UNITED STATES AIR FORCE GROUND ACCIDENT INVESTIGATION BOARD REPORT

Tower Mishap Fatality
FOB Kalagush, Afghanistan

TYPE OF ACCIDENT: Class A Fatality

LOCATION: FOB Kalagush, Afghanistan

DATE OF ACCIDENT: 12 November 2010

BOARD PRESIDENT: COLONEL DIANE L. FLETCHER

CONDUCTED IAW Air Force Instruction 51-507

UNITED STATES AIR FORCE
GROUND ACCIDENT INVESTIGATION BOARD REPORT
CLASS A FATALITY
FOB KALAGUSH, AFGHANISTAN
12 NOVEMBER 2010

EXECUTIVE SUMMARY

On 12 November 2010, at approximately 1130 local time, a 107-foot tall telescoping steel tower with an attached camera that is used for force protection at Forward Operating Base (FOB) Kalagush, Afghanistan, collapsed and folded in half during routine maintenance training, striking an active duty Air Force member as well as a member of the Naval Reserves. Prior to the collapse, the scheduled operation had been proceeding smoothly with no apparent issues. The Air Force member ultimately died as a result of his injuries, and the Naval Reservist suffered serious injuries that will require ongoing care.

The two men were deployed to FOB Kalagush in support of Operation ENDURING FREEDOM, and they were assigned to the S-6 (Communications) section of the Provincial Reconstruction Team (PRT) for Nuristan Province. They were observing five other members of the PRT train on how to lower the tower, clean the tower's camera, and extend and secure the tower at the time of the mishap. A contractor known as a trainer/installer was assigned to provide comprehensive training on the camera and tower system for the newly arrived personnel at the PRT, and on this particular day, he was instructing the members on maintenance and tower operations. The trainees had lowered the tower and cleaned the camera, and they had extended the tower within approximately two feet of its full height when the collapse occurred.

The trainees and the trainer/installer immediately initiated first aid on the injured members and called medics to the scene. Both men were stabilized for helicopter transport to a nearby forward surgical team who administered advanced trauma and cardiac life support in order to stabilize them for further transport to the theater hospital at Bagram Air Base. Despite extraordinary medical efforts at all locations including the administration of multiple blood products, extensive diagnostic evaluation, and surgery, the Air Force member died as a result of the catastrophic injuries to his head at 2036 on 12 November 2010 at Bagram Air Base. The Navy member suffered multiple facial and skull fractures and serious injuries to his head and shoulder. The theater medical personnel treated and stabilized him for aeromedical evacuation to Landstuhl Regional Medical Center in Germany and then onto the United States. He was ultimately released from Bethesda Naval Hospital and will require ongoing care.

The tower and attached radio antenna, valued at $305,000 and $1,581, respectively, were destroyed during the collapse. No other property was damaged, and no one else was injured.

SUMMARY OF FACTS
TOWER COLLAPSE FATALITY
12 NOVEMBER 2010

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COMMONLY USED ACRONYMS & ABBREVIATION

AE	Aeromedical Evacuation	MAT	Mishap Alternate Trainee
AETC	Air Education and Training Command	MCT	Mishap Curb-side Trainee
		MFT	Mishap Front-side Trainee
AFB	Air Force Base	MRT	Mishap Road-side Trainee
AFI	Air Force Instruction	MV1	Mishap Victim 1
AMW	Air Mobility Wing	MV2	Mishap Victim 2
BAS	Battalion Aid Station	MTI	Mishap Trainer/Installer
BETT-C	Base Expeditionary Targeting Surveillance Systems Combined	MTT	Mishap Tower Operator Trainee
		OEF	Operation ENDURING FREEDOM
CT	Computed Axial Tomography		
DOD	Department of Defense	PRT	Provincial Reconstruction Team
DVD	Digital Video Disc	RAID	Rapid Aerostat Initial Deployment
EO/IR	Electro-optical/Infrared		
FOB	Forward Operating Base	RIP/TOA	Relief In Place/Transfer of Authority
FSR	Field Service Representative		
FST	Forward Surgical Team	RTO	Radio Telephone/Transmission Operator
HESCO	Hercules Engineering Solutions Consortium		
		SIB	Safety Investigation Board
HFACS	Human Factors Analysis and Classification System	TI	Trainer/Installer
		USAF	United States Air Force
ICU	Intensive Care Unit	USAFCENT	United States Air Forces Central
ISAF	International Security Assistance Force	USCENTCOM	United States Central Command
L	Local Time		

The above list was compiled from the Summary of Facts, the Index of Tabs, and witness testimony (Tab V).

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority.

On 24 November 2010, Lieutenant General Douglas H. Owens, Vice Commander Air Education and Training Command (AETC), appointed Colonel Diane L. Fletcher to conduct a ground accident investigation into the facts and circumstances of the ground mishap that occurred on 12 November 2010 resulting in the fatality of one active duty United States Air Force member and the serious injury of a Reserve member of the United States Navy at Forward Operating Base Kalagush, Nuristan Province, Afghanistan. The investigation convened at Altus Air Force Base (AFB), Oklahoma, from 15 December 2010 through 14 January 2011. Technical advisors were Colonel Mark S. Campbell (Medical), Major Lee F. Sanderson (Legal), Capt Owen J. Scott (Medical), Technical Sergeant Daniel A. Gomez (Communications), and Technical Sergeant Rose Marie A. Thames (Recorder). (Tab X-2, X-3, X-4, X-5, X-6, X-7, X-8, X-9)

b. Purpose.

The purpose of this investigation is to inquire into the facts surrounding this ground accident, to prepare a publicly-releasable report, and to gather and preserve all available evidence for use in litigation, claims, disciplinary actions, administrative proceedings, and for other purposes.

2. ACCIDENT SUMMARY

On 12 November 2010, Staff Sergeant Andrew S. Bubacz (Mishap Victim 1 - MV1), an active duty Air Force member, and Chief Petty Officer Thomas A. Bristoll, III (Mishap Victim 2 - MV2), a member of the Naval Reserves, were injured when a 107-foot Rapid Aerostat Initial Deployment (RAID) tower collapsed and struck the two individuals. MV1 died later that day due to the injuries he sustained, and MV2 was seriously injured. (Tabs G-2, G-3, R-3, R-8, R-17, R-20, R-52, R-76, R-79, R-93, R-99, and V-63, V-70)

Both men were deployed in support of Operation ENDURING FREEDOM (OEF) to Provincial Reconstruction Team (PRT) Nuristan, Forward Operating Base (FOB) Kalagush, Afghanistan. Five individuals were being trained on how to lower, raise, and operate the tower when the mishap occurred. The RAID tower utilizes various sensors to provide force protection as the first line of defense for the FOB, and the five individuals in training were assigned to monitor the sensors and maintain the tower. (Tabs G-2, G-3, CC-3, CC-4, CC-5, and V-58, V-71, V-74)

At approximately 1130 local time (L), MV1 and MV2 were struck by the payload portion of the tower as it collapsed, and MV1 appeared to be thrown into the tower's trailer, sustaining head and internal injuries. After initial medical care was rendered at the scene, they were immediately transported by helicopter to FOB Fenty near Jalalabad, Afghanistan, and were aggressively treated by the 745th Forward Surgical Team (FST) to stabilize them for further helicopter transport to the Craig Joint Theater Hospital at Bagram, Afghanistan. (Tabs R-3, R-8, R-17, R-20, R-52, R-76, R-93, R-99, and V-63)

MV1 died of catastrophic head injuries later the same day. MV2 was transported via aeromedical evacuation (AE) aircraft to Landstuhl Regional Medical Center, Germany, where he was further treated and stabilized prior to AE transport to the Bethesda Medical Center in Maryland. (Tab W-3, W-6)

The tower and attached radio antenna, valued at $305,000 and $1,581, respectively, were completely destroyed in the mishap. (Tab P-2)

3. BACKGROUND

Members involved in the mishap came from different services, but all were deployed in support of OEF to FOB Kalagush in Nuristan Province, Afghanistan. They were assigned to PRT Nuristan, which is part of the International Security Assistance Force (ISAF) for Afghanistan. MV1, who was fatally injured during the mishap, was permanently stationed at Altus AFB, Oklahoma, as a member of the 97th Communications Squadron. He worked as a member of the communications helpdesk for the PRT while deployed to Afghanistan. MV2 is a Naval Reservist assigned to the Naval Reserve Center at Camp Mabry, Texas. While deployed to FOB Kalagush, he served as the Non-Commissioned Officer in Charge of the S-6 section (Communications) and supervised all of the members involved in the mishap. (Tabs G-2, G-3, V-72, and CC-3)

Department of Defense (DOD) contractors are responsible for maintaining the system involved in the mishap as well as training servicemembers on how to use the system. An overview of the relevant military and contractor organizations follows. (Tabs R-47, R-120, BB-21, BB-22, and CC-4)

a. Air Education and Training Command.

