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SEP 5 2013

MEMORANDUM

From: L.P. CURRIER, VADM
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To: Distribution

Subj: FINAL ACTION ON THE ADMINISTRATIVE INVESTIGATION INTO THE CRASH OF CG-6535 THAT OCCURRED ON 28 FEBRUARY 2012

1. **Overview:**

On 28 February 2012, at approximately 1910 local time, CG-6535, an MH-65D helicopter assigned to Coast Guard Aviation Training Center (ATC) Mobile, Alabama, was lost in Mobile Bay. CG-6535 was conducting a training flight, including approaches to the water, basket hoists with a 41-foot motor vessel, rescue swimmer hoists, and night water hovering/position keeping. The aircrew consisted of a qualified ATC instructor pilot as Pilot-in-Command (PIC), a pilot under instruction as Copilot (CP), a flight mechanic (FM), and a rescue swimmer (RS). Training was conducted as planned, but weather conditions deteriorated during the flight. After the final hoist, the PIC passed the controls to the CP to practice hovering at night with the assistance of the flight director's hover augmentation (HOV-AUG) mode. After two minutes of hover work, the PIC elected to depart for ATC. Based on cockpit recorded dialog, it appears that Night Vision Goggles (NVGs) were in use by the PIC. The PIC disengaged the HOV-AUG mode and the CP initiated an instrument departure toward 1,000 feet. Sometime after the aircraft ascended above 200 feet, but below the maximum recorded altitude of 362 feet, the PIC noticed they had entered Instrument Meteorological Conditions (IMC) and immediately took the controls. IMC describes weather conditions that require pilots to fly primarily by reference to instruments rather than by outside visual references. Sixteen seconds prior to the mishap, the PIC stated his intention to slowly come down to try and regain visual conditions and requested that the CP provide the Radar Map page on the PIC's multi-function display flight instrument. Approximately 2.4 seconds prior to impact, the PIC increased collective pitch and aircraft torque. The aircraft impacted the water with a descent rate of 2,197 feet per minute at 84.5 knots airspeed. All four aircrew members perished.

This document sets forth the material facts, as determined by the Administrative Investigation, which led to this mishap, states my conclusions and orders actions to further mitigate risks in an effort to prevent similar incidents and tragic loss of life.

2. **Findings of Fact and Opinions:**

Coast Guard Aviation Training Center in Mobile, Alabama is a multi-mission unit, acting as the Service's aviation training and capabilities development center, as well as an operational air station. ATC conducts training to qualify Coast Guard pilots in all Coast Guard aircraft including the H-65.

CG-6535 was an MH-65D helicopter primarily used for flight training at ATC. Built in 1986, CG-6535 had been through seven major maintenance overhauls. It was re-engined in August 2006. It was placed into service at ATC on 12 June 2011 after a six month maintenance availability at the Aviation Logistics Center in Elizabeth City, North Carolina. CG-6535 contained up-to-date technology, a robust Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) suite, and other new equipment replacing its navigation system and gyros with a digital Global Positioning System and inertial navigation systems. A review of maintenance records revealed no outstanding maintenance or mechanical trends. The helicopter was properly equipped for hoisting and Instrument Flight Rules (IFR) operations on the evening of 28 February 2012. IFR refers to a ceiling less than 1,000 feet and/or visibility less than three (3) miles. All required maintenance had been completed prior to the mishap. There is no evidence that a mechanical failure or maintenance practice contributed to this incident.

The details of CG-6535's flight the evening of 28 February 2012 are as follows: CG-6535's scheduled flight was a syllabus flight, Night Water One (NW-1). NW-1 includes training in approaches to water, boat hoist familiarization, rescue swimmer hoist familiarization, and night water hovering and position keeping. The Aviator's Night Vision Imaging System (ANVIS)-9's, were the type of NVGs used during this flight. Qualified NVG pilots are able to conduct rotary wing operations including visual and instrument approaches to the water, hoists and rescue swimmer deployment and recovery sequences. This flight was for the benefit of the CP who was nearing the completion of his course. The CP had reported to ATC on 16 January 2012 for his MH-65D Transition Course, a seven-week series of events established to qualify aviators as copilots in the MH-65D aircraft.

All times are local, central standard time.

Scheduled ramp time was 1645, scheduled takeoff time was 1730, and scheduled on-scene time with ATC's contract training vessel, the M/V SOLOMON, a 41-foot boat, was 1745.

At 1600, the FM and an AMT2 from another crew conducted a thru-flight inspection of CG-6535, which had been flown on a training mission earlier that day.

