SHERIFFDOM OF GLASGOW AND STRATHKELVIN AT GLASGOW

Court ref: GLW-B1473-18

WRITTEN SUBMISSIONS FOR SAFRAN HELICOPTER ENGINES

In the

FATAL ACCIDENT INQUIRY

into the deaths of

GARY LOUIS ARTHUR,

ANTHONY LYNDON COLLINS,

JOSEPH ROBERT CUSKER,

COLIN GIBSON,

ROBERT JAMES JENKINS,

JOHN MCGARRIGLE,

SAMUEL BELL MCGHEE,

KIRSTY MARY NELIS,

MARK EDWARD O'PREY and

DAVID IAIN TRAILL

1) These submissions, on behalf of SAFRAN HELICOPTER ENGINES ('Safran"), have been prepared under reference to the Consolidated List of Issues before the Inquiry ("The Issues") and to the statutory questions posed by section 26(2)(a) - (g) and (4) of the Inquiries into Fatal Accidents and Sudden Deaths etc. (Scotland) Act 2016 ('the 2016 Act').

2) Safran adopts the submissions and findings in fact proposed by the Crown, subject to the points raised below.

3) In particular, Safran agrees that the findings and conclusions of the AAIB in its investigation into the G-SPAO crash should be adopted by the Inquiry, noting that support was, as always, willingly provided to the AAIB during its investigation by Safran, and other parties, reflecting their ongoing commitment to maintain safety.

4) In this regard, it is worth remembering that up until the G-SPAO accident, "the EC135 had accumulated more than three million flying hours, over a period of about 20 years, and there had not been a reported instance of fuel starvation." (AAIB report 3/2015, Crown Production 327 at para 1.18.2.2).

5) Submissions relating to specific proposed findings in fact are as follows:

Water Contamination (Paras 34 - 39 of Crown submissions)

6) There is always some water in helicopter fuel systems and it can never be excluded. (See for example Nikolai: Day 10, page 19, lines 2-7).

7) Water ingress post cold compressor washes, and more particularly 50 hour cleans (Vickery: Day 5, page 39 lines 1-2), first arose in 2003 following the introduction of Eurocopter Service Bulletin EC135-71-011 (Production 234), and after seven years of trouble free operation post the aircraft's introduction in 1996.

8) Engine washes were a necessary and normal part of maintenance given the UK's saline atmosphere (Nikolai: Day 10, page 35 lines 14-19 and Taylor: Day 18, page 84, lines1-6).

9) The suggestion that water entering via the expansion tank may be in a partially emulsified state, via the fuel injectors, was based on assumption rather than testing or expertise (Mendick: Day 8, page 55, lines 14 – 17 and page 100 line 13).

10) However, such joint testing as was done by engine specialists from Turbomeca and Eurocopter/Airbus, firstly at Saxony Police in July 2013 (Crown Production 442), and secondly with Bond at Staverton in March 2014 (Crown Production 257), did not in fact demonstrate this. Both tests involved multiple cold washes. In the first test no contamination through the injectors (or the HMU post proposed EC modification of

the HMU drain line – see p4 of the report), was found, and in the second, 0.5 ml of fluid was recovered which was clearly distinct from the fuel. (Price: Day 16, page 97, lines 8 -16 and Crown Production 257, page E7, Figures 2 and 3).

11) This bears out the findings of the AAIB report that Bond were reporting water and compressor wash fluid entering the fuel tanks of their EC135 fleet under a cold compressor washing routine, which happened at random, and needed approximately "800 ml of water contaminated fuel" in the aircraft expansion tank before it made its way to the fuel tanks. (Crown Production 327 para. 1.16.3, final paragraph E68).

12) The finding of compressor wash fluid is unremarkable in itself given that in accordance with the EMM (Crown Production 332, E466) the mixture had to be homogenised before being used (Taylor: Day 18, page 34, lines 20-23 and Vickery: Day 5, page 64, lines 10-18).

13) As set out in the AAIB Report, emulsification "tended to occur when fuel and free contaminants passed through the fuel pumps" (Crown Production 327, page E67. See also Vickery: Day 5, page 57, lines 8-20).

14) It should also be remembered that helicopters by their nature vibrate (Nikolai: Day 10, page 33 lines 12-15), that fuel moves around dynamically (Vickery: Day 5, page 6. Lines 19-25 and Crown Production 1394, page 26 paragraph 3.8, last sentence), and that in any event daily draining did not remove all free water (Crown Production 1394, page 26 paragraph 3.8).

Sections 26(2)(a) of the 2016 Act: when and where the deaths occurred
Paragraph 1 of Issues

15) Reference is made to the first joint minute of agreement of evidence. Findings reflective of those facts are invited for the purposes of section 26(2)(a) of the 2016 Act.