AETC's mission is to "develop America's Airmen today…for tomorrow" with the vision to deliver unrivaled air, space and cyberspace education and training. AETC is located at Randolph AFB near San Antonio, Texas, and the command is composed of more than 85,000 personnel. It is responsible for recruiting, training, and educating Air Force personnel by providing Basic Military Training, Technical Training, Flying Training, Expeditionary Training, and Professional Military Education. The command oversees the Air Force Recruiting Service, two Numbered Air Forces, and Air University. (Tab BB-2, BB-3, BB-4, BB-5, BB-6, BB-7)

b. 97th Air Mobility Wing (97 AMW).

AETC's 97th Air Mobility Wing is based at Altus AFB in southwestern Oklahoma, and its primary mission is to train airlift and air refueling crews in the C-17 and KC-135 aircraft. The Wing also deploys members to support worldwide contingency operations such as Operations ENDURING FREEDOM, NOBLE EAGLE, and IRAQI FREEDOM, and it has supported relief operations following hurricanes and earthquakes. Its mission statement, "Forging combat mobility forces…deploying airman warriors," summarizes those elements. (Tab BB-8, BB-9, BB-10)

c. 97th Communications Squadron.

The 97th Communications Squadron supports the 97 AMW by maintaining all airfield radar systems, base meteorological and navigational control systems, ground-to-air and land mobile radios as well as local area network operations and infrastructure, long-haul communications circuits, and computer equipment control. Its vision is to provide outstanding support as the single point of contact for focused communications and information technology planning, implementation, maintenance and support. The unit's motto is "In Omnia Paratus," or "Prepared for All Things." (Tab BB-11)

d. United States Air Forces Central (USAFCENT).

United States Air Forces Central is the air component of United States Central Command (USCENTCOM), and it is responsible for air operations. Its mission is to project decisive air and space power for USCENTCOM and America. All Airmen deployed to southwest Asia are administratively assigned to USAFCENT. These Airmen conduct missions of close air support; air refueling; intelligence, surveillance, and reconnaissance; airlift; distinguished visitor escort; training; and sitting alert. Airmen are now being used in nontraditional ways such as convoy operations, protecting infrastructure, capturing high value targets, and humanitarian efforts in rebuilding bridges, roads, and schools, working closely with their counterparts in the Middle East to ensure stability in the region. (Tab BB-13, BB-14)

e. International Security Assistance Force for Afghanistan (ISAF).

The multinational International Security Assistance Force for Afghanistan conducts operations to reduce the capability and will of the insurgency, support the growth in capacity and capability of the Afghan National Security Forces, and facilitate improvements in governance and socio-economic development. It conducts security and stability operations throughout the country alongside the Afghan National Security Forces and helps develop the Afghan National Army through mentoring, training, and equipping. ISAF provides support for reconstruction and development efforts and humanitarian assistance efforts conducted by the Afghan government, international organizations, and non-governmental organizations. Through provincial reconstruction teams, ISAF helps local authorities strengthen institutions required to fully establish good governance and rule of law and to promote human rights. (Tab BB-15)

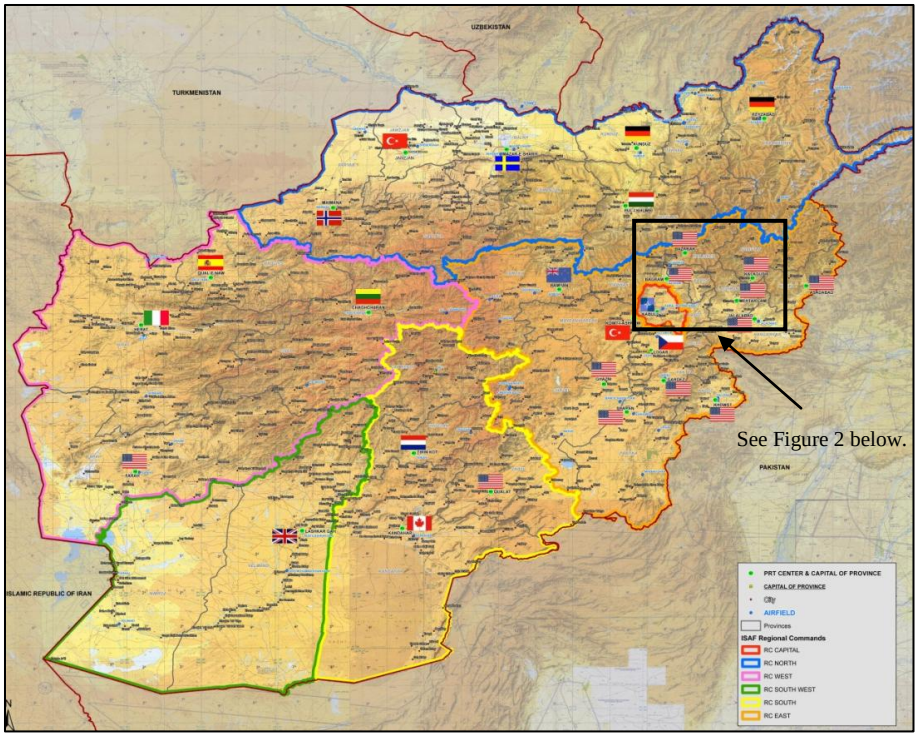

Figure 1. Map of Afghanistan Showing ISAF Components

f. Provincial Reconstruction Team (PRT) Nuristan.

ISAF's Provincial Reconstruction Team Nuristan, in partnership with the Government of the Islamic Republic of Afghanistan and the Afghan people, and in close coordination with joint, interagency, intergovernmental, and multinational partners, conducts combined action in stability operations in the Task Force Bastogne assigned Area of Operations, building capacity in Afghan institutions in order to establish the legitimacy and credibility of the Afghan Government and restore a stable society. It accomplishes the mission by meeting with local leaders and overseeing construction projects by local contractors throughout the province. The PRT is located on FOB Kalagush, approximately 150 kilometers from Afghanistan's capital, Kabul. (Tabs BB-23 and CC-3)

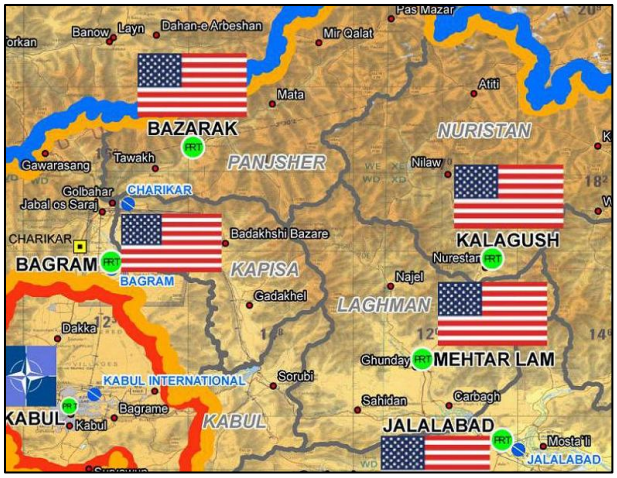

Figure 2. Map Showing Kalagush, Jalalabad, and Bagram.

g. ManTech International Corporation (ManTech).

