

ACCIDENTS IN MOUNTAIN RESCUE OPERATIONS



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COVER PHOTO: A Pavehawk helicopter crashed during a May 2002 rescue effort on Mt. Hood in Oregon. Photo courtesy Matt Weaver/Portland Mountain Rescue.

PHOTO ON "OBJECTIVE" PAGE: Howard Paul

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Objective

The Mountain Rescue Association, a national nonprofit association of membership teams dedicated to saving lives through rescue and mountain safety education, has developed this “Accidents in Mountain Rescue Operations” program for search and rescue professionals who work in mountainous terrain. This program profiles numerous accidents in mountain rescues so users of the program can learn valuable lessons through accidents and analyses that followed.

About the Author

Charley Shimanski is President and Education Director for the Mountain Rescue Association, a national organization of rescue mountaineers. A 20-year veteran of Colorado’s *Alpine Rescue Team*, Charley has participated as a field member and Incident Commander for hundreds of rescues among Colorado’s highest peaks.

The author of the Mountain Rescue Association’s *Helicopters in Mountain Rescue Operations* manuals and several others, Charley has consulted rescue mountaineers, mountain guides, and climbers throughout the world, from Canada to Israel, from Kilimanjaro to Aconcagua. Charley is a frequent speaker at meetings of the International Technical Rescue Symposium, The National Association of Search and Rescue, the Wilderness Medical Society, and the Mountain Rescue Association.

Introduction

In 1927, the country's first mountain rescue team was formed when a group called the Crag Rats responded to the need for mountain rescue services on Mt. Hood, Oregon. These early rescue pioneers also came together as the result of collective action. Knowing they might need assistance themselves someday, these highly experienced mountaineers banded together to form a rescue group professional in skills, while volunteer in pay.

By the late 1950's, and with the help of members of European and American mountaineering and rescue organizations, the [Mountain Rescue Association](#) (MRA) was incorporated for the purpose of performing "rescue and mountain safety education." The first meeting of the MRA took place in 1958 at Mt. Hood, where several National Parks, Air Force units and others immediately joined the MRA, as did teams from Oregon, California, and Colorado. Other states and units from Canada followed later.

By the 1960's, rescue training materials were starting to appear. Mountain Search and Rescue Techniques, by Bill May and the Rocky Mountain Rescue Group, became the first complete text on rescue techniques. Tim Setnicka, a seasoned rescuer in Yosemite National Park, wrote Wilderness Search and Rescue, another search and rescue (SAR) primer.

In 1972 the National Association for Search and Rescue (NASAR) emerged. NASAR is a non-profit membership association comprised of thousands of dedicated paid and non-paid professionals - all active or interested in search and rescue, disaster aid, emergency medicine and awareness education.

During the first 50 years of organized mountain rescue in the United States, great attention has been placed on rescuer safety. Between the MRA's semi-annual conferences, the multitude of annual NASAR conferences and training programs, and the International Technical Rescue Symposium, opportunities abound for rescuers to seek training in technical, tactical, and management areas of SAR response.

Despite these numerous training opportunities, accidents do still happen. This program is designed to study and learn from accidents that have occurred during the last 50 years of mountain rescue operations. Through a careful analysis of these accidents, we can identify improvements and enhancements to our operating and management guidelines.

Categories of Rescue Accidents

In this program, we will break down rescue accidents into four categories. They are:

- Aircraft Accidents
- Operator Error
- Equipment Failure
- Mother Nature

Of course there is some overlap in these categories, particularly between aircraft accidents and Mother Nature. Still, most accidents seem to have an overriding element of one of these four categories.

At the conclusion, we will look at mechanisms to reduce the risk of these elements in mountain rescue operations.

Part 1 - Aircraft Accidents

The most common accident that results in injuries or death in mountain rescues is the aircraft accident. In particular, accidents involving helicopters are all too common. For a number of reasons, helicopter operations in mountainous terrain pose special concerns, including:

1. Mountains are at higher altitude than sea level, which decreases air pressure making lift more difficult.
2. Mountain weather is generally more unpredictable, and can change at a moment's notice
3. Flight operations over mountains leave less “margin for error” as the pilot is generally flying above terrain that prohibits safe autorotation in the event of mechanical failure or other emergencies

Ken Phillips, Chief Emergency Services at Grand Canyon National Park, has studied helicopter accidents in detail. In his recent study, he found that nearly 1 in 3 EMS/SAR helicopter accidents involved a condition known as inadvertent Instrument Meteorological Conditions (IMC) – an aviation term for flying into bad weather and/or poor visibility.

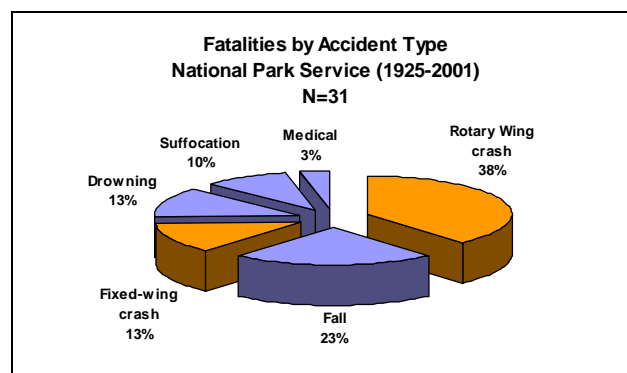
Phillips also questions the “need for speed” that often results in the use of helicopters for patient evacuation or rescuer transportation in mountain SARs.

According to a study in Prehospital Care and Disaster Medicine, “code three” responses change patient outcome in less than 5% of all ambulance calls. If we initiate emergency responses with rescue helicopters in an equally aggressive manner, then we are undoubtedly

putting aircrews at unacceptable risks, when it will have no bearing on the outcome. Developing “helicopter discipline” is an essential skill of all personnel involved in helicopter rescue operations.

Human error accounts for the greatest majority of all aircraft accidents and surprisingly many of these accidents are initiated from outside the cockpit.ⁱ

Data from National Park Service rescue accidents indicates that rescuer death from helicopter accidents far out-paced all other causes of death.ⁱⁱ



There are a multitude of lessons that can be learned by studying helicopter accidents in mountain rescue operations. For this reason, we have detailed several such accidents on the following pages.

Fall from the “Hell Hole”

On January 7, 1975, members of Seattle Mountain Rescue Council (SMRC) were responding to the crash of a fixed-wing aircraft. Near the crash site, SMRC member Al Givler was being lowered through the belly of a twin-rotor Boeing CH-47 Chinook flown by the 92nd Army Reserve out of Ft. Lewis, Washington. He was being lowered using a winch cable and a horse-collar. He was also wearing his backpack at the time of the lowering.

In the middle of the lowering, high winds forced the crew to reverse the winch in an attempt to raise Givler back into the helicopter. During the raising, the combination of the backpack and horse-collar pinched a nerve in Givler's upper body, causing him to lose all sensation in his arms. Just as rescuers on board the helicopter began to pull Givler aboard, he slipped from the horse collar and fell from the helicopter.



A hoist operation through the "Hell Hole" of a Chinook helicopter. Photo courtesy of Denali National Park

Givler fell an estimated 150 feet, landing on his back. The Chinook landed nearby and dropped off the three other rescuers on board. They reached Givler in 45 minutes and found him conscious, but bleeding from the ears

Miraculously Givler suffered only a basal skull fracture. He never lost consciousness.

The combination of cushioning snow and his great physical conditioning saved him. The ground was populated by many post-logging tree stumps and there were many tree snags around, but he missed these in his fall.ⁱⁱⁱ

Crash of 'Angel 6'

On June 16, 1975, rescuers from Yosemite National Park were called to a climber who had fallen 150 feet on El Capitan. Ranger Dan Sholly was the first to the subject, Peter Barton, who had sustained fatal injuries. In lieu of a very difficult evacuation over treacherous cliffs, Sholly called for a UH-1 Huey helicopter from the San Joaquin Valley's Lemoore Naval Air Station.

On board the helicopter were a crew of six; Pilot Lt. Tom Stout, Co-pilot John Sullivan, Ranger Paul Henry, and three other crewmembers. Shortly after hoisting the dead climber into the helicopter, one of the two engines quit. The chopper rolled to the right side in a spiral descent that included two 360-degree turns. It crashed into the trees, approximately 500-600 feet below the original rescue. Although the deceased subject and the helicopter were burned, nobody on board was seriously hurt.

The engine ran for two more hours

On January 4, 1978, a twin-engine commuter plane disappeared in the Great Smoky Mountains National Park. The next day, three Army Huey helicopters were searching for the crash site when one of the helicopters crashed. Witnesses reported a loud noise as the pilot was trying to land with an Army medic and rangers from the park. After yelling "May Day" into the radio four times, the pilot tried to land the helicopter.

