

ENGULFED IN FLAMES:

Refueling Accident Survivor Shares Experience

By Skip Tackett, CW4 (retired)



Skip Tackett, after 16 years of recovery.



One sunny Texas afternoon, in a long and excruciating 18 seconds, my existence changed dramatically....



**13 April 1994, 1450 hours
AH-64A, call-sign "35," 100 feet
AGL, Camp Bowie, TX**

**Lieutenant, before landing check please.
Hold on, let me grab the checklist.
Okay. Weapons systems safe?**

Safe and off.

Tail wheel locked?

Tail wheel locked.

Parking brakes released?

Handle in and verified.

TADS/PNVS anti-ice off?

Off in the back, verify the front.

Front's off.

Okay boss, I've got the FARP out the left. Leads on it and turning. Everything looks good. We'll be going into point four. Remember the log pile they briefed and keep an eye out for it.

**I think I've got it in sight. Should be
no problem**

"35, this is 55.

I'm going to go ahead and scoot on over to point four and give you guys three. That way you don't have to worry about the woodpile."

Roger, we've got it. Okay lieutenant, everything looks good, watch for the ground guide and keep me off of the grounding rod. We're going into three now.

**No sweat. Looking good. Roll forward
about a foot. Stop.**

Okay, if you'll block, I'll set the brakes.

Blocking.

Brakes set. I have all of the flight controls.

You've got 'em.

Number Two is back at idle. I'll monitor refueling. Start putting all your notes together, so we can debrief the guys as soon as we get back. I'll go through mine too—Holy shit!

What's the matter?

"Skip, you're on fire! Get out! Get out!
Get out!"

Get outta here, lieutenant! We're on fire! Get out!!

This is not a fictional scenario out of a military novel but an actual conversation that occurred during the last few minutes of a routine training flight that ended in disaster on April 13, 1994.

The AH-64A involved in the flight was completely destroyed by fire. I was the pilot in command of the aircraft in the backseat.

Background

The mission we were performing when the accident happened was a daytime "deep attack" rehearsal. My unit was an advanced attack helicopter battalion that consisted of 18 AH-64A Apaches, 12 OH-58C Kiowas and 3 UH-60 Blackhawks.

A deep attack mission is a nighttime scenario in which we pilot Apaches and

small scout helicopters at low levels using night vision devices deep behind enemy lines to strike primarily enemy armor and headquarters elements and cause a disruption of the enemy's ability to do battle. It is a high risk mission but very lethal if done correctly. On one very long night during Desert Storm, my unit, the 4/229th "Flying Tigers" destroyed an entire Iraqi Republican Guard armor brigade, being credited with 35 main battle tanks and another 70-plus support vehicles.

In the Apache business, this was our bread-and-butter mission, and we were good at it. We practiced the missions all the time, in all kinds of weather, day and night. The daytime phase was used to allow everyone to work the basics and make mistakes in an environment that was relatively easy to control.

On the day of the accident, we were going to refuel in the Forward Area Refuel and Re-Arm Point (FARP) after the training mission was completed, fly back to our tactical field site and shut down, grab some dinner, discuss the mission issues and re-brief, then go back out and do it again during the night phase. We had a slight change of plans.

We were using a "crawl, walk, run" training methodology, so the accident didn't happen because people took shortcuts or were in a hurry.

Human Factors

Until this accident occurred, I had never heard of or been briefed that the Army had designed and fielded an emergency break-away connector (EBC) for the D-1 Nozzle on the HEMTT Tanker Refueling System (HTARS) or what its purpose was. The

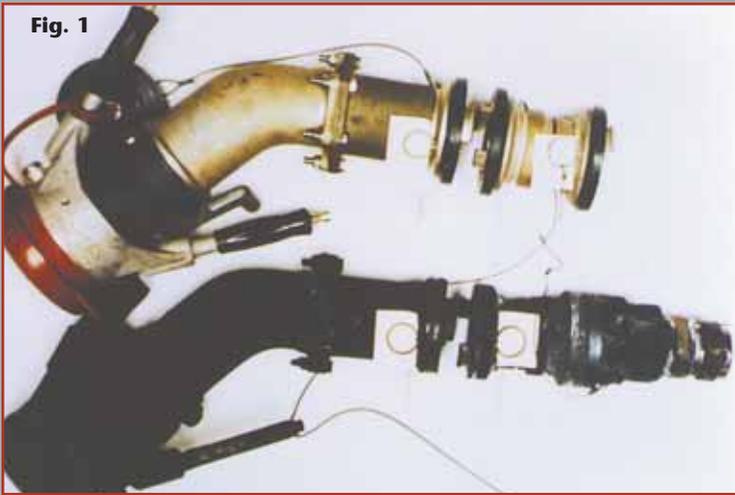


Fig. 1: The correct D-1 nozzle assembly is on the top. The bottom image was dug out of the wreckage. Note the safety pins highlighted by the 3x5 cards underneath them.



