FACTUAL REPORT – ATTACHMENT 6

Interview Summaries

# AIRWORTHINESS

ERA21FA233

# Record of Conversation

Monday, July 26, 2021
8:00 AM

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| **Interview:** | Frankie Marrero |
| **Phone:** | [redacted] |
| **Location:** | Telecon |

**Narrative:**

The following is a summary of conversation with Mr Frankie Marrero who was the FAA Administrative Designated Engineering Representative (DER) managing the Blackhawk Mission Equipment fire tank STC application.

Attendees:

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|---|---|
| NTSB (AS40) | Van McKenny |
| NTSB (IIC) | Daniel Boggs |
| DER Frankie LLC | Frankie Marrero |

Mr Marrero said that he was aware of the BHI H-60 accident and that it had been 14 months since his last review of the water tank installation structural analysis. A company called HD Aero out of Colorado performed the analysis, which is managed by the Denver ACO. Rolf Hamerquist of HD Aero was the structures DER who was responsible for the analysis. Mr Marrero said that he himself was responsible for the proof reading of the document to ensure that the correct part numbers, drawing numbers, and nomenclature of all the assemblies were correct. They were working as a team, the structures DER performed the analysis and Mr Marrero would review the analysis for accuracy regarding parts and assemblies, but not the actual analysis calculations.

Overall, Mr Marrero was acting as the certification project engineer for BME (Blackhawk Mission Equipment) at the time. BME hired him to be their certification project engineer. He managed the hiring of all the DERs required to conduct the STC application.

Mr Marrero said that his background consisted of 38 years in the aerospace industry, holding a A&P license, employment with various airlines and companies (Sikorsky Aircraft, Bell Helicopters), has a degree in professional aeronautics from Embry Riddle Aeronautical

University, and became an Administrative DER in 2003. However, the FAA eliminated the designation of Administrative DER in October 2017. While the designation existed, an Administrative DER acted as a certification project manager with key knowledge of the certification process per Part 21. As an Administrative DER Mr. Marrero's responsibility was to ensure every single document submitted to the FAA, be it a STC, TC, major repair or alteration was correct. He ensured the information was correct on everything linked to the drawings and everything in the report was based on approved data. He was also responsible for regulatory compliance and followed the compliance checklist.

Technical issues of the report need to be addressed by Rolf Hamerquist.

Regarding the discrepancy of snorkel pump weight in the report verses the actual weight of the assembly, Mr. Marrero said that the weight information was provided to him by the STC applicant, and that he did not verify or validate the weight of the assembly, nor was he required to. Additionally, any information contained in the aircraft weight and balance was for the test aircraft and not the aircraft involved in the accident.

Regarding the use of the emergency landing loads per Part 29.561(d) he said that would have been based on the amendment level that was required per the type certificate of the aircraft.

Van S. McKenny IV
Aerospace Engineer (Helicopters)
Aviation Safety Engineering Div (AS-40)

# Record of Conversation

Tuesday, July 27, 2021
11:00 AM

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| **Interview:** | Rolf Hamerquist |
| **Phone:** | [redacted] |
| **Location:** | Telephone |

**Narrative:**

The following is a summary of conversation with Mr Rolf Hamerquist, who is the structural DER that checked the structural analysis report for the Blackhawk Mission Equipment (BME) water tank STC application.

Mr Hamerquist said that he and another DER, Lonnie Davidson, run a consulting company called HD Aero. Mr Hamerquist is delegated (structures) for helicopters and aircraft under Parts 23, 25, 27, & 29. Mr Davidson is another DER and is his partner in the company, but is not delegated for helicopters. Per the PSCP, Mr Hamerquist was the DER for structures and approved the analysis report.

Mr Frankie Marrero from Firehawk/BME was managing the project, and they had come up with a tank they wanted to use. It was determined that the tank would need to be tested for emergency landing loads to show the liquid would be restrained. There was some reluctance to do that because it would likely be a destructive test, and they were not budgeted for that. At that point HD Aero got involved. They determined that the tank was going to need reinforcement and that they likely could do component testing to meet certification criteria without doing a full-up test. They got involved in adding structure to the tank, specifically how the tank was connected to the interior. Overall, as the tank had been built, it did not meet the regulatory requirements. The tank needed attachments added to the top of the tank and included reinforcing plates on the back (more than just inserts) in order to meet regulatory requirements.

The project was managed by the Denver ACO, and both he and Mr Davidson as DER's were managed by the same ACO. They had some involvement in setting up the PSCP and compliance checklist, but mostly that was being managed through BME by Mr. Marrero. Mr.Marrero was the program manager and HD Aero would provide information to Mr Marrero, and Mr Marrero would then put it together for the FAA.

BME asked HD Aero to look at the whole tank and tank installation on the aircraft. The conditions were evaluated by using AC 21-101 (change of product rule) and it was determined that the water tank design was not a significant change. They were then able to apply the original certification basis for the helicopter, as determined in the PSCP. They determined that the critical conditions were the emergency landing conditions, which established the envelope for the loads analysis.

The way the factor of safety is applied is as a limit condition (what the aircraft could see during the lifetime of the fleet), thus a maximum limit condition is calculated. Normally a 1.5 factor of safety is applied to the limit condition. However, when considering emergency landing loads, these are criteria loads and therefor don't need to have the factor of safety applied to them. For these conditions the margin of safety is calculated by determining the capability of the structure and dividing by the applied load and subtracting 1, which provides the margin of safety value.

With regards to loads imparted on to the snorkel support structure of the tank, the primary focus was on static loads. Lateral or dynamic loading of the snorkel support appears to not have been considered. Generally, Mr Hamerquist thought that the program would have been looking at lateral loads on the snorkel support, but he could not recall if it was discussed or if there was rationale for not including it in the analysis.

Regarding the fact that HD Aero was provided incorrect pump-hose assembly weight (50 lbs vs 130 lbs), for the vertical static case, even with a 30% increase, the margin of safety would still be about 0.9. Looking at the flange fastener loads, which are relatively small, however the flanged composite is kind of weak, but there still remains more capability on that flange even with the heavier pump-hose assembly weights. The analysis only addresses the vertical static load case, it does not examine lateral load or dynamic load cases.

When considering lateral loads the question arises as to how a flexible hose (behaving similarly to a rope) would impart a load and maybe it becomes more of a dynamic impact type of question. This type of question would not normally be considered by this type of analysis.

Van S. McKenny IV
Aerospace Engineer (Helicopters)
Aviation Safety Engineering Div (AS40)