



Investigation into helicopter safety in Statoil following the Turøy helicopter accident on 29 April 2016



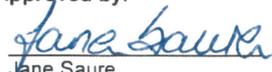
Statoil

Investigation Report COA INV

Helicopter safety in Statoil following the Turøy helicopter accident on 29 April 2016

Classification: Open	Status: Final (released)																											
Report no.: A DPN L1 2016-8	Date: 29 September 2016																											
Expiry date: 30 September 2026	Synergi no.: 1472922																											
Summary: <p>The main purpose of this investigation is to strengthen helicopter safety in Statoil. It is also crucial to learn from Statoil's management of the emergency response to the Turøy accident. In order to best understand Statoil's helicopter safety-related work and emergency response, it has been important for the investigation team to invite external partners to share their reflections. The conclusions in this report are based upon interviews and meetings with more than 80 people, both within and outside Statoil. In addition, the investigation team has reviewed the Statoil group's organisation of helicopter safety-related work, its governing documentation, and the framework upon which Statoil builds its safety work. The report provides recommendations in eight specific areas which can help improve safety and emergency response management in Statoil. The attachments to the report contain the mandate for the investigation and a review of important external reports and studies which form part of Statoil's helicopter safety-related work. A detailed timeline from the emergency response phase of the accident is also included.</p>																												
Investigation team: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Jane Saure</td> <td style="width: 33%;">Investigation leader</td> <td style="width: 33%;">COA INV</td> </tr> <tr> <td>Geir Støkken Østby</td> <td>Co-investigator</td> <td>COA INV</td> </tr> <tr> <td>Tor Ulleberg</td> <td>Subject matter expert</td> <td>TPD R&T PTC ICI</td> </tr> <tr> <td>Anne Therese Hestenes</td> <td>Subject matter expert</td> <td>TPD PRD PMC</td> </tr> <tr> <td>Olav Hustad</td> <td>Legal adviser</td> <td>LEG TPD</td> </tr> <tr> <td>Knut Rostad</td> <td>Communication adviser</td> <td>CCOM MR</td> </tr> <tr> <td>Terje Herland</td> <td>Safety delegate representative</td> <td>DPN OW GF GFB INS OM</td> </tr> <tr> <td>Per Martin Labråthen</td> <td>Safety delegate representative</td> <td>CFO GBS HR EML CUR</td> </tr> <tr> <td>Solveig Krey</td> <td>External expert</td> <td>Norwegian military</td> </tr> </table>		Jane Saure	Investigation leader	COA INV	Geir Støkken Østby	Co-investigator	COA INV	Tor Ulleberg	Subject matter expert	TPD R&T PTC ICI	Anne Therese Hestenes	Subject matter expert	TPD PRD PMC	Olav Hustad	Legal adviser	LEG TPD	Knut Rostad	Communication adviser	CCOM MR	Terje Herland	Safety delegate representative	DPN OW GF GFB INS OM	Per Martin Labråthen	Safety delegate representative	CFO GBS HR EML CUR	Solveig Krey	External expert	Norwegian military
Jane Saure	Investigation leader	COA INV																										
Geir Støkken Østby	Co-investigator	COA INV																										
Tor Ulleberg	Subject matter expert	TPD R&T PTC ICI																										
Anne Therese Hestenes	Subject matter expert	TPD PRD PMC																										
Olav Hustad	Legal adviser	LEG TPD																										
Knut Rostad	Communication adviser	CCOM MR																										
Terje Herland	Safety delegate representative	DPN OW GF GFB INS OM																										
Per Martin Labråthen	Safety delegate representative	CFO GBS HR EML CUR																										
Solveig Krey	External expert	Norwegian military																										

Approved by:


Jane Saure

Investigation leader

COA INV


Date

Approved by:


Gunnar Breivik

VP Investigation

COA INV


Date

Released by commissioning entity:


Eldar Sætre

Chief Executive Officer

Statoil


Date

Contents

1	Summary	4
1.1	<i>Introduction.....</i>	4
1.2	<i>Main conclusions.....</i>	5
2	Investigation mandate and investigation execution.....	7
2.1	<i>Mandate</i>	7
2.2	<i>Limitations</i>	7
2.3	<i>Investigation work.....</i>	8
3	Helicopter safety work on the Norwegian continental shelf	10
3.1	<i>Background</i>	10
3.2	<i>Important reports and factual basis.....</i>	12
3.3	<i>Frameworks, regulations and requirements.....</i>	13
3.3.1	<i>Frameworks.....</i>	13
3.3.2	<i>Regulations and requirements</i>	13
3.3.3	<i>Authorised maintenance organisations</i>	14
3.4	<i>Cooperation between Statoil, the industry and the authorities</i>	15
4	Statoil's organisation and activities related to helicopter services.....	16
4.1	<i>Organisation, roles and responsibilities</i>	16
4.1.1	<i>Flight safety department.....</i>	16
4.1.2	<i>Air transport department</i>	17
4.1.3	<i>Company representative and procurement.....</i>	17
4.1.4	<i>Observations</i>	18
4.2	<i>Helicopter contracts.....</i>	18
4.2.1	<i>Procurement process</i>	19
4.2.2	<i>Compensation for delays (penalties).....</i>	19
4.2.3	<i>Time between each flight ("turnaround time")</i>	20
4.2.4	<i>Helicopter operating companies' economic and financial position</i>	21
4.3	<i>Contractor follow-up</i>	22
4.4	<i>Helideck verification</i>	22
5	Learning from helicopter incidents and follow-up	23
5.1	<i>Definition of incidents and accidents.....</i>	23
5.2	<i>Overview of helicopter accidents</i>	23
5.3	<i>Contractors' safety management systems.....</i>	24
5.3.1	<i>CHC Helikopter Service</i>	24
5.3.2	<i>Bristow.....</i>	24

5.4	<i>Statoil's system for following up incidents</i>	25
5.5	<i>Statoil's follow-up of Super Puma helicopter accidents in the British sector</i>	26
5.6	<i>Helicopter Safety Study HSS-3b</i>	27
6	New European Union regulations	28
7	Statoil's emergency response-related management of the accident, including cooperation with the authorities and partners	29
7.1	<i>Crisis management in Statoil</i>	29
7.2	<i>Statoil's emergency response organisation</i>	29
7.3	<i>Emergency notification and mobilisation on 29 April 2016</i>	31
7.4	<i>Next-of-kin follow-up</i>	33
7.5	<i>Cooperation with the authorities</i>	34
7.6	<i>Cooperation with affected contractors</i>	34
7.7	<i>Communication management</i>	36
7.8	<i>Business continuity</i>	38
8	Recommendations	41
8.1	<i>Recommendations related to helicopter safety</i>	42
8.1.1	Recommendation no. 1 – Holistic risk assessment	42
8.1.2	Recommendation no. 2 – Roles and responsibilities	43
8.1.3	Recommendation no. 3 – Learning from accidents	44
8.1.4	Recommendation no. 4 – Ambition	45
8.1.5	Recommendation no. 5 – Maintain critical competence	45
8.2	<i>Recommendations related to emergency response</i>	46
8.2.1	Recommendation no. 6 – Coordination with partners.....	46
8.2.2	Recommendation no. 7 – DaWinci and heliports.....	46
8.2.3	Recommendation no. 8 – Routines for external communication	47
8.2.4	Recommended actions implemented immediately after the accident.....	48
8.2.5	Evaluations conducted following the accident	48
9	Glossary	49
10	References	53
App A	Investigation mandate	55
App B	Detailed “Bow Tie Model” for flight safety in Statoil	57
App C	Important reports and factual basis	58
App D	Notification and mobilisation 29 April 2016	62

1 Summary

1.1 Introduction

The helicopter crash near the small island of Turøy, west of Bergen, is the most serious helicopter accident on the Norwegian continental shelf (NCS) since 1997. All 13 people on board helicopter flight HKS241 died.

On 13 May 2016, Statoil's Chief Executive Officer commissioned an investigation into the helicopter crash, the purpose of which was to identify measures to improve Statoil's organisation and follow-up of helicopter safety on the NCS.

It is the responsibility of the Norwegian Accident Investigation Board (AIBN) – Aviation department – to determine the cause of the accident. Statoil's investigation team has not examined the sequence of events surrounding the loss of flight HKS241 or the cause(s) of the accident.

In a preliminary report of 28 June 2016, the AIBN stated that the accident was most likely the result of fatigue fracture in one of the eight second-stage planetary gears in the helicopter's gearbox. It appears that the fracture propagated in a manner which was unlikely to have been detected by existing mandatory or supplementary systems for warning of an imminent failure.

The aim of this report is to answer two main questions:

1. How can Statoil's helicopter safety-related work be strengthened?
2. Was the emergency response to the Turøy accident handled in accordance with Statoil's governing documentation?

Over several decades there have been considerable developments in offshore helicopter transport from a regulatory, technical and commercial perspective. Purposefully-directed work has been, and is still being carried out by the regulatory authorities, by the industry itself and by professional bodies, to identify measures that can help improve safety. This work will continue indefinitely.

A company with the ability to identify, understand and manage risk, together with the will to learn, has a good safety culture. This culture must be maintained and adapted to external and internal changes, without weakening the quality of the company's work.

Even if many believe that a good basis has been established in Norway for continuous risk reduction in helicopter transport on the NCS, it is crucial that this good work is continued, and that "no stone is left unturned" in the task of maintaining satisfactory safety standards. Long periods without accidents must not lead to complacency when it comes to safety work. The Turøy accident shows that accidents can occur even if the risk level has decreased considerably over recent decades. It is therefore very important to examine all significant factors relevant to helicopter safety, and to influence those elements which Statoil is able to influence.

Beyond the introduction and summary of the main conclusions, the investigation report is divided into the following sections:

Section 2 describes the investigation mandate, the limitations of the investigation and how the investigation work was conducted.

Section 3 provides the context for offshore helicopter safety-related work and outlines the framework for helicopter safety in Statoil.

Section 4 describes how helicopter safety-related work is organised in Statoil, and outlines the follow-up of helicopter operators and key elements in contracts related to helicopters.

Section 5 examines how Statoil has followed up and learned from previous helicopter incidents.

Section 6 highlights how the introduction of new European Union (EU) regulations may impact future helicopter safety on the NCS.

Section 7 provides a review and assessment of Statoil's emergency response management, and cooperation with partners following the Turøy accident.

Section 8 contains the investigation team's recommendations and proposed actions.

1.2 Main conclusions

Safety in offshore helicopter transport is a dynamic interaction between several stakeholders. Over the years the cooperation between oil companies, trade unions, helicopter companies and the authorities has helped to considerably reduce risks related to helicopter transport on the NCS. The safety culture has been built up through purposefully-directed safety-related work over the course of several decades.

This is the reason that helicopter transport on the NCS has had a significantly lower level of risk compared with onshore helicopter activities, and with offshore activities elsewhere in the world. This will apply also after the Turøy accident.

The investigation team has only examined the interaction between the various stakeholders to a limited extent, focussing instead on the internal safety work in Statoil.

The investigation team's main conclusions are as follows:

- Helicopter safety in Statoil has high priority and a good reputation among external partners. For several decades the company has been a driving force, both nationally and internationally, in strengthening helicopter safety. Statoil should strive to maintain a leading role in helicopter safety in an industry which, amongst other things, is faced with the challenge of an increasing focus on costs.
- Statoil has a culture and systems in place through which it can learn from earlier helicopter incidents.
- Statoil's emergency response to the helicopter accident at Turøy, from mobilisation during the morning of Friday 29 April 2016, until demobilisation during the morning of Monday 2 May 2016, is considered to have been good throughout. On the whole, the follow-up of next of kin, cooperation with partners, and the internal organisation of the emergency response worked well.

At the same time, measures have been proposed which the investigation team believes there is reason for Statoil to look into more closely, and which could help strengthen Statoil's helicopter safety and emergency response.

The essence of the measures that relate to helicopter safety are:

- Helicopter safety is a complex assignment that is managed by several stakeholders and functions in Statoil, and it may be difficult to predict how individual decisions, taken in isolation, can affect overall safety. There is a need to strengthen safety by highlighting and better understanding the relationship between technical and commercial factors that, either individually or combined, can affect safety. With this as a starting point, a clearer flight safety strategy and associated plan of action must be prepared.
- The organisation of helicopter safety-related work in Statoil appears to be complicated, with many participants and a varying understanding of each individual participant's role. Although it is not apparent that this has impacted negatively upon the quality of helicopter safety-related work to date, the investigation team recommends that a review of the organisation of helicopter safety-related work in Statoil be conducted to ensure simplification and a clearer description of participants' roles. This particularly applies to the distribution of roles between the departments for flight safety, air transport and procurement, and personnel with the role of Company Representative (CR).
- The majority of recent helicopter accidents offshore have been as a result of design-related weaknesses. Statoil should therefore consider measures which facilitate better interaction and information exchange between the helicopter operators and manufacturers.
- Statoil is actively involved in assessing whether the relationship between probability and consequence-reducing measures is correctly balanced, including through the ongoing Helicopter Safety Study HSS-3b, **Ref. /8/**. The investigation team is aware that there has been more focus on consequence-reducing measures in the UK than in Norway. There may be incidences of emergency landings at sea where consequence-reducing measures could have a positive impact upon safety. Statoil should consider whether flight safety-related work should attach even greater importance to consequence-reducing measures.
- New EU regulations will lead to a change in the risk picture related to helicopter services on the NCS. At the same time, the petroleum industry is faced with challenges that may affect the focus on helicopter safety. Statoil must therefore be clear in its ambition to maintain the current standard of helicopter safety and continually improve it.
- In order for Statoil to be able to continue to occupy a leading role in helicopter safety, it must ensure that new personnel are recruited who, in time, can maintain the competence and capacity of the flight safety department.

The essence of the measures that relate to emergency response are:

- Statoil must conduct more joint emergency response exercises with prioritised external partners to ensure good interaction and coordination.
- Access to the DaWinci personnel logistics system must be automatically adapted to the roles in the emergency response organisation, and DaWinci must be updated so that in an emergency situation the system can be locked in the intended manner.
- In the hours following the accident, inadequate information was provided to personnel travelling to and waiting at Bergen heliport. Procedures must therefore be established so that information is provided to travellers in the early phase following an incident.
- Based upon the experiences from the Turøy accident, Statoil must review its procedures and systems for handling communication during an emergency response situation. This review could help to identify potential areas of improvement, including providing verified information to the public at an earlier stage.

2 Investigation mandate and investigation execution

2.1 Mandate

The investigation team's mandate has been to review the following factors of significance for safety related to Statoil's helicopter activities on the NCS:

- Statoil's emergency response handling of the accident, including interaction with the authorities and partners
- Statoil's organisation and activities related to helicopter services, including the division of roles and responsibilities between Statoil, helicopter operators and other stakeholders involved in the operation and maintenance of helicopter operations for Statoil on the NCS
- How helicopter incidents are followed up by Statoil and the company's contractors/suppliers

Based on the review, the investigation team will present its observations and proposed actions to strengthen Statoil's helicopter safety and emergency preparedness work.

A translated version of the mandate for the investigation is included in its entirety in **App A**.

2.2 Limitations

In accordance with the investigation mandate, the investigation team has not examined the sequence of events or the cause(s) of the accident, as this lies within the mandate and scope of the Norwegian Accident Investigation Board (AIBN) investigation.

The Statoil investigation mandate specifies that the investigation team shall assess factors of significance for safety with regard to Statoil's helicopter operations on the NCS. Factors relating to international helicopter transport are therefore not included in this report. In the AIBN's preliminary report no. 4, **Ref. /25/**, fatigue fracture in a planetary gear is provided as the most likely immediate cause of the accident. Based on this, the investigation team, in agreement with the investigation's commissioning body, has elected to review how Statoil *follows up* maintenance management, rather than conduct a detailed review of the maintenance management systems of the helicopter companies and their various suppliers and subcontractors. Moreover, the investigation team acknowledges that annual industry verifications ("Grand audits") include a review of helicopter operators' maintenance management systems, **Ref. /18/** and **/19/**.

Statoil's strategy has been to utilise at least two different types of helicopter, primarily to ensure business continuity and robustness in the event of one type of helicopter being grounded for any reason. Following the accident on 29 April 2016, all Airbus H225 and L2 Super Puma helicopters were grounded, and as a result Statoil could only use the Sikorsky S-92 helicopter for offshore personnel transport. The investigation team is of the opinion that using just one type of helicopter may increase the operational risk related to personnel transport, but it does not increase the safety risk. Statoil has initiated a project to look into alternative helicopter transport solutions, **Ref. /21/**. The project will, amongst other things, propose a strategy for backup solutions for the existing Sikorsky S-92 helicopter and other alternative transport solutions. A recommended strategy for realising the proposed solutions will also be developed. With this project in mind, the investigation team has not assessed this issue beyond what has already been initiated.

2.3 Investigation work

The mandate for the investigation was published on 18 May 2016. The investigation team had its first meeting on 23 May 2016 at Sandsli in Bergen. Chief Operating Officer Anders Opedal and senior vice president for Corporate Safety Torstein Hole participated in the meeting to ensure a common understanding of the mandate, and to underline the commissioning body's expectations to the members of the investigation team.

The formulation of the mandate reflects the different context to that of a standard accident investigation in Statoil, since it does not specify that the investigation team examine and analyse the sequence of events or cause(s) of the accident. The investigation work documented in this report has been carried out in accordance with Statoil's governing documentation for investigating accidents, but adapted to the mandate where necessary. For example, Section 3 of the report, which covers helicopter safety, provides a critical review of Statoil's safety-related work rather than the approach of a standard Statoil accident investigation.

On 27 May 2016 a meeting was held at AIBN's office at Lillestrøm, north-east of Oslo, the primary aim of which was to inform AIBN about Statoil's investigation work.

Contractors and suppliers whose employees were aboard helicopter flight HK S241 were invited to a joint meeting on 3 June 2016, where they were informed that Statoil's investigation had commenced. At the same meeting, CHC Helikopter Service informed the participants about their own internal investigation. A similar meeting was held on 6 June 2016 with Statoil trade union representatives.

The investigation work has consisted of gathering and reviewing relevant documents, and conducting interviews and meetings with relevant stakeholders. More than 80 people were interviewed, of which several had follow-up discussions with the investigation team. Fifteen meetings were held with external stakeholders, both in Norway and abroad.

Statoil personnel who were interviewed belong to the following units/functions:

- Flight safety department
- Air transport department
- Company Representative (CR) vis-à-vis helicopter operators
- Joint operations support (including logistics and emergency response)
- Procurement
- Communication
- Emergency response (Line 2 and 3)
- Senior management, Development and Production Norway (DPN)
- Senior management, Technology, Projects and Drilling (TPD)
- Corporate safety and security (CSS)
- Corporate emergency response
- Platform management and chief safety delegate on the Gullfaks B platform
- Coordinating chief safety delegate for the NCS
- Operations technology
- Global Business Services (GBS)

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

The investigation team has conducted meetings with the following external stakeholders:

- Aker Solutions
- Halliburton
- Karsten Moholt
- Schlumberger
- Welltec
- Bristow
- CHC Helikopter Service
- Joint Rescue Coordination Centre for Southern Norway
- Western Norway police district, Bergen police force
- Norwegian Civil Aviation Authority
- SINTEF
- Fjell and Øygarden municipality

The investigation team has held video conferences with the following:

- The UK Civil Aviation Authority (CAA)
- Shell Aircraft International
- HeliOffshore
- Step Change in Safety

The investigation team has had access to sufficient information to form a picture of the company's organisation and activities linked to helicopter safety, how helicopter incidents are followed up by Statoil and the company's contractors, and Statoil's emergency response handling of the accident.

