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CHIEF OF NAVAL AIR TRAINING
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5830
Ser N00J/273
9 Apr 18

THIRD ENDORSEMENT on Commander (b)(6) USN, ltr of 08 Nov 17

From: Chief of Naval Air Training
To: File

Subj: COMMAND INVESTIGATION INTO THE TRAINING SQUADRON SEVEN CLASS A AIRCRAFT MISHAP INVOLVING T-45C BUNO 165632 IN THE VICINITY OF TELLICO PLAINS, TN ON 01 OCTOBER 2017

Encl: (84) CNATRA T-45 Temporary Operating Instructions
(85) WINGSTATS Flight Data – LT (b)(6)
(86) WINGSTATS Flight Data – Capt (b)(6)
(87) WINGSTATS Flight Data – LT (b)(6)
(88) WINGSTATS Flight Data – LCDR (b)(6)
(89) Flight Data Report – Exceeded 4.0 Gs
(90) Flight Data Report – Exceeded 10,000 MSL
(91) PR Report of LT (b)(6) flight gear
(92) T-45C NATOPS Flight Manual, Chapter 4, section 4.14
(93) CNATRA P-1209 Flight Training Instruction, Strike, T-45 and IUT
(94) ONAV Ground School flight procedures training (ON1102)

1. After careful review of the subject investigation, I approve the findings of fact, opinions and recommendations of the Investigating Officer, as modified by Commanding Officer, Training Squadron SEVEN and Commander, Training Air Wing ONE except as set forth in paragraphs 3 through 5 of this endorsement. Any delay beyond the prescribed 20 days was due to necessary additional investigative steps to provide a thorough and complete endorsement.

2. Executive Summary

a. On Sunday, 1 October 2017, at approximately 1600 local (EDT), a T-45C jet aircraft assigned to Training Squadron SEVEN (VT-7) and piloted by LT Patrick Ruth (Instructor Pilot (IP)) and LTJG Wallace Burch (Student Naval Aviator (SNA)), impacted an isolated area of the mountainous National Forest near Tellico Plains, Tennessee. Tragically, neither the IP nor the SNA survived the crash.

b. The cause of the mishap was not due to mechanical, maintenance, or weather related issues. The cause of the mishap is not related to a physiological episode on the part of either the IP or the SNA nor due to inadequate written training procedures or directions. Rather, this mishap resulted from individual pilot error, a culture within VT-7, and Chief of Naval Air Training (CNATRA) at large, which fostered IPs and SNAs flying their aircraft beyond the

bounds of approved Naval Air Training Command (NATRACOM) curriculum, and a failure of leadership to oversee training operations to ensure strict adherence to all approved publications.

c. The mishap flight was the second leg of a properly scheduled Operational Navigation (ONAV) Low Altitude Awareness Training (LAAT) flight on an approved military training route (MTR). The aircrew was returning to their home base of Naval Air Station Meridian, as the final event in an approved weekend cross-country mission during which several ONAV LAAT training events were conducted.

d. As documented in the Second Endorsement, the IP was "flat hatting" (flight conducted at low altitude and/or a high rate of speed for thrill purposes) during various parts of this particular cross country training event, and actively encouraged/instructed his SNA to follow his example. The investigation further demonstrated that this IP was overly confident, nonchalant, and aggressive at low altitude training, with limited awareness of the performance capabilities of the T-45C in the LAAT environment. This attitude influenced the IP's instructional style, and conditioned the SNA to fly the aircraft in an aggressive manner, without correction from the IP.

e. At the time of the mishap, events were being flown at the direction of the IP that exceeded approved training curriculum, specifically tactical type maneuvers. This included aggressive ridgeline crossings and descending turns that took them below the minimum altitude of 500 feet above ground level (AGL) many times, to include potentially as low as 210 feet AGL. Per the written syllabus they should not have been operating so close to the limits of the aircraft's performance. Such advanced skills and abilities are the responsibility of the Fleet Replacement Squadrons (FRSs) to train and are not part of the NATRACOM curriculum.

f. Approximately 35 seconds before the mishap, the IP told the SNA that they would deviate from the direct line of the MTR in order to follow terrain. The IP assumed control of the aircraft 26 seconds before mishap, and commenced a descending turn to demonstrate terrain following techniques. The IP nonchalantly returned the aircraft to the SNA 10 seconds before the mishap, and then instructed the SNA to make a hard right turn. What neither the IP nor SNA knew was that they were too slow and too low relative to the rising terrain in front of them and that the attempted control input to recover was beyond the limitations of the aircraft. In response to their maneuvers the aircraft entered into a stall. By the time the aircrew realized they were in extremis, it was too late to eject safely.

3. Findings of Fact. I approve the findings of fact of the Investigating Officer, as modified by Commanding Officer, Training Squadron SEVEN and Commander, Training Air Wing ONE, along with Training Air Wing ONE's supplemental investigation, subject to the following additions and modifications.

a. FF 52 is disapproved.

b. FF 59: Restate to read "IUTs are taught from the ONAV Flight Training Instruction (FTI), P-1208, and Low Altitude Awareness Training (LAAT) Instruction, P-912, from which they gain

knowledge related to teaching the concepts, procedures, and administrative procedures for LAAT. [Encl (23)]"

c. FF 60: Restate to read "Per the Contract Simulator Instructor, the IUT ONAV ground syllabus consists of the procedures portion of the fourth day of ground school, which IUTs may attend or audit during a student class. [Encl (24)]"

d. FF 61: Restate to read "The procedures class teaches the basics of low-level way-point navigation and ONAV procedures. [Encl (21)]"

e. FF 62: Restate to read "Per the Contract Simulator Instructor, the ground school prepares the students for straight and level flying from point "A" to point "B," using heading, groundspeed, and timing while teaching chart interpretation at low altitude. [Encl (24)] "

f. FF 129: Restate to read "On 1 October 2017, LT Ruth was not qualified as a T-45C ONAV instructor since there is no documentation of him completing ground school as required. [Encls (18) (20) (78)]"

g. FF 217: Restate to read "ON4104 provides instruction on the question of the day (QOD), and how to perform low altitude flight safety, mission task management, and autosequential steering. [Encl (71)]"

h. FF 259: Restate to read "Low Altitude Awareness Training Rules state that aircraft shall immediately cease dynamic and low altitude maneuvering when aircraft descends in a turn that was intended to be level or when weather deteriorates below minimums or into inadvertent instrument meteorological conditions (IMC). [Encl (25)]"

i. FF 262: Restate to read "Per the CNATRA ONAV Standardization Officer, the standard briefed maneuver following the termination of dynamic and low altitude maneuvering due to an unsafe condition, emergency, or loss of situational awareness is a wings level 17 unit Angle of Attack (AOA) pull to climb above the briefed minimum safe altitude for the route. [Encl (23)]"

j. FF 348: Restate to read "During the OBOGS ORM Safety pause, LTJG Burch conducted 29 events in the simulator. [Encl (67)]"

k. FF 351: Restate to read "Squadron instruction permits the Commanding Officer to verbally update the Training Qualification Matrix outside of the normal Advanced Qualification Board cycles once CNATRA and TRAWING syllabus events are completed. [Encls (34) (69)]"

l. FF 362: Restate to read " Advanced Strike Phase, Operational Navigation stage does not include tactical maneuvering, nor terrain masking as required training objectives or critical items. [Encl (71)]"

m. FF 363: Restate to read "Advanced Strike phase, Operational Navigational stage includes ridge crossings as a maneuver item for ON 4105, and it is a discussion item for ON 4103. [Encl (71)]"

n. FF 364: Restate to read: "The Course Training Standards (CTS) in the Multi-Service Pilot Training System establish performance metrics for each maneuver listed in a block of training. For Advanced Strike Phase, the CTS for low-level navigation/procedures on "Ridge Crossing" reads: *"Executes ridge crossing IAW briefing and regulations. Maintains briefed altitude (-0 to +300 feet) and above minimum airspeed. Does not exceed maximum bank."* and is included as a critical item. [Encl (71)]"

o. FF 367: Restate second sentence to read "There is no in-depth discussion on terrain masking. [Encl (25)]"

p. FF 369 is disapproved.

q. FF 370 is disapproved.

r. FF 372: Restate to read: "Training support publications do define the 50-percent rule but not the 10-degree rule. [Encls (25) (46) (72) (73)]"

s. FF 379: Restate to read: "The Operational Navigation Flight Procedures are an important segment of training for strike pilots. The purpose of this training stage is twofold: (1) to introduce mission planning and chart interpretation for correct pilotage methods, and (2) to introduce basic multiplane reconnaissance techniques. [Encl (72)]"

t. FF 380: Restate to read: "Three options are given for returning to low altitude after a ridgeline crossing: 1) a wings-level bunt; 2) a roll to 90-120 degree AOB and unload, letting the intentional overbank help you achieve a roll-out dive angle for recovery; and 3) an inverted pull. The inverted pull technique, while used in the fleet, is not authorized in the Training Command. [Encls (25) (72) (76)]"

u. FF 381: Include enclosure (93).

v. FF 382: Restate to read: "Per a Cubic ONAV Standardization Instructor, "Simulator ONAV events for both student and instructors under training at NAS Meridian are flown on local low altitude training routes, which do not have vertical terrain. Students' first exposure to vertical terrain and ridgeline crossing is in the aircraft on ONAV flights outside the local area. [Encl (76)]"

w. FF 384: Restate to read "T-45C simulators cannot display Terrain Awareness Warning System (TAWS) alerts. The first time a student will see a TAWS alert is in the aircraft. Per the ONAV Stage Manager, TAWS is not addressed in ONAV flight briefs for either students or IUTs. [Encls (76) (77)]"

x. FF 385: Restate to read "Per the ONAV Stage Manager assigned to VT-7, it is common practice during ONAV flights that terrain masking is taught in the context of using large geographic formations to shield an aircraft. [Encl (77)]"

y. FF 386: Restate to read "Timing is incorporated into all ONAV flights. ONAV routes are planned/flown at 360 knots ground speed (KGS). Per the ONAV Stage Manager assigned to VT-7, this was interpreted to be 360±30 KGS and he stated that, the low end of this speed range is based on g-available for maneuvering. The high end is based on managing the risks of overstress, bird strike, and excess fuel consumption. Per the ONAV Stage Manager the low end could provide inadequate aerodynamic performance if the aircraft is maneuvered aggressively. [Encls (72) (77)]"

z. FF 388: Restate to read "Per the ONAV Stage Manager assigned to VT-7, it is common practice in all stages that ONAV standardization (stan) pilots – the IUT instructors – are expected to incomplete an IUT sortie as needed based on IUT proficiency, in order to allow for additional IUT sorties. IUTs are encouraged to request additional IUT sorties as needed until they feel comfortable instructing students in that stage. LT Ruth flew two additional IUT sorties, for a total of four ONAV IUT sorties, before beginning to instruct students in the ONAV stage. [Encls (18) (20) (77)]"

aa. FF 389: Restate to read "Per the ONAV Stage Manager assigned to VT-7, it is common practice that ONAV stan pilots discuss in detail with each IUT the contents of the ONAV FTI. Specific areas of emphasis include maneuvering around terrain, ridgeline crossings, not descending in a turn, dead-reckoning and timing techniques, and common student mistakes. IUTs whose background is not fast-jet aircraft receive additional discussion of the T-45C's G-availability at low altitude, and are passed as much "corporate knowledge" as possible. [Encl (77)]"

bb. FF 400: (b)(6)

(b)(6)

cc. Supplemental Investigation FF 122: Restate to read "A majority of the ridgeline crossings conducted during the flights flown by LT Ruth and LTJG Burch were executed with an overbank followed by nose slicing turns. [Encls (27) (28) (29) (30)]

dd. Supplemental Investigation FF 135: Restate to read "At 1:03:08, LTJG Burch performed a ridgeline crossing, executing a 134 degree overbank and pulling to -28.9 degrees nose low flight path angle (FPA) with a left 40 degree AOB recovery vice wings level. [Encls (29) (31)]"

ee. Supplemental Investigation FF 136: Restate to read "At 1:04:01, LTJG Burch performed a ridgeline crossing where he achieved -17 degrees nose low FPA with a loaded roll to pullout. [Encl (29)]"

ff. Supplemental Investigation FF 137: Restate to read "At 1:05:50, LT Ruth took the controls and executed a -10 degree nose low FPA descending turn to below 500 feet, then passed the controls back to LTJG Burch. [Encl (29)]"

gg. Supplemental Investigation FF 138: Restate to read "At 1:07:02, LTJG Burch performed a ridgeline crossing where he achieved a -15 degrees nose low FPA and bottomed out at 420 feet. [Encl (29)]"

hh. Supplemental Investigation FF 165 is disapproved.

ii. With further investigation into the potential aggressive ONAV culture in Training Air Wing ONE, the following incidents demonstrated additional operations which were conducted in an unauthorized or unapproved manner.

El Centro Detachment

FF 402: The minimum altitude for NATRACOM training is 500 feet. [Encl (72)]

FF 403: During the El Centro detachment in February and March 2017 there were 21 Training Air Wing ONE flights, 18 Training Air Wing TWO flights and 16 VT-7 flights where aircraft were flown below 400 feet. [Encl (78)]

OBOGS Flight Restrictions Violations

FF 404: In response to concerns related to the T-45 Onboard Oxygen General System (OBOGS), CNATRA issued updated temporary operating restrictions on 2 May 17, limiting T-45 operations to 5,000 feet Mean Sea Level (MSL), 2 G, 1.2 hours of flight time, and 100 nautical miles from home base. The restrictions were updated on 12 June 17 to allow flight to 10,000 feet MSL if flying with the modified MBU-23 mask, and on 7 July 17 to allow 4 G max acceleration. Operations under these restrictions were intended to mitigate risks while allowing instructor pilots to continue flying in order to maintain proficiency. [Encl (84)]

FF 405: On 6 July 17, four VT-7 instructors completed a TAC form re-standardization flights; none of the pilots had the necessary current qualifications or waivers for TAC form flying at that time, and all pulled more than 4.0 G's. [Encls (33) (85) (86) (87) (88) (89)]

FF 406: On 6 July 17, an IP completed a TAC form re-standardization flight above 5,000 MSL without a modified mask. [Encls (90) (91)]

FF 407: On multiple occasions events were scheduled that could not be completed with the CNATRA restrictions in place. Additionally, grade sheets were marked indicating that events were completed which would have either required violation of those restrictions or falsifying records. [Encl (78)]

Procedures Conducted during Mishap Cross Country Flights

FF 408: CNATRA LAAT Flight Training Instruction states that when using the straight ahead method ridgeline crossing, pull to place the velocity vector to a minimum of five degrees above the ridgeline to ensure a minimum clearance of 500 feet crossing the ridge. [Encl (25)]

FF 409: A majority of the ridgeline crossings executed by LT Ruth and LTJG Burch on 30 September 17 and 1 October 17 were at two to three degrees above the ridgeline. [Encl (78)]

FF 410: A majority of the ridgeline crossings conducted during the flights flown by LT Ruth and LTJG Burch were executed with an overbank followed by an aggressive pull. [Encl (78)]

FF 411: There were multiple pitch bucks during descending turns and frequent RADAR altimeter (RADALT) alarms that went unnoticed and were not responded to throughout the flights. [Encls (50) (79) (80) (81)]

FF 412: During the first flight on 1 October 2017, LT Ruth instructs LTJG Burch to "stay down in this valley, don't worry about the lines so much, as long as you are going in the right direction". [Encl (78)]

FF 413: LT Ruth had never flown the mishap flight route. [Encl (78)]

FF 414: ONAV training is completed through use of the master curriculum guide which requires maneuver items that are defined in the CTS with the purpose that these standards outline the tasks and proficiency required to graduate from this syllabus. All maneuver items and required knowledge is available in the Computer Aided Instruction (CAI) (ON 1101), Lecture (ONFP 1102), ONAV FTI (P-1208) and LAAT FTI (P-1209). [Encls (76) (72) (93) (94)]

4. Opinions. I approve the opinions of the Investigating Officer, as modified by Commanding Officer, Training Squadron SEVEN and Commander, Training Air Wing ONE, along with Training Air Wing ONE's supplemental investigation, subject to the following additions and modifications.

a. Opinion 2: Restate to read "LT Ruth was not fully qualified per CNATRA and VT-7 Operational Navigation (ONAV) syllabus based on the lack of documentation of his ground school. LTJG Burch was fully qualified as a student naval aviator. [FF (12) (17) (20) (21) (24) (25) (26) (29) (30) (31) (32) (34) (35) (39) (40) (41) (43) (44) (66) (85) (88) (93) (124) (125) (128) (129) (352) (353) (356)]"

b. Opinion 3 is disapproved.

c. Opinion 4: Restate to read: "LT Ruth and LTJG Burch did not exercise good ORM during the flight series between 29 September 17 and 1 October 17 as their procedures were unnecessarily aggressive and were not in accordance with the syllabus. [FF (408) (409) (410) (411) (412) (413) (414)]"

d. Opinion 11: The last sentence is disapproved.

e. Opinion 12 is disapproved.

f. Opinion 14 is disapproved.

g. Opinion 16: Restate to read "Students and IUTs are sufficiently trained if they follow the prescribed syllabus. Flying near the aircraft's aerodynamic limits at low altitude is not a part of the events NATRACOM pilots should be conducting and thus is not a part of the prescribed training. [FF (379) (403)]

h. Opinion 17: Restate to read "The slow end of the airspeed range often encountered during ONAV sorties can cause a pilot to unexpectedly enter a high AOA regime of flight and can become a safety of flight hazard if an accelerated stall is entered and recovery actions are not started immediately. At the time LTJG Burch began the pull that led to the accelerated stall, the aircraft HUD indicated 324 KIAS. He likely repeated the same manner of pull that - starting from 341 KIAS less than a minute earlier - gave him over 4 G's and 17 units AOA. Beginning from a slower airspeed, the pull could not sustain 4.0 G's and the pilot's continued input rapidly increased AOA beyond the aerodynamic limit of the aircraft. [FF (243) (381) (386) (387)]"

i. Opinion 22: Restate to read "LT Ruth failed to instruct ONAV flights within the bounds of the approved CNATRA training curriculum. As an E-2C pilot prior to joining CNATRA, LT Ruth did not have prior Fleet experience in dynamic flight regimes. Yet, the HUD video from all flights the weekend of the mishap indicate that LT Ruth was comfortable with both himself and his student performing aggressive ridgeline crossings, descending turns, and flat-hatting maneuvers that violated the ONAV FTI and other instructions. Many of the habit patterns and techniques he chose to use during low altitude flights were both violations of existing guidance and unsafe. Throughout the weekend LT Ruth and his student had numerous excursions right to the edge of the aircraft's performance envelope, with no real understanding of the danger. LT Ruth's failure to instruct the ONAV syllabus as designed, his fleet background, and his overconfident attitude left him unprepared to recover from the situation in which he put his student at 20:03:45 UTC, 01 October 2017. [FF (86) (88) (89) (95) (117) (118) (128) (373) (374) (375) (376) (379) (380) (381) (382) (383) (384) (385) (386) (387) (388) (389)]"

j. Opinion 23 is disapproved.

k. Opinion 24: Pilots of VT-7 either operated outside of the OBOGs restrictions in place or falsified records by marking as complete flights that didn't occur. Either situation violated in place procedures designed to preserve safety of flight. [FF (407)]

l. Opinion 25: On 6 July 2017, four instructor pilots flew TAC form restan events without the proper CNATRA waiver or qualifications to complete the intended flight. [FF (404) (405) (406)]

m. Opinion 26: Based upon missing training for purported qualified instructors, flying below the minimum clearance, falsifying records or flying beyond the limits put in place during the operational pause, flying without proper waivers, and not recognizing or responding to RADALT alarms, some pilots of VT-7 did not properly follow CNATRA training curriculum and often flew overly aggressively in the aircraft. [FF (356) (402) (403) (404) (405) (406) (407) (408) (409) (410) (411) (412) (413) (414)]

n. Opinion 27: CNATRA inspections were not thorough or sufficiently performed to discover discrepancies that were present at the time. [FF (96) (352) (353) (356) (398) (403)]

o. Opinion 28: VT-7, Training Air Wing ONE, and CNATRA did not take sufficient action to identify the aggressive flying and deviations from the curriculum and guidelines before and during the operational pause. [FF (397) (404) (405) (406)]

p. Supplemental Investigation Opinion 1: Sentences 5, 7, and 8 are disapproved.

5. Recommendations. I approve the recommendations of the Investigating Officer, as modified by Commanding Officer, Training Squadron SEVEN and Commander, Training Air Wing ONE, along with Training Air Wing ONE's supplemental investigation, subject to the following additions and modifications.

a. I concur with Recommendations 1 and 2 that both LT Ruth and LTJG Burch's death be found in the line of duty and not due to misconduct.

b. Recommendation 3: Restate to read "Review the CNATRA T-45C ONAV syllabus and update training objectives with guidance for events that will contain the introduction of low level navigation techniques as stated objectives. Include a desired airspeed in Knots Ground Speed for flights focused on dead-reckoning and visual navigation, and a minimum airspeed in Knots Indicated Air Speed for flights in low altitude environment."

c. Recommendation 4: Restate to read " Standardize all CNATRA T-45C ONAV briefing guides to include Low Altitude Awareness Training Rules."

d. Recommendation 5: Restate to read "Update the CNATRA T-45C ONAV student and IUT ground training syllabi to include training on low altitude performance capabilities, stall margins, and limitations of the T-45C per the NATOPS manual in the low altitude flight regime."

e. Recommendation 6 is disapproved.

f. Recommendation 8: Restate to read "Define and include in all applicable low altitude awareness training references, the procedures for a standardized safe escape maneuver and add it to applicable events within the curriculum."

g. Supplemental Investigation Recommendations 1, 2 and 3 are disapproved.

h. Supplemental Investigation Recommendation 4: Restate to read: "Appropriate instruction and messaging should be developed to ensure CNATRA IPs adhere to the training material provided and not introduce tactics and procedures that are not part of the curriculum."

