

AIRCRAFT ACCIDENT REPORT No 1/2011

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REPORT ON THE ACCIDENT TO EUROCOPTER EC225 LP SUPER PUMA, G-REDU NEAR THE EASTERN TROUGH AREA PROJECT CENTRAL PRODUCTION FACILITY PLATFORM IN THE NORTH SEA ON 18 FEBRUARY 2009

Registered Owner and Operator:	Bond Offshore Helicopters Ltd
Aircraft Type:	Eurocopter EC225 LP Super Puma
Nationality:	British
Registration:	G-REDU
Place of Accident:	Approximately 300 metres southwest of the Eastern Trough Area Project (ETAP) Central Production Facility Platform helideck in the North Sea Central Area Latitude N 57° 17.49' Longitude E 001° 39.41'
Date and Time:	18 February 2009 at 1837 hrs All times in this report are UTC (coincident with local time)

Synopsis

The Aeronautical Rescue Co-ordination Centre (ARCC) notified the Air Accidents Investigation Branch (AAIB) of the accident at 1912 hrs on 18 February 2009 and the investigation commenced the following day.

In accordance with established international arrangements, the Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA) of France, representing the State of Design and Manufacture of the aircraft, appointed an Accredited Representative and was supported by additional investigators from Eurocopter. The operator co-operated with the investigation and provided expertise as required.

Prior to this Final Report, the AAIB published Special Bulletins on 24 March 2009 and 23 June 2009.

Twenty-seven Safety Recommendations have been made.

The helicopter departed Aberdeen Airport at 1742 hrs on a scheduled flight to the Eastern Trough Area Project (ETAP). The flight consisted of three sectors, with the first landing being made, at night, on the ETAP Central Production Facility Platform. Weather conditions at the platform deteriorated after the aircraft departed Aberdeen; the visibility and cloud base were estimated

as being 0.5 nm and 500 ft respectively. At 1835 hrs the flight crew made a visual approach to the platform during which the helicopter descended and impacted the surface of the sea. The helicopter remained upright, supported by its flotation equipment which had inflated automatically. All those onboard were able to evacuate the helicopter into its liferafts and they were successfully rescued by air and maritime Search and Rescue (SAR) assets.

The investigation identified the following causal factors:

1. The crew's perception of the position and orientation of the helicopter relative to the platform during the final approach was erroneous. Neither crew member was aware that the helicopter was descending towards the surface of the sea. This was probably due to the effects of oculogravic¹ and somatogravic² illusions combined with both pilots being focussed on the platform and not monitoring the flight instruments.
2. The approach was conducted in reduced visibility, probably due to fog or low cloud. This degraded the visual cues provided by the platform lighting, adding to the strength of the visual illusions during the final approach.

Footnote

¹ An oculogravic illusion is a visual illusion that affects the apparent position of an object in the visual field. A full explanation is provided in Appendix A and B to this report.

² A somatogravic illusion is a non-visual illusion that produces a false sensation of helicopter attitude. A full explanation is provided in Appendix A and B to this report.

3. The two radio altimeter-based audio-voice height alert warnings did not activate. The fixed 100 ft audio-voice alert failed to activate, due to a likely malfunction of the Terrain Awareness Warning System (TAWS), and the audio-voice element of the selectable 150 ft alert had been suspended by the crew. Had the latter not been suspended, it would also have failed to activate. The pilots were not aware of the inoperative state of the TAWS.

The investigation identified the following contributory factors:

1. There was no specified night visual approach profile on which the crew could base their approach and minimum heights, and stabilised approach criteria were not specified.
2. The visual picture on final approach was possibly confused by a reflection of the platform on the surface of the sea.

Findings

1. The helicopter was certified, equipped and maintained in accordance with existing regulations and approved procedures. At the time of the accident there were no recorded Acceptable Deferred Defects that might have contributed to the accident.
2. The flight crew were properly licensed and qualified to conduct the flight and were well rested. Their training was in accordance with the operator's requirements and they were in recent night deck landing practice.