The helicopter came to a standstill upside down, nose down, with the jet engine still running.^{iv}

The 1,100-horse power engine continued to run for two more hours.

Four rescuers were killed in the crash, including Army Captain John Dunnavant,

Army Captain Terrance Woolever, Army Sergeant Floyd Smith, and Civil Air Patrol Lt. Col. Ray Maynard. Four rescuers survived, including Ranger Bill Acree (compound broken leg, broken collar bone, shoulder, back), Ranger Dave Harbin (fractured rib, contused lung, dislocated shoulder, broken elbow), Air Force Sgt. Phillip Thurlow (5 broken ribs, fractured clavicle, ruptured biceps), and Army paramedic Chris Wyman (grossly fractured femur, facial lacerations)



The engine of this Army Huey helicopter ran for two hours after the crash. Photo courtesy Butch Farabee

Another rescuer was injured during the subsequent rescue of the crash victims. Army paramedic Collier, who arrived at the scene by jungle penetrator, was injured by tree limbs and by being dropped several feet.

Downdrafts, updrafts, and local whirlwind

On Saturday April 5, 1980, Jay Bienen (27) and Ted Botner headed out on a late winter hike in the mountains of northern Colorado. Bienen planned to bivouac that evening while Botner returned to the cars. The plan

was for Bienen to meet friends at the trailhead Sunday morning.

On Monday, Botner contacted SAR authorities because Bienen was already one day overdue, and he had not been at classes at the local college. After searching Monday afternoon, Larimer County SAR (MRA) called on additional resources, including Alpine Rescue Team (MRA).

As Alpine members arrived Tuesday morning, a local television helicopter, “SKY-9” arrived at mission base – unannounced – from Denver. An Alpine Rescue Team veteran, Hunter Holloway, boarded SKY-9 and joined the pilot, photojournalist and a reporter. They were assigned to fly the perimeter of the search area.

Less than an hour later, the Bell 206-B attempted to land in “an unauthorized L.Z.” As the helicopter was circling on final approach, it crashed into nearby trees. The helicopter suffered substantial damage as it landed on its side. Three of the four passengers were injured. The rescuer walked away from the scene. An Army Chinook helicopter, assisting in the search, landed near the crash site, and evacuated the four passengers.



Former Mountain Rescue Association President J. Hunter Holloway stands beside the helicopter that crashed while he was aboard. Photo courtesy Dale Atkins

Weather conditions at the time of the accident were 0 degrees F. with winds of 30 mph, gusting to 50 mph. – The NTSB sited “Weather: Downdrafts, updrafts, and local whirlwind” as causes for the accident.

Just over two hours later, search teams located the lost subject near the trailhead. He was unhurt. The rescuer on board the helicopter, Hunter Holloway, went on to become the President of the Mountain Rescue Association less than a decade later.

Metal- and men - had flown everywhere

On September 11, 1980 a Canadian climber reported his partner seriously injured in North Cascades National Park. A helicopter was requested from Whidbey Island Naval Air Station to pull the climber from the rugged terrain. The “Navy... was reluctant to launch. The sheriff eventually persuaded them to fly.”^v

The twin-rotor SeaKnight CH-46 (“Firewood One”) lifted off with a six-man crew. En route they picked up a Sheriff’s Deputy to help navigate.

As they felt their way through the thick mist, it silently closed around them. Judging from the badly twisted remains, Firewood One first hit the ground at the rear loading ramp, just before a 50-foot rotor blade chopped the cockpit off. Metal – and men – had flown everywhere.^{vi}

There were five fatalities in that accident, Dan Mahoney, Pat Kidgell, Roy Lewis, Tom Sanders, and Rick Kubal. Two rescuers survived, the co-pilot (2 broken arms) and the Sheriff’s Deputy Hurlbut. One of the

fatalities was catapulted to a cliff 200 yards away.

The next morning, two climbers stumbled onto the carnage... The Canadian Armed Forces Base in B.C. reached the scene along with other teams from the area... According to Park Ranger Bill Lester, ‘the Canadians hoisted the last survivor into their helicopter while hovering in a cloud.’^{vii}

Litter spin ejects patient

On December 9, 1989, 9 year-old Debbie Baisa fell in the Franklin Mountains outside El Paso Texas. She had been hiking with her father and other friends and family members when she fell, approximately one mile from the road. When the rescue was initiated, the EMS dispatcher stated that Debbie had a suspected broken ankle. Later analysis would show she had sprained her ankle.

Six rescuers from the police Mountain Rescue Team reached the girl at dusk. They strapped her in a Thomson litter and tried, unsuccessfully, to carry her down the steep slope on foot. Due to the late hour, and falling temperatures, the El Paso EMS Division contacted the 2/507th Medical Company for a Military Assistance to Safety and Traffic (MAST) helicopter from Fort Sam Houston, Texas. They requested a hoist extraction.

The aircraft departed at 19:05 hours in a UH-1V Huey helicopter. They landed at the EMS Command Post, where the pilot, medic, and crew were briefed on the mission.

Mountain Rescue Team members on the ground, using their flashlights, would identify the location of the patient. Once over the scene, the crew performed a reconnaissance of the site, and determined

the area unsuitable for landing, due to the slope and terrain. The medic was then lowered 50 feet by hoist to the patient, where he evaluated the patient, and performed a cursory check of the civilian litter. Mountain Rescue Team members assured the medic that the patient was adequately secured. The medic then notified the pilot that the Stokes litter and patient were ready for the hoist operation. The litter immediately began to spin, and at 30-feet above the ground, the spin was uncontrollable. At this point, the crew chief terminated the lift and began lowering the spinning litter back to the ground. 25-30 feet above the ground, the patient was ejected, feet first, from the litter.

After the patient impacted the ground, the Flight Medic examined the patient, administered first aid, and recommended an immediate hoist evacuation using the Sked litter. The patient was then secured in the Sked litter and following a suggestion by the Mountain Rescue Team, tag lines were secured to both ends of the litter.^{viii}

The patient was hoisted into the helicopter, and the medic was hoisted using the jungle penetrator. The helicopter then flew to William Beaumont Army Medical Center where a trauma team met them. The patient suffered numerous injuries from her fall from the litter, including head and internal injuries, a fractured pelvis and several fractured ribs. She spent four months in a body cast.

Although the Army and police rescue team had met to review the Army rescue equipment, the pilot later stated that two groups had never practiced the hoist operation they attempted that night.

Upon a thorough study of the accident, an investigation board found the following factors contributed to the accident:

1. The litter assembly was incomplete, and was lacking a foot board,
2. The mountain rescue team only secured the patient in the litter loosely for ground transport,
3. The Flight Medic was not familiar with the litter, which turned out to have unacceptable aerodynamic properties. The slitter was a solid Thomson litter, yet she called it a Stokes litter. The manufacturer guidelines for the litter suggest a tag line should be used during hoist operations.
4. The US Army Aeromedical Center had not made firm recommendations regarding the use of tag lines to prevent the spin that occurred during this incident.
5. Although it had no direct effect on the conduct of the rescue, the board also noted that “the lack of compatible radio equipment prevented the flight crew from contacting the ground crew until the medic was on the ground.” Until the medic was lowered, rescuers on the ground had prepared to load the litter in a one-skid loading. This may have led to their loosely securing the patient.

Another Hell Hole incident

In the summer of 1986, the Colorado Search and Rescue Board held a helicopter training in Kremmling, Colorado. During that event, Bob Shelton, a member of Grand County Search and Rescue, fell while being lowered from the jungle penetrator.

The helicopter was estimated to be 75-100 feet from the ground when he became detached from the cable as he was at the bay door. Shelton suffered numerous fractures and some internal injuries, although he was immediately surrounded by a host of EMT's

and paramedics, since the accident occurred during an organized training.

The crash site looks catastrophic

In early-August, 1988, Chicago Sportswriter Keith Reinhardt, a novice and somewhat fearful hiker, attempted to climb the steep and heavily wooded slope of Pendleton Mountain, north of Silver Plume Colorado. He left in the late afternoon for a climb that would take an experienced hiker several hours. He had no map, compass or flashlight, nor extra clothing. He was wearing blue jeans, a cotton shirt, and tennis shoes. He took only a can of soda.

Reinhardt failed to return that evening. Starting the next afternoon, rescuers searched for seven days. Due to the rugged terrain, and sizeable search area, other Mountain Rescue Association volunteers from throughout the western United States were recruited. In addition, six helicopters, and two fixed-wing aircraft from the Civil Air Patrol, participated.

On August 29, 1988, the fifth day of the search, a Civil Air Patrol Cessna 182R fixed-wing aircraft participated in the search, with pilot Terry Leadens and spotter Don Drobny. Due to a large number of search and rescue helicopters operating that day, the SAR Incident Command requested the fixed-wing pilot to maintain an altitude above 13,000 feet MSL.