ManTech International Corporation is the DOD contractor charged with instructing servicemembers on how to raise, lower, and perform basic maintenance on the RAID Tower system. Typically units contact the various ManTech field offices in the applicable theater of operations to schedule training when new units and personnel arrive for their deployment. The field offices dispatch a trainer-installer (TI) who will go to the base and train a minimum of five personnel to perform operations and basic maintenance on the tower and camera system. This training typically takes five days and consists of classroom sessions, demonstration, and hands on training. ManTech also employs the field service representatives (FSRs) that perform major maintenance on the RAID system. (Tabs R-47, R-120, BB-21, BB-22, and CC-4)

h. Rapid Aerostat Initial Deployment Tower System.

Raytheon's RAID system provides persistent surveillance for the user through a combination of sensor suites placed on an elevated tower, mast, or aerostat mobile platform. The sensors employed, called the Star SAFIRE III system, include electro-optical infrared (EO/IR) camera sensors with laser range finding capability. They support a variety of missions from force protection to border surveillance. The RAID tower system includes the sensors mentioned previously mounted atop a 107-foot telescoping steel lattice tower anchored by 15 galvanized aircraft "guy" cables. Typically the tower is anchored by connecting the guy cables to three blocks of concrete that are 120 degrees apart. The system also includes map overlay software, a generator, and a command shelter. (Tabs V-51, V-52, V-53, AA-3, AA-4, and BB-15, BB-16, BB-17, BB-18)

Figure 3. RAID Tower.

The tower, which is manufactured by US Tower Corporation (model number RMTU3107MDPL), has six heavy-duty steel telescoping sections mounted on a dual-axle mobile trailer. It is tilted to the vertical position with two hydraulic cylinders and then extended vertically with an electric winch. All sections of the tower telescope simultaneously from the base. The tower is supported by four heavy outriggers with leveling jacks and stabilized by the guy cables. It can support a payload of 650 pounds, has a transportable weight of 10,500 pounds, can be erected in wind speeds up to 30 miles per hour, and can sustain winds of up to 90 miles per hour when anchored. The tower deployed at FOB Kalagush, Tower 89, was installed there in May of 2007. Its payload included the sensor suite previously mentioned and weighed approximately 200 pounds. (Tabs V-52 and BB-16, BB-17, BB-18, BB-19)

The tower employs a color-coding system to ensure the cables are connected to the proper anchor points. Specifically, the shackles on each side of the tower are color-coded black, silver, red, and white (each side has two white shackles). The guy cables are connected to the shackles with hooks, which are also color-coded black, silver, red, and white. The cables themselves are not painted even though they are referred to by the color of the shackle to which they connect, and they are attached to the anchor points by two shackle plates on each side. One shackle plate connects the black, silver, and red cables to the anchor points, and the other connects the two white cables to the anchor points. (Tab AA-7, AA-8, AA-9, AA-10, AA-11, AA-12, AA-13, AA-14)

Figure 4. RAID Tower Before Tilting Showing Legs Out and Jacks Extended.

Figure 5. Close-up View of Color-coded Shackles and Hooks. From left to right, the two white cables appear first, followed by the red, the silver, and the black.

The procedure for erecting the tower is a multi-step process. First, the tower trailer is leveled using the attached jacks. Once leveled, the tower is tilted to the upright position using

the trailer's hydraulic system. The tower is then "plumbed" to ensure that it is completely vertical. (Tab V-53, V-54, V-128, V-129, V-130)

Next, the lowest level cables of the five on each side, the black color-coded guy cables, are connected to the anchors on each of the three sides and tensioned equivalently to approximately 550 pounds. The tower is then fully extended using the winch, and locked into place with the brakes, which are steel plates that support the full weight of the tower when engaged. The remaining cables are connected and tensioned on each side in order securing the tower in place. The silver color-coded cables are connected first followed by the red color-coded cables. Finally, the two white color-coded cables (each side has two white color-coded cables) are connected. (Tab V-54, V-130, V-131, V-132 and AA-8, AA-10, AA-11, AA-12, AA-13, AA-14)

During the extension process, one person operates the tower controls, and one person is assigned to each of the three anchor points. (Tabs R-49 and V-53, V-54, V-55)

Figure 6. Anchor Point Showing Come-alongs and Guy Cables.

The front-side anchor is directly in front of the trailer. The curb-side anchor is to the right rear of the trailer, and the road-side anchor is to the left rear of the trailer, as if the trailer is being towed on the road. Each person on the anchors is responsible for ensuring their guy cables do not get caught on anything and for watching the tower as it goes up. (Tabs V-55, V-59, V-60, V-61 V-128, V-132 and AA-12, AA-13)

The guy cables are connected to the anchor points by inserting one of the guy cable's "swedge balls" into what is called a keeper. The keeper is part of a ratchet system that is connected by a shorter "come-along" cable to the anchor. The ratchets are used to remove the slack in the cables and ultimately apply roughly 550 pounds of tension on each cable to ensure the tower is as vertically straight as possible. (Tabs V-132 and AA-13, AA-14)

Figure 7. Ball and Keeper.

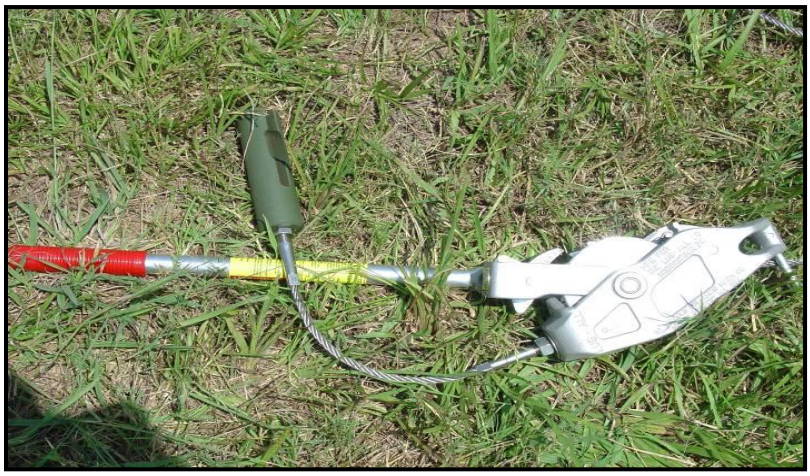

Figure 8. Come-along – Ratchet Assembly.

The person operating the tower controls monitors the straightness of the tower and directs how much slack to remove. This is typically done by telling each member to tighten their ratchet one or more "clicks" (meaning one ratchet cycle) which applies tension to the cables. (Tab V-54, V-128)

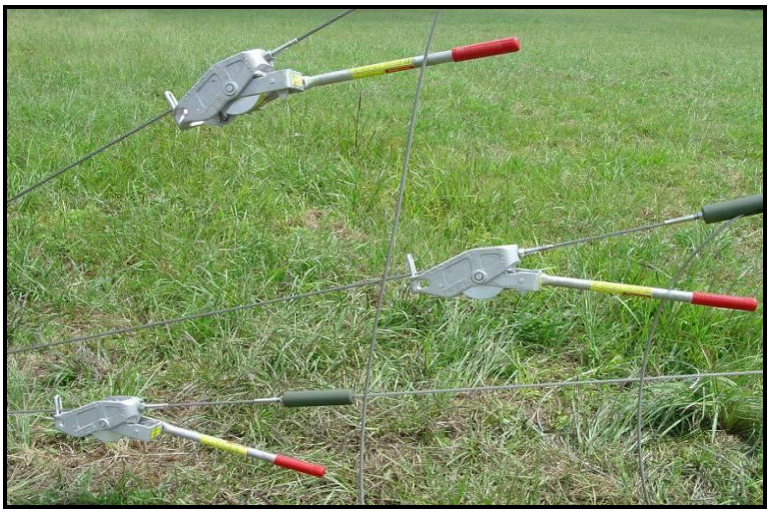

Figure 9. Tensioned Come-along – Ratchet Assemblies with Attached Guy Cables.