At about the same time, the PIC provided a student brief to the CP in the student briefing spaces on the second deck of Hangar One. The CP had received the brief before, but his scheduled flight (on the previous night) was cancelled because of weather. The PIC and CP checked the weather computer, and reviewed the preflight service record.

CG-6535 received a properly documented preflight inspection. The PIC and CP fulfilled the NW-1 event prerequisites. The PIC completed and signed the Aviation Logistics Management Information System (ALMIS) documentation for CG-6535. The crew completed a pre-flight brief, inspected the aircraft, started the aircraft, and taxied for departure without incident. The PIC occupied the right (pilot) seat and the CP was in the left (copilot) seat.

CG-6535 departed ATC Mobile at 1721 in visual meteorological conditions (VMC) and flew to Mobile Bay following visual course rules on the established "Church Departure" flight route. Local sunset time in Mobile Bay occurred at 1750. VMC describes conditions in which pilots have sufficient visibility to fly the aircraft maintaining visual separation from terrain and other aircraft.

The CG-6535 crew briefed and completed four approaches to the water. The CP briefed the M/V SOLOMON and the PIC completed four uneventful basket hoist evolutions. Following the basket hoisting, the PIC completed four Rescue Swimmer (RS) hoisting evolutions with the M/V SOLOMON providing cover. The first RS hoist was completed without difficulty. During the second RS hoist, however, the PIC began to struggle to maintain heading. During the third and fourth RS hoists, the PIC struggled to maintain heading and position and had difficulty recovering the RS. During the post mishap investigation, the M/V SOLOMON reported having difficulty seeing CG-6535 and the simulated survivor during the RS hoisting portion of the NW-1 event due to poor visibility.

After the completion of RS hoisting, the PIC transferred the controls to the CP for over-water hover training. The CP spent two minutes practicing over-water hover position keeping using the Hover Augmentation (HOV-AUG) flight director mode. HOV-AUG assists the pilot with maintaining a steady hover. Following the over-water practice hovering, the PIC directed the aircraft to be reconfigured for forward flight and disengaged the HOV-AUG mode. Forty-four seconds prior to the mishap, the CP began a manual instrument takeoff/departure (ITO) from the over-water hover. A manual ITO is conducted without the assistance of the aircraft's flight director modes. During the ITO, the PIC acknowledged that a positive rate of climb was established and discussed hoisting performance with the RS. Shortly after CG-6535 ascended above 200 feet, but below the maximum achieved altitude of 362 feet, the PIC recognized the aircraft had encountered IMC and verbalized a transfer of control of the aircraft.

The PIC assumed control of the aircraft approximately twenty-three seconds prior to the mishap. Sixteen seconds prior to the mishap, the PIC stated his intention to slowly come down to try and regain visual conditions and requested the CP provide the Radar Map page on the PIC's multi-function display flight instrument. The PIC did not verbalize the minimum altitude he intended to descend to or alter the pilots radar altimeter warning setting. While maneuvering the aircraft without the assistance of the aircraft's flight director, CG-6535 entered an attitude indicating a right hand turn greater than 43 degrees angle of bank, 5.5 degrees per second yaw rate to the right, and 22 degrees nose down attitude. Approximately 2.4 seconds prior to the impact, the PIC increased collective pitch and aircraft torque. The aircraft impacted the water with a descent rate of 2,197 feet per minute at 84.5 knots airspeed.

Having completed the training operations for the evening and unaware the mishap had occurred, M/V SOLOMON contacted the ATC Operations Duty Officer requesting to return to port. CG-6535 did not respond to call-outs from ATC Mobile. Sector Mobile initiated lost communications procedures for CG-6535 and ATC Mobile directed the M/V SOLOMON to proceed to CG-6535's last known position. Minutes later, the M/V SOLOMON located CG-6535 inverted in the water and reported this sighting to Sector Mobile.

Sector Mobile assumed Search and Rescue (SAR) Mission Coordinator duties, and began executing a SAR response. Throughout the SAR response, Sector Mobile surface assets, ATC Mobile air assets, Alabama Marine Resources, and several other local government responders assisted in the effort. The RS was found in the water and recovered within minutes of the response approximately 40 feet from CG-6535. Attempts to revive the RS were unsuccessful. No other crewmembers were recovered that evening. On 1 March 2012, the PIC was recovered from the seabed 400 yards from CG-6535's fuselage. Later that day, the CP was recovered from the seabed 300 yards from the PIC. On 8 March 2012, the FM was recovered from the water's surface, several miles from the site of impact. All were transported to NAS Pensacola for autopsies.