For unknown reasons, the pilot descended well below the 13,000-foot level during his flight. It is estimated that he was flying at 11,000 feet when...

A passenger reported that the pilot said 'I don't like the feel of this.' A paramedic said the passenger also related that they had 'hit a downdraft.' A helicopter pilot flying in the area said that the winds were not conducive for

fixed wing flights, especially in the trenches. The broken trees indicated a descent angle of 45 degrees. The distance from the first tree strike to the main wreckage was 62 feet. The aircraft came to a rest on its nose. The terrain elevation was about 10,600 feet MSL. ix



Pilot Terry Leadens died in the line of duty when his Civil Air Patrol single engine Cessna crashed during a search for a missing hiker. Photo from KCNC-TV helicopter footage

When the Cessna failed to make its hourly radio check-in, a search began. Thanks to the skill of KCNC-TV helicopter pilot Mike Silva, the crash site was located within minutes. Despite Silva's report that "the crash site looks catastrophic," rescuers were immediately flown to the site by Army Chinook helicopter, where they rescued the passenger, who survived the crash numerous despite serious injuries.

The National Transportation Safety Board determines the probable cause(s) of this accident as follows: Weather evaluation – Inadequate - pilot in command; Airspeed – Inadequate - pilot in command; Altitude – Inadequate - pilot in command^x

The pilot, Terry Leadens (40) of Franktown Colorado died in the crash.

Later that day, several rescuers who had just arrived the previous night from California, would have to be evacuated from the mountain due to altitude-related illnesses. Television pilot Silva assisted with two of these evacuations as well.

The missing hiker was never found.

Overgross Miscalculation!

On June 25, 1994, rangers from Rocky Mountain National Park were conducting a rescue of a fallen climber in the area of Hallett's Peak. While shuttling two additional rescuers to a helispot reported to be between 11,800 feet and 12,460 feet, the Bell 206A helicopter crashed at 8:49 p.m. (just before dark).

The accident investigation determined that the original load calculation was in error and a new one was never completed following a refueling operation just prior to the accident. As rescuers pushed to complete their mission prior to sunset, the pilot had attempted the high altitude landing with a helicopter that was 700 lbs. overgross. As the pilot lost tail rotor effectiveness, he augured the helicopter into the ground and fortunately all personnel survived the crash.^{xi}

“Do you have any oxygen you can throw down to them?”

On June 26, 1994, the US Air Force 305th Rescue Squadron at Davis Monthan Air

Force Base in Tucson, Arizona, was responding to a rescue of a stranded hiker in the Sierra Ancha Mountains. Their HH-60G Blackhawk autorotated into the steep canyon, where it sustained significant damage. The engine continued to run for an hour after the crash, and there was a small fire that resulted as well.

The Air Force crew was assisting rescuers from Gila County Sheriff's Department Rescue Team.

An increased air temperature leading to high density altitude at the rescue site combined with the confines of a steep narrow canyon allowed the recirculation of engine exhaust to overheat the engine. Aircraft radio communication with ground personnel was hampered by incompatibility between military and civilian equipment. Most notably the decision to request a helicopter for this mission was later questioned by the Air Force, since the use of the hoist is restricted to 'life or death' situations.^{xii}

One crewmember was pinned between the helicopter and a boulder resulting in amputation of his leg above the knee. Three other crewmembers received minor injuries. During the subsequent rescue, a local television helicopter assisted by throwing down axes into the rocky ravine to aid rescuers in the extrication. During that effort, radio traffic captured the pilot asking, “Do you guys have any oxygen you can throw down to them?” Indeed oxygen cylinders were dropped, but fortunately away from any rescuers.

The terrain condition was a related factor

On July 9, 1994, a hiker fell and broke her ankle at the 12,200-foot level Colorado's 14,003-foot Mount Huron. The terrain at the site of the fall was sloped approximately

35 degrees. Rescuers from the local Sheriff's posse were called. It was a long hike and climb to the scene by rescuers who were unaccustomed to climbing to such altitude. Despite the fact that the terrain was steep (35 degrees) and the subject's injuries were minor, rescuers determined that a helicopter evacuation was the best approach.

The Flight for Life program, based out of St. Anthony's Hospital in Denver, was the first helicopter-based air-ambulance program in the United States. The helicopter that responded to this rescue came from their Frisco, Colorado medical clinic. Their A-Star AS-350 B2 helicopter arrived at the scene as dusk approached.

Ground rescue personnel said the pilot was in radio contact with them as he made his approach at the 12,200-foot level. The pilot advised them he would place the helicopter's right skid on the mountain slope to allow them to load the patient on the downhill side. Rescuers said they were beneath the rotor disc and were shielding their faces from flying debris when they heard "chopping" noises. They saw the main rotor blades strike the rocks and saw the helicopter flip over their heads and tumble down the mountain, coming to rest 800 feet away at the 11,400 foot level.

Examination of the accident site revealed the slope to be approximately 35 degrees. Using the flight manual's three-dimensional scale drawing, three lines were drawn from the center of the helicopter, the center of the pilot's seat, and the edge of the right skid, and extended to the tip of the rotor blade. Angles formed by the intersection of these lines with the horizontal plane measured approximately 28 degrees, 28.5 degrees, and 29 degrees, respectively.

The National Transportation Safety Board determines the probable cause(s) of this accident as follows: Failure of the pilot to assure main rotor clearance from sloping terrain while in a hover. The terrain condition was a related factor.

Flight for Life Pilot Gary McCall (49) and flight nurse Sandy Sigman (43) were killed in the accident. There were numerous minor injuries to rescuers on the ground. A ground team ultimately evacuated the subject the next morning

Worst short-haul accident in American history

On July 21, 1995, a Honolulu Fire Department McDonnell Douglas 369D helicopter was involved in a search for a missing hiker in the Koolau Mountains near Sacred Falls, on the island of Oahu. According to the NTSB, "the pilot had made two prior insertions of search and rescue (SAR) personnel into the general area of the search. They repelled (sic) out of the helicopter to the ground. On each of the two insertions an observer was onboard to retrieve the rope. The pilot subsequently relocated the first two inserted SAR personnel separately with an observer onboard to a campsite with the use of a Billy Pugh helicopter rescue net. According to an HFD report to the Safety Board, after returning to the staging area, a decision was made to insert two Honolulu Police Department (HPD) officers into the search area at one time using the Billy Pugh net. The report stated that the decision was made by the pilot to fly without an observer.

On its final flight, the pilot was conducting a short-haul insertion of two searchers from the Honolulu Police Department using a Billy Pugh rescue net 50-feet below the helicopter.

After the pilot departed the staging area with the two HPD searchers in the net, a previously placed searcher radioed the pilot of Air 1 three times. He advised the pilot, "Pete, it's just too soupy up here, your gonna have to take 'em back down. I can't even see the other side of the river." A review of the recorded voice communications revealed that there was no verbal acknowledgment from the pilot. Shortly thereafter, a searcher heard a crash or impact sound followed briefly by a sound of the helicopter engine noise spooling up then down and then silence.^{xiii}



Honolulu Fire Department officials pay respect to their three colleagues who died in the line of duty. Photo courtesy of Ken Phillips

Pilot Peter Crown and Honolulu police officers Bryant Bayne and Tate Kahaki were killed in the accident.

The National Transportation Safety Board determines the probable cause(s) of this accident as follows: the pilot's poor judgment by intentionally flying into adverse weather conditions in mountainous terrain with an external load and no observer which resulted in loss of aircraft control. Factors were pressure from the conditions/events

and a lack of total experience in the type of operation.^{xiv}

Fog rolled in, visibility reduced and the ceiling dropped

September 12, 1997 was the fifth day of a search for 73 year-old John Devine, who went on a hike around Mt. Baldy in Olympic National Park. 150 people from a dozen rescue groups, including several from Canada, a CAP plane, and 5 helicopters, were used to assist in the rescue.

On that fifth day of the search, a Bell 205 A1 helicopter was rented from a private company in Eugene Oregon. The helicopter attempted to pick up rescuers from the peak at the end of their assignment.

The pilot advised the SAR personnel to load quick (sic), as he had no intentions of spending the night there. The pilot held up five fingers to ground personnel, who assumed that meant to wait 5 minutes for the obscuration to clear. However, in less than that time, the helicopter performed a vertical takeoff in the obscuration. According to the remaining SAR personnel, they lost sight of the helicopter about 50 feet agl. They continued to hear the helicopter throughout its climb, impact, and as it fell down the side of the mountain towards H10. The sound of the tumbling helicopter was described by several witnesses as that of an avalanche and caused several SAR personnel to take cover.