Fig. 2: The pressure refuel point is in the black circle just in front of the wing by the green glove.

design of the EBC is what's described as a "frangible connection." It is designed to break at a specific point in a controlled manner. The purpose was to allow a crew to takeoff in the event of an emergency (incoming artillery, an aircraft catching on fire or crashing, etc.) while still refueling. Approximately one pint of fuel was all that was supposed to be spilled, even under extreme pressure. It was a good idea, but there were shortcomings in the design of the system.

The primary cause of this accident was human error in two areas. First, the EBC was installed incorrectly (Fig. 1), which caused a separation of the fuel line at the EBC connection (not the failure of the actual EBC). This resulted in approximately 30-40 gallons of jet fuel being sprayed at 350 gallons per minute (between two to six gallons per second) all over the refueler and the running AH-64.

Second, there was a design deficiency on the part of the manufacturer. The EBC is bi-directional and can be installed either way. As far as functionality, it works the same in either direction. The only clue to which is the nozzle end is a very small inscription on one end that says "nozzle end." The equipment was removed from service shortly after the accident and has never been reinstated.

Additional "present, but not contributing" factors were refueler unfamiliarity with a new system, new personnel still being trained and pilots that didn't know the system existed.

Chain of Events

After we landed and I verified the ground crew had hooked up the nozzle correctly and the switches were set where they needed to be, I started writing down notes from the mission with

which to debrief the crews. The Apache is refueled on the right side just below and behind the rear edge of the canopy door of the backseat and about 2.5 feet in front of and below the engine intake and nose gearbox assembly (Fig. 2). We normally keep the canopies closed when the blades are turning and are refueling as a safety precaution.

The visibility of the actual refuel point is somewhat limited due to the placement of the attachment point, canopy structure and seat armor. The first indication I had that something was wrong was a violent vibration on the right side of the cockpit caused by the fuel being pumped out under high pressure and bouncing off the side of the aircraft, immediately followed by an overpowering fuel smell.

When I first saw the fuel spraying all over the outside canopy from the backseat, all I could think was, "this can't be happening." I looked out the right canopy in disbelief. It was completely obscured by fuel running down it. I remember looking up and over to the left as I followed the trail of spraying fuel. It was just as bad on the left side. The HEMTT crew shut the fuel off in a matter of a few seconds, but it was too late.

When the fuel sprayed up into the rotor system, it atomized, forming a vapor cloud, and whether it was the engine exhaust or an electrical spark from the generators, something ignited it (Fig. 3). There was not an explosion per se, but the entire forward portion of the helicopter from the engine nacelles to the nose was almost instantaneously engulfed in flame.

Even as I muttered a few choice expletives trying to take it all in, my wingman was yelling on the radio telling me I was



Fig. 3: The vapor cloud has burned off (top smoke) and secondary fires starting from the fuel on the ground and the aircraft.

on fire and to get out. In the time it took me to turn my head back to the right, there was already a fire spreading from the right wing forward. I still can't believe how fast it started. It was only a matter of seconds. I told the lieutenant in the front to get out, and I grabbed the power levers and pulled them off, shut the fuel switches off, and initially turned the battery switch off in my hurry to get out.

I immediately turned the battery back on as I remembered the warning in the operator's manual about leaving it on in the event of an emergency egress with the rotors turning. This is to keep the magnetic control brakes functioning so the rotor system doesn't fall over on the Apache as you're trying to get away from the helicopter. I took an extra second or two to glance at the cockpit instruments and switches to make sure I had done everything I could to shut the aircraft down and minimize any chance of an explosion or the aircraft coming apart while still running and injuring someone on the ground.

The problem was I had no idea what had happened. I glanced to the left front as one wingman pulled pitch from the point on my left. As I looked back to the right, I could barely see through the fire now, and I couldn't tell if the aircraft to my right was gone or not. I could see the lieutenant was on the forward avionics bay, so I knew he was almost out. My world was all black smoke and boiling fire, and I knew no one could get to us in time from the outside. We were on our own.

Self-Egress

I had done all I could. The lieutenant was gone into the boiling smoke, and now it was my turn. My mind was moving at warp speed, but my body seemed to move in slow motion trying to keep up. I was hyperventilating. I made the same mistake here that most people make when they are in a hurry to get out of a cockpit in an emergency. I forgot to



Fig. 4: Severe burns to my hands, even with NOMEX flight gloves on.