The tension in the cables is then checked with a tensiometer to ensure equivalent tension is on each cable. (Tabs V-130, V-131, V-132 and AA-13, AA-14)

i. The Mishap Fatality.

MV1 enlisted in the United States Air Force on 27 September 2005. After completion of Basic Military Training, he completed technical school at Keesler AFB, Mississippi, where he was assigned to the 336th Training Squadron. He then moved to Altus AFB, Oklahoma, in February 2006, and was assigned to the 97 CS. During his time at Altus, MV1 worked as a help desk technician, 97 AMW command section client support administrator, and in the 97 CS official mail center. His supervisors described him as being positive, persistent, down to earth, and a hard worker. In his spare time, he was an avid student and was working toward a career in the medical field. He earned Community College of the Air Force degrees in both biology and information management. He also earned an Associate's degree in biology from Western Oklahoma State College. He was selected for promotion to the rank of Senior Airman below the zone in 2008, meaning that he was promoted ahead of schedule, and was posthumously promoted to Staff Sergeant in November 2010. He was a recipient of the Air Force Achievement Medal, the National Defense Service Medal, and the Global War on Terrorism Service Medal. (Tab BB-24, BB-26)

4. SEQUENCE OF EVENTS

At approximately 0900L on 12 November 2010, five members of PRT Nuristan met at the base of RAID Tower 89 for hands-on training and a demonstration of how to extend and lower the tower and perform basic sensor camera cleaning. The five members had recently arrived at FOB Kalagush, Afghanistan, and had not received formal training on tower operations from DOD's contracted trainers although they had assisted the outgoing team lower and extend the tower. The individuals being trained included Mishap Front Trainee (MFT), Mishap Curb-side Trainee (MCT), Mishap Tower Operator Trainee (MTT), Mishap Road-side Trainee (MRT), and Mishap Alternate Trainee (MAT). The Mishap Trainer/Installer (MTI) was a contractor from ManTech Corporation, who was sent from ManTech's Jalalabad office to train the new personnel. The trainees were going to raise and lower the tower multiple times, and MTI intended to have the trainees perform a variety of roles during the day's training. MV1, who normally worked at the PRT's computer helpdesk, met the group at the onset of training that morning but was not part of the official training team, nor was he trained on tower operations. He wanted to repay a favor to one of the trainees by helping them during the training session. MV2 would later join the group to observe the training since he was the supervisor of the trainees. MAT participated in the training initially but was called away prior to the collapse to perform other duties. (Tabs R-2, R-6, R-10, R-15, R-19, R-20, R-21, R-22, R-24, R-29, R-49, R-64, R-92, R-105, R-107, R-108, V-7, V-9, V-27, V-36, V-58, V-62, V-74, V-90, V-110, V-120, and CC-4, CC-5)

Prior to approaching the tower, the trainees were told to bring safety goggles and gloves, but no formal safety briefing was given by the TI. MTI began the training with an overview of the tower's operations controls and functions of the various tower components. Next, he assigned specific roles and responsibilities to each member. MTT, MFT, MRT, and MAT were initially assigned to manage the cables at the three anchor points, and MCT was assigned to man the tower's winch control, which is the motor that physically extends and lowers the tower. (MCT and MTT would later switch positions during the extension of the tower to become familiar with the different roles– initially MCT manned the winch control but during the extension of the tower was at the curb-side, and MTT initially manned the curb-side but during the extension process was manning the winch.) MV1 was assigned to help out as needed. (Tabs R-2, R-7, R-13, R-15, R-16, R-18, R-20, R-22, R-23, R-24, R-62, R-65, R-66, R-69, R-70, R-88, R-89, R-91, R-92, R-108, R-110, and V-7, V-8, V-9, V-27, V-29, V-31, V-35, V-56, V-59, V-60, V-90, V-91, V-92, V-93, V-94, V-110, V-111)

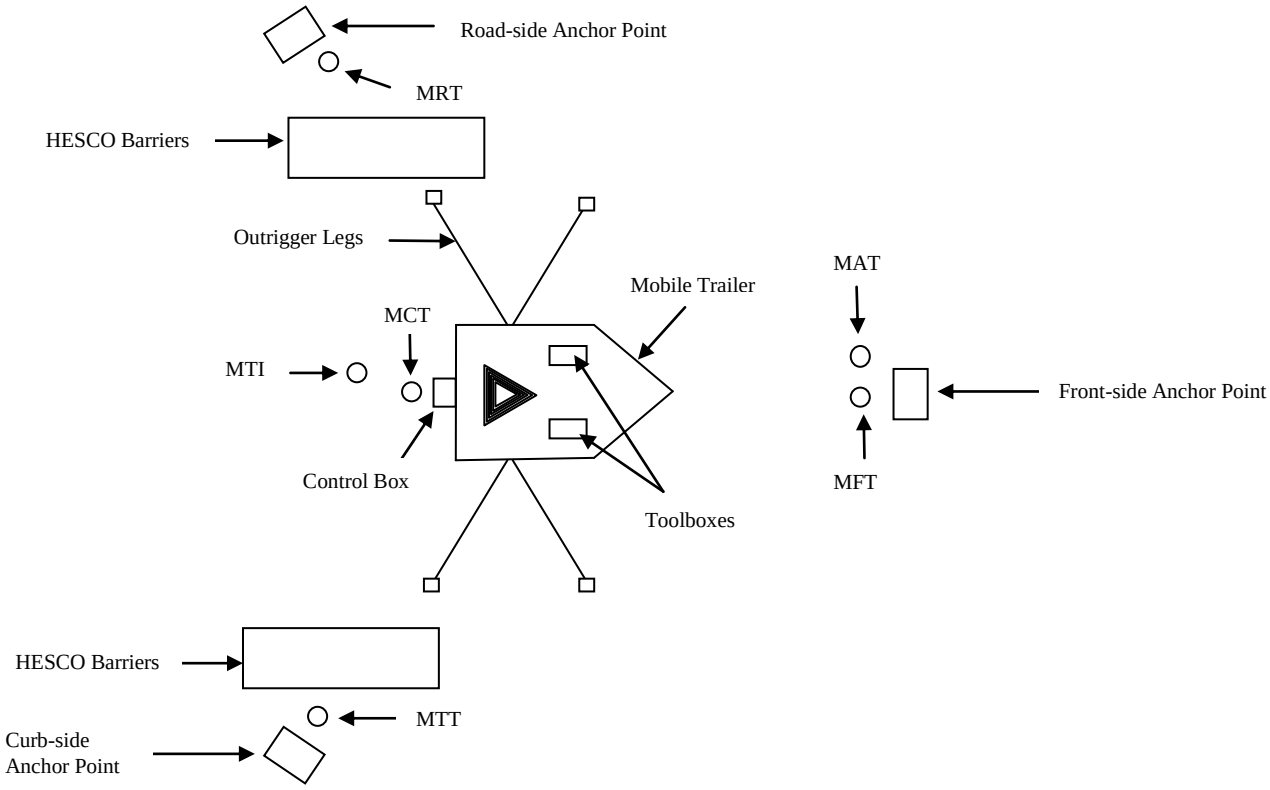

Figure 10. Schematic Diagram Showing Approximate Location of Personnel.