6. Corrective Action. Since this mishap occurred, I directed the following actions to be completed.

a. Ordered an audit of all Instructor Pilots training jackets on 12 January 2018, to ensure all instructor pilots have auditable records, confirming completion of all training requirements. Completed: 1 February 2018.

b. Re-inspected Training Wing One from 12-15 December 2017 to ensure compliance with the published syllabus. Completed: 15 December 2017.

c. Stood-up Flight Instructor Training Units (FITUs) to ensure that all IPs are properly trained and standardized in execution of the approved syllabus. Completed: 1 March 2018.

d. Standardized ONAV e-briefs, ensuring that appropriate LAAT procedures are included. Completed: 22 December 2017.

e. Conducted CNATRA Commander's Conference during which all Commodores and Commanding Officers received Flag direction, face-to-face, on the requirement to train to the approved curriculum and that any deviations or waivers are to be approved at the designated level in accordance with existing CNATRA instructions. Completed: 22 February 2018.

f. Conduct a review of all pilot's ADMITS records to have complete situational awareness on any after-care plans or prior incidents. Completed: 19 January 2018.

g. Conduct an immediate review of the T-45 instructor pilot process to ensure all pilots, regardless of aircraft background, are properly trained to instruct student naval aviators in the T-45. Completed: November 2017.

h. Review and update all LAAT training references to provide standardization in airspeed limits and requirements. In progress, to be completed by 20 April 2018.

i. Conduct an immediate review of the T-45 curriculum to ensure NATRACOM is properly preparing naval aviators for the FRS in addition to the prescribed 18 month periodic review. In progress, to be completed by 1 June 2018.

j. Conduct CNATRA inspections as true inspections rather than assist visits. On-going.

k. Require all Squadron COs to attend at least one curriculum conference so that they are able to observe how input is requested and provided to review and update the CNATRA syllabi. On-going.

l. Ensure all procedural violations and overly aggressive flying or maneuvers are investigated and corrected appropriately to ensure the proper example is set for safe, standardized instruction to occur. On-going.

7. Commander's Additional Comments. Both the First and Second Endorsers chose to include an "Additional Comments" section. To be clear, these represent their opinions. While these statements remain a part of the investigative record, I do not formally approve or disapprove them. Rather, I will conclude this investigation with my own professional perspective.

a. LT Ruth and LTJG Burch put their aircraft into an aerodynamic stall and subsequently departed controlled flight at low altitude in rising terrain. It was their actions flying the aircraft in violation of the CNATRA syllabus and training objectives that resulted in the mishap.

b. During this investigation it was discovered that CNATRA T-45 IPs were training towards what they thought would best prepare SNAs for the fleet, which is unacceptable. While instructor pilots within NATRACOM teach students using their fleet experience, they are not to teach advanced tactical maneuvers. As noted in the Second Endorsement, fleet experienced IPs should explain to the SNAs why the approved curriculum is relevant and essential as the foundation that will enable them to start the development of tactical maneuvers at the Fleet Replacement Squadrons (FRS). The ONAV LAAT syllabus has a defined training syllabus and its critical objectives are clearly defined. It is built in stages that are designed for SNAs to grow with each successive step. The SNAs are expected to learn to aviate, navigate, and communicate from IPs that have successfully completed their own training to be instructors. In this case, the IP engaged in aggressive flying beyond approved training curriculum, to the edge of the performance envelope, and encouraged his student to follow his lead. Ultimately, they flew beyond the aerodynamic limits of the aircraft, which resulted in the mishap.

c. This investigation revealed that, over time, a culture developed within VT-7, Training Air Wing ONE, and CNATRA at-large where IPs took it upon themselves to deviate from approved NATRACOM curriculum and operating parameters. These deviations were tolerated, which in effect became tacit endorsement. As such, these behaviors were not appropriately corrected. Any attempt to rationalize the deviations as "leaning forward" and aligning training to some amorphous Fleet perspective and execution is simply misplaced. NATRACOM curriculum is

specifically designed to impart the basic skills in building block fashion to provide the fundamentals, first and foremost. It is not the place of any individual IP to determine how they can best support Fleet requirements and institute his or her own training program that would supplement those fundamentals. As documented in multiple incidents, there was a culture of flying beyond the approved syllabus and ignoring clear operational limits that resulted in a free-for-all where each instructor developed his own standard of training and chose the skillsets to teach. The syllabus was designed to be safe when executed within existing guidance, because it was designed with built-in risk control measures at every level. Once aircrew deviate from the syllabus and guidance, these established risk controls become ineffective. This mishap is a glaring example of just how tragic the consequences can be when there is either a lack of flight discipline or willful deviation from standards.

d. I have issued direct orders to all Training Air Wings and Training Squadrons that they fly and train in accordance with the curriculum as promulgated by CNATRA. This incident highlighted the need for intrusive inspections to ensure a uniform, standardized syllabus is being taught by properly trained IPs with auditable training jackets. We have stood up Flight Instructor Training Units at all Wings to ensure standardization, and the correct leadership is now in place within Training Air Wing ONE to ensure that my guidance is followed. We must and we will continue to meet our production demands in strict compliance with all applicable regulations and instructions. We are focused on the mission and will follow the approved curriculum to deliver properly trained aviators to the fleet.

8. No punitive action is warranted.

(b)(6)

J. S. BYNUM

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5800
Ser N00/358
29 Jan 18

SECOND ENDORSEMENT on Commander (b)(6), USN, ltr of 08 Nov 17

From: Commander, Training Air Wing ONE
To: Chief of Naval Air Training

Subj: COMMAND INVESTIGATION OF THE TRAINING SQUADRON SEVEN CLASS A AIRCRAFT MISHAP INVOLVING T-45C BUNO 165632 IN THE VICINITY OF TELLICO PLAINS, TN ON 01 OCTOBER 2017

Encl: (74) Autopsy Report on LT Patrick L. Ruth, USN
(75) Autopsy Report on LTJG Wallace E. Burch, USN
(76) Memorandum for the Record of Conversation with Cubic Simulator Operational Navigation (ONAV) Standardization Instructor Regarding ONAV Ground School
(77) Memorandum for the Record of Conversation with CNATRA Operational Navigation (ONAV) Stage Manager Regarding ONAV Standardization
(78) Report of CDR (b)(6) on the Supplemental Command Investigation of the Training Squadron Seven Class A Aircraft Mishap Involving T-45C BUNO 165632 in the vicinity of Tellico Plains, TN on 01 October 2017
(79) Crash Survivable Memory Unit (CSMU) Data Disk, 29 Sep 2017 Flight One
(80) CSMU Data Disk, 29 Sep 2017 Flight Two
(81) CSMU Data Disk, 01 Oct 2017 Flight One
(82) Spreadsheet Depicting Overbanked Descending Turns During LT Ruth's ONAV Flights
(83) Spreadsheet Depicting Overbanked Descending Turns During TW-1 El Centro Detachment, February to March 2017

1. Forwarded. I have carefully reviewed the investigation and First Endorsement and concur with the findings of fact, opinions, and recommendations of the Investigating Officer and First Endorser except as set forth in paragraphs 3 through 5 of this endorsement.

2. Executive Summary. This mishap occurred due to the aircraft being placed into an aerodynamic stall and subsequently departing controlled flight at low altitude in rising terrain. Recognition of the stalled condition did not occur in time to either correct the condition or initiate an ejection within a safe ejection envelope.

Some factors were considered and rejected as contributing to this incident, including alcohol use and command climate. Two primary factors contributed to the entry into the stall and the delay in subsequent action. The first was lack of awareness and familiarity with the aerodynamic capabilities of the T-45C in the low altitude regime, due to the Instructor Pilot's (IP's) fleet background and the syllabus provided by CNATRA. The training that exists to prepare both instructors and students for low altitude flight in the T-45C does not adequately address aircraft performance or provide adequate preparation for situations of extremis at low altitude. Additionally, as an E-2C pilot, the IP had no exposure to low altitude flying in previous

tours, and very limited exposure during this tour. The syllabus used to train him and the oversight it proscribed did not properly prepare him to instruct in the low altitude environment.

The second factor that contributed to this mishap was a cavalier, relaxed and thrill-seeking attitude of the IP when flying at low altitude. The risk of this attitude was exacerbated by the first factor – adequate oversight and direction did not exist within the syllabus, within the squadron, within the Wing, or within CNATRA to catch and correct his behavior as an Operational Navigation (ONAV) instructor. As a result, he was comfortable flying the aircraft routinely to the edges of its performance envelope at low altitude, and worse, did not seem to recognize that he was doing so. The IP's actions over the three flights prior to the mishap flight conditioned his student naval aviator (SNA) to share his comfort level and to respond aggressively to his direction.

Faced with unexpected and unfamiliar aircraft response to control inputs and rising terrain ahead, neither aircrew was able to diagnose the situation and respond correctly in the limited time available before exiting a survivable ejection envelope. It is questionable whether the aircraft and its crew should ever have been operating so close to the limits of the aircraft's performance at low altitude. The system failed long before the aircrew.

3. Findings of Fact. I approve and concur with all Findings of Fact of the Investigative Officer and First Endorser, except as modified or appended in the following paragraphs.

a. FF 377: "The military Medical Examiner (ME) determined that the cause of death of LT Patrick L. Ruth, USN, was "multiple blunt force injuries due to an aviation mishap." [Encl (74)]"

b. FF 378: "The military ME determined that the cause of death of LTJG Wallace E. Burch, USN, was "blunt force injuries due to an aircraft mishap." [Encl (75)]"

c. FF 379: (b)(5)

(b)(5)

d. FF 380: (b)(5)

(b)(5)

e. FF 381: "At 20:02:56 UTC, less than one minute prior to the aircraft impacting the ground, LTJG Burch executed a ridgeline crossing with a roughly +8 degree flight path angle (FPA) climb, followed by rolling beyond 120 degrees angle of bank and pulling more than 4 G's to get the nose below the horizon, reaching a FPA of roughly -17 degrees before recovering to level flight. Starting the pull at 341 knots indicated airspeed (KIAS), the aircraft achieved 4.7

G's at 17.5 units of angle of attack (AOA) during the maneuver. On the previous flight that day, LTJG Burch executed at least three overbanked, positive G descents. On the third, he overbanked beyond 120 degrees angle of bank and pulled more than 4 G's to a FPA of -27 degrees before executing a loaded-roll reversal to level flight (a loaded-roll is a roll executed with more than 1.0 positive G on the aircraft). These maneuvers were in direct contradiction to the ridgeline crossing information provided in ONAV ground school, were a violation of the ONAV FTI prohibition on inverted pulls, and exceeded the maximum recommended/allowed dive angle in the Low Altitude Awareness Training (LAAT) FTI of -10 degrees FPA. LT Ruth did not comment on or correct any of these maneuvers. In fact, on the previous flight that day, as they cleared the ridgeline he asked, "Ready?" and when LTJG Burch responded, "Yeah," LT Ruth said "Do it!" just prior to the maneuver. [Encls (50) (54) (72) (81)]"

f. FF 382: (b)(5)

(b)(5)

g. FF 383: "Emergencies are practiced during simulator ONAV events. On the second simulator, students are given degraded weather and a bingo profile (Note: "Bingo" refers to the minimum amount of fuel required to safely proceed to a destination. A "bingo profile" is an emergency situation where the aircraft must be flown on a precise profile to reach the destination using the minimum amount of fuel. End note). On the third simulator the student must handle a system failure while flying the route. Students are not given accelerated stalls as an emergency during simulator events. [Encl (76)]"

h. FF 384: (b)(5)

(b)(5)

i. FF 385: (b)(5)

(b)(5)

j. FF 386: (b)(5)

(b)(5)

k. FF 387: "At time 20:03:45 UTC, at the start of the turn leading to the accelerated stall, heads up display (HUD) video indicated 324 KIAS. Within two seconds, airspeed decreased to below 300 KIAS. Maximum sustained G during the pull was 3.8 G. [Encl (50)]"

l. FF 388: (b)(5)

(b)(5)

(b)(5)

m. FF 389: (b)(5)

(b)(5)

o. FF 390: "The IUT syllabus in use at the time LT Ruth qualified in the ONAV stage, the CNATRAINST 1542.160, stated in paragraph 6.d of the Curriculum Guidelines section: "Extra time flight and simulator instruction shall be given at the discretion of the TRAWING Commander." [Encl (21)]"

p. FF 391: "On the three ONAV flights prior to the mishap, LTJG Burch performed at least 11 descending turns of more than 3 G's that pulled to a FPA lower than -10 degrees, which is the maximum recommended or allowed by the LAAT FTI for descents in the low altitude environment. Most of these turns were executed as a ridge line crossing. LT Ruth did not comment on or correct any of these maneuvers, and in fact demonstrated similar maneuvers on multiple occasions. [Encls (25) (79) (80) (81)]"

q. FF 392: "On the second flight on 29 Sep 2017, at approximately 19:13:45 UTC, LTJG Burch conducted a ridgeline crossing with a descending turn of more than 4 G's that reached a -15 degree FPA. During this turn, angle of attack briefly exceeded 22 units, resulting in momentary pitch buck. LT Ruth made no comment, appearing not to recognize the pitch buck as a sign of an impending accelerated stall. [Encls (52) (80)]"

r. FF 393: "During the three ONAV flights prior to the mishap, LT Ruth made multiple comments directing LTJG Burch to execute ridgeline crossings or other maneuvers that do not contribute to the ONAV training objectives. Examples just prior to ridgeline crossings include: "Let's go dude, f@#$ing love it," "We need to do this," "Oh yeah, big ol' ridgeline crossing here," "Ready…Do it," and "Nothing good to do here, maybe coming up there's one." After taking control to aggressively fly over a boat on a lake, LT Ruth stated "Just gave that guy the show of his life." Approaching a boat on another lake with LTJG Burch at the controls, LT Ruth asked "Gonna give him a good show?" On at least four occasions, LT Ruth gave LTJG Burch sudden direction to execute a "hard pull", and at one point teased LTJG Burch for not wanting to pull 4 or more G's during turns. [Encls (79) (80) (81)]"

s. FF 394: "On the second flight of 29 Sep 2017, LT Ruth took the controls in order to fly over a boat on a lake. He accelerated the aircraft then executed multiple turn reversals over the boat, pulling 4 or more G's on each. On the first flight of 01 Oct 2017, approaching another lake with a boat on it, LT Ruth asked LTJG Burch if he was going to give the boat "a good show." LTJG Burch accelerated the aircraft and executed what amounted to a minimum radius turn – an airshow maneuver – over the top of the boat at roughly 500 feet above ground level,

turning continuously for 320 degrees at more than 4 G's. LT Ruth did not stop the maneuver and seemed to like it. [Encl (81)]"

t. FF 395: "During the three ONAV flights prior to the mishap, LT Ruth took the controls on at least three occasions and continued to maneuver the aircraft aggressively, causing airspeed to bleed below 310 KIAS. On one occasion he began a 3 G nose high maneuver over a ridgeline at around 300 KIAS and bled to 280 KIAS in the climb. He did not seem to recognize his low airspeed as a concern or threat. [Encls (79) (80) (81)]"

u. FF 396: "According to automatic data recorder (ADR) data, on six of LT Ruth's 23 ONAV flights he or his student executed a descending turn at more than 110 degrees angle of bank and more than 3 G's while below 600 feet above ground level. LT Ruth's first IUT flight and three of the four flights the weekend of the mishap are included in this group. [Encl (82)]"

v. FF 397: "According to ADR data, on at least seven flights during the February and March 2017 Training Air Wing ONE (TW-1) El Centro detachment, Training Squadron SEVEN (VT-7) IPs either executed or allowed students to execute descending turns at more than 110 degrees angle of bank and more than 3 G's while below 600 feet above ground level. LT Ruth was the IP on one of these flights. Of note, LT Ruth's ONAV IUT instructor, Capt (b)(6), was not a participant in any of these flights. [Encl (83)]"

w. FF 398: "Multiple investigations have concluded that there is no culture of unsafe operations or exceeding limitations within VT-7. The Commanding Officer (CO) is engaged and executes due diligence before granting waivers he is allowed to approve. [Encls (29) (30) (78)]"

x. FF 399: "On the first flight of 01 Oct 2017 (Sunday), LT Ruth mentioned that he had consumed a lot of "Irish car bombs" on Friday. When questioned by LTJG Burch, he stated that he had stopped drinking a 6, felt hungover at midnight, and had woken up and 5am (Saturday) and had not been able to go back to sleep. [Encl (81)]"

y. FF 400: (b)(5)

(b)(5)

z. FF 401: "LT Ruth did not consume excessive alcohol during the day on Saturday, 30 Sep 2017. Further, he stopped drinking 17 hours before his first flight brief on Sunday and had the opportunity for at least 10 hours of sleep Saturday night. [Encls (37) (78)]"

4. Opinions. I approve and concur with all opinions of the Investigative Officer and First Endorser, except as modified or appended in the following paragraphs.

a. Opinion 7: Add FF "(377) (378)".

b. Opinion 10: Add FF "(377) (378)".

c. Opinion 13: "Alcohol did not play a role in this mishap. LT Ruth described drinking a lot of Irish car bombs on Friday evening, feeling hungover that night and not sleeping well that night. However, he did not consume excessive alcohol on Saturday, stopped drinking 17 hours before the first flight brief of the day, and had the opportunity for at least 10 hours of sleep on Saturday night. The toxicology screen from LT Ruth's autopsy revealed no alcohol in his system at the time of the mishap. [FF (37) (78) (399) (400) (401)]"

d. Opinion 14: (b)(5)

(b)(5)

e. Opinion 15: "VT-7 may have had an aggressive ONAV culture that contributed to this mishap. As indicated by ADR data, a small number of VT-7 instructors were allowing maneuvers outside the FTI on the February to March 2017 El Centro detachment. I believe that LT Ruth's ONAV IUT instructor, Capt (b)(6), was not a part of an aggressive ONAV culture, and that he corrected LT Ruth's inappropriate maneuver on his first ONAV IUT flight. [FF (396) (397)]"

f. Opinion 16: (b)(5)

(b)(5)

g. Opinion 17: (b)(5)

(b)(5)

h. Opinion 18: "LT Ruth was overly comfortable, nonchalant, and aggressive at low altitude – essentially a cowboy. He had little to no awareness of the performance capabilities of the T-45C in that environment, as evidenced by his willingness to allow the aircraft to get dangerously slow (<310 KIAS) while performing aggressive maneuvers and by his lack of recognition of the fact that LTJG Burch had nearly entered an accelerated stall two flights before the mishap. He seemed to be aware of FTI and syllabus requirements but frequently ignored or dismissed them. His focus appeared to be on having a fun flight at low altitude, in particular maximizing aggressive ridgeline crossings that violated the FTI and giving a "good show" to witnesses of opportunity on the ground. The maneuvers he performed and that he allowed LTJG

Burch to perform over boats were flat-hatting and served no training purpose." [FF (381) (391) (392) (393) (394) (395)]

i. Opinion 19: "LT Ruth's instructional style conditioned LTJG Burch to be complacent at low altitude and to react aggressively to direction. Whenever LT Ruth took the controls from LTJG Burch at low altitude, he flew with aggressive nose movements and rapid onset of G. Numerous times through the three flights before the mishap, LT Ruth directed LTJG Burch to make a hard turn in order to go around a peak or set up for a ridgeline crossing. The combination of these experiences conditioned LTJG Burch to maneuver the aircraft aggressively when directed to turn by LT Ruth, which led to a control input beyond what the aircraft could provide when LT Ruth called for a hard right just prior to the mishap. [FF (391) (392) (393) (394) (395)]"

j. Opinion 20: "The CO of VT-7 failed in his responsibility to provide oversight of the ONAV IUT syllabus and "ensure strict adherence to all approved…publications by instructors and students." [FF (33) (357)]"

k. Opinion 21: "The Commander of TW-1 failed in his responsibility to "Ensure compliance with…appropriate training curricula," and to "establish an Instructor Under Training (IUT) program that provides qualified instructors to the training squadrons." [FF (33)]"

l. Opinion 22: (b)(5)

(b)(5)

(b)(5)

m. Opinion 23: (b)(5)

(b)(5)

5. Recommendations. I approve and concur with all recommendations of the Investigating Officer and First Endorser, except as modified or appended in the following paragraphs.

a. Recommendation 3: (b)(5)

(b)(5)

b. Recommendation 8: (b)(5)

(b)(5)

c. Recommendation 9: "Accelerate installation of upgraded T-45C operational flight training simulators with the capability to accurately train to TAWS indications and responses."

6. Corrective Action. TW-1 has completed a review of the qualification process for all IPs currently designated on each squadron's Flight Instructor Standardization and Training (FIST) document, with particular attention on IPs whose background is not fast-jet. I have personally met with all ONAV IPs to discuss the appropriate techniques for ridgeline crossings and to emphasize that inverted pulls are not authorized. Effective immediately and until CNATRA provides more specific guidance on the ONAV syllabus, as described in Recommendation 3, TW-1 will prioritize clock-chart-ground visual navigation and timing over terrain following or terrain masking on all ONAV events. I am conducting further investigation of an aggressive ONAV culture in TW-1. Should any instructors be found to have routinely violated the ONAV

or LAAT FTIs, further action will be taken. This investigation and actions will be complete by 09 Feb 2018.

