Photo by PH3 Kevin S. O'Brien. Modified.

Mountain Shadow

By Lt. Lamar Hardy

It was a standard Navy day, at least to me it was. You know, rolling out of your mosquito-net-guarded cot in a hangar of 500 Soldiers and Sailors in a city where the nearest ocean was an eight-hour flight away.

The HSC-26 Det 1 "Desert Hawks" were deployed in support of the Pakistan earthquake relief. We had been living the high quality of life our Army advertises. Our living facility was a single hangar that had been transformed into barracks. The hangar had no running water, so we took three wooden pallets and tied down 100-gallon coolers on top to make showers. We ate chicken and rice three times a day. The flight tempo had been high, and with our two aircraft detachment, we were rotating three crews for nearly seven hours of flight time, per aircraft, each day. After supporting the relief effort for two weeks, my crew was used to our new way of life.

The days began with a 0500 formation and intelligence brief. These formations generally were made of mixed aircraft, and for my flight today, we were flying a three aircraft formation of one Army CH-47, one Navy MH-53, and my MH-60S Dash 3. Our first of many missions of the day was to depart the airfield at Qasim, fly 10 miles north of Chaklala to pick up the cargo load, and then get further tasking. After we arrived at Chaklala and received our tasking, the formation departed for our second predetermined LZ flight to the north to drop food and other essential items.

The CH-47 and MH-53 are much larger aircraft than the MH-60S, so the landing zones are more limited. Because our aircraft and cargo load were much lighter, we had to take the supplies to the houses not accessible by vehicles. During our briefing at Chaklala, we were told our drop zones were uncontrolled. We would have to fly low passes or come into a hover to unload our supplies, while our playmates landed at their controlled LZs to unload. Because our flight time was higher than the rest of the flight, I decided to get a full bag of gas: 3,700 pounds.

We launched from Chaklala and verified our calculations via power checks. We used our calculations and actual numbers to determine the max altitude we could perform our drops. The first two missions were unevent-

ful, and we flew to the drop zone. After unloading our cargo, we landed at one of the other controlled LZs to pick up any other survivors who required priority medical attention. Upon returning to Chaklala, we would unload the survivors, shut down for gas, and reload cargo.

We received our ops brief, and were prepared to depart for the third and final mission of the day. This flight would take us farther north into the Himalayans than we had been previously. We determined our max LZ altitude to be around 7,000 feet. As expected, flights into the Himalayans are surrounded by mountains towering more than 15,000 feet. This leg had us crossing high-altitude ridge lines, including the last ridge line at 9,500 feet. From there, we'd split our flight, so our playmates could land and unload while we continued our flight and unloaded supplies. Weather was not a factor, with the temperature around 15 degrees Celsius, and only a scattered layer well above 10,000 feet.

Before entering any LZ, we would verify wind direction and perform a max-power check. To obtain the wind direction, we would use our embedded global-positioning system/inertial-navigation system (EGI), and use any available flags or trees to verify that information. For this leg of the flight, we were fortunate to have a Pakastani-made LZ (rocks laid on the ground in the shape of an H, with a wind sock).

Our EGIs had indicated winds out of the southwest, while the windsock indicated the winds were out of the east. Because the windsock rarely lies, we used this as our main indicator for true winds. From there, we would set up for an approach to the LZ into the wind and perform our second max-power check. Our margin of safety was a 5-percent buffer to allow for a waveoff. The LZ of choice was on the upwind (according to the EGI) side of the valley, at nearly 6,500 feet MSL.

After completing the max-power checks, we noted we were pulling 102-percent torque. Our calculated max torque was 104 percent, which left us only a 2-percent margin of safety. Because of this situation, we continued down to 5,000 feet MSL, where we found another LZ, this time on the downwind side of the valley. The wind appeared to be the same as the previous LZ, as we set up for our power checks. Power in a hover-out-of-ground-effect (HOGE) indicated 82 percent, which gave us more than a 20-percent margin of safety.

The LZ of choice this time was a football-sized piece of farmland, with terraces approximately three-to-four feet high. These terraces appeared to be nearly 25 to 50 feet wide, stretching and descending down the valley. The eastern, western and northern perimeter of the LZ was outlined with low-lying wires about 20 feet high. The southern side of the perimeter was our 9,500-foot ridge line that was nearly vertical. The north end of the LZ, in the center of the valley, was the river bed. With these factors considered, we briefed the approach and discussed that our waveoff route would be toward the center of the valley.