MTI walked the trainees through the process to lower the tower, which involved each individual on the anchor points in unison releasing the tension on each cable, starting with the top two cables and working down. After all cables were released, the tower was lowered uneventfully into the retracted vertical position. (Tabs R-15, R-16, R-20, R-66, R-67, R-68, R-69, R-91, R-92, R-108, R-109, R-110 and V-8, V-9, V-10, V-27, V-29, V-90, V-111)

The trainees then lowered the tower from the upright position into its horizontal position on the trailer. MTI instructed the trainees on how to clean the camera sensor and visually inspect the unit. MTI then told the trainees how to level the tower trailer. MV1 assisted the trainees in ensuring that it was level. (Tabs R-16, R-69, R-92, R-110 and V-8, V-9, V-10, V-27, V-28, V-30, V-31, V-90, V-94, V-112)

The trainees then began the process of extending the tower with MTT manning the winch controls and MFT, MCT, and MRT manning the cables. (This is the point where MCT and MTT switched positions as stated on page 12.) MAT was called away at about this time to perform air operations duties. As the tower is being extended, each person manning the cables should maintain positive control of their five cables, that is have sight of the cables and keep the cables in their hands. They should also ensure that the cables do not get caught on anything and observe the tower for any abnormal movement. The individual manning the tower controls

should be controlling the operation, communicating with and supervising the team. In addition, that individual is responsible for monitoring the tower and ensuring it goes up smoothly and does not lean excessively. (Tabs R-10, R-12, R-16, R-18, R-20, R-22, R-23, R-51, R-56, R-71, R-72, R-92, R-108, V-32, V-54, V-55, V-60, V-61, V-90, V-91, V-92, V-93, V-120, and CC-5)

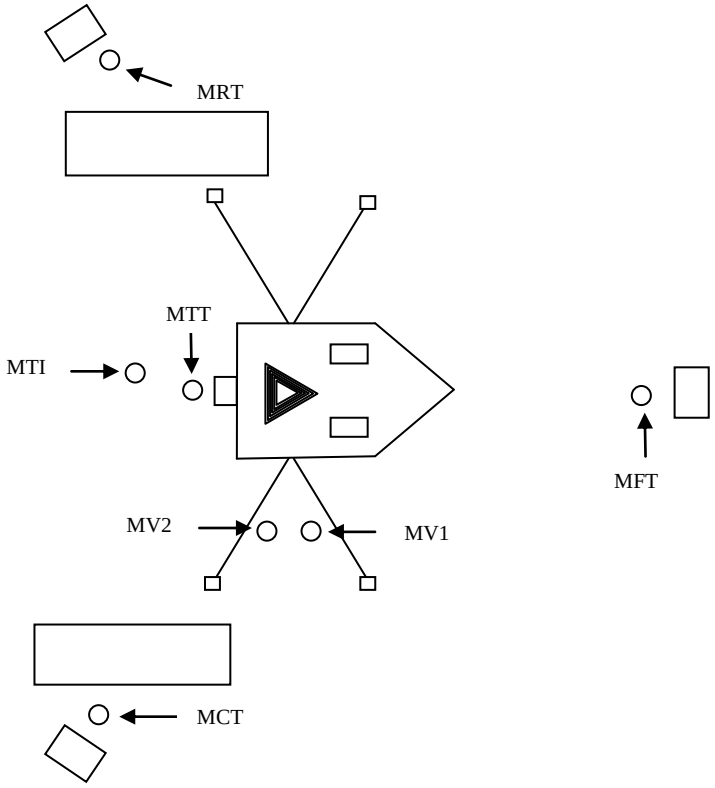

Figure 11. Approximate Location of Personnel When Raising Tower.

At an undetermined point during the extension process, MV2 approached the tower and stood in between the legs on the curb-side of the tower next to MV1. He began a conversation with MV1 about a personal family issue. Several trainees were involved in the conversation at various times, as was MTI. They were joking with MV2 and trying to cheer him up about the situation. (Tabs R-7, R-17, R-20, R-32, R-51, R-72, R-93, R-99, R-105, and V-11, V-12, V-35, V-61, V-62, V-90, V-95, V-99)

During the extension process, one of MCT's cables got caught on something on the tower (the exact cable and entanglement could not be determined), and either MV1 or MTI appeared to have fixed the problem. MCT at some point before the tower was fully extended began preparing the come-alongs at his anchor point. He could not see the control operator or those at the base of the tower due to the location of protective barriers, referred to as HESCO (Hercules Engineering Solutions Consortium) barriers (see Figure 11 below), between the anchor point and the tower. MFT was focused on his cables and climbed onto the front of the trailer to ensure that they did not become tangled. MTT was focused on the base of the tower watching the brakes, preparing to engage them. MRT had prepared his come-alongs and was sitting on his anchor smoking and awaiting instructions as the tower was extending. (Tabs R-3, R-7, R-10, R-12, R-

16, R-17, R-30, R-34, R-44, R-51, R-54, R-72, R-74, R-75, R-80, R-92, R-93, R-111, R-112 and V-11, V-12, V-14, V-16, V-19, V-33, V-34, V-42, V-93, V-97, V-113, V-114)

Figure 12. Protective Barriers in Between MCT's Anchor Point and the Tower.

Figure 13. MCT's Anchor Point.

When the tower was approximately two feet from being fully extended, MFT felt the tower shake, heard a noise, and looked up at the tower and saw it shaking violently. He yelled, "Tower!" and jumped down from the trailer. He saw MV1 in its path and yelled, "Get down!" At about the same time, MRT yelled, and MCT yelled, "Tower!" before taking cover. MTT ducked at the base of the tower. The fourth section of the tower then collapsed towards the curb-side, and the upper half swung down in an arc with the payload section striking both MV1 and MV2. MV1 and MV2 appeared to hear the warnings shouted by the trainees but did not have adequate time to get out of the way. MFT saw MV1 being struck by the tower payload and the impact throw him head-first into the trailer. (Tabs R-3, R-8, R-12, R-17, R-20, R-52, R-76, R-77, R-79, R-93, R-99, R-101, R-112, and V-13, V-14, V-27, V-37, V-38, V-39, V-42, V-63, V-96, V-115, V-116)

Immediately after the tower collapsed, MTI rushed over to MCT's anchor point because the tower fell in his direction, and he asked MCT what happened. MTI recalled MCT stating, "I connected an upper cable." (MCT recalled connecting a cable at some point during the training, and he thought it was the bottom cable. However, the timing of this cable connection could not be determined.) Then, MTI heard one of the trainees yell, "Chief!" and realized at this point that personnel were injured and went to check on them. (Tabs R-20, R-33, R-34, R-80, and V-13, V-38, V-64, V-65)

MV1 and MV2 were lying at the base of the tower on the curb-side. MV2 was on his back underneath the back outrigger leg, and MV1 was lying next to the trailer tires partially on his back and side. (Tabs R-8, R-12, R-56, R-107, and V-14, V-39, V-40, V-65, V-96, V-97, V-117)

Figure 14. The Collapsed Tower (View from the Curb-side).

MRT and MTT began to render first aid to MV1 and MV2, and medics were called to the scene by MFT over his radio. When the medics arrived, they took control of the medical care of the injured individuals. The medics assessed and stabilized MV1 and MV2 and transported them on all terrain vehicles to the awaiting commuter helicopter that had just landed. The attending physician at FOB Kalagush examined both MV1 and MV2 and contacted the trauma surgeon at FOB Fenty. The two physicians determined it best to rapidly transport MV1 and MV2 for the 15-minute flight to FOB Fenty near Jalalabad, Afghanistan, to further treat and stabilize them rather than fly directly to Bagram, which was a 40-minute flight. Six medical technicians accompanied them on the flight. MV1 required intermittent assisted ventilation support during the flight. (Tab R-8, R-12, R-52, R-77, R-102, R-103, V-39, V-40, V-97, V-116, and W-2, W-4, W-5)

At FOB Fenty, the FST gave MV1 aggressive medical treatment in order to stabilize him for transport to the hospital at Bagram Air Base. The treatment included cardio-pulmonary resuscitation (required off and on for approximately an hour and a half), advanced trauma and cardiac life support, surgical airway intervention, and transfusion of multiple units of blood and blood products to treat low blood pressures and bleeding. (Tab W-2, W-4, W-5)