Witnesses reported that the weather conditions in the accident area were instrument meteorological conditions (IMC) with very low ceiling and visibility less than 1/4 mile in fog. The

National Transportation Safety Board determines the probable cause(s) of this accident as follows... the pilot's intentional flight into known adverse weather conditions in mountainous terrain.^{xv}

Eight people were on board when it crashed in the Buckhorn Wilderness area just east of the park boundary on the north side of Mt. Baldy. The crash occurred at approximately 5,600 feet. Three rescuers died (although witnesses report that many more would have died were it not for the expert care by rescuers on scene who were waiting for their turn to be evacuated when the helicopter returned).



This photo was taken moments before this helicopter departed and flew into adverse weather conditions killing three of the eight on board. Photo: Office of Aircraft Services

Killed in the accident were Kevin Johnston (35) pilot, Taryn Hoover (31) seasonal employee of Olympic National Park, and Rita McMahon (52) President of West Coast Search Dogs. Five rescuers on board suffered injuries, some serious.

Winter storm closes in on AirMed flight

On January 11, 1998, Dave Anderson, (43) an accomplished backcountry skier, was caught in a small avalanche (3 feet deep, 30 feet wide, 60 feet long) on Pink Pine Ridge in Little Cottonwood Canyon, Utah. He made contact with a tree, and fractured both legs and suffered internal injuries. After rescuers were notified by friends who were with the subject, and in very bad weather, Anderson was transported by snowmobile to the road.

A University of Utah Hospital AirMed helicopter (Bell 222 twin engine) left the LZ, a parking lot at Snowbird Ski Resort, at about 11:00 p.m.

Snow was not falling when the helicopter departed the hospital, but there were 'gusty winds and light to moderate snow' during arrival at the landing zone. The dispatcher telephoned the pilot (using a cellular phone) to advise him that hospital weather conditions had deteriorated due to a fast moving front. She said it was 'snowing really hard,' the winds were gusting to 37 knots, and visibility was less than 300 feet (she could not see a wing of the hospital on the closed circuit television monitor, and could barely distinguish the helipad).

A sheriff's deputy said that the helicopter took off from the landing zone in 'blizzard conditions' and circled the landing zone, then turned north and disappeared from view. Seconds later, a deputy heard 'a slight muffled boom . . . The weather had grown steadily worse and the snow was falling very heavily.' Later, the helicopter was found where it had impacted mountainous terrain in a canyon area. Several tree tops were severed when the helicopter crashed.^{xvi}

The helicopter had slammed into the side of the canyon about 1 1/4 mile up the mountain from the road. Search and rescue workers hiked to the crash site up steep terrain and through deep snow in extreme avalanche conditions. The rotor blades had been tangled in a patch of pine trees and the helicopter slammed into some rocks, according to Salt Lake County Sheriff's Sgt. Lane Larkin said. It crashed at an elevation of about 8,500 feet. The weather was closing in and it was windy at the time of the accident.

Four people died in the crash, including the subject, Dave Anderson. Also killed were Stan Berg, (48), pilot, Tim Hynes, (45), paramedic, and Shayne Carnahan, (32), nurse.

The National Transportation Safety Board determines the probable cause(s) of this accident as follows. Flight by the pilot into known adverse weather conditions, and his failure (or inability) to maintain sufficient clearance or altitude from mountainous terrain. Related factors were: darkness, heavy snow, high winds, the pilot's perception of pressure that was induced by the conditions and events, and mountainous terrain.^{xvii}

Two rescue helicopters crash while searching for another

At midday on September 10, 1999, a Temsco Helicopters, Inc. flight-seeing helicopter had just finished its second glacier landing in the Juneau Ice Field with five flight-seeing passengers. The aircraft was flying through a mountainous valley where radio signals were blocked. After lifting off from 5,270 feet, and on its way back to the Juneau Airport, the pilot encountered a

localized light snow shower, and “flat light conditions” that momentarily reduced his forward visibility. The pilot later reported that,

'The visibility got to a point where I was unable to discern any topographic features, only a dark shape on the horizon.' He added that 'flat light conditions' contributed to his inability to recognize any topographical features on the ice surface. The helicopter continued to descend, struck the snow-covered ice field, slid about 150 feet, and nosed over.'^{xviii}

The pilot had slowed the helicopter from 100 knots to 75 knots prior to striking the snow-covered ice field. Although the helicopter was destroyed on a 150-foot long wreckage path, the pilot and passengers all survived. The crash destroyed the ELT antennae, making the radio and ELT inoperable.



A survivor stands beside the igloo that she and fellow survivors built as an impromptu shelter. Photo courtesy Juneau Mountain Rescue Team

Using an unusual amount of ingenuity, the subjects attempted to build an igloo. Using a Rubbermaid plastic container they found in the helicopter's cargo bin, they compacted snow into bricks and built an igloo. Not realizing that the igloo needed ventilation, they found themselves subjects

of massive amounts of melting snow while inside. The dripping water drenched them, and they retreated to the broken fuselage for a dry shelter.

Realizing that one of their helicopters was overdue, the base manager contacted other aircraft in the area. Another helicopter company, with an FAA check pilot on board, spotted the missing helicopter on the ice through the approaching storm. Seeing all 6 passengers standing outside the helicopter, the pilot radioed that they appeared to be all right and it looked like they had “a mechanical”. What he thought was the rotors of the aircraft were actually the skids of the overturned helicopter.

Based on that information, the base manager dispatched a small utility helicopter with a pilot and a mechanic to the scene. This aircraft encountered the exact “flat light” circumstances as the first aircraft, and hit the snow as it searched for the first crash site.

“The pilot added that just seconds before the impact, he thought the helicopter was at least 500 feet above the surface. He said that ‘flat light conditions’ made it very difficult to see the topographical features of the ice field below. The helicopter struck the snow-covered ice field, slid about 75 feet, and the helicopter rolled over to the right.”^{xix}

Both escaped unhurt. The crash sites were in a deep glacier valley at 5600’. The mountains again blocked radio signals.

With no way to contact the second aircraft, the base manager waited for 30 minutes and then dispatched a third utility helicopter to support the other 2. The third helicopter found and picked up the pilot and mechanic of the second crashed helicopter. At that time, they all elected to search for the original missing helicopter. The third helicopter also encountered the same “flat

light” conditions and struck the unseen snow-covered ice field in full view of the first survivors. It slid about 50 feet, nosed over, and rolled to the left. The pilot:

“said that he slowed the helicopter to about 30 knots in an attempt to gain reference using a mountain range on the left of the helicopter, and the accident site of N6007S. He said that the helicopter struck the unseen snow-covered ice field, slid about 50 feet, nosed over, and rolled to the left.”^{xx}

All 4 occupants survived. They dug a snow cave and prepared to wait out the storm.

After losing contact with the third helicopter, the base manager contacted the Alaska State Troopers, and a search was begun. A command post was activated. Fixed base operators, Coast Guard, 4 helicopter companies, Juneau Mountain Rescue, SEADOGS, Civil Air Patrol, FAA, the hospital and the fire department were alerted that a helicopter was on the ground due to a mechanical, all 6 passengers were Ok, and 2 other helicopters were missing. A winter storm had begun, with snow and wind forecasted for the next three days. The ceiling was 4,200’ and dropping. Alaska state Incident Command asked Juneau Mountain Rescue to prepare to climb into the storm with tents, food, clothing and medical supplies to support the passengers of the first aircraft. The Air Operations Manager sent several helicopters into the area, but weather pushed them back.

Juneau Mountain Rescue was airlifted to 4,200’ and began their climb. They found the first crash site in the dark shortly before 11:00 p.m. that night. At this point there were 19 people on the glacier for the evening - nine rescue mountaineers, and ten subjects of helicopter crashes

The next morning, a HH-60 Coast Guard helicopter rescued the six survivors of the initial crash by hoist. The Coast Guard and

another flight-seeing helicopter rescued the remaining crash victims from the other two flight-seeing aircraft.

The Coast Guard, Alaska State Troopers (AST), Temsco Helicopters Inc. and several other public and private agencies coordinated a two-fold search and rescue mission to safely evacuate all ten stranded people from Juneau Ice Field^{xxi}.

The base manager was recognized for his support and effective management of the Air Operations division of the Incident Management Team. Members of the rescue team were awarded the Coast Guards second highest national medal for heroism. The company has since redesigned the antenna system on the A-Star series aircraft to allow for manual operation; radar altimeters have been installed; and each pilot carries a handheld radio.^{xxii}

Insufficient power at that altitude

On October 2, 1999, a 3 year-old boy had become separated from his family in a heavily wooded area in the Cameron Pass area of Colorado. The next day, searchers called for a UH-1N Huey helicopter from F.E. Warren Air Force Base, WY.

According to the NTSB preliminary report, the helicopter:

...departed F.E. Warren Air Force Base en route to the search area, approximately 60 miles SSW of the base. Following a briefing at the search and rescue command post, the crew flew two sorties over the search and rescue area. After refueling, the crew returned to the SAR area and began their final sortie. Shortly after crossing the base camp for a pass up the valley, the mission co-pilot felt the helicopter sinking. He pulled up to maximum

power in an effort to arrest the sink, but that failed and the mission pilot took the controls. The mission pilot also unsuccessfully tried to increase power and airspeed, but there was not sufficient power at that altitude to recover.