The investigation report has been published in both Norwegian and English. To assist the investigation team, this English version of the report was translated and prepared by James Bunn and Janet C. Haavik from COA.

A united investigation team stands behind the report.

The Norwegian version of the report is governing.

3 Helicopter safety work on the Norwegian continental shelf

3.1 Background

In order to better understand Statoil's organisation and activities relating to helicopter services and the interaction with other stakeholders, it is important to outline the scope of helicopter safety-related work on the NCS of which Statoil is an integral part.

Statoil's Norway-based operations and activities represent approximately 50% of the helicopter transport on the NCS (based on the number of flying hours in 2015). In more recent years the volume of traffic has gradually decreased in line with the reduced level of activity. The prognosis for the number of passengers in 2016 is approximately 151,000 (in 2013 this figure was 211,000) with approximately 19,000 flying hours (in 2013 it was 25,500), divided between a total of 13-14 helicopters (18-19 helicopter in 2013). Prior to the Turøy accident, two of the helicopters used for personnel transport services were of the Airbus H225 type, and the rest were Sikorsky S-92. In addition, five Airbus H225 helicopters were used for Search and Rescue (SAR) operations.

According to the independent research organisation SINTEF, helicopter transport on the NCS has had a considerably lower level of risk compared with helicopter activities onshore, and compared with offshore helicopter flights elsewhere in the world. This will also apply after factoring the Turøy crash into the statistics. Norway is considered one of the leading countries in this type of safety work by the specialist disciplines working with offshore helicopter safety. The cooperation between petroleum companies, helicopter operators, trade unions and the authorities is one of the factors used to explain this strong performance, which is exemplified by good interaction in the Cooperation Forum for Helicopter Safety on the Norwegian Continental Shelf. Another factor which has been emphasised is the proactive and preventive approach practised by the stakeholders in Norway, where the focus is on probability-reducing measures (i.e. measures intended to prevent accidents from occurring).

Figure 3-1 shows the barrier approach (the "Bow Tie" model) which forms the basis of helicopter safety work on the NCS (a more detailed description can be found in App B). The left-hand side of the model shows the measures, requirements and provisions which reduce the *probability* of an accident. These are called probability-reducing measures or conditions, and also *barriers*, since they prevent nonconformities and initial undesired incidents from being able to escalate into a more severe accident situation (e.g. an emergency landing at sea). The right-hand side of the model shows the measures, requirements and provisions that reduce the *consequences* of an incident that has occurred, and these are also intended to prevent further escalation of an incident. In the incident scenario of an emergency landing at sea, typical requirements for personal locator beacons, training in emergency evacuation from the helicopter and the SAR service are good examples of consequence-reducing measures that increase the probability of personnel survival.

The Norwegian Civil Aviation Authority (NCAA) believes that the systematic approach practised on the NCS is an important contributing factor to the current good safety level for Norwegian offshore helicopter operations.

It is also important to mention the safety culture of the helicopter operators. Over the course of several years, a practice has been developed whereby communication between the operators takes place at an operational level, and where ground-based chief pilots and operational helicopter pilots (commanders) share important safety-enhancing information and coordinate operational decisions together. Such information may include discussions about conditions linked to weather warnings (icing, lightning, etc.), choice of route, and other local conditions where the coordination of activities is desirable. This openness is the result of a culture within which the consensus is that safety takes priority over competitive advantage.

It is essentially the same large helicopter companies, Bristow and CHC that operate in the Norwegian and British sectors of the North Sea. The management of these companies attach great importance to the standardisation of technical and operative procedures, as well as logistics processes. Differences in the national regulations in the UK and Norway are relatively small and, as such, are difficult to justify as the primary reason for why the number of accidents and serious incidents has varied so much between the two countries. The specialist disciplines have not been able to identify a clear explanation for this difference either. Factors which are mentioned in the Norwegian sector are a better reporting culture and using reduced engine power during flight which places less of a strain on the helicopters, as well as better interaction between stakeholders as described above.

British stakeholders in the helicopter industry attach greater importance to limiting the extent of the damage *after* an accident has occurred than Norwegian stakeholders (consequence-reducing rather than preventative measures), **Ref. /35/ (CAP 1145).**

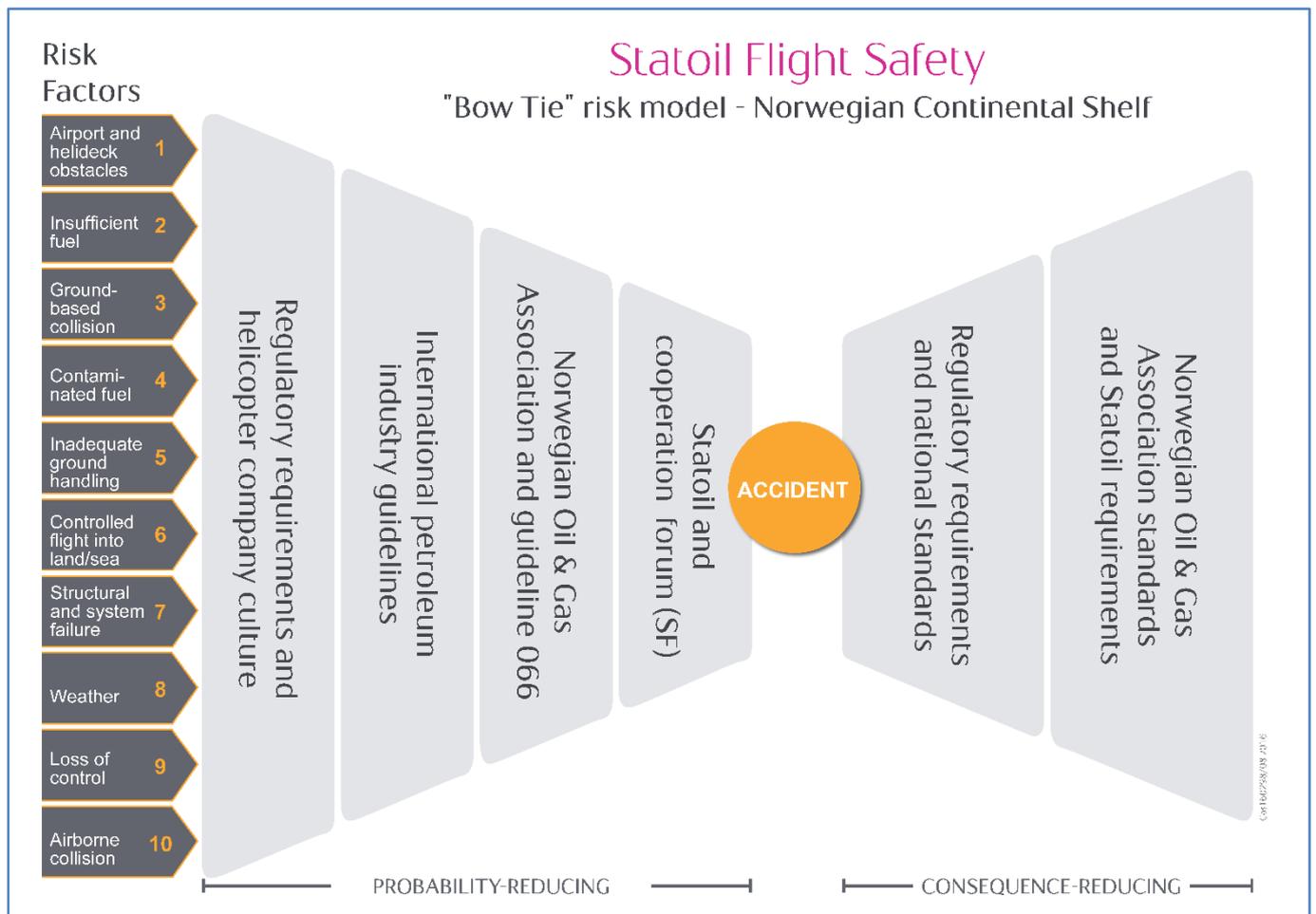


Figure 3-1 "Bow Tie" risk model for the NCS (Source: Statoil flight safety department)

3.2 Important reports and factual basis

The basis of the Norwegian practice is a series of major helicopter safety studies (HSS) which the oil industry initiated itself, and which SINTEF has carried out: HSS-1 (1990), HSS-2 (1999) and HSS-3 (2010). In addition, there have been two important public reviews initiated by the Norwegian Ministry of Transport and Communications: “Helicopter safety on the NCS” (NOU 2001:21 and NOU 2002:17) which, amongst other things, recommended that the Cooperation Forum for Helicopter Safety on the NCS (2003) be set up, a more detailed description of which can be found in **App C**.

HSS-3b, **Ref./8/**, which is currently underway, is a study with a five-year perspective (2010-2016), while the previous helicopter safety studies had a 10-year perspective. The reason for HSS-3b is that the industry wants to analyse the more recent helicopter accidents (especially in the British sector of the North Sea). The aim of the study is to assess the degree to which the measures and recommendations introduced in the UK following accidents should also be implemented in Norway. HSS-3b began before the Turøy accident, and Statoil is representing the petroleum industry in this study, ref. **section 5.6**.

The systematic work on helicopter safety that has been performed in Norway since 1990 has resulted in a considerable reduction in the level of risk associated with offshore helicopter transport.

Figure 3-2 shows the estimated reduction in risk in the three periods examined in the helicopter safety studies. In HSS-2 the level of risk reduction between the two first periods is estimated to have been 45%. In HSS-3 a further risk reduction of 16% was estimated for the next study period (1999–2009), with a further 23% for the following decade (2010–2019). The last risk reduction estimate assumed that the improvements planned for 2010 would be carried out, ref. **App C**. In addition, further risk reduction will be achieved by implementing several of the proposed safety-enhancing measures.

HSS-3b will give an updated assessment of the risk level following the Turøy accident.

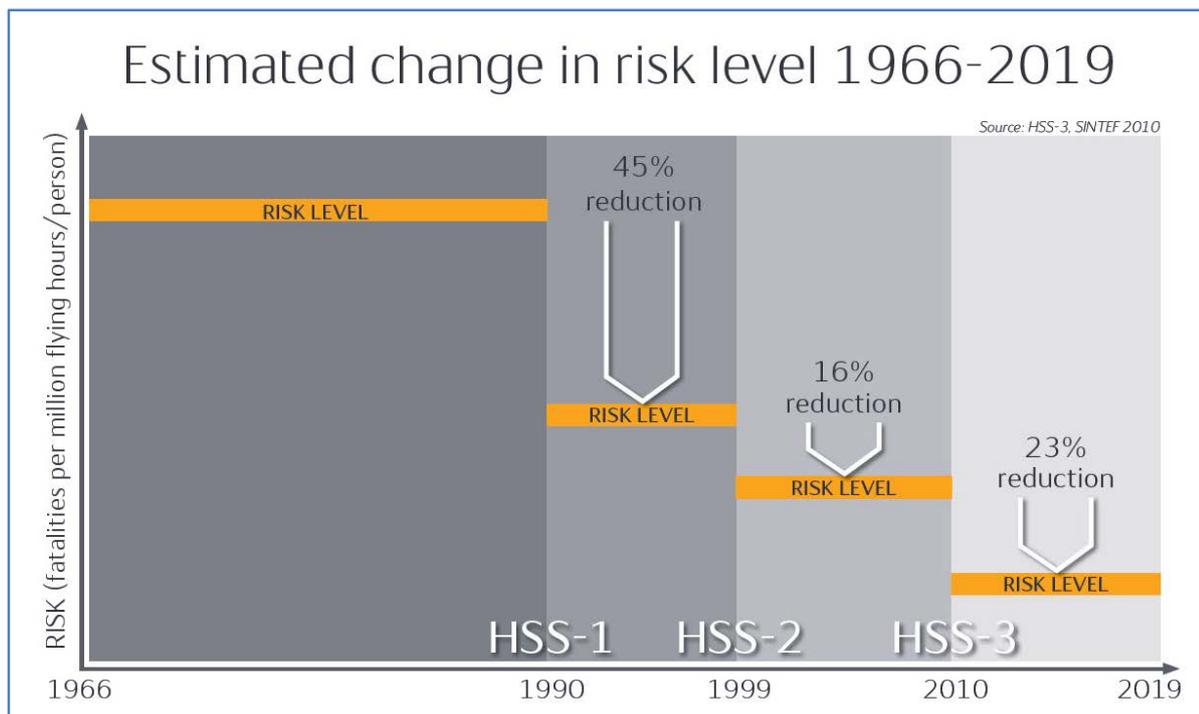


Figure 3-2 Estimated changes in risk level 1966–2019 (Source: HSS-3, SINTEF, 2010)

3.3 Frameworks, regulations and requirements

3.3.1 Frameworks

The regulatory framework that governs the way offshore helicopter operations are conducted in Norway is currently determined by EU and Norwegian regulations, Norwegian certification requirements (Air Operator Certificate - AOC), client requirements and the helicopter operators' own requirements.

The current model, with requirements for a Norwegian AOC, means that the NCAA can comprehensively monitor helicopter operators. This includes access control when the company is certified, and subsequent regulatory inspection of the whole organisation, including the company's management and its management system. Access control is an umbrella term for the various controls the NCAA conducts *before* helicopter operators are approved and an official AOC is issued.

Beside the certification of helicopter operators, the NCAA's main task is to actively promote safe civil air traffic. The main purpose of NCAA inspections is to confirm that the responsible manager has a good attitude and approach to safety, and understands the importance of using safety management and quality systems to ensure safe operations, in line with internal and regulatory requirements. The NCAA will also assess the quality of these systems, ref. **section 5.3**.

In addition, regular safety-enhancing cooperation has been established through the Cooperation Forum for Helicopter Safety on the NCS. The forum consists of representatives from the authorities, helicopter operators, petroleum industry, Avinor, trade unions and others involved in offshore aviation. The cooperation forum is led by the NCAA and is designed to be a driving force vis-à-vis the responsible authorities and stakeholders, thus ensuring that the recommendations contained in the two reports NOU 2001:21, **Ref. /15/** and NOU 2002:17, **Ref. /16/** are acted upon. The forum also takes up new issues of significance for helicopter safety, and follows these up with proposals for specific measures. One current example of this is the assessment of the proposal for new EU regulations, ref. **section 6**.

A considerable number of the requirements regulating safety in offshore helicopter operations in Norway are stipulated in the NOROG 066 guidelines from The Norwegian Oil and Gas Association, **Ref. /13/**. This functions in practice as an industry standard on the NCS and is currently used as a contractual requirement between the customers and the helicopter operators.

The helicopter operators have also voluntarily implemented some internal safety requirements which go beyond the requirements stipulated in the regulations.

These safety measures, which are not required by law, have been developed through the industry's own safety efforts, and made possible, amongst other things, due to the industry providing the necessary financial resources.

Taken together, the elements described above form the framework for offshore helicopter safety work in Norway.

3.3.2 Regulations and requirements

The helicopter operators' activities are currently regulated by, amongst other things, the regulations governing aviation operations, **Ref. /36/**. The regulations enforce EU Commission Regulation no. 965/2012 which contains the general operational provisions for commercial air transport by helicopter. Other important regulations include the regulation governing aviation on the NCS – commercial aviation to and from helidecks on installations and vessels at sea, **Ref. /37/**;

the regulation concerning the requirement for tracking of helicopters on the NCS, **Ref. /38/**; the regulation concerning systems for monitoring vibrations on helicopters, **Ref. /39/**; and the regulation on refuelling of aircraft, **Ref. /40/**. An increasing number of the Norwegian regulations have adopted the EU regulations, though some retain features particular to Norway. Both the distinctively Norwegian regulations and the EU regulations build largely upon recommendations provided by the International Civil Aviation Organisation (ICAO). The EU regulations are prepared by the European Aviation Safety Agency (EASA) and the European Commission.

With EASA's assistance, the European Commission has prepared a draft regulation proposing several changes to regulation no. 965/2012. Implementing the proposed EU rules will mean that the Norwegian national rules currently in force will be replaced by a more updated and holistic set of regulations, but the main points from the current Norwegian system will also be included. The challenges associated with the implementation of these regulations are discussed in **section 6**.

EASA approves and certifies the types of helicopter used in Europe and can influence the helicopter manufacturers through its participation in committees. The NCAA only has the opportunity to influence the helicopter manufacturers through participation in committee-based work in EASA.

The national aviation authorities, like the NCAA, are monitored by international civil aviation organisations. EASA monitors the NCAA in much the same way as the NCAA monitors its stakeholders in Norwegian civil aviation.

3.3.3 Authorised maintenance organisations

The helicopter operators CHC and Bristow use authorised organisations to undertake helicopter maintenance, which includes overhaul, repair, inspection, part replacement, modification or correcting faults on a helicopter or component.

The activities of these maintenance organisations are subject to the regulation governing authorised workshops (the Norwegian Workshop Regulation), **Ref./41/**, which is based on the EASA Basic Regulation Part 145. The maintenance organisations/workshops are therefore referred to as "the 145 organisations".

The aim of the Workshop Regulation is to ensure that the maintenance of aircraft and aircraft parts is carried out by workshops with the necessary expertise, so that the work is carried out properly and correctly from a safety perspective. The regulation applies to the establishment and operation of Norwegian authorised workshops which carry out helicopter maintenance.

The NCAA approves and issues certificates of authorisation to the workshops which carry out helicopter maintenance.

An authorised workshop shall be led by a workshop manager who is responsible for all activities. The workshop manager shall be a permanent employee and approved by the NCAA. The workshop manager is responsible for ensuring that the workshop is run in accordance with applicable rules and regulations, and in accordance with the conditions set out by the NCAA for the approval of the authorised workshop.

An authorised workshop shall have a workshop handbook for use and guidance of maintenance personnel, and this must correspond at all times with applicable rules and regulations, and also be approved by the NCAA.

3.4 Cooperation between Statoil, the industry and the authorities

NOROG 066, **Ref. /13/**, has been developed with broad participation from key parties in the Norwegian petroleum industry. It is owned by the Norwegian petroleum industry, represented by The Norwegian Oil and Gas Association (NOROG). The guideline is intended for use by all helicopter operators operating commercial flights on the NCS.

In NOROG 066 Section 1.1 it is stated that:

“This will be achieved by coordinating the companies' requirements vis-à-vis the Helicopter Operator, including requirements related to technical, operations and operational standards and procedures. This will contribute towards simplifying the tasks the passengers and the Helicopter Operator must carry out during helicopter transportation and emergency situations. The guidelines also include company-specific requirements for the helicopters, and the operations related to them. Coordinated requirements may also contribute to a more efficient operation, and a reduction in flight costs. These guidelines are not intended to replace the authorities' requirements relating to this activity, but include additional requirements where the industry has found it to be appropriate.”

The industry wishes to formalise NOROG 066 as part of the petroleum regulations and has sent an enquiry to the Petroleum Safety Authority, who is now considering this.

Flying on the NCS is an integral part of the petroleum industry. This means that Statoil has a particular responsibility to ensure that these activities are monitored and quality assured, in line with other activities on the NCS. Statoil's own management system, including the requirements for the helicopter operators' management systems, use of the NOROG guidelines (NOROG 066), regular audits and verifications, monitoring plans and follow-up of incidents, plays an important part in ensuring that this responsibility is taken care of, ref. inter alia **section 4.3**.

Statoil's ability to influence safety requirements and standards is achieved through participation in national and international committees, through research and through investigative work.

