

UNITED STATES AIR FORCE
GROUND ACCIDENT INVESTIGATION
BOARD REPORT



**SURVIVAL, EVASION, RESISTANCE AND ESCAPE
SPECIALIST SCREENING COURSE
TRAINING FATALITY
66TH TRAINING SQUADRON, DETACHMENT 3
58TH SPECIAL OPERATIONS WING
JOINT BASE SAN ANTONIO-LACKLAND TEXAS**

LOCATION: JOINT BASE SAN ANTONIO-CAMP BULLIS, TEXAS

DATE OF ACCIDENT: 7 JULY 2016

BOARD PRESIDENT: COLONEL JEFFREY K. FALLESEN

**CONDUCTED PURSUANT TO CHAPTER 13 OF
AIR FORCE INSTRUCTION 51-503**

[RESERVED FOR CONVENING AUTHORITY'S ACTION]

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EXECUTIVE SUMMARY

On 7 July 2016, an Air Force Survival, Evasion, Resistance, and Escape (SERE) Specialist Candidate (Candidate of Concern) was found unresponsive during the SERE Specialist Screening (SSS) Course at Joint Base San Antonio (JBSA)-Camp Bullis, Texas (TX). Medical personnel declared the Candidate of Concern deceased on the scene.

The SSS Course is the first phase of Air Force SERE Specialist development. The incident occurred during the solo living exercise on the 14th day of the 15-day course.

The solo living exercise required the SSS Course's eleven Candidates to complete various tasks in seclusion to simulate real-life SERE activity. Instructors drove the Candidate of Concern to his designated location at 1120 Local Time (LT). At 1420 LT, instructors conducted a scheduled face-to-face visit and observed no signs of distress. Another Candidate was diagnosed with heat exhaustion at about 1530 LT (local temperature had reached 101.8 degrees Fahrenheit (°F) at 1500 LT). As a result of this call, instructors provided each Candidate with an additional five-gallon jug of water, dropping the water off at about 1615 LT. The Candidate of Concern verbally acknowledged receipt of the water, but did not have face-to-face contact with the instructors.

Instructors attempted to conduct a scheduled final check with the Candidate of Concern at about 1735 LT. When they were unable to locate him, the SSS Course Flight Chief initiated lost student procedures. At approximately 1840 LT, the search team found the Candidate of Concern unconscious on a brush pile on the extreme edge of his assigned training area. His body temperature was 112 °F.

Instructors, aided by an on-scene medical technician, attempted to revive the Candidate of Concern with cardio-pulmonary resuscitation and an automated external defibrillator. Air ambulance staff assessed the Candidate of Concern and relayed his status to their medical director, who declared the Candidate of Concern deceased at 1909 LT. The autopsy concluded that the Candidate of Concern's death was accidental and caused by elevated body temperature (hyperthermia).

The Ground Accident Investigation Board President concurred with the findings of accidental death caused by elevated body temperature. He also concluded that the Candidate of Concern displayed signs of hyponatremia, but he could not determine the extent, if any, to which hyponatremia contributed to the Candidate of Concern's death.

SUMMARY OF FACTS
SERE SPECIALIST SCREENING TRAINING FATALITY
7 July 2016

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ACRONYMS, ABBREVIATIONS AND KEY TERMS

19 AF	Nineteenth Air Force	LT	Local time
1T0X1	Air Force Specialty Code for SERE Specialist	METAR	Meteorological terminal aviation routine
AED	Automated external defibrillator	mEq/L	Milliequivalent of solute per liter of solvent
AETC	Air Education and Training Command	mg/dL	Milligram per deciliter
AETCI	Air Education and Training Command Instruction	mmol/L	Millimole per liter
AF	Air Force	mph	Miles per hour
AFB	Air Force Base	NCO	Noncommissioned officer
AFI	Air Force Instruction	MRE	Meal-ready-to-eat
AK	Alaska	MTL	Military training leader
BMT	Basic Military Training	NAS	Naval Air Station
CDAI	Commander-directed accident investigation	OSI	Office of Special Investigations
CFETP	Career Field Education and Training Plan	OI	Operating instruction
CPR	Cardiopulmonary resuscitation	PAST	Physical ability and stamina test
DoD	Department of Defense	PR	Personnel recovery
Det	Detachment	ROE	Rules of engagement
ECAC	Evasion & conduct after capture	SERE	Survival, Evasion, Resistance and Escape
ECG	Electrocardiogram	SOW	Special Operations Wing
°F	Degrees Fahrenheit	SSS	SERE Specialist Screening
GAIB	Ground accident investigation board	TRG	Training Group
HIV	Human immunodeficiency virus	TRS	Training Squadron
HLZ	Helicopter landing zone	TTPs	Tactics, techniques, and procedures
IDMT	Independent duty medical technician	TX	Texas
JBSA	Joint Base San Antonio	US	United States
		USAF	United States Air Force
		UTV	Utility vehicle
		WBGT	Wet bulb globe temperature

The above list was compiled from the Summary of Facts, the Index of Tabs, and witness testimony (Tabs A through CC).

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 25 July 2016, Major General John E. McCoy, Vice Commander of Air Education and Training Command (AETC), appointed Colonel Jeffrey K. Fallesen to conduct a Commander-Directed Accident Investigation (CDAI) into the facts and circumstances of the 7 July 2016 training-related fatality of the Candidate of Concern, an active-duty United States Air Force (USAF) member assigned to Joint Base-San Antonio (JBSA), Texas (TX). Board members included two medical advisors, a physician (Lieutenant Colonel) and an aerospace physiologist (Captain); a legal advisor (Major); a Survival, Evasion, Resistance, and Escape training expert (Technical Sergeant); and a recorder (Staff Sergeant) (Tab Y-2 to Y-6).

On 22 November 2016, Lieutenant General Darryl L. Roberson, Commander of AETC, converted the CDAI into a formal Ground Accident Investigation Board (GAIB). The members of the CDAI were appointed as GAIB members in the same roles as on the CDAI team (Tab Y-7 to Y-8).

b. Purpose

In accordance with Air Force Instruction 51-503, *Aerospace and Ground Accident Investigations*, this accident investigation board conducted a legal investigation to inquire into all the facts and circumstances surrounding this Air Force ground accident, prepare a publicly-releasable report, and obtain and preserve all available evidence for use in litigation, claims, disciplinary action and adverse administrative action.

2. ACCIDENT SUMMARY

On 7 July 2016, the Candidate of Concern was found unresponsive during the Air Force Survival, Evasion, Resistance, and Escape (SERE) Specialist Screening Course's at JBSA-Camp Bullis, Texas (TX) (Tabs R-2.3, R-3.5, R-4.4, R-5.3). Medical personnel declared the Candidate of Concern deceased on the scene (Tabs R-2.4, R-3.6, R-5.3, and X-3). The incident occurred during the solo living exercise on the 14th day of the 15-day course (Tab O-52). The Candidate of Concern was assigned to the 66th Training Squadron, Detachment 3, 336th Training Group, 58th Special Operations Wing, JBSA-Lackland, TX (Tab T-2).