The helicopter impacted the trees, stopped on a sloped mountainside at approximately 8,600 feet and was damaged beyond repair. All helicopter crewmembers were treated and released for minor injuries. There was no damage to private property.

The accident investigation board, convened by the AFSPC commander, Gen. Richard B. Myers, concluded the helicopter crash was caused primarily due to the mission pilots flying too low and too slow for the altitude, terrain, and winds/turbulence (sic). Once the aircraft began to sink, they did not have enough power, airspeed, or altitude to recover.^{xxiii}



Headlines of the Denver Post describe a line of duty injury to a rescuer from Larimer County Search and Rescue. Photo: Rocky Mountain News

One of the rescuers was a volunteer member of Larimer County Search and Rescue, an MRA team.

The missing boy was never found.

“I won’t get on a helicopter without a helmet any more”

On February 3, 2001, several snowmachiners triggered an avalanche on Peak 7075, on the northern side of the Chugach Mountain Range in Alaska. Two snowmachiners were killed, four were caught, and one was nearly caught, in a human-triggered hard slab avalanche. The fracture, with depth ranging from 1.5 to 15-foot deep, ran more than 3,000 feet, crossed two ridges, and cleaned out three separate bowls with two runout zones a quarter of a mile apart. The avalanche in the main path traveled more than a half-mile and fell 1800 vertical feet. Snow was piled 35-40 feet deep in the runout zone and nearly ¼ mile wide.^{xxiv}

Early in day two of the rescue efforts, an Alaska Fish and Wildlife Protection helicopter (a float-equipped Robinson R-44) flew into the site to assess the additional hazard for other rescuers.

Although the weather conditions were clear, the pilot said the lighting conditions in the valley provided little contrast (flat light). The pilot said that as he began to add power near the termination of the landing approach, the low rotor warning horn sounded, and he noticed that the main rotor gauge was indicating 92 to 94 percent. He reduced collective pitch, ensured the throttle was full open, and began to initiate a go-around toward the west, an area of lower terrain. The helicopter continued to descend, and the right front portion of the landing gear float assembly contacted the snow. About the same time, the main rotor contacted the slope of a small, snow-covered hill, to the right of the helicopter. The helicopter then rolled onto its right side. After the accident, the pilot said he

noted that the wind was blowing about 10 knots from the east.^{xxv}



Doug Fessler, long time director of the Alaska Mountain Safety Center, stands beside the Alaska Fish and Wildlife helicopter that crashed in flat light with him on board. Photo courtesy Doug Fessler

The helicopter crashed in flat light and was heavily damaged. The pilot and two passengers were uninjured. One of the passengers was Doug Fessler, director of the Alaska Mountain Safety Center. Fessler has logged hundreds of hours in helicopters performing avalanche control work and assisting in search and rescue missions. He was not wearing a helmet at the time of the crash, yet he later told the author, “I won’t get on a helicopter without a helmet anymore!”

“Chopper’s going down! Chopper’s going down!”

What is arguably the best-known helicopter rescue accident occurred on May 30, 2002 on the slopes of the 11,239-foot Mt. Hood.

Nine climbers were swept into a 50-foot wide and 20-foot deep crevasse, known as the Bergschrund, early in the morning.

Three of the victims were killed and four more were critically injured, according to Portland Mountain Rescue, which was called to rescue the injured shortly after 9:00 a.m.

Within a few hours, UH-60 Blackhawk helicopters from the 1042nd Medical Company (Air Ambulance) were on scene. The Blackhawk crews would rescue several climbers by hoist during the subsequent hours.

At about 1:51 p.m., a Pavehawk helicopter, from the 304th Rescue Squadron of the Air Force Reserve Command's 939th Rescue Wing was called to rescue the final climber. Just as the hoist operation began, the helicopter suddenly crashed into the side of the mountain. Sgt. Alan Alderman, monitoring helicopter radio transmissions for the Clackamas County Sheriff's Office, said "I heard, 'chopper's going down, chopper's going down. Blackhawk down,'".

Portland Mountain Rescue reports that, "the helicopter crashed while attempting to airlift one of the critically injured climbers. The chopper lost lift, dipped to the southwest, impacted nose first into the mountain and rolled eight times down into the mountain's crater. The accident injured the five crewmembers on board at the time - one seriously - but, amazingly, no one was killed."

The Pavehawk helicopter landed on the snowy slope, and its rotor blades immediately shattered. Without rotors, and position parallel to the slope, the fuselage was able to roll 1,100 feet down the mountain as horrified rescuers looked on.

The rescue was carried on two Oregon television stations, and viewers watched the crash live.

A derivative of the Army's UH-60 Blackhawk, the Air Force's MH-60 Pavehawk weighs 4,000 pounds more than

its Blackhawk counterpart. This is due to an additional 185-gallon internal fuel tank, refueling system, and other communications equipment.



An Air Force Reserve Pavehawk helicopter lies at the bottom of a slope after crashing during a rescue effort. Photo Courtesy: Matt Weaver, Portland Mountain Rescue

Many associated with helicopter rescues believe that the Pavehawk pilot saved lives by directing his failing aircraft away from rescuers as he lost power. An Air Force crewman aboard the helicopter also prevented further injuries by cutting the winch cable attached to the rescue litter as the aircraft lost power, avoiding injury to the rescuers and victim alike.

During its many rolls down the mountain, two crewmembers were ejected and catapulted over the top of the aircraft, only to have the helicopter roll over them. The fact that it was mid-afternoon meant that the snow was soft, which likely was the reason that the crewmembers survived.

Contact with Main Rotor

An Arizona Department of Public Safety (DPS) flight paramedic was killed during a helicopter rescue near Sedona, Arizona on

October 13, 2008. 36 year-old Bruce Harrolle was struck by the main rotor blades during a rescue effort.



Arizona DPS Paramedic Bruce Harrolle (center) paid the ultimate sacrifice while rescuing a couple near Sedona Arizona. Photo: Arizona DPS

Ken Phillips, Search and Rescue Coordinator at Grand Canyon National Park reports:

The rescue helicopter with pilot and paramedic had responded from their Flagstaff base, at the request of the Sedona Fire Department, to provide assistance in locating two uninjured “stranded hikers” in the Bear Mountain area. While the helicopter responded, Sedona FD personnel visually spotted a male and female couple matching the description and DPS was asked to verify location and identity of the hikers.

The DPS crew landed near the hikers on Bear Mountain in a rugged drainage. The helicopter, which is equipped with high skids, landed with both skids on the ground, however the uneven terrain forced the pilot to maintain a “power-on landing” for

stability of the aircraft. Bruce escorted the male subject to the aircraft and was in the process of loading the female hiker, when the accident occurred. As he escorted her to the helicopter, they momentarily became physically separated on either side of a cactus. When they reconnected Bruce stood upright facing the helicopter from the twelve o’clock position and he was struck by the rotor blades.

According to the NTSB report, “The female hiker reported that after the paramedic motioned her toward him, he also pointed out a cactus to her, motioning for her to go around it. The hiker went around the cactus, and then stepped in front of the paramedic who now had his back to the helicopter. She then heard a loud sound and turned back toward the paramedic, and saw him lying on the ground. The paramedic had been struck by the main rotor blades.”

“Lack of a requirement for a risk assessment at any point during the mission”

On June 9, 2009 a New Mexico State Police Agusta A109 was attempting to rescue an uninjured lost hiker on the 12,632-foot Santa Fe Baldy Peak.

The State Police Dispatcher, ironically the wife of the helicopter pilot, had telephone communication with the hiker, Megumi Yamamoto. She directed the helicopter to her location. The pilot, Andy Tingwall, landed and shut down his helicopter. He exited the helicopter just before dark in an

attempt to locate the hiker. As he did so, he reported to the dispatcher that the weather was deteriorating and that “it’s gonna start snowing up here...” and he later added, “I’m not gonna spend a lot of time or we’re going to have two search and rescues.”

The pilot located the hiker, and helped her to the helicopter. The pilot decided to attempt to fly despite poor weather. Shortly after taking off, the pilot encountered clouds. Moments later, he radioed to the dispatcher, “We hit a mountain.” Flying under instrument meteorological conditions, the helicopter struck the mountaintop, and the aircraft rolled 900 feet down a rocky slope to near a lake below.

The 46 year-old pilot and his female subject died from injuries they sustained. The spotter survived, and was located the following morning as he attempted to hike from the rescue scene.



The crash site of the New Mexico State Police Agusta A-109E helicopter. NTSB photo.