Section 26(2)(b): when and where any accident resulting in the deaths occurred
Paragraph 2 of Issues

16) Reference is made to the first joint minute of agreement of evidence. Findings reflective of those facts are invited for the purposes of section 26(2)(b) of the 2016 Act.

Section 26(2)(c): the cause or causes of the death
Paragraph 3 of Issues

17) Reference is made to the first joint minute of agreement. Findings reflective of those facts are invited for the purposes of section 26(2)(c) of the 2016 Act.

Section 26(2)(d): the cause or causes of any accident resulting in the death
Paragraph 4 of Issues

18) Safran have nothing to add to the Crown submissions save in the following respects:

4.10. what the root cause or causes were of any such false fuel indications and whether they were adequately investigated and acted upon prior to the accident;

19) Paragraphs 4.10.1- 4.10.5. of the Crown's written submissions are adopted.

20) As for paragraph 4.10.6, it was clear on the evidence that Airbus, had design authority and therefore had to effect change to their initial 2003 modification (Nikolai: Day 19, page 102, lines 1-25). This was achieved by issuing SB EC135-71-047 in 14 April 2014 (Crown Production 254), although earlier attempts at modification had been made to mitigate the problem.

21) Moreover, there was particular awareness of the issue within Bond with the result that there may have been disconnection of drain pipes in 2013 anyway (Price: Day 16, pages 89-92 and Booth: Day 12, page 43, lines 5–23).

22) It is also noteworthy that further investigations were ongoing prior to the crash but did not reveal the existence of problems. See report of joint testing by Turbomeca and Eurocopter at Saxony Police in July 2013 (report contained within Crown Production 442).

23) Finally, and as noted already, water will always be found in helicopter fuel systems. Many of the reported instances of water being found in samples post 2013 may reflect

the three alternatives sources routinely referred to in evidence, namely heavy rain, condensation, or contaminated fuel at source, over and above cold compressor wash.

24) The suggestion that problems of water contamination post cold compressor wash or clean may not even now have been adequately resolved may reflect events prior to all modifications introduced by Airbus and Safran being implemented. With retrofitting of vent hoses and disconnection of fuel drains, carried out as recommended, contamination will be prevented.

Section 26(2)(e): any precautions which- (i) could reasonably have been taken; and (ii) had they been taken, might realistically have resulted in the death, or any accident resulting in the death, being avoided
Paragraph 5 of Issues

25) Safran have nothing to add to the Crown submissions.

Section 26(2)(f): any defects in any system of working which contributed to the death or any accident resulting in the death
Paragraph 6 of Issues

26) Safran have nothing to add to the Crown submissions.

Section 26(2)(g): Any other facts which are relevant to the circumstances of the death
Paragraph 7 of Issues

27) Safran have nothing to add to the Crown submissions save in respect of paragraph 7.2 as follows:

28) In addition to the concession issued by Safran to Bond on 8 December 2014 (Babcock production 21) Safran have issued two Service Letters to address the potential of water ingress post compressor wash via the injectors.

29) The first was SL 2924/14 Arrius2B, dated 1 August 2014, (Crown Production 343) which as well as highlighting Airbus IN 2535-I-28 (Crown Production 227) and Airbus SB EC135-71-047 (Crown Production 254), references the discovery of

limited quantities of water (0.5 ml) at the main injector purge. Disconnection of the main injector drain pipe was recommended.

30) The second letter (Crown Production 496) superseded SL2929/14 Arrius2B, dated 1 August 2014, with a 2nd Issue dated 17 March 2017 which was subsequently incorporated into the Engine Maintenance Manual Update of 2017.

31) Both documents were examples of Safran following Airbus in recommending disconnection of drains to prevent water contamination (See Mendick: Day 9, page 121, line 6 – page 122, line 23, and Remfry: Day 20, page 85, line 11- page 87, line 13).

32) Crown Production 1422, the update of 9 April 2019 on the safety actions of the helicopter manufacturer reported in the AAIB Report 3/2015, produced by Airbus Helicopters, confirms, at the foot of page 3 and onto page 4, all of the steps set out above. It adds that both aircraft and engine manufacturers continue to work together to avoid water contamination.

Recommendations under section 26(1)(b) and (4) of the 2016 Act

33) The 2016 Act gives the Sheriff discretion to make recommendations as to the taking of reasonable precautions, the making of improvements to, or introduction of, a system of working, or the taking of any other steps, which might realistically prevent future deaths in similar circumstances.

34) It is respectfully submitted that, on the evidence in so far as it relates to Safran, there are no matters that would usefully be addressed by any recommendation of this sort.

IN RESPECT WHEREOF

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