3. BACKGROUND

a. Air Education and Training Command



Air Education and Training Command (AETC) is the Air Force's Major Command responsible for recruiting, training, and educating of Airmen. Headquartered at JBSA-Randolph near San Antonio, TX, AETC consists of more than 51,000 personnel (Tab CC-2 to CC-10).

b. Nineteenth Air Force



Nineteenth Air Force's (19 AF) training mission includes aircrews, remotely piloted aircraft crews, air battle managers, weapons directors, and Survival, Evasion, Resistance, and Escape (SERE) Specialists. Headquartered at JBSA-Randolph, 19 AF consists of more than 32,000 personnel (Tab CC-11 to CC-12).

c. 58th Special Operations Wing



58 SOW is responsible for training Air Force special operations and combat search and rescue, including SERE Specialists. Headquartered at Kirtland Air Force Base (AFB), New Mexico, near Albuquerque, 58 SOW employs over 2,500 personnel and trains over 14,000 students a year (Tab CC-13 to CC-16).

d. 336th Training Group



336 TRG operates the Air Force Survival School. Headquartered at Fairchild AFB, Washington, near Spokane, 336 TRG provides training to Air Force SERE Specialists who train more than 6,000 students each year. It administers training courses and gives command guidance, standardization, and curriculum support to geographically-separated units at Eielson AFB, Alaska (AK) near Fairbanks (the Arctic Survival School) and JBSA-Lackland (the SSS Course). The group consists of the 336th Training Support Squadron, 66 TRS, 22d Training Squadron, and 36th Rescue Squadron (Tab CC-17).

e. 66th Training Squadron



66 TRS trains all Air Force SERE instructors. Headquartered at Fairchild AFB, 66 TRS includes detachments at Eielson AFB, AK (Det 1) and JBSA-Lackland (Det 3). Det 3 conducts the SSS and Evasion and Conduct After Capture (ECAC) Courses (Tab CC-17).

f. SERE Specialist Screening Course



The SSS Course is the first phase in Air Force SERE Specialist training development. New BMT graduates selected for the SERE career field attend the SSS Course immediately following completion of BMT; prior-service Airmen attend the course as retrainees. SERE Specialist candidates who successfully complete the SSS Course continue with SERE Specialist apprentice training at Fairchild AFB (Tab BB-2 to BB-5).

g. SERE Specialist

Air Force SERE Specialists are the Department of Defense's (DoD) experts in survival, evasion, resistance, and escape. All SERE Specialists must complete the SSS Course at JBSA-Lackland. Candidates who successfully complete the course move on to additional training toward becoming Air Force SERE Specialists. Fully trained SERE Specialists teach SERE skills to DoD and other personnel and provide direct operational unit support (Tab CC-18 to CC-19).

h. SSS Flight Chief

The SSS Flight Chief supervises the SSS Course. Relevant responsibilities include Candidate accountability and safety, risk management assessments and briefings, and leadership notification of medical emergencies and missing personnel (Tab O-53 to O-54).

i. Operations Noncommissioned Officer

The Operations NCO (Ops NCO) manages daily SSS personnel accountability and requirements. The Ops NCO is the second-in-charge to the SSS Flight Chief (Tab O-54).

j. Independent Duty Medical Technician

The Air Force IDMT program is part of the Aerospace Medical Service career field and is governed by AFI 44-103, *The Air Force Independent Duty Medical Technician Program*. IDMTs perform patient examination and render medical/dental treatment and emergency care to personnel. During

the SSS Course, IDMT support is required for certain activities (the physical ability and stamina test, ruck assessments, the first physical training session, and team runs) and available during all other scheduled syllabus time (Tab O-54).

k. SSS Cadre

SSS Cadre are instructors responsible for conducting daily course objectives according to the syllabus (Tab O-54).

4. SEQUENCE OF EVENTS

a. Background

The Candidate of Concern enlisted in the United States Air Force in California and successfully completed Basic Military Training (BMT) on 3 June 2016. He began Survival, Evasion, Resistance, and Escape (SERE) Specialist Selection (SSS) Course 17-02A on 20 June 2016 (Tab G-15). The SSS Course consists of 15 training days and is the initial phase of the SERE Specialist development program (Tabs O-49 to O-52 and BB-2). SERE Specialist Candidates must successfully complete the SSS Course before moving to the next phase of training (Tab BB-2 to BB-5).

By all accounts, the Candidate of Concern was highly motivated to complete SERE training and was well liked by his fellow Candidates, who described him as “performing above standard[s] in the course” and “very upbeat” (Tab R-8.2 and R-10.2). Through the afternoon of 7 July 2016, the Candidate of Concern had successfully completed the SSS Course’s academic and laboratory instruction portions (Tab G-2 to G-14). He also successfully completed the SERE physical ability and stamina test, which consists of a 200-meter swim in under 10 minutes, a 1.5-mile run in less than 11 minutes, 8 pull-ups, and 48 sit-ups/push-ups in under two minutes (Tabs G-2 and BB-3).

b. Field Training and Solo Living Exercise

On 4 July 2016, the Candidate of Concern and the ten other Candidates in Class 17-02A traveled approximately 25 miles from Joint Base San Antonio (JBSA)-Lackland to JBSA-Camp Bullis for five days of field training (Tabs O-51 to O-52 and Z-2). JBSA-Camp Bullis is the primary training location for field operation (Tab O-57). The first three training days at JBSA-Camp Bullis consisted of laboratory and operational training under the guidance and observation of SSS Course instructors (Tab O-51 to O-52). During this time, the Candidate of Concern made regular and consistent progress and successfully completed all of the labs and operational training (Tab G-2 and G-11).

On 7 July 2016 and before instructors arrived, Candidates prepared for the day’s activities, including filling their canteens and drinking water (Tab V-10.1 and V 15.1). Instructors arrived at the Candidates’ camp at approximately 0730 LT (Tabs R-3.3, R-4.3, and R-18.8). That day’s curriculum included a navigation exercise and a solo living exercise. The Candidates dismantled the camp (Tabs R-3.3, R-4.3, R-18.8, and V-15.1) and prepared for the solo navigation exercise (Tab R-3.3). Instructors ensured that the previous night’s tasks were completed (Tab R-3.3). They

also checked water levels in the Candidates' canteens (Tabs V-5.1 and V-15.1) and provided two meal-ready-to-eat (MREs) to prepare for use that day (Tabs R-15.2 and V-17.1). No additional food was provided.

At 0900 LT, the solo navigation exercise began (Tab R-3.3). This exercise required the Candidates to navigate a specific course within a fixed amount of time, without assistance (Tabs R-3.3 and R-4.3). The Candidate of Concern successfully completed his solo navigation exercise (Tabs R-16.2 and R-17.2).