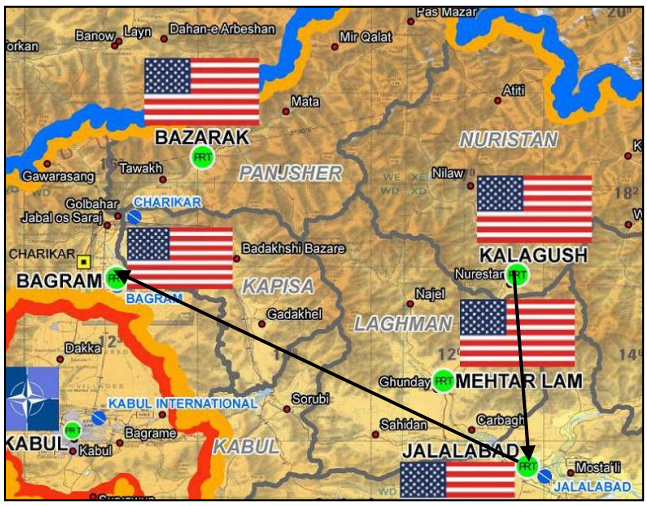

Figure 15. Transport Route for Injured Personnel.

Both individuals were transported to the theater hospital at Bagram Air Base, arriving at 1715. MV1 was immediately assessed and taken for exploratory surgery to find the source of his bleeding, which potentially was the most immediate threat to his life. He was stabilized during surgery, and afterwards, he was taken for a CT scan to evaluate his head injuries. He was taken to the intensive care unit (ICU) at 1815. Upon reviewing the results of the CT scan, the attending neurosurgeon, trauma surgeons, and general surgeon discovered that his head injuries were catastrophic and unrecoverable. The physicians discussed MV1's critical condition, in light of these CT results, and verified that further medical care could not save MV1. They then provided comfort measures, including medications for him, and ceased resuscitation efforts. He died as a result of his injuries at 2036 on 12 November 2010. Numerous members of the 455th Air Base Wing were at his side in the ICU including the Wing Commander, Wing Chaplain, Medical Group Commander, Medical Operations Squadron Commander, and Chief of Medical Staff as well as the physicians, nurses, and medical technicians attending to him. He was never alone, nor was he in pain during this time in the ICU. (Tabs W-3, W-4, W-5, W-8, and CC-10)

MV2 was stabilized and aeromedically evacuated to the Landstuhl Regional Military Center in Germany and then onto Bethesda Naval Hospital for further treatment. His injuries will require ongoing care. (Tabs V-80, V-81 and W-6, W-7, W-10)

5. MAINTENANCE

a. Forms Documentation.

Maintenance records for Tower 89 indicate a number of hardware and software issues occurred between 15 May 2007 and 12 November 2010. The majority of these issues were related to the EO/IR camera. No discrepancies were noted concerning the guy cables, pulley system or the physical condition of the tower. A discrepancy with the power supply to the tower motor was discovered, but was not a failure of the motor itself. A discrepancy with one of the hydraulic brake tubes was noted, but records do not state what led FSRs to replace this part. Historical records indicate that there were no recurring issues with the mechanical operation of this tower. The noted discrepancies would not have contributed to the collapse of Tower 89. (Tab U-2, U-6, U-7, U-8, U-9)

b. Maintenance Procedures.

Major maintenance for the MTU 3107 tower is performed by FSRs employed by the ManTech Corporation. Minor maintenance such as lens cleaning and guy wire checks are performed by Radio Tower Operators (RTOs), personnel located on station and trained by RAID tower Trainer/Installers (TIs). Technical Manual H426267 outlines required periodic checks of Tower 89, but no routine maintenance log was discovered. Personnel on site took the tower down weekly to clean the lens. No evidence suggested that maintenance procedures contributed to the collapse of Tower 89. (Tabs R-47, R-62, R-119, and CC-3)

c. Unscheduled Maintenance.

Unscheduled maintenance is performed by FSRs. Documentation from 15 May 2007 until the collapse of Tower 89 revealed that the unscheduled maintenance performed largely consisted of power supply and communications equipment replacement. Historical records indicate that there were no recurring issues with the mechanical operation of the RAID tower, guy cables, pulley system, or hydraulics. The noted discrepancies would not have contributed to the collapse of Tower 89. (Tab U-6, U-7, U-8, U-9)

d. Maintenance Personnel and Supervision.

Maintenance on Tower 89 was completed by various FSRs employed by ManTech Corporation. Records were not present to indicate training status of maintenance personnel; however, no evidence suggested that maintenance personnel or supervision contributed to the collapse of Tower 89. (Tab R-47)

6. EQUIPMENT, VEHICLES, FACILITIES, AND SYSTEMS

On the day of the mishap, Tower 89 and its related equipment appeared to be in proper working condition. The tower was undamaged and nothing unusual was noted. This tower had been lowered and raised the previous week during RIP/TOA (relief in place/transfer of authority) operations with the previous PRT personnel, and no issues were reported. (Tab R-7, R-20, R-62, R-73, R-88, R-97).

The collapse occurred when the fourth section of the tower collapsed to the curb-side and ultimately failed structurally. This occurred as the tower was nearly fully extended. (Tab R-3, R-8, R-20, and S-3)

Figure 16. Close-up of Failure Point.

The collapse resulted in irreparable damage to Tower 89 as well as the communications antenna attached to it valued at $305,000 and $1,581, respectively. The tower was removed from service and cut apart for storage and shipment. A replacement MTU 3107 tower was installed at Kalagush in early December 2010. (Tabs P-2, U-9, and CC-3)

Figure 17. Disassembled Tower Post-Accident.

Figure 18. The Top Four Tower Sections Post-Mishap.

7. ENVIRONMENTAL CONDITIONS

a. Forecast Weather and Observed Weather.

The forecasted and observed weather for the morning of the mishap included clear skies with a temperature ranging from 20 – 22 degrees Celsius (68 – 72 degrees Fahrenheit) with light winds ranging from 5 – 6 knots (6 – 7 miles per hour). (Tab F-2)

b. Other Environmental Conditions.

No other environmental conditions were relevant to the mishap.

c. Warnings, Restrictions and Procedures.

The MTU 3107 tower can be extended and lowered in wind speeds up to 30 miles per hour. The winds observed on the day of the mishap were well below that limit. (Tabs F-2 and BB-18)

8. PERSONNEL QUALIFICATIONS

a. Mishap Trainer.

MTI was the trainer/installer (TI) on site during the incident. MTI was trained as a TI in March-May 2010 at Redstone Arsenal, Alabama. He successfully completed all tasks concerning operation of the 107-foot tower. MTI completed the Radio Tower Operator written test with a score of 90% on 25 March 2010. MTI was trained on the operation of the 107-foot tower, 80-foot tower, and aerostat blimp system. Upon completion of his training, MTI was assigned to Iraq where he operated as a RAID TI on the 107-foot tower, 80-foot tower, and Aerostat blimp system from June 2010 to November 2010. He completed six missions on the 107-foot tower, training 57 students in that time. During these missions, the trainees would typically lower and extend the tower two to three times. MTI also completed three missions on the BETT-C (Base Expeditionary Targeting Surveillance Systems-Combined) 80-foot tower, training 26 students, and two missions on the Aerostat blimp system, training 24 students. MTI transferred to Afghanistan at the beginning of November 2010. (Tabs G-4, G-5, G-6, G-19, R-31, R-115, R-116, R-117, R-121, V-51, and CC-5)

b. Mishap Trainees.