3. The flight crew had the relevant meteorological information and, although the weather was suitable for departure, the helicopter entered an area of reduced visibility in the immediate vicinity of the ETAP platform.
4. A TAWS caution caption on the CWP illuminated en-route to the platform and was announced by the co-pilot who was the non-handling pilot. The caution immediately extinguished without crew intervention.
5. The commander, who was the pilot flying, initially briefed the co-pilot for an Airborne Radar Approach due to the updated weather at the ETAP platform.
6. The flight crew visually acquired the lights and flare of the ETAP platform at a range of about 20 nm. This led to their decision to carry out an en-route descent to a height of 300 ft to position the helicopter for a visual approach and landing.
7. The helicopter entered low cloud during the initial en-route descent to a height of 300 ft, so the crew initiated a climb. On reaching a height of 400 ft, the crew regained and were able to maintain visual contact with the ETAP. Consequently, a further climb to MEA was not carried out.
8. A second descent to 300 ft was initiated at a range of 1.5 nm but, again, the helicopter entered low cloud and a climb was commenced. At 400 ft the platform lights and the flare were visible and the commander stopped the climb and continued the approach.
9. There was no specified visual approach profile providing the crew with recommended range, height and rate of descent information for the approach. Also, there were no minimum heights at which a go-around must be initiated.
10. There was no specified procedure for the 'pilot not flying' to monitor the approach using the flight instruments.
11. The co-pilot stated the opinion during the climb, thinking that it was a go-around, that a second approach would be successful.
12. The commander de-selected the upper modes of the Automatic Pilot, at a range of approximately 0.75 nm, and suspended the height alert of the radio altimeter.
13. The commander executed a 20° banked turn to the left through 62°, during which the helicopter entered a continuous descent.
14. The co-pilot identified the descent and announced it to the commander but no corrective action was taken. He also provided range and speed information.
15. The commander could see the platform flare and diffused lights but not the green perimeter lights of the helideck.
16. The co-pilot could see the flare, diffused lights of the platform and the green perimeter lights of the helideck.
17. The green helideck perimeter lights were visible from below the elevation of the helideck.

18. The commander's attention became focussed on visually acquiring the helideck which was not visible to him.
19. The co-pilot monitored the helicopter's groundspeed and range from the platform and attempted to assist the commander in visually acquiring the helideck.
20. Both flight crew members were unaware of the helicopter's continued descent.
21. Neither pilot observed the oval shape defined by the perimeter lighting of the helideck and could not determine the helicopter's approach path angle.
22. The commander gradually pitched the helicopter's nose up in order to reduce speed. He maintained what he thought was a constant approach angle using the visual picture of the ETAP relative to his windscreen.
23. The fixed 100 ft height audio voice alert failed to activate, due to a likely malfunction of the TAWS, and the selectable 150 ft audio voice alert would also have failed to activate for the same reason, had it not already been suspended by the crew.
24. The pilots were not aware of the inoperative status of the TAWS.
25. The commander had the sensation that the helicopter was high and fast and increased the nose-up pitch attitude.
26. Both pilots thought that the helicopter was still above the level of the helideck when it impacted the surface of the sea.
27. It was probable that both pilots were subjected to the effects of oculogravic and somatogravic illusions possibly reinforced by the reflection of the platform lights in the surface of the sea.
28. The accident was survivable and all those onboard were rescued by a Search and Rescue helicopter and other surface vessels.

Safety Recommendations

Safety Recommendations made previously in Special Bulletin S4/2009 published on 23 June 2009.

Safety Recommendation 2009-064

It is recommended that the Civil Aviation Authority review the carriage and use in commercial air transport helicopters of any radio location devices which do not form part of the aircraft's certificated equipment.

Safety Recommendation 2009-065

It is recommended that the Civil Aviation Authority advise the European Aviation Safety Agency of the outcome of the review on the carriage and use in commercial air transport helicopters of any radio location devices which do not form part of the aircraft's certificated equipment.

Safety Recommendation 2009-066

It is recommended that the European Aviation Safety Agency require manufacturers of Emergency Locator Transmitters (ELT(S)s)/Personal Locator Beacons (PLBs) units to add details, where absent, of the correct use of the antenna to the instructions annotated on the body of such beacons.

Safety Recommendation 2009-067

It is recommended that the Civil Aviation Authority ensure that all aspects of Emergency Locator Transmitter (ELT(S))/Personal Locator Beacon (PLB) operation, particularly correct deployment of the antenna, are included and given appropriate emphasis in initial and recurrent commercial air transport flight crew training, as applicable.

Safety Recommendations made in this report.

Safety Recommendation 2011-049

It is recommended that the Civil Aviation Authority re-emphasises to Oil and Gas UK that they adopt the guidance in Civil Aviation Publication (CAP) 437, entitled *Offshore Helicopter Landing Areas - Guidance on Standards*, insofar as personnel who are required to conduct weather observations from vessels and platforms equipped for helicopter offshore operations are suitably trained, qualified and provided with equipment that can accurately measure the cloud base and visibility, in order to provide more accurate weather reports to helicopter operators.

Safety Recommendation 2011-050

It is recommended that the Civil Aviation Authority encourages commercial air transport helicopter operators to make optimum use of Automatic Flight Control Systems.

Safety Recommendation 2011-051

It is recommended that the Civil Aviation Authority ensures that commercial air transport offshore helicopter operators define specific offshore approach profiles, which include the parameters for a stabilised approach and the corrective action to be taken in the event of an unstable approach.

Safety Recommendation 2011-052

It is recommended that the Civil Aviation Authority commissions a project to study the visual illusions that may be generated during offshore approaches to vessels or offshore installations, in poor visibility and at night, and publicises the findings.

Safety Recommendation 2011-053

It is recommended that the Civil Aviation Authority (CAA) amends Civil Aviation Publication (CAP) 437, *Offshore Helicopter Landing Areas - Guidance on Standards*, to encourage operators of vessels and offshore installations, equipped with helidecks, to adopt the new lighting standard, for which a draft specification has been published in Appendix E of CAP 437, once the specification has been finalised.

