

Safety review of offshore public transport helicopter operations in support of the exploitation of oil and gas

Progress report – 2016

CAP 1386



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Foreword

Between 2009 and 2013 there were five significant accidents in the UK offshore helicopter aviation sector, two of which tragically resulted in fatalities. Following these accidents, the CAA Board commissioned a comprehensive review of the safety of offshore helicopter operations (CAP1145, published 20 February 2014). The review resulted in a number of wide ranging recommendations and actions to improve safety standards. The review made clear our determination to implement these actions and recommendations as swiftly as possible.

In January 2015, we published CAP 1243, a Progress Report outlining the advances being made against the actions and recommendations. The report described how significant and important progress had been made towards improvements in offshore helicopter safety, such as flights no longer taking place over the most extreme sea conditions and passengers being equipped with new and improved Emergency Breathing Systems (EBS) with the associated training having been completed.

Since the publication of the progress report, we have continued to work closely with industry and the European Aviation Safety Agency (EASA) to complete the remaining actions and recommendations. Passengers are now seated next to emergency exits that correspond to their body size, EBS was introduced for offshore flight crew from April 2016, and we have made good progress to implement new proposals for safety improvements at Normally Unattended Installations (NUIs).

The majority of the actions and recommendations are now completed and we have identified a number of ongoing workstreams to ensure that we continue to see improvements in offshore helicopter safety. This further progress report details the completed actions and recommendations and highlights the ongoing work streams. The CAA intends to continue its efforts through close collaboration and support with stakeholders, and further progress will be measured and reported as part of the developing role of the Offshore Helicopter Safety Action Group (OHSAG)¹ following this publication.

We are pleased that there continues to be a strong collective commitment to change, which is evidenced by the co-operation received from all parties represented by the OHSAG and its Technical Sub Group. This forum has proved to be an excellent catalyst for increased dialogue between helicopter operators, the oil and gas industry, employee

¹ The CAA established a new top level group to drive change, the Offshore Helicopter Safety Action Group (OHSAG) that includes unions, CEOs from the helicopter operators, representatives from the oil and gas industry, Step Change in Safety and the CAA.

representatives, helicopter manufacturers and regulators. We are strongly committed to ensuring that this co-operation and commitment extends beyond the implementation of the actions and recommendations and that the work of the OHSAG will remain focussed on achieving real steps in reducing the number of safety occurrences.

The ultimate aim is for rotary wing safety performance to be on a par with large commercial fixed wing operations; recent events have only served to reinforce the need for the relative safety performance gap to be reduced. To do so, the focus needs to be on prevention, as opposed to survival, through helicopter design improvements. In this regard, our ambition is to have a defined certification strategy where rotary wing can realistically approach commercial fixed wing safety and reliability performance. The CAA and the OHSAG have no direct means to secure these design ambitions and, as such, we will continue to work closely with EASA and support all necessary EASA working groups to assist in this objective. We are pleased to be participating in the work currently undertaken by EASA as part of their Safety Risk Portfolio – Offshore Helicopter Operations. It is clear that EASA is devoting significant energy, time and expert resources into this activity. This work provides an opportunity for real and lasting progress in this area. We also acknowledge and welcome the initiative, announced in August 2015 by EASA, to commission an independent study into Helicopter North Sea Operations Management Current Practices Safety Review and have already provided them with the requested information to assist them in their task.

The safety of those who rely on offshore helicopters remains our priority; the CAA is committed to continuing to work with industry to take the further steps needed to secure the long term change envisaged by the review, even against the challenging financial conditions in which the oil sector is trading at present. The next step will be to define the future role of OHSAG post this report with an ambition to continue to influence and improve safety standards and performance for this sector and the workforce. We are also now working with the emergent offshore renewable energy industry to ensure that lessons learned from the oil and gas industry experience can be suitably incorporated into this expanding aviation sector.



