Aviation Investigation Final Report

Location:	Mount Charleston, Nevada	**Accident Number:**	WPR13GA338
Date & Time:	July 22, 2013, 22:20 Local	**Registration:**	N233JP
Aircraft:	Bell HH-1H	**Aircraft Damage:**	None
Defining Event:	External load event (Rotorcraft)	**Injuries:**	1 Fatal, 5 None
Flight Conducted Under:	Public aircraft		

Analysis

The purpose of the flight was to rescue a stranded hiker from the side of the mountain in dark night conditions. Once on scene, the pilot, copilot, hoist operator, and two rescue crewmembers briefed that one of the rescue crewmembers would be lowered down to the hiker and that he would then help the hiker into the strop harness. The rescuer was to remain attached to the hoist hook that was attached to his sit harness via a carbineer throughout the rescue operation, which was planned to take about 30 seconds. The hoist hook had three attachment points: a main hook, a secondary hook, and a utility eye; it is likely that the rescuer's sit harness was attached to the main hook and that the strop harness was attached to the utility eye.

The hoist operator reported that, after the rescuer was lowered down to the hiker, he observed the rescuer helping the hiker into the strop harness. The hoist operator then told the pilot that he would be cleared to move the helicopter to the left and aft to clear the rock face as soon as he "had the load." The hoist operator added that he saw the rescuer signal to begin the hoisting operation.

The hiker reported that the rescuer put him into the harness while remaining attached to the hoist hook. He stated that the rescuer was moving purposefully and that his actions appeared very deliberate. The rescuer then told him to stand up, and he heard what he thought was the sound of a carabineer unclipping. It is likely that the rescuer's carabineer inadvertently became disengaged or partly disengaged from the hoist hook at this point. As the cable started moving upward, the hiker then noticed that the rescuer began rushing his actions, likely indicating that the hoist operation had begun before the rescuer was ready. As the hook was ascending, the rescuer grabbed both of the hiker's hands and placed them on the harness just below the hoist hook, which was at the hiker's eye level, and told to the hiker to hold on.

During a rescue using a strop harness, the rescuer is supposed to leave the ground first. However, the hiker reported that his feet left the ground first while the rescuer remained on the ledge. The hiker then started to rotate and move away from the rock face. While moving away from the rock face, the hiker

felt the rescuer grab him around his waist and then slide down his body until the rescuer fell, which resulted in his death. The hiker was hoisted into the helicopter and was uninjured.

Examination of the harness and hoist hook revealed no damage that would have precluded normal operation. The hoist's main and secondary hooks did not have self-locking safety mechanisms; this design could allow a carabineer to travel upward against the hoist hook's nonlocking safety latch and inadvertently disengage the hook. Given the hiker's statement about hearing a carbineer unclipping and the rescuer's subsequent fall, it is likely that the hoist hook inadvertently disengaged from the rescuer's harness.

The helicopter was not equipped to allow direct intercommunications between the hoist operator and the rescuer. Therefore, once the rescuer departed the helicopter, the only effective communication between the hoist operator and the rescuer was hand signals. Although the hoist operator was using night vision goggles during the flight, the dark night conditions likely limited his detail vision and made it difficult to see the rescuer's hand signals. The lack of direct audio communications between the hoist operator and the rescuer prevented the rescuer from being able to report a problem after the hoist operation began and might have contributed to the hoist activation occurring before the rescuer was ready.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The premature hoisting operation and the inadvertent disengagement of the hoist hook on the rescuer's harness in dark night conditions. Contributing to the accident was a lack of direct audio communication between the rescuer and the hoist operator.

