last five years and have levelled out

(see Figures 37-38 opposite).

Airprox is a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. In the UK Airprox incidents are monitored by the UK Airprox Board.



Figure 39: Fatal and non-fatal incidents in UK waters versus western region

Incidents in the UK vs. international comparison

Across the globe there has been a significant increase in fatal and non-fatal accidents. Many of these occur in single-pilot or singleengine aircraft which have not been used in the UK since 2001. However, there are strong challenges facing the global industry such as spare parts and maintenance, the retention of experienced staff, unsustainable commercial contracting and an imbalance of risk and reward between the contracting parties. The other, non-aviation safety statistics presented in this report also present a picture of declining performance. While we must celebrate the incredible safety record in aviation in the UK in recent years, we must also redouble our efforts to ensure that the safe regime is protected from these challenges.



5. Conclusion and look ahead

While there are many encouraging statistics overall the challenges remain the same for HSE. Incidents and hydrocarbon releases have the potential to increase and resources across the industry are strained, from maintenance teams to onshore subject matter experts.

Achieving significant developments in embedding process safety leadership principles and material reductions in the maintenance backlog are going to require leadership and investment to ensure that the risk profile is sufficient.

In addition, although the sector has shown continuous commitment to decarbonisation,

achieving a third consecutive year of emissions reductions, further reductions will now rely on large-scale, capital-intensive projects. This will be crucial to accelerating the industry's journey toward net zero, especially since low-hanging opportunities such as operational enhancements and reductions in flaring and venting have already been accomplished.

OEUK will continue to provide insights and remain at the centre of facilitating work groups, workshops and conferences to ensure the industry is supported for the remainder of 2023 and for as long as there is an offshore energy industry.



Glossary

A&E	Accident & Emergency
Airprox	An AIRPROX is a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised.
Anaerobic digesters	Micro-organisms that break down biodegradable material in the absence of oxygen
Bq	Becquerel
Bunding	A retaining wall for safety or environmental purposes
САА	Civil Aviation Authority
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent - number of metric tons of CO_2 emissions with the same global warming potential as one metric ton of another greenhouse gas.
Dangerous occurrences	Certain specified events as defined in RIDDOR 2013, including dropped objects, HCR, fires or explosions
DESNZ	Department for Energy Security and Net Zero (formally BEIS)
Discharge	A permitted disposal of substances offshore
Duty holder	In relation to a production installation, this means the operator, and in relation to a non-production installation, the owner
EEMS	Environmental Emissions Monitoring System
Flaring	The controlled burning of natural gas in the course of oil and gas production operations
GHG	Greenhouse gases
HMCS	Harmonised Mandatory Control Scheme
HSE	Health and Safety Executive
IOGP	International Association of Oil & Gas Producers
KPI	Key Performance Indicator
Lagging indicator	Output oriented measurement of past performance
Leading indicator	Input oriented prediction of future performance
mn boe	Million barrels of oil equivalent
NORM	Naturally occurring radioactive materials

NSTD	North Sea Transition Deal
OCNS	Offshore Chemical Notification Scheme
OMAR	Offshore Major Hazard Regulator
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSD	Offshore Safety Directive
OSPAR	The Oslo/Paris Convention for the protection of the marine environment of the Northeast Atlantic
Over-seven-day injuries	Accidents that cause an employee to be away from work or unable to perform their normal work activities for more than seven consecutive days
Personal safety	Protecting an individual from harm
PLONOR	Pose Little Or No Risk – used by OSPAR to classify substances used and discharged offshore
PON1	Petroleum Operations Notice 1
Process safety	Managing major hazards that could lead to multiple casualties, such as fires, explosions or structural collapse
Produced water	Water that comes to the surface with hydrocarbons during production, either naturally from the reservoir or after injection into the reservoir to displace oil and lift it to the surface.
Production efficiency	The total annual production divided by the maximum production potential of all fields on the UKCS
Release	An unintentional discharge of oil or chemicals
RTB	Return to base
SUB	SUB chemicals are those classified under OCNS as harmful and should be phased out and substituted with a less harmful substance.
UKCS	UK Continental Shelf
SO _x	Sulphur oxides
SUB	SUB chemicals are those classified under OCNS as harmful and should be phased out and substituted with a less harmful substance.
UKCS	UK Continental Shelf

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