The students working on the tower that day received 8-12 hours of training prior to the day of the mishap. They learned how to use the computer software as well as the digital video disc recorder. In addition, they also received training on the use of the EO/IR sensor and the laser range finder. This training was conducted from the 8th to the 12th of November 2010. Due to their varied schedules, MTI conducted training on a one-on-one basis when necessary with the RTOs. These sessions typically lasted between 2-3 hours each. (Tabs R-12, R-62, R-63, R-89, R-107, and V-57, V-86, V-87)

Some trainees had previously experienced the RAID tower being lowered and extended during RIP/TOA with previous PRT RTOs. During that operation, the members were primarily assisting the previous RTOs to gain some familiarity with the RAID tower lowering and extending process. Prior to 12 November 2010, the trainees had not received any formal training on the 107-foot tower extending and lowering procedures. (Tabs R-3, R-6, R-12, R-62, R-63, R-88, R-90, and V-5, V-17, V-18, V-25, V-43, V-61, V-62, V-76, V-86, V-100, V-108)

c. Medical Personnel.

The Hospital Corpsmen and Medical Technicians were fully trained and competent to perform first aid including stabilizing life-threatening injuries in the field. The technicians at forward positioned locations all attended several trauma courses at Fort Sam Houston in San Antonio, Texas, prior to their deployment where they were taught emergency trauma care in a classroom setting using simulation and live models. (Tab W-4, W-5, and CC-2)

The nurses who cared for MV1 and MV2 were all skilled medical care providers who held current nursing licenses. The nurses attended several trauma courses at Fort Sam Houston

in San Antonio, Texas, prior to their deployment. These courses consisted of emergency trauma care in a classroom setting using simulation and live models. (Tab W-4, W-5, and CC-2)

The physicians at each location within the Afghanistan Theater were fully credentialed to provide the most up-to-date medical care to MV1 and MV2. The physicians who cared for them included an Internal Medicine physician specializing in Infectious Disease, three Trauma Surgeons, one General Surgeon, two Emergency Medicine physicians, one Neurosurgeon, one Anesthesiologist, one Intensive Care Specialist, one Radiologist, and one Certified Registered Nurse Anesthetist. (Tabs W-3, W-4, W-5, and CC-2)

9. MEDICAL

a. Medical Records.

The available medical records of MTI, the trainees, MV1, and MV2 were reviewed for any issues that may be pertinent to the mishap, and no medical issues would have contributed to the mishap. (Tabs V-103, V-104, V-122, V-123, and W-10)

b. Injuries and Cause of Death.

MV1 sustained fatal injuries from this mishap. MV1's injuries are thought to be caused by being struck by Tower 89 as it collapsed and then being thrown into the tower trailer from the force of the impact to his body. Specific injuries for MV1 included a large right-sided skull fracture involving multiple bones resulting in severe brain trauma and extensive bleeding. MV1 had severe bruising on his right upper chest and right shoulder. Also, MV1 had right and left flank bruising as well as some blood in the abdomen. (Tab W-3, W-4, W-5, W-6, W-7)

MV2 sustained non-fatal injuries in this mishap. The following summarizes the injuries incurred: severe traumatic brain injury, right-sided skull fracture, small right brain bleed, multiple right-sided facial and jaw fractures, and left brain bruising. Also, MV2 sustained multiple cuts on the right-side of his head and a right shoulder/collarbone separation. (Tab W-6, W-7)

c. Toxicology.

Toxicology was not relevant to this mishap. (Tab W-6, W-7)

d. Lifestyle.

No lifestyle factors were found to be relevant to the mishap. (Tab V-20, V-21, V-45, V-46, V-66, V-67, V-78, V-79, V-80, V-102, V-103, V-104, V-121, V-122, V-123)

10. OPERATIONS AND SUPERVISION

a. Operations.

The mishap occurred during a hands-on training exercise that demonstrated how to lower and extend the RAID 107-foot tower. The personnel involved in the training were scheduled to extend and lower the tower multiple times on the day of the mishap, and there were no identified pressures to hasten the operation. Operations tempo was not relevant to the mishap. (Tabs R-107 and V-17, V-43, V-57, V-100, V-119)

b. Supervision.

The responsibility and overall supervision of the tower training exercise belongs to the TI. The TI is responsible for ensuring the tower is extended and lowered in accordance with the applicable manuals as well as ensuring the operation was conducted safely. Several operational deviations from the manual were noted (see following paragraphs), and the layout of the site prevented line of sight supervision of all personnel. Specifically, the trainees at the curb-side and road-side anchor points were not visible to MTI during multiple parts of the tower training. Multiple obstructions were in between the base of the tower and the curb-side and road-side anchors. The trainee manning the front-side anchor climbed onto the trailer unbeknownst to MTI, and the trainee manning the road-side anchor spent the entire time the tower was extending sitting on his anchor waiting for instructions. The trainee manning the curb-side anchor connected a cable prior to being given instructions to do so. The obstructions on site appeared to inhibit proper supervision of the trainees. (Tabs R-23, R-33, R-34, R-48, R-93, V-13, V-27, V-33, V-57, V-64, V-113, V-114, V-119)

11. HUMAN FACTORS ANALYSIS

Human factors consider how people's tools, tasks and working environment systematically influence human performance. The DOD developed the Human Factors Analysis and Classification System (DOD HFACS) to provide a common system of cross-feeding human error data using a common human error categorization system, and the model is designed to present a systematic, multidimensional approach to error analysis. The following paragraphs outline the DOD HFACS codes applicable to this mishap.

a. Skill-Based Error – AE103 Procedural Error:

Procedural Error applies when a procedure is accomplished in the wrong sequence or using the wrong technique, and this results in an unsafe situation.

The testimony obtained indicated that two procedural errors occurred relevant to the mishap. First, the trainee manning the curb-side anchor point appeared to have connected a cable prior to the tower being fully extended. The second procedural error was that MV1 and MV2 were standing at the base of the tower while not actively engaged in tower operations. MTI should have ensured the area was clear of bystanders when the tower was being extended. Both of these errors resulted in an unsafe situation. (Tabs R-20, R-22, R-24, R-33, R-34, R-49 and V-12, V-13, V-61, V-62, V-63, V-64, V-96)

b. Violation – AV001 Violation Based on Risk Assessment:

This human factor applies when the consequences or risk of violating published procedures was recognized, consciously assessed and honestly determined by the individual, crew or team to be the best course of action. Routine "work-arounds" and unofficial procedures that are accepted by the community as necessary for operations are also captured under this code.

The data obtained regarding the site conditions surrounding the tower indicated that there were obstructions around the tower in contradiction of published site selection guidance. Large HESCO barriers prevented the tower operator and MTI from being able to see the members at the curb-side and road-side anchor points. These HESCO barriers also prevented the members at the anchor points from being able to see the tower operator and each other. Furthermore, the guy cables had to go over the barriers in order to be secured to the anchor points, which presented multiple opportunities for the cables to get caught. Neither MTT nor MTI noticed that the member at the curb-side anchor point had connected a cable, nor did they notice that the curb-side and road-side members failed to maintain positive control of their guy cables. (Tabs R-29, R-30, R-109, S-5, and V-9, V-15, V-16, V-33, V-64, V-110, V-114, V-119, V-133)

The inappropriate site conditions had been pointed out to the previous commands at FOB Kalagush; however, the situation was not corrected until after the mishap. The obstructions prevented line of sight supervision and presented multiple opportunities for cables to get caught. The inappropriate site conditions resulted in an unsafe situation. (Tabs R-29, R-30, and CC-4)

c. Cognitive Factors – PC101 Inattention:

Inattention is a factor when an individual has a state of reduced conscious attention due to a sense of security, self-confidence, boredom or a perceived absence of threat from the environment which degrades crew performance, resulting in an unsafe situation.

Multiple personnel involved in the training failed to perceive the threat of the situation and did not pay attention to the cables and tower. The member manning the road-side anchor was sitting on the anchor smoking and waiting for instructions when the tower was being extended. The trainee operating the tower was looking at the brakes near the base and not checking the overall alignment of the tower. The member manning the curb-side anchor had completely taken his eyes off the tower and was preparing the come-along system prior to the tower collapsing. MTI did not notice that one of the trainees climbed onto the tower trailer. Additionally, no one noticed that the tower was starting to lean until it collapsed. These multiple instances of inattention created an unsafe situation. (Tab R-23, R-36, R-48, R-75, and V-13, V-15, V-16, V-42, V-60, V-62, V-95, V-113, V-114, V-115)

d. Cognitive Factors – PC102 Channelized Attention:

Channelized Attention applies when an individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of other important cues, leading to an unsafe situation.