Mark Swan

Group Director, Safety and Airspace Regulation, CAA

Introduction

In February 2014, we published a Safety Review ('the Review') of offshore helicopter operations (CAP 1145). The Review examined the risks to helicopter operations to support the oil and gas industry in and around the North Sea. It was conducted in conjunction with the EASA and the Norwegian Civil Aviation Authority and was peer-reviewed by independent experts. It identified a wide range of opportunities to improve the safety of those operations and, in particular, to increase the chances of passengers and crew surviving an accident.

In total, the Review listed 32 actions and 29 recommendations that would all contribute towards the end goal of improving the safety of offshore helicopter operations. Some of these would necessitate long term changes in areas such as helicopter design and others could be implemented almost immediately, and have an instant impact on survivability.

About this report

We stated that we would report publicly on the progress of all actions and recommendations in the Review. Our first progress report (CAP 1243) was published in January 2015, and provided an update on progress at that date. This report provides an update to the January 2015 report, highlighting where further progress has been made against the remaining actions and recommendations, and where we have identified further work streams to continue to improve the safety of offshore helicopter operations. This will be the final CAA report on progress, with the newly re-formed Safety Action Group producing future reports.

Appendix A summarises progress against each action and recommendation. The majority of actions and recommendations have now been completed. The table in the Appendix also shows where further work streams have been identified.

Chapter 1

Passenger safety and survivability

The evidence presented in the Review showed that just over half of the accidents in which offshore helicopters impacted the sea between 1976 and 2012 in the UK were potentially survivable. However, these accidents led to 38 fatalities. CAP 1243 highlighted several areas where significant progress had been made in improving the protection of passengers in the event of an accident, including:

- improving the chances of a safe rescue from the sea by prohibiting operations over sea conditions exceeding 6 metres significant wave height;
- reducing the risk of capsizing in a ditching by prohibiting operations over sea conditions exceeding the certified ditching performance of the helicopter;
- reducing the likelihood of the helicopter sinking by requiring helicopter operators to ensure that the Emergency Floatation System (EFS) is armed for all overwater departures and arrivals;
- increasing underwater survival time to improve the chances of escape from a capsized helicopter through the introduction of new improved Category A Emergency Breathing Systems² (EBS) for all passengers;
- introducing a new standardised clothing policy to ensure core body heat is retained while waiting for rescue.

All of these measures, except the last, were mandated by CAA Safety Directive SD-2014/001 (issued on 21 May 2014), subsequently replaced by SD-2014/002 (issued on 14 October 2014) and then SD-2015/001 (issued on 28 January 2015). Since then, significant progress has been made in introducing new requirements relating to the compatibility of passenger body size and underwater escape exit (window) size. Further work has also been performed in the areas of EBS training and extending EBS to flight crew on offshore helicopters. The current Safety Directive (SD-2015/005 issued on 8 December 2015) introduced cover for support to Lighthouse Authorities and, in response to concerns raised by the industry, also introduced alleviation for the carriage of EBS for medically incapacitated passengers. An additional alleviation has been provided against the operating rules for such passengers in respect of life jackets and survival suits.

² Category A EBS is one that may be deployed underwater within the breath-hold time of the user and using only one hand. CAA published CAP 1034 in May 2013 to define a draft technical standard for these systems. CAA is currently participating with EASA in the development of a European standard that will incorporate the draft CAA standard and the experience gained during the CAA approvals of EBS for passengers and crew.

As a result of the aforementioned safety directives, we believe that the exposure has been reduced and that, in the event of service difficulties over water, the changes introduced should greatly improve the chances of survival.

Passenger size versus window size

As described in CAP 1243, the action that received the most publicity at the time the Review was published was around passengers' body size. The Review highlighted that if passengers cannot fit through the push-out windows that form the underwater escape exits, they were not only at greater risk themselves, but they also potentially increased the risk to their fellow passengers, whose access to an exit might be blocked. The Review stated that from 1 April 2015, helicopter operators would not be allowed to carry passengers who could not fit through the push-out window exits. This action led to discussions with the Trade Unions and the Transport Select Committee, who were concerned that the Review action may result in some offshore workers being prevented from flying offshore. This was not the intention of the Review, and we worked closely with Step Change (SC³), helicopter operators and experts at Robert Gordon University (RGU) to identify a suitable solution that would address these concerns without compromising the safety objective.