7. Commander's Additional Comments. I concur with the Additional Comments of the First Endorser regarding the scope-creep of the CNATRA ONAV syllabus and the contrast between "instruction as published and instruction as executed." I also agree that IPs have brought their FRS and Fleet experience with them to CNATRA, by design. We need fleet experience to inform the training provided to the next generation of Fleet aviators and to explain to the students how the skills they learn in CNATRA will apply to their future.

We also need standardized instruction in CNATRA, and not all IPs bring the same level of experience in low-altitude fast jet operations, which is a very unforgiving regime of flight. The gradual expansion and de-standardization of the scope of the ONAV syllabus was extended to IPs whose background does not adequately prepare them to fly, let alone instruct, the expanded scope of a mission they are learning to perform for perhaps the first time in their career. The safety net of verified and approved flight procedures does not exist in publications or lectures, or even at all for this aircraft. We rely on IUTs to request additional IUT sorties until they feel "comfortable" instructing ONAV missions. In this, case, it appears LT Ruth was essentially making up his own procedures and was clearly comfortable with aggressive maneuvers at low altitude. I believe his comfort level was built upon overconfidence and a misperception that the level of knowledge, experience, and oversight provided to him as an ONAV instructor was adequate. It was not. I don't know if he would feel comfortable flying a T-45C at the edge of its envelope at low altitude, but I don't believe he was given the tools, including oversight, to even recognize he was there. The system failed at every level: the cowboy attitude of the individual, the lack of oversight by the squadron and the Wing, and the lack of adequate training resources from CNATRA.

Tragically, the result was that the implications of slow airspeed at low altitude went unrecognized as LTJG Burch, under friendly, positive, directive instruction from LT Ruth, flew a T-45C into a position from which neither pilot could recover.

8. No punitive action is warranted.

(b)(6)

N. A. MUNGAS CAPT USN

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27 Nov 17

FIRST ENDORSEMENT on Commander (b)(6), USN, ltr of 08 Nov 17

From: Commanding Officer, Training Squadron SEVEN
To: Chief of Naval Air Training
Via: Commander, Training Wing ONE

Subj: COMMAND INVESTIGATION OF THE TRAINING SQUADRON SEVEN CLASS A AIRCRAFT MISHAP INVOLVING T-45C BUNO 165632 IN THE VICINITY OF TELLICO PLAINS, TN ON 01 OCTOBER 2017

Encl: (67) Wing Stats Simulator Hour Summary for LTJG Wallace Burch, USN
(68) Email from LCDR (b)(6) dtd 06 Jun 16
(69) TRARONSEVENNOTE 3740 VT-7 QUALIFICATION MATRIX UPDATE dtd 28 Oct 16
(70) Training Squadron SEVEN Operational Navigation Standardization Exam
(71) CNATRAINST 1542.167A Combined Multi-Service Pilot System Curriculum
(72) CNATRA P-1208 Flight Training Instruction for Operational Navigation T-45 MPTS and IUT Curriculum
(73) COMTRAWINGONEINST 3710.7T / COMTRAWINGTWOINST 3710.7R T-45 Standard Operating Procedures (SOP)

1. Forwarded. I have carefully reviewed the investigation and concur with the findings of fact, opinions, and recommendations of the Investigating Officer except as otherwise set forth in paragraphs 4 through 6 of this endorsement.

2. Executive Summary. This mishap occurred because of an aerodynamic stall and the subsequent departure from controlled flight that occurred at low altitude in rising terrain. A loss of lift occurred when the aircrew commanded an angle of attack (AOA) that exceeded critical AOA. The resultant wing roll-off and pitch break are typical characteristics of a T-45C stall in the clean configuration. Recognition of the stalled condition did not occur quickly enough to execute a timely recovery with rapidly decreasing altitude. In simpler terms, the aircrew demanded more performance from the airplane than it was capable of providing, and they were unable to recognize, analyze, and respond during the few fleeting moments that were available before they lost the option to safely eject.

It is an oversimplification to state that the mishap was the result of aircrew error alone. The investigation clearly lays out the events that occurred, but the narrative may not adequately convey the extremely rapid timeline on which the events took place. No fewer than fifty Findings of Fact were required to document all that transpired in less than six seconds –

with approximately half of that occurring within a survivable ejection envelope. Time and altitude were acutely aggravating factors in this chain of events.

Instructor pilots will often verbally lead students through maneuvers, who respond obediently to coaching and guidance, typically with little to no hesitation. When faced with rising terrain ahead and the associated instinctual need to increase the turn performance of the aircraft, the instructor directed the student to pull harder, and the student dutifully obeyed. While focused on terrain clearance, neither recognized how close they were to the limits of the aircraft's performance. The increased pull caused the stalled condition which quickly led to loss of aircraft control.

3. Administrative Changes. I note the following administrative and clerical errors.

a. Note the correct spelling is Captain (b)(6), USMC.

b. Except when annotated as Universal Time Coordinated (UTC), all times are in Daylight Savings Time (EDT/CDT) rather than Standard Time (EST/CST).

c. FF 23: Add enclosure (16).

d. FFs 30 and 32: Add enclosure (16).

e. FF 34: LT Ruth completed the Flight Instructor Training Course on 10 July 2015 per enclosures (12) and (18) to the command investigation.

f. FF 50: Add enclosure (21).

g. FF 103: The Commander Naval Air Forces Culture Workshop was facilitated by CAPT Tom Maloney, USNR. [Encl (68)]

h. FF 270: Add enclosures (50), (51), and (54) and delete reference to enclosure (52).

i. FFs 286, 294, and 295: Add enclosure (44) and delete reference to enclosure (40).

j. FF 333: Add enclosure (52).

4. Findings of Fact. I approve and concur with all Findings of Fact of the Investigating Officer except as modified or appended in the following paragraphs.

a. FF 126: Restate to read, "ONAV warm-up simulators were conducted by LTJG Burch on 1 September 2017, 8 September 2017, 25 September 2017, and 26 September 2017. Low altitude procedures were conducted on each of these events. [Encl (16)]"

b. FF 217: (b)(5)

(b)(5)

c. FF 277: Restate to read, "At 20:03:49 UTC, the aircraft Angle of Attack (AOA) indicator increased from nineteen (19) to the maximum of thirty (30) units, though true AOA as recorded by the Crash Survivable Memory Unit was near an equivalent of thirty-two (32) units. [Encl (50)]"

d. FF 280: Restate to read, "At 20:03:50 UTC, the aircraft Angle of Attack (AOA) indicator decreased from thirty (30) units to eighteen (18). [Encl (50)]"

e. FF 346: Restate to read, "Aside from those tones associated with the normal start sequence, the Low Altitude Warning, and the Terrain Awareness Warning System, the audio recording from the Crash Survivable Memory Unit (CSMU) recovered from BUNO 165632 indicates that there was no aural tone associated with an aircraft caution or warning from 19:53:07 until impact at 20:03:51 UTC on 1 October 2017. [Encls (50) (51)]"

f. FF 347: Restate to read, "Aside from the Low Altitude Warning cue and Terrain Awareness Warning System cueing arrow, the video data from the Crash Survivable Memory Unit (CSMU) recovered from BUNO 165632 indicates that there was no visual indications of a warning or caution in the Head-Up Display (HUD) from 19:53:07 until impact at 20:03:51 UTC on 1 October 2017. [Encls (50) (51)]"

g. FF 348: (b)(5)

(b)(5)

h. FF 349: "LT Ruth was designated as a single plane ONAV "I" on 28 Oct 2016 by CDR Pavao A. Huldisch, Commanding Officer VT-7 on TRARONSEVENNOTE 3740, which was first routed as a draft on 24 Oct 16. The 3740 established LT Ruth's eligibility for the ONAV IUT syllabus. [Encl (69)]"

i. FF 350: "LT Ruth's single plane ONAV "I" designation was entered in the Total Information Management System (TIMS) on 25 October 2016. [Encl (18)]"

j. FF 351: (b)(5)

(b)(5)

k. FF 352: "LT Ruth's single plane ONAV stage standardization examination was not filed in his Instructor Training Jacket (ITJ). [Encls (18) (26)]"

l. FF 353: "LT Ruth's attendance in ONAV ground school could not be verified, as it was not properly documented or recorded in the Total Information Management System (TIMS). [Encl (18)]"

m. FF 354: "The VT-7 Mission Qualification Pre-Requisite Tracker defines squadron-unique requirements for Instructor Pilot stage designations that exceed the current CNATRA IUT Curriculum required events. [Encl (34)]"

n. FF 355: "Currently there is no policy requirement to verify completion of the VT-7 Mission Qualification Pre-Requisite Tracker or to keep the document on file. [Encl (34)]"

o. FF 356: "There is no record of LT Ruth having completed the pre-requisites for single plane ONAV stage designation listed on the VT-7 Mission Qualification Pre-Requisite Tracker. [Encls (18) (34)]"

p. FF 357: "As directed by the Chief of Naval Air Training (CNATRA), the responsibilities of the Training Squadron Commanding Officer include: ensure the Standardization Officer maintains Flight Instructor Standardization and Training (FIST) jackets in accordance with instruction; and ensure strict adherence to all approved curricula and associated publications by instructors and students. [Encl (33)]"

q. FF 358: "CNATRA P-1208, the Flight Training Instruction for Operational Navigation, is the "*textbook for the Operational Navigation (ONAV) stage of...Advanced Strike Pilot Training and is the source document for all procedures related to ONAV.*" [Encl (72)]"

r. FF 359: "CNATRA P-1208 states: "*The purpose of this training stage is twofold: (1) to introduce mission planning and chart interpretation for correct pilotage methods, and (2) to introduce basic multiplane reconnaissance techniques.*" [Encl (72)]"

s. FF 360: "CNATRA P-1208 does not include a discussion on ridgeline crossing techniques or procedures. [Encl (72)]"

t. FF 361: "Critical items are maneuvers required to be completed by the end of a block of training and must meet a specified standard of performance. [Encl (71)]"

u. FF 362: (b)(5) (b)(5)

v. FF 363: (b)(5) (b)(5)

w. FF 364: (b)(5) (b)(5)

x. FF 365: "CNATRA P-912, The Flight Training Instruction for Low Altitude Awareness Training (LAAT) states: "*This instruction is intended as a low altitude safety adjunct to the Tactical Formation, Operational Navigation, and Weapons Flight Training Instructions. Its primary purpose is to standardize the rules of conduct in the Low Altitude flight regime throughout the Training Commands.*" [Encl (25)]"

y. FF 366: "CNATRA P-912 does not discuss aircraft-specific performance, maneuvers, or procedures, but rather the theory, physiology, and physics of low altitude flight which apply to all aircraft Type/Model/Series. [Encl (25)]"

z. FF 367: "CNATRA P-912 includes a discussion on basic maneuvers, specifically: straight and level flight, level turns, and ridgeline crossings. (b)(5) (b)(5) [Encl (25)]"

aa. FF 368: "CNATRA P-912 covers three techniques for negotiating the descent during ridgeline crossings, and a note indicates the third technique – the inverted pull – "*will not be used in the TRACOM.*" [Encl (25)]"

ab. FF 369: (b)(5) (b)(5)

ac. FF 370: (b)(5) (b)(5)

ad. FF 371: "Training support publications do not define dive recovery rules for the T-45C. [Encls (25) (46) (72) (73)]"

ae. FF 372: (b)(5) (b)(5)

af. FF 373: "Training support publications do not define the minimum airspeed for the T-45C in the low altitude training environment. [Encls (25) (46) (72) (73)]"

ag. FF 374: "Training support publications do not define boldface procedures for Emergency Dive Recovery, Maximum Recovery Maneuver (MRM), nor Climb to Cope (CTC) procedures for the T-45C. [Encls (25) (46) (72) (73)]"

ah. FF 375: "Training support publications and standard operating procedures do not require the following to be briefed prior to conducting low altitude training: mission cross check times, dive recovery rules, Emergency Dive Recovery, MRM/CTC, 50-percent rule, nor the 10-degree rule. [Encls (25) (71) (72) (73)]"

ai. FF 376: "Training support publications do not provide any guidance on the integration, capabilities and limitations, and proper use of the Terrain Awareness Warning System (TAWS) in Low Altitude Awareness Training (LAAT). [Encls (25) (72)]"

5. Opinions. I approve and concur with all opinions of the Investigating Officer except as modified or appended in the following paragraphs.

a. Opinion 9: Restate to read, "…placing the aircraft in the stalled condition. LTJG Burch likely maintained full aft stick deflection attempting to avoid terrain while inputting left stick deflection to stop the roll and to honor TAWS indications; however, it is plausible that LT Ruth input left stick in attempt to recover the aircraft from the aft cockpit. This orientation further exacerbated…"

b. Opinion 11: "Training Squadron SEVEN was deficient in the proper maintenance of Instructor-Under-Training (IUT) training records as required by governing instructions. The Commanding Officer is directly responsible for these tasks. (b)(5) (b)(5) (b)(5) [FF (58) (66) (81) (349) (350) (351) (352) (353) (356) (357)]"

c. Opinion 12: (b)(5) (b)(5)

6. Recommendations. I approve and concur with all recommendations of the Investigating Officer except as modified or appended in the following paragraphs.

a. Recommendation 3: (b)(5) (b)(5)

b. Recommendation 6: (b)(5) (b)(5)

(b)(5)

c. Recommendation 8: (b)(5)

(b)(5)

7. Corrective action: I have directed Training Squadron SEVEN to conduct a thorough review of all policies and procedures for Instructor Pilot (IP) designation and upgrade qualification within the next 90 days. Specifically, an audit will be conducted of all Instructor Training Jackets to ensure compliance with governing directives, training record completeness, and IP stage currency verification. Additionally, an internal review of internal processes will be conducted for IP upgrade submissions and upgrade approvals to ensure proper verification and tracking of all prerequisites necessary for initial designation and upgrade qualifications

8. Commander's additional comments.

a. Tactical maneuvering a high performance fighter often requires flying the aircraft at or near the limits of controllability in order to achieve maximum aerodynamic performance. As tactical aviators, we must be able to correctly recognize, analyze, and recover from departures and near-departures associated with high-AOA maneuvering and maximum performance maneuvering. Flying near the edges of our performance envelope is fundamental to what we do, and we must be confident in our ability to do so.

We achieve success in the instruction and development of Student Naval Aviators (SNAs) through kinesthetic and experiential learning. Students learn through the process of doing, often independently with hands-on learning, and often near the limits of aircraft performance. Missteps are not uncommon in training and are frequently the catalyst for the greatest learning. We rely on the experience of our Instructor Pilots (IPs) to recognize the safe limits of these missteps, permit them to the extent that they enhance learning, and intervene when safety demands action. It is a well-established formula for success.

As they prepare for their first instructional flights with students, I counsel each of my new IPs, "It is not the student who is struggling who will scare you – it is with a student who is doing well, where you let your guard down, when something will happen that gets your attention." It is my reminder that complacency occurs naturally, and it is my warning to them to be alert for its influence in flight. The student at the controls for the mishap flight had a reputation as a solid performer, and all indications were that he had been doing well during the cross country training flights preceding the mishap flight.

There is little time to recognize, analyze, and recover from an aerodynamic departure from controlled flight at 500 feet above the ground. Proper recovery would have been easily achieved if executed immediately at the first indication of the stall. There may have been a subtle complacency that the IP developed from a well-performing student which predisposed him to a delayed reaction when it was simply unaffordable.

b. After discussions with my instructor cadre following the mishap, and in conjunction with an exhaustive review of this investigation, I have come to the conclusion that there is a quiet

contrast between instruction as published and instruction as executed within the Operational Navigation (ONAV) stage of training. I am persuaded that it is a result of an unintentional collective drift of mission conduct away from the original ONAV construct towards conduct more representative of Fleet execution.

Fleet-experienced Navy lieutenants and Marine Corps captains are the principal instructors for undergraduate flight training. The varied and extensive Fleet experience that IPs bring to the Naval Air Training Command (TRACOM) is invaluable for SNAs as they learn their tradecraft and develop their skills. The IPs understand what is required of an aviator in the Fleet. They know the trade and they lean forward to teach it to the next generation. They do so with passion and vigor, which often motivates them to instruct SNAs more closely towards a Fleet standard of execution. These efforts are critical to the development of future combat effectiveness; therefore, we must judiciously foster and encourage them from every IP.

There are two viewpoints regarding the objective of ONAV training as conducted in the TRACOM. The first, more conservative view is that ONAV is low altitude visual navigation which simply focuses on dead reckoning, chart interpretation, and building comfort in operations at lower altitudes. It is the first stepping stone towards later tactical flying. The second view leans forward, more closely aligned with Fleet execution. It expands upon the first view to include dynamic maneuvering such as terrain following and ridgeline crossings as introductions to tactical execution at low altitude similar to instruction provided at a Fleet Replacement Squadron (FRS). Through this investigation, and informally through observation, it is clear that most IPs teach ONAV from the latter viewpoint and consider the intent of the syllabus is to include introduction to more tactical, dynamic execution.

However upon close examination, the curriculum assigned by Chief of Naval Air Training (CNATRA) does not signify any intent to include dynamic maneuvering in ONAV training. There are no training objectives, critical maneuvers, Course Training Standards, Flight Training Instructions, or lecture materials that introduce terrain following. There is only limited discussion on ridgeline crossings in an instruction not written for the T-45C, but rather for generically for all TRACOM Type/Model/Series. Unlike the syllabi at the FRSs, there are no procedures in the TRACOM syllabus for Maximum Recovery Maneuver, Emergency Dive Recovery, or dive recovery rules, and mission crosscheck times are not required to be briefed from memory. These tools are necessary to conduct tactical flight at low altitudes and are required to have automatic, rote responses to ensure safe execution in time-critical flight regimes. The FRSs will provide all of these tools to develop the next set of skills required of a Fleet combat aviator.

So it is not what is included in the syllabus, but rather what is not included in the syllabus that indicates TRACOM ONAV should be taught in the former, more conservative fashion as the first stepping stone towards the Fleet standard, with a focus on the basic fundamentals of low altitude flight. The TRACOM term Low Altitude Awareness Training (LAAT) differs from the FRS terms Low Altitude Training (LAT) and Low Altitude Tactical Training (LATT), which further suggests the intent of ONAV remains to be the initial building block for follow-on training.

Instructor Pilots are not wrong to lean forward. I applaud their passion, their commitment to excellence in their mission, and their desire to provide Fleet-representative training to students under their charge in order to prepare them for the challenges ahead. IPs that instruct today were taught by their predecessors, and I am convinced that the drift that has

occurred in ONAV instruction has slowly taken place over many generations of IPs. Techniques that have been successful to aviators in the Fleet are often useful tools to ensure SNA success in training and preparation for their future. These tools are passed along and refined with each new set of IPs. However, the current ONAV training system is not designed for this type of dynamic tactical flying. CNATRA has not provided the tools, the procedures, the guidance, nor expressed the intent that ONAV should be an immediate precursor to FRS LAT and LATT.

Over many years we have permitted a gradual informal expansion of the scope of the single plane ONAV syllabus. During which time, we neglected to expand the formal instruction necessary to provide aircrew with the foundational knowledge of low altitude performance considerations and training that reinforces the need for timely, reflexive, almost instinctual responses to time-critical needs in the low altitude environment. Many IPs come from the Fleet with these habits, skills, and knowledge deeply ingrained in them from their experience in line combat squadrons. Many do not.

As recommended above, TRACOM should conduct a holistic review of ONAV training that focuses on at least these two questions: (1) what is the desired end state for low-altitude training in the TRACOM syllabus?; and (2) what are the competencies that the FRSs require to enable their formal training? If the answers are in alignment with the first more conservative viewpoint discussed above, then the TRACOM must conduct a reset regarding ONAV training. If the answers align with the latter viewpoint and strive to accelerate skill development towards Fleet standards, then the syllabus must be expanded and refined to provide proper instruction and procedures in order to safely achieve those goals.

9. No punitive action is warranted.

10. Original evidence related to this matter is preserved at:

Training Squadron SEVEN
101 Fuller Road, Suite 270
Meridian, MS 39309-5405

POC: Commander Steven Vitrella, USN, (601) (b)(6)

11. In accordance with reference (a), an advanced copy of this endorsement and the command investigation is forwarded to Commander, Naval Air Forces.