The senior adviser in Statoil's flight safety department is the industry's contact point for NOROG 066 and HSS-3b, **Ref. /8/**, and represents Statoil and/or the industry in the following external fora:

- International Oil and Gas Producers (IOGP) Aviation Subcommittee (handling flight safety)
- Helicopter Safety Research and Management Committee (HSRMC, an international committee which coordinates research in the area of helicopter safety)
- HeliOffshore, together with the NCAA (technical participation in a global organisation for helicopter safety offshore)
- Cooperation Forum for Helicopter Safety on the NCS
- Aviation Forum (formerly the Civil Aviation Technical Expert Group) in NOROG
- Aviation expert group in RNNP (Trends in risk level in the (Norwegian) petroleum activity, Petroleum Safety Authority)
- Helicopter noise committee

In 2016 the Barents Sea Exploration Collaboration (BaSEC) was established; this is a forum comprising international operators who collaborate and optimise oil and gas recovery and operations in the Barents Sea. The flight safety department has participated in the work to define the specific requirements associated with helicopter operations in the Barents Sea, **Ref. /20/**.

4 Statoil's organisation and activities related to helicopter services

4.1 Organisation, roles and responsibilities

4.1.1 *Flight safety department*

Statoil's executive vice president for Development and Production Norway (DPN) has the responsibility for helicopter safety in Statoil's operations on the NCS. This responsibility is delegated to the DPN Joint Operational Support function. The senior adviser for flight safety has responsibility for flight safety across the Statoil group, as stipulated in DPN's governing documentation OMC01, **Ref. /4/** and **/5/**.

This responsibility includes the following requirements:

- Set standards and conduct inspections of corporate air transport operations
- Perform pre-qualifications and verifications, and take part in contract assessments of air transport companies
- Conduct helideck verifications
- Safeguard the role of safety management responsible for the Helicopter Flight Information Service (HFIS) on Gullfaks and for other regulatory requirements within air transport, including the requirements issued by the NCAA **Ref. /42/**

Corporate Safety and Security (CSS) shall facilitate and ensure that the Company has "a proactive, systematic, dynamic and comprehensive approach to the management of safety", **Ref. /6/ (OMC19)**. The responsibility includes the following:

- Ensure a systematic and comprehensive reduction in risk related to flying, through active surveillance and control
- Use of regional/international air/helicopter companies with a high standard of safety
- Only suppliers and aircraft that are approved by Statoil shall be used
- Imposing flight restrictions if required
- The company shall cooperate with external collaborators in order to increase safety
- Ownership of the flight safety forum

In practice, performance of the tasks related to this responsibility is delegated to the senior adviser for flight safety.

The department for flight safety consists of the senior adviser for flight safety. The senior adviser carries out the tasks described above, together with three employees from the department for air transport who have air safety competence. Following Statoil's reorganisation in 2015 (Corporate Review), the flight safety department was moved from Technology, Projects and Drilling (TPD) to DPN Joint Operational Support. The justification for this move was to more tightly associate the flight safety function with its tasks.

The majority of external stakeholders interviewed by the investigation team emphasised that Statoil's flight safety department is a pioneer and front runner in the improvement of offshore helicopter safety. This also appears to be the perception of relevant internal stakeholder groups within Statoil. What was highlighted from the external side, which includes helicopter operating companies, was the department's driving role in adopting the latest generation of helicopter technology. This is considered crucial for the improvement of flight safety. At the core of the flight safety department's work is the "bow tie" model, see **Figure 3-1**. The systematic approach to working that has underpinned flight safety over time is also a notable factor for external stakeholders.

Since work on HSS-1 began in 1990, **Ref. /11/**, Statoil has had a steadily increasing role as contributor to the industry's work with helicopter safety. In particular, the Flight safety department is, and has been, a driving force in internal and external fora that work with helicopter safety on the NCS and internationally. See **section 3.4**.

The senior adviser for flight safety administrates Statoil's internal flight safety forum, which is an internal arena for cooperation with the safety delegate service and trade union representatives. The forum reviews flight safety in Statoil, relevant air traffic incidents, strategies and contracts, together with other current topics in the aviation industry that are relevant to Statoil. The forum normally meets twice annually.

In addition to internal tasks, the senior adviser for flight safety represents Statoil and/or the industry in several external fora, as described in **section 3.4**. The aim of a broad degree of engagement with external stakeholders is to contribute to improved safety.

4.1.2 Air transport department

The air transport department delivers air transport services to the whole Statoil group, as described in Appendix A of the Statoil Book, **Ref. /3/** and described further in **Ref. /4/** and **/5/**.

On the NCS the air transport department is responsible for ensuring helicopter resources, based upon the level of demand reported in to the department and an assessment of available capacity. This includes, amongst other things, safe and efficient operation of personnel logistics, personnel transport and SAR helicopters, charter and fixed-wing flights.

The area of responsibility for air transport also encompasses the role of requisitioning unit in procurement and supplier monitoring, including task responsibilities for the Company Representatives (CR). On the NCS, the air transport department is also responsible for helicopter bases and base-related services. The head of the air transport department has resource responsibility for the three employees with flight safety expertise that perform tasks assigned by the flight safety department.

The responsibility to plan, organise and cancel in and outbound flights and provide air transport services lies with other departments in DPN JOS.

4.1.3 Company representative and procurement

The contracts with CHC and Bristow are followed up by dedicated personnel with the role of Company Representative (CR). In the procurement process, the CR contributes to the preparation of specific procurement strategies, defines lists of suppliers and conducts technical verifications together with the department for flight safety.

In the operations phase of the contracts, the CR is responsible for ensuring that a strategy for following up contractors is prepared, and that users in Statoil are familiar with the contracts. The CR administrates the meetings with contractors and suppliers and handles all contractual elements of the contractor's deliveries. Currently, the CRs are organised under the Operations Technology function, a unit in DPN, but outside the Joint Operational Support and air transport departments.

The procurement function is responsible for coordinating, planning and conducting procurements on behalf of line management.

4.1.4 Observations

Clear roles and responsibilities are crucial for conducting priority tasks efficiently, and therefore strengthening helicopter safety-related work. DPN governing documentation specifies that the flight safety department has corporate responsibility for flight safety, but this is not clear in the Statoil Book. The investigation team believes that:

- Corporate responsibility for carrying out tasks related to flight safety must be described in Statoil's highest governing document. This was previously described in appendix A of an earlier version of the Statoil Book.
- OMC19 should state that the performance of tasks within flight safety is delegated to the senior adviser for flight safety in DPN.

The investigation team believes that it is crucial that Statoil has internal resources with which to drive flight safety-related work. The significance of a robust department for flight safety with sufficient capacity, visibility and driving power is considered to be great. Tasks related to flight safety in Statoil are currently carried out by four people whose complementary technical and operational competence has taken many years to build up. This also presents a vulnerability, since the average age in this group is resultantly high. As such, the departure of such key personnel at the same time would weaken Statoil's flight safety competence base. As several of the investigation team's external sources have stated; *"Statoil has a capable, but vulnerable flight safety team"*.

To ensure continuity, the investigation team therefore believes that new personnel must be recruited. There is an indication that several years of training may be required to achieve the levels of competence and experience necessary for taking over key positions within flight safety.

The investigation team believes that the organisation of helicopter safety-related work in Statoil is complicated, with many participants and a varying understanding of each individual participant's role. This particularly applies to the departments for flight safety, air transport and procurement, together with personnel with the role of Company Representative. Although it has not appeared that this, so far, has affected the quality of helicopter safety-related work, the investigation team recommends that a review of the organisation of helicopter safety-related work in Statoil be conducted to ensure simplification and clarify role descriptions.

4.2 Helicopter contracts

Statoil currently procures helicopter services from two companies, Bristow Norway AS and Integra Leasing AS (with CHC Helikopter Service AS as a subcontractor). The services are procured through helicopter contracts that typically have a duration of five to 10 years, with possible extensions. There are currently individual contracts for flights from Stavanger, Bergen, Florø, Kristiansund, Brønnøysund and Hammerfest.

The contracts set out the helicopter services that will be delivered, including the types of helicopters and how they will be equipped, how many helicopters will be accessible and when they will be available, together with requirements for reserve capacity. Further, the contracts contain provisions concerning increasing or reducing the total numbers of available helicopters, and how such adjustments will be notified and compensated (financially).

The helicopter contracts are based upon industry standard NOROG 066 "*Recommended guidelines for aviation on petroleum installations*" **Ref./13/**, which provides a range of requirements for helicopter services (organisational, competency, operative, technical, operational and reporting requirements). In many areas this industry standard provides more stringent requirements than the relevant applicable laws.

The services are mainly compensated through rates - a "day rate" per helicopter (which is independent of how much they fly) and a "helicopter rate" which runs while the helicopters are in flight. Since the helicopter contracts are long-term, the rates are normally index-regulated.

The investigation team has assessed whether there are sides to the helicopter contracts that can impact negatively on the safety level. Related factors that have been highlighted are how the helicopter contracts are entered into and administered, ref. **section 4.2.1**, together with the contracts' conditions regarding how much time can pass between each flight, ref. **section 4.2.3**, and the consequences of delays, ref. **section 4.2.2**. An additional factor concerns the helicopter operator's economic and financial position ref. **section 4.2.4**.

4.2.1 Procurement process

The procurement of helicopter services is performed in accordance with Statoil's governing documentation for procurement. The procurement process consists of a range of sub-activities, including:

- production of an overall strategy for procurement of logistics services in general
- production of a strategy for every helicopter contract that will be entered into
- selection of the contractors/suppliers that will be invited to tender bids ("Prequalification")
- production of enquiry documents including assessment of contractual requirements and provisions
- evaluation of incoming bids, including clarifications and negotiations with the bidders.
- initiation of a contract and follow-up of contractors and deliveries, including development of a flight programme, following up incidents, commercial dispositions and regular audits.

Several stakeholders in Statoil are involved with the different activities, particularly the air transport, flight safety and procurement departments. In addition, the department for strategy and portfolio management produces an overall strategy for procurement and logistics services.

The investigation team believes that there is a strong focus on helicopter safety at all stages in the process, particularly because the corporate flight safety competence is involved in all activities with the greatest impact upon safety. These activities include assessment of the contractors who receive invitations to tender, production of strategies and contractual requirements, bid evaluations and follow-up of contractors and deliveries.

4.2.2 Compensation for delays (penalties)

The contracts specify that the helicopter operators do not receive payment in full if the transport services are delivered too late or are not delivered at all. The definition of "too late" and "not delivered" varies from contract to contract: for example, a service may be classified as "too late" if it is delayed by more than two hours, whilst a service may be classified as "not delivered" if the delay exceeds eight hours. The price for a service cannot be reduced if the delay or "non-delivery" occurs as a result of the weather or factors on Statoil's side.

Such provisions serve multiple purposes. They reflect that the service was not delivered as agreed, they contribute to compensating for the loss, and they encourage punctuality and regularity. The latter point is vital, since punctuality and regularity provide foreseeability, which is a necessary condition for good planning. Good planning is in itself a condition for good offshore safety.

Several of the individuals that the investigation team has spoken with have questioned whether the "penalty" regime may negatively affect helicopter safety. Some have maintained that the system can contribute to stress amongst pilots and mechanics, and therefore increase the risk of making mistakes or *"stretching it too far"*. Further, it has been pointed out that work operations can be disturbed if resources are redirected in order to avoid a penalty. It has also been indicated that requirements for shorter turnaround time and fewer reserve helicopters will lead to an increase in the total number of potential delays, and therefore also an increase in the *total number of situations* where the aspects of the penalty regime mentioned above may occur.

One of the risk-reducing measures that was drafted into HSS-3, **Ref. /9/**, was a *"Review of the fine regime ("penalties")"*. *"The recommendation will include that those oil companies that practise "penalties" should examine the regime for imposing fines on helicopter operators when the requirements in the contract are not fulfilled, especially for delays". "The recommendation will (...) also include that the helicopter operators' management are aware of how possible criticism from customers is communicated within their organisation, so that it does not create unnecessary stress"*.

In 2010 SINTEF did not find that this recommended measure was amongst the ones that would contribute most to risk reduction going forward. The investigation team believes that further work must now be done with this recommendation, and to see whether other systems that stimulate punctuality and regularity can be found, *without* the negative effects that are highlighted above. One possible system is described in the SINTEF study: *"One suggestion is that fines are not imposed on the basis of single flights, rather that they are based upon relevant monthly statistics and current indicators"*.

4.2.3 Time between each flight ("turnaround time")

Several activities are carried out during the period between each flight. Some are directly related to safety, including reading off vibration measurements (HUMS). Others are more logistics-related, for example refuelling and baggage handling.

In recent years it has become normal to specify a 60-minute turnaround time when the flight programme is prepared. In the new contracts for Bergen and Florø airports, which will apply from 1 May 2017, this is reduced to 30 and 45 minutes respectively. The new turnaround times were also put into the existing contracts for flights from Bergen and Stavanger that are currently in use. These should have come into force on 1 May 2016, but following the Turøy accident they have been postponed.

The intention behind the changes was that a shorter turnaround time would allow more efficient use of the helicopters, for example by potentially creating enough time for extra offshore flights. A shorter turnaround also has other positive effects, including that a larger portion of the flight programme can be conducted in daylight. The assessment was that, because of technological advances and improved logistics routines, it would be possible to reduce turnaround time without affecting safety. The helicopter operators confirmed that this was possible, but pointed out that the new shorter turnaround times could potentially result in more frequent delay situations.

The investigation team has not found anything that indicates that a direct connection can be made between reduced turnaround time and reduced safety, for example inadequate time for conducting necessary activities. However, it cannot

be ignored that shorter turnaround time, in combination with other factors, may possibly still contribute to negative effects. Shorter turnaround time can, for example, result in more frequent potential delay situations that, again, may result in the possible negative effects of the penalty system occurring more often. The investigation team finds that this underscores the importance of strengthening holistic mapping and management of all factors that, individually or combined, may affect helicopter transport safety.

4.2.4 Helicopter operating companies' economic and financial position

Helicopter operators with a weak economic and financial position represent a potential safety risk for Statoil in two main ways. Firstly, a situation may occur where the helicopter operator no longer has the capability to cover Statoil's requirement for safety-critical transport and SAR services. Secondly, it may result in the helicopter operators cutting costs in a way that negatively affects safety.

Statoil therefore performs a thorough assessment of the helicopter companies' economic and financial position before the contract is awarded. When awarding the contracts, it is also a natural stage in the evaluation process to assess whether the prices that have been offered are so low that they constitute a risk when carrying out the contract, for example if the price indicates poor quality of services or constitutes a risk to the helicopter operators' financial position. Statoil continues to monitor the helicopter operators' economic and financial position throughout the duration of the contract. Statoil's close follow-up of helicopter operators and deliveries provides a good basis for capturing signs that indicate economic factors possibly taking precedence over safety.

During the contract period Statoil can make commercial dispositions that affect the helicopter operators' financial position, including cancelling the contract or renegotiating the rates. A reduced need for helicopters, combined with a need to reduce costs, has led to an increase in the scope of such dispositions in recent years.

Several parties that the investigation team has spoken with, including the NCAA, maintain the importance of Statoil's awareness of the combined effect of such dispositions, and how they may work together with other efficiency measures and factors. Examples of this include the relationship between reduced reserve capacity, increased use and utilisation of flight time for each individual helicopter, a greater degree of "cannibalising" parts (also known as "robbery" of parts from helicopters needing more extensive maintenance, in order to supply other helicopters with more pressing needs), a challenging spare parts situation, a system with compensation in the event of delays and reduced turnaround time. The question, as many have formulated it, is "when are you stretching it too far?"

The investigation agrees with this view and believes that it underscores the importance of facilitating holistic mapping and management of all factors that, taken individually or in combination, can affect helicopter transport safety.

The NCAA has expressed that a weak economic position and reduction of helicopter operator personnel can lead to safety culture withering. The investigation team believes that some of these points can be addressed by introducing more stringent minimum requirements in the contracts, to prevent positions related to long-term safety-related work from being cut down. This may be positions that contribute to improved cooperation between helicopter operators and manufacturers, for example.

4.3 Contractor follow-up

A number of fixed meeting arenas have been established, within which Statoil meets helicopter companies at different levels in the organisations for cooperation and close follow-up. This applies to the main suppliers, and also interim, contract-related, monthly operating and daily morning meetings. In the morning meetings the day's operations are discussed, together with the previous day's flight traffic.

The monthly operational meetings place an emphasis upon safety, operations, and security issues. The purpose of the meetings is to ensure a good dialogue between key stakeholders, ensure efficient operations and deal with current challenges. The participants are informed about timetables and traffic needs, together with planned movements of exploration rigs with a one to three-month time horizon. When necessary, technical issues that have arisen since the last meeting are reviewed.

In quarterly meetings representatives from helicopter operators meet with Statoil's management. The previous quarter's deliveries are reviewed, with a focus on improvements. The helicopter operators' financial status is also reported.

Contract meetings are held as required to follow up deliveries and contractual relationships.

Main supplier meetings are held regularly with Statoil's most important suppliers. The agenda for the meetings is characterised by a long-term perspective. Statoil places emphasis on providing feedback to suppliers on how they deliver their services and how they work with continuous improvement.

Helicopter operators are audited annually by a group composed of representatives from the operating companies on the NCS (with the exception of one company). The audit is completed within a week, and a joint report is submitted ("Grand audit report"). Findings from audits are followed up by meetings to check that high-risk nonconformities are closed as quickly as possible. The scope of audits conducted in 2015, **Ref. /18/** and **Ref. /19/**, included helicopter operators' management of maintenance and spare parts.

4.4 Helideck verification

The Norwegian Facilities Regulations, **Ref. /2/**, specify that a helideck shall be designed and equipped to meet the requirements of the NCAA's regulations governing NCS flights, **Ref. /37/**. Consent to use the helideck is granted by the PSA with assistance from the NCAA. Inspections of helidecks on vessels and mobile offshore units are performed by the Norwegian Maritime Directorate (NMD), NCAA or other bodies authorised by the NMD. In addition to regular monitoring of any incidents and nonconformities, Statoil performs periodic verifications of Statoil-operated helidecks. On rigs and vessels that Statoil leases, Statoil checks that required documentation is available.

Helicopter operators can only operate to and from helidecks on installations and vessels that meet the requirements of the regulations governing NCS flights, and that have the approval or consent of the supervising authority for the installation or vessel. Helicopter operators have an independent responsibility to verify that the helidecks they use are in accordance with the requirements. In practice, helicopter operators participate in some of Statoil's verifications. Helidecks are operated in accordance with NOROG 074, Helideck Manual, **Ref./14/**, a handbook prepared by NOROG and the helicopter operators. The handbook is intended to promote common practice when working with and landing on helidecks, and to set out minimum competency requirements for helideck personnel. Education and training of helideck personnel is facilitated by training centres managed by NOROG. The curriculum has been developed by NOROG's Aviation Forum together with the helicopter operators. The curriculum is partly based on the requirements described in the NCAA regulations for flights on the NCS, **Ref. /37/**.

5 Learning from helicopter incidents and follow-up

5.1 Definition of incidents and accidents

The terms “incident” and “accident” are defined as follows, **Ref./17/**:

Incident: An occurrence associated with the use of an aircraft which is not an aviation accident, but which affects or could affect the safety of aviation activities. An incident is classified as serious if circumstances indicate that an aircraft/aviation accident almost occurred.

Accident: An aviation accident is an occurrence associated with the use of an aircraft where there have been fatalities, serious injury to personnel and/or significant material damage.

5.2 Overview of helicopter accidents

Table 5-1 shows an overview of registered accidents in the period 1999-2016. There were three accidents in a course of a six-week period in 2009. The table shows that almost all the accidents happened in the British sector, and that the type of helicopter most frequently involved was a Super Puma (various models). The table also shows that the accidents classified as “technical” are often associated with gearbox-related faults.