In January 2015, a minimum width and diagonal measurement had been established and agreed for push-out window exits. Earlier research performed for the CAA had indicated that the width of the opening should correspond to the passenger's chest depth and the diagonal to their shoulder width. Results from the ongoing study at RGU indicated that only shoulder width needed to be considered; if a passenger's shoulder width was within prescribed limits, then their chest depth would be too.

SC conducted an initial campaign to measure all offshore workers in early 2015, and over 40,000 had been measured before the 1 April 2015 target date. This figure represented 100% of the core workforce and 50% of those who travel less frequently. Of all the workers measured, just under 3% had a shoulder width exceeding the minimum window diagonal and were classified as XBR (Extra Broad). Under the scheme agreed, XBR passengers are now seated next to the larger exits that are required under the Airworthiness regulations on all helicopters and which have a diagonal measurement and width large enough for any passenger. To ensure that passengers are seated correctly in the helicopter, XBR passengers now wear a chequered arm-band and the seats suitable for them are identified with a matching chequered head rest cover. From 1 April 2015, all passengers are now seated next to exits large enough for their body size and are checked by the helicopter flight and ground crews before takeoff as part of standard pre-flight procedures.

³ Step Change in Safety (SC) is a not for profit tripartite organisation (representing the workforce, regulators and employers) with an overall aim of making the UK the safest place to work in the global oil and gas industry. SC is independent of Oil & Gas UK.

Emergency Breathing Systems

Since 1 January 2015, all passengers have been required to wear suitable Cat A EBS (CAP 1034 Category A). In our previous progress report, we described how this had been introduced ahead of schedule for all passengers on 1 September 2014, and how the oil and gas industry had worked hard to provide the basic training required on EBS usage to all offshore workers.

In response to a recommendation in the Review (R07), the Offshore Petroleum Industry Training Organisation (OPITO) has been leading on a review of the broader safety and survival training provided to offshore workers. A working group was formed in Autumn 2014 to perform a review of the industry standard, and the initial focus was on training for the new Cat A EBS. The Basic Offshore Safety Induction and Emergency Training (BOSIET) and Further Offshore Emergency Training (FOET) initially continued to use the earlier hybrid EBS for in-water training after the introduction of the Cat A EBS, which raised pertinent questions regarding the possibility of 'negative transfer of training'. The most obvious solution would be to replace the hybrid system with Cat A EBS.

Using Cat A EBS in-water, however, is currently considered by the Health and Safety Executive (HSE) to fall within the scope of the Diving At Work Regulations (DAWR) due to the use of compressed air. Consequently, the training for the new Cat A EBS currently comprises 'dry' poolside/classroom training only. All in-water training using the earlier hybrid EBS has ceased, however, which will avoid any negative training transfer. Drawing on favourable experience in Canada, in July 2016 HSE agreed in principle to exempt 'shallow water' Cat A EBS training from the DAWR. If implemented, this will significantly improve the fidelity of the current EBS training and will represent a worthwhile step towards the ultimate goal of full in-water training with the new Cat A EBS.

In addition, we have been working with helicopter operators to approve and introduce EBS for flight crew in order to provide them with the same or equivalent benefits now available to their passengers. Slightly different Cat A EBS and associated lifejacket changes are required for flight crews to ensure that the equipment does not interfere with any controls or switches, or the pilots' ability to operate the aircraft in all normal and emergency conditions. A protocol for testing the suitability of the EBS for the flight deck environment has been agreed with the helicopter operators. Three flight crew EBS systems have been approved. EBS for flight crew was introduced into operations on time from 1 April 2016.