At about 1100 LT, the solo living exercise began (Tab R-3.3). As with the previous exercise, Candidates were briefed on ROEs, emergency procedures, conditions, standards, and tasks (Tabs R-3.3 and R-4.3). The purpose of this exercise was to evaluate the Candidates' ability to accomplish various survival tasks in an isolated setting, consistent with operational experience as a SERE Specialist (Tab BB-5). Candidates were assigned to a single operating location and given six tasks to accomplish: prioritize needs; build a shelter; prepare a fire; construct a ground-to-air signal; identify and procure sustenance; and adhere to sanitation, hygiene, care and use standards (Tabs BB-5 and CC-24). All tasks were to be accomplished within the specified operating location (Tab BB-5). The solo living exercise was scheduled to last six hours (Tab R-3.3).

Instructors drove each Candidate to a road cone within a specific operating location. The road cone was utilized as a point of reference during the exercise (Tabs Z-3 and BB-5). Each Candidate was instructed not to venture more than 100 meters away from the road cone (Tab BB-5). They were also instructed not to cross the road (Tab BB-5). Because each Candidate was supposed to be alone, all personnel were considered off limits (Tab CC-24). If a Candidate saw another Candidate, they were directed to step away and continue working (Tab CC-24).

At 1120 LT, the Ops NCO and SSS Instructor 2 drove the Candidate of Concern and two other Candidates to their respective solo living exercise operating locations (Tabs R-3.3 and V-7.2). The Candidate of Concern appeared normal at this time (Tab V-7.2).

It is not known in which order the Candidate of Concern completed the assigned tasks, so they are described in the same order that instructors briefed them to the Candidates. For the shelter task, each Candidate constructed a parachute shelter, according to instructions previously provided (Tabs Z-11 to Z-12, and CC-24). The Candidate of Concern completed this task by successfully fashioning wooden tent stakes out of materials available on scene (Figure Z-1). He successfully constructed a shelter within visual range of the road and about 20 yards from his road cone (Figures Z-2 and Z-3). He also hung a chem-light above the shelter, as instructed (Tab CC-24).

For the fire, Candidates were instructed to prepare a fire circle with a minimum diameter of 10 feet (Tab CC-24). The Candidate of Concern appears to have completed this task, because a fire circle had been constructed in a clearing a short distance from his shelter (Tab S-16 to S-17).

The next task for completion was a ground-to-air signal in the shape of a "V" (Tab CC-24). The signal is constructed of natural materials and should provide enough contrast to be identifiable from the air (Tab BB-5). The Candidate of Concern appears to have successfully completed this task, because a ground signal had been scraped to bare earth in a clearing about 25 yards from his

signal cone (Figure Z-6 and Tab R-3.4).

The final tasks for completion were sustenance and sanitation and hygiene (Tab CC-24). It is unclear whether the Candidate of Concern successfully completed the final sanitation and hygiene task, as he was discovered missing when SSS Course instructors began final checks (Tabs R-3.4 and R-10.2).

c. Mid-Exercise and Lost Student Sequence

At 1420 LT, the Ops NCO and SSS Cadre 2 conducted the planned mid-exercise student check, including the Candidate of Concern (Tabs R-3.3 and V-7.2). The Ops NCO and SSS Cadre 2 conducted this check at each solo living area to verify that the Candidates were progressing with the tasks and could continue with the exercise (Tabs R-3.3 and V-7.2). When visiting the Candidate of Concern, the instructors went about 20 yards into his operating area for their face-to-face meeting (Tabs R-3.3 and V-7.2). SSS Cadre 2 confirmed that the Candidate of Concern was progressing with his assigned tasks and that he was in good health (Tabs R-3.3 and V-7.2).

At 1500 LT, the wet bulb globe temperature (WBGT) was 87.1 °F and the temperature was 101.8 °F (Tab F-2). At about 1530 LT, one of the Candidates made an emergency radio call to instructors to report that he was experiencing heat-related distress (Tab V-2.1). The SSS Flight Chief and IDMT responded to the call and the Candidate was transported to JBSA-Camp Bullis' larger medical facility for further treatment (Tab V-2.1).

As a result of the Candidate's heat-related distress, the SSS Flight Chief directed the Ops NCO, SSS Cadre 1, and SSS Cadre 2 to drop off additional water with the remaining Candidates. The instructors provided five-gallon water cans to the Candidate of Concern and other Candidates at approximately 1615 LT (Tabs R-3.3 to R-3.4, R-4.3, R-5.3, and V-7.2).

When supplying the Candidate of Concern with the additional water, SSS Cadre 1 and SSS Cadre 2 did not leave the road cone to physically interact with the Candidate of Concern (Tabs R-3.4, R-4.3, and V-7.2). Instead, they called out to tell the Candidate of Concern that they had brought extra water (Tabs R-3.3 to R-3.4, R-4.3, and V-7.2). SSS Cadre 1 and SSS Cadre 2's only visual confirmation with the Candidate of Concern was from a distance of between 25 and 30 yards (Tab R-3.3 to R-3.4). The Candidate of Concern acknowledged SSS Cadre 1 and SSS Cadre 2 and gave no indication of distress (Tabs R-3.3 to R-3.4, R-4.3, and V-7.2). The Candidate of Concern thanked the instructors for bringing the water, because he "was down to his last canteen" of water (Tabs R-3.3 to R-3.4, R-4.3, and V-7.2).

After the instructors dropped off the water, the Candidate adjacent to the Candidate of Concern's operating area saw him moving around in his area. The view was nearly obscured by foliage. Shortly after losing sight of the Candidate of Concern, the other Candidate heard what sounded like a tree branch crashing down (Tab R-8.1 to R-8.2). The Candidate stated he was not concerned about the sound at that time because a loud branch crack "wasn't out of the normal" (Tab V-8.1). The Candidate did not see anything else and, in accordance with the instructions for the solo living exercise, did not investigate further (Tabs V-8.1 and CC-24).

At about 1700 LT, the Ops NCO and SSS Cadre 2 left instructor camp to perform a final check of all Candidates (Tabs R-3.4 and V-7.3). About 35 minutes later, the Ops NCO and SSS Cadre 2 arrived at the Candidate of Concern's road cone (Tabs R-3.4 and V-7.3). The Candidate of Concern was not at the road cone, so the instructors walked into his operating area to look for him (Tab R-3.4).

About 20 yards into the operating area, the instructors saw the Candidate of Concern's ground-to-air signal in a clearing, with his backpack next to it (Tabs R-3.4 and V-7.4). They looked around and called out to the Candidate of Concern, but did not receive a response. The instructors saw the Candidate of Concern's emergency vest and emergency gear hanging on a tree branch near the rucksack (Tabs R-3.4 and V-7.4). After five to ten minutes of looking, instructors were unable to locate the Candidate of Concern (Tabs R-3.4, R-4.4, and V-7.4).

The instructors called for Candidates in adjacent areas to come and assist in looking for the Candidate of Concern (Tabs R-3.4 to R-3.5, R-4.4, R-5.3, R-8.2, R-10.3, R-14.2, V-7.5, and V-10.1). Thinking it possible that the Candidate of Concern had become disoriented by the terrain and traveled in the wrong direction, they expanded the scope of the search (Tab R-3.4). It was during this phase of the search that the Candidates who had been operating adjacent to the Candidate of Concern told the instructors that he had previously heard the sound of a crashing tree branch (Tabs R-3.4 and R-8.2).