Findings

Personnel issues	Incorrect action sequence - Flight crew
Aircraft	Agricultural/external load sys - Unintentional use/operation
Personnel issues	Lack of communication - Not specified
Environmental issues	Dark - Effect on personnel

Factual Information

History of Flight

Maneuvering-hover	External load event (Rotorcraft) (Defining event)

HISTORY OF FLIGHT

On July 22, 2013, about 2220 Pacific daylight time (PDT), a rescue officer was fatally injured during a rescue hoist operation from a Bell HH-1H helicopter, N233JP, near Mount Charleston, Nevada. Las Vegas Metropolitan Police Department (LVMPD) was operating the helicopter as a public-use aircraft flight. The flight crew consisted of two commercial pilots and three crewmen: a crew chief/hoist operator; and two rescue officers. The helicopter sustained no damage. The local flight departed North Las Vegas, Nevada, about 2150. Night visual meteorological conditions prevailed, and no flight plan had been filed.

According to the operator, the mission was to rescue a stranded hiker from the side of a mountain. During the hoist back to the helicopter, the rescue officer fell and was fatally injured. The civilian hiker was recovered to the helicopter via the hoist without injury.

The hiker reported that while hiking in the area of Mount Charleston, he became trapped on a rock outcropping. He contacted the 911 operator using his cell phone, and was told that LVMPD would send help and to remain where he was.

The hiker reported that once the rescue helicopter arrived, he watched as the rescuer was lowered. After the rescuer landed on the outcropping, the hiker was directed to remain in a crouched position as the rescuer put him into the harness. The hiker stated that the rescuer was moving very purposefully and his actions appeared very deliberate. He noted that the rescuer remained attached to the hoist hook while the hiker was put into the harness. The rescuer then told him to stand up. As the hiker stood up, he heard what he thought was the sound of a carabineer unclipping. The hiker stated that he was looking up at the helicopter, and the cable started to move. He never saw the rescuer make any indications to the helicopter that they were ready to be hoisted, but he did not know what those hand signals would have been. As the hoist cable was coming up, the movements of the rescuer changed cadence. The rescuer appeared to be rushing his actions. The hiker stated that as the rescue hook was at about his eye level, the rescuer grabbed both of his hands and placed them onto the harness below the hook. With a determined look on his face, the rescuer indicated everything was going to be okay, and directed him to hold on tight.

The hiker stated that as his feet left the ground, he started to rotate and move away from the rock face. The rescuer was still on the ledge behind him as he was lifted off the ground. As they moved away from the rock face, he felt the rescuer grab him around the waist. The hiker felt the rescuer sliding down his body until the rescuer fell away. The lift continued, and the hiker was hoisted into the helicopter. Subsequently they landed, and he was taken off the helicopter.

PERSONNEL INFORMATION

PILOT

The 45-year-old pilot held a commercial pilot certificate with ratings for airplane single-engine land, rotorcraft, and instrument airplane and rotorcraft. The pilot held a certified flight instructor (CFI) certificate with ratings for helicopter.

The pilot held a second-class medical certificate issued on July 31, 2012. It had no limitations or waivers.

The pilot had a total flight time of 2,754 hours, with 100 hours in the last 90 days, and 35 in the last 30 days. He had 90 hours in the accident helicopter make and model. He completed a biennial flight review on January 10, 2012.

The pilot reported that he had 145 hours of rescue flight time, which included training time. He had completed 38 rescues in his 2 years as a rescue pilot for LVMPD.

The pilot was interviewed following the accident and related that he was assigned as the pilot-in-command of Rescue Air-6. He was dispatched with a co-pilot and three rescue crew members to the area of Mount Charleston to rescue a hiker who was trapped on a ledge.

The pilot, co-pilot, left-side rescue crew member, and the hoist operator were all utilizing Night Vision Goggles (NVG) during the rescue operation.

Once on scene, the crews briefed that they would lower the rescuer down to the hiker, and use the strop harness to recover the hiker. The rescuer briefed that he would remain attached to the hoist during the operation.

After the rescuer had been lowered to the hiker, and before being hoisted up, the hoist operator advised the pilot that as soon as they had the load he would be cleared to move to the left away from the mountain face.