Table 5-1 Overview of accidents in the North Sea in the period 1999-2016 (Source: SINTEF)

No.	Date	Location	Helicopter	No. of fatalities	Technical	Comments
1	15.02.2000	UK	Super Puma AS332L	0	No	Lightning strike
2	12.07.2001	UK	Sikorsky S-76A	0	No	Human factors Unfortunate placement of the handle for the parking brake
3	10.11.2001	UK	Super Puma AS332L	0	No	Lack of procedures
4	28.02.2002	UK	Super Puma AS332L	0	No	Storm (waterspout/tornado)
5	16.07.2002	UK	Sikorsky S-76A	11	Yes	Rotor came loose
6	05.11.2002	NO	Super Puma AS332L	0	Yes	Loss of engine power
7	03.03.2006	UK	Super Puma AS332L	0	No	Lightning strike
8	27.12.2006	UK	Super Puma SA365N	7	No	Human factors
9	22.02.2008	UK	Super Puma AS332L	0	No	Lightning strike
10	09.03.2008	UK	Super Puma SA365N	0	No	Human factors
11	18.02.2009	UK	Super Puma EC225	0	No	Human factors
12	12.03.2009	Canada*	Sikorsky S-92	17	Yes	Oil lubrication. Gearbox
13	01.04.2009	UK	Super Puma AS332L	16	Yes	Rotor came loose. Gearbox
14	10.05.2012	UK	Super Puma EC225	0	Yes	Oil lubrication. Gearbox
15	22.10.2012	UK	Super Puma EC225	0	Yes	Oil lubrication. Gearbox
16	23.08.2013	UK	Super Puma AS332L	4	No	Human factors
17	29.04.2016	NO	Super Puma H225	13	Yes	Rotor came loose

*The accident from Canada is included in this overview due to its severity

5.3 Contractors' safety management systems

The helicopter operators use different digital Safety Management Systems (SMS), for reporting and handling incidents and dangerous conditions.

5.3.1 CHC Helikopter Service

CHC Helikopter Service uses the "SMS-Reports" module in the Safety Quality Integrated Database (SQID) reporting system. The system currently in use, SQID3, was implemented in May 2015. SQID contains various modules for incident reporting, quality audits, nonconformities, risk analyses, etc.

Anyone in CHC who is involved in, or who has observed, an incident is required to report it. All reports are reviewed every working day at 08:30 at a regular "Daily Safety Review Meeting", in which all department heads and process managers participate.

This group reviews and classifies all reports, and also assesses them from a risk perspective; they ensure that the relevant client and authorities are notified, and determine the level of investigation required, as well as delegating to a case handler. They also verify that the client in question is specified in the report.

The reports are divided into four incident categories: Flight, Technical, Ground and HSE.

Reports with a medium-to-high level of risk are handled by quality and safety personnel, while reports with a low risk are handled by relevant line personnel. The case handler assesses necessary measures and makes an action plan. In some cases, the decision may be taken to close reports with low risk in the daily safety review meeting.

For reports with medium-to-high risk, the action plan must also cover the underlying causes, and an assessment of the residual risk shall be made once the actions have been implemented.

Reports should normally be processed within 60 days from the date of issue. The status of the reports is reviewed in weekly and monthly management meetings.

Statoil receives all reports relating to helicopter flights. CHC has informed the investigation team that there were 1,174 incident reports in 2015, of which 481 were related to flights. Approximately 17% of the incident reports were sent to the NCAA in 2015.

There are also modules in SQID for registering and following up all quality audits (internal, clients and authorities) and associated nonconformities/observations. Emergency response exercises are also registered in SQID.

5.3.2 Bristow

Bristow currently uses an industry-standard tool called "Sentinel" to register and follow up incidents. Pilots, technicians and other ground personnel all report in the same module in Sentinel. The system is available on Bristow's intranet portal.

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

The Sentinel reporting format is threefold:

- Air Safety Reports (ASR) – used by the pilots to report operational incidents
- Ground Occurrence/Technical Safety Reports (GOR) – used by technicians to report incidents related to maintenance of helicopters
- Ground Handling Reports (GHR) – used to report incidents that occur in connection with, for example, check-in, boarding, cargo, baggage

Once a report has been registered, an email is automatically sent to the quality and safety personnel for case handling. A classification and risk assessment of the incident is performed. An assessment is also done as to whether the incident requires investigation due to the type of incident and level of severity. This assessment is generally done in agreement with the process manager (typically a chief pilot, maintenance manager, technical manager, etc.).

Statoil receives all reports relating to helicopter flights. Bristow has informed that there were 510 incident reports in 2015, of which 430 related to flights. Approximately 70% of the reports were sent to the NCAA.

Bristow has its own systems for following up audits and risk management. The plan is to replace the current three systems with one common platform; this should take place in 2017.

5.4 Statoil's system for following up incidents

The flight safety department in Statoil is continuously informed about incidents, either by email or phone, from the helicopter operators. In interviews it became clear that the culture for reporting incidents is considered good. This view is shared by both Statoil and the helicopter operators.

Statoil only records the most serious incidents (red level of severity) from the helicopter operators in the Synergi database, as the helicopter operators' own safety systems are considered by Statoil to be more effective for following up less serious incidents. Once an incident report has been received, Statoil will assess whether additional supporting documentation is required and, if deemed necessary, it will be requested. If the conclusion is that an investigation team is to be set up in connection with the follow-up of an incident, a technical expert from Statoil may participate.

Representatives from Statoil flight safety attend quarterly meetings with the helicopter operators. The status of incidents from the preceding quarter is reviewed at these meetings.

In connection with the annual joint audits or "Grand audits", the contractors' systems used for reporting incidents will be examined. Statistics for reported incidents will be reviewed, and an assessment made as to whether there are certain categories of incident that should be the subject of further investigation or follow-up.

The monthly operational meetings have a fixed agenda point where the operational incidents are reviewed, with a focus on learning and improvement.

If the cause of an incident is linked to a Statoil activity, for example conditions on the helideck, Statoil is immediately notified of this, even though the level of severity may be considered low.

The helicopter operators are evaluated each quarter. This evaluation includes, amongst other things, an assessment of the safety culture.

5.5 Statoil's follow-up of Super Puma helicopter accidents in the British sector

In the British sector of the North Sea there have been five serious accidents involving Super Puma helicopters since the beginning of 2009; two accidents in 2009, two in 2012 and one in 2013. Of these five accidents, two resulted in fatalities, and a total of 20 people lost their lives, see **Table 7-1**. Three of these accidents involved an EC225 Super Puma, and two involved an AS332 L2 Super Puma. Three of the accidents were due to gearbox problems, one of which was the Peterhead accident on 1 April 2009 where 16 people died.

In 2009 Statoil followed up the Peterhead accident through discussions at the European Helicopter Operator Conference (EHOC), now HeliOffshore, in the International Association of Oil & Gas Producers (IOGP) and with the manufacturer Airbus. This topic was also addressed at the Cooperation Forum for Helicopter Safety on the NCS. It quickly became clear that the helicopter operator had noticed indications of metal particles in the gearbox some 30 hours before the accident. Statoil did not use this helicopter operator, nor did it have any plans to do so. This was therefore seen as a case that should be followed up by the British sector stakeholders and Airbus.

The emergency landing incident on 10 May 2012 was closely followed up by Statoil. Separate meetings were held with the helicopter operators' management, the major oil companies' advisers and the manufacturer's management. This resulted in the introduction of HUMS readings after a maximum of five hours' flying.

The next incident, on 22 October 2012, was caused by a fault in the gearbox, despite the fact that it was less than five hours since the last HUMS reading (4.9 hours). As a result, this type of helicopter was grounded. Later on, Airbus was able to confirm and prove that the fault had developed over time. The immediate cause of the fault was that cracks had formed in the axle that drove the oil pumps in the main gearbox, which then broke. A fault was also indicated in the emergency lubrication system.

The following measures were implemented:

- All passenger transport flights with the Airbus H225 (EC225) Super Puma from Statoil were stopped with immediate effect (also decided later by the NCAA)
- The following issues were to be addressed:
 - The reason for the crack formation and its propagation had to be clarified
 - Improved maintenance procedures
 - Established in-flight monitoring and warning
 - Specially-developed non-destructive testing (NDT) inspections accessible
 - Improvement of the emergency lubrication system

Flights with the H225 (EC225) Super Puma were resumed in August 2013, with the following compensatory measures:

- To avoid corrosion, oil jets were adjusted so that the relevant area was sprayed with oil directly
- A new cockpit warning provided to the pilots from the HUMS in the event of crack development and propagation
- Upgrades to the emergency lubrication system to ensure further flying in case of an oil leak

Extra measures implemented by Statoil *beyond* the authorities' requirements:

- NDT (ultrasonic inspection of the oil shaft axle's crack-prone area on a daily basis)
- 15% reduction in engine power during flight (resulting in reduced speed of approximately 3 knot)
- Implementation of HUMS reading and interpretation between **all** flights

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

The Cooperation Forum for Helicopter Safety on the NCS and the Aviation Forum in NOROG were involved in the processes, and Statoil's flight safety department handled the information through Statoil's internal flight safety forum and by informing the relevant units directly.

The accident on 23 August 2013 with the AS332L2 Super Puma helicopter was not followed up in detail by Statoil since that type of helicopter was no longer used by the company.

The investigation team has not identified any follow-up measures which should have been implemented following the accidents in the British sector beyond those described above.

5.6 Helicopter Safety Study HSS-3b

The Helicopter Safety Study HSS-3b, **Ref. /8/**, covers the period 2009-2015 and also looks ahead. The purpose of HSS-3b is to provide an updated picture of helicopter safety on the NCS. It will also encourage recommendations to help maintain or improve safety in the area of offshore helicopter transport. The study will look at international helicopter accidents of recent years, and assess whether the measures and recommendations which have been introduced following these accidents should also be implemented in Norway. In addition, the final report will provide the basis for prioritising the proposed measures from a cost-benefit perspective. **Ref. /12/**.

HSS-3b will include an update of parts of HSS-3, but it will not be a full-scale HSS-4 study. Based on the frequency of previous studies, HSS-4 will probably be performed in 2020.

The aim of HSS-3b is to update selected key parts of the HSS-3 report, which was published in 2010. The update will pay particular attention to the following:

- New accidents: obtain and analyse data from relevant accidents (particularly accidents in the British sector) after the conclusion of HSS-3
- CAP 1145: Assess selected recommendations from UK CAP 1145 against the identified risk-reducing measures from HSS-3 and more recent studies, **Ref. /35/**.
- New European regulations for Helicopter Offshore Flight Operation (HOFO): Update trends in the forthcoming five to 10-year period, including the consequences of technical recommendations proposed in EASA's HOFO

The most important result of the study will be an updated identification and assessment of risk-reducing measures. This will include, among other things, an assessment of measures linked to the placement of seats in relation to passenger weight, emergency breathing systems and wave restrictions.

The study will also give an update of key technological and organisational development trends of significance to helicopter operations on the NCS, as well as relevant statistics on accidents, incidents and volume of traffic.

The investigation team views it as positive that this work has started, and assumes that the recommendations from the study will be followed up by Statoil and the Cooperation Forum for Helicopter Safety on the NCS in line with previous helicopter safety studies, **Ref. /9/**, **/10/** and **/11/**.

6 New European Union regulations

The European Aviation Safety Agency (EASA) has prepared a new set of EU regulations for, amongst other things, offshore helicopter operations. The expressed purpose of the regulations is to create a harmonised set of flight safety regulations for offshore helicopter operations in Europe, and to ensure a level playing field for competitors in this market.

The draft version of the new regulations has just been sent out for comments, with the deadline for comments set at 1 September 2016. The Norwegian Ministry of Transport and Communications has given risk management company Safetec the task of clarifying the consequences of introducing these rules in Norway.

The investigation team is of the opinion that the implementation of the new rules will lead to a *change in the risk picture* associated with helicopter operations on the NCS. New risks will include:

- The risk that the EU rules, now and in the future, will not impose stringent enough safety requirements because too little weight will be attached to the particular safety challenges associated with helicopter services on the NCS
- The risk that any extra customer-specific requirements specified by the purchasers of helicopter services may “disintegrate” over time. This may be because there are cheaper alternatives available, which are legal and certified, but which operate with a lower standard of safety
- The risk that the task of certifying and monitoring the helicopter operators is carried out by authorities with inadequate knowledge of the special challenges relating to flight safety on the NCS
- The risk that helicopter operators elect not to participate in the important safety work which is carried out under the auspices of the Cooperation Forum for Helicopter Safety on the NCS, and that the forum will therefore lose its key role in helicopter safety work on the NCS.

The Cooperation Forum for Helicopter Safety on the NCS is working to map these risks and how they can and should be addressed. Statoil is actively participating in this work, but, in the opinion of the investigation team, it should also formulate, anchor and be clear on *Statoil's own ambition* to address the risks which will be a consequence of the new rules being implemented. This may be particularly important if cooperation in the industry is weakened and, at the same time, it will send an important signal to the market about what the biggest customer on the NCS expects.

7 Statoil's emergency response-related management of the accident, including cooperation with the authorities and partners

7.1 Crisis management in Statoil

Statoil's emergency response organisation and emergency response culture is largely built upon 40 years of experience of offshore activities on the NCS. The more recent period of international expansion has helped the emergency response organisation to become more internationalised.

This work is highly prioritised by Statoil's management and organisation. The company's emergency response-related work is defined in Statoil's governing documentation:

1. The Statoil Book:
 - The Statoil Book is Statoil's highest governing document and sets out a common framework for how the company is led and run, setting standards for deliveries and leadership
 - *"If accidents occur, our emergency response organisation will do its utmost to reduce injury and loss. Saving lives is our highest priority."*
 - *"We transform lessons learned into improved safety measures through continuous learning."*
2. Statoil's functional requirements relating to "Safety and security" (FR10), **Ref. /7/**:
 - Define the basic requirements for safety and security work in the company, including management of emergency response and crisis management
3. SF700 "Preparedness and response", **Ref. /26/**:
 - Defines how the business units in the company shall develop emergency response plans
4. SF801 "Business Continuity Management", **Ref. /27/**:
 - Defines how business continuity plans shall be prepared in the business areas.

Specified role descriptions and requirements for each of Statoil's three emergency response lines are stipulated in the following documents: WR2296 for Line 3 (**Ref. /28/**), WR1214 for Line 2 (**Ref. /29/**) and WR1156 for DPN's Line 1 (**Ref./30/**).

7.2 Statoil's emergency response organisation

Statoil's emergency response organisation comprises three levels: emergency response (Line 1), incident management (Line 2) and crisis management (Line 3).

Line 1 has the operational responsibility for emergency response handling at the site of the incident and receives tactical support from the second line.

Line 2 is organised at 40 locations around the world. Line 2's main tasks are to provide tactical guidance and support to Line 1, coordinate with local and national emergency response authorities and to follow up Statoil's own employees and next of kin. DPN's Line 2 is based in Bergen and comprises 80 people on a duty roster divided into six teams. In addition, there are approximately 100 volunteers who can be called upon if required. The unit trains for three hours every Monday

in connection with the shift change at operational installations. Line 2 also conducts exercises on selected potential emergency response situations several times a year; some of which are conducted with external partners. In 2015 there were approximately 40 exercises in addition to the regular Monday training exercises.

In an emergency response situation, it is Line 2, led by an Incident Commander (IC), who has the mandate to reinforce the emergency response team depending on the magnitude of the incident. In the guidelines there are nine requirements for Line 2, including the following **Ref. /29/**:

- The emergency response organisation shall mobilise within 60 minutes following notification.
- Once the IC has taken the decision to notify contractors, Line 2 is responsible for commencing with notification within 30 minutes.
- A call centre number for next of kin shall be operational no later than 30 minutes after Line 2 has mobilised.
- Once the IC has taken the decision to set up a call centre number, this shall be staffed within two hours.
- Once the IC has taken the decision to set up a next-of-kin centre, this shall be up and running within 60 minutes.
- Viewer access to DaWinci is to be locked when incidents occur, on the IC's instructions.

Line 3 is led by an emergency response leader from Statoil's head office in Stavanger. Line 3's main tasks are to assess and plan the strategic consequences of an incident, provide the necessary support to Line 2, coordinate with the relevant authorities, monitor the handling of the incident, follow up enquiries from the media, prepare internal and external communications, and prepare for business continuity.

Line 3 shall be mobilised within an hour following notification, and be responsible for informing the CEO, the Statoil board of directors and the relevant political authorities. Line 3 shall also handle contact and communication with the media, provide regular updates to partners, and assess the need to send a liaison to the Joint Rescue Coordination Centre for Southern/Northern Norway.

In 2015, Statoil's Line 3 conducted 26 exercises, either independently or together with Line 1 and Line 2. External partners did not participate in these exercises.

In September 2013, the recommendations from the In Amenas investigation were presented to Statoil's board of directors, **Ref. /33//33/**. A separate project, the Security Improvement Project, was given the responsibility of ensuring that the recommendations in the investigation report were followed up and implemented in the Statoil organisation. Among the In Amenas investigation team's 19 recommendations was a proposal to introduce a system to coordinate and standardise crisis and emergency response planning, in line with the principles of the Incident Command System (ICS). This was to be achieved without losing the best elements of Statoil's existing emergency response culture.

As a result of this recommendation, the Incident Management System (IMS) was developed for Statoil, and was first used in 2016. IMS is a command and control system for Line 2 that is used by several petroleum companies. IMS is scalable and well adapted for use in major accidents that have a wide geographical distribution and as such involve managing a large number of resources (both personnel and equipment). In accordance with WR1214, **Ref. /29/**, IMS, with some adjustments, was used in the handling of the Turøy accident.

7.3 Emergency notification and mobilisation on 29 April 2016

Helicopter flight HKS241 left the Gullfaks B platform at 11:16 with 11 passengers and two pilots on board. Estimated time of arrival at Bergen Airport Flesland was 12:08. The helicopter crashed at approximately 11:55.

Statoil was first notified of the accident at 12:09, and the decision was made to immediately mobilise the Line 2 and 3 duty teams. Notification of mobilisation was prepared in Statoil's Notification Centre (SNC), but this notification was not sent until 12:20, 11 minutes after the decision to mobilise was taken. Following the accident, the emergency response organisation improved its procedure to avoid any delay in sending out the notification to mobilise. The consequences of the delay are discussed in the section on cooperation with contractors, **Ref. section 7.6**.