Grand Canyon National Park search and rescue specialist Ken Phillips studied this accident in detail. Phillips reports,

“The deteriorating weather conditions were known in advance and the helicopter response lacked a formal mission briefing between all personnel involved. The incident commander had not dispatched and

was not in operational control of the helicopter during the mission. The flight crew was not prepared with adequate survival equipment to remain at the landing zone overnight.”

The NTSB report following this accident noted as contributory factors:

“The pilot’s decision to take off from a remote, mountainous landing site in dark (moonless) night, windy, instrument meteorological conditions. Contributing to the accident were an organizational culture that prioritized mission execution over aviation safety and the pilot’s fatigue, self-imposed pressure to conduct the flight, and situational stress.”

Most notably, and perhaps the greatest lesson for rescue personnel is the additional NTSB findings, which read,

*“Also contributing to the accident were **deficiencies in the NMSP aviation section’s safety-related policies, including lack of a requirement for a risk assessment at any point during the mission**; inadequate pilot staffing; lack of an effective fatigue management program for pilots; and inadequate procedures and equipment to ensure effective communication between airborne and ground personnel during search and rescue missions.”*

Ranger dies from fall after helicopter rescue

On June 21, 2012, Mount Rainier National Park ranger Nick Hall died while assisting in

a rescue of four climbers at the 13,800 foot level of Mt. Rainier. Hall was 33 years old.

The four climbers had summited earlier in the day and were descending when two of the party fell into a crevasse on the Emmons Glacier. The remaining climbers were able to arrest the fall, and one called for help by cell phone.

A Chinook helicopter from Joint Base Lewis-McChord removed three of the four climbers and transported them to Madigan Army Medical Center at the military base near Tacoma. They were hospitalized in fair condition.



**Mount Rainier National Park
Ranger Nick Hall.
Photo: Mt. Rainier National Park**

Hall had helped put the three climbers into the helicopter before he fell. Park Officials are investigating the cause of the fall.

Nick Hall had served as an avalanche forecaster at Yellowstone National Park and as an EMT for Washington's Stevens Pass Ski Area.

Trooper falls to his death after rescuing two hikers

On June 30, 2012, Utah Highway Patrol (UHP) tactical flight officer Aaron Beesley

responded to a call for two stranded teenagers on Mount Olympus. The UHP helicopter responded to the scene with its pilot, Trooper Beesley, and a Unified Police Department Officer.

The trooper loaded the two teens onto the UHP helicopter, an AS350-B2 aircraft. The pilot exited the scene with the plan to transport the hikers to safety and return for Trooper Beasley. When the pilot returned, Beasley could not be located.



**Utah Highway Patrol trooper Aaron Beesley died while performing a rescue of two stranded hikers.
Photo: Utah Highway Patrol**

Trooper Beesley, a 13-year veteran of the Utah Highway Patrol, is believed to have slipped and fell down a cliff while he attempted to retrieve his gear. "He was soon located at the bottom of a 90-foot cliff, unconscious on his back," Sheriff Jim Winder of the Unified Police reported.

An investigation into the accident is underway.

Rescue Victim Suddenly Becomes Rescuer

On Wednesday, July 5, 2012, Dr. (Major) Jeremy Kilburn, a U.S. Air Force Critical

Care Pulmonologist, was hiking a remote trail near Big Bear Lake, in the Shasta Trinity Forest when he fell. He sustained a fractured leg and dislocated ankle.

When the call for help came in, the California Highway Patrol (CHP) responded with one of its AS-350 B3 rescue helicopters. CHP Pilot, Officer Brian Henderson, and Flight Officer/Paramedic Tony Stanley were dispatched to the remote scene.



California High Patrol AS 350 B-3 Helicopter (Photo from Flickr)

When they arrived, Henderson was only able to land the aircraft on a small rock outcrop next to steep embankment. Officer Stanley exited the aircraft, and according to one report, removed his helmet and put on his medical vest. He then and apparently climbed up the embankment when he was hit in the back of the head by the main rotor blade – knocking him unconscious and causing severe bleeding.

The injured doctor who was awaiting rescue was able to get himself to the injured CHP Officer to render aid. Using the medical equipment available on the helicopter and his training as an Air Force trauma surgeon, Dr. Kilburn started an IV line, administered oxygen and worked with others to apply pressure to Stanley’s injuries to his skull to slow the bleeding.

CHP Commissioner Joe Farrow commented, “Dr. Kilburn fought through his own pain to save the life of our officer, highlighting the dedication of our military that put their life on the line every day for our country. Dr. Kilburn's actions were clearly above and beyond the call of duty. These individuals are not only heroes, they are guardian angels.”

Both injured men were flown to a Redding hospital. Dr. Kilburn was released. At the time of this publication, Paramedic Stanley was still hospitalized at Mercy Medical Center in critical condition.

Part 2 - Operator Error

As much as we focus on the proper use and limitations of technical rescue systems, the data for rescue accidents shows conclusively that our greatest risk for failure is the failure of the human element. This tells us we are doing an admirable job of evaluating our technical systems. In fact, data from the National Park Service indicates that there has yet to be a rescuer death during a mountain rescue caused by failure of the system itself.

Several examples of “operator error” follow below:

Rescuer dies on training

On January 11, 1964, Frederick C. Scheberies, a candidate member of the China Lake Mountain Rescue Group (CLMRG), was participating in an ice-climbing training for the CLMRG at the frozen cascade of the Middle Fork of Lone Pine Creek at Whitney Portal in the Sierra Nevada

Scheberies spent the morning session practicing various techniques including step-cutting and crampon use on gentle ice. He then joined the group to practice belayed ice axe arrests. Following that practice, he proceeded to the next station.

At 11:30 a.m., after reaching the area which was located directly below the second steep pitch of the cascades, other members of the party set up the belays to be used in the ice axe practice. Scheberies crossed the stream and delivered a rope to be carried farther up the left bank by another person. He returned pausing before reaching the

right bank, and attempted a steeper portion of the slope. After taking a long step, he lost his balance and fell forward, with his hands on the ice. His crampons slipped out and he fell, accelerating slowly, but making no attempt to arrest with his ice axe. After reaching a steeper portion, he lost the ice axe, and continued down the slope for 300 feet, somersaulting over the first practice pitch.

Those reaching the victim found him unconscious, bleeding from the mouth and ears and not breathing. A doctor was sent for, and mouth-to-mouth resuscitation and first aid for shock were administered, until the victim was pronounced dead (of a skull fracture) 40 minutes later. His crampons were found to be still tightly strapped and correctly positioned on his boots.^{xxvi}

Analysis of the Accident provided by China Lakes Mountain Rescue Group follows:

The location of the victim's fall was on ice whose gradual slope led the other members of the Group (who had practiced at this area on several previous years) to believe that a slip there would be improbable. Although it was recognized that the consequences of such a slip without a belay would be severe. The judgment of the situation by the trip leaders was further influenced by the capable use of crampons demonstrated by the victim prior to his fall. It must be recognized that gently sloping ice can appear to be deceptively easy, and that beginners especially must be belayed if a fall could result in injury, however low the probability of a slip might seem.^{xxvii}

Rescuer falls to his death on body recovery

On December 21, 1966 Richard Slates, an experienced member of the China Lake Mountain Rescue Group (CLMRG) was assisting in a recovery of Grant Trigg, a hiker who had been fatally injured after losing control while glissading down the eastern slope of Telescope Peak in Death Valley National Monument. Near the completion of the recovery, it became known that rescuer Slates was unaccounted for.

... the last information about Richard was that he had been inserted by helicopter on the ridge below the summit of Telescope. The helicopter could only take one passenger at a time. Richard apparently decided to go alone to where he felt the victim could be. Ironically he fell down the exact same chute that claimed the life of Grant Trigg.

The search for Richard started at 8pm on the 21st of December 1966. A team of two followed his tracks to the point where he fell. It was not steep at the spot where he fell, but it got very steep, very quickly. Somehow he lost his balance and was unable to use his ice axe quickly enough to stop his fall. He was wearing crampons and may have caught a crampon point on his trousers. Richard was an excellent mountaineer and rock climber and it is difficult to imagine him falling on such moderate terrain.^{xxviii}

Analysis of the Accident provided by China Lake Mountain Rescue Group follows:

This happened a long time ago and the lessons are clear. No person should venture off alone. Our radio capability

at that time was limited so everyone did not know the conclusion of the initial search in a timely manner. It is clear that Richard died after the initial victim had been found.

Yosemite climber dies in rescue

On October 14, 1968, climber Jim Madsen (20) and four others went to the top of El Capitan to go to the aid of two climbers who had been on the Dihedral Wall since Oct. 9. Madsen and another climber planned to rappel down from the summit to Thanksgiving Ledge and make contact with the climbers from there. Early the morning of October 15, they established a rappel anchor, and Madsen began his rappel with five ropes, two pairs of Jumars, carabiners and pitons, a radio, and two thermoses of hot soup.