(b)(6)

J.M. GUSTIN

5800
8 Nov 17

From: Commander (b)(6), USN
To: Commanding Officer, Training Squadron SEVEN

Subj: COMMAND INVESTIGATION OF THE TRAINING SQUADRON SEVEN CLASS A AIRCRAFT MISHAP INVOLVING T-45C BUNO 165632 IN THE VICINITY OF TELLICO PLAINS, TN ON 01 OCTOBER 2017

Ref: (a) JAGINST 5800.7F (JAGMAN)

Encl: (1) Ltr of appointment ICO Major (b)(6) USMC 3 October 2017
(2) Ltr of appointment ICO CDR (b)(6) USN 12 October 2017
(3) Ltr of extension and approval, 1 November 2017
(4) Email from Mr. (b)(6) PMA-202
(5) Orders for LTJG Wallace Burch, USN
(6) Training Squadron SEVEN Instructor and Student Command Recall
(7) Page Two for LTJG Wallace Burch, USN
(8) Officer Appointment for LTJG Wallace Burch, USN
(9) Orders for LT Patrick Ruth, USN
(10) Page Two for LT Patrick Ruth, USN
(11) Officer Appointment for LT Patrick Ruth, USN
(12) NATOPS Jacket for LT Patrick Ruth, USN
(13) NATOPS Jacket for LTJG Wallace Burch, USN
(14) Medical Recommendation for Flying for LTJG Wallace Burch, USN
(15) Wing Stats Flight Hour Summary for LTJG Wallace Burch, USN
(16) Training Jacket for LTJG Wallace Burch, USN
(17) Break in Training Syllabus for LTJG Wallace Burch, USN
(18) Training Jacket for LT Patrick Ruth, USN
(19) Medical Recommendation for Flying for LT Patrick Ruth, USN
(20) Wing Stats Flight Hour Summary for LT Patrick Ruth, USN
(21) CNATRAINST 1542.160 T-45 Combined Strike Flight Instructor Training Curriculum
(22) CNATRAINST 1542.177 T-45C Strike Flight Instructor Under Training Curriculum
(23) Summary of Interview with Captain (b)(6), USMC
(24) Summary of Interview with Mr. (b)(6) Civilian
(25) CNATRA P-912 Flight Training Instruction for Low Altitude Awareness Training
(26) Summary of Interview with Major (b)(6) USMC
(27) CNATRA Safety Pre-Assist Email from Captain (b)(6), USMC
(28) Summary of Interview with LCDR (b)(6) USN
(29) Naval Safety Center Aviation Safety Assessment Results
(30) CNAF Safety Culture Workshop Seminar Results
(31) Summary of Interview with LCDR (b)(6) USN
(32) Training Squadron SEVEN Instructor Warm-Up Plan
(33) CNATRA 3710.13H Flight Instructor Standardization and Training Program

(34) TRARONSEVENINST 5214.1J Standardization and Training Program
(35) COMTRAWINGONEINST 3710.4D CH-1 Cross Country Request Form
(36) Summary of Interview with Captain (b)(6) USMC
(37) Summary of Interview with LT (b)(6) USN
(38) Summary of Interview with LTJG (b)(6) USN
(39) Summary of Interview with LTJG (b)(6) USN
(40) Training Squadron SEVEN Flight Schedules 29 September – 1 October 2017
(41) BUNO 165632 Aircraft Discrepancy Book
(42) McGhee Tyson Airport Weather 1 October 2017
(43) Summary of Interview with Mr. (b)(6) Civilian
(44) Google Earth Imagery of Mishap Site
(45) Tellico Trout Hatchery Address
(46) TRAWINGONE Standardization Notes and FTI Supplement
(47) Bird/Animal Strike Hazard Report 1 October 2017
(48) Sun Angle and Direction Data 1 October 2017
(49) DOD Flight Information Publication Area Planning 1B (AP/1B)
(50) BUNO 165632 Digital Data Suite (DDS) Data Disc
(51) BUNO 165632 Digital Data Suite (DDS) Noise Reduced Audio Disc
(52) T-45C NATOPS Manual A1-T45AC-NFM-000
(53) BUNO 165632 Aircraft Engineering Investigation
(54) BUNO 165632 3-Dimensional Animation Disc
(55) BUNO 165632 Mishap Site Photographs
(56) NAVAIR Mishap Investigation Support Team Report of BUNO 165632
(57) LTJG Wallace Burch, USN Aviation Life Support Systems Maintenance Record
(58) LT Patrick Ruth, USN Aviation Life Support Systems Maintenance Record
(59) LTJG Wallace Burch, USN Spare Regulator Maintenance Record
(60) LT Patrick Ruth, USN Spare Regulator Maintenance Record
(61) Email Interview with Mr. (b)(6) Civilian
(62) Monroe County Emergency Management Agency Dispatch Report
(63) CNATRA Maintenance Detachment Inspection Summary of BUNO 165632
(64) BUNO 165632 90 Day Flight Control and Hydraulic Work Order Report
(65) BUNO 165632 90 Day Total Aircraft Work Order Report
(66) PMA-273 Analysis of Engine Performance Data for OBOGS Pressure

Preliminary Statement

1. This reports completion of the command investigation conducted in accordance with reference (a) and enclosures (1) and (2) into the fatal Class A aircraft mishap of Lieutenant (LT) Patrick L. Ruth, United States Navy (USN) and Lieutenant Junior Grade (LTJG) Wallace E. Burch, USN on 1 October 2017 during a scheduled Operational Navigation (ONAV) Low Altitude Awareness Training (LAAT) flight on the VR-1055 Military Training Route (MTR) from McGhee Tyson Airport (KTYS), Knoxville, Tennessee to Naval Air Station (NAS) Meridian (KNMM), Meridian, Mississippi.

2. On 3 October 2017, Major (Maj) (b)(6), United States Marine Corps (USMC), was appointed as the Investigating Officer by Commander, Training Wing ONE (CTW1). On 12 October 2017, Commander (CDR) (b)(6) USN was appointed as the Investigating Officer by Commanding Officer, Training Squadron SEVEN (VT7). CDR (b)(6) assumed primary responsibility for the investigation with the assistance of Maj (b)(6). This change was made to facilitate the endorsement of the investigation by VT7 and import an objective perspective from an officer outside of the Chief, Naval Air Training (CNATRA) command.

3. An extension was granted on 1 November 2017 to extend the submission date to 10 November 2017 to accommodate the collection of the aircraft Engineering Investigation (EI) and medical examiner report, per enclosure (3). The inclusion of information from these two records detailing potential cause and consequence of inflight and impact events was critical to the comprehensive analysis of the mishap. The final oxygen systems EI was unavailable at the conclusion of this command investigation due to the amount of damage to the components recovered at the mishap site. A preliminary e-mail, enclosure (4), was obtained by the Investigating Officer with a condensed summary of the oxygen systems recovered and reconstruction timeline based on the recovered components as an adequate substitute. At the time of this report total mishap costing was unavailable due to the remote nature of the mishap, Federal forest land and recovery requirements. Additionally, the Armed Forces Medical Examiner did not release a preliminary medical examiner's report and the final medical examiner's report was not available at the conclusion of the command investigation. Inclusion of the final medical examiner's report would require an additional extension of thirty to sixty days. The conclusion of this investigation without the full oxygen systems EI, total mishap costing, or medical examiner's report was coordinated with VT7, the convening authority, and CNATRA, the General Court Martial Convening Authority.

4. All reasonably available evidence was collected with the exception of the above noted items. However, the quality and character of physical evidence collected at the mishap location was significantly compromised due to the high energy impact of the mishap aircraft. Documentation of LT Ruth's ONAV ground training was also unavailable because the training was not recorded in Total Information Management System (TIMS).

5. Time zones and geographic coordinates are appropriately noted where relevant.

6. Lieutenant Commander (LCDR) (b)(6), Judge Advocate General's Corps (JAGC), USN and LT (b)(6), JAGC, USN, provided legal guidance during the course of this investigation.

Findings of Fact

LTJG Burch Personal Information

1. LTJG Wallace E. Burch was a Naval Officer and Student Naval Aviator (SNA) assigned to VT7 located at NAS Meridian, Mississippi, 101 Fuller Road Suite 270, Meridian, MS 39309-5405. [Encls (5), (6)]

2. LTJG Burch was born on 15 October 1991 and does not have any dependents. [Encl (7)]

3. LTJG Burch was commissioned as an Ensign in the United States Navy upon completion of Officer Candidate School (OCS) on 16 January 2015 and remained on Active Duty until his death. [Encls (5), (8)]

4. As of 1 October 2017, LTJG Burch resided at 4315 Hwy 39N Apt 5A, Meridian, MS 39309; his home recall number was (901) (b)(6) and his command recall phone number was (601) 679-2321. [Encl (6)]

5. LTJG Burch reported to CTW1 at NAS Meridian, Mississippi on Active Duty orders for temporary duty in a flying status involving flying on 6 May 2016. [Encl (5)]

LT Ruth Personal Information

6. LT Patrick L. Ruth was a Naval Officer and Aviator on Active Duty, and assigned to VT7 located at NAS Meridian, Mississippi, 101 Fuller Road Suite 270, Meridian, Mississippi 39309-5405. [Encls (6) (9)]

7. LT Ruth was born on 29 April 1986 and does not have any dependents. [Encl (10)]

8. LT Ruth was commissioned as an Ensign in the United States Navy upon completion of Reserve Officer Training Corps (ROTC) on 17 May 2008 and remained on Active Duty until his death. [Encls (9) (11)]

9. LT Ruth was designated as a Naval Aviator on 18 March 2011. [Encl (12)]

10. LT Ruth reported on Active Duty orders to VT7 for permanent duty in a flying status involving flying on 30 April 2015. [Encl (9)]

11. On 1 October 2017, LT Patrick Ruth resided at 8199 Clearside Lane, Collinsville, Mississippi 39325; his home recall number was (504) (b)(6) and his command recall phone number was (601) 679-2321. [Encls (6) (9)]

LTJG Burch Training History

12. LTJG Burch completed Naval Aviation Survival Training Program (NASTP), Aircrew Indoctrination Training for Class 1 Aircraft, which includes the T-45C Goshawk aircraft, on 8 June 2015 at NAS Pensacola, Florida. [Encl (13)]

13. LTJG Burch completed Joint Primary Pilot Training at Training Squadron SIX on 14 April 2016. [Encl (13)]

14. LTJG Burch completed Centrifuge-Based Flight Environment Training (CFET) on 13 May 2016. [Encl (13)]

15. LTJG Burch conducted the F-18 profile during CFET training and was found to have a relaxed G-Tolerance of 5.0 on 13 May 2016. [Encl (13)]

16. LTJG Burch completed Dynamic Hypoxia Training (DHT) on 6 June 2016; expiration 30 June 2018. [Encl (13)]

17. LTJG Burch was designated fully instrument qualified in the T-45C on 5 January 17 by CDR Jason M. Gustin, Commanding Officer, VT7; expiration 31 January 2018. [Encl (13)]

18. The required annual Hypoxia Awareness Training and G-Loss of Consciousness (LOC) / G-Tolerance Improvement Program are covered under the Commander Naval Air Forces (CNAF) M-3710.7 Annual Level A Training. [Encl (13)]

19. The required annual T-45C Ejection Seat, Aeromedical Aspects of Ejection, and Aviation Life Support Systems trainings are covered under the CNAF M-3710.7 Annual Level A Training. [Encl (13)]

20. LTJG Burch completed CNAF M-3710.7 Annual Level A Training on 19 July 2017. [Encl (13)]

21. LTJG Burch was found to be fully medically qualified, by LT (b)(6) MD, MC(FS) USN on 25 September 2017; expiration 31 October 2018. [Encl (14)]

22. LTJG Burch had no mishaps or flight violations prior to 1 October 17. [Encl (13)]

23. LTJG Burch's flight hours on 28 September 2017 were 150.1 total military time, of which 69.1 hours were in the T-6B Texan II aircraft and 81.0 were in the T-45C aircraft. [Encl (15)]

24. LTJG Burch's ONAV 3101 simulator event was completed on 5 April 2017. [Encl (16)]

25. LTJG Burch's ONAV 3102 simulator event was completed on 6 April 2017. [Encl (16)]

26. LTJG Burch's ONAV 3103 simulator event was completed on 7 April 2017. [Encl (16)]

27. An ONAV 3103 (2) simulator event was completed on 17 April 2017 as a warmup because ten (10) days had elapsed since LTJG Burch's last ONAV simulator. [Encl (16)]

28. An ONAV 3103 (3) simulator warm-up event was completed by LTJG Burch on 27 June 2017 for proficiency training; however, no low altitude procedures were conducted during this simulator. [Encl (16)]

29. LTJG Burch began his Break-in-Training Syllabus (BITS) on 18 August 2017 after an extended break in his training due to the CNATRA T-45C On-Board Oxygen Generating System (OBOGS) Operational Risk Management (ORM) safety pause. [Encl (17)]

30. An ONAV 3103(4) warm-up simulator event was completed on 24 August 2017 as the first event of LTJG Burch's BITS training syllabus. [Encl (17)]

31. Two Instrument Rating warm up flights were flown by LTJG Burch on 13 September 2017. [Encl (17)]

32. On 14 September 2017, LTJG Burch flew a Familiarization (FAM) 4302 warm-up flight, during which multiple aircraft stall series were conducted. [Encl (17)]

LT Ruth Training History

33. LT Ruth was designated as E-2C Aircrew Training Continuum (ACTC) Level III / Carrier Aircraft Plane Commander (CAPC) qualified on 6 October 2013 by CDR John W. Hewitt, Commanding Officer, Carrier Airborne Early Warning Squadron ONE TWO SIX. [Encl (12)]

34. LT Ruth completed the Training Air Wing ONE Flight Instructor Training Course on 14 July 2015. [Encl (12) (18)]

35. LT Ruth was designated a T-45C Flight Instructor on 26 August 2015 by Captain (CAPT) Paul A. Carelli, Commander, Training Air Wing ONE. [Encl (12) (18)]

36. LT Ruth was designated as a Crew Resource Management (CRM) Facilitator on 28 February 2017 by CDR Jason M. Gustin, Commanding Officer, VT7. [Encls (12)]

37. LT Ruth was designated as an Instrument Check Pilot on 28 February 2017 by CDR Jason M. Gustin, Commanding Officer, VT7. [Encls (12) (18)]

38. LT Ruth was designated as the Command Operational Risk Management Assistant Manager on 5 June 2017 by CDR Jason M. Gustin, Commanding Officer, VT7. [Encls (12) (18)]

39. LT Ruth was found to be fully medically qualified by LT (b)(6) MD, MC(FS) USN on 22 Jun 2017; expiration 30 April 2018. [Encl (19)]

40. LT Ruth was fully NATOPS qualified in the T-45C on 31 August 2017 by CDR Jason M. Gustin, Commanding Officer, VT7; expiration 31 August 2018. [Encl (12)]

41. LT Ruth was designated fully instrument qualified in the T-45C on 31 August 17 by CDR Jason M. Gustin, Training Squadron SEVEN Commanding Officer; expiration 31 August 2018. [Encl (12)]

42. LT Ruth completed Centrifuge-Based Flight Environment Training (CFET), F-18 profile, on 10 March 2010. [Encl (12)]

43. LT Ruth completed NASTP, Aircrew Indoctrination Training for Class 1 Aircraft, which includes the T-45C, on 24 March 2015 at NAS Pensacola, Florida. [Encl (12)]

44. LT Ruth completed CNAF M-3710.7 Annual Level A Training on 19 January 2017; expiration 31 January 2018. [Encl (12)]

45. LT Ruth completed Dynamic Hypoxia Training (DHT) on 23 March 2017; expiration 31 March 2019. [Encl (12)]

46. LT Ruth had no mishaps or flight violations prior to 1 October 2017. [Encl (12)]

47. LT Ruth's flight hours on 28 Sep 2017 were 1953.8 total military time, of which 881.0 were in the T-45C aircraft. [Encl (20)]

CNATRA Flight Training for Instructor Pilots

48. To become a qualified Instructor Pilot (IP) for a specific stage, IPs must complete the respective stage syllabus delineated in CNATRAINST 1542.160 T45 Combined Strike Flight Instructor Training Curriculum. [Encl (21)]

49. CNATRAINST 1542.160 was implemented on 8 May 2009. [Encl (21)]

50. CNATRAINST 1542.160 was in place at the time that LT Ruth was completing his IP syllabus. [Encl (9)]

51. On 18 April 2017, CNATRAINST 1542.177 replaced CNATRAINST 1542.160 and issued updated T-45C Strike Flight Instructor Under Training (IUT) Curriculum. [Encl (22)]

52. (b)(5)

53. A VT7 instructor pilot must complete the IUT syllabus for each stage before he/she may instruct a student on that stage. [Encl (21)]

54. Each stage of the CNATRA IUT syllabus requires a different course of training and experience usually requiring computer-based instructional modules, lecture, simulator evolutions, and flight training. [Encl (21)]

55. Stages include Ground Training, NATOPS Training, Formation Training, Navigation Training, and ONAV Training, among others. [Encl (21)]

56. For an instructor to begin the IUT syllabus for a given stage, he/she must be selected during an Aircrew Qualification Board (AQB) that verifies personal aptitudes of the officer. [Encl (23)]

57. Once selected, the IUT is scheduled for ground school based on the appropriate stage-specific syllabus. [Encl (23)]

ONAV Syllabus Requirements

58. CNATRAINST 1542.160 requires IUTs without previous ONAV training during their undergraduate pilot training complete a syllabus that includes ONFP-01 Low-Level Waypoint Navigation, ONAV-02 ONAV Procedures, ONFP-03X Operational Navigation Stage Exam, ON-01S Operational Navigation One Simulator, ON-02 Operational Navigation Two, and ON-03X Operational Navigation Three Check. [Encl (21)]

59. (b)(5)
(b)(5)

60. (b)(5)
(b)(5)

61. (b)(5)
(b)(5)

62. (b)(5)
(b)(5)

63. As trained in ground school, ONAV briefs cover the student-made chart, divert chart, route entry, route direction, route exit, notable terrain, and the point of highest elevation. [Encl (23)]

64. IUTs and students are taught, as a technique, to negotiate ridgelines utilizing natural breaks or to follow gaps and passes through terrain. [Encl (25)]

65. Instructors are told before they begin training that additional training events are available if desired or required. [Encl (23)]

LT Ruth's ONAV Stage Syllabus

66. LT Ruth completed his Operational Navigation (ON) ON-01S, ONAV IUT simulator event on 25 October 2016. [Encl (18)]

67. The ON-01S training introduces basic T-45 series low altitude training, systems, and navigational procedures, to include low altitude hazards. [Encl (21)]

68. The briefing items for ON-01S are flight schedule Questions of the Day (QOD), GPS/Inertial Navigation Assembly (GINA) failure, and low level weather considerations. [Encl (21)]

69. LT Ruth completed an ON-01S simulator event on 25 October 2016 in accordance with standard operating procedures (SOP), Flight Training Instruction (FTI), Master Curriculum Guide (MCG) and NATOPS with no issues noted. [Encl (18)]

70. LT Ruth's ONAV IUT flight events were conducted enroute and during the November 2016 T-45C Weapons Detachment at Naval Auxiliary Field (NAF) El Centro, California. [Encl (23)]

71. The ON-02, Operational Navigation flight is flown as a single aircraft by the IUT from the front cockpit and focuses on pilotage in the low altitude environment. [Encl (21)]

72. The briefing items for ON-02 are flight schedule Questions of the Day (QOD) and weather response. [Encl (21)]

73. All of LT Ruth's ONAV IUT training flights were instructed by Captain (Capt) (b)(6) (b)(6), USMC; the current CNATRA ONAV Stage Standardization Officer. [Encl (23)]

74. LT Ruth incompleted ON-02 IUT flight event on 26 October 2016 while enroute from NAS Meridian, MS and Naval Air Facility (NAF) El Centro, California for a T-45C Weapons Detachment. [Encls (18) (20)]

75. LT Ruth incompleted ON-02 (2) IUT flight event on 27 October 2016 while enroute from NAS Meridian, Mississippi and NAF El Centro, California for the November 2016 T-45C Weapons Detachment. [Encls (18) (20)]

76. LT Ruth's ON-2 and ON-2 (2) indicate incomplete due to weather as the reason code for TIMS administrative requirements to incomplete a flight. [Encls (18) (23)]

77. No weather restricting Low Altitude Awareness Training was observed by Capt (b)(6) on 26 and 27 October 2016. [Encl (23)]

78. During the November 2016 T-45C Weapons Detachment to NAF El Centro, California, instructors were unable to log grade sheets in TIMS causing qualifications to be delayed. [Encl (26)]

79. TIMS is designed to notify an instructor if pre-requisites are not complete. [Encl (23)]

80. The VT7 Standardization Officer, Maj (b)(6) USMC, stated that he asked LT Ruth on 12 December 2016 for his missing ONAV stage standardization exam and issued the qualification on 22 December 2017 after receiving the missing documentation. [Encl (26)]

81. Maj (b)(6) believes it is possible that LT Ruth's ONAV stage standardization exam could have been discarded inadvertently when other tests were being filed, or that it could have been inadvertently filed in another training jacket. [Encl (26)]

82. Instructors in an IUT syllabus are told that they can fly extra events if they feel they need additional training. [Encl (26)]

83. LT Ruth requested additional ONAV IUT flights. [Encl (23)]

84. LT Ruth flew two additional ONAV IUT flights beyond what the syllabus requires because he voluntarily wanted to gain additional proficiency before instructing in the ONAV stage. [Encl (23)]

85. LT Ruth completed ON-02 (3) IUT flight event on 15 November 2016, flying the VR-1266 MTR from NAF El Centro, CA to Marine Corps Air Station (MCAS) Yuma, Arizona. [Encls (18) (20)]

86. ON-03X, Operational Navigation check flight, is flown as a single aircraft by the IUT in the aft cockpit and focuses on preparation for instruction, pilotage, low level basic air work, low altitude hazards, flight instruction, performance evaluation, guidance/feedback, and debriefing. [Encl (21)]

87. The briefing items for ON-03X are flight schedule Questions of the Day (QOD) and weather response. [Encl (21)]

88. LT Ruth completed ON-03X IUT check flight event on 15 November 2016, flying the VR-1266 MTR from MCAS Yuma, AZ to NAF El Centro, CA. [Encls (18) (20)]