To ensure that the introduction of Cat A EBS in the UK is afforded a wider platform for international safety, a working group to produce a formal standard as a European Technical Standard Order (ETSO) for EBS has been established. Work is nearing completion and the ETSO is based on the CAA specification contained in CAP 1034, which has so far been used to approve the introduced Cat A EBS.

Longer term improvements

The Review also recommended that helicopter operators should consider addressing some of the survivability improvements under discussion in the EASA Rule Making Task on helicopter ditching and water impact survivability (RMT.0120). SC committed to investigate the feasibility of changes in this area, working with helicopter manufacturers and operators.

Since January 2015, we have confirmed with one UK operator that it is feasible for all of the key items identified in the Review's Recommendation (R05) to be retrofitted within 2 to 3 years, with the possible exception of the side-floating helicopter scheme. However, we are currently unaware of any voluntary activity in this area apart from work on handholds and revised push-out window pull-tabs performed by Airbus Helicopters for their helicopter types.

The RMT.0120 initiative has represented a major step forward and the associated working group has included extensive international industry and regulatory expertise. All of the Recommendation R05 items were included in the EASA Notice of Proposed Amendment (NPA) 2016-01 produced by RMT.0120 and published in March 2016. If adopted however, they will only be mandatory for new helicopter designs after any resulting rule changes have been introduced (Significant Design Changes as required by Part 21.101). EASA has agreed that RMT.0120 will continue its work and produce a further NPA to cover the retrofit of measures considered to be practical and proportionate for the existing helicopter fleet. This may eventually lead to the introduction of some of the Recommendation R05 improvements, but voluntary adoption would deliver the safety benefits much sooner.

The actions already mandated were originally introduced as short term measures pending the introduction of rule changes by EASA. In summary, improvements could be introduced more quickly either through EASA action or operators voluntarily applying these changes to their existing helicopter fleets based upon their individual Safety Management System's assessments, or by a contractual requirement imposed by the oil and gas industry.

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Chapter 2

Operations

The actions and recommendations for operations were focused on the medium term, and the CAA has continued to work with helicopter operators and the wider oil and gas industry to agree the most effective ways to raise safety standards.

The previous progress report highlighted that advances had been made in the areas of:

- The Safety Management System (SMS) and the identification of a list of top ten safety issues, suggestions for mitigation and meaningful measures of their performance;
- Minimising the risk of post-crash fire;
- Reviewing operations at smaller helidecks;
- Reviewing night operations;
- Raising the standards of pilot training.

Work in all of these areas has been ongoing, with significant progress being made in relation to minimising the risk of fire. The engagement of helicopter operators, manufacturers and Oil & Gas UK has been vital to this work.

Adopting a more consistent approach to safety

Following the SMS symposium held in Aberdeen during July 2014 and the identification of the top ten safety issues, suggestions for their mitigation and meaningful measures for performance, a member of the CAA Intelligence Team has been working closely with the three Aberdeen-based offshore helicopter operators to progress a collaborative project to raise the quality of the safety data collected and its subsequent analysis.

As part of the CAA's risk assessment and management strategy, we have used bowtie barrier risk modelling techniques. One strength of the barrier approach is as a qualitative tool which is adaptable to deliver practical solutions to the challenges of risk assessment in the dynamic environment of aviation operations. Moreover, the output of a bowtie can be shared with, and taken up more widely, by stakeholders as part of their SMS and risk mitigation strategies. As such, the CAA has developed 5 specific bowties as part of this work, which focus on:

- Helicopter approach to a fixed unmanned North Sea installation;
- Helicopter approach to a small North Sea vessel, with a loss of terrain/obstacle separation;

- Helicopter approach to a large North Sea vessel/mobile installation, with loss of terrain/obstacle separation;
- Helicopter approach to a fixed manned North Sea installation, with loss of terrain/obstacle separation;
- North Sea helicopter operating en-route with automation, with deviation from desired flight parameters.