Madsen tied a knot in the end of his 11mm rope, and rappelled using a 2,2 and 2-carabiner brake system. As he rappelled down, he somehow lost his rappel and slipped off the rope and fell to his death. He fell 2,500 feet.

The original climbers stated they were all right and they finished the climb under their own power.

“The party in general made several errors...There was no discussion about choosing a leader. Madsen was the youngest in the party and should have been more cautiously checked on all of his decisions. He did not feel a belay was necessary, but a critical view would have shown that one was, or at least had him apply a Jumar.^{xxix}”

Rescue fever was also sited.

Experienced rescuer walks off the trail and falls to his death

On May 23, 1977, two climbers, Larry Day (26) and Donald Evans (23), began an attempt to climb the Yosemite Buttress in Yosemite National Park. Although they each had some experience, neither was prepared for bad weather or an overnight bivouac. The two climbers stumbled up the route, and as rain fell, their problems increased. Ultimately, Evans fell and injured himself, and Day called for help. He was told that rescuers would be coming in the morning.

Six rescuers started walking up an established trail up Yosemite Falls at 3:30 a.m. the following morning in search of the ill-prepared rock climbers who had cried out in the dark. For an unknown reason, Yosemite volunteer Jack Dorn walked off a well-worn path and plunged 400-600 feet to his death. He had been wearing a portable tape player at the time of the accident.



Rescuers recover the body of Jack Dorn, who died in the line of duty while engaged in a rescue in Yosemite National Park. Photo courtesy Butch Farabee

Rescuer injured by falling Hang-glider

In June 1986, a novice hang-glider launched off Lookout Mountain in Golden Colorado, west of Denver. Lookout Mountain is very popular among hang-gliders and parasailers, as there are often favorable updrafts rising from this foothill of the Rocky Mountains.

Shortly after launching, the hang-glider crashed into a steep grassy slope, just ¼ mile from a road. Witnesses called for rescue, and the Golden Fire Department responded to the scene. While paramedics attended to the patient, firefighter Tom Young held on to the hang-glider itself, so that it would blow onto rescuers or tumble down the slope.

Suddenly a large gust of wind ripped the hang-glider from the slope. Instinctively, firefighter Young held on to it so that it would not blow onto rescuers or tumble down the slope, and he and the hang-glider were launched over a small cliff. Tom Young landed hard. Fellow rescuers ran to his aid and found him unresponsive, and without a pulse or respirations. They proceeded with CPR and now planned for an evacuation of two patients. Although the original subject had broken bones and internal injuries, Young's injuries were life threatening.

Attempts at CPR were successful at restoring Young's pulse, however he was unable to breathe on his own. Rescuers were able to evacuate him and he was transported to the hospital where he was placed on a respirator. Spinal assessment revealed a broken cervical spine with a fractured spinal cord.

As a result of his injuries, Tom Young is a quadriplegic. An active father, and community member, Young has remained with the Golden Fire Department to this

day. He has proven to be an inspiration for the Golden community, young and old alike.

Whether the gust of wind was weather-induced may never be known. The Jefferson County Sheriff's office had also launched its rescue helicopter in an attempt to lower rescuers to the scene. Some reports indicate that the helicopter's rotor wash may have caused the hang-glider to shift its position.

2 rescuers injured in 2 incidents one day apart

In early March 1994, in Shenandoah National Park, 2 students from a Smithsonian Institute Conservation and Research Center study group failed to return from a data-collecting hike. During the ensuing search, ranger Janice Pauley slipped on ice and slid 50 feet, breaking the radius and ulna of her left arm. The next day a 55 year-old park visitor slid on ice and suffered a fractured collarbone and other minor injuries. During the ensuing rescue, Ranger Bob Martin slipped and slid 60 feet, striking a tree. He suffered injuries to his back and ankle.

The Park later reviewed its rescue procedures to improve safety measures.^{xxx}

Asleep at the Wheel

On May 2, 1994, Lisa Hannon was working as Incident Commander for the State of Virginia. She was leading a massive search for a missing five year-old boy lost in the mountains. She worked all day and throughout the night.

On a "bright, clear morning" on May 3, Lisa left to drive home. Less than an hour after she left, she fell asleep behind the wheel, struck a tree and was killed.

Lisa Hannon was posthumously awarded the NASAR State Award for Virginia that year.



Lisa Hannon was a beloved member of the Virginia SAR community. Photo: Robert Koester

Search, Recovery, RESCUE!

Early in the morning of December 15, 1997, Alex Toubia headed out in the Tahquitz Peak area of California to try out some new in-step crampons he had just purchased.

After a few short hours of searching, two different Riverside Mountain Rescue Unit (RMRU) teams had located a set of in-step crampon tracks. From there, they ultimately found the subject, who had fallen 250 feet, coming to rest against a large pine tree. His injuries were fatal.

As the search transitioned into a body recovery, rescuers from San Geronio Search and Rescue Team joined the RMRU members. Early the next morning, a Riverside County Sheriff's Office Hughes 500E helicopter was called on to assist, and four rescuers were flown to the scene to conduct the recovery.

As the recovery was complete and the rescuers were assembling their gear, Tom Rutledge from Gorgonio Search and Rescue suddenly fell. Before he could self-arrest, Rutledge was traveling at a high rate of speed down a 50-degree ice chute.

“I paused to catch my breath and check on the progress of those behind me, when I heard someone yell. As I looked back at the recovery site, Tom Rutledge from the San Gorgonio team had fallen and was sliding feet first on his stomach down the steep snow chute we had just recovered Mr. Toubia from. I yelled for him to self arrest with his ice axe, but within a matter of seconds he must have accelerated to 40 mph. Tom was heading straight for a large Ponderosa Pine which I thought might stop his fall. When he hit the tree, it knocked him completely out of control. Now, with or without his ice axe there was nothing he could do. He continued to pin-ball off of trees and rocks for about 1,000’ until I lost sight of him.”^{xxxii}

The rescuer “had come to rest face down in some tree branches about three feet off the ground. He was unconscious and bleeding from the mouth.” Having just transported the fatally injured subject, the Riverside Sheriff’s helicopter returned to the scene with a Stokes litter, and the subject was packaged and loaded in a difficult one-skid maneuver.

Rutledge was at Desert Hospital within 29 minutes of the accident.

Tom Rutledge spent the next two weeks in a coma with several broken bones, including cracked ribs, a ruptured spleen, and severe head and neck injuries. We are very glad to be able to report that Tom came out of his coma on New Year’s Day 1998.^{xxxiii}

For their bravery in rescuing Rutledge, RMRU members Bob Baker and Lee Arnson

were awarded the Medal of Valor for bravery and heroism by the San Bernardino County Sheriff’s Department. RMRU member Henry Negrete and Riverside Aviation Unit pilot Tony Bowen received letters of commendation for their roles in the rescue.

“Largely due to this accident, the San Bernardino County Sheriff’s Department instituted a system of training and performance standards (individual and team-based) for all SAR teams in the county.”^{xxxiii}

Denali VIP dies in fall

On May 24, 1998, a Canadian climber, Daniel Rowarth, fell towards the Peters Glacier while descending the popular West Buttress route of Mt. McKinley at roughly 16,900 feet. He and his partner were attempting to get back to 14,000-foot camp in worsening weather.



While on patrol on Mt. McKinley, volunteer ranger Mike Vanderbeek fell to his death while trying to rescue another climber that he had seen fall. Photo courtesy Gerry Vanderbeek

Mike Vanderbeek, an experienced climber and course director for the Colorado Outward Bound School's Alaskan program, was working as a Denali National Park Volunteer Ranger at the time of the accident. He and his partner Tim Hurtado had been descending the West Buttress route when Hurtado saw the Canadian climber fall. Hurtado radioed Chief Climbing Ranger Daryl Miller at the 14,200-foot camp for permission to join Vanderbeek and go after the fallen climber. Vanderbeek crossed 100-feet of the route and located the fallen climber's ice ax.

Hurtado reported that as he and Vanderbeek down-climbed in an attempt to locate Rowarth, Vanderbeek lost his footing on the steep ice. Denali rescuers searched for four days – they found the Canadian – who had died - but never found Vanderbeek. Mike Vanderbeek, who had grown up in Talkeetna, and served as a VIP once before, was a very experienced climber

The National Park Service convened a “serious accident investigation team” which included Ralph Tingey, an NPS official and long-time climber, and Renny Jackson, supervisory climbing ranger at Grand Teton National Park.

The team cited the possibility that “rescue fever” played a role, stating “It is most common among people who have not had experience in emergency situations. The heightened sense of urgency produces a desire for speed and a sacrifice of personal safety.” They did note Vanderbeek's vast climbing experience.