89. LT Ruth's performance during ON-03X IUT check flight was noted as standardized, well executed, and ready to instruct. [Encl (18)]

90. Capt (b)(6) did not note any performance deficiencies in LT Ruth's flying abilities. [Encl (23)]

91. Capt (b)(6) remembered LT Ruth as having an abundance of caution, specifically noting LT Ruth's maturity in the aircraft. [Encl (18)]

92. LT Ruth's ONAV Standardization Exam was logged on 22 December 2016; expiration 31 December 2017. [Encl (18)]

93. LT Ruth received his ONAV student check instructor designation 22 December 2016; expiration 22 December 2066. [Encl (18)]

94. Between 26 October 2016 and 31 July 2017, LT Ruth flew nineteen (19) single aircraft ONAV LAAT flight events. [Encl (20)]

95. Between 23 December 2016 and 31 July 2017, LT Ruth flew fifteen (15) single aircraft ONAV Low Altitude Awareness Training instructional flight events with Student Naval Aviators (SNA). [Encl (20)]

VT7 Post OBOGS ORM Pause

96. On 13 June 2017, CNATRA conducted a Safety Pre-Assist visit to VT7 following the T-45C Operational Risk Management (ORM) safety pause related to OBOGS reliability, noting no major discrepancies. [Encls (27) (28)]

97. On 25 July 2017, CNATRA conducted a Safety Assist visit of VT7 and provided positive verbal feedback to the VT7 Safety Officer, LCDR (b)(6) USN; official results are pending approval by CNATRA as of 9 November 2017. [Encls (27) (28)]

98. On 11 August 2017, the Naval Safety Center Aviation Assessment Team, led by CDR (b)(6) USN conducted a one-day safety assessment of VT7 following the T-45C ORM safety pause related to OBOGS reliability. [Encl (29)]

99. During the Naval Safety Center visit on 11 August 2017, the assessment team observed robust ORM integration into all processes being utilized during the resumption of VT7's production mission. [Encl (29)]

100. The Naval Safety Center team observed that VT7 invested heavily in completing pilots in the IUT syllabus as OBOGS restrictions were lifted. [Encl (29)]

101. The Naval Safety Center team noted on 11 August 2017 that VT7 command safety promotion was strong and that Student Naval Aviators did not feel they were being pressured to take unnecessary risk. [Encl (29)]

102. The Naval Safety Center team noted on 11 August 2017 that VT7 aircrew morale appeared to be on a strong positive upswing following the operational pause due to OBOGS reliability. [Encl (29)]

103. From 16 to 17 August 2017, Commander, Naval Air Forces (CNAF) conducted a Culture Workshop with VT7, led by CAPT William P. Kronen, USN. [Encls (28) (30)]

104. The CNAF Culture Workshop noted that the squadron was an "extremely good command, doing great work towards mission success." [Encl (30)]

105. LCDR (b)(6) felt that safety concerns during the CNATRA ORM pause were handled well by VT7 and CTW1. [(Encl (28)]

106. LCDR (b)(6) noted that he was personally logging eighteen (18) to twenty (20) hours a month during the pause and felt it was sufficient for him to maintain proficiency. [Encl (28)]

107. Maj (b)(6) felt that the VT7 Operations department ensured all Instructor Pilots (IPs) were flying as frequently as possible given the restrictions imposed on dynamic flying. [Encl (26)]

108. Prior to the aircraft mishap that occurred on 1 October 2017, LCDR (b)(6) felt that there were no glaring safety issues and that the safety culture in the squadron was robust and intact. [Encl (28)]

109. Following the safety pause, VT7 developed a phased instructor training plan to maintain instructor proficiency in qualifications based upon the most applicable student requirements. [Encl (31)]

110. VT7 utilized current VT7 and Training Squadron NINE (VT9) Standardization qualified instructors to re-standardize instructors with expired qualifications based upon CTW1 priorities. [Encl (26)]

111. The phased plan created by VT7 prioritized instructor qualifications that could be obtained while adhering to CNATRA mandated OBOGS restrictions, during which 2 and 4-G flight restrictions were imposed. [Encl (31)]

112. During the 2-G restriction, VT7 prioritized basic section and division instructor re-standardization flights, instrument flights, and basic pattern work. [Encls (31) (32)]

113. During the 4-G restriction, VT7 prioritized limited tactical formation flights and section low altitude instructor re-standardization flights with a 4-G limitation. [Encls (31) (32)]

114. Student production began in August 2017 based on student priority and individual Break in Training Syllabi (BITS). [Encl (31)]

115. IPs typically volunteer for two to three flights per day to build flight hours. [Encl (31)]

116. IPs are free to excuse themselves from flights they are not physically or mentally prepared to fly, or "ORM out of flights," at any time without any repercussions. [Encls (28) (31)]

Flight Hours Prior to 29 September 2017 Cross Country Flights

117. Aircrew are required to have a flight within the previous thirty (30) days prior to Low Altitude Awareness Training. [Encl (25)]

118. The type of flight required within thirty (30) days prior to Low Altitude Awareness Training is not specified by guiding instruction. [Encl (25)]

119. LT Ruth flew 22.4 hours in the thirty (30) days prior to 29 September 2017. [Encl (20)]

120. LT Ruth flew 39.3 hours in the sixty (60) days prior to 29 September 2017. [Encl (20)]

121. LT Ruth flew 53.7 hours in the ninety (90) days prior to 29 September 2017. [Encl (20)]

122. LTJG Burch flew 7.7 hours in the thirty (30) and sixty (60) days prior to 29 September 2017. [Encl (15)]

123. LTJG Burch flew 10.1 hours in the ninety (90) days prior to 29 September 2017. [Encl (15)]

Last Flight Prior to 29 September 2017 Cross Country Flights

124. LT Ruth's last flight prior to 29 September 2017 was flown on 28 September 2017. [Encl 20)]

125. LTJG Burch's last flight prior to 29 September 2017 was on 27 September 2017. [Encl (15)]

126. (b)(5)
(b)(5)

LT Ruth's IP ONAV Requirements Prior to 29 September 2017 – 1 October 2017 Cross Country Flights

127. Instructor aircrew must have at least one instructional ONAV flight event within the previous 180 days to be considered current to instruct student ONAV syllabus events. [Encls (33) (34)]

128. Prior to 29 September 2017, LT Ruth's last single aircraft ONAV low altitude flight was 31 July 2017. [Encl (20)]

129. (b)(5)
(b)(5)

27 September 2017 – 1 October 2017 Cross Country Flight Timeline of Events

27 September 2017

130. A cross country request was routed on 26 September 2017 through the appropriate channels and approved by CDR Jason M. Gustin, Commanding Officer, VT7 on 27 September 2017. [Encl (35)]

131. On 29 September 2017, three T-45C aircraft, including Bureau Number (BUNO) 165632 (the aircraft), were scheduled to depart NAS Meridian, Mississippi from VT7 to conduct weekend ONAV cross-country training missions to Lynchburg, Virginia and return on 1 October 2017 to NAS Meridian, Mississippi. [Encls (36) (37) (38) (39) (40)]

132. Flight schedules for 29 September 2017, 30 September 2017, and 1 October 2017 were approved by CDR Jason M. Gustin, Commanding Officer, VT7 on 29 September 2017. [Encl (40)]

29 September 2017

133. On 29 September 2017, LT Ruth signed for the aircraft, BUNO 165632, accepting custody as aircraft commander. [Encl (41)]

134. The aircraft, BUNO 165632, was flown by LTJG Burch with LT Ruth as the Instructor Pilot. [Encl (40)]

135. LT Ruth and LTJG Burch were scheduled to fly ON4101, ON4102, and ON4103 ONAV flight events on 29 September 2017. [Encls (36) (37) (38) (39) (40)]

136. LT Ruth and LTJG Burch were scheduled to fly ON4104 and ON4105 ONAV flight events on 1 October 17. [Encls (36) (37) (38) (39) (40)]

137. LT Ruth flew three flights on 28 September 17, with his final flight landing at 2220 CDT. [Encls (20) (36) (37) (38) (39)]

138. To facilitate crew rest, LT Ruth cancelled the first ONAV flight for himself and LTJG Burch on 29 September 2017. [Encls (36) (37) (38) (39)]

139. LTJG Burch and LT Ruth completed ON4101 and ON4102 ONAV flight events on 29 September 2017, after the first event of the day was cancelled. [Encls (36) (37) (38) (39) (40)]

140. LTJG Burch and LT Ruth were the first two crew members to arrive in Lynchburg, Virginia at approximately 1630 EDT on 29 September 2017 and retrieved the two reserved rental cars. [Encls (36) (37) (38) (39)]

141. LTJG (b)(6), USN, LTJG (b)(6), USN, Captain (Capt) (b)(6), USMC, and LT (b)(6), USN arrived in Lynchburg, Virginia approximately 30 minutes after LTJG Burch and LT Ruth on 29 September 2017. [Encls (36) (37) (38) (39)]

142. LTJG Burch mentioned to LTJG (b)(6) that he had gotten airsick after the second flight at altitude when transiting to Lynchburg, Virginia. [Encl (38)]

143. LTJG Burch was able to complete the flight despite being airsick. [Encl (38)]

144. LT Ruth, LT (b)(6), LTJG Burch, LTJG (b)(6), and LTJG (b)(6) stayed in the same hotel in Christiansburg, Virginia from 29 September 2017 to 1 October 2017. [Encls (36) (37) (38) (39)]

145. Capt (b)(6) left the group to spend the rest of the weekend with a family friend who lived nearby. [Encl (36)]

146. When not in their individual hotel rooms, LT Ruth and LT (b)(6) spent the weekend together and shared a rental car. [Encl (37)]

147. When not in their individual hotel rooms, LTJG Burch, LTJG (b)(6) and LTJG (b)(6) spent the weekend together and shared a rental car. [Encls (38) (39)]

148. On the evening of 29 September 2017, LT Ruth and LT (b)(6) went to Roanoke, Virginia and had dinner at an Indian restaurant with LT (b)(6)'s cousin. [Encl (37)]

149. Following dinner, LT Ruth and LT (b)(6) traveled back to their hotel in Christiansburg, Virginia. [Encl (37)]

150. LT Ruth and LT (b)(6) arrived at their hotel at approximately 2200 EDT. [Encl (37)]

151. LT Ruth and LT (b)(6) planned to go out to a bar for a drink, but due to the wait for an Uber taxi, they decided to stay at the hotel. [Encl (37)]

152. LT Ruth and LT (b)(6) had a couple of beers in LT (b)(6)'s room and went to bed around 2300 EDT. [Encl (37)]

153. On the evening of 29 September 2017, LTJG Burch, LTJG (b)(6) and LTJG (b)(6) met up with LTJG (b)(6)'s brother for dinner in Blacksburg, Virginia. [Encls (38) (39)]

154. After dinner, LTJG Burch, LTJG (b)(6), LTJG (b)(6), and LTJG (b)(6)'s brother went to several different bars in Blacksburg, Virginia. [Encls (38) (39)]

155. LTJG (b)(6) and LTJG (b)(6) state that LTJG Burch's attitude and demeanor were normal on 29 September 2017, like every other time they had gone out together socially. [Encls (38) (39)]

156. At 0145 EDT on 30 September 2017, LTJG Burch, LTJG (b)(6) and LTJG (b)(6) took an Uber taxi back to Christiansburg, Virginia, stopped to eat at a Denny's restaurant, and were asleep at their hotel by 0315-0330 EDT. [Encls (38) (39)]

30 September 2017

157. On 30 September 2017, LT Ruth and LT (b)(6) woke up at 0900 EDT and drove to Blacksburg, Virginia. [Encl (37)]

158. LT Ruth and LT (b)(6) spent the day walking around the Virginia Tech campus and attending College Game Day. [Encs (37)]

159. LT (b)(6) stated that he and LT Ruth went to three different bars during the day. [Encl (37)]

160. LTJG Burch, LTJG (b)(6) and LTJG (b)(6) woke up between 0930 EDT and 1100 EDT on 30 September 2017 and drove to Blacksburg, Virginia. [Encls (38) (39)]

161. LTJG Burch, LTJG (b)(6) and LTJG (b)(6) spent the day eating brunch, walking around Virginia Tech campus, and attending College Game Day. [Encls (38) (39)]

162. LT Ruth and LT (b)(6) met up with LTJG Burch, LTJG (b)(6) and LTJG (b)(6) at the third bar on 30 September 2017 where they had approximately four beers apiece. [Encls (37) (38) (39)]

163. LT Ruth and LT (b)(6) separated from LTJG Burch, LTJG (b)(6) and LTJG (b)(6) after they left the bar. [Encls (38) (39)]

164. LT Ruth and LT (b)(6) went to a restaurant where they each had some food and one beer each, leaving the restaurant around 1700 EDT. [Encl (37)]

165. After dinner, LT Ruth and LT (b)(6) attended a tailgate party where LT Ruth had half of a beer. [Encl (37)]

166. After LTJG Burch, LTJG (b)(6) and LTJG (b)(6) left the bar they attended a separate tailgate party. [Encls (38) (39)]

167. Both groups then went separately to the stadium to watch the game. [Encls (37) (38) (39)]

168. For LT Ruth and LT (b)(6) the remaining portion of the evening consisted of watching the football game at the stadium, eating food at the stadium, and traveling back to the hotel via Uber taxi. [Encl (37)]

169. LT Ruth and LT (b)(6) did not consume alcohol after 1900 EDT / 2300 UTC. [Encl (37)]

170. LT Ruth and LT (b)(6) retired to their rooms at 2330 EDT. [Encl (37)]

171. For LTJG Burch, LTJG (b)(6) and LTJG (b)(6) the rest of the evening consisted of watching the football game at the stadium and traveling back to the hotel via Uber taxi. [Encls (38) (39)]

172. LTJG Burch, LTJG (b)(6) and LTJG (b)(6) did not consume alcohol after 1800 EDT / 2200 UTC. [Encls (38) (39)]

173. LTJG Burch, LTJG (b)(6) , and LTJG (b)(6) retired to their rooms and were asleep sometime between midnight and 0130 EDT on 1 October 2017. [Encls (38) (39)]

1 October 2017

174. On 1 October 2017, LT Ruth and LT (b)(6) awoke at approximately 1000 EDT and LTJG Burch, LTJG (b)(6) and LTJG (b)(6) awoke between 0900 and 0930 EDT. [Encls (37) (38) (39)]

175. LT Ruth, LT (b)(6) , LTJG Burch, LTJG (b)(6) and LTJG (b)(6) all had a good breakfast on 1 October 2017 before arriving in Lynchburg, Virginia to brief. [Encls (36) (37) (38) (39)]

176. The flight brief for the first sortie began between 1200 and 1230 EDT / 1600 and 1630 UTC. [Encls (36) (37) (38) (39)]

177. All three aircraft departed from Lynchburg, Virginia and flew the IR-726 MTR to McGhee Tyson (KTYS) in Knoxville, Tennessee. [Encls (36) (37) (38) (39)]

178. The crews spent approximately one hour on the ground at KTYS, where they refueled, briefed, and prepared for the final flight of the weekend. [Encls (36) (37) (38) (39)]

179. At KTYS, LT Ruth mentioned to LT (b)(6) that he had observed a low Hydraulic System One (1) Reservoir indication after shutdown, but no fluid leaking. [Encl (37)]

180. Following preflight for the second flight leg from KTYS to NAS Meridian, Mississippi (KNMM) LT Ruth gave a thumbs-up to LT (b)(6) indicating that he thought Hydraulic System One (1) was good. [Encl (37)]

181. LTJG (b)(6) and LTJG (b)(6) stated that they did not feel rushed while on deck at KTYS. [Encls (38) (39)]

Preparations and Conditions Prior to Mishap Flight on 1 October 2017

Brief

182. All Low Altitude Awareness Training sorties shall include a thorough brief of the planned route to include route restrictions, crossing routes, obstacles, potential hazards, and an assessment of possible environmental factors such as smoke, haze, sun angle, etc. [Encl (25)]

183. LTJG (b)(6) and LTJG (b)(6) felt that all briefs for events from 29 September 2017 through 1 October 2017 were thorough and that they were well prepared to execute each flight safely. [Encls (38) (39)]

Mental State

184. Nothing abnormal was noted about LT Ruth or LTJG Burch on 1 October 2017 by any of the other aircrew. [Encls (36) (37) (38) (39)]

185. It was noted by LTJG (b)(6) that LTJG Burch was happy, positive, and as excited as ever on 1 October 2017. [Encl (39)]

Weather

186. The weather conditions between 1900 and 2159 UTC on 1 October 2017 at McGhee Tyson Airport (KTYS) were winds 050 at four (4) knots, shifting to 030 at eight (8) knots, ten (10) statute miles visibility, broken at 25,000 feet. [Encl (42)]

187. CNATRA minimum weather for low altitude training is a ceiling of 3000 feet Above Ground Level (AGL) and visibility of five (5) statute miles. [Encl (25)]

188. Mr. (b)(6) a Technician at Tellico Trout Hatchery, noted that the weather on 1 October 2017 was, "clear and sunny and fairly calm, the weather was fair" at approximately 2000 UTC at Tellico Hatchery. [Encls (43) (44)]

189. The Tellico Trout Hatchery is located in the Cherokee National Forest near the North Carolina border in Monroe County, Tennessee. [Encl (45)]

190. The Tellico Trout Hatchery is part of the Tennessee Wildlife Resources Agency. [Encl (45)]

The mailing address is P. O. Box 265, Tellico Plains, TN 37385; telephone (423) (b)(6) [Encl (45)]

Bird/Animal Strike Hazard (BASH)

191. Aircrew shall use the Avian Hazard Advisory System (AHAS) to assess the risk of bird strikes for all flight operations. [Encl (46)]

192. Bird/Animal Strike Hazard (BASH) condition on the VR-1055 MTR between points A and B at 1600 EDT / 2000 UTC on 1 October 2017 was moderate. [Encl (47)]

193. No bird activity was noted over Tellico Trout Hatchery on 1 October 2017. [Encls (43) (44)]

194. During preflight BASH conditions of MODERATE, aircrew may still fly the VR/IR route and will exercise elevated caution. [Encl (46)]

Sun Angle

195. At 2004 UTC on 1 October 2017, the sun angle and direction in eastern Tennessee was 36 degrees above the horizon from 232 degrees magnetic. [Encl (48)]

196. On 1 October 2017, sunset in eastern Tennessee was at 2318 UTC. [Encl (48)]

Mission Responsibilities

197. LTJG Burch occupied the front seat of the aircraft as the student and was the primary flying pilot for the flight. [Encl (40)]

198. LT Ruth occupied the rear seat of the aircraft as the IP and was the non-flying pilot during the majority of the flight. [Encl (40)]

The Route Flown on 1 October 2017

199. On 1 October 2017, LT Ruth and LTJG Burch were scheduled to fly ON4104 on the low altitude VR-1055 Military Training Route (MTR) from McGee Tyson Airport (KTYS) in Knoxville, Tennessee to NAS Meridian, Mississippi. [Encls (36) (37) (38) (39) (40)]

200. VR-1055 MTR originates approximately twenty (20) nautical miles south-southwest of Knoxville, Tennessee and flows south and west before terminating approximately seventy-five (75) nautical miles east of NAS Meridian, Mississippi. [Encl (49)]

201. VR-1055 MTR consists of eight (8) geographical points that define the route, labeled points A through G. [Encl (49)]

The Mishap Flight on 1 October 2017

202. On 1 October 2017 at 19:53:07 UTC, BUNO 165632, the aircraft carrying LT Ruth and LTJG Burch, took off from McGhee Tyson Airport (KTYS). [Encl (50)]

203. From 19:53:07 to 20:01:03 UTC, the aircraft transited uneventfully between KTYS and point "A" of the VR-1055 Military Training Route (MTR). [(Encl (50)]

204. A "G" awareness maneuver is not required for single aircraft low altitude training. [Encl (25)]

205. At 20:01:04 UTC, the aircraft entered the VR-1055 MTR at point "A". [Encl (50)]

206. At 20:01:04 UTC, LT Ruth and LTJG Burch identified a horseshoe bend in the Little Tennessee River as their pilot-defined "A" timing start point on the VR-1055 MTR, located at Latitude 35.5460 degrees North / Longitude 084.1373 degrees West. [Encls (50) (51)]

Low Altitude Flight Conditions

207. LT Ruth and LTJG Burch set the radar altimeter (RADALT) warning altitude on the aircraft to 450 feet in keeping with a briefed minimum altitude of 500 feet AGL for the VR-1055 MTR. [Encls (36) (37) (38) (39) (50)]

208. Minimum altitude for all CNATRA low altitude training is 500 feet AGL. [Encls (25) (46)]

209. An operational RADALT is required for all CNATRA aircraft so equipped. [Encl (25)]

210. The T-45C is equipped with a RADALT, providing an instantaneous measurement and reading of the height AGL from 0-5000 feet in 10-foot increments. [Encl (52)]

211. The RADALT warning shall be set no lower than 10% below the briefed minimum altitude. [Encl (25)]

212. A RADALT Low Altitude Warning (LAW) tone and visual warning cue in the Heads-up Display (HUD) alert the pilot when the aircraft descends below the altitude entered by the pilot into the RADALT system. [Encl (52)]

213. The Low Altitude Warning (LAW) tone should not be used as a crutch for altitude, but rather as a "warning" for lost situational awareness. [Encl (46)]

214. When the Low Altitude Warning (LAW) tone sounds, aircrew should immediately execute a wings level climb until the tone ceases then return to the briefed altitude. [Encl (46)]