Shortly after the rescuer signaled to begin the hoist, as the helicopter was moving to the left, the hoist operator stated on the intercom that the rescuer had fallen. The pilot related that the hoist operation continued as the hiker was recovered into the helicopter. After a few minutes of trying to locate the fallen rescuer, the pilot landed the helicopter at the staging area, which had been set up for the rescue, and off loaded the hiker.

The pilot and crew made one more attempt to locate the rescuer before another flight crew arrived and took over the search and ultimately the recovery operation.

CREW CHIEF/HOIST OPERATOR-(HOIST)

The crew chief/hoist operator's assignment was to operate the hoist from the right side of the helicopter and to assist the pilot in maintaining proper clearance from the mountainside.

The hoist operator related that once they arrived on scene, an assessment was done after they saw where the hiker was located. The rescuer suggested that they use the strop harness, and the rescuer stated he would remain attached to the hoist hook during the rescue, which was estimated to take about 30 seconds. After configuring the rescuer with the strop harness, which was attached to the hoist hook, the rescuer was lowered down to the hiker.

The hoist operator could not directly see what the rescuer did as his back was to the hoist operator, but the rescuer's movements were consistent with the rescuer putting the strop harness onto the hiker. The hoist operator was verbalizing to the flight crew what he was observing using the helicopter intercom. During this time, the hoist operator informed the pilot that as soon as the pilot "had the load," he was cleared to move left and aft to clear the rock face.

The hoist operator stated he saw the rescuer signal to begin the hoisting operation. The hoist operator watched the hiker, who was facing the helicopter, and the rescuer, who had his back to the helicopter. The hiker was observed holding onto the strop harness and looking up at the helicopter. The rescuer was relaxed and looking up at the hoist operator, just like a typical rescue. As the hiker and the rescuer lifted off, they started to rotate, which is normal as the hook can free spin. The hoist operator saw the rescuer was positioned a little bit higher on the hook and was above and behind the hiker's left shoulder. As they came off the ground, the hoist operator cleared the helicopter away from the mountainside. The hiker was closest to the mountainside, and the rescuer was closest to the drop off. As he was operating the hoist, the hoist operator felt the weight on the cable change, and he watched as the rescuer fell.

SEARCH AND RESCUE OFFICER-(SAR Officer)

The SAR officer's assignment was as the left side crew member. As such, he helped with whatever was needed inside the helicopter and monitored clearance on the left side of the helicopter.

The SAR officer related that most hoist rescue operations would be accomplished using a standard body harness, which is a pre-sewn harness with quick-attach buckles. Generally the rescuer would be lowered to the victim, detach from the hoist hook, and signal for the hook to be recovered. The helicopter would then move away to allow the rescuer to communicate and harness the victim. The rescuer, when ready, would signal to the crew, and the helicopter would return and lower the hook to the rescuer. The rescuer would attach the hook to the victim who would then be hoisted to the helicopter. Then the hook would be returned to the rescuer, and he would be hoisted to the helicopter.

Because of the location of the hiker, the rescue crew decided it would be better if the rescuer remained attached to the hoist hook and used the strop harness. The strop harness is like a horse collar with a crotch strap. The strop harness is normally used for water rescues, but they felt it would allow for a rapid recovery. The pilot agreed that he could hoist two people since they had the left side SAR officer to counterbalance the load.

The SAR officer did not take notice of how the rescuer and the strop were attached to the hoist hook. However, he stated that the normal configuration that was used by LVMPD was that the rescuer was attached to the large hook and the strop harness was attached to the small eyelet at the base of the hoist hook with a locking carabineer.

The SAR officer could not see the hoist operation from his side of the helicopter. He stated everything appeared normal until the hoist operator reported that the rescuer had fallen. At that time, the SAR

officer looked under the helicopter from the left side and saw the rescuer tumbling down the mountainside.

AIRCRAFT INFORMATION

The helicopter was a Bell HH1H, serial number 70-2478. The operator reported that the helicopter had a total airframe time of 6,630 hours at the time of the accident.