At 1812 LT, the SSS Flight Chief contacted 66 TRS's Director of Operations and initiated "lost student procedures" by ending the exercise and organizing more formal search efforts (Tab R-5.3). The IDMT, who was at the larger medical center to treat the Candidate previously experiencing heat-related stress, immediately returned to the Candidate of Concern's site (Tab V-2.1). At about 1830 LT, instructors organized the remaining instructors and Candidates into a line for a systematic search for the Candidate of Concern (Tabs R-3.5, R-4.4, R-5.3, R-8.2, R-10.3, R-14.2, R-18.1, V-7.5, V-10.1, V-16.1, and V-17.1).

d. Search and Rescue

Ten minutes into the organized search, at about 1840 LT, a Candidate called out "We found him! Medic!" (Tabs R-2.3, R-3.5, R-4.4, R-5.3, R-10.3, R-14.2, R-18.1, and V-7.6) The Candidate of Concern was laying on top of a brush pile in a prone position with his arms bent inward toward his chest (Tabs R-2.3, R-3.5, R-18.1, V-7.6, and V-16.1). His legs were straight and rigid (Tabs R-18.4 and V-7.6). The instructors and IDMT immediately began treatment (Tabs R-2.3, R-3.5, R-4.4, R-5.3, V-4.1, V-7.6 to V-7.7, and V-10.1). The IDMT found the Candidate of Concern had fluid coming out the mouth and nose (Tabs R 2.3, R-10.3, V-7.6, and V-10.1). The instructors and IDMT moved the Candidate of Concern off the brush pile onto flat ground (Tab R-2.3). The IDMT began the initial medical assessment and quickly directed CPR to begin (Tabs R-2.3, R-3.5, R-4.4, R-5.3, R-8.2, R-18.3, V-4.1, V-7.6 to V-7.7, and V-10.1). During CPR, the instructors and a Candidate cut off the Candidate of Concern's clothing to examine him for injuries, bites, or wounds, with negative findings (Tabs R-4.4 and R-18.1). The IDMT used a thermometer to measure the Candidate of Concern's internal body temperature at 112 °F (Tab R-2.3).

At this point, the IDMT retrieved and prepared the AED (Tabs R-2.3, R-3.5, R-4.4, and V-7.7).

After applying the AED pads to the Candidate of Concern's body, the device said, "Analyzing, stand clear, no shock advised" (Tabs D-4, R-2.3, R-3.5, and V-7.7).

The SSS Flight Chief contacted JBSA-Camp Bullis Range Control and requested air and ground ambulance services (Tabs R-3.5 and R-5.3). While attempted resuscitation continued, the IDMT and instructors prepped the Candidate of Concern for transport to the helicopter landing zone (HLZ) (Tabs R-2.3, R-3.6, R-4.4, R-5.3, and V-7.7). They placed the Candidate of Concern on a litter for transport (Tabs R-2.3, R-3.6, R-5.3, and V-7.7) and loaded the litter onto a medical Ranger utility task vehicle (UTV) (Tab R-2.3).

During the ride in the medical Ranger UTV to the HLZ, the AED signaled the responders to administer an electrical impulse (Tabs D-5, R-2.3 to R-2.4, R-3.6, and V-7.8). The medical Ranger UTV stopped and one electrical impulse was administered. After no further electrical therapy was advised, the team continued to the HLZ (Tabs D-5 to D-6, R-2.4, R-3.6, and V-7.8).

At about 1855 LT, the medical Ranger UTV arrived at the HLZ (Tab R-2.4). The IDMT and JBSA-Camp Bullis fire/rescue paramedics (who had encountered the instructors during the drive) maintained CPR throughout the entire drive to the HLZ (Tabs R-3.6 and R-5.3). At about 1900 LT, the medical air ambulance landed, and the air ambulance staff offloaded equipment to begin treating the Candidate of Concern (Tab R-2.4). The air ambulance staff placed a 12 lead-ECG on the Candidate of Concern and confirmed no cardiac electrical activity (Tab R-2.4). At about 1905 LT, a ground ambulance arrived on scene (Tab X-2). The air ambulance staff contacted their medical director and provided information collected during treatment, including care provided by the IDMT before the air ambulance arrived on scene (Tabs R-2.4 and X-2 to X-3).

e. Recovery of Remains

Based upon this information, the air ambulance's medical director pronounced the Candidate of Concern dead at 1909 LT (Tab X-3). At this point, Air Force Office of Special Investigations (OSI) agents conducted a mandatory forensic assessment (Tab X-3). Once the OSI assessment was complete, an ambulance delivered the Candidate of Concern's body to the military morgue (Tab X-3).

5. MAINTENANCE

Not applicable.

6. EQUIPMENT, VEHICLES, FACILITIES, AND SYSTEMS

Automated External Defibrillator

The IDMT used an AED in the attempted resuscitation of the Candidate of Concern (Tab D-4 to D-6). Maintenance of the AED is performed in accordance with Air Force Instruction 41-201, *Managing Clinical Engineering Programs*. Following this event, the information from the AED used on the Candidate of Concern was downloaded and analyzed. The AED appears to have been operated properly and was properly maintained (Tab D-7 to D-8).

7. ENVIRONMENTAL CONDITIONS

a. Forecasted and Observed Weather and Warnings, Restrictions, Procedures, and Briefings on Environmental Conditions

The nearest official weather station to Joint Base San Antonio (JBSA)-Camp Bullis is at San Antonio International Airport (Tab F-3). Between 5-7 July 2016, observed weather conditions were a low temperature of 79 degrees Fahrenheit (°F) and high temperature of 99 °F, with no precipitation (Tab F-3 to F-9).¹

On 7 July 2016, the temperature at JBSA-Camp Bullis ranged from 81 °F to 101.8 °F between 0800 and 1500 and the wet bulb global temperature (WBGT) ranged from 82 °F to 88.6 °F (Tab F-2). When the air temperature and WBGT are high, the work rate is reduced and water consumption is increased (Tab O-63), in accordance with Air Force Instruction (AFI) 48-151, *Thermal Injury Prevention Program*, Table A2.3. Between 0800 and 1500 on 7 July 2016, the heat category ranged between 2 and 4, which required green flag, yellow flag, and red flag precautions, respectively (Tab F-2).

The exact temperature at the time of this incident is unknown because the JBSA-Camp Bullis weather station closed at 1600 LT. The WBGT and humidity are unknown for the same reason (Tab F-2).

b. Other Environmental Conditions

The solo living exercise requires “[s]ites . . . located in areas conducive for solo living objectives” (Tab O-57). The topography and vegetation at JBSA-Camp Bullis includes a variety of clearings, hilly terrain, and tree and brush cover. JBSA-Camp Bullis’ proximity to JBSA-Lackland and available materials, resources, and shade made it AETC’s choice for the field training portion of the SSS Course (Tab O-57).