215. After the aircraft passed point "A" at 20:01:04, the LAW tone alerted LT Ruth and LTJG Burch that they were below 450 feet AGL six times over a period of approximately 50 seconds without any guidance issued from LT Ruth. [Encls (50) (51)]

216. Upon receiving the seventh Low Altitude Warning (LAW) alert, the aircraft indicated a 230 feet AGL crossing perpendicular to a ridge line, causing LT Ruth to discuss with LTJG Burch the need to cross terrain at a higher altitude. [Encls (50) (51)]

217. (b)(5)

(b)(5)

218. Between 20:03:14 to 20:03:19 UTC, LT Ruth discussed that they could deviate from the direct line between points A and B and follow terrain, and then asked LTJG Burch for the controls. [Encls (44) (50) (51)]

219. At 20:03:19 UTC, LTJG Burch passed the controls to LT Ruth. [Encls (50) (51)]

220. At 20:03:19 UTC, LT Ruth assumed control of the aircraft and commenced a right descending turn from a heading of 180 degrees magnetic to 190 degrees magnetic to reposition the aircraft from the side of a valley to the low point of the valley. [Encls (44) (50) (51)]

221. From 20:03:24 to 20:03:29 UTC, LT Ruth flew the aircraft to demonstrate terrain following and banked the aircraft left to a heading of 155 degrees magnetic. [Encls (44) (50)]

222. From 20:03:25 to 20:03:37 UTC, LT Ruth continued to discuss terrain following techniques. [Encls (50) (51)]

223. From 20:03:32 to 20:03:41 UTC, LT Ruth commenced a left turn to a heading of 123 degrees magnetic. [Encls (44) (50)]

224. At 20:03:40 UTC, LT Ruth stated, "There you go." [Encls (50) (51)]

225. Between 20:03:41 UTC and 20:03:43 UTC, LT Ruth began an ICS transmission by explaining how to execute the task of following the terrain in the general direction of the route and then instructed LTJG Burch to make a hard right turn. [Encls (50) (51)]

226. At 20:03:43 UTC, the aircraft Heads-up Display (HUD) video and Airborne Data Recorder (ADR) indicated 325 Knots Indicated Airspeed (KIAS), 344 Knots Ground Speed (KGS), and commenced a climbing right turn; reaching a maximum climb rate of approximately 2,000 feet per minute (FPM). [Encl (50)]

227. The aircraft was following a valley that turned approximately ninety (90) degrees to the right, from a southeast orientation to a southwest orientation just forward of the aircraft's position. [Encls (44) (50)]

228. The climbing right turn commenced by LT Ruth and LTJG Burch at 20:03:43 allowed the aircraft to round the 90 degree turn and resulted in the aircraft passing over a ridge before entering a narrow draw on the opposite side. [Encls (44) (50)]

229. At 20:03:45 UTC, the aircraft was at Latitude 35.2889 degrees North / Longitude 084.0986 degrees West, adjacent to the Tellico Trout Hatchery. [Encls (44) (50)]

230. Around 20:00:00 UTC, Mr. (b)(6) the Technician at the Tellico Trout Hatchery working on site on 1 October 2017, observed the mishap aircraft fly past the hatchery and bank over a ridge near the hatchery. [Encl (43)]

231. Mr. (b)(6) noted that the aircraft was flying lower and slower compared to other aircraft flying the VR-1055 MTR. [Encl (43)]

232. VR-1055 MTR is a training route commonly used by military aircraft. [Encl (49)]

233. Mr. (b)(6) stated that he normally sees military aircraft fly over the Tellico Trout Hatchery on similar headings. [Encl (43)]

234. The aircraft was flying between 500 and 800 feet AGL as it passed by Tellico Trout Hatchery at 20:03:45 UTC. [Encl (50)]

235. At 20:03:45 UTC, LT Ruth instructed LTJG Burch to pull harder due to rising terrain in front of the aircraft and to facilitate the turn to the right into the draw. [Encls (50) (51)]

236. At 20:03:45 UTC, the time of LT Ruth's instruction, the aircraft was flying at 17 units Angle of Attack (AOA). [Encl (50)]

Stall

237. In all configurations of the T-45C, stalls are defined by wing roll off and associated pitch break. [Encl (52)]

238. The aircraft provides very little natural stall warning, which leaves rudder shakers and the Angle of Attack (AOA) warning tone as the best indication of impending stall. [Encl (52)]

239. Cruise configuration in the T-45C is defined as flaps and slats up. [Encl (52)]

240. The aircraft was configured with landing gear retracted and flaps and slats up at 19:53:17 UTC and remained in that configuration for the duration of the flight. [Encls (50) (53)]

241. In the cruise configuration there is little or no aerodynamic stall warning such as buffet or wing rock until immediately prior (1 to 2 knots) to stall. [Encl (52)]

242. In the cruise configuration, rudder pedal shaker and tone come on at 21.5 units Angle of Attack (AOA), approximately 4.5 units (10 knots) prior to stall. [Encl (52)]

243. At 20:03:45 UTC, Angle of Attack (AOA) rapidly increased to twenty-eight (28) units and the right wing dropped. [Encls (50)]

244. Due to the longitudinal stick gearing at near full aft stick travel, a small amount of aft stick commands a large stabilator deflection, causing the rate of stall onset to occur rapidly. [Encl (52)]

245. If aft stick force continues to increase beyond first indications of stall, an uncommanded wing drop of twenty-five (25) to thirty (30) degrees occurs accompanied by a mild pitch break, which defines the stall at approximately twenty-six (26) units Angle of Attack (AOA). [Encl (52)]

246. During accelerated stalls, the amount of pre-stall buffet warning in maneuvers varies with airspeed and altitude. [Encl (52)]

247. Accelerated stall indications are primarily pitch oscillations, which manifest in a bucking motion, accompanied by wing rock at all airspeeds and altitudes. [Encl (52)]

248. At 20:03:45 UTC, the aircraft began to exhibit characteristics of an accelerated stall. [Encls (50) (52)]

249. At 20:03:45 UTC, the aircraft rolled past ninety (90) degrees to the right and the nose began to drop below the horizon. [Encl (50)]

250. At 20:03:45 UTC, the control stick was commanded full left and remained there until 20:03:50 UTC. [Encls (50) (54)]

251. At 20:03:46 UTC, LT Ruth repeated the word "no" multiple times in quick succession. [Encls (50) (51)]

252. At 20:03:46 UTC, the aircraft Heads-up Display (HUD) video and Airborne Data Recorder (ADR) data indicated 310 KIAS, 110 degrees right over-bank, and a rate of descent of approximately 2500 fpm. [Encl (50)]

253. At 20:03:46 UTC, the aircraft Angle of Attack (AOA) decreased from twenty-four (24) to nineteen (19) units before increasing back to twenty-five (25) units. [Encl (50)]

254. Pitch oscillations are noticeable at Angle of Attack (AOA) anywhere between buffet onset and full aft stick. [Encl (52)]

255. At 20:03:46 UTC, the aircraft began a series of pitch oscillations or bucking motions. [Encl (52)]

256. At 20:03:47 UTC, the stall warning tone can be heard on the audio feed captured by the Digital Data Suite (DDS). [Encls (50) (51)]

257. At 20:03:47 UTC, LT Ruth instructed LTJG Burch to stop pulling and asked what he was doing. [Encl (50)]

258. Accelerated stall recovery procedure is to ease aft stick. [Encl (52)]

259. (b)(5)

(b)(5)

260. Low Altitude Awareness Training Rules state that aircraft shall immediately cease dynamic and low altitude maneuvering when there is a loss of situational awareness. [Encl (25)]

261. Low Altitude Awareness Training Rules state that aircraft shall immediately cease dynamic and low altitude maneuvering when any unsafe condition or emergency occurs. [Encl (25)]

262. (b)(5)

(b)(5)

263. At 20:03:47, the aircraft continued to experience pitch oscillations indicative of an accelerated stall. [Encl (50)]

264. At 20:03:47 UTC, the aircraft Heads-up Display (HUD) video and Airborne Data Recorder (ADR) indicated 300 KIAS, 110 degrees right over-bank, and a rate of descent of 3800 fpm. [Encl (50)]

265. At 20:03:47 UTC, the aircraft Angle of Attack (AOA) increased from twenty-five (25) to twenty-nine (29) units before decreasing back to nineteen (19) units. [Encl (50)]

266. Terrain Altitude Warning System (TAWS) capabilities provide protection against flight into all terrain types (rising, level, and descending) as well as Ground Proximity Warning System (GPWS) capability. [Encl (52)]

267. All TAWS warnings should be treated as though an imminent flight into terrain condition exists. [Encl (52)]

268. Pilot response to a TAWS warning should be instinctive and immediate with no hesitation until the Controlled Flight into Terrain (CFIT) condition no longer exists. [Encl (52)]

269. TAWS CFIT protection is severely reduced in flight regimes of shallow dive angle over mountainous or undulating terrain. [Encl (52)]

270. At 20:03:47 UTC, the aircraft TAWS commanded the aircrew to roll the aircraft left by illuminating a large arrow in the Heads-up Display (HUD) pointing in the direction of required roll, and by announcing "roll left, roll left" through the auditory warning function of the system. [Encl (52)]

271. At 20:03:47 the aircraft stick position continued to remain in the fully aft and left corner position. [Encls (52) (54)]

272. At 20:03:48 UTC, the aircraft continued to have pitch oscillations indicative of an accelerated stall. [Encl (50)]

273. At 20:03:48 UTC, the aircraft Heads-up Display (HUD) video and Airborne Data Recorder (ADR) indicated 297 KIAS, seventy-five (75) degrees right bank, a rate of descent of 4000 fpm. [Encl (50)]

274. At 20:03:48 UTC, the aircraft Angle of Attack (AOA) increased from nineteen (19) to twenty-nine (29) units decreasing back to nineteen (19) units. [Encl (50)]

275. At 20:03:48 UTC, an "eject" call was transmitted over the Intercomm System (ICS) and was the final ICS transmission of the flight. [Encls (50) (51)]

276. At 20:03:49 UTC, the aircraft Heads-up Display (HUD) video and Airborne Data Recorder (ADR) data indicated 292 KIAS, ninety (90) degrees right bank, and a rate of descent of 5500 fpm. [Encl (50)]

277. (b)(5)

(b)(5)

278. At 20:03:49 UTC, the aircraft continued to have pitch oscillations indicative of an accelerated stall. [Encl (50)]

279. At 20:03:49 UTC, the aircraft Heads-up Display (HUD) video and Airborne Data Recorder (ADR) data indicated 287 KIAS, 125 degrees right over-bank, a rate of descent of 6500 fpm, and 150 feet AGL. [Encl (50)]

280. (b)(5)

(b)(5)

281. At 20:03:50 UTC, the aircraft continued to have pitch oscillations indicative of an accelerated stall. [Encl (50)]

282. At 20:03:50 UTC, Digital Data Suite (DDS) audio and video recording ceased. [Encl (50)]

283. At 20:03:51 UTC, the last Airborne Data Recorder (ADR) recorded data indicated 285 KIAS, heading 220 degrees magnetic, 121 degrees right over-bank, sixteen (16) units Angle of Attack (AOA), and 19.53 feet AGL. [Encl (50)]

284. At 20:03:51 UTC, the Airborne Data Recorder (ADR) recorded the last position of the aircraft as Latitude 35.280682 degrees North / Longitude 084.097694 degrees West. [Encl (50)]

285. At 20:03:51 UTC, the aircraft contacted multiple trees before impacting the ground, right wing down at Longitude 35.280300 degrees North / Latitude 084.097950 degrees West. [Encls (44) (55)]

286. At approximately 20:03:51 UTC, ejection was initiated by LTJG Burch, occurring after the aircraft entered the tree canopy and was interrupted by contact with the terrain causing catastrophic failure of the ballistic gas system. [Encls (40) (50) (56)]

287. The canopy of the aircraft broke apart after making contact with the trees, prior to ejection being initiated from the forward occupant, LTJG Burch. [Encl (56)]

288. At ejection initiation, the aircraft was entering the tree canopy oriented right wing down, with the top of the aircraft oriented away from the mountainside. [Encls (50) (55) (56)]

289. Both forward and aft seat leg restraint lines were cut prior to the designed shear link, indicating that the aircraft cockpit deck came apart before thirty-two (32) inches of ejection seat travel. [(Encl (56)]

290. The forward seat ballistic gas system was compromised after approximately thirty-two (32) inches of seat travel before the seat could clear the cockpit canopy rails. [Encl (56)]

291. The aft seat ballistic gas system was compromised after approximately thirty-two (32) inches of seat travel before the seat could clear the cockpit canopy rails. [Encl (56)]

292. At ejection initiation, the cockpit seat mounting structure was compromised due to entering the forest canopy and terrain, taking the lower portion of the catapult guns and venting the ballistics gas and thus interrupting the ejection sequence. [Encl (56)]

293. In the command eject selector mode, aft seat ejection is immediately initiated and sequenced first, followed by the forward seat 0.4 seconds later. [Encls (52) (56)]

294. Following ejection initiation, the aft seat containing LT Ruth, came to rest after impacting two large tree trunks located approximately seventy (70) feet downhill from the impact site. [Encls (40) (56)]

295. Following ejection initiation, the forward seat containing LTJG Burch, came to rest thirty (30) feet downhill from the impact site. [Encls (40) (56)]

296. The survivable ejection envelope available to LT Ruth and LTJG Burch expired between 20:03:48 and 20:03:49 UTC on 1 October 2017. [Encls (50) (56)]

297. All Aviation Life Support Systems (ALSS) inspections for LTJG Burch were current on 1 October 2017. [Encl (57)]

298. All Aviation Life Support Systems (ALSS) inspections for LT Ruth were current on 1 October 2017. [Encl (58)]

299. The lower oxygen hose assembly, CRU-103A/P Demand Oxygen Regulator, and Aviator's Personal Equipment utilized by LTJG Burch on 1 October 2017 passed all required inspections on 30 August 2017; next removal date 28 November 2017. [Encl (59)]

300. The lower oxygen hose assembly, CRU-103A/P Demand Oxygen Regulator, and Aviator's Personal Equipment utilized by LT Ruth on 1 October 2017 passed all required inspections on 6 July 2017; next removal date 4 October 2017. [Encl (60)]

First Responders Report

301. Mr. (b)(6) Chief, Turkey Creek Fire Department stated that he was dispatched on 1 October 2017 at 1615 EDT for what was originally reported as a forest fire in the Cherokee National Forest. [Encls (61) (62)]

302. Mr. (b)(6) arrived in the vicinity of the mishap site at 1643 EDT on 1 October 2017 via First Response Vehicle. [Encls (61)]

303. On 1 October 2017 the Turkey Creek Fire Department, Tellico Plains Fire, Monroe County Rescue Squad, Monroe County Sheriff's Department, Monroe County Emergency Medical Service (EMS), Monroe County Emergency Management Agency (EMA), and the Southern Cherokee Ranger District were notified by Mr. (b)(6) of the aircraft mishap. [Encls (61) (62)]

304. Mr. (b)(6) assumed the role of Incident Commander on 1 October 2017, securing the roadway from traffic and unauthorized personnel above and below the mishap site wreckage. [Encl (61)]

305. Mr. (b)(6) stated that on 1 October 2017 members of the Monroe County Sheriff's Department, hiked up to the mishap site to confirm if there were any immediate signs of life. [Encl (61)]

306. There were no immediate signs of life found by the Monroe County Sheriff's Department. [Encl (61)]

307. Upon return from mishap site on 1 October 2017, the Monroe County Sheriff's Department determined that the mishap area would be secured until daylight on 2 October 2017 and no firefighters or EMS personnel would be allowed to enter the area of the mishap site. [Encl (61)]

308. Mr. (b)(6) returned to the mishap site on 2 October 2017 and remained on scene until 12 October 2017. [Encl (61)]

Maintenance History for BUNO 165632

Physical Characteristics

309. The mishap aircraft, Bureau Number (BUNO) 165632, was a T-45C Goshawk, side number 190. [Encl (41)]

310. BUNO 165632 was based out of NAS Meridian, Mississippi and was operated by the squadrons of CTW1. [Encl (41)]

311. BUNO 165632 had 6355.2 hours on the airframe prior to 29 September 2017. [Encl (63)]

312. BUNO 165632 was powered by a Rolls Royce F405-RR-401 engine with an estimated 2713.8 hours since new, as of 29 September 2017. [Encls (52) (63)]

Maintenance Inspections for BUNO 165632

313. The aircraft, BUNO 165632 had a current Daily and Turnaround inspection on 1 October 2017 at the time of the mishap. [Encl (41)]

314. The work order history for BUNO 165632 for the ten (10) days prior to 1 October 2017 included discrepancies pertaining to a hydraulic filter, two nose tires, flap drooping on deck, an inspection to recover a missing flashlight, and inspection of chipped Heads-up Display (HUD) glass. [Encl (41)]

315. On 1 September 2017, BUNO 165632 was found to have hydraulic fluid leaking from the right aileron which was signed off after it was determined that the leak was within permissible limits. [Encl (64)]

316. On 26 September 2017, BUNO 165632 was found to have a flap droop discrepancy, which was corrected by resetting a circuit breaker. [Encl (64)]

317. On 27 September 2017, BUNO 165632 was found to have a hydraulic filter indicator extended two times, which was corrected by replacing the filter. [Encl (64)]

318. The maintenance action records for BUNO 165632 were reviewed between 1 July 2017 and 1 October 2017 with no major flight control or hydraulic discrepancies noted. [Encl (64)]

319. The flight control Engineering Investigation (EI) released on 27 October 2017, having been conducted on recovered components of BUNO 165632, noted no abnormalities with the flight control systems. [Encl (53)]

320. Aileron trim on BUNO 165632 was near neutral. [Encl (53)]

321. The stabilator trim actuator on BUNO 165632 was near neutral. [Encl (53)]

322. No physical evidence from flight control components recovered from BUNO 165632 exhibited indications of pre-impact disconnect. [Encl (53)]

323. BUNO 165632 had current twenty-eight (28), 140, 364, and 728 day inspections as of 1 October 2017. [Encls (41) (63)]

324. BUNO 165632 had a current twenty-five (25) hour inspection, with 23.7 hours remaining, as of 29 September 2017. [Encls (41) (63)]

325. BUNO 165632 had a current 500 hour inspection, with 205.4 hours remaining, as of 29 September 2017. [Encl (63)]

326. BUNO 165632 had a current 1000 hour special inspection, with 374.5 hours remaining, as of 29 September 2017. [Encl (63)]

327. The last phase inspection on BUNO 165632 was completed on 1 November 2016 and there were 144.8 hours remaining. [Encls (41) (63)]

328. The Maximum Oil Consumption log for the aircraft engine, serial number 9243, showed normal oil consumption from the time of installation into BUNO 165632 on 21 June 2016. [Encl (41)]

329. The Physiological Event Technical Directives AFB-262, 263, 264, 326, and 327 were complied with on 23 August 2017. [Encl (41)]

330. The Physiological Event Technical Directive "Flight Line Health Monitor (FLHM)" was complied with on 29 August 2017. [Encl (41)]

331. All maintenance actions performed on BUNO 165632 between 1 July 2017 and 1 October 2017 were conducted in accordance with applicable Maintenance Instruction Manuals (MIMS). [Encl (65)]

Airframe Change 311 Digital Data Suite

332. Airframe Change 311 (AFC-311) was incorporated on BUNO 165632. [Encl (41)]

333. AFC-311 adds the Terrain Awareness Warning System (TAWS) and the Digital Data Suite (DDS) to the T-45C. [Encl (41)]

334. The Digital Data Suite (DDS) records flight incident data continuously, at a constant rate, for up to seven (7) and a half hours. [Encl (52)]

335. The Digital Data Suite (DDS) performs Airborne Data Recorder (ADR), Mission Data Loader (MDL) and video recording functions. [Encl (52)]

336. The control panel for the Digital Data Suite (DDS) houses a Crash Survivable Memory Unit (CSMU). [Encl (52)]

337. The Crash Survivable Memory Unit (CSMU) from BUNO 165632 was recovered and all data was preserved. [Encl (50)]

338. The T-45C has redundant hydraulic systems to operate the main flight control surfaces. [Encl (52)]

339. Normal main flight control operation will continue with the loss of a single hydraulic system. [Encl (52)]

340. Normal T-45C hydraulic system pressure is 3000 pounds per square inch (psi). [Encl (52)]

341. If the pressure of a single hydraulic system drops below 1660+/-110 psi, the Hydraulic (HYD) Caution light and Master Caution light will illuminate with associated aural tone. [Encl (52)]

342. If the pressure of both hydraulic systems drops below 1660+/-110 psi, the HYD FAIL warning light and Master Caution light will illuminate with associated aural tone. [Encl (52)]

343. No engine abnormalities for BUNO 165632 were noted on the Airborne Data Recorder (ADR) data from 19:53:07 UTC until impact at 20:03:51 UTC on 1 October 2017. [Encl (50)]

344. Engine performance data recovered from BUNO 165632 indicates that the engine was operating at a sufficient power setting throughout the flight on 1 October 2017 to provide the OBOGS concentrator a high enough pressure to maintain adequate breathing dynamics during flight. [Encl (50) (66)]

345. The digital data from the Crash Survivable Memory Unit (CSMU) recovered from BUNO 165632 indicates that there were no Warning or Caution indications from 19:53:07 UTC until impact at 20:03:51 UTC on 1 October 2017. [Encl (50)]

346. (b)(5)

(b)(5)

347. (b)(5)

(b)(5)

Opinions

1. LT Ruth and LTJG Burch were both on Active Duty on 1 October 2017 during the flight from McGee Tyson Airport (KTYS) in Knoxville, Tennessee to NAS Meridian, Mississippi. [FF (1) (3) (5) (6) (8) (10)]

2. (b)(5)

(b)(5)

3. (b)(5)

(b)(5)

4. (b)(5)

(b)(5)

5. All flight controls were fully functional on 1 October 2017. [FF (318) (319) (320) (321) (322)]

6. The mishap on 1 October 2017 was not due to aircraft failure or improper maintenance. All required maintenance was completed in accordance to all applicable maintenance publications. Aircraft data recovered from BUNO 165632 shows that no warning or caution indications were set at any time during the flight. [FF (313) (314) (315) (316) (317) (318) (323) (324) (325) (326) (327) (328) (329) (330) (331) (335) (336) (337) (343) (345) (346) (347)]

7. The mishap on 1 October 2017 was not due to hypoxic conditions of the aircrew. BUNO 165632 had completed all T-45C OBOGS maintenance improvements. Engine data at the time of mishap shows that the engine was operating at high power settings providing sufficient pressure to the inlet of the OBOGS concentrator to ensure adequate breathing dynamics during the flight. Both LT Ruth and LTJG Burch maintained clear and coherent communications throughout the flight until impact. [FF (216) (218) (222) (224) (225) (235) (251) (257) (275) (279) (298) (299) (300) (329) (330) (344)]

8. The aircraft, BUNO 165632, was a fully mission capable (FMC) aircraft on 1 October 2017. [FF (207) (215) (216) (270) (311) (312) (313) (318) (319) (323) (324) (325) (326) (327) (328) (332) (333) (334) (344) (345) (346) (347)]

9. The mishap on 1 October 2017, and resulting deaths of LT Ruth and LTJG Burch, was due to aircrew (b)(5) (b)(5) (b)(5) the accelerated stall condition and caused the aircraft to overbank, increasing the rate of descent and rapidly placing the aircrew outside of a survivable ejection envelope. [FF (219) (224) (225) (226) (227) (228) (235) (236) (237) (240) (241) (243) (245) (248) (249) (250) (252) (253) (254) (255) (256) (257) (258) (263) (264) (265) (267) (268) (269) (270) (271) (272) (273) (274) (275) (276) (277) (278) (279) (280) (281) (286) (290) (291) (292) (296)]

10. No evidence exists to suggest either death was the result of suicide. [FF (155) (184) (185)]

Recommendations

1. The death of LT Ruth is found to be in the Line of Duty and not due to misconduct or negligence.

2. The death of LTJG Burch is found to be in the Line of Duty and not due to misconduct or negligence.

3. (b)(5) (b)(5)

4. (b)(5) (b)(5)

5. (b)(5) (b)(5)

6. (b)(5) (b)(5)

7. Define and include in all applicable low altitude awareness training references, a standardized minimum airspeed based upon low altitude performance capabilities of the T-45C that will be referenced during all single and multi-ship low altitude training.