Safety Recommendation 2011-054

It is recommended that the Civil Aviation Authority reviews the procedures specified by commercial air transport helicopter operators as to when a crew may or should suspend a radio altimeter aural or visual height warning.

Safety Recommendation 2011-055

It is recommended that the Civil Aviation Authority reviews commercial air transport offshore helicopter operators' procedures to ensure that an appropriate defined response is specified when a height warning is activated.

Safety Recommendation 2011-056

It is recommended that the Civil Aviation Authority reviews the procedures set out by commercial air transport offshore helicopter operators to ensure that a member of the flight crew monitors the flight instruments during an approach in order to ensure a safe flight path.

Safety Recommendation 2011-057

It is recommended that the International Civil Aviation Organisation introduces a Standard for crash-protected recordings of the operational status of Airborne Collision Avoidance System (ACAS) and Terrain Awareness and Warning System (TAWS) equipment, where fitted, on helicopters required to carry a flight data recorder.

Safety Recommendation 2011-058

It is recommended that the European Aviation Safety Agency requires that crews of helicopters, fitted with a Terrain Awareness and Warning System, be provided with an immediate indication when the system becomes inoperative, fails, is inhibited or selected OFF.

Safety Recommendation 2011-059

It is recommended that the European Aviation Safety Agency reviews the acceptability of crew-operated ON/OFF controls which can disable mandatory helicopter audio voice warnings.

Safety Recommendation 2011-060

It is recommended that the Civil Aviation Authority reviews the guidance in *Civil Aviation Publication (CAP) 562, Civil Aircraft Airworthiness Information and Procedures*, Part 11, Leaflet 11-35, *Radio Altimeters and AVADs for Helicopters*, regarding the pre-set audio height warning that is triggered by the radio altimeter and may not be altered in flight, to ensure that crews are provided with adequate warning to take corrective action.

Safety Recommendation 2011-061

It is recommended that the European Aviation Safety Agency ensures that helicopter performance is taken into consideration when determining the timeliness of warnings generated by Helicopter Terrain Awareness and Warning Systems.

Safety Recommendation 2011-062

It is recommended that the European Aviation Safety Agency reviews the frequency of nuisance warnings generated by Terrain Awareness and Warning System equipment in offshore helicopter operations and takes appropriate action to improve the integrity of the system.

Safety Recommendation 2011-063

It is recommended that the European Aviation Safety Agency, in conjunction with the Federal Aviation Administration, defines standards governing the content, accuracy and presentation of obstacles in the Terrain Awareness and Warning System obstacle database for helicopters operating in the offshore environment.

Safety Recommendation 2011-064

It is recommended that the European Aviation Safety Agency establishes the feasibility of recording, in crash-protected memory, status indications from each avionic system on an aircraft.

Safety Recommendation 2011-065

It is recommended that the European Aviation Safety Agency considers amending certification requirements for rotorcraft, that are certified in accordance with ditching provisions, to include a means of automatically inflating emergency flotation equipment

Safety Recommendation 2011-066

It is recommended that the European Aviation Safety Agency modifies European Technical Standard Order (ETSO) 2C70a and ETSO 2C505 to include a requirement for multi-seat liferafts, that do not automatically deploy their Sea Anchor, to include a label, visible from within the inflated liferaft, reminding the occupants when to deploy the Sea Anchor.

Safety Recommendation 2011-067

It is recommended that the Federal Aviation Administration modifies Technical Standard Order (TSO) C70a to include a requirement for multi-seat liferafts, that do not automatically deploy their Sea Anchor, to include a label, visible from within the inflated raft, reminding the occupants when to deploy the Sea Anchor.

Safety Recommendation 2011-068

It is recommended that the European Aviation Safety Agency requires Eurocopter to review the design of the fairings below the boarding steps on AS332 and EC225 series helicopters to reduce the possibility of fairings shattering during survivable water impact and presenting sharp projections capable of damaging liferafts.

Safety Recommendation 2011-069

It is recommended that the European Aviation Safety Agency, in conjunction with the Federal Aviation Administration, review the design requirements

and advisory material for helicopters to require 'delethalisation' of the fuselage to prevent damage to deploying and floating liferafts following a survivable water impact.

Safety Recommendation 2011-070

It is recommended that the European Aviation Safety Agency ensures that a requirement is developed for all emergency equipment, stowed in deployable survival bags, to be capable of being easily accessed and utilised by the gloved hands of a liferaft occupant whilst in challenging survival situations when a liferaft may be subject to considerable motion in cold, wet and dark conditions.

Safety Recommendation 2011-071

It is recommended that the European Aviation Safety Agency reviews the location and design of the components and installation features of Automatically Deployable Emergency Locator Transmitters and Crash Position Indicator units, when required to be fitted to offshore helicopters, to ensure the reliability of operation of such units during and after water impacts.