Mike Vanderbeek was a very experienced mountaineer with a long resume of difficult climbs on various high altitude peaks, including Mt. McKinley.^{xxxiv}

Part 3 - Equipment Failure

Listed in the preceding pages are dozens of rescue accidents that involve aircraft and most often include operator error.

Thankfully, there are few occurrences of rescue accidents in which equipment failed... and for the few that do exist, most of them involve misuse of the equipment.

Tragedy on Mt. Rainier

On August 12, 1995, John Craver broke his ankle in a fall on the Emmons Glacier, just 900 feet from the top of Mt. Rainier.

Craver's two companions returned to Camp Muir, stating they left the injured climber with all their extra food, water, and clothing.

Park officials were concerned that the injured climber had been left alone by his partners, especially given that the subject was erroneously reported as being "shocky."

Three rescuers set out for the injured climber at 7:00 p.m. The rescuers included Sean H. Ryan (23) a seasonal climbing ranger with 11 ascents of the peak, and Philip J. Otis (22), a Student Conservation Association aide. A weekend SAR volunteer accompanied the two, but feeling ill, the volunteer turned around after 30 minutes.

At 11:25 p.m., Ryan radioed that the two rescuers were at 12,900 feet, that it was cold and windy, and although they were having crampon problems, they would continue. They expected to reach Craver by 1:00 a.m.

All attempts to contact the two men after that last transmission were unsuccessful. Leaving Camp Muir just after midnight, the second rescue team reached Craver five hours later; Ryan and Otis had never arrived.^{xxxv}

Later the next day, a climbing party found an NPS ice axe and part of a crampon at the 13,000-foot level on the Winthrop Glacier. The bodies of the two rescuers would be found 1,000 feet below that location. They had fallen to their death.

The rescuers reported having crampon problems, and given that part of a crampon was found at the spot where they presumably fell, it is clear that equipment failure was contributory cause of this tragedy.

Part 4 - Mother Nature

“We don’t deserve to be here!”

On January 25, 1982, 17 year-old Hugh Herr and 20 year-old Jeff Batzer climbed Huntington Ravine on the northeast side of Mt. Washington – well known for its extreme weather. Herr had climbed the Exum ridge of the Grand Teton at age thirteen. At the last minute, they ditched a pack with their bivy gear, a compass, and camera on the trail. Descending in a whiteout, they mistakenly went by way of the vast wilderness of the northeast ridge, not the southeast ridge as they had thought.

A solid 5.11 climber, 28 year-old Albert Dow was an instructor at the EMS Climbing School in North Conway. He and Michael Hartrich were part of New England’s Mountain Rescue Service sent to look for Herr and Batzer. Dow and Hartrich found the lost climbers’ trail. While the two were searching, a 3-foot slab avalanche ran down a 30-degree slope and overtook the pair. 70-feet wide and 100-feet long, the avalanche buried Dow completely.

Enveloped and buffeted by white, Hartrich fought to stay afloat. He was dragged through a forest of birch and fir trees and felt some break as he hit them.^{xxxvi}

Hartrich, mostly buried, was able to reach his radio and call for help. Within 25 minutes, two rescuers arrived to dig out Hartrich. 90 minutes after the accident they found Dow.

There was no sign of there having been any respiration while buried and CPR produced

no results. It was apparent from his obvious injuries that he had hit a number of trees.

“He had broken his back, shoulder and several ribs. They tried CPR for 30 minute to no avail. A deep cut had not bled... he was killed instantly.^{xxxvii}”

Late in the afternoon of the fourth day, a night manager for the Appalachian Mountain Club who had gone snowshoeing found Herr and Batzer. Just before dark, the two were evacuated by New Hampshire National Guard Huey helicopter using the jungle penetrator for Jeff, and a stokes litter on winch for Hugh. Hugh’s legs were frozen from the knees down, and Jeff had one frozen foot. Herr lost both legs below the knee.

“Since the avalanche, the members of the search and rescue team have purchased Pieps radio beacons and have taken a course in avalanche forecasting from the American Avalanche Institute. Yet, any of us involved in search and rescue know that, even with the best knowledge available, there will continue to be times when, because an individual or group is in need of assistance, chances such as Dow and Hartrik took will be necessary^{xxxviii}.”

After learning that Albert Dow was killed in avalanche searching for them, Jeff Batzer said, “We don’t deserve to be here.”

Hugh Herr is now an instructor at Harvard’s Spaulding Rehabilitation Hospital, and a recognized expert in developing prosthetics for amputees.

Rescuers swallowed by crevasse while eating lunch

In October 23, 1978, members of Seattle Mountain Rescue Council for searching for two overdue climbers on Mt. Baker. Al Errington, one of the rescuers injured during that effort, submitted the following report. Strangely, it is not the only reported training accident that took place while the rescuers were eating lunch.

As the rescue team ascended the Coleman Glacier they checked crevasses and bergschrunds looking for signs of the missing climbers. At about midday SMR members Al Errington and Joe Kassuba proceeded to check a very big bergschrund below a glacial rock-island. After we checked this 'schrund, which was too deep to be checked in its entirety, we decided that it was time for lunch. So, we descended about 30 feet downhill from the edge of the schrund, took off our packs and began to eat lunch. We were roped together, but sat down next to each other, with the rope coiled beside us.

We had just began (sic) to eat when our entire region of the glacier calved-off and collapsed into the schrund. We fell backwards through the air and I recall feeling completely certain that we were dead, as the schrund had no apparent bottom when we had earlier examined it. However, the blocks of ice somehow jammed in the schrund and formed a basin about 30 feet down.

When I landed I was flat on my back amongst large blocks of ice. I couldn't see Joe and assumed that he had fallen into the depths of the schrund. Then, I heard a very loud groan and cautiously rolled over to find Joe draped over an ice block, screaming in pain. I prepared to go to Joe, but realized that

we were still roped together. So, I got out my jack knife to cut the rope, which went from my waist under the surrounding ice blocks. I quickly realized that the falling ice had completely sliced through the rope.

Happily, my radio, which had been sitting on top of my pack during lunch, was still sitting on my pack, which had been transported, intact, to my impact spot. I called for assistance and Joe and I were extricated from the 'schrund and Joe was transported, by helicopter, to a hospital. He suffered a fractured pelvis, fractured ribs and a collapsed lung as the result of puncturing by a rib.^{xxxix}

When asked about the final disposition of the missing climbers, Errington reported that, "They walked out, unharmed, later in the day of our accident. They had gotten lost in bad weather and descended the wrong side of the mountain."

Ice fall kills rescuer

On March 24, 1998, two rescue mountaineers from Las Vegas Metro Police Department Search and Rescue had just descended from a frozen waterfall where they had been engaged in an ice climbing training. They were on Echo Face near the Cathedral Rock area. Suddenly, thousands of pounds of ice fell on them, narrowly missing a rescue team volunteer, and killing Russell Peterson, an eight-year veteran of the police department and the Search and Rescue Team.



Members of Las Vegas Metro Police Department Search and Rescue recover the body of their teammate, Russell Peterson, while family members look on. Photo courtesy the Las Vegas Sun

Peterson, who had been on countless SAR missions for LVMPD over the years, was killed immediately. His partner hiked two hours to notify authorities.

Rock fall injures rescuers, again during lunch!

On March 7, 2001, a group of rangers from Arches National Park were performing technical rock rescue training. A report from the Park indicates that a rock estimated between 30- and 40-feet fell nearly 300 feet from the top of a cliff. It broke into smaller pieces on its way down, causing a loud noise.

The noise alerted six people who were directly below, sitting down to take a lunch break. They scattered just before the rock hit the ground a few yards behind the lunch location and exploded. Two park employees were injured. Andrew Fitzgerald was knocked to the ground by flying debris and suffered a head injury and multiple lacerations; Lee Kaiser, who was not among the six,

injured his leg slightly while trying to get away from the flying rock. Fitzgerald was treated for his injuries, secured to a litter, lowered over the side of a 100-foot cliff to a second team, then transported a quarter-mile cross-country to a waiting ambulance. His injuries turned out to be relatively minor, and he was released from the hospital later that afternoon. Rain had fallen off and on for several days prior to the training session.

Examination of the release site at the top of the cliff revealed that a large sandstone flake had simply let go of the surrounding rock. The rain-weakened condition of the sandstone, an existing crack in the rock, and freeze-thaw conditions typical of late winter in the area are thought to have been the primary reasons for the natural release.^{x1}

Conclusion

This program has been compiled using reports from Mountain Rescue Association members and teams nationwide, as well as reports from Death, Daring and Disaster, (DD&D) by C.R. "Butch" Farabee. The report "Keeping the Skies Safe," by Grand Canyon National Park's Ken Phillips also provided valuable data and insight.

Analysis of the accidents has been provided by witnesses and subjects alike, as well as from Accidents in North American Mountaineering, an annual publication of The American Alpine Club. The National Transportation Safety Board reports were also evaluated, when available.

Acknowledgements

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