8. (b)(5)

(b)(5)

(b)(6)

Enclosure 78

29 Jan 18

From: Commander (b)(6) USN
To: Commander, Training Air Wing ONE

Subj: SUPPLEMENTAL COMMAND INVESTIGATION OF THE TRAINING SQUADRON SEVEN CLASS A AIRCRAFT MISHAP INVLOVING T-45C BUNO 165632 IN THE VICINTY OF TELLICO PLAINS, TN ON 01 OCTOBER 2017

Ref: (a) JAG Manual, Chapter II
(b) Command Investigation of the Training Squadron SEVEN Class A Aircraft Mishap Involving T-45C BUNO 165632 in the Vicinity of Tellico Plains, TN on 01 October 2017 dtd 8 Nov 17

Encl: (1) Letter of Appointment ICO Commander (b)(6) USN 17 Jan 2018
(2) CNATRA 1542.160 T-45 Combined Fight Instructor training Curriculum 2009
(3) CNATRA 3710.13H Flight Instructor Standardization and Training Program 2016
(4) Summary of Interview with LCDR (b)(6) USN
(5) CNATRA P-912 Low Altitude Awareness training (LAAT) 2007
(6) DOD Flight Information Publication AP/1B
(7) TW-1 Stan Notes / FTI Supplement, Single Plane Operational Navigation Nov 15
(8) CNATRA P-1208 Operational Navigation T-45 MPTS and IUT 2016
(9) CNATRANOTE 3710 CNATRA T45 Temporary Operating Restrictions
(10) Summary of Interview with Capt (b)(6) USMC
(11) Summary of Interview with Mr. (b)(6) Civ
(12) Summary of Interview with Maj (b)(6) USMC
(13) WingStats Report
(14) Summary of Interview with LCDR (b)(6) USN dtd 24 Jan 18
(15) Summary of Interview with LCDR (b)(6) USN dtd 25 Jan 18
(16) VT-7 IP Warm Up Plan
(17) VT-7 flight events in question
(18) ATFs from flights in question
(19) TW-1 T-45 Status Report
(20) Summary of Interview with CDR Jason Gustin, USN
(21) Summary of Interview with LT (b)(6) USN
(22) VT-7 Qualification Tracker, "FIST"
(23) LT Ruth's Operational Navigation grade sheets
(24) Spreadsheet depicting exceeded limits during LT Ruth's ONAV Flights
(25) Spreadsheet depicting exceeded limits during TW-1 El Centro detachment
(26) Spreadsheet depicting exceeded limits during TW-2 El Centro detachment
(27) Crash Survivable Memory Unit (CSMU) data disk, 29 Sept 2017 flight one
(28) CSMU data disk, 30 Sept 2017 flight two
(29) CSMU data disk, 1 Oct 2017 flight one
(30) CSMU data disk, 1 Oct 2017 flight two (mishap flight)
(31) Spreadsheet depicting exceeded limits during the mishap weekend
(32) Summary of Interview with Capt (b)(6) USMC

Subj: SUPPLEMENTAL COMMAND INVESTIGATION OF THE TRAINING SQUADRON SEVEN CLASS A AIRCRAFT MISHAP INVLOVING T-45C BUNO 165632 IN THE VICINTY OF TELLICO PLAINS, TN ON 01 OCTOBER 2017

(33) Closed circuit TV video from the McGee Tyson FBO
(34) Summary of Interview with LT (b)(6) USN
(35) VT-7 flight schedules 29 Sept - 1 Oct 2017
(36) CNATRA P-1204 Instrument T-45C MPTS and IUT 2016
(37) CNATRA P-1212 Familiarization T-45 Strike 2010
(38) LT Ruth Autopsy toxicology report
(39) LTJG Burch Autopsy toxicology report
(40) Summary of Interview with LTJG (b)(6) USN
(41) Summary of Interview with LTJG (b)(6) USN
(42) (b)(6)
(43)
(44)
(45)

Preliminary Statement

1. This reports completion of the command investigation conducted in accordance with reference (a) and enclosure (1) into the Training Squadron SEVEN (VT-7) Class A mishap on 1 October 2017. All reasonably available evidence was collected. All times noted during heads up display (HUD) video playback are referencing the recording time, not actual time of day.

2. LT (b)(6) JAGC, USN provided legal guidance during the course of this investigation.

Findings of Fact

Overall Execution of the Chief of Naval Air Training (CNATRA) Operational Navigation Syllabus

T-45 Combined Strike Flight Instructor Training Curriculum 2009

1. All newly reporting Instructor Pilots (IP) are required to complete the T-45 Combined Instructor Training Curriculum, CNATRAINST 1542.160, during their tenure at Training Squadron SEVEN (VT-7). [Encl (2)]

2. CNATRAINST 1542.160 is the curriculum for training IPs in the T-45 and T-45 Intermediate and Advanced phases of training promulgated by the Chief of Naval Air Training (CNATRA). [Encl (2)]

3. Instructors Under Training (IUT), instructors who have not completed the curriculum, without previous Operational Navigation (ONAV) training must also attend ONAV academics or ground school, in accordance with CNATRAINST 1542.160, to qualify for ONAV stages. [Encl (2)]

4. ONAV academics include: ONFP-01 Low-Level Waypoint Navigation, ONFP-02 ONAV Procedures, and ONFP-03X Operational Navigation Stage Examination. [Encl (2)]

5. IUTs do not start instructing student naval aviators (SNA) until they have completed Module 00 (Academics, NATOPS) and Module 01 (Familiarization, Instruments, Airways Navigation, NATOPS) of the curriculum. [Encl (2)]

6. Once IUTs have completed a particular module, they are then eligible to teach that module. [Encl (2)]

7. The curriculum authorizes IUTs to request extra flights and simulator instruction as they work through the curriculum, which may be granted at the discretion of the Training Air Wing (TRAWING) Commander. [Encl (2)]

8. An IUT who receives an event grade of "Unsatisfactory" during any portion of instructor training will receive additional instruction as deemed appropriate by the Squadron Commanding Officer (CO) or IUT Officer in Charge (OIC), depending on the type of IUT training. [Encl (3)]

9. Additional training of any origin must be documented on an Aviation Training Form (ATF) or grade sheet. [Encl (3)]

10. It is a common workaround for IUTs to get extra flights by marking a flight as "Incomplete" instead of awarding an event grade of "Unsatisfactory" so that the pilots can attempt the flight a second time. [Encl (4)]

Low Altitude Awareness Training (LAAT) 2007

11. During Module 03 of the curriculum, IUTs complete ONAV and Weapons Stages. [Encl (5)]

12. Operational Navigation (ONAV) is a type of flying that pilots learn to ingress to a target at a low altitude. [Encl (5)]

13. The ONAV stage includes Flight Training Instruction, Low Altitude Awareness Training (LAAT FTI). [Encl (5)]

14. The LAAT FTI publication is not specific to any particular CNATRA aircraft, but instead provides a general introduction to operating in a low altitude environment. [Encl (5)]

15. The LAAT FTI provides a generic "50%" rule and dive recovery table that is not validated for the T-45. [Encl (5)]

16. CNATRA, however, has directed that the "minute to live" rule will be utilized to get to a low altitude environment. [Encl (5)]

17. There is a discussion of mission crosscheck times for straight and level flying, and during turns, but there is no table provided or application to the training rules. [Encl (5)]

18. The LAAT FTI para 107-3-b broadly discusses the three types of ridgeline crossings; utilizing natural breaks, the straight-ahead approach, and the 45 degree angle off/parallel methods, with generic procedures about execution of each maneuver. [Encl (5)]

19. The LAAT FTI states in para 107-3-b-i, "Probably the best way to negotiate a ridge is to do a good map study during your preflight planning." [Encl (5)]

20. The LAAT FTI para 107-3-b-ii-(a) states that to start the straight ahead method of ridgeline crossing, "pull to place the velocity vector (or Whataburger) to a minimum of five degrees above the ridgeline to ensure a minimum clearance of 500 ft crossing the ridge." [Encl (5)]

21. The LAAT FTI para 107-3-b-(b) provides guidance to approach the ridgeline, and then "[a]s the terrain begins to pass under the horizon bars, begin a gentle push in order to cross the terrain in a level attitude." [Encl (5)]

22. The LAAT FTI then provides guidance to either bunt to -10 degrees nose down, roll to 90 to 120 angle of bank (AOB), or execute an inverted turning pull or pure inverted pull. [Encl (5)]

23. The inverted turning pull or pure inverted pull is widely used in the fleet, but prohibited in the TRAWING. [Encl (5)]

24. The LAAT FTI para 107-3-b-ii-(c)-(1) states that the maximum dive angle for both of the authorized options for a ridgeline crossing should be -10 degrees flight path angle (FPA). [Encl (5)]

25. The LAAT FTI para 107-3-b-ii-(c)-(2) recommends that the overbank method be executed as follows: "roll to 90 – 120 degree AOB and unload, letting the intentional overbank help you achieve a roll-out dive angle for recovery. Again a -10 degree FPA is a good place to stop rollout and accomplish a standard dive recovery." [Encl (5)]

26. The LAAT FTI para 107-3-b-ii-(d), however, provides that whatever method of pull-down should stop at no more than -10 degrees FPA." [Encl (5)]

27. The LAAT FTI para 108-13, states that a G-awareness maneuver is only required for section low level flights, flights involving two or more aircraft, not single low level flights. [Encl (5)]

28. VR-1055 is a military training route that covers areas from north-central Alabama through eastern Tennessee. [Encl (6)]

29. CNATRA Low Altitude Training Rules do not provide a maximum recovery maneuver (MRM), low altitude training (LAT) checks, or minimum airspeed. [Encl (5)]

30. Instruction about low altitude checks, however, can be found in the Training Wing ONE (TW-1) Stan Notes, a FTI supplement generated by TW-1. [Encl (7)]

31. To ensure that a pilot maintains currency of ONAV flights, a pilot must complete an ONAV flight every 180 days or complete a check ride with a standardization (STAN) pilot if outside the 180 day window. [Encl (3)]

32. The 180 day re-fly window differs from the 90 day window for other stages of the curriculum, such as Familiarization flights or Basic Instruments flights. [Encl (3)]

TW-1 Stan Notes / FTI Supplement, Single Plane Operational Navigation Nov 2015

33. TW-1 Stan Notes / FTI Supplement, Single Plane Operational Navigation Nov 2015 is the only document that teaches low altitude checks. [Encl (7)]

34. The Stan Notes para 5-a-4 state, "Prior to commencing low level flight operation, students will FENCE-IN by accomplishing their low altitude checklist on descent to the first point. *Radalt - Good tone, reset IAW 10% below planned altitude, Visor – Down, Loose Cockpit Items – Secure."* [Encl (7)]

35. The Stan Notes para 5-b-6 state, "A 60-degree AOB is used in planning and executing the route turns; this is not the AOB limit when making a course correction on the route" is contradictory to the FTI. [Encl (7) (8)]

36. The Stan Notes para 5-c-1 state, "When the LAW [low altitude warning] sounds, immediately execute a wings level climb until LAW tone ceases." [Encl (7)]

37. The Stan Notes para 5-c-1 state, "When descending to intercept an altitude use the rule of thumb of 1 deg depression for every 100' to lose" is not tied to the CNATRA directed rule of using the minute to live rule. [Encl (5) (7)]

Operational Navigation T-45 Operational Navigation T-45 Multi-service Pilot Training System (MPTS) and Instructor Under Training (IUT) 2016

38. During Module 03 of the T-45 Combined Strike Flight Instructor Training Curriculum, IUTs complete ONAV academics or ground school. [Encl (2)]

39. IUTs use CNATRA P-1208 Flight Training Instruction, Operational Navigation T-45 Multi-service Pilot Training System (MPTS) and IUT during ground school. [Encl (8)]

40. During ground school, IUTs are provided with an ONAV FTI that covers the fundamentals of planning, route corrections, timing corrections, waypoint data entry and use, communications, multi-plane procedures, bingo, diverts, and emergencies with a heavy emphasis on timing to the target. [Encl (8)]

41. The ONAV FTI does not cover techniques or procedures for flying the T-45C specifically in the low level environment. [Encl (8)]

42. There is conflicting guidance provided in the ONAV FTI para 206 about how to execute a pop-off: para 206 states, "A pop-up may be a roll ahead or an angle-off" while para 304-5 states: "Roll-aheads are forbidden." [Encl (8)]

43. The ONAV FTI para 302 states that all T-45C ONAV and Section Low Level (SLL) flights will be planned for 360 knots and limited to 45 degrees AOB. [Encl (8)]

44. The minimum altitude for CNATRA aircraft flying any type of mission is 500 feet above ground level (AGL). [Encl (8)]

Chief of Naval Air Training Flight Instructor Standardization and Training Program 2016

45. Flight Instructor Standardization and Training Program para 102-h provides that an IUT who receives an event grade of unsatisfactory during any portion of instructor training will receive additional instruction as deemed appropriate by the Squadron Commanding Officer (CO) or IUT Officer in Charge (OIC), depending on the type of IUT training. [Encl (3)]

46. All additional training must be documented on an Aviation Training Form (ATF) or grade sheet. [Encl (3)]

47. To ensure that a pilot maintains currency of Operational Navigation flights, a pilot must complete an Operational Navigation flight every 180 days or complete a check ride with a standardization (STAN) pilot if outside the 180 day window. [Encl (3)]

48. The 180 day re-fly window differs from 90 day window for other stages of the curriculum, such as Familiarization flights or Basic Instruments flights. [Encl (3)]

Oversight and Management of Instructor Qualifications

T-45C On-Board Oxygen Generating System (OBOGS)

49. CNATRA suspended all flying for T-45 aircraft in April 2017 after there were concerns for the onboard oxygen generating system (OBOGS) . [Encl (9)]

50. All CNATRA T-45s resumed flying on 26 April 2017 with a limitation that all flights stay under 2Gs and 5,000 feet, thus initiating the interim flight clearance. [Encl (49)]

51. On 12 June 2017, the limit was raised to 2Gs and 10,000 feet. [Encl (49)]

52. On 7 July 2017, the limit was raised to 4Gs and 10,000 feet. [Encl (49)]

53. On 17 July 2017, all restrictions were removed. [Encl (49)]

Operational Navigation Standardization Officer Role at Training Squadron SEVEN

54. Capt (b)(6) USMC, is the CNATRA ONAV Standardization Officer at VT-7. [Encl (10)]

55. Capt (b)(6) was interviewed in the 8 November 2018 JAGMAN investigation. [Encl (10)]

56. Capt (b)(6) stated that instructors are told from day one that if they need additional training events, they are available. [Encl (10)]

57. Capt (b)(6) stated that everyone is comfortable asking for more flights, or telling an IP that they need more flights. [Encl (10)]

58. Capt (b)(6) stated that low altitude training rules are not briefed if they are not on the CNATRA Power Point E-brief. [Encl (10)]

59. Capt (b)(6) stated that it is not unusual for SNAs to do some terrain masking on flights with easier timing. [Encl (10)]

60. Capt (b)(6) stated that he is not aware of a minimum airspeed published for ONAV flights. [Encl (10)]

61. Capt (b)(6) however, does teach SNAs to use 360 knots ground speed plus or minus 30 knots (330-390 knots ground speed). [Encl (10)]

62. Capt (b)(6) is not aware of minimum airspeed being taught in ground school or being written anywhere for reference. [Encl (10)]

Operational Navigation Ground School Instruction

63. Mr. (b)(6) Civilian, is a government contractor who teaches at the ONAV ground school in Meridian, MS. [Encl (11)]

64. Mr (b)(6) was interviewed in the 8 November 2018 JAGMAN investigation. [Encl (11)]

65. One of his responsibilities is to teach the ONAV class to SNAs and IUTs. [Encl (11)]

66. The IUT ONAV syllabus includes three classes, one simulator, and two flights. [Encl (11)]

67. The IUT ONAV ground syllabus, the three classes and one simulator, consists of the procedures portion of the fourth day of SNA ground school. [Encl (11)]

68. The SNA ONAV ground syllabus includes three separate simulators. [Encl (11)]

69. The procedures portion teaches the basics of low-level chart interpretation, basic airwork, and navigation. [Encl (11)]

70. Mr. (b)(6) stated, "There are no tactics involved in it [ground school]. It's basically just straight and level flying from point A to point B using heading, groundspeed, and time and learning chart interpretation at low altitude." [Encl (11)]

71. During ground school, "the students are learning to interpret the chart and make sense of it compared to the ground at low altitude. They fly basic airwork to achieve the mission. They from point A to point B to point C ahead of time and use heading, clock, and airspeed to make it happen. It's a drill in basic airwork and chart interpretation." [Encl (11)]

72. Mr. (b)(6) stated that the SNA and IUT syllabi "cover Low Altitude Awareness Training (LAAT). LAAT is not very in-depth; it's the basics of not flying the aircraft into the ground. They teach three maneuvers: 1) straight and level flight, 2) level turns, and 3) ridgeline crossings. They also talk about Terrain Clearance Tasks, Mission Tasking, Critical Tasks, and Non-Critical Tasks. They talk about what is needed to accomplish a low level mission from start to finish with prioritization on flying the airplane." [Encl (11)]

73. He stated that they "don't discuss a minimum airspeed. They assume there isn't a case where aerodynamic stall will be an issue." [Encl (11)]

74. Mr. (b)(6) believes, "that the course of instruction adequately prepares the students for the Sims. He is unsure if it prepares them well for the airplane, with terrain following. For the basics of getting through a route he thinks the training is sufficient. They don't do any type of tactical training or terrain following. Tactical training and terrain following are not discussed in the Sim Building." [Encl (11)]

Standardization Officer Role at Training Squadron SEVEN

75. Major (b)(6) USMC, is the current Standardization Officer at VT-7, and was during the time of the mishap flight. [Encl (12)]

76. He served as an Instructor Pilot (IP) with TW-1 from 2007 to 2010. [Encl (12)]

77. Major (b)(6) was interviewed in the 8 November 2018 JAGMAN investigation. [Encl (12)]

78. Major (b)(6) explained, "His understanding of the formalized syllabus for non tac-air IUTs is that they are supposed to go through all academics as part of their ground school before completing simulator and flight events. In LT Ruth's case, he flew two extra flights. Additionally, IUTs should be looking at the ONAV FTI and Low Altitude Awareness FTI," which corresponds with the curriculum. [Encl (2), (12)]