The CAA's aim is to acquire further feedback of these initial bowties from front-line industry operational staff as a validation exercise before finally publishing the results. While these models were developed from the safety issues identified at the SMS symposium, it has become clear that there may be other topics which could also benefit from this process, which will be explored with operators as the subject matters arise. The bowtie models will be used to further develop our candidate Safety Performance Indicators (SPIs) with industry to facilitate the creation of an offshore helicopter sector risk picture.

The use of the bowties and SPIs has helped to develop and inform the EASA safety risk portfolio for the offshore sector; work is ongoing with EASA and industry bodies to discuss alignment of strategies. The EASA Helicopter Accident Data Collaboration and Analysis Group (HADCAG) was tasked to analyse safety data to support the strategic risk assessments; the group has provided information to the Safety Risk Portfolio (SRP), the SRP is supported by industry and Aviation Authorities.

Industry Auditing

Oil & Gas UK is also continuing with its project to harmonise procedures for flight safety auditing. The project aims to identify and agree best practice standards for such audits, so that instead of undergoing multiple audits with slightly different demands for each customer, helicopter operators will increasingly be asked to demonstrate how they meet common standards. The project has delivered a toolbox which is now fully operational and consists of audit schedules, a pre-audit questionnaire, audit templates and a feedback form. As feedback is received, the process and documentation will be reviewed to ensure it remains fit for purpose.

The new approach has been adopted by industry and Oil & Gas UK continue to work to encourage full uptake. The industry Management of Aviation Guidelines have also been revised and strengthened to reflect the new process and will be published during 2016.

Reviewing and reducing risks around helidecks

One of the longer term intentions of the Review was to improve safety on helidecks. In May 2015, we consulted with industry on the options available to the CAA to assume responsibility for certification. We received 20 responses to the consultation from a wide range of organisations, and a way forward was identified and proposed to the OHSAG for agreement.

The OHSAG was supportive, but the proposed scheme cannot be implemented without appropriate legal authority. This will likely take several years to establish due to the particular legislation change process. In the meantime, we plan to enhance our oversight of helidecks using existing CAA resources and work towards the desired final solution in collaboration with HCA.

Minimising the risk of post-crash fire

The Review endorsed our long-held position that post-crash fire, which presents a major risk for helicopter safety and occupant survivability, is a reasonably foreseeable event following a helicopter accident on a helideck. Helicopter operators had previously raised their concerns that the fire-fighting provisions at a significant number of helidecks located on Normally Unattended Installations (NUIs) were insufficient to address a crash with fire.

As mentioned in the report, the CAA had published an enhanced requirement for fire fighting facilities at NUIs in CAP 437 but this had met with little progress. Significant debate has since taken place between regulators, helicopter operators and the oil and gas industry to resolve what additional standards and equipment are necessary and should be applied for NUIs. To assist and bring some independence and fresh thinking on this issue, the CAA commissioned Cranfield University to undertake a detailed review of the case for and against improved fire-fighting systems on NUIs. Their independent Cranfield University report stated that “OGUK, the aircraft operators, BALPA, HCA, HSE and CAA must work together to agree a way forward. The discussion should focus on how the reasonably foreseeable event of a helicopter on fire on a NUI helideck can be mitigated against.”

To move matters forward, we conducted a bow-tie risk assessment that was generated in collaboration with industry and produced a working paper for OHSAG consideration which focused on the 3 key items. The key items related to: engine failure accountability during take-off and landing; crash resistant fuel systems; and the availability of automated helideck fire fighting facilities in relation to the frequency of operations to the helideck. This has generated further debate and review with industry and a revised plan has been drafted to provide an achievable and proportionate solution bearing in mind all the relevant constraints.

The way ahead includes the following:

- All new build unattended helidecks must have automated helideck fire fighting facilities as detailed in CAP 437.
- Current NUIs:

A safety case provided by aircraft operators that describes in detail the operation (number of flights / day / night operations), aircraft types (including certification standards and configuration), fire fighting provisions, etc, to manage and minimise

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risk. In the absence of an acceptable safety case the following will form the basis for mandatory application.