As we set up for our approach into the wind, we faced rising terrain off the nose and our ridge line to the right. I turned on contingency power (C-power) and commenced the approach. After obtaining a stable hover at 50 feet AGL, I said I would be coming down and right to our briefed zone. I then called for the doors to open and to begin dropping the supplies. The copilot, while monitoring the engine instruments, called for a waveoff. Not second-guessing the rhyme or reason to wave off from a perfectly stable hover, I began to execute the waveoff; I lowered the nose and pulled power.

This action, of course, was the wrong choice. As I increased the collective, I saw the ridge line was no longer out the right side but now was directly in front of me. My copilot said our NR was continuing to decrease and read 91. Realizing the situation I had put myself in, I started executing the loss-of-tail-rotor-effectiveness emergency procedures. My first step had me place about 5,000 pounds of pressure to the left pedal, while I reduced the collective slightly and followed the turn with cyclic. The most uncomfortable feeling I ever had felt came over me. I had the controls; my hands and feet were indeed on them. However, I absolutely had no control of the aircraft that was flying me. Our superb crew chief began to make all the clearance calls, as we began a slightly more aggravated spin. The 50-foot terraces actually were 10 to 15 feet wide, which, of course, added to my situation.

I continued to circle and tried to regain control of the aircraft. Then my copilot called, "Wires, wires, wires."

This call came over the formation frequency, instead of the ICS. After making half a dozen revolutions and keeping enough power on the aircraft to prevent complete touchdown, I had regained enough control to set down the aircraft on the terrace. Fortunately, the terrace was the exact footprint of our aircraft. Looking out the left side of the aircraft, I had a mere four-to-five foot clearance from the slope of the terrain, so I kept extra power on the rotor blades.

After a few seconds to regain composure, I asked the

crew chief to give a quick walkaround. The crewman then completed the aircraft walkaround. He said we had scraped the belly of the aircraft, and our dump tube had broken off, but no other problems were noted. I looked up the hill and saw the locals, excited about receiving their supplies, coming to help unload the cargo.

I ordered the crewman to empty the aircraft of all supplies, hoping to lighten the load, so we could depart before we were overrun. The next sight I had of the four-to-five-foot terrace and rotor-blade separation was a local doing the "duck walk" under the rotor blade to gather supplies we had dropped. The crew chief managed to get him safely out of the rotor arc, and we accepted the downwind departure.

After departing the LZ, we closely monitored our engine indications to be sure we had no other malfunctions. We noticed no other aircraft problems. Our playmates, hearing our wires radio call, were circling overhead. We reported the situation and stated our intentions to return to the closest controlled LZ for a better walkaround. We split up the formation and continued single ship to Muzahfarabad. After landing, we left the rotors turning, and the crewman exited the aircraft for the walkaround. I left the copilot on the controls and took a look at the aircraft. Our dump tube had been broken, the tail lock pin had been sheared, and the belly of the aircraft was covered in mud.

The flight into the controlled LZ was fine; all instruments indicated normal, so I opted to rejoin the flight and return to Chaklala. Because of the mountains, our first radio communications with base did not occur until we were about 10 miles out.

Again, the flight back was uneventful, and we chose to shut down for gas. During the shutdown, we heard a loud whistle seeming to come from above our heads. As we continued to shut down, I noticed a hole the size of my fist in the main rotor blade. At that moment, I experienced the second worse feeling I ever had felt. Noting the condition of the aircraft, we began arranging other means of transportation with our playmates back to Qasim.

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Looking back, and having discussed the incident with Army helo pilots who are experienced flying at high altitude, I believe I entered a tail-rotor, vortex-ring state, which was aggravated by the standard Navy waveoff. I identified it as tail-rotor, vortex-ring state because of the unpredictable and uncommanded yaw rates, which I could not control by full pedal inputs. Full left pedal demanded max power to the tail rotor, therefore taking power needed for the main rotor and resulting in NR droop. The situation was only worsened by having a waveoff route that was to the left, over an LZ that did not permit landing. Subsequent flights in the area were completed with a max of 2,400 pounds of fuel to reduce gross weight, and we maintained forward airspeed during all drops in which we did not land.

Many lessons were learned from this experience. Power available and power requirements may not indicate the ability to enter an LZ. The Army high-altitude instructors explained the region I had entered was a "mountain shadow," where the valley winds are lost, and the downdrafts over the mountain are a factor. Through the Grace of God and solid CRM, we kept this near-mishap a hazrep.

Lt. Hardy flies with HSC-26.

Mishap-Free Milestones

VR-46	22 years 9 months	100,000 hours
VAQ-136	20 years	32,800 hours