79. Major (b)(6) stated, "The IUTs are always told they can fly more flights if they are on comfortable after the required flights. This guidance may also come from the Stan instructor recommending the IUT see more flights." [Encl (12)]

80. Major (b)(6) stated, "The squadron has the ability to be more restrictive on re-fly requirements for the various stages. LT Ruth was within the required 180 day re-fly window, and would have been current even if there would have been a 90-day re-fly requirement. LT Ruth's last ONAV flights prior to the cross county were in July." [Encl (3) (12) (13)]

Operations Officer Role at Training Squadron SEVEN

81. Lieutenant Commander (LCDR) (b)(6) USN, is an IP and the Operations Officer at VT-7. [Encl (14)]

82. LCDR (b)(6) was interviewed in the 8 November 2018 JAGMAN investigation and re-interviewed on 24 and 25 January 2018 by the Investigating Officer. [Encl (4) (14) (15)]

83. After the interim flight clearance period, LCDR (b)(6) developed the "VT-7 IP Warm Up Plan" to help keep pilots current during the interim flight clearance and implemented it on a daily basis. [Encl (15) (16)]

84. LCDR (b)(6) stated that during the interim flight clearance, "Within the squadron there was more of a sense of concern for safety. The CO was more concerned that the squadron lacked proficiency, and less concerned about production." [Encl (14)]

85. LCDR (b)(6) stated, "There was ONAV training being conducted early in the step-up process, even when there was a 2G limit. Training during this phase was kept within the restricted limits." [Encl (14)]

86. He stated that during the 2G limitation period, only 2 and 4 plane form, FAM, and instrument flights were conducted. [Encl (15) (16)]

87. He stated that: "During the pre-OBOGs, 4G limit period, tac form (without gun sight tracking), section low levels, and single plane ONAVs were added for re-stan purposes only, no initial qualifications were given. Jets were flown with two pilots since the number of sorties allowed each day was limited. This could put a pilot in the back seat during a flight that he was not qualified in which would make it look like an upgrade, but the re-stan was for the pilot in the front seat. No re-stans counted as an IUT events." [Encl (9) (15) (16) (17) (18) (19)]

88. No new designations were issued during the interim flight clearance. [Encl (15) (20)]

89. LCDR (b)(6) was the IP for two flights on 16 June 2017, during the time of the interim flight clearance where flights were restricted to 2Gs or 10,000 feet. [Encl (18)]

90. The grade sheet for these flights reflected certain maneuvers that required greater than 2Gs or 10,000 feet to be performed; however, this was an error entering the grade sheet into the Training Integrated Management System (TIMS). [Encl (15) (18)]

91. All pilot training is tracked in TIMS. [Encl (14)]

92. TIMS features a "Select All" button for entering grades, in addition to allowing IPs to leave comments about the student. [Encl (14)]

93. LCDR (b)(6) confirmed that 2Gs was not exceeded for these flight, despite grades being entered for these maneuvers. [Encl (15) (18)]

94. LT (b)(6) USN, an IP, flew two flights, one on 7 June 2017 and one on 15 June 2017, where the grade sheet also reflected certain maneuvers that required greater than 2Gs or 10,000 feet to be performed. [Encl (21)]

95. LT (b)(6) confirmed that although he had marked all events for the flight on the grade sheet, they did not do any maneuvers that would require more than 2Gs. [Encl (18) (21)]

96. LCDR (b)(6) stated that each day, schedule writers get a daily "FIST", or qualification matrix, showing each pilot's qualifications and expiration dates, which allows them to schedule pilots for the appropriate flights. [Encl (4) (22)]

97. CDR Jason Gustin, USN, Commanding Officer VT-7, has waiver authority for flights, granted by the master curriculum guide or OPNAV, in three situations: (1) convective SIGMETs, a weather condition that can be conducive to thunderstorms, (2) solo SNA weather minimum conditions, and (3) maximum man-ups or flight attempts per day. [Encl (20)]

98. CDR Gustin's goal during the interim flight clearance was to fly his IPs as much as possible in order to maintain proficiency as appropriate under the current temporary flight restrictions. [Encl (20)]

99. For maintaining currency in a particular stage of flight training, an IP must only fly one type of flight within that stage. [Encl (20)]

100. An IP does not need to perform every maneuver within a stage, which could mean an IP might never perform certain maneuvers from a stage, but still maintain currency. [Encl (20)]

101. While operating during the interim flight clearance, CDR Gustin tried to get his IPs training where he saw opportunities to train so that they would be prepared to instruct when the restrictions were lifted. [Encl (20)]

102. CDR Gustin admits that during the interim flight clearance squadron members were sloppy with the ATFs, or grade sheets, by marking complete for events that were not done, which could give the impression that they were operating outside the boundaries set forth in the restrictions. [Encl (20)]

103. CDR Gustin cannot recall any new IPs being designated while operating under the temporary operating restrictions. [Encl (20)]

104. LCDR (b)(6) the Operations Officer, explained that the CO is always asked when an IP needs a waiver to fly during a convective SIGMET. [Encl (20)]

105. If a convective SIGMET does not develop as forecasted and the aircraft can maintain visual meteorological conditions, a waiver can be granted to fly. [Encl (20)]

106. When a waiver is granted, the Operations Officer may adjust the schedule and change the type of flights scheduled in order to get them done. [Encl (20)]

107. LCDR (b)(6) plans ahead if the forecast includes conditions that might impact particular flights from one portion of the syllabus in order to have students scheduled for stand-by to execute flights that may not be impacted, such as Instrument Training. [Encl (4)]

LT Ruth Operational Navigation Instructor Under Training (IUT)

108. IUTs without a Tactical Aviation (TACAIR) background are required to attend the fourth day of academic ground school with the Student Naval Aviators (SNA) for the ONAV stage. [Encl (2)]

109. There is no record of LT Ruth attending the fourth day of ground school. [Encl (2)]

110. LT Ruth flew ONAV IUT flights on 25 and 26 October 2017 and two flights on 15 November 2017 enroute to the CTW-1 and 2 detachment in El Centro, California from Yuma, Arizona with Capt (b)(6) [Encl (13) (23)]

111. The 25 and 26 October 2017 ONAV IUT flights were marked incomplete for LT Ruth due to weather, although the weather was greater than 3,000' and 5 nm visibility. [Encl (10) (23)]

112. The flights were marked incomplete so that he could get more practice and get comfortable in the low altitude environment. [Encl (10) (23)]

113. During these flights, Capt (b)(6) did not note any deficiencies in LT Ruth's flying abilities and felt that he was cautious and open to asking for more training if he felt he needed it. [Encl (10)]

114. There are no real comments on LT Ruth's ONAV IUT grade sheets, only "good job" on 3 of the 5 grade sheets, one of which was a simulator. [Encl (23)]

115. LT Ruth exceeded at least one ONAV parameter on each of his ONAV training flights. [Encl (24)]

116. Including the 4 IUT ONAV training flights, LT Ruth flew 23 ONAV flights during his time at VT-7. [Encl (24)]

117. LT Ruth's tendency was to exceed the limits set forth in the FTI during the 23 ONAV flights he flew at VT-7. [Encl (24)]

118. During the CTW-1 and 2 detachment to El Centro, California, there were 31 flights where aircraft exceeded 130 degrees AOB greater, 39 flights where aircraft were flown below 400 feet, and 16 flights where negative 20 degrees pitch attitude was exceeded. [Encl (25) (26)]

119. On many of the flights where there were exceedances, multiple occurred. [Encl (25) (26)]

Cross-Country Weekend: 29 September – 1 October

120. LT Ruth and Lieutenant Junior Grade (LTJG) Burch completed four flights over the course of the cross-country weekend, 30 September and 1 October 2017. [Encl (13)]

121. A majority of the ridgeline crossings executed by LT Ruth and LTJG Burch on September 30 and October 1 were at two to three degrees above the ridgeline. [Encl (27) (28) (29) (30)]

122. (b)(5)

(b)(5)

29 September 2017, Flight 1

123. During the first flight, at 53:46 on the Heads-Up Display (HUD), LT Ruth explained that he allows SNAs to use the Global Positioning System (GPS) on the first two flights rather than just the "clock, chart, ground" method because he feels that it is safer in unfamiliar territory. [Encl (27)]

124. LT Ruth also expressed that he was happy as long as the SNA can navigate and get close to the times planned for the route. [Encl (27)]

125. LT Ruth talked about how cool low levels are to fly several times throughout the flight; and, after talking about flying in the mountains in the western United States, he said, "I love it." [Encl (27)]

126. The flight was mostly straight and level with a slight increase in aggressiveness as the flight progressed. [Encl (27) (31)]

29 September 2017, Flight 2

127. At 35:20, after a ridgeline crossing, a -17.5 degrees pitch attitude is observed and LT Ruth says, "Nicely done," to which LTJG Burch responds, "Is that what you want, Sir?" [Encl (28) (31)]

128. At 45:59, an -11 degrees pitch attitude is observed after the last ridgeline crossing. [Encl (28) (31)]

129. At 47:40, LT Ruth stated, "Weather is coming down, we got to pop off soon, sorry, I don't like this." [Encl (28)]

1 October 2017, Flight 1

130. The pre-flight mass brief started at about 1230 EST on Sunday, 1 October 2017. [Encl (32)]

131. LT Ruth arrived at about 1245 EST with another IP and they were caught up for the portion they missed. [Encl (32)]

132. Throughout the flight, most turns to stay on the route were about 85 degrees AOB and some had a descending component to them. [Encl (29)]

133. At 46:15, LT Ruth instructs LTJG Burch to stay down in a valley and not to worry about the course line too much. [Encl (29)]

134. At 52:33, LT Ruth stated that the night prior, he was "hungover at midnight, woke up at 0500, and could not go back to sleep;" he continued, "I should have just gotten hammered, then I would be able to sleep." [Encl (29)]

135. (b)(5)
(b)(5)

136. (b)(5)
(b)(5)

137. (b)(5)
(b)(5)

138. (b)(5)
(b)(5)

1 October 2017, Flight 2

139. LT Ruth and LTJG Burch entered the Fixed Base Operator (FBO) building at McGee Tyson Airport (KTYS) at 1457 EST. [Encl (33)]

140. Pre-flight mass brief began at 1506 EST. [Encl (33)]

141. During the mass brief for the second flight on 1 October 2017 at KTYS, all aircrew appear to be functioning normally on the FBO closed circuit footage. [Encl (33)]

142. There were 17 hours from when LT Ruth stopped drinking on Saturday and the brief on Sunday afternoon. [Encl (32) (33) (34)]

143. The mass brief ended at 1520 EST and left the FBO at 1530 EST. [Encl (33)]

144. The closed circuit TV footage from the FBO does not capture any individual aircrew briefs after the mass brief. [Encl (33)]

145. The closed circuit TV footage from the FBO does not capture a map study. [Encl (33)]

146. The plane carrying LT Ruth and LTJG Burch launched at 1543 EST. [Encl (30)]

147. This was first time that LT Ruth had flown on VR-1055. [Encl (13)]

148. LT Ruth and LTJG Burch were flying a single low level flight for this flight. [Encl (32) (35)]

149. A G awareness maneuver is not required for a single low level flight, and they did not conduct one. [Encl (5)]

150. At 23:12, there was a period of about 50 seconds where the Low Altitude Warning (LAW) went off without any corrective action from LT Ruth and LTJG Burch. [Encl (30)]

151. At 23:53, LTJG Burch performed a ridgeline crossing achieving 126 degrees AOB and -19.6 degrees nose down pitch attitude with a loaded roll on the pullout. [Encl (30) (31)]

152. The CNATRA Instrument FTI directs that transfer of control of the aircraft between two pilots must always be a three-way exchange between the front seat and back seat pilots, using the words, "I have the controls," "you have the controls," I have the controls," if control is being taken from the other pilot; or "you have the controls," "I have the controls," "you have the controls," if control is being given. [Encl (36)]

153. The CNATRA P-1212 Familiarization (FAM) T-45 Strike FTI directs pilots to always say, "I have the controls" or "you have the controls," when passing control between two pilots in the aircraft. [Encl (37)]

154. The FAM FTI describes a situation where using the term, "I've got it," for who has control of the aircraft can be misinterpreted and lead to a situation where nobody is actually flying the aircraft. [Encl (37)]

155. At 24:11, there is a two-way change of controls where LT Ruth says, "Can I have the controls for a second?" and LTJG Burch replies, "you got 'em." [Encl (30)]

156. At 24:14, LT Ruth demonstrates some terrain following and tells LTJG Burch that he needs to get down in the low points and that he was not worried about timing. [Encl (30)]

157. At 24:37, there is a slightly faint "there you go" heard over the intercom system (ICS). [Encl (30)]

158. Throughout the cross country weekend, all of the control transfers between LT Ruth and LTJG Burch were two-way exchanges with many using the terms, "you got it" or "I've got it." [Encl (27) (28) (29) (30)]

Autopsy Toxicology Report

159. No drugs or alcohol were detected in either LT Ruth or LTJG Burch by the coroner. [Encl (38) (39)]

160. On Friday, 29 September 2018, LT Ruth only had a couple beers in the hotel and went to bed at about 2300. [Encl (34)]

161. LT Ruth had 5.5 beers on Saturday between 1230 and 1900. [Encl (34)]

162. LTJG Burch consumed approximately 5 to 6 drinks on Saturday with the last drink consumed not later than 1800. [Encl (40) (41)]

(b)(6)

163. (b)(6)

(b)(6)

164. (b)(6)

(b)(6)

165. (b)(5)

(b)(5)

(b)(6)

166. (b)(6)

(b)(6)

Opinions

1. If the ONAV flights are flown by an IP experienced in the low level environment, then the limitations set forth in the LAAT and ONAV FTIs, training materials, and procedures would be adequate. However, all IPs must be prepared to handle the various situations that may arise while a SNA is flying the aircraft. IPs come from various backgrounds and type/model/series (TMS) aircraft, as well as having varying experience levels. Nevertheless, they all undergo the same IUT syllabus. (b)(5)

(b)(5)

(b)(5) IUTs without the low altitude training received at fleet replacement squadrons (FRS) or the experience gained during a fleet tour must be taught all of the aspects of

operating in the low altitude environment when they arrive at a training squadron. (b)(5)

(b)(5)

[FF (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (29) (30) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (66) (69) (70) (71) (72) (73) (74)]

2. ONAV flights are not being flown per the FTIs throughout CNATRA. Based on data derived from the flights conducted while on detachment to El Centro from Feburary to March 2017, both CTW-1 and CTW-2 pilots are exceeding the 120 degree AOB limitation prescribed for ridgeline crossings, the -10 degree pitch attitude, and the 45 degree AOB for flying along the route. No single squadron stands out for being a greater offender of those limits. LT Ruth exceeded the limits starting with his first training flight and continued to do so in later flights. Terrain masking is commonly taught, but there is no instruction for it. [FF (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (29) (30) (33) (34) (35) (36) (37) (42) (43) (44) (59) (74) (115) (117) (118) (119) (121) (122) (123) (124) (127) (128) (132) (133) (136) (137) (138) (150) (152) (153) (154) (155) (156) (157) (158)]

3. I believe that it shows maturity in an IUT when they are aware of their limitations and they ask for more instructional flights without receiving a failing grade when the syllabus is inadequate. While an IUT may appear to meet Maneuver Item File (MIF) on a flight, recognizing the need for more flights to improve their comfort level to instruct should be encouraged, especially if the flights are dynamic or new to the IUT. [FF (2) (3) (4) (5) (6) (7) (8) (10) (56) (57) (79) (111) (112)]

4. I do not believe that alcohol played a part in this mishap because of the time elapsed between drinking on Saturday and the brief on Sunday, and additional time until the mishap. As conveyes in the interviews, LT Ruth acted responsibly on Friday night. On Saturday, he consumed less than 1.5 drinks per hour and ate several times. Both LT Ruth and LTJG Burch stopped drinking before the football game, which allowed ample time to metabolize the alcohol. The fact that LT Ruth stated he "was hungover at midnight" does not lead me to believe the effects of the alcohol carried on into the next day. Both LT Ruth's and LTJG Burch's autopsy toxicology reports showed no drugs or alcohol in their systems. I believe that the combination of a long day outside and dehydration led to him feeling hungover prior to going to sleep for the night. [FF (134) (141) (142) (159) (160) (162) (163) (164) (165) (166)]

5. I believe that VT-7 approached the return to flying after the grounding of all T-45 aircraft in a well-thought-out manner. They had a plan to maximize the utilization of available resources to maintain currency and proficiency for as many IPs as possible. This meant putting two pilots in an aircraft at the same time to double their efficiency. As the restrictions were lifted, they increased the complexity of the flights appropriately. [FF (2) (32) (47) (48) (49) (50) (51) (52) (53) (83) (84) (85) (86) (87) (88) (91) (96) (98) (99) (100) (103)]

6. VT-7 was able to maintain currency in stages that consisted of maneuvers that must be conducted above the maximum allowed altitude or G by omitting some of those maneuvers. This is not prohibited by the Master Curriculum Guide and naturally occurs during normal flight

operations. An IP can maintain currency in one of several phases by flying one particular type of mission from that stage. Some examples include: if an IP flies a high aspect BFM, he is considered current for the entire BFM syllabus although he did not fly offensive perch, defensive perch, flat scissors, or rolling scissors; or, if an IP flies a basic instrument flight and only conducts instrument approaches and not any of the high work, he is considered current. The same holds true if an IP flies a FAM flight, but only remains in the landing pattern and does not do any of the high work, again, by the instruction, he is considered current to instruct FAM flights. The same holds true for most stages of training. [FF (2) (83) (84) (85) (86) (87) (88) (91) (96) (98) (99) (100) (101) (103)]

7. The VT-7 CO has a standing policy for granting waivers for either weather or IP man-ups per day, and is directly involved in each case. Blanket authority is never assumed by the IPs. I believe that this is a good practice and should be continued. [FF (97) (104) (105) (106) (107)]

8. LT Ruth was an E-2C pilot who clearly loved flying the ONAV flights, based on the conversations recorded by the CSMU on 30 September 2017 and 1 October 2017. However, he did not have the needed experience operating in the low altitude environment, nor the level of training, as evidenced by both the HUD video from the mishap weekend and CSMU data from all of his ONAV flights. He routinely flew very aggressively and allowed his students to fly beyond the limitations of the FTI. He repeatedly flew this way during the El Centro detachment where he received his ONAV qual. He was also observed, during the mishap weekend flights, to disregard some of the training objectives set forth in the curriculum guide. [FF (113) (114) (115) (117) (121) (122) (125) (127) (128) (133) (136) (137) (150) (151)]

9. All of the aircrew during the cross country weekend appeared to be in a more relaxed mindset with regards to briefing and deviating from training objectives. There was only a very quick mass brief follow by very little time for individual crew briefs. Nowhere did there appear to be any route study and LT Ruth had never flown VR-1055. LT Ruth stated in the aircraft that he was not worried about timing. He allowed full system use in the first two flights. He told LTJG Burch not to worry about the course line too much, but instructed him to get down low in the valleys. All of these combined with the data from his previous ONAV flights indicate he was pushing the limits and not exercising his role of instructor to the best of his ability, but rather trying to show the students a fun flight. [FF (120) (123) (124) (130) (131) (133) (139) (140) (141) (143) (144) (145)]

10. The introduction section of the Instrument FTI states that there will always be a positive three-way exchange of control of the aircraft. Specific phrases, "I have the controls," and "you have the controls," will always be used. The introduction section of the FAM FTI reinforces the use of "I have the controls," and "you have the controls." The introduction expands on the transfer terminology by explaining how using non-standard phrases such as, "I've got it," can be misleading and may result in a situation where no one in actually flying the aircraft. Throughout the four flights of the cross country weekend, LT Ruth and LTJG Burch routinely used only a two-way exchange of controls. The language used to accomplish the exchange was not consistent, but it always seemed like a positive exchange except for the last one. At 24:37, LT Ruth is flying the aircraft and you can hear a slightly faint, "there you go." There is no apparent

response from LTJG Burch that he has assumed control of the aircraft. [FF (152) (153) (154) (155) (157) (158)]

11. It is likely that the phrase, "there you go" was meant to pass control of the aircraft back to LTJG Burch. Since there was not even a two-way exchange between the two pilots, it is again likely that LTJG Burch either did not hear, or did not understand that "there you go" meant that he was supposed to be flying the aircraft. I believe that this left several seconds of ambiguity as to who was in control and flying the aircraft. Not until LT Ruth says, "you might start making a hard right here," immediately followed by "real hard," did LTJG Burch likely realize that he was supposed to be flying the aircraft. This moment is coupled with the aircraft traveling toward the mountainside, executing terrain following, and the additional "real hard" with voice inflection that likely caused LTJG Burch to overcontrol the aircraft, and ultimately depart from controlled flight. [FF (152) (153) (154) (155) (157) (158)]

Recommendations

I respectfully recommend the following:

1. (b)(5)

(b)(5)

2. (b)(5)

(b)(5)

3. (b)(5)

(b)(5)

4. (b)(5)

(b)(5)

5. Appropriate controls should be developed to ensure CNATRA IPs do not deviate from the flight limitations set forth in the FTIs or other governing documents.

6. IPs must include relevant comments on all aviation training forms so that incomplete items and deficiencies can be tracked.

Subj: SUPPLEMENTAL COMMAND INVESTIGATION OF THE TRAINING SQUADRON SEVEN CLASS A AIRCRAFT MISHAP INVLOVING T-45C BUNO 165632 IN THE VICINTY OF TELLICO PLAINS, TN ON 01 OCTOBER 2017