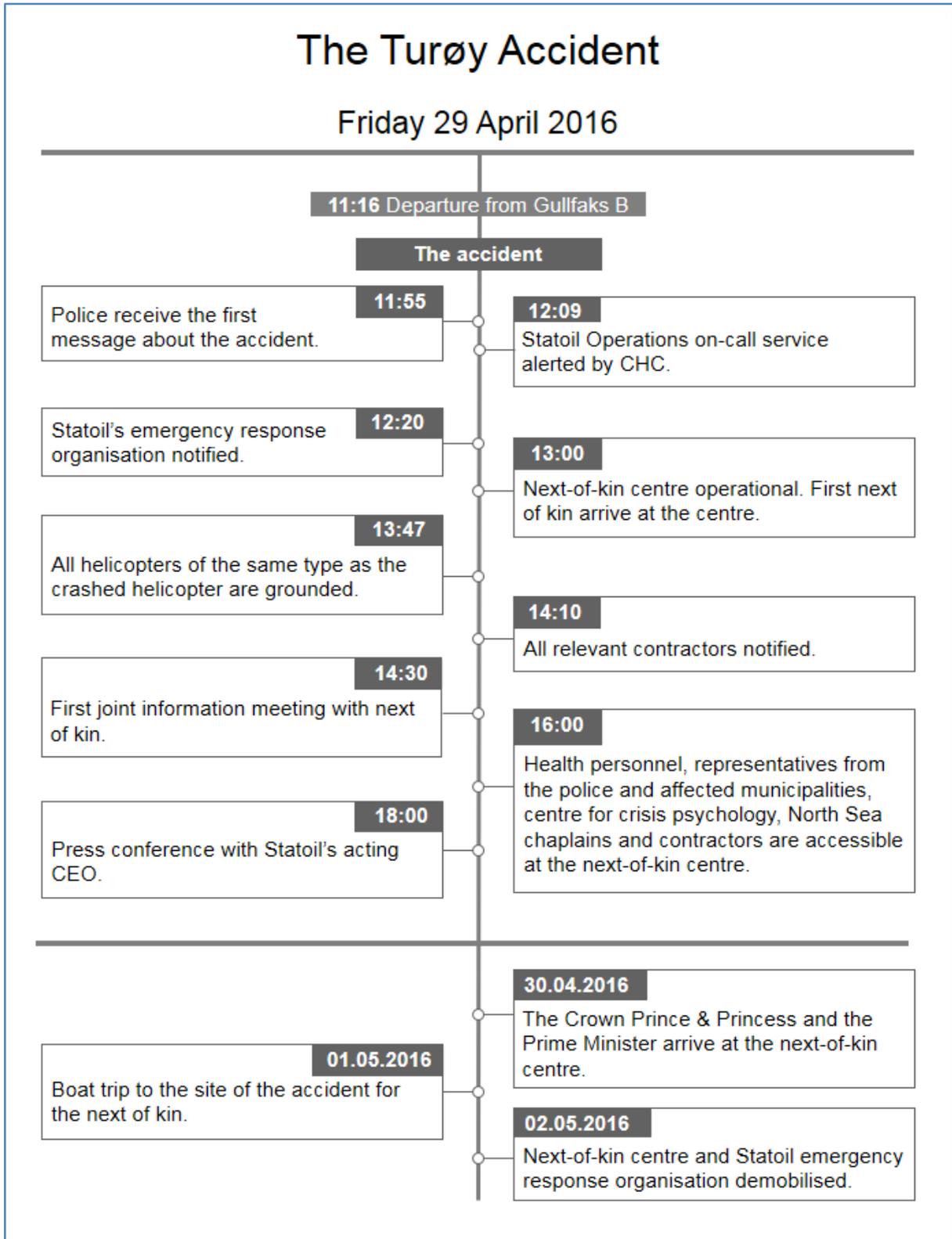
The accident happened during lunchtime on a weekday when many people were at work. Several members of the duty teams found out about the accident through the media, and they contacted the emergency response rooms on their own initiative to offer their assistance, without having received the notification to mobilise. A number of volunteers in Statoil's organisation, who were not on emergency response duty that day, also reported to emergency response rooms to offer their help. As such, Statoil's Line 2 and 3 emergency response organisation had access to all the necessary resources.

From the time Statoil was notified about the accident at 12:09 on Friday morning until Monday at 14:00, when the emergency response organisation was demobilised, approximately 250 people in Statoil were involved in the emergency response in Line 2 and 3.

A detailed description of the sequence of events linked to Statoil's emergency response is included in **App D**.

Offshore employees, primarily on Gullfaks B, were offered the opportunity to talk to health personnel and North Sea chaplains following the accident; town hall meetings were also held. From Friday 29 April 2016 and for the next month representatives were available at the heliports in case personnel travelling by helicopter needed someone to talk to.

Even though the notification to mobilise was sent out 11 minutes late, it is the opinion of the investigation team that Statoil's governing documentation for notification and mobilisation during this emergency response situation was followed adequately.



7.4 Next-of-kin follow-up

Through information provided by HR contacts and feedback from the contractors, the investigation team has the distinct impression that the next of kin felt they were well taken care of throughout the weekend following the accident. To quote one family: *"We would have been in a completely different place in our grieving process if it hadn't been for the good follow-up"* (at the next-of-kin centre). The efforts and presence of contractors, health personnel, the municipalities affected, police, North Sea chaplains and hotel staff were a decisive factor in this.

The requirements in Statoil's governing documentation for Line 2 state that a call centre number for next of kin shall be operational no later than 30 minutes after mobilisation, **Ref. /29/**. The call centre shall be staffed no later than two hours after the Incident Commander has taken the decision to do so. These requirements were met in the emergency response to the Turøy accident.

A number of telephone lines were opened and staffed, followed shortly afterwards by a call centre number, and approximately 200 calls were received in the course of the first 24 hours following the accident.

Just before 12:30, Line 2 became aware that family members of passengers travelling on flight HKS421 were waiting at the heliport at Flesland. The helicopter was expected to land there at 12:08. A decision was taken immediately to send personnel to Flesland to take care of those who were waiting.

In parallel, work started on setting up a next-of-kin centre. As operator on Gullfaks B, Statoil took on the primary responsibility for establishing and running a next-of-kin centre at Kokstad, just outside Bergen. The overriding principle was that, while the 13 on board the helicopter came from different companies, they were all on assignment for Statoil.

As part of Statoil's emergency response planning, the company has entered into an agreement with the Scandic Bergen Airport Hotel at Kokstad. The hotel is located between Statoil's office at Sandsli and Flesland. In the agreement, the hotel commits to preparing common areas that can be operative within two hours after the hotel has been contacted. A certain number of hotel rooms shall be ready for guests to move in within six hours, and the rest of the hotel, as required, shall be ready within 24 hours.

The hotel was affected by a national hospitality workers' strike when the helicopter accident occurred, but applied for and immediately received dispensation from the strike when Statoil contacted the hotel just before 12:30. The first next of kin were at the centre at about 13:00, and the centre was operative at around the same time. During the course of the next few hours, the staff at the centre was increased to include health personnel, representatives from the police and the municipalities affected, the Centre for Crisis Psychology, North Sea chaplains and contractors.

Statoil took responsibility for managing and running the centre. A room was set up for Statoil management and the police, and the first information meeting with the next of kin was held at 14:30. The next of kin were given access to updated information in plenum every hour. On arrival, each family was assigned HR contacts. There is no formal requirement in the guidelines that HR contacts shall be appointed, but this was decided by a representative of the corporate executive committee. The experience with HR contacts was very good, **Ref. /33/**.

The cooperation with the hotel, and the efforts of the staff, were described as good. The experience the hotel has from previous emergency response situations was considered to have been very important. During the course of the weekend, the next of kin of all 13 families were at the centre. Most of them chose to spend the night at the hotel, but some wanted to go home. Feedback from the next of kin (via the contractors), partners and the police was that the follow-up at the next-of-kin centre was very good. External health personnel pointed out in their evaluation that "the next-of-kin centre

functioned well, and in a much more structured way than after the hostage situation at In Amenas. This time there are far fewer improvement points to focus on than after In Amenas". **Ref. /34/**.

One of the observations during the In Amenas investigation in 2013 was that the degree to which the company's various Line 2 organisations had an emergency response which was dimensioned to meet the requirements for setting up a call centre, a physical next-of-kin centre and HR contacts, varied somewhat. Since then, Statoil has established a more common approach, also at an overall global level, to taking care of the next of kin.

The centre at Sandsli was demobilised once the last family left the hotel on 2 May 2016.

7.5 Cooperation with the authorities

Line 2 was responsible for notifying contractors and informing the emergency services, while Line 3 was responsible for informing the political authorities and the municipalities affected.

The Norwegian Prime Minister's office (SMK) was contacted by Statoil's Line 3 by phone at 13:46, and at 16:00 Statoil's acting CEO and the Prime Minister had a conversation by phone. As SMK was planning to hold a press conference at 17:30, Statoil decided to make the acting CEO available for the media at 18:00.

Notifying the Ministry of Petroleum and Energy, the supervisory authorities and the Norwegian Petroleum Directorate started at around 13:30.

The helicopter crashed in the municipality of Øygarden, while the closest neighbours and witnesses to the accident were in the municipality of Fjell. Øygarden municipality was contacted by Statoil at 13:55. The municipality representative informed that they could provide six people to assist at the next-of-kin centre. At 14:02 the municipality was given the name of a contact person in Statoil.

At 14:30 Øygarden municipality decided that their mayor should go to the next-of-kin centre, to serve as a resource for the next of kin from their municipality.

Through SMK, the office of the Norwegian royal family confirmed that the Norwegian Crown Prince and Princess, and the Prime Minister, would visit the next-of-kin centre in Bergen on 30 April 2016.

7.6 Cooperation with affected contractors

DaWinci is a common data tool for all stakeholders on the NCS and provides, amongst other things, an overview of all helicopter traffic to and from the installations, the Personnel On Board (POB), the employers' contact person, and the latest updated list of next of kin and their contact information.

It is up to the person travelling to check before each trip that their personal information in DaWinci is up-to-date.

A few minutes after the accident, Statoil's emergency response department could, with a large degree of certainty, conclude which helicopter had gone missing/crashed.

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

Governing documentation stipulates that, if an incident occurs, the Incident Commander in Line 2 makes the decision to lock DaWinci so that people cannot see the POB list of the flight/installation in question, **Ref./29/ /29/**. The purpose of this is to avoid having personal details going astray while trying to compile a verified list of POB in Crisis Manager (the crisis management tool), so that it is possible to start notifying contractors and next of kin. The same person who locks DaWinci must also unlock it.

Notification to mobilise was sent to the emergency response organisation at 12:20, some 11 minutes after the decision was taken to send out the notification to mobilise. This was probably the reason why viewer access to DaWinci was not locked in accordance with the guidelines in WR1214, (**Ref. /29/**). As such, it was not initially possible to see the POB list. A manual list had to be created instead, using information from other data systems (including the SAP business administration system used in Statoil). The investigation has shown that the manually-compiled list did not correspond fully with the actual information stored in DaWinci. The incomplete list was distributed to the emergency response organisation during the early phase following the accident.

Distribution of the incomplete POB list was probably the reason why one contractor, who was in telephone contact with a representative from Statoil approximately two and a half hours after the accident, was told that the contractor did not have any employees on board flight HKS241. This information gave rise to some uncertainty with the contractor, but had not been passed onwards by the time new information was provided from Statoil some five to 10 minutes later. The previous message was then retracted, and it was confirmed that the contractor did in fact have employees on board.

This error did not have any major consequences during the emergency response to the Turøy accident, since the contractor did not pass the erroneous information on to anyone else. It is, however, possible to imagine a quite different scenario where incorrect information provided to a contractor could have had an unfortunate outcome.

The investigation team is of the opinion that Statoil's emergency response organisation must improve its procedures to ensure that in future, viewer access to DaWinci is locked in line with the guidelines. Access to DaWinci must be automatically adapted to the roles in the emergency response organisation, and DaWinci must be updated so that the system can be locked in the manner intended. Precise information is crucial for good emergency response handling and in the dialogue with partners and next of kin.

For the most part, contractors and partners stated that they were followed up well by Statoil during the day of the accident and over the weekend. However, some of the partners have indicated that they thought it took too long before they were contacted by Statoil, and that it was difficult to get hold of Statoil's emergency response organisation during the first couple of hours after the accident. There was little information about who people could contact or direct enquiries to.

The partners also stated that it was difficult to reach Statoil's communication department, and that due to the lack of information from Statoil they had to update themselves, to a certain extent, using information available in the media during the initial phase of the emergency response. This led to some uncertainty as to what could be communicated and when. It also gave the impression that the various parties involved in the emergency response were not presenting a united front, according to one contractor. As one interviewee commented: *"If we want to present a united front, Statoil needs to do more"* to coordinate communication with partners. Another piece of feedback received was that regular meetings in the communication network would have been useful, so that people would know what time the next press conference would be held, be able to coordinate the message and be kept informed about when information would be released, etc.

Feedback is valuable and highlights the need for prompt and effective notification, as well as ongoing coordination, in the first few hours. Comprehensive media coverage from the moments shortly after the accident occurred, and numerous

enquiries from contractors and next of kin, may have given the feeling that verified information from Statoil was not immediately forthcoming. With so many contractors, emergency services and other partners involved in the Turøy accident, the need for coordination and regular updates was particularly great.

In some cases, notification to contractors about the accident did not go via the emergency contact numbers established by the contractors, but via their central switchboard or the personnel responsible for the company's contract with Statoil. This is due to the fact that the emergency response numbers for some contractors were not updated in DaWinci, ref.

section 8.2.4.

In some cases, the personal information and next-of-kin details for employees, and the emergency contact numbers for contractors, seems to have been incomplete/incorrect. Notification sent via the wrong number did not lead to any notable delay in notifying the contractors' emergency response leaders, largely because the accident happened on a weekday when many people were at work and it was easy to pass the message on to the right person. However, if faced with a situation where an accident happened at night, or during a holiday period, cooperation with contractors could have been less efficient if the wrong number were used.

Statoil, the contractors and employees are all responsible for ensuring that the information in DaWinci is up-to-date at any given time.

7.7 Communication management

The helicopter accident happened during the daytime, close to a residential area, with many eyewitnesses. It did not take long before the emergency services were notified, and only a few minutes before the media first reported the accident, showing photos and videos from the crash site. As it was natural to assume that the helicopter was travelling either to or from an offshore installation, Statoil received a lot of calls from the media to clarify which installation the helicopter had flown from or was heading to.

One news website published an article at 12:13, incorrectly stating that the helicopter had flown from the Brage platform, operated by Wintershall.

At 12:53 Statoil published its first message on www.statoil.com:

Today, 29 April at 12:20, Statoil was informed of a helicopter incident on the Norwegian continental shelf. Statoil has mobilised its emergency response organisation. Press enquiries: 51 99 19 83

Once this first message was published, Statoil's spokespersons were available via the press enquiries telephone number to confirm the information that had been released. At the same time, work continued to prepare another press release as soon as it was possible to confirm where the helicopter had flown from.

Statoil's general practice when communicating information about incidents and emergency response is that information shall not be shared externally until it is confirmed, and possibly also released by the relevant emergency services. In addition, the company communicates externally through designated spokespersons; this is regulated in the Statoil Book. There are limits to what information Statoil can communicate, and what must be handled by the emergency services.

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

Following the accident, questions have been raised as to whether Statoil was too slow in releasing information that the helicopter had flown from Gullfaks B, and whether more prompt release of information could have prevented incorrect details from being reported in the media. In June 2016 the Norwegian Press Complaints Commission (PFU) handled a complaint concerning a news website that published incorrect information shortly after the accident about the platform flight HKS241 had departed from. In processing the case, questions were raised as to “where the media should obtain information from when the official channels remain silent”. The leader of the PFU pointed out that in such situations “it is more important to calm down and present the facts than to be first and risk publishing something that is incorrect and potentially damaging.”

The investigation team wishes to underline that particular requirements in terms of speed and precision apply when managing communication in an emergency response situation.

- Speed, because social media and news published on the internet will often raise public awareness of the incident early on. Affected parties can help to reduce uncertainty and speculation by sharing information early on. In this case, the public knew about the accident before Statoil’s emergency response organisation had mobilised.
- Precision, because inaccuracies spread fast and can be difficult to correct later, together with the consequences they may incur.

In Statoil’s governing documentation it is not specified at what point a piece of information can be characterised as ‘verified’ and shared externally. In WR2296, **Ref. /28/**, for communication management for Line 3, it states that a statement shall be issued “*as soon as possible*”. In the Statoil Book, it states that the company’s general approach is to “communicate with quality and precision”, and that Statoil commits to “communicate with speed and accuracy”.

The investigation shows that the emergency response organisation and partners had information early on that the helicopter came from Gullfaks B. Viewer access to DaWinci was locked at 12:26.

At a meeting between Line 2 and 3 at 13:30, Line 2 confirmed that the helicopter came from Gullfaks B. Line 3 finished the press release they had already started on with updated information about which installation the helicopter came from, including a number that next of kin could call. The message was approved by the Line 3 emergency response leader, in line with the guidelines, before it was published on www.statoil.com at 13:46.

Today, 29 April at 12.20, Statoil was informed that a helicopter had gone down outside Turøy in Fjell municipality outside Bergen. The helicopter was en route from Gullfaks B to Bergen.

A total of 13 people were on board the helicopter, which was a CHC helicopter. Statoil has temporarily grounded all equivalent traffic helicopters.

The rescue operation is led and coordinated by the rescue coordination centre, and Statoil is providing additional resources.

Statoil has mobilised its entire emergency response organisation.

Contact tel: Next of kin: 800 500 20

Press: 51 99 19 83

The requirement for precision and verified information must take precedence over the need for speed. At the same time, it is important to share key information with the public as early as possible, especially after an accident which has the attention of the media and the public from the very start. There is reason to believe that many of the next of kin asked for

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

confirmation as to which installation the helicopter came from. Notification of this just a few minutes earlier can make a difference.

The investigation team believes that it took too long to obtain internal confirmation of which installation the helicopter had flown from and thereafter share the information externally. Statoil must therefore go through its procedures and systems for communication management to identify any potential improvements which could make it possible to confirm information earlier on, and ensure that key information is shared with the public as quickly as possible.

This case is an important reminder that Statoil's emergency response organisation must look at the learning points that can be drawn after this accident. It may appear that the coordination with key partners, in this case the Joint Rescue Coordination Centre for Southern Norway (HRS), was somewhat lacking as HRS confirmed verbally to the media that Statoil was the operator and that the helicopter came from Gullfaks B at around 13:20, less than 30 minutes before Statoil did so itself. **Ref. App D**. This corresponds with other findings in the investigation, where certain contractors requested earlier contact with Statoil and better cooperation on communication. **Ref. section 7.6**.

The first media representatives arrived at Statoil's head office at Forus and the next-of-kin centre at Sandsli approximately one hour after the accident. At Forus there was a press briefing with the acting CEO at 18.00 on the day of the accident. Apart from that, Statoil's spokespersons were available to the media, both at Forus and Sandsli, throughout the day and evening.

A lounge with workroom facilities was set up at the entrance of the next-of-kin centre and made available to the media; this was shielded from the area where the next of kin were. In addition to Statoil's spokespersons, representatives from the Centre for Crisis Psychology and North Sea chaplains were also available to the media at the centre during the afternoon and evening.

The company's management representative at the next-of-kin centre, executive vice president for Technology, Projects and Drilling (TPD), arrived at the hotel at 13:15. At around 20:00 the EVP was interviewed by the media who were present.

The first interview with Statoil's spokespersons took place at about 07:30 on 30 April 2016, after which there was continuous contact with the media during the day.

7.8 Business continuity

Statoil's work on Business Continuity is an integral part of the company's emergency response planning, **Ref. /27/**. The purpose of this is to ensure a good transition from the emergency response situation to day-to-day operations. The work entails reducing financial losses and ensuring that the company fulfils its commitments, also when it is struck by an incident.

In the weeks before the accident, Statoil had prepared an emergency response plan to assess the operational consequences of reduced helicopter capacity, and how it might be possible to handle a period if Airbus H225 helicopters were no longer available for search and rescue (SAR) operations. The plan was due to be finalised on 29 April 2016.

When the accident happened, the business continuity organisation had this plan as their starting point to assess the further operation of passenger transport services and SAR operations. In the work to develop the emergency response

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

plan for helicopter services, the use of seagoing emergency response vessels was deemed the most appropriate alternative if the H225 helicopters were no longer available.

One question which was raised early on concerned the consequences with regard to helicopter services and use of helicopters of the same type as the one that crashed, the Airbus H225. CHC had a total of seven H225 helicopters in operational service (passenger transport service and SAR) for Statoil at the time of the accident.