8. PERSONNEL QUALIFICATIONS

Training records for each SSS Course instructor are maintained in accordance with Air Force guidelines. These records were reviewed for each instructor involved in this incident. For the Individual Duty Medical Technician (IDMT) who provided care to the Candidate of Concern, the certifications were also reviewed separately for currency, performance, experience level, and overall qualifications (Tab T-2 to T-4).

a. SSS Flight Chief

The SSS Flight Chief was certified to manage and instruct all aspects of the SSS Course at the time of the mishap (Tab T-2).

¹ Observed weather conditions described at Tab F consist of Meteorological Terminal Aviation Routine (METAR) weather reports taken at San Antonio International Airport. A description of METAR and how to read METAR reports is available at: <http://www.met.tamu.edu/class/metar/quick-metar.html>.

b. Operations Noncommissioned Officer

The Ops Noncommissioned Officer (NCO) was certified to perform all positions for the SSS Course, including line instructor, proctor, Ops NCO, and Flight Chief at the time of the mishap (Tab T-2).

c. Individual Duty Medical Technician

In accordance with Air Force Instruction 44-103, *The Air Force Independent Medical Technician Program*, para. 1.11.4, IDMTs are required to obtain and maintain emergency medical technician (EMS)/paramedic certification and licensure and basic life support (BLS) instructor qualifications. The IDMT obtained national EMS certification from the National Registry of Emergency Medical Technicians at the paramedic provider level and was current on this training at the time of the mishap (Tab T-5). In addition, the IDMT was certified as a BLS instructor by the American Heart Association and was current on this training at the time of the mishap (Tab T-4).

d. SSS Cadre 1

SSS Cadre 1 was certified to perform SSS instructor duties at the time of the mishap (Tab T-2).

e. SSS Cadre 2

SSS Cadre 2 was briefed as a newly-assigned instructor on 20 June 2016 and did not have any instructional duties (Tab T-3).

9. MEDICAL

a. Medical Records

A review of the Candidate of Concern's pre-mishap medical records revealed no significant issues relevant to this mishap (Tab X-3 to X-4). The Candidate of Concern completed an enlistment physical on 2–4 September 2015 and reported good health with no significant medical conditions (Tab X-3).

Prior to going to Joint Base San Antonio (JBSA)-Camp Bullis for the SSS Course's field exercises, all Candidates, including the Candidate of Concern, were required to complete an Initial Flight Class III physical, which included a 12-lead electrocardiogram (ECG) (Tab X-3). The Candidate of Concern underwent a series of five ECGs on 1 July 2016 (Tab X-3). The ECGs showed abnormalities (Tab X-3), so the results were referred to the Air Force School of Aerospace Medicine for further analysis (Tab X-3 to X-4). Further analysis determined that the Candidate of Concern's ECG results were acceptable and no further study was required (Tabs X-3 and X-9).

These findings were confirmed in a post-mortem memorandum by the Air Force School of Aerospace Medicine (Tab X-3 and X-9). A post-mortem review of the Candidate of Concern's ECG results was also conducted by the Cardiology Department at the Brooke Army Medical Center at JBSA-Fort Sam Houston. This review confirmed the anomalies found in the Candidate

of Concern's ECG. It also confirmed that the ECG results did not suggest a significant pathology that necessitated further evaluation, but were more consistent with the heart rhythms one might expect from a well-conditioned athlete. This finding was further confirmed by the fact that the Candidate of Concern's post-mortem autopsy revealed his heart to be structurally normal (Tabs X-3 and X-11).

In addition to the Flight Class III physical and attendant procedures, the Candidate of Concern also had routine screening labs drawn (Tab X-3). The lab results were negative, and there is no evidence to indicate any of the conditions tested for were a factor in the mishap (Tab X-3).

b. Injuries and Cause of Death

Medical experts determined that the Candidate of Concern's cause of death was heat exposure (hyperthermia) and that his death was accidental (Tab X-7).

Hyperthermia is a condition when an individual's core body temperature is greatly above normal (Tab X-4). In general terms, hyperthermia occurs when the body's core temperature exceeds the normal range (Tab X-4). Heat stroke occurs when the core body temperature is in excess of 104 °F (Tab X-4). When the instructors and independent duty medical technician (IDMT) began administering first aid, the Candidate of Concern's core body temperature was 112 °F, well in excess of the level for heat stroke, indicating that he suffered from hyperthermia (Tab R-2.3).

Hyponatremia is a condition that occurs when total body sodium is depleted or when excess water consumption dilutes sodium in the blood, causing low plasma sodium (Tab X-7). Hyponatremia occurring as a result of low sodium may present as an electrolyte imbalance (Tab X-7). Profound hyponatremia occurs when the serum sodium level falls below 120 mEq/L (Tab X-7). Even though vitreous fluid electrolyte analysis is a less accurate method of determining serum sodium levels than blood drawn prior to death, vitreous fluid electrolyte analysis can be used as a correlate to serum electrolyte analysis (Tab X-7). The post-mortem sodium level in the vitreous fluid of the Candidate of Concern was 126 mEq/L (which may also be expressed as 126 mmol/L), less than the normal range but not profoundly low (Tab X-7). His potassium level was 17.6 mEq/L, above the normal range of 3.5-5.0 (Tab X-7), and his urine was found to be clear (Tab X-3). In a subsequent medical opinion dated 6 April 2017 issued by the Armed Forces Medical Examiner System as a secondary review of the autopsy results and medical findings, some doubt was cast on the previously reported sodium level measured from post mortem vitreous fluid (Tab X-11). The subsequent medical opinion points out that vitreous potassium increases and vitreous sodium decreases as natural decomposition occurs indicating that the low sodium level previously reported may have resulted from the natural decomposition process (Tab X-11).

Some of the symptoms observed in or displayed by the Candidate of Concern are associated with both hyperthermia and hyponatremia. There is no directly observable evidence, but it is possible the "sound of a tree crashing" heard around 1615-1645 LT was the Candidate of Concern collapsing on the brush pile (Tab X-6). The Candidate of Concern was instructed to wear his emergency vest at all times, but he was found a considerable distance away from his emergency gear (Tabs R-5.3). Before this incident, the Candidate of Concern had followed all SSS Course instructions and was exceling (Tab G-2 to G-14). These facts suggest that an intervening factor

such as confusion, delirium, or disorientation may have contributed to this mishap (Tab X-6 to X-7). Confusion, delirium, and disorientation are associated with hyperthermia and hyponatremia (Tab X-6 to X-7). At least one other Candidate complained of feeling lightheaded with a headache and cramping during the SSS Course (Tab R-12.2). Headache and weakness are associated with hyperthermia and hyponatremia (Tab X-5).

Post-mortem vitreous fluids report the Candidate of Concern had an allergy serum panel done in which levels of allergen were absent or at low levels (Tab X-7). Therefore, it is unlikely that he died from anaphylaxis or some other allergic reaction (Tab X-7). Moreover, an inspection of the Candidate of Concern's body upon discovery showed no signs of receiving a fatal animal or insect bite or sting (Tab R-2.3).

c. Toxicology

The investigation discovered no significant toxicology evidence.

d. Lifestyle

The investigation discovered no significant lifestyle evidence.

10. OPERATIONS AND SUPERVISION

a. Operations

The investigation discovered no significant operations evidence.

b. Supervision

The investigation discovered no significant supervision evidence.

11. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Primary Operations Directives and Publications

(1) 66th Training Squadron, Detachment 3 (66 TRS Det 1) Operating Instruction (OI) 10-3, *Survival, Evasion, Resistance, and Escape (SERE) Specialist Screening (SSS) Operations*, dated 1 January 2016 (Tab O-53 to O-65; this instruction is incorrectly numbered "10-4" on page 1).

(2) Air Education and Training Command Instruction 36-2205, Volume 11, *Formal Flying Training Administration and Management—Survival, Evasion, Resistance and Escape (SERE)*, dated 22 February 2010; available at: www.e-publishing.af.mil.

(3) Air Force Instruction 36-2626, *Airman Retraining Program*, dated 3 June 2013, incorporating through Change 3, 13 January 2015; available at: www.e-publishing.af.mil.

(4) Air Force Instruction 41-201, *Managing Clinical Engineering Programs*, dated 15 October 2014; available at: www.e-publishing.af.mil.

(5) Air Force Instruction 44-103, *The Air Force Independent Medical Technician Program*, dated 6 December 2013; available at: www.e-publishing.af.mil.

(6) Air Force Instruction 48-151, *Thermal Injury Prevention Program*, dated 7 April 2016; available at: www.e-publishing.af.mil.

(7) Air Force Instruction 51-503, *Aerospace and Ground Accident Investigations*, dated 14 April 2015; available at: www.e-publishing.af.mil.

(8) Air Force Instruction 91-204, *Safety Investigations and Reports*, dated 12 February 2014, Corrective Actions Applied on 10 April 2014; available at: www.e-publishing.af.mil.

(9) Air Force Instruction 16-1301, *Survival, Evasion, Resistance, and Escape (SERE) Program*, dated 6 September 2006; available at: www.e-publishing.af.mil.

(10) Air Force Policy Directive 16-13, *Survival, Evasion, Resistance, and Escape (SERE)*, dated 1 March 2000; available at: www.e-publishing.af.mil.

(11) Career Field Education and Training Plan 1TOX1, *Survival, Evasion, Resistance, and Escape (SERE) Specialist*, dated 1 December 2010; available at: www.e-publishing.af.mil.²

b. Known or Suspected Deviations from Directives or Publications

The evidence raised the issue of whether SSS Course instructors and Candidates followed Air Force water consumption guidelines (Tabs O-63, V-15.1, and V-16.1).

Air Force Instruction (AFI) 48-151, para. A2.2, indicates that “[a]n individual is considered acclimatized [to a given climate] if he or she has undertaken at least two continuous hours of work or exercise in five of the last seven days, or 10 of the last 14 days in the same environmental conditions as the proposed activity.”

AFI 48-151 also provides a guideline to determine workloads and heat guidelines for the average acclimatized individuals. In accordance with AFI 48-151, Table A2.2, “easy work” consists of walking on a hard surface at 2.5 miles per hour (mph) with a load of less than 30 pounds. “Moderate work” consists of walking on a hard surface at 3.5 mph with a load of less than 40 pounds, walking on loose sand at 2.5 mph with no load, light maintenance work, or operating construction equipment. “Hard work” consists of walking on a hard surface at 3.5 mph with a load greater than 40 pounds, walking on loose sand at 2.5 mph with a load, or loading or unloading pallets, or dragging hoses or lines. The Candidate of Concern performed at all of these work rates during certain portions of the daily field requirements. Based on the course requirements, it appears the Candidate of Concern performed at the “hard work” category for 2 hours on day 14. Once beginning the solo living exercise, the Candidate of Concern experienced work categories of

² At the time of this incident, the most recent CFETP for SERE Specialists was published on 1 December 2010. A new version was released on 9 December 2016. A careful review of these versions reveals no significant difference (Tab T-3).

either “easy” or “moderate.”

In accordance with AFI 48-151, Table A2.3, heat guidelines are determined by the Wet Bulb Globe Temperature (WBGT), and workload varies based on the WBGT. For acclimatized individuals performing easy work in green flag conditions, ½ of a quart of water per hour is the recommended water intake. For acclimatized individuals performing easy work in yellow and red flag conditions, and individuals performing moderate work in green, yellow, or red flag conditions, ¾ of a quart of water per hour is the recommended water intake. For all work rates, in accordance with AFI 48-151, para. A2.7.1, individual water intake may vary by plus or minus ¼ quart of water per hour. 66 TRS Det 3 has adopted AFI 48-151’s heat and water guidelines for acclimatized individuals performing easy, moderate, and hard work (Tab O-63). At no time on training day 14 did the Candidate of Concern experience black flag conditions.

By 7 July 2016, the Candidate of Concern and the other Candidates had undertaken at least two continuous hours of work in 10 of the previous 14 days in the same environmental conditions (Tabs O-4 and O-7).

Candidates were provided with two one-quart canteens, two two-quart canteens, and one five-quart camelback-style bag to carry 11 quarts of water (Tab V-5.1 and V-13.2). This standard is the same regardless of the season (Tab V-13.2).

Instructors monitored water consumption because it was a safety issue and because water consumption affected other aspects of training (Tabs V-12.1 to V-12.2 and V-13.2). Adequate hydration is critical to the body’s process of temperature control, but hydration alone does not preclude the onset of heat-related injury (Tab X-4 to X-5). Instead, it is one of several factors impacting thermal stress injury (Tab X-5). Instructors performed water checks on each Candidate to ensure overall safety and compliance with the fluid replacement chart published in the Squadron OI 10-3 (Tab O-63). Water checks were conducted in the morning to ensure that Candidates had sufficient water for the day’s events (Tab V-12.1 to V-12.2). Instructors also monitored water consumption throughout the day, because it was an activity that needed to be regularly maintained (Tab V-14.1).

Notwithstanding the prescribed water consumption and related workload guidelines adopted by Squadron OI 10-3, there appears to be inconsistency between the direction given by instructors and what was understood by Candidates. Instructors monitored water consumption for Candidates and graded on a “sat/unsat” standard (Tabs G-2, R-13.2, V-12.1 to V-12.2, and V-14.1). The Ops NCO did not recall a specific directive or order that Candidates should drink one quart of water per hour specifically or extra water generally (Tab V-12.1 to V-12.2). However, the SSS Flight Chief remembered making a specific comment that instructors should make sure that Candidates were consuming enough water due to elevated temperatures in the field (Tab V-13.3). This comment was not intended to be an official order (Tab V-13.3). The SSS Flight Chief made this comment because of the hot conditions and to ensure that all Candidates were graded to the same standard (Tab V-13.3).

Instructors did not recall giving a specific directive or order that Candidates should drink one quart of water per hour or extra water generally (Tab V-12.1 to V-12.2). However, testimony identified

a general understanding by multiple Candidates that one quart per hour was the consumption standard regardless of heat conditions (Tabs R-12.2, R-13.2, V-9.1, and V-10.1). Some Candidates testified they felt like they were expected to drink all of their water or they would receive an “unsat” for that item (Tab V-9.1). Some testified they recalled drinking water that may have exceeded the fluid replacement guidelines (Tab V-9.1). One Candidate testified that Candidates who were in the SSS Course to cross-train from para-rescue to SERE Specialist told him that they received “unsats” for water consumption, even though they said they didn’t need the amount required by the instructors (Tab V-9.1).

c. Medical Publications

The following medical publications were relied upon by the medical advisors.