On 1 March 2012, a commercial salvage company lifted CG-6535 from the seabed recovering many components. The majority of CG-6535 including the fuselage, engines, and gearbox were recovered and transferred to Sector Mobile. They were then offloaded for transport to Fort Whiting, Alabama for analysis by the Commandant's Mishap Analysis Board (MAB). Following MAB analysis, the wreckage of CG-6535 was transferred to the Aviation Logistics Center in Elizabeth City, NC. The aircraft was deemed a total loss.

The MH-65 Operational Flight Manual, CGTO 1H-65C-1 does not include inadvertent IMC procedures. The procedures exist for several U.S. Navy aircraft. Inadvertent IMC calls for establishing an instrument scan and climbing to a safe altitude. PIC actions indicate that inadvertent IMC was encountered and that he was attempting to descend to regain VMC.

The aircrew's training requirements were current. The PIC had 3,972 hours of flight time, including 3,628.6 in the H-65 airframe, and 20 flight hours in the 30 days preceding the mishap. The CP had 263 hours of flight time, including 39 in the H-65 airframe, and 9.8 hours in the 30 days preceding the mishap. For the FM, 4.5 hours of flight time were logged during the 30 days prior to the mishap. For the RS, 4.2 hours of flight time were logged during the 30 days prior to the mishap. The adequacy of aircrew flight time did not contribute to the mishap.

Prior to the evening of 28 February 2012, the PIC's most recent night/NVG flight was on 11 January 2012. His most recent night/NVG boat or night/NVG RS hoisting was on 19 August 2011. His most recent day boat or RS hoisting was on 16 February 2012. While the PIC was current in NVG boat and NVG RS hoisting flights, more than six months had elapsed since he had performed this type of flight. Though mitigated by recent day boat and RS hoisting, the PIC lacked recency and proficiency in night/NVG boat hoist and RS operations.

The CP's most recent night/NVG flight occurred on 9 February 2012 (NVG Check flight). The CP's total NVG flight time during the transition course was 5.9 hours. The CP's most recent day rescue swimmer hoist occurred on 17 February 2012. He completed a night operational simulator flight in the MH-65D Operational Flight Trainer on 21 February. This simulator flight included night and NVG approaches to the water as both the pilot at the controls and the safety pilot. This simulator flight also included practicing the use of NVGs while in a hover. The CP's training recency is consistent with the MH-65D curriculum and did not contribute to the mishap. The CP's performance throughout the MH-65D syllabus was to standard.

Prior to the mishap, the CG-6535 crew met all crew rest requirements in accordance with the Coast Guard Air Operations Manual, COMDTINST M3710.1F. The PIC, CP, and FM were medically qualified. The RS did not have a current flight physical; however, this administrative error did not contribute to the mishap.

The weather at the time of departure and forecasted for the evening allowed flight in VMC. Flight under Visual Flight Rules was appropriate to conduct the training event. Weather was not forecasted to deteriorate below VMC until approximately 2100 local time. During the approaches to the water, the crew of CG-6535 commented on the weather being good. During the RS hoisting portion of the event, ceilings had lowered to 400 feet and visibility began to deteriorate. This factor was noted by the M/V SOLOMON but not conveyed to CG-6535. Prior to departure from hover operations, the PIC and CP were using NVGs, which may have affected their ability to recognize weather deterioration. It appears the PIC remained NVG-aided for the remainder of the flight. There are no indications the crew of CG-6535 recognized the changes in weather conditions until 23 seconds prior to the mishap when IMC was inadvertently encountered.

Adherence to standardized flight training and procedures is evaluated through annual standardization team visits to all operational units. These visits examine unit training programs, proficiency under actual conditions, and provide refresher training opportunities. ATC Mobile received an annual standardization visit from 17 to 27 January 2012 with no deficiencies that had bearing on this mishap. Annual standardization team evaluation summaries are provided to the Commanding Officer of the unit in order to both improve performance and recognize trends. Annual standardization team evaluations are not provided to aviation program managers or Force Readiness Command (FORCECOM). Although not directly related to this mishap, review of these evaluations by aviation program managers and FORCECOM would allow evaluation of fleet-wide trends and the sharing of best practices with the entire aviation community.

3. **Findings and Directed Action:**

A. Based on FORCECOM's memorandum dated 8 March 2012, it has already been determined that all CG-6535 crew members died in the line of duty and not due to misconduct.

B. I find that this mishap was caused by pilot error.

I base this finding on the following facts:

1. There is no evidence to indicate mechanical failure of the airframe or its components.

2. CG-6535 impacted the water in an unusual attitude and high rate of descent.

3. The PIC stated his intentions were to "slowly come down."

4. The PIC increased collective and aircraft torque two seconds prior to impact.

5. The CP did not make any statements beyond the act of transferring the controls to the PIC after instrument meteorological conditions were encountered.