Around two hours after the accident, Statoil took the decision to stop all use of Airbus H225 helicopters for passenger transport.

29 April 2016: 13.53 *“Statoil has temporarily grounded all transport helicopters of the equivalent type”*

In agreement with the Logistics and Emergency Response department, the flight safety department, DPN health and working environment, operative SAR personnel, and the duty Offshore Health Services (OHS), it was decided that H225 helicopters could still be used for red-level (lifesaving) SAR operations.

The term ‘lifesaving’ is understood to be illnesses and injuries which are classified as red according to the Norwegian Index for medical emergency assistance. The duty doctor has the ultimate responsibility for classifying/prioritising transport missions, in accordance with governing documentation, **Ref. /31/**. In situations where the classification is uncertain, the duty doctor will consult the relevant SAR medic when making their assessment.

The pilot always has the final say as to whether to carry out the mission, based on their operational assessment.

Yellow and green transport operations should be carried out using passenger transport aircraft, those on scheduled flights or additional aircraft, and be requisitioned from the SAR coordinator, in accordance with the notification matrix. The need to have an accompanying doctor from the shore or a medic from the installation should be assessed by the duty doctor on a case-to-case basis.

Later the same day the NCAA introduced restrictions on the use of Airbus H225 helicopters (also known as the EC225LP Super Puma) until further notice, but with an opening to give dispensations for SAR operations. This decision was taken based on the facts available at the time.

“SAFETY DIRECTIVE - Airbus Helicopters EC225LP - Limitation of operations in the Kingdom of Norway due to fatal accident on the 29th of April 2016.

2.2 Operators must not conduct any public transport flight or a commercial air transport operation with Airbus Helicopter EC225LP.

2.3 Paragraph 2.2 does not apply to any Search and Rescue flights for the purpose of saving life.”

In line with the NCAA’s decision, in the period 29 April 2016 to 1 June 2016, Statoil carried out a total of 19 SAR operations with the H225 helicopter type. Six of these were training flights which were a prerequisite for maintaining emergency response competence. Four ambulance flights and nine transfer/ferry flights were conducted, in addition to the six training flights. See **Table 7-1**.

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

Table 7-1 Overview of SAR operations in the period 29 April 2016 to 1 June 2016 with helicopter type H225 (EC225LP Super Puma)

Base	Route	Trip date	ATD						Status	ATA	Call sign	HK type	Trip type
Sola	HKS41R	15.05.2016	01:55	SVG	WAL	SVG			Approved	04:09	LN-OJO	EC225	Ambulance
Sola	HKS40E	27.05.2016	15:14	SVG	SVG				Approved	15:58	LN-OJO	EC225	Training
Sola	HKS40E	29.05.2016	15:27	SVG	SVG				Approved	16:26	LN-OJO	EC225	Training
Sola	HKS40E	01.06.2016	16:05	SVG	SVG				Approved	16:56	LN-OJO	EC225	Training
Oseberg	HKS60R	30.04.2016	14:46	BGO	OSE				Approved	16:27	LN-OJD	EC225	Ferry
Oseberg	HKS60R	13.05.2016	13:54	OSE	STA	GRO	BGO	OSE	Approved	17:25	LN-OJD	EC225	Ambulance
Oseberg	HKS60T	14.05.2016	20:08	OSE	BGO				Approved	20:45	LN-OJD	EC225	Ferry
Oseberg	HKS60R	14.05.2016	22:50	BGO	SDO	GRO	BGO		Approved	00:23	LN-OJD	EC225	Ambulance
Oseberg	HKS60T	15.05.2016	12:17	BGO	OSE				Approved	12:57	LN-OJL	EC225	Ferry
Oseberg	HKS60T	20.05.2016	12:43	BGO	OSE				Approved	13:31	LN-OJD	EC225	Ferry
Oseberg	HKS61T	20.05.2016	15:13	OSE	HEI				Approved	17:19	LN-OJL	EC225	Ferry
Oseberg	HKS40E	01.06.2016	12:58	OSE	OSE				Completed	14:30	LN-OJD	EC225	Training
Tampen	HKS90R	30.04.2016	11:15	BGO	STB				Approved	12:09	LN-OHZ	EC225	Ferry
Tampen	HKS90T	05.05.2016	13:01	STB	BGO				Completed	14:08	LN-OHZ	EC225	Ferry
Tampen	HKS90T	16.05.2016	15:28	BGO	STB				Completed	16:30	LN-OHZ	EC225	Ferry
Tampen	HKS90R	23.05.2016	23:45	STB	STC	GRO	BGO	STB	Approved	02:59	LN-OHZ	EC225	Ambulance
Tampen	HKS90E	27.05.2016	13:47	STB	STB				Approved	15:19	LN-OHZ	EC225	Training
Tampen	HKS90E	31.05.2016	13:27	STB	STB				Approved	14:47	LN-OHZ	EC225	Training
Heidrun	HKS50T	25.05.2016	13:08	HEI	KSU				Approved	14:09	LN-OJL	EC225	Ferry

On 1 June 2016 the NCAA decided, in cooperation with the English CAA and CHC, to suspend all use of H225 (EC225LP) Super Puma helicopters, including for SAR operations. This was based on the AIBN's preliminary report no. 3, Ref. /24/.

"The Norwegian CAA has, with immediate effect from June 1 2016, expanded the restrictions for operations with helicopters EC225LP and AS332L2. The restrictions now also apply to the use of these helicopter types in search and rescue (SAR) operations. The extension of the flight ban comes after the Accident Investigation Board Norway published a new preliminary report late on June 1 following the tragic accident at Turøy on April 29."

As a result of the decision to suspend all use of H225 (EC225LP) helicopters for use in SAR operations in Norway, Statoil decided to start using the Super Puma L/L1 as a SAR/Medevac aircraft, in addition to Sikorsky S-92 helicopters equipped for SAR/Medevac, until further notice. The Super Puma L/L1 has a different, and more traditional, design in the gearbox and was not covered by the directive on the flight ban for helicopter types H225 (EC225LP) and AS332L2.

Acceptance to only use the Super Puma L/L1 for SAR/Medevac functions during a necessary transition period was the result of the Business Continuity process, where alternatives, possibilities and availability had been charted in advance. By utilising the Super Puma L/L1 for SAR services, necessary safety limitations had to be introduced before these helicopters were upgraded from Limited Search and Rescue with weather restrictions (LIMSAR) to All Weather Search and Rescue (AWSAR). Until the AWSAR capability is in place, operational restrictions have been imposed.

Despite the limitations, the SAR/Medevac service met the relevant predefined hazard and accident scenario requirements (DFU). The requirements relating to experience, training and competence were not changed.

8 Recommendations

Recommendations in the form of suggested actions for how Statoil can maintain and strengthen its work with helicopter safety and emergency response to accidents are presented in the following subsections. The recommendations are based upon the observations made by the investigation team through conducting interviews and from collecting factual evidence, as described in sections **3-7**.

The investigation team has proposed a total of eight recommendations. These are divided between the following four main improvement areas:

- Statoil's organisation and activities related to helicopter services – **recommendations 1, 2 and 5**
- Following up and learning from helicopter incidents – **recommendation 3**
- New EU regulations – **recommendation 4**
- Emergency response – **recommendations 6, 7 and 8**

During the investigation, one immediate recommendation was communicated to the commissioning entity. This concerned issuing an alert to contractors in the event of an emergency response situation. The subject of the recommendation had no significant practical consequences during the emergency response on 29 April 2016, but was later highlighted as an area for improvement by the contractors. See **section 8.2.4**.

8.1 Recommendations related to helicopter safety.

8.1.1 Recommendation no. 1 – Holistic risk assessment

Basis for the recommendation		
<p>Flight safety is a complex assignment that is managed by several stakeholders and functions in Statoil, and it may be difficult to predict how individual decisions, taken in isolation, can affect overall safety.</p> <p>For example, cost reductions have resulted in a reduction in spare helicopter capacity that can lead to increased flying hours for each individual helicopter, and also more frequent maintenance. Combined with a possible lack of spare parts, this can lead to technicians cannibalising parts from other helicopters (robbery) that are undergoing maintenance in order to avoid delays that have economic implications (such as penalties or daily fines). The situation can become even more complex when adding reduced turnaround time.</p> <p>Statoil's governing documentation states that safety risks shall be addressed holistically.</p>		
No.	Recommended action	Responsible
1	<p>Statoil must regularly conduct a holistic assessment in association with helicopter operators in order to improve understanding of the relationship between technical and commercial factors that, either individually or combined, can affect safety. Starting with the holistic assessment, a clearer flight safety strategy and accompanying action plan must be developed. Important factors that should be incorporated into the holistic assessment as a minimum include:</p> <ul style="list-style-type: none"> • The compensation format (penalty) • Spare capacity • The spare parts and parts cannibalisation situation (robbery) • Turnaround time • Several proactive risk indicators that can highlight undesirable developments amongst helicopter operators in a timely manner • Minimum requirements for competence and key positions in the contracts Statoil has with helicopter operators 	DPN JOS

8.1.2 Recommendation no. 2 – Roles and responsibilities

Basis for the recommendations		
<p>Corporate responsibility for carrying out tasks related to flight safety is not described in Statoil's highest governing document, The Statoil Book.</p> <p>Corporate Safety and Security (CSS) is responsible for carrying out tasks related to flight safety in Statoil. In practice, this is delegated to the senior adviser for flight safety. This delegation of responsibility is not described in Statoil's governing documentation (OMC19).</p> <p>The investigation team believes that the organisation of helicopter safety-related work in Statoil is complicated, with many participants and a varying understanding of each individual participant's role. This particularly applies to the departments for flight safety, air transport and procurement, together with personnel with the role of Company Representative.</p>		
No.	Recommended actions	Responsible
2.1	The department for flight safety's corporate responsibility for carrying out the tasks associated with flight safety must be clearly stated in Statoil's governing documentation. This was previously described in an appendix to the Statoil Book.	COO
2.2	A review of the organisation of helicopter safety-related work in Statoil should be conducted to ensure simplification and to clarify role descriptions, particularly between the departments for flight safety, air transport and procurement, together with personnel with the role of Company Representative.	DPN JOS

8.1.3 Recommendation no. 3 – Learning from accidents

Basis for the recommendation		
<p>A review of helicopter accidents in the North Sea in the period 1999-2016 showed that the most recent accidents all primarily resulted from technical causes, often linked to the design of the gear and rotor systems. During the course of the investigation it was recommended that, as a key customer, Statoil should encourage design improvements with manufacturers to a greater extent. Many have pointed to the importance of good cooperation and exchange of information between helicopter operators and manufacturers. This was also highlighted in the Norwegian Helicopter Safety Studies (HSS 1, 2 and 3) published between 1990 and 2010, and CAP 1145. The investigation team believes that Statoil's role in this area is to facilitate satisfactory cooperation and exchange of information between helicopter operators and manufacturers.</p> <p>Statoil is actively involved in assessing whether the relationship between probability and consequence-reducing measures is correctly balanced, including through the ongoing Helicopter Safety Study HSS-3b. Amongst other topics, this study is evaluating measures related to seat location relative to passenger weight, emergency breathing systems and wave-related restrictions.</p> <p>The investigation team is aware that there has been more focus on consequence-reducing measures in the UK than in Norway. Statoil does not impose wave-related limitations on helicopter transport services in the Norwegian sector, while other companies operating in the Norwegian and British sectors of the North Sea have introduced such restrictions. Statistics indicate that incidents involving emergency helicopter landing at sea could occur. The investigation team believes that increased focus on consequence-reducing measures will have a positive impact upon safety.</p>		
No.	Recommended actions	Responsible
3.1	Statoil should assess measures for facilitating better cooperation and exchange of information between helicopter operators and manufacturers.	DPN JOS
3.2	DPN Joint Operational Support must assess whether Statoil should emphasise consequence-reducing measures to an even greater extent. The assessment should be based in Statoil's internal flight safety forum.	DPN JOS
3.3	The recommendations from HSS-3b must be followed up by Statoil and The Cooperation Forum for Helicopter Safety on the NCS.	DPN JOS

8.1.4 Recommendation no. 4 – Ambition

Basis for the recommendation		
<p>The investigation team believes that the possible introduction of new EU regulations in Norway will change the risk picture related to helicopter services on the NCS. The investigation team perceives it to be a risk that the new safety requirements are not stringent enough for the NCS. The use of NOROG 066, which is currently Statoil's company-specific requirement and guideline on the NCS, will possibly be challenged.</p> <p>The Cooperation Forum for Helicopter Safety on the NCS currently plays an important role in helicopter safety-related work. In the event that new helicopter companies choose not to participate in cooperative efforts, then the forum will not be able to maintain its strong position.</p> <p>The investigation team believes that a united industry will achieve a greater level of safety than individual companies operating independently of each other. As the largest customer on the NCS, Statoil should be clear on the safety standard it expects.</p>		
No.	Recommended actions	Responsible
4.1	<p>In order to address the risks that accompany the possible introduction of new EU regulations for offshore helicopter services, Statoil must clarify its own intent to maintain and continually improve the current standard.</p> <p>This intent must be based upon a safety standard equivalent to, or better than, the currently applicable version of the Norwegian Oil & Gas Association's guideline 066 (NOROG 066).</p>	EVP DPN
4.2	<p>The intent described in action 4.1 above must be owned and followed up by Statoil's corporate executive committee.</p>	CEO

8.1.5 Recommendation no. 5 – Maintain critical competence

Basis for the recommendation		
<p>The investigation team believes that it is essential that Statoil has internal resources with which to drive progress within flight safety-related work.</p> <p>The tasks associated with flight safety are currently carried out by four people whose complementary technical and operational competence has taken many years to build up. This also presents a vulnerability, since the average age in this group is resultantly high. As such, the departure of such key personnel at the same time would weaken Statoil's flight safety competence base.</p> <p>There is an indication that several years of training may be required to achieve the levels of competence and experience necessary for taking over key positions within flight safety. To ensure that Statoil can continue to play a leading role in flight safety-related work, new personnel must be recruited who, in time, can maintain the competence and capacity of the flight safety department.</p>		
No.	Recommended action	Responsible
5	<p>In order to ensure continuity within the department for flight safety, a recruitment process must commence as soon as possible. New personnel must possess the necessary helicopter-related, technical and/or operational expertise.</p>	DPN JOS

8.2 Recommendations related to emergency response

8.2.1 Recommendation no. 6 – Coordination with partners

Basis for the recommendation		
<p>Line 3's tasks include coordinating with external parties during an emergency response situation. In 2015 Statoil's Line 3 conducted 26 exercises, either independently or together with Line 1 and 2. External partners did not participate.</p> <p>The investigation team has received feedback from external partners, calling for more joint emergency response exercises with Statoil. In the emergency response to the Turøy accident, coordination with external partners was inadequate in some instances. The investigation team believes that these could have been avoided through building up stronger relationships and conducting joint exercises.</p>		
No.	Recommended action	Responsible
6	Prioritised external partners must be included in Line 3 emergency response exercises to a greater degree.	CSS

8.2.2 Recommendation no. 7 – DaWinci and heliports

Basis for the recommendations		
<p>Locking the DaWinci system must take place in accordance with guidelines for Line 2 emergency response (WR1214), but on 29 April 2016 DaWinci was not locked correctly. A consequence of this was that the updated POB list was not initially accessible, which in one instance resulted in a partner being alerted in error.</p> <p>The investigation has revealed that, in the hours following the accident, travellers at Bergen heliport received inadequate information and care.</p>		
No.	Recommended actions	Responsible
7.1	Access to DaWinci must automatically fit the roles in the emergency response organisation, and DaWinci must be updated in such a way that the system can be locked in the intended way.	Air transport department
7.2	Routines for safeguarding information for travellers at the heliports during the early phase following an incident must be established.	JOS LE

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

8.2.3 Recommendation no. 8 – Routines for external communication

Basis for the recommendation		
<p>Statoil's governing documentation for Line 3 emergency response communication does not contain specific requirements for when verified information should be made public. The burden of providing precise, verified information weighs heavily, even when the public is aware of the incident and the media have requested further information.</p> <p>Despite this, the investigation team believes that information regarding the installation that flight HKS241 flew from could have been released slightly earlier, which would have served to reduce uncertainty amongst the public.</p>		
No.	Recommended action	Responsible
8	Based upon the experiences from the Turøy accident, Statoil must review communication routines and systems in order to identify possible improvements that would allow more timely public disclosure of verified, critical information.	CSS

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

8.2.4 Recommended actions implemented immediately after the accident

On 23 June 2016 the investigation team communicated the following to the commissioning entity's representative:

"As part of the ongoing investigation, it has emerged that notification to affected contractors should be improved. Only one supplier was contacted via their emergency contact number, as specified in their contract with Statoil. Instead, notification has been via supplier's central switchboards or personnel responsible for the contract. This did not result in significant practical consequences during the incident, but has been highlighted as a clear area for improvement by the suppliers.

The investigation team has observed that the emergency contact numbers stored in DaWinci for several of the affected suppliers were incorrect.

The investigation team considers DaWinci to be a key tool in an emergency response situation, where correct information can be significant for the successful management of a crisis.

On this basis, the investigation team recommends that a review and possible update of suppliers' emergency contact numbers in DaWinci should be conducted immediately. Additionally, routines should be established to ensure that the information stored in DaWinci is always correct."

The recommendation was forwarded by the corporate emergency response manager to emergency response contacts in all business areas in Statoil

8.2.5 Evaluations conducted following the accident

Several internal evaluations were conducted following the incident.

8.2.5.1 Line 2 emergency response

The Line 2 organisation conducted an evaluation of the emergency response to the Turøy accident, with the intention of learning and improvement. Based upon this evaluation, recommendations were proposed in the Synergi incident reporting database.

The investigation team has reviewed the emergency response organisation's evaluation report and associated recommendations to ensure that key improvement points are not repeated in the investigation teams' own recommendations. Ref. Synergi case number **1472922**.

8.2.5.2 Global Business Services - Real estate and facility management (GBS REFM)

Following the accident, GBS REFM produced an experience transfer report to compare its deliveries against the mandate REFM has in an emergency response situation, and to identify which improvement areas can possibly be addressed. Incidents such as the one that occurred at Turøy are not included in WR 2670, **Ref. /32/**. As such, REFM has no formal mandate in an emergency response situation of that type.

However, SNC, which is organised within REFM, has a role in all emergency response situations. SNC receives and coordinates all notifications made to Line 2 and Line 3.

Recommendations identified by GBS REFM that correspond with the investigation team's recommendations are not reproduced in this report. GBS REFM-specific recommendations are to be followed up through GBS's own management line.