The helicopter was being operated by LVMPD under the public-use exemption. The helicopter was equipped with night vision lighting as LVMPD received it from the military. The helicopter was not certified for night vision goggle operations. Nor was it required to be certified per Federal Aviation Administration (FAA) regulations.

The helicopter was equipped with the Lucas Aerospace Cargo System, Part number (PN)-527KES; the boom assembly - Goodrich Corporation, PN-82402ASSY42305-300 and the winch assembly - Goodrich Corporation, PN -00462ASSY42305-103. The hoist hook, PN 42305-283, was the original hook that was supplied with the hoist system when purchased and installed by LVMPD.

Post-accident examination of the hoist, winch, and harness connections revealed no abnormalities.

The hoist hook, PN 42305-283, when originally installed with the hook kit was identified as PN 42315-785, and has the following ratings per UTC Aerospace Systems, the distributor for the hoist system: The main hook was rated for 3,000 pounds; the secondary hook was rated for 1,000 pounds; and the eyelet was rated for 1,500 pounds. The hoist was rated for 600 pounds, and had been designed for a 1,800 pound limit and a 2,700 pound ultimate load.

The accident hoist hook had gates to prevent disengagement of the load from either the main hook or the smaller hook. The gates were not locking gates, which would prevent a dynamic rollout occurrence.

METEOROLOGICAL INFORMATION

The closest official weather observation station was North Las Vegas Airport, Las Vegas, Nevada (VGT), which was 22 nautical miles (nm) east of the accident site. The elevation of the weather observation station was 2,205 feet mean sea level (msl). An aviation routine weather report (METAR) for VGT was issued at 2153 PDT. It stated: Wind from 110 degrees at 6 knots; visibility 10 miles; skies clear; temperature 33/91 degrees Celsius/Fahrenheit; dew point 14/57 degrees Celsius/Fahrenheit; and altimeter 29.93 inches of Mercury.

COMMUNICATIONS

The accident helicopter was not equipped to allow direct intercommunications between the hoist operator and the rescuer. The only direct communication available was by hand signals.

Federal Aviation Administration regulation Part 133.45(e)-(2) requires direct radio intercommunications among required crewmembers. However, LVMPD, being a public-use agency, was exempt from this regulation.

MEDICAL AND PATHOLOGICAL INFORMATION

The Clark County Coroner completed an autopsy of the rescuer on July 23, 2013, and determined the cause of death to be a result of multiple blunt force injuries due to a fall.

TESTS AND RESEARCH

Investigators examined the helicopter and the hoist system at the hangar facilities of the LVMPD, on August 8, 2013. The examination revealed no mechanical anomalies.

The rescuer's harness and the hoist hook were sent to the NTSB materials laboratory for analysis. A copy of the report is attached to the accident docket. No anomalies were noted in the report.

ADDITIONAL INFORMATION

The National SAR Academy Training Manual, dated 10-23-2013, Page 46 Described UNINTENTIONAL DISENGAGEMENT (Dynamic Rollout) as follows:

The inadvertent release of a load or "rollout" from a hoist hook can occur when a carabineer or attachment D-ring travels upward, through possible load relief, and rides up against the safety latch of the hoist hook. This reversal up over the point of the hook puts pressure on a non-locking safety latch, which can self-release the load. A fatal accident occurred in December 1995, when a rescue strop separated from the hoist hook of an Australian Navy S-70B-2 helicopter. The hoist hook was relieved of the weight of the load, when it touched the ground before being hoisted up, thereby permitting the connection point to become dangerously oriented across the non-locking gate of the hoist hook. This dangerous phenomenon can be prevented through the use of attachment rings, which do not permit reversing over the point of the hook, and the use of auto-locking hoist hooks.

QUICK STROP

The Lifesaving Systems Corp. Quick Strop Model 214 is placed under the arms, around the back, or over the head of a subject. It can be deployed quickly around a subject. The quick strop has a friction slide that can snug the strop around the subject. There is a length-adjustable strap that is folded into a pocket on the back of the quick strop. The strap terminates in a snap hook. This strap is routed between the survivor's legs and then clipped into the friction slide when the survivor is unconscious.