C. I find that inadvertent IMC entry and lack of established inadvertent IMC entry procedures contributed to this mishap.

I base this finding on the following facts:

1. There are no Coast Guard published inadvertent IMC procedures.

2. At the time of the mishap, the weather reporting station located closest to the training area reported visibility of 4.4 NM and a 400 ft ceiling.

3. During the post mishap investigation, the M/V SOLOMON reported having difficulty seeing CG-6535 and the rescue dummy during the RS hoisting portion of the NW-1 event.

4. The PIC recognized that IMC was encountered during the CP's manual ITO maneuver.

5. Federal Aviation Administration published inadvertent IMC procedures call for a climb to safe altitude. U.S. Navy training publications address this condition in several aircraft types.

6. Prior to impact, the PIC indicated that his intentions were to slowly descend to reach VMC.

Action: As a result of this finding, I direct that:

1. Within thirty days of my signature on this memorandum, ATC Mobile through FORCECOM publish the inadvertent IMC procedures that have been developed by the Transition Flight Working Group (TFWG) in both the pre-flight briefings and emergency procedures for all Coast Guard aircraft.

D. I find that lack of recent night/NVG over-water operations by the PIC contributed to this mishap.

I base this finding on the following facts:

1. Prior to the evening of 28 February 2012, the previous time the PIC had performed night/NVG boat or night/NVG rescue swimmer hoisting was on 19 August 2011.

2. The PIC experienced difficulty in maintaining heading and position during the RS hoisting portion of the NW-1 event.

Action: As a result of this finding, I understand that:

1. ATC Mobile has undertaken a careful review of TRADIV IP proficiency and instituted a requirement for H65 IPs to conduct night/NVG hoist training every ninety days at a minimum, preferably with another TRADIV IP or ATC staff.

2. ATC Mobile has made changes to ATC Mobile Standard Air Operating Procedures, ATCINST 3710.1. In addition to semiannual minimums, IPs shall conduct a night/NVG hoisting event every 90 days at a minimum. If more than 90 days passes since an IP's last night/NVG hoisting event, a night/NVG hoisting flight shall be conducted with a qualified pilot prior to hoisting with an unqualified-in-type student. Recurrent training flights should be completed with qualified pilots.

3. ATC Mobile conducted an exhaustive review of all aircrew training records to ensure 100% compliance and standardization.

4. On 15 March 2012, the Deputy Commandant for Operations (DCO) directed "Operational Commanders [to] ensure that Air Station leadership focus on overall experience level and recency of mission set experience when determining flight crew assignments to manage operational risk during all training and operational missions." This directive pertains to this mishap and shall continue to be reinforced across the fleet.

E. Additional Observations. Although not considered causal or contributory to this mishap, additional matters were raised during the course of this investigation that warrant attention.

Action: In order to improve oversight and enhance effectiveness, I direct the following actions:

1. ATC Mobile shall provide Annual Aviation Standardization Reports to the aviation program manager and the Assessment Division within FORCECOM.

2. FORCECOM shall ensure that the Assessment Division conducts an annual analysis of standardization reports and provides trends and best practices to the aviation community.

3. CG-1 shall complete a one time audit to ensure flight physical currency across the aviation fleet.

4. CG-11 shall develop procedures to flag expiring flight physicals at operational units.

4. **Summary:**

Night Rescue swimmer operations and hovering over the water at night are among the most demanding of the recurring maneuvers Coast Guard aviators must perform in order to maintain proficiency. Night approaches to the water and departures from night water evolutions are also extremely demanding. Varying and quickly changing environmental conditions make these maneuvers even more challenging. Night time operations, deteriorating weather, transition flight, and inadvertent entry into IMC amplified the inherent risks of this operation. Absent inadvertent IMC entry procedures, the PICs instinctive reaction was to descend in altitude rather than climb. In this case, the air crew was properly qualified and followed current procedures. They began a challenging training evolution with every expectation of remaining within risk and safety parameters. Despite the PICs proven skills and experience, CG-6535 quickly entered into an unrecoverable situation. The basic age-old aviation dogma to aviate, navigate, and communicate holds true when pilots encounter unexpected and demanding situations. We honor the crew of the CG-6535 by learning from this tragedy and implementing actions directed herein. We must ensure a service-wide focus on continuous risk assessment and crew resource management.

I commend ATC Mobile and M/V SOLOMON for their diligence in executing lost communications procedures and Sector Mobile's outstanding resolve in their response and execution of SAR Mission Coordinator duties. I am extremely grateful to the many first responders, the Mobile community, and the State of Alabama for their compassionate response and support of the U.S. Coast Guard through this tragedy.

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