(1) Binkley, Helen, M., Joseph Beckett, Douglas J. Casa, Douglas M. Kleiner, Paul E. Plummer. National Athletic Trainers’ Association Position Statement: Exertional Heat Illnesses. *Journal of Athletic Training* (2002); 37(3):329–43.

(2) Carter, R. Exertional heat illness and hyponatremia: an epidemiological prospective. *Curr. Sports Med. Rep.*, Vol. 7, No. 4, pp. S20-S27, 2008.

(3) Clark JM, Gennari FJ: Encephalopathy due to severe hyponatremia in an ultramarathon runner. *West J Med* 1993; 159; 188-189.

(4) Farrell, DJ, and L. Bower. “Fatal Water Intoxication.” *J Clin Pathol* 56 (2003): 803-04.

(5) Friedman, Bruce, Biff Palmer, and Fariborz Rezai. “Managing the Critically - Ill Patient with Hyponatremia.” *Journal of Critical Care* (2014): 1-28.

(6) Glazer, J. “Management of Heatstroke and Heat Exhaustion,” *Am Fam Physician*, 2005, 71:2133–40, 2141–42.

(7) Gleason, Vaness M., and Niels D. Martin. “Intracranial Hypertension Secondary to Psychogenic Polydipsia.” *J Emerg Trauma Shock* 5.2 (2012): 193-95.

(8) Memorandum to 559 AMDS/SGPF from USAFSAM/FECIE, dated 19 July 2016, one page.

(9) Muruganathan, A. “Approach to a Patient with Hyponatremia.” *Medicine* (2011): 197.

(10) Noakes, T. D., K. Sharwood, M. Collins, and D. R. Perkins. “The Dipsomania of Great Distance: Water Intoxication in an Ironman Triathlete.” *British Journal of Sports Medicine*. N.p., 20 May 2003. Web. 19 Aug. 2016.

(11) OSHA. Using the Heat Index: A Guide for Employers. N.p.: n.p., 2016. Print.

(12) Popkin, Barry M., Kristen E. D’Anci, and Irwin H. Rosenber. “Water, Hydration and Health.” *Water, Hydration and Health* 68.8 (2010): 439-58. Web. 25 Aug. 2016.

(13) Watson, David. “General Aspects of Managing Critically Ill Patients.” *Intensive Care*. By Charles J. Hinds. 3rd ed. N.p.: n.p., n.d. 295-96. Print.

(14) Yamashiro, Mari, Hajime Hasegawa, Akihiko Matsuda, Masanobu Kinoshita, Osamu Matsumura, Kazuo Isoda, and Tetsuya Mitarai. “A Case of Water Intoxication with Prolonged Hyponatremia Caused by Excessive Water Drinking and Secondary SIADH.” *Case Reports in Nephrology and Urology* 3 (2013): 147-52. Web.

12 May 2017

Date

JEFFREY K. FALLESEN, Colonel, USAF
President, Ground Accident Investigation Board

**UNITED STATES AIR FORCE
GROUND ACCIDENT INVESTIGATION BOARD REPORT
SURVIVAL, EVASION, RESISTANCE, AND ESCAPE SPECIALIST
SCREENING COURSE TRAINING FATALITY
JOINT BASE SAN ANTONIO-CAMP BULLIS, TEXAS
7 JULY 2016**

STATEMENT OF OPINION

1. OPINION SUMMARY

On 7 July 2016 at about 1840 hours local time (LT), an Air Force male Survival, Evasion, Resistance, and Escape (SERE) Specialist Candidate (Candidate of Concern) assigned to the 66th Training Squadron, Detachment 3, 336th Training Group, 58th Special Operations Wing, Joint Base San Antonio (JBSA)-Lackland, Texas (TX), was found unresponsive during the solo living exercise of the SERE Specialist Screening (SSS) Course at JBSA-Camp Bullis, TX. Instructors administered first aid, but these efforts were unsuccessful and medical personnel declared the Candidate of Concern deceased at JBSA-Camp Bullis. A post-mortem examination determined the circumstances of death to be accidental and the cause of death to be hyperthermia, a medical condition that occurs when the body's core temperature greatly exceeds the normal range. I find by a preponderance of evidence that the primary cause of death was hyperthermia. I also believe that hyponatremia may have been a contributing factor to the Candidate of Concern's death, but there is insufficient evidence to reach that conclusion by a preponderance of the evidence.

2. DISCUSSION OF FACTS LEADING UP TO TIME OF DEATH

The Candidate of Concern was one of 11 SERE Specialist Candidates in the SSS Course. All were trained at the same time, in the same general area of JBSA-Camp Bullis, and under the same environmental conditions.

On the day of the mishap, the Candidates were to complete a solo navigation exercise and a solo living exercise. The Candidate of Concern successfully completed the solo navigation exercise.

At 1120 LT, SSS Course instructors drove the Candidate of Concern to his designated exercise location for the solo living exercise. At the mid-exercise check at 1420 LT, instructors toured the training location of each SERE Specialist candidate. During this check, instructors conducted a face-to-face visit with the Candidate of Concern to observe his performance. He was progressing well on his tasks and exhibited no signs of struggling or being distressed in any way.

Due to the hot weather (JBSA-Camp Bullis' local temperature had reached 101.8 °F at 1500 LT) and to the fact that another Candidate was treated for symptoms related to the heat, instructors dropped off an additional five-gallon water container for each of the Candidates at approximately 1615 LT. The Candidate of Concern verbally acknowledged receipt of the container, but did not have face-to-face contact with instructors because he was in a wooded area away from the road. When the water was dropped off, the Candidate of Concern thanked the instructors and responded that he was down to his last canteen.

At approximately 1615-1645 LT, a Candidate in an adjacent exercise area heard the “sound of something like a tree crashing” in the general direction of the Candidate of Concern’s exercise location. At approximately 1735 LT, instructors re-visited the Candidate of Concern’s training location for the solo living exercise’s final check. The instructors found the Candidate of Concern’s emergency vest hanging on a sapling near his ground signal work area, but they could not locate the Candidate of Concern. After a search of the immediate area, the SSS Flight Chief initiated lost student procedures.

At 1840 LT, the search team comprised of instructors and Candidates found the Candidate of Concern. He was a considerable distance and well out of line of sight from the location where his emergency vest was located. The Candidate of Concern was in a prone position on a brush pile and unconscious. There is no indication that the Candidate of Concern ever used his emergency gear to signal instructors or any other person. The brush pile was on the extreme edge of his assigned training area.