9 Glossary

AOC	Air Operator Certificate Technical and operational approval for air transport companies, with regulatory requirements for organisation and management, flight safety programme and quality management system, together with personnel training and education
ASR	Air Safety Reports Report format used by Bristow for in-flight incidents
ATC	Air traffic control (the air traffic control service at Bergen's Flesland airport)
AWSAR	All Weather Search and Rescue
BaSEC	Barents Sea Exploration Collaboration Cooperative body for operators with activities in the Barents Sea
BSL	Norwegian: <i>Bestemmelser for Sivil Luftfart</i> Regulations issued pursuant to the Norwegian Aviation Act and other laws/regulations/legislation of particular relevance for civil aviation
CAA UK	The United Kingdom Civil Aviation Authority
CHC	Canadian Helicopter Corporation
CHC Norway	Previously CHC Helikopter Service AS. Norway-based subsidiary of CHC
COA	Corporate Audit Statoil's internal audit and investigation department
COO CSS	Chief Operating Officer, Corporate Safety and Security Corporate staff in Statoil
CR	Company Representative
Crisis Manager (CM)	Crisis management tool used in Statoil
DaWinci	Personnel logistics system used for the administration of offshore helicopter transport in Norway
DFU	Norwegian: <i>Definerte Fare og Ulykkeshendelser</i> A set of predefined hazard and accident scenarios with accompanying emergency response procedures
DPN	Development and Production Norway Business area in Statoil
DPN JOS	Development and Production Norway, Joint Operational Support Business cluster in DPN

DPN OTE	Development and Production Norway, Operational Technology Excellence Business cluster in DPN Delivers technical operational support across the various operations sub-units of DPN, as well as Statoil's new field developments on the Norwegian continental shelf
EASA	European Aviation Safety Agency
FDM	Flight Data management Part of the Safety Management System (SMS)
GBS	Global Business Services
GHR	Ground Handling Reports Report format used by Bristow for incidents on the ground
GOR	Ground Occurrence Reports Report format used by Bristow for incidents that occur during maintenance
HeliOffshore	Global, safety-focussed, offshore helicopter industry association
HFIS	Helicopter Flight Information System This is equivalent to the Aerodrome Flight Information Service unit (AFIS), but the HFIS unit is adapted to installations on the Norwegian continental shelf
HFIS Tampen	Helicopter Flight Information Service Tampen Offshore air traffic service that provides local aviation information services for the Gullfaks, Statfjord and Snorre fields for helicopters flying up to 1,500 feet
HOFO	Helicopter Offshore Flight Operation European Union additional rules for offshore helicopter operations.
HRS	Norwegian: <i>Hovedredningssentralen</i> Joint Rescue Coordination Centre
HSE	Health, Safety and the Environment
HSRMC	Helicopter Safety Research Management Committee A committee consisting of both authority and industry stakeholders that identifies, conducts and coordinates research related to offshore helicopter safety
HSSG	Helicopter Safety Steering Group A Step Change in Safety sub-group created to share information, provide advice and stimulate learning across the helicopter industry
HUMS	Health and Usage Monitoring System System for vibration monitoring in helicopters
IC	Incident Commander
ICAO	International Civil Aviation Organisation The United Nations international organisation for civil aviation
ICS	Incident Command System Computer program for handling emergency response situations
IMS	Incident Management System Computer program for handling emergency response situations
IOGP	International Association of Oil & Gas Producers

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

IOGP AMG	International Oil & Gas Producers Aircraft Management Guidelines
LFE	Norwegian: <i>Luftfartsfaglig Ekspertgruppe</i> (now known as the Aviation Forum) Aviation technical expert group
LIMSAR	Limited Search and Rescue/Medical evacuation
NCAA	The Norwegian Civil Aviation Authority
NCS	Norwegian continental shelf
NDT	Non-destructive testing
NMD	The Norwegian Maritime Directorate
NOPEF	Norwegian: <i>Norsk Olje- og Petrokjemisk Fagforbund</i> The Norwegian Oil and Petrochemical Workers Union
NOROG	Norwegian: <i>Norsk olje og gass</i> The Norwegian Oil and Gas Association, previously the Norwegian Oil Industry Association
NOU	Norwegian: <i>Norges offentlige utredninger</i> Official Norwegian Reports
NPD	The Norwegian Petroleum Directorate
OFS	Norwegian: <i>Oljearbeidernes fellessammenslutning</i> The Federation of Oil Workers Trade Unions, which changed its name to SAFE in 2005
OHS	Offshore Health Services
OLF	Norwegian: <i>Oljeindustriens Landsforening</i> The Norwegian Oil Industry Association. Changed to NOROG (see above) in 2012
OMC	Organisation, management and control Governing documents in Statoil
PC2e	Performance Class 2 enhanced Regulations issued by EASA for helicopter traffic, which replaced PC2
PFU	Norwegian: <i>Pressens Faglige Utvalg</i> The Norwegian Press Complaints Commission
POB	Personnel On Board
PSA	The Norwegian Petroleum Safety Authority
REFM	Real estate and facility management Unit in Statoil
RNNP	Norwegian: <i>Risikonivå i norsk petroleumsvirksomhet</i> "Trends in risk level in the (Norwegian) petroleum activity". An annual report published by the Petroleum Safety Authority, previously entitled "Risk level on the Norwegian continental shelf" (RNNS)

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

SAP	<i>Systeme Anwendungen Produkte.</i> Business administration system used in Statoil
SAR	Search and Rescue
SF	Norwegian: <i>Samarbeidsforum.</i> Cooperation Forum for Helicopter Safety on the Norwegian Continental Shelf, as named in the English translation of Report No. 12 to the Norwegian Storting, (2005-2006).
SMK	Norwegian: <i>Statsministerens kontor.</i> The Norwegian Prime Minister's Office
SMS	Safety Management System Safety system used in helicopter company CHC
SNC	Statoil Notification Centre
SQID	Safety Quality Integrated Database Database for following up quality in helicopter company CHC
The Statoil Book	Statoil's highest-level governing document, which sets out a common framework for how the company is led and run
Step change in safety	A member-based organisation that includes operator companies and contractors from the United Kingdom within the oil and gas value chain. The organisation was established in 1997 following the industry's central trade unions' decision that a "step change" in health and safety was necessary in order for the industry to meet its ambitions. The organisation established working groups to support these aims, including HSSG
TPD	Technology, Projects and Drilling Business area in Statoil
VHM	Vibration Health Monitoring Vibration measurement and follow-up within the aviation industry

10 References

- /1/ *Regulations relating to health, safety and the environment in the petroleum activities and at certain onshore facilities (The Framework Regulations), Norwegian Petroleum Safety Authority*
- /2/ *Regulations relating to design and outfitting, etc. in the petroleum activities (The Facilities Regulations), Norwegian Petroleum Safety Authority*
- /3/ *The Statoil Book, Appendix A Organisation. Statoil governing document*
- /4/ *OMC01: Development and Production Norway (DPN) – Organisation, management and control. Statoil governing document*
- /5/ *OMC01: Joint Operational Support (DPN JOS) - Organisation, management and control. Statoil governing document*
- /6/ *OMC19: Corporate Safety and Security (COO CSS) - Organisation, management and control. Statoil governing document*
- /7/ *FR10: Safety and Security. Statoil governing document*
- /8/ *Helicopter Safety Study 3b (HSS-3b), SINTEF 2016 (ongoing)*
- /9/ *Helicopter Safety Study 3 (HSS-3), SINTEF 2010*
- /10/ *Helicopter Safety Study 2 (HSS-2), SINTEF 1999*
- /11/ *Helicopter Safety Study 1 (HSS-1), SINTEF 1990*
- /12/ *Norwegian Oil and Gas Helicopter safety studies, www.norskoljeoggass.no/no/virksomheten/HMS-og-Drift/Helikopter/Helikoptersikkerhetsstudier*
- /13/ *NOROG 066, Norwegian Oil and Gas Recommended guidelines for flights to petroleum installations, rev 5, 03.06.2015*
- /14/ *NOROG 074, Norwegian Oil and Gas Recommended guidelines for helideck personnel (the Helideck Manual), established 01.09.2002)*
- /15/ *NOU 2001: 21 Helikoptersikkerheten på norsk kontinentalsokkel — Delutredning nr. 1: Organiseringen av det offentlige engasjement (2001), Norwegian Ministry of Transport and Communications (Helicopter Safety on the Norwegian continental shelf, part 1: Organising of the public authorities' involvement) – in Norwegian, with a summary in English*
- /16/ *NOU 2002: 17 Helikoptersikkerheten på norsk kontinentalsokkel— Delutredning nr. 2: Utviklingstrekk, målsettinger, risikopåvirkende faktorer og prioriterte tiltak, Norwegian Ministry of Transport and Communications (2002) (Helicopter Safety on the Norwegian continental shelf, part 2: Trends, objectives, risk-influencing factors and recommended measures) - in Norwegian, with a summary in English*
- /17/ *Civil Aviation Authority Norway, www.luffartstilsynet.no/incoming/Ordliste (Glossary) - in Norwegian only*
- /18/ *Verification Report – CHC Norway AS, verification period 23-27 November 2015, report date 08.12.2015*
- /19/ *Audit Report – Bristow Norway AS, verification period 26-29 January 2016*
- /20/ *Report -SSEPA Barents Sea 23 R Area South East phase 2 – EER operations and resources, Barents Sea Exploration Collaboration, DNV GL Report No.:2016-0010, Rev. 0, Date: 2016-05-29*

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

- /21/ *Statoil project mandate: Alternatives to current helicopter solution in Statoil, dated 15.06.2016*
- /22/ *Accident Investigation Board Norway (AIBN), LN-OJF – Preliminary report no. 1, 13 May 2016*
- /23/ *Accident Investigation Board Norway (AIBN), LN-OJF – Preliminary report no. 2, 27 May 2016*
- /24/ *Accident Investigation Board Norway (AIBN), LN-OJF – Preliminary report no. 3, 1 June 2016*
- /25/ *Accident Investigation Board Norway (AIBN), LN-OJF – Preliminary report no. 4, 28 June 2016*
- /26/ *Work process for Emergency response, SF700 - Preparedness and response, Statoil management system*
- /27/ *Work process SF801 - Business Continuity Management (BCM), Statoil management system*
- /28/ *WR2296 - Crisis management plan (Line 3) in the Statoil group, Statoil management system*
- /29/ *WR1214 – Line 2. DPN Emergency response plan, Statoil management system*
- /30/ *WR1156 NCS Emergency response plan – Statoil operated installations, Statoil management system*
- /31/ *WR1149 – Medical transport, Statoil management system*
- /32/ *WR2670 - Emergency response plan GBS REF M Norway, Statoil management system*
- /33/ *“The In Amenas Attack. Report of the investigation into the terrorist attack on In Amenas. Prepared for Statoil ASA’s board of directors” published 12.09.2013*
- /34/ *Feedback following the Turøy helicopter accident, Centre for Crisis Psychology, Bergen 05.07.2016*
- /35/ *CAP 1145, UK Civil Aviation Authority – Safety review of offshore public transport helicopter operations in support of the exploitation of oil and gas, 20.02.2014*
- /36/ *Forskrift om luftfartsoperasjoner, BSL D 1-1, FOR-2013-08-07-956 (Regulation on aviation operations) – in Norwegian only*
- /37/ *Forskrift om kontinentalsokkelflyging, ervervsmessig luftfart til og fra helikopterdekk på innretninger og fartøy til havs, BSL D 5-1, FOR-2007-10-26-1181 (Regulation on aviation on the NCS – commercial aviation to and from helidecks on installations and vessels at sea) – in Norwegian only*
- /38/ *Forskrift om krav til sporing av helikoptre på norsk kontinentalsokkel, BSL D 2-10, FOR-2016-04-19-400 (Regulation on the requirement for tracking of helicopters on the NCS) – in Norwegian only*
- /39/ *Forskrift om vibrasjonsovervåkningssystemer for helikopter, BSL D 1-16, FOR-2005-02-01-216 (Regulation on vibration monitoring systems on helicopters) – in Norwegian only*
- /40/ *Forskrift om tanking av luftfartøy, BSL D 1-10, FOR-1975-03-21-3205 (Regulation on refuelling of aircraft) – in Norwegian only*
- /41/ *Forskrift om autoriserte verksteder (verkstedsforskriften), BSL B 2-4, FOR-2004-02-24-469 (Regulation on authorised workshops - The Norwegian Workshop Regulation) – in Norwegian only*
- /42/ *Forskrift om bruk av system for sikkerhetsstyring innen flysikringstjenesten og bakketjenesten, BSL A 1-9, FOR-2003-08-21-1068 (Regulation on the use of safety management systems for flight safety services and ground services) – in Norwegian only*

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

App A Investigation mandate

The original signed mandate is in Norwegian. Below is a translation of the text:

Investigation into helicopter safety in Statoil following the Turøy helicopter crash on 29 April 2016

Purpose

The purpose of Statoil's investigation is to identify measures to improve Statoil's organisation and follow-up of helicopter safety work on the Norwegian continental shelf (NCS).

Norway's Accident Investigation Board (AIBN) – Aviation department - shall determine the sequence of events and cause(s) of the accident. Statoil's investigation team shall not examine the sequence of events or the cause(s) of the accident. Statoil's investigation will examine issues that can be evaluated, independent of the AIBN's final investigation report being completed.

Background

On 29 April 2016, an Airbus 225 helicopter operated by CHC crashed near the small island of Turøy, west of Bergen. The aircraft was en route from Gullfaks B to Bergen Airport Flesland. There were 11 passengers and two pilots on board the helicopter, all of whom were killed.

The AIBN is the investigative authority for air traffic accidents and incidents. The purpose of their investigation is to improve safety and prevent air traffic accidents. The AIBN shall determine the sequence of events and cause(s), examine issues of significance to prevent air traffic accidents and submit an investigation report. The investigation shall not conclude on civil or criminal blame or liability.

The AIBN will determine the scope of their investigation, and how it is to be conducted. When making this decision, the AIBN will, among other things, take into consideration the learning points the investigation expects to propose with regard to improving safety, the accident itself or the incident's degree of severity, its impact on air traffic safety in general, and whether it forms part of a series of accidents or incidents. The report will explain the sequence of events and contain the investigative authority's statement on the cause(s).

The report will also, as far as is expedient, contain the investigative authority's recommended measures which should be implemented or considered with a view to preventing similar accidents or serious incidents in the future.¹

The AIBN has stated that their report is not expected to be completed for at least one year, but it may also take two to three years. It has also indicated that the immediate cause of the incident was technical, not human error on board.

Statoil will contribute to the investigation insofar as the AIBN requests this.

CHC Helicopter is conducting its own investigation, in which Statoil will have an observer. The Norwegian police are also investigating the accident.

The purpose of Statoil's own investigation is to assess Statoil's organisation and activities relating to helicopter safety on the NCS. Statoil's investigation team shall not examine the sequence of events and cause(s) of the accident. This lies within the AIBN's investigation mandate.

Statoil's investigation will therefore examine issues that can be evaluated, independent of the AIBN's final investigation report being completed. Once the AIBN investigation report is ready, Statoil will assess more closely how this can be expediently followed up. This assessment is not part of Statoil's investigation mandate.

¹ See Norwegian Aviation act §§ 12-1, 12-13, 12-21

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

Scope of the investigation

Statoil's investigation team will conduct an assessment of the following issues of significance for safety with regard to Statoil's helicopter operations on the NCS:

- Statoil's emergency response handling of the accident, including interaction with the authorities and partners
- Statoil's organisation and activities relating to helicopter services, including the distribution of roles and responsibilities between Statoil, helicopter operators and other key entities involved in the operation and maintenance of helicopter services for Statoil on the NCS
- How helicopter incidents are followed up by Statoil and its suppliers.

Based on their assessment, the investigation team will present their observations and recommend measures to strengthen Statoil's work regarding helicopter safety and emergency response.

Should the investigation team come across any safety-critical issues in the course of their work, the CEO shall be informed of this immediately.

Members of the investigation team

- Jane Saure, lead investigator, Corporate Audit and Investigation
- Geir S. Østby, co-investigator, Corporate Audit and Investigation
- Tor Ulleberg, expert
- Anne Therese Hestenes, expert
- Olav Hustad, Legal department
- Knut Rostad, Communication department
- Terje Herland, safety delegate representative
- Per Martin Labråthen, safety delegate representative
- The investigation team will be supplemented with an external member who has technical expertise within helicopter safety

The commissioning body for this investigation is Eldar Sætre, president and CEO of Statoil. The CEO's representative is executive vice president Anders Opedal (EVP COO).

Schedule

The report will be ready by 30 September 2016. It will be made public.

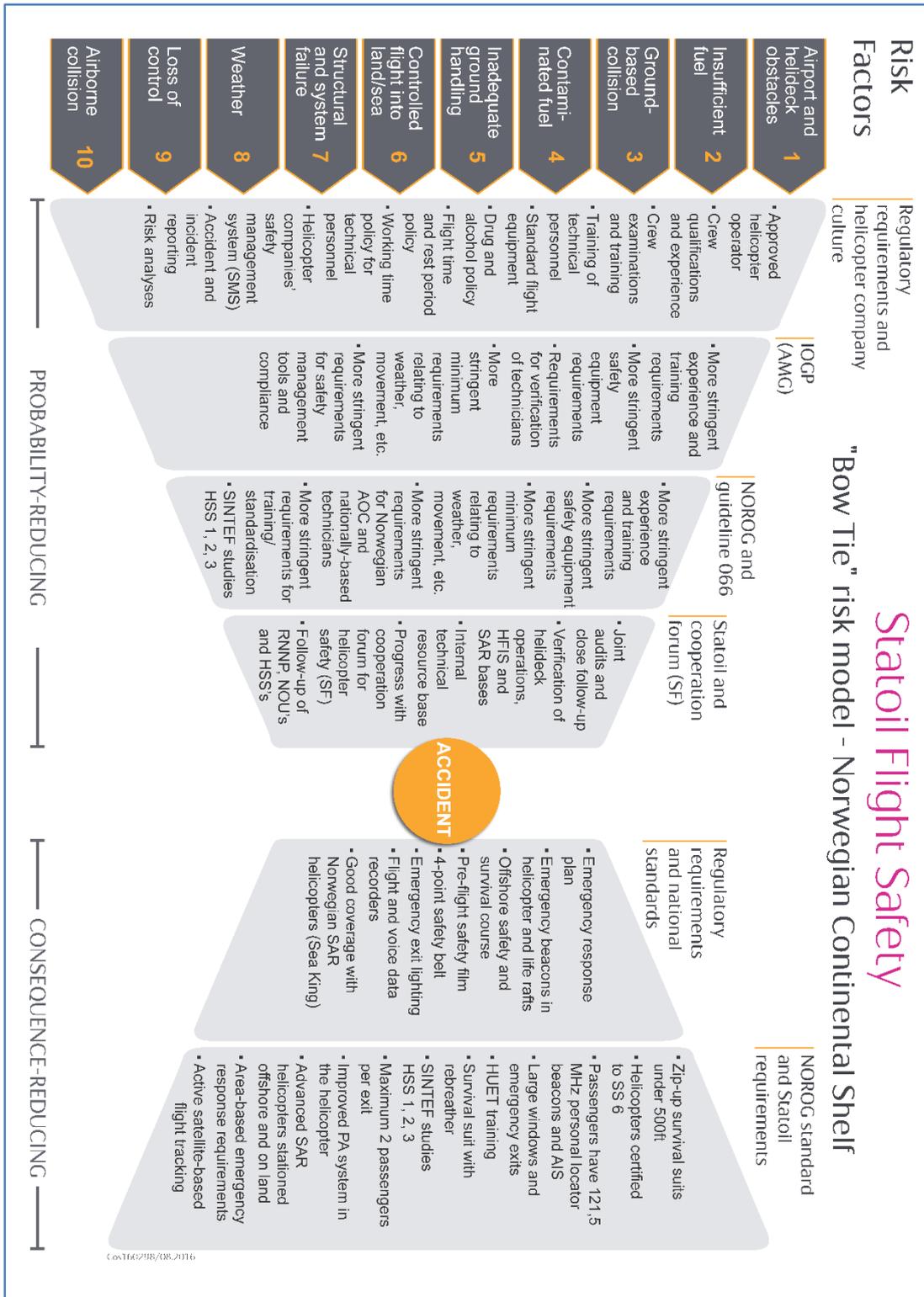
Any information which, by law or due to confidentiality requirements, cannot be published will be reported to the commissioning body in the appropriate way, but will not be included in the public report.

Stavanger, 13 May 2016

Eldar Sætre

President and CEO

App B Detailed “Bow Tie Model” for flight safety in Statoil



App C Important reports and factual basis

NOU 2001: 21 “Helicopter safety on the Norwegian continental shelf – Part 1: Organising of the public authorities’ involvement”, Ref. /15/.