- a) For any decks which do not comply with the requirements for the installation of an automated fire-fighting system, it is proposed to apply an annual limit for landings when the helideck is unattended to constrain overall exposure. In addition, operations to such decks should not take place at night unless a circle and H helideck lighting system compliant with CAP 437 Appendix C is fitted.
- b) When helidecks without an automated fire-fighting system are attended by personnel trained in the use of the fire-fighting equipment that is available, operations may continue until a cut-off date which will be set following industry consultation.
- c) From the cut-off date, however, the fire-fighting facilities must meet or exceed the Rescue and Fire Fighting Service (RFFS) provisions of the minimum ICAO Annex 14 Volume II surface level standards for H1 or H2 helicopters as applicable and as referred to in CAP 789.
- d) It is proposed that helidecks without an automated fire-fighting system that do not upgrade to the level stated in c) above by the cut-off date will be subject to an annual limit for landings.

To ensure evenness, the means of implementing the determined safety measures will most likely be through an Operational Directive applicable to all operations conducted on the UK Continental Shelf.

Raising the standards of pilot training

The Review identified a number of areas where pilot training could be further improved, with the aim of reducing the number of accidents and near accidents that occur as a result of Human Factors.

We have examined the output of our review into the safety of large UK commercial air transport aeroplane operations for relevance and applicability to the offshore environment, and we have integrated this work into a CAA joint fixed and rotary wing group in order that common issues affecting both communities can be assessed and resolved in an efficient and joined up manner. A further joint fixed and rotary wing group has also been initiated at EASA to discuss moving towards Evidence Based Training (EBT) and the CAA will contribute to this work programme.

We have also reviewed our examiner assessment protocols to include specific competencies so that industry senior examiners can identify trends in common failings through their company Safety Management Systems and take appropriate and timely interventions.

The training of Flight Crews for the offshore role and establishment of Standard Operating Procedures against the manufacturers' operating philosophy is now underpinned by the publication of the first Flight Crew Operating Manuals (FCOM). Whilst this has been slow to develop across all manufacturers, its introduction sees a significant safety enhancement. EASA is actively supporting such initiatives and has encouraged the manufacturers through the Operational Suitability Data (OSD) process.

Pilots' interaction with automation and complex flight displays remains challenging and has given rise to the CAA chaired Helicopter Automation Work Group. This collaborative industry/regulator group has collated an active issues list which identifies a number of key areas including important disparities between aeroplane and helicopter certification material where the latter would benefit from additional detail. This means manufacturer innovation directly translates into training needs as pilots move between a variety of flight display layouts and systems. EASA has also specifically identified section 2X.1302 of the Certification Requirements for human factors and this is foreseen in its rulemaking inventory.

Pilot AOC training programmes have been modified to take account of instrument scan techniques on complex electronic flight displays. Likewise, the role of the monitoring pilot has been reviewed and implemented by AOCs taking into account extant CAA material written for airline operations. Recent CAA work has seen a review of these training programmes to assess their effectiveness.

Operator policy rightly identifies the most appropriate use of automation, but pilots must be able to readily revert to manual instrument flying skills when required. The review of revised operator training indicated that AOCs are specifically addressing this need in the flight simulator setting.

The introduction of Operational Suitability Data (OSD) by EASA for the newer types and aircraft still in production has now seen a more interactive use by AOCs who have modified training programmes to take account of those training areas needing special emphasis. The CAA and EASA actively support the Automation Work Group; this group has also identified a need for the OSD to be a live document reflecting ATO and operator feedback through Safety Management Systems.

Flight Data Monitoring (FDM)

It had been anticipated that the helicopter operators' Flight Data Monitoring (FDM) programmes would provide further objective information on operational issues to obtain a better understanding of the factors which underlie operational cause accidents. This proved not to be the case and scope for improvement of the current, voluntary FDM programmes has been identified. The CAA will seek to improve the intelligence generated from FDM by working with the industry to improve their programmes. This will be realised in the form of guidance on best practice to support the new European Air Operations