After moving the Candidate of Concern from the brush pile, the on-scene independent duty medical technician (IDMT) measured the Candidate of Concern’s core body temperature at 112 degrees Fahrenheit (°F). Instructors started cardiopulmonary resuscitation (CPR) and the IDMT used an automated external defibrillator. After requesting ambulance support, the instructors and IDMT transported the Candidate of Concern to a nearby helicopter landing zone. An air ambulance was dispatched, and after landing, air ambulance staff assessed the Candidate of Concern and relayed the information to their medical director. Based upon the information provided by the on-scene medical technicians, the medical director stated that further CPR was unnecessary and declared the Candidate of Concern deceased at 1909 LT.

3. POST-MORTEM MEDICAL EXAMINATION

The Candidate of Concern’s body was transported to a military morgue for a post-mortem examination. Findings from this medical examination indicated a potassium value of 17.7 mEq/L, above the normal range of 3.5-5.0; and a sodium value of 126 mEq/L, below the normal range of 135-145. Urine was found to be clear. The Candidate of Concern also exhibited edema, or swelling, of the brain.

4. DISCUSSION OF FACTS RELATED TO POST-MORTEM FINDINGS

Hyperthermia occurs when the body’s core temperature greatly exceeds the normal range. Within the broad category of hyperthermia are the sub-categories of heat exhaustion and heat stroke. Medical literature indicates that that heat stroke is characterized by a core body temperature greater than 104 °F. The IDMT recorded the Candidate of Concern’s core body temperature at 112 °F at the time of discovery. I was unable to determine from available evidence, including eyewitness testimony, physical evidence, and the post-mortem medical examination, what caused the Candidate of Concern’s core body temperature to become elevated, when it reached the recorded level, or how long his core body temperature may have been elevated.

Hyponatremia occurs when total body sodium is depleted or when excess water consumption

dilutes sodium in the blood, causing low plasma sodium. Hyponatremia occurring as a result of low sodium may present as an electrolyte imbalance. Profound hyponatremia occurs when the serum sodium level falls below 120 mEq/L. The post-mortem sodium level in the vitreous fluid of the Candidate of Concern was 126 mEq/L, less than the normal range but not profoundly low. Vitreous fluid electrolyte analysis can be used as a correlate to serum electrolyte analysis. Blood drawn at the time first aid treatment was performed is the best way to determine serum sodium level to ascertain whether the Candidate of Concern suffered from hyponatremia. Unfortunately, no testing was conducted, so it is impossible to make a conclusive determination of the serum sodium level. I was unable to determine from the available evidence what caused the Candidate of Concern's vitreous sodium level to fall below the normal range. In addition, a subsequent medical opinion dated 6 April 2017 issued by the Armed Forces Medical Examiner System as a secondary review of the autopsy results and medical findings, cast some doubt on the previously reported sodium level measured from post mortem vitreous fluid. The subsequent medical opinion points out that vitreous potassium increases and vitreous sodium decreases as natural decomposition occurs indicating that the low sodium level previously reported may have resulted from the natural decomposition process.

As relates to thermal stress injury, adequate hydration is required to facilitate sweating and convection cooling. However, the level of hydration is one of several factors impacting thermal stress injury and adequate hydration in and of itself does not preclude the onset of heat related injury. Instructors briefed water consumption guidelines to all Candidates and ensured they carried sufficient water. The evidence shows that Candidates carried 11 quarts of water, consisting of a five-quart Camelbak, two two-quart canteens and two one-quart canteens. Instructors monitored water consumption by Candidates by ensuring that canteens were filled at the beginning of each day, by periodically monitoring consumption throughout the day, and by checking for empty canteens at the end of each day. In my opinion, lack of water consumption or dehydration did not contribute to the elevated body temperature. This opinion is supported by the fact that urine was found to be clear in the post-mortem medical examination.

The data from the post-mortem findings raises questions as to whether excessive water consumption may have contributed to the cause of death. In my opinion, an electrolyte imbalance, which includes low plasma sodium or depleted body sodium, may have been a contributing factor in the cause of death. However, I cannot determine by a preponderance of evidence whether the electrolyte imbalance measured in the vitreous fluid post mortem is scientifically accurate due to the natural decomposition process. In addition, if the condition of electrolyte imbalance did exist, there is insufficient evidence for me to determine whether the condition may have been brought on by drinking too much water. I found no direct evidence to suggest the Candidate of Concern did not follow established water consumption guidelines. I found no evidence to indicate that the Candidate of Concern drank significantly more or less water than the other Candidates. Other metabolic factors, such as depletion of body fluid through perspiration and/or urination, may have contributed to the low sodium condition found in the post-mortem medical examination. However, I cannot determine by a preponderance of evidence whether those factors impacted the Candidate of Concern's electrolyte levels. It is my opinion that heat exposure was the key factor in the cause of death.

I also considered whether the swelling of the brain may have led to cognitive dysfunction, resulting

in the Candidate of Concern failing to recognize his body's reaction to the heat and failing to take corrective action. There was no evidence in the post-mortem examination that he hit or injured his head in falling on the brush pile. However, medical literature indicates that heat exposure and an electrolyte imbalance or a combination of these factors may have contributed to the swelling of the brain. Cognitive dysfunction could also explain why the Candidate of Concern was found on a brush pile located outside his immediate exercise location on the edge of his training area, having left his emergency vest hanging on a sapling near his ground signal. Leaving his vest and emergency gear, contrary to course requirements, would have been out of character for the Candidate of Concern, who was a top performer in the course. However, I believe that there is insufficient evidence to conclude by a preponderance of evidence that cognitive dysfunction was a contributing factor to the cause of death.

The Candidate of Concern's body was examined for toxic venom or antigens that may have indicated snake bite, bee sting, or some form of an allergic reaction. No such evidence was found.

The Candidate of Concern was found to have an abnormal heart rhythm in an electrocardiogram (ECG) evaluation prior to going to JBSA-Camp Bullis for field exercises during the SSS course. These results were reviewed by the USAF School of Aerospace Medicine and verified to be within acceptable limits, so the Candidate of Concern was cleared for field exercises. This interpretation was confirmed by other cardiovascular physicians post-mortem. First, the post-mortem examination of the Candidate of Concern's heart found no evidence of physical abnormality. Second, a post-mortem review of the ECG by cardiovascular physicians also confirmed that the subtle abnormalities in the ECG findings were not sufficiently outside the norm to necessitate further evaluation, and were more in line with the heart rhythms one might expect from a well-conditioned athlete. In consideration of the available information, including medical opinions of subject matter experts, I find no evidence to indicate that an abnormal heart rhythm represented by ECG findings contributed to the cause of death.

5. CONCLUSION

I concur with the determination of medical experts that the Candidate of Concern's death was heat-related and occurred under accidental circumstances. I find by a preponderance of evidence that the cause of this mishap was heat stroke, a condition clinically known as hyperthermia. I also believe that a medical condition known as hyponatremia, more specifically low plasma sodium or depleted body sodium, may have been a contributing factor to the Candidate of Concern's death, but there is insufficient evidence to reach that conclusion by a preponderance of the evidence. I have developed my opinion through careful consideration of witness statements, all available evidence, and available medical documentation.

12 May 2017

Date

JEFFREY K. FALLESEN, Colonel, USAF
President, Ground Accident Investigation Board

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