The trainee operating the tower controls was only focused on the base of the tower waiting for the moment when the brakes should be engaged instead of checking the tower alignment in its entirety. The trainee on the front-side was focused on his cables and even went so far as to climb on the tower trailer to ensure they did not become tangled. He, too, was not watching the tower alignment as it was being extended and was focused exclusively on his cables. The trainee manning the curb-side had diverted his attention from the tower and his cables to preparing his come-alongs. These three trainees exclusively focused on their individual tasks, which prevented timely recognition of the tower beginning to lean, resulting in an unsafe situation. (Tabs R-12, R-75, R-112, and V-15, V-16, V-35, V-42, V-97)

e. Cognitive Factors – PC106 Distraction:

Distraction is a factor when the individual has an interruption of attention and/or inappropriate redirection of attention by an environmental cue or mental process that degrades performance.

Most of the trainees recalled the appearance of MV2 and the resulting conversation about his family issue. MV1 appeared to engage in conversation with MV2 about the situation and was trying to cheer him up. Given that multiple trainees recalled the conversation vividly and that MV1 was actively engaged in the conversation, it diverted their attention and created an unsafe situation. (Tabs R-32, R-105, and V-16, V-33, V-34, V-35, V-96)

f. Psycho-Behavioral Factors – PC208 Complacency:

Complacency is a factor when the individual's state of reduced conscious attention due to an attitude of overconfidence, under-motivation or the sense that others have the situation under control leads to an unsafe situation.

The trainee manning the road-side anchor point was not engaged in the process when the tower was being extended. He was sitting on the anchor smoking and awaiting instructions. He appeared to be either under-motivated or believed there was nothing for him to do. Whatever the reason, his attention was not devoted to the task at hand, and this resulted in an unsafe situation because he failed to recognize the impending danger. (Tab V-113, V-114, V-115)

MTI had raised the tower many times successfully with other groups of trainees. He believed this group of trainees were familiar with the system, citing their two weeks experience and prior training in using it. MTI did not closely monitor the trainees' actions, and this resulted in an unsafe situation. (Tabs R-21, R-23, R-34, R-48, and V-63)

g. Physical or Mental Limitations – PC405 Technical or Procedural Knowledge:

This human factor applies when an individual was adequately exposed to the information needed to perform the mission element but did not absorb it. Lack of knowledge implies no deficiency in the training program, but rather the failure of the individual to absorb or retain the information.

Other trainees indicated that MTI put forth the correct information on what they were supposed to do. Specifically, MTI instructed them to watch their cables to ensure they did not get caught on anything, watch the tower, and listen to the commands from the tower operator. The two trainees manning the road-side and curb-side anchor points failed to maintain positive control over their cables, and at least one of them did not watch the tower as it was extending. They appear to have failed to acquire or retain the procedural knowledge required to properly perform their tasks, and this resulted in an unsafe situation. (Tabs V-15, V-59, V-114, V-115, and CC-5)

h. Coordination, Communication, or Planning Factors – PP110 Mission Briefing:

Mission briefing is a factor when information and instructions provided to individuals, crews, or teams were insufficient, or when participants failed to discuss contingencies and strategies to cope with contingencies.

The trainees recalled MTI mentioning the importance of following procedures and were told to bring certain safety equipment items; however, none recalled discussing potential contingencies. The full risk of the operation did not seem apparent to the trainees; thus, the safety briefing appears to have been inadequate, and contingencies were not discussed. (Tabs R-13 and V-9, V-28, V-29, V-91, V-92, V-110, V-111)

i. Inadequate Supervision – SI001 Leadership, Supervision or Oversight Inadequate:

This factor applies when the availability, competency, quality or timeliness of leadership, supervision or oversight does not meet task demands and creates an unsafe situation.

MTI did not notice that two of the trainees were not properly engaged in their assigned tasks. The road-side trainee was sitting on his anchor smoking and awaiting further instructions when he should have had control over his cables and been watching the tower. The curb-side trainee was preparing his come-alongs and appeared to prematurely connect a cable instead of maintaining control over his cables and watching the tower. The front-side trainee was manning his cables but had climbed on the trailer to do so, and MTI did not notice this. Visual obstructions may have inhibited supervision at the site, but MTI did not maintain constant awareness of the trainees' actions, which resulted in an unsafe situation. (Tabs R-23, R-48, R-109, and V-15, V-16, V-34, V-63, V-113, V-114, V-115)

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Primary Operations Directives and Publications.

(1) Technical Manual H426267, *Operators Manual for Rapid Aerostat Initial Deployment (RAID) Remote Ground Station (RGS) Ready Tower and RGS*, October 2009.

(2) Rapid Aerostat Initial Deployment (RAID) Technical Manual, TM 11-598-XXX-12&P, *Guyed Mobile Tower Unit (MTU) 3107 RAID (Legacy) System Operator Manual*, June 2009.

(3) Software User Manual (SUM) for Version 3.02 of the RAID Software, *Rapid Aerostat Initial Deployment (RAID) Ground Station*, 28 August 2008.

(4) Air Force Instruction 51-507, *Ground Accident Investigations*, 28 May 2010.

b. Known or Suspected Deviations from Directives or Publications.

(1) The site location did not conform to required conditions.

The requirements for the site selection are included in Technical Manual H426267, Emplacement: Site Survey. Specifically, a 100-foot radius around the tower should be level and clear of natural and man-made obstructions that could interfere with the guy cables. The site must also be clean and free from debris that may cause a safety problem. (Tabs R-28 and AA-5, AA-6)

The site at the time of the incident did not have a 100-foot clear radius around the tower. Multiple pallets of miscellaneous equipment were stored at the site, as well as stacks of assorted construction materials such as wood, drywall panels and unfilled HESCO barriers. Rows of concertina wire were strung throughout the area within feet of the tower guy cable anchor points. Multiple communications antennas and their associated guy cables were within the area. The tower trailer was set up on a slight incline, which required mounds of earth to be built up beneath the outriggers to further level the structure. (Tabs R-28, S-2, S-3, S-4, S-5, S-6, and V-9, V-27, V-28, V-133)

(2) The black color-coded guy cables were not connected prior to extension of the tower.

After the tower is leveled, tilted, and locked into the upright position and plumbed, the three black color-coded guy cables should be connected to the come-along ratchet assembly. Once connected, the slack in the cables should be removed by applying tension with the ratchet to 550 pounds of force on each cable (plus or minus 50 pounds). (Tabs R-28, V-56, V-130, V-131 and AA-7, AA-8, AA-9, AA-10, AA-11, AA-12, AA-13, AA-14)

The tower was leveled, tilted, and locked into place in accordance with procedure; however, the black color-coded guy cables were never connected. (Tabs R-28, R-98, and V-27, V-60).

(3) Personnel were standing immediately beneath the tower during the extension process.

The technical manual warns, "Do not stand beneath tower or between guy wires during extension. Failure to observe this may result in personnel injury, entanglement, or death." (Tab AA-12, AA-14)

During the extension process, the injured personnel were standing at the base of the tower. Both members were observing the training, and neither was directly participating in the extension process. (Tabs R-12, R-22, R-24, R-49, and V-35, V-61, V-62, V-96, V-131)

(4) Proper safety equipment was not utilized.

The technical manual warns that members should wear gloves, hard hats, and eye protection at all times when working with guy cables. (Tab AA-16, AA-20)

Hard hats were not worn by anyone in the tower area during the training. (Tabs R-65, R-89, R-109, and V-91, V-128)

14 January 2011

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