Fig. 5: My Apache in Desert Storm. This picture shows the doors locked in the upright position and the difficulty in someone trying to extract a pilot or quickly egressing the cockpit area.

"Jumping out into that fire was the hardest thing I have ever done, but I was determined not to sit in that cockpit and burn to death."

release my shoulder harness, even though I had done the step in my head. I reached down to grab the door handle, and in the two or three seconds that I had seen the fire there, the aluminum handle was already so hot that it burned my hand right through the flight glove (Fig. 4).

I threw the canopy open, and it was instant inferno. The fire hit the open door and channeled right into the cockpit, across the top inside of the canopy and down the left side. Even if I had released my harness at this point, my natural reaction wasn't going to let me exit the aircraft. I remember turning my face to the left and trying to breathe and get away from the intense heat of the fire. It felt like my face was melting from the 800-1000F temperature. There was nowhere I could turn to get away from it. All I could think of was to turn off the heat, so I reached up and grabbed the canopy release to let the canopy door back down. (Another habit of mine is to flip the handle back down when I turn the canopy release so that the door will lock in the open position once it is at the top [Fig. 5]. This also allows the door to lock in the intermediate position when lowered.)

When the door came down, it locked as advertised. At that point, there was an area about four to six inches wide funneling the fire into the cockpit with me. My mind was racing a million miles per hour as I was trying to deal with the situation and find a way out. I released my harness and started to reach for the door handle again, but by now the whole right side of the aircraft was nothing but flame. I couldn't even see the ground. The left side wasn't much better. I briefly remember thinking about blowing the canopy and going out the left side, but something told me not to. Looking back on it, it was the right decision. I didn't know it at the time, but the left side was burning worse than the right, and the winds were blowing from the left rear to the right front. I likely would have flash fried if I had blown it.

Probably due to the adrenaline rush, my hand was not hurting yet from the severe burn it had sustained. However, instinct wouldn't let me reach into the fire to close the door, even though I was wearing NOMEX. The heat was absolutely unbearable. I stood in the cramped cockpit and took my right leg and kicked the door as hard as I could to break the locking mechanism.

As the door closed, I grabbed a big breath of air. The pain from the burn on my face was intense, but that wasn't my primary concern. I took another look around the aircraft, looking for an easier way out. Not finding one, I remember thinking, "I've got to get out of here before this thing blows up." I made my decision to go, threw the door open one more time, and half dove, half fell out of the cockpit. Jumping out into that fire was the hardest thing I have ever done, but I was determined not to sit in that cockpit and burn to death. If I was going to die in this fire, then they would find my charred body trying to crawl away.

During the seven-foot fall headfirst to the ground, I kept thinking about my wife and four sons and how badly I wanted to see them again. I remember seeing a Hellfire missile seeker flash past my face, and then I hit the ground. The heat was beyond intense, and I remember yelling at the top of my lungs as I began to really burn. This turned out to have been exactly what I needed to do. It kept me from inhaling not only the fire, smoke and superheated gasses, but also the toxic fumes from the composites as the high tech aircraft burned. Because of this, I only had very minor damage to one small portion of my left lung.

I half stood and half stumbled as I tried to get my feet underneath me to keep

Fig. 6



The smoldering remains of Apache 235.

going. Somehow in the confusion, I remained oriented to where “out” was and ran in the correct 45-degree forward direction. As I came out of the fire, I ran a few more feet, then stopped and started gulping air. It really felt good. I looked down at my front to see if I was on fire and needed to “stop, drop and roll”. No fire—I was just smoking from my chest to my boots, and for some reason, I found this humorous and started laughing. I know now that it was a stress relief action from making it out of the hell behind me.

Outside the Inferno

The total elapsed time from when my wingman called me and said I was on fire until I ran out of the fireball was only 18 seconds. It seemed like an eternity. The aircraft was a total loss (Fig. 6).

I saw the lieutenant in front of me, grabbed him and asked him if he was okay. He looked at me and said the same thing. Neither one of us answered, we just stared at each other, thinking, “If he looks like that, how bad am I?”

The majority of the pain had not really set in yet, but I knew I was burned badly. My face hurt the worst. It felt like it had melted, and I could smell my burned skin and partially see my charred nose when I looked down. I looked back at the flaming inferno behind me and couldn’t believe I had just come out of it. What I didn’t know at that point was that at least three people were trying to use the small 10-pound dry chemical fire extinguishers to help us out, but the heat from the fire was so intense they couldn’t get close enough for the extinguishing agent to even reach the edge of the fire.