Note: The United States Coast Guard required the use of the crotch strap when an unconscious, unresponsive, or incapacitated subject while being hoisted.

Caution: Deploying a rescue strop to a subject without the aid of a rescuer was not recommended. Rescue strop recovery without proper application had resulted in subjects falling out of the device during extraction with fatal consequences.

When a rescuer has deployed a rescue strop on a subject and is beginning to be extracted, the rescuer will be elevated above the subject. This would mean the rescuer would leave the ground first and the subject would be a few feet below, depending on the length of the rescue strop.

As a result of this accident and the subsequent investigation, the LVMPD has modified their aviation program and a copy of the current changes as of June 30, 2014, and are included in the accident docket. Some of the changes made were as follows:

The accident rescue hook was replaced with a rescue hook with a self-locking safety mechanism, which requires the rescue personnel to manually disengage the locking safety before the hook gate can open. The locking rescue hook will prevent an unintentional disengagement event.

The implementation of standardized hand signals between rescue personnel and air crew members and the use of new two-way communication equipment between the hoist operator and the rescue personnel.

To improve visibility all SAR personnel are now wearing high visibility clothing, and the use of reflective tape on helmets, and to utilize chemical light sticks and helmet lights during night operations.

Pilot Information

Certificate:	Commercial; Flight instructor; Private	**Age:**	45
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	July 31, 2012
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 10, 2012
Flight Time:	2754 hours (Total, all aircraft), 90 hours (Total, this make and model), 2604 hours (Pilot In Command, all aircraft), 100 hours (Last 90 days, all aircraft), 35 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial; Private	**Age:**	40
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	July 30, 2012
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	July 27, 2011
Flight Time:	1150 hours (Total, all aircraft), 0 hours (Total, this make and model), 974 hours (Pilot In Command, all aircraft), 107 hours (Last 90 days, all aircraft), 34 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Other flight crew Information

Certificate:	None	**Age:**	
Airplane Rating(s):	None	**Seat Occupied:**	None
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	None	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	0 hours (Total, all aircraft), 0 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N233JP
Model/Series:	HH-1H	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	None	**Serial Number:**	70-2478
Landing Gear Type:	Skid	**Seats:**	15
Date/Type of Last Inspection:	December 6, 2012 Continuous airworthiness	**Certified Max Gross Wt.:**	9500 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	6630 Hrs at time of accident	**Engine Manufacturer:**	Honneywell/Lycoming
ELT:	Not installed	**Engine Model/Series:**	T53-L703
Registered Owner:	LAS VEGAS METROPOLITAN POLICE DEPARTMENT	**Rated Power:**	1800 Horsepower
Operator:	LAS VEGAS METROPOLITAN POLICE DEPARTMENT	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	VGT,2205 ft msl	**Distance from Accident Site:**	22 Nautical Miles
Observation Time:	21:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	110°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.93 inches Hg	**Temperature/Dew Point:**	33°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	North Las Vegas, NV (VGT)	**Type of Flight Plan Filed:**	Company VFR
Destination:	North Las Vegas, NV (VGT)	**Type of Clearance:**	None
Departure Time:	21:50 Local	**Type of Airspace:**	

Airport Information

Airport:	NORTH LAS VEGAS VGT	**Runway Surface Type:**	
Airport Elevation:	2205 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal, 4 None	**Aircraft Damage:**	None
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 5 None	**Latitude, Longitude:**	36.278331,-115.670829(est)

Administrative Information

Investigator In Charge (IIC):	Jones, Patrick
Additional Participating Persons:	John Waugh; Federal Aviation Administration; Las Vegas, NV Patrick Neville; Las Vegas Metropolitan Police Department; Las Vegas, NV
Original Publish Date:	December 14, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=87555