The committee concluded that the division of responsibilities between the various authorities was experienced as difficult to follow and confusing for the parties concerned. Problems were linked to the interface and overlap between the different authorities’ responsibilities, tasks and laws/regulations, in addition to what was considered as the industry’s own responsibility.

It was the committee’s view that the public authorities did not do enough in terms of acting as a driving force, or perceiving themselves to be a driving force, for promoting helicopter safety on the continental shelf. Over time, this had led to inadequate and unclear minimum requirements and a lack of common standards in some areas.

There was a general need for better cooperation and coordination between the different parties associated with helicopter operations on the NCS, and a need for a more proactive, risk-based method of supervision in this area.

The committee had 16 recommendations. The investigation team has not gone into all of these in detail, as not all areas are relevant to the task in hand. The most relevant recommendations concerned the following:

- That the NCAA be given extended authority in this field, and thereby the main responsibility for all matters affecting aviation operations, from departure to landing, on helidecks on fixed and mobile installations on the NCS (this was not followed up, but is currently being considered again by the PSA).
- That a cooperation agreement be prepared for helicopter operations on the NCS.
- That the NCAA should require the use of technical condition monitoring systems (HUMS) for helicopter operations on the NCS.

The last two points were addressed in more detail and recommendations were given in part 2 of the review:

NOU 2002: 17 “Helicopter safety on the Norwegian continental shelf – Part 2: Trends, objectives, risk-influencing factors and recommended measures”, Ref. /16/.

The committee defined a main goal for helicopter safety, expressed as follows: The total probability of fatalities in helicopter transportation shall at least be halved during the next 10-year period, compared to the period 1990-2000.

The committee also stated that follow-up of the helicopter safety indicators, which the committee had recommended as the basis for the authorities and involved parties’ monitoring and improvement work, should build upon the existing cooperation, methodology and data in the “Trends in risk level in the (Norwegian) petroleum activity” (RNNP) project.

The committee agreed on a prioritised list of 13 risk-influencing factors as the basis for its recommendations. In the committee’s opinion, all measures must be carried out in order to reach the main objective of at least halving the risk over the next 10 years. Five of the 13 recommendations (summarised) were as follows:

1. That a Cooperating Committee be established, under the leadership of the NCAA, and with participation from relevant authorities, public service providers (Norwegian Air Traffic and Airport Management), representatives from employers and

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

employees, the Norwegian Oil Industry Association's Aviation technical expert group (OLF LFE), the Norwegian Maritime Directorate, helicopter operators, the Norwegian Oil and Petrochemical Workers' Union (NOPEF), the Federation of Oil Workers Trade Unions (OFS) and the Norwegian Airline Pilots Association. It was additionally specified that the OLF LFE, as a technical forum, should be further built upon.

2. Helideck design: The committee recommended that the OLF update its guidelines to integrate new knowledge and best practice with regard to helicopter design. The committee also recommended some additional requirements for moving helidecks.

3. Stricter impact absorption requirements for hard landings and emergency landings at sea (ditching).

4. Helicopter stability in the sea: The implementation of requirements relating to helicopter buoyancy and stability when ditching at sea, corresponding to realistic conditions on the NCS (i.e. sea state 6 or higher). Additional emergency flotation gear must ensure that doors and windows stay above water long enough to make quick evacuation possible.

5. Health and Usage Monitoring System (HUMS): The authorities should introduce requirements for technical condition monitoring systems, or HUMS. This should preferably be based upon a common Norwegian/British standard for design and functionality. This would mean that a helicopter would not be considered airworthy without HUMS installed and functioning.

Helicopter Safety Studies 1-3 (HSS 1-3, SINTEF 1990, 1999, 2010), Ref. /11/, Ref. /10/ and Ref. /9/.

The overall objective of the Helicopter Safety Study 3 (HSS-3) was to contribute to improved safety in the helicopter transport of personnel to and from fixed and floating oil and gas installations on the NCS. An important part of the mandate in HSS-3 was to utilise the experiences from the two previous studies, HSS-1 (1990), HSS-2 (1999) and the two reports NOU 2001: 21 and NOU 2002: 17 (see above).

Towards the end of the project period, the study was extended with three additional activities which reflected the latest developments in 2009: the significance of accidents and serious incidents which occurred in 2009, challenges following changes in the internal framework conditions of the two largest helicopter operators, and the proposal for a new European decree.

The reduction in risk on the NCS between the periods 1990–1998 and 1999–2009 was estimated to be 16%, based on expert assessments. The most important factors contributing to this result were: the phasing-in of new types of helicopters and implementation of the latest generation of proven helicopter technology; improved use of HUMS in helicopters; increased pilot skills through additional requirements regarding competence, experience and simulator training for NCS operations; improved flight operational procedures; improved helideck design and operations through regulatory requirements and active use of the OLF (now NOROG) helideck manual and recommended guidelines; improved emergency preparedness (such as improved personal locator beacons, impact absorption and survival suits, more rescue helicopters); the introduction of the Safety Management System (SMS); establishment of the Cooperation Forum for Helicopter Safety on the NCS. The forum has helped to strengthen the cooperation between the various stakeholders, and to follow up the recommendations in NOU 2001: 21 and NOU 2002: 17.

Over the next decade (2010–2019), the potential reduction in risk was estimated to be 23% compared to the period 1999–2009. It was expected that the following planned improvements would contribute most to improved safety:

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

- Continued phasing-in of new type(s) of helicopter, and implementation of the latest generation of proven helicopter technology.
- Increased technical and operational experience with the new types of helicopter, in particular Sikorsky S-92 and EC225 (H225) Super Puma.
- Further development, updates and increased use of HUMS/Vibration Health Monitoring (VHM).
- Further development and increased use of Flight Data Monitoring (FDM) and SMS.
- Introduction of “Performance Class 2 enhanced” (PC2e).
- Improved safety standard of helidecks (procedures, size, lighting equipment, markings, helideck motion monitoring, weather reports, improved picture of turbulence conditions).
- Improved meteorological services.

The most important potential threats to helicopter safety in the period 2010-2019 were considered to be the following:

- Lack of the possibility to maintain established Norwegian additional requirements for offshore flights, or that it would not be possible to introduce new requirements adapted to the conditions on the NCS.
- Exemptions from requirements and deviations from recommended guidelines.
- Undesirable consequences of changes implemented by the helicopter operators and other stakeholders in this area.
- Reduced competence among technicians and pilots in the helicopter companies due to the retirement of existing personnel.
- Lack of heavy-helicopter competence and resources in the NCAA.
- Excessive focus on economic factors and revenue among the stakeholders on the NCS.

The study also documented relatively extensive changes in the internal framework conditions within the two largest Norwegian helicopter operators in the period 1999–2009. As part of large international corporations, the helicopter operators have had access to greater capital and a larger fleet. However, the study identified a set of organisational trends that may have contributed to the focus shifting away from the primary, operational work tasks. It was claimed that this could have posed a threat to safety in the long term.

Recommended measures in HSS-3 (2010), Ref. /9/

Provided that already-planned-for improvements were implemented, the study concluded with a series of recommended measures designed to keep the potential threats under control and further improve safety. These measures, not in prioritised order, covered the following areas (not presented here in detail):

1. Improve safety when approaching the helideck.
2. Reduce the likelihood of technical failures.
3. Improve the management of organisational changes and changes to internal framework conditions.

Classification: Open
Status: Final (released)
Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
Turøy helicopter accident on 29 April 2016

4. Increase the use of proactive safety indicators.
5. Improve interaction between the operators involved in offshore helicopter transport.
6. Develop and maintain technical and operational competence.
7. Reduce the risk of lightning strikes and their possible consequences on helicopters.
8. Minimise exemptions from requirements and deviations from recommended guidelines.
9. Evaluate measures to reduce perceived risk.

“Trends in risk level in the (Norwegian) petroleum activity” (RNNP)

The RNNP process was initiated as a pilot project by the Norwegian Petroleum Directorate (NPD) in 1999, and the first annual report, for the period 1996-2000, was published in April 2001. After the Norwegian Petroleum Safety Authority (PSA) was established on 1 January 2004, in connection with the division of the NPD into a resource management unit and a supervisory unit (PSA), RNNP was taken over by the PSA.

Since 2004, the PSA has published “Trends in risk level in the (Norwegian) petroleum activity” (RNNP, formerly “Risk level on the Norwegian continental shelf”, RNNs) on an annual basis. The report also includes an assessment of trends in risk level linked to offshore helicopter transport.

The PSA aims to present a relevant picture of the risk level based on a complementary set of information and data from various parts of the industry, in order to measure the effect of the collective safety-related work being performed.

RNNP's work is confined to the PSA's sphere of authority, with the exception of helicopter transport of personnel. The latter is covered in cooperation with the NCAA and helicopter operators on the NCS.

On 28 April 2016, the report on trends in risk level in the petroleum industry on the NCS was published. The report pays particular attention to risk indicators linked to factors such as major accidents, including helicopters, and selected barriers associated with major accidents. It is evident from the report that:

- The perceived risks relating to helicopter accidents have declined, which is also reflected in the fact that, throughout the RNNP period, the employees stated that they were more satisfied with their comfort level during helicopter transport.
- Serious near-misses show a decline in the total number of incidents involving helicopters.

RNNP has divided earlier incidents into incident indicators for offshore helicopter transport. These indicators show the incident trends since 1999, and are as follows:

Incident indicator 1 covers aviation accidents with a high, medium and low level of severity, aviation incidents with a high, medium and low level of severity, and operational interruptions with a high level of severity.

Incident indicator 2 covers the same as incident indicator 1, as well as operational interruptions with a medium and low level of severity, and incidents occurring where the helicopter is not in service (parked).

Incident indicator 3 covers the same as incident indicator 1, with the additional inclusion of incidents occurring where the helicopter is not in service (parked).

App D Notification and mobilisation 29 April 2016

The investigation team has used the logs from the Line 2 and 3 emergency response and conducted a series of interviews with Statoil employees in the emergency response organisation, as well as external partners, in order to obtain as detailed an overview as possible of the emergency response.

The focus has been on the activities/elements which were of significance for the emergency response to the accident. Other activities have been included where necessary to understand the management of the emergency response.

Date Time	Sequence of events	Comments
Friday 29 April 2016		
11:55	The Norwegian police received the first message about the crash from eyewitnesses.	
11:55	The tower on Gullfaks C (Tampen) called the Offshore Installation Manager (OIM) on Gullfaks B and informed him as follows: <i>"Have lost contact with the helicopter"</i>	The Tampen air traffic centre forms part of the Helicopter Flight Information Service (HFIS) offshore and is located on Gullfaks C.
11:58	The OIM on Gullfaks B went to the emergency response room and wrote on the board: "Loss of helicopter".	Line 2 Incident Commander called the OIM on Gullfaks B and confirmed that the helicopter had come from Gullfaks B.
11:59	The police and air traffic control centre (ATC) notified the Joint Rescue Coordination Centre for Southern Norway (HRS).	
12:04	Local rescue service confirmed to HRS that all emergency services were on their way.	
12:09	Statoil's air operations duty officer was notified by the CHC operations centre. The air operations duty officer notified Statoil's operations centre and Incident Commander (IC) on duty in Line 2.	
12:09	Statoil's operations centre notified the Statoil Notification Centre (SNC).	SNC registered the incident in Crisis Manager (CM) and prepared to send the notification to mobilise out to the duty teams in Line 2 and 3. However, the "send" button was not activated until 12:20. Following the incident, Line 2 has updated its procedure for sending out this notification in order to avoid delays in the future.
12:10	Key Line 2 and 3 personnel mobilised in the emergency response rooms in Bergen and Stavanger on their own initiative. Statoil's CEO was travelling: the EVP for Development and Production Norway (DPN) took on the role of acting CEO in his absence.	

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

Date Time	Sequence of events	Comments
12:12	The OIM on Gullfaks B commenced production shutdown	All activities on Gullfaks B were stopped
12:13	A news website claimed that the helicopter was en route to the Brage field in the North Sea.	“(the news website) has received confirmation that the helicopter was en route to the Brage field in the North Sea, which is operated by the German oil company Wintershall”
12:15	HRS called Statoil's operations centre to find out where the helicopter came from.	Statoil's operations centre gave no information to HRS about the accident, but referred them to the emergency response organisation.
12:16	HRS received information from the Tampen air traffic control centre that the helicopter was operated by CHC, and that there were 11 passengers and two pilots on board.	
12:20	The personnel function in the emergency response organisation was informed that next of kin were waiting at the heliport at Bergen Airport Flesland.	The personnel function in the emergency response organisation sent a representative to the heliport at Flesland to take care of next of kin. This person was not charged with the task of informing those travelling by helicopter about the status during the early stages of the accident.
12:20	SNC notified the duty teams in Line 2 and 3 about the mobilisation.	Most of the personnel in the Line 2 and 3 emergency response organisation were already at the emergency response centres when the notification was sent.
12:20-12:30	The first status meeting in Line 2. The decision was taken to notify the contractors.	Responsibility for notifying contractors was transferred to the Kristiansund office.
12:26	The Line 2 Incident Commander decided that viewer access to DaWinci should be locked so that it was not possible to see the passenger on board (POB) list for the helicopter that had crashed.	<p>DaWinci should have been locked in accordance with the guidelines included in WR 1214, Ref. /29/, but in this case it was not locked as described in the guidelines.</p> <div style="background-color: red; color: white; padding: 2px;">Air Operation Branch Director (AOBD)</div> <p>The air operation Branch Director is responsible for preparing and coordination of the air operation.</p> <p>Initial Actions</p> <ul style="list-style-type: none"> <input type="checkbox"/> Review Common Responsibilities <input type="checkbox"/> Establish contact with air operation center offshore and get an overview over current situation and mobilized resources <input type="checkbox"/> Verify POB and transfer POB-list from Dawinchi to "C/M" <input type="checkbox"/> Create a copy of the emergency POB in Dawinchi <input type="checkbox"/> Establish contact with Helicopter Companies for available resources <input type="checkbox"/> Establish contact with reception center onshore <input checked="" type="checkbox"/> Lock the POB information in Dawinchi when instructed to by IC
12:29	HRS received the POB from Statoil (Tampen).	
12:45	The Scandic Bergen Airport hotel at Kokstad was notified by the emergency response team and asked to set up a next-of-kin centre.	

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

Date Time	Sequence of events	Comments
12:50	Statoil's liaison contacted HRS and arranged to meet up at HRS.	
12:53	The first message was published on www.statoil.com that Statoil's emergency response organisation had been mobilised following a helicopter incident.	<p>"Today, 29 April at 12.20, Statoil was informed of a helicopter incident on the NCS. Statoil has mobilised its entire emergency response organisation."</p> <p>The telephone number for enquiries from the press was given: 51 99 19 83</p>
12:54	Line 2 notified the Petroleum Safety Authority about the incident.	 <p>PETROLEUM SAFETY AUTHORITY NORWAY</p>
12:54	The Centre for Crisis Psychology was notified by Line 2.	A representative from the centre went to the heliport at Flesland.
13:00	The first next of kin arrived at the next-of-kin centre from the heliport, together with a representative from Statoil's emergency response organisation.	The next-of-kin centre was operative.
13:00	The Statoil liaison arrived at HRS.	
13:04	The North Sea chaplains were notified by Line 2.	The Norwegian Seaman's Mission confirmed that they could provide four chaplains that afternoon.
13:04	Line 2 started notifying the contractors.	
13:09	Status meeting between Line 2 and 3.	Next status meeting was arranged for 14:00
13:10	All personnel working on the Gullfaks field were asked to call their next of kin.	
13:13	Contact was established with the AIBN.	The AIBN were informed about the type of helicopter and its registration number from CHC.
13:15	Statoil's EVP for Technology, Projects and Drilling (TPD) went to the next-of-kin centre.	
13:18	The Norwegian Civil Aviation Authority was informed.	

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

Date Time	Sequence of events	Comments
13:20	HRS confirmed to the media that the helicopter had flown from Gullfaks B, which is operated by Statoil.	
13:26	Two North Sea chaplains went to the heliport at Flesland and were available for those travelling by helicopter.	
13:30	In the status meeting between Line 2 and 3, Line 2 confirmed that the helicopter had flown from Gullfaks B.	
13:46	Telephone contact was established between Statoil's CEO office and the office of the Norwegian Prime Minister.	
13:46	Statoil updated its message on www.statoil.com to state that a helicopter had crashed off the small island of Turøy, west of Bergen. The helicopter was en route from Gullfaks B to Bergen.	The contact number for the next of kin was established.
13:47	The decision was taken to temporarily ground all H225 Super Puma transport helicopters.	The Search and Rescue (SAR) helicopters were operative for red-level missions.
13:50	Production on Gullfaks B was shut down.	Production was gradually resumed from 13:55 on 1 May 2016.
14:46	The medic on Gullfaks B requested assistance.	Line 2 decided that one medic and two North Sea chaplains should be sent to Gullfaks B as soon as possible.
14:07	A total of seven next-of-kin phone lines were now open.	
14:09	A medic from the emergency response organisation left for the heliport at Flesland to take care of next of kin who needed support.	
14:10	All the contractors had now been notified.	
14:30	A toll-free (800) call centre number for next-of-kin was set up and replaced the other phone lines.	Approximately 200 calls were received from next of kin during the course of the first 24 hours. All calls were answered.
14:47	Status of the next-of-kin centre: eight next of kin had arrived. Updated information was given every hour.	A room was set up for management, together with the police. Several contractors had arrived.
15:44	All the contractors were represented at the next-of-kin centre.	
16:00	Phone call between the acting CEO and Norwegian Prime Minister, where the acting CEO relayed the information he had at that point in time.	

Classification: Open
 Status: Final (released)
 Date: 29.09.2016

Investigation into helicopter safety in Statoil following the
 Turøy helicopter accident on 29 April 2016

Date Time	Sequence of events	Comments
16:00	The helicopter with the chaplains and psychologist left for Gullfaks B.	
16:10	Updated message on www.statoil.com that all H225 Super Puma transport helicopters were temporarily grounded.	
18:00	EVP for Development and Production Norway (DPN) met the media in Stavanger.	
19:04	Updated message published on www.statoil.com. The police confirmed that the 13 people on board the CHC helicopter, on assignment for Statoil, were feared dead.	
19:49	Status next-of-kin centre: Several families had already availed themselves of the offer; some had gone home; more families were expected to arrive during the course of the evening.	
21:01	Updated message on www.statoil.com confirming which companies the 13 people on board represented.	
From Friday evening to Saturday evening	Debrief with all departments on Gullfaks B.	The debriefs were held in groups of up to 15 people and lasted approximately one and a half hours.
Saturday 30 April 2016		
02:30	Status meeting with the police: 72 next of kin were registered at the hotel during the course of 29 April 2016. Most of them spent the night at the hotel.	Many had expressed a wish to come back for the information meeting on Saturday morning
05:00	Statoil's CEO landed at Stavanger airport.	
08:30	Status update on the situation with the emergency response management and CEO at Statoil's head office at Forus.	
12:00	Statoil's CEO met the next-of-kin at Kokstad.	
14:00	The Norwegian Crown Prince and Princess arrive at the next-of-kin centre, along with the Prime Minister.	
16:00	Town hall meeting on Gullfaks B.	
Sunday 1 May 2016		
09:30	Boat trip and memorial ceremony for the next of kin at the site of the accident.	The next-of-kin centre stayed open until 2 May 2016. The emergency response organisation demobilised the same day and handed over to the DPN line organisation for further follow-up.