Not one person saw both of us get out, so they were still risking their lives to help us. That was all resolved in a minute or so, and we started walking toward the FARP soldiers by the HEMTT. I remember feeling weak all of the sudden and began to stumble as one of the pilots came running up to see how I was. He helped

me to a cot that someone had brought out of the tent for us, and I sat down. He popped the chinstrap on my helmet and took it off. I didn’t have my visor down, but it wouldn’t have mattered anyway because the third degree burns I received were along my lower jaw and mouth (Fig. 7). My aviator sunglasses saved my eyes.

From that point on things started to get fuzzy. There were so many people trying to help us, literally giving the shirts off of their backs to cover us to keep us protected. The intense pain began to set in, and my body began to shut down to deal with the injuries. All I can say to all of them that were there—the medics, the guys that tried to fight the fire to help us out of the cockpit, the guys that just gave us moral support, the guys or gals that helped in ways that I don’t even know about—thank you from the bottom of my heart.

Fire Extinguishers

The authorized and approved 10-pound dry chemical fire extinguishers in the FARP were completely inadequate for the rapid ignition of the vapor cloud and size of the fire. Because of that, the Army lost a \$16 million dollar aircraft and almost had two pilots burn to death.

Most aviation fires are Class B petroleum-based fires, and aviation operations provide a unique fire environment with constant airflows that feed fires. Tradi-

tional fire extinguishing systems simply do not work well in that environment, as they do not provide re-flash capability and cool the surrounding materials below the flash-point of the petroleum products.

After my accident, the Army searched for a year for a suitable fire extinguisher replacement since neither Halon nor carbon dioxide systems fare any better. After 18 months of extreme testing, the brass approved and authorized Kingsway Industries Tri-Max 30 portable Compressed Air Foam Systems using Aqueous Film Forming Foam for worldwide deployment. This has become the de facto standard for military flight line operations worldwide, and the U.S. Army alone has almost 7,000 Tri-Max 30s and 1,100 Tri-Max 3s. In the past 13 years, these systems have saved over a dozen multi-million dollar aircraft and dozens of lives.

The Injuries

I received second- and third-degree burns to 42 percent of my body surface area. The Lieutenant had second- and third-degree burns to 21 percent of his body surface area. Our feet were not burned at all thanks to the all-leather combat boots we wore. With the exception of our faces, which were completely unprotected, the majority of our burns were to the backsides of our arms, legs and tops of our knees.

Wherever the NOMEX was pulled tight against the body with no second layer underneath, we lost that trapped layer of insulating air, and the heat transferred. My chest, back and buttocks were spared due to the cotton underwear I had on (Fig. 7). The burns literally went to where the underwear was and stopped. Luckily for me, those became donor sites for the three major skin graft operations I had to undergo.

The bottom line is this: if I hadn’t been properly wearing my NOMEX protective equipment, I could have either died in the fire or as a result of the even more severe burns I would have received. I was wearing an almost new flight suit and had just



Fig. 7

Fig. 7: Facial burns were severe with no protection. The picture on the right clearly shows the severe burns received where only a single layer of NOMEX covered the skin. The areas where the t-shirt provided a second layer with trapped air received almost no burns at all.

acquired new gloves prior to going to the field. It truly paid off.

Recovery

The lieutenant and I were lucky to have survived this accident. Another three or four seconds, and we may not have been able to get out. The lieutenant went back to flying in three months; it took me 2.5 years. The scarring and associated issues continued for approximately 10 years.

Unfortunately, there will be some things from which we will never recover, such as an extreme sensitivity to heat and cold, but that can be dealt with. We couldn't have made it without the unwavering support of family, friends, the amazing staff at the burn center at Brooke Army Medical Center in San Antonio and various folks throughout the years that have made a huge difference.

No amount of training can prepare you to deal with a situation like the one we had to face, especially when there are no emergency procedures that deal with an almost instantaneous total envelopment of the cockpit by fire. But that doesn't mean it can't be dealt with quickly and professionally. The key is not to panic, let your survival instinct take over and do what you have to do to get out.

This accident never should have happened for several reasons, but if some of these lessons can be passed on and change the way you do something in the cockpit or cause you to think about what you would try to do in a similar situation, then it won't have been for nothing. 

Author Background

CW4 (retired) Skip Tackett joined the U.S. Army in 1979 and retired in 2000. His career saw assignments in special operations as a heavy weapons section sergeant in the 2/75th Ranger battalion at Ft. Lewis, WA, Aeroscout pilot and SERE instructor at Ft. Carson, CO, and AH-64A Apache and AH-64D Longbow Apache attack helicopter standardization instructor pilot and master gunner. He flew numerous combat missions in Operation Desert Storm (1991) in Apaches and is a decorated war veteran.

Tackett has survived two Class A aircraft accidents. He sustained a broken neck and broken leg in a crash in 1985 and sustained second and third degree burns on 42 percent of his body surface area in 1994. He returned to full flight status with no restrictions after both accidents.

Tackett was one of the first Army instructors qualified in the AH-64D Longbow Apache, flying prototypes with experimental test pilots at the Boeing factory in Mesa, AZ. In 1997, he created the first digital gunnery program for the U.S. Military, which is still the standard on which every Longbow Apache pilot trains.

After retirement, Tackett continued to fly and instruct in Longbows at Ft. Hood, TX, teaching advanced combat skills to Army and foreign mili-

What 16 Years of Recovery Has Taught Me

When I first recounted this event, it was for an article for the U.S. Army Safety publication called *FlightFax* in late 1994. The aviation refueling accident was only eight months old, and I was trying to heal from second and third degree burns on 42 percent of my body surface area. Most of each day was spent dealing with severe pain and sleep deprivation, struggling into and out of full body compression garments while trying not to damage my paper thin skin grafts, completing the next session of grueling, self-imposed physical therapy sessions at home, and coming to grips with the fact that my life as I had known it was gone forever.

One sunny Texas afternoon, in a long and excruciating 18 seconds, my existence changed drastically. Before the accident, I was a husband and father of four young sons, a military flight officer starting his 15th year of service and a veteran attack helicopter instructor pilot teaching combat lessons from Desert Storm. Afterwards, I was simply trying to accomplish once again the little things we all take for granted—touching my nose with either hand, standing for more than a couple of minutes at a time, and trying to find enough strength to hang on one more hour, one more day, praying that it would be just a little better than the hell I was living right then.

My life at the time was experienced in four hour blocks, around the clock. That's the time it took a dose of Percocet to make the pain subside long enough for me to grab a few minutes of sleep, work on the next set of tasks, read a short story to my kids or think about my future momentarily and then wear off

again. I was literally in a fight for my life, and honestly, I didn't know if I was going to make it.

It's been a little over 16 years now, and thankfully, a lot of those fresh memories and subsequent nightmares of the horror of burning alive while diving out of an inferno that only moments earlier had been my Apache helicopter have faded. The seemingly endless hours of wondering how I could get through the next few minutes have turned into a success story of physical and mental survival and overcoming long odds to fully make it back, and more. So

many silver linings to that very dark storm cloud have emerged that it is now almost impossible to imagine how my life would have turned out if the accident hadn't happened.

I sincerely hope that you, the reader, can take away something beneficial from this article to use in

your particular situation. I realize the event happened within a military environment while conducting a hot-refuel (which most civilian agencies do not do), but many of the conditions pertain to all flight operations and can provide valuable insight to potential problem areas.

I have updated and revised the original article for this issue of *Air Beat* and its readership. I have taken out some of the specific lessons targeted at the military and added some background info for non-military readers, but the overall message hasn't changed: a major burn injury is something to avoid at all costs. Refuel fires are preventable for the most part just by doing the things we are all taught as aviators and aircrew members—by being professional.

—Skip Tackett, September 2010



tary sales (FMS) attack pilots from the Netherlands, Singapore, Israel, Kuwait and Egypt. He also designed, developed and implemented a counter-insurgency training program involving U.S. and FMS attack pilots and special operations forces that has significantly influenced current combat operations throughout the world. Working closely as a subject matter expert with first McDonnell Douglas then Boeing Aircraft Company (Mesa), he has made significant contributions to the design and software integration of current Longbow aircraft. In 2007, as a civilian, he went to Afghanistan to fly combat missions in Russian Mi-17s supporting the Global War on

Terror. He is a published author with several articles in various magazines.

Tackett is qualified in 10 different helicopters, including the Russian Mi-8/Mi-17, and a commercial multi-engine fixed-wing pilot with over 5,000 hours of flight time and over 1,500 hours under night vision devices. He is qualified to fly UAVs at Level 4 from the front seat of a Longbow and is Joint Forward Air Controller-Airborne (JFAC-A) qualified. Today, he continues to fly and teach USAF expeditionary pilots to fly Mi-8/Mi-17 helicopters in Iraq and Afghanistan. He and Dorene, his wife of 31 years, have four sons and make their home in Texas.