

# IMPROVE YOUR WINTER OPERATIONS

## An NVG Snow Operations Refresher

*Law enforcement agencies that operate in cold weather environments must consider certain dangers before launching during winter Conditions.*

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Winter poses high moisture and cold temperatures that can lead to engine, airframe and blade icing. During day and night operations, snow and ice become significant threats in many ways. Ice on a ramp or, worse, ice or snow on a helipad during a rapid spool-up and spool-down can cause a helicopter to rotate. Snow can lead to a whiteout during takeoff and landing. During night NVG operations, a slow increase in snowfall can lead to CFIT, loss of situation awareness and/or instant IMC conditions that often lead to loss of control.

Awareness of these conditions, proper training, mission planning and crew-coordination can prevent flight crews from getting caught in these traps and thereby prevent accidents. The bad news is accidents involving loss of situational awareness, resultant loss of control and CFIT are usually fatal accidents. The good news is these accidents are typically avoidable.

Mission planning, crew coordination and plain old good judgment remain the best manner in which to prevent being in dangerous and deadly situations. Good crew coordination involves flight leadership, two-way communication and the ability to maintain situational awareness. Oftentimes, as flight crews become more proficient with NVG operations, overconfidence and complacency compromise flight safety. Risk assessment and management must be continuous from the initial pre-flight briefing to the post flight debrief.

### ICING BASICS

Pilots and all crewmembers should know that icing can occur in conditions of high humidity when the ambient temperature is at or below 0 degrees Celsius. This does not require you to be in clouds. Icing can also occur at higher temperatures during times of falling barometric pressure. So, for safety sake, during temperatures of 5 degrees Celsius or less, high humidity, and temperature and dew point being nearly even, we must be aware of the dangers of ice accumulation.

The primary effect of ice on helicopter blades is drag and loss of lift. During temperatures between 0 and -3 Celsius, ice will form on the leading edge from the root towards the tip, covering about 70 percent of the blade, as kinetic energy or the heat from the blade tip typically prevents some ice accumulation. This kinetic energy benefit is lost during temperatures below -3 Celsius.

Ice accumulating on a blade will cause vibration, from very slight to significant, depending on the type of blade and accumulation rate of icing, and an increase in required torque to sustain level flight. In icing conditions, remember that the faster the helicopter is traveling, the

faster ice accumulates. Any indication of ice on typical law enforcement helicopters or any vibration should be cause for an immediate landing.

The turbine engine also can encounter dangers associated with icing conditions. While many of our helicopters have engine anti-ice systems, these systems are meant for light icing, and ice can accumulate at the throat near the first compressor stage. This in itself will not cause the engine to fail or flameout. It is the breaking of this ice being ingested into the engine that can cause a flameout. Engine manufacturers have conducted testing and found that even 350cc of water entering the engine at one time can cause a flameout. Aircraft with particle separators are less susceptible to these engine induction hazards.

## **SNOW FALL**

Perhaps a more common danger in winter is snow. Snow has caused many helicopter accidents during takeoff, level flight and landings due to whiteout conditions and loss of situational awareness.

Prior to departing from a snow-covered ramp or helipad, whiteout should be considered. In fresh snow, pulling just enough pitch to not lift can cause the snow to blow away from the point of departure. Depending on the helicopter model, flight crews should use the chin bubble as a reference point, as it seems ground contact can often be seen through this window during takeoff and landing even when snow is obscuring the primary windows.

Off-site landings and take off pose a problem of their own. In addition to the whiteout described above, landing in snow-covered fields can become a dangerous situation, as the snow may have been filling in a depression.

Similarly, landing on frozen snow can be dangerous. Just after landing, the helicopter's weight can break through the frozen snow, and the pilot in command may not be ready for a slope situation, and the slope caused by settling into the snow may exceed the helicopter's limitations. After having landed in a field and sitting for some time, when departing, a skid may have frozen to the ground and dynamic rollover situation may occur. The best prevention during off-airport landings is to have a ground support officer assist in assessing the landing area, and in all cases, land slowly and treat each snow covered landing and takeoff as you would a slope landing.

## **NVGS AND INADVERTANT IMC**

The increased use of NVGs requires us to be ever vigilant of light snow. While flying with NVGs in light snow, the snow may only be seen as a slight increase in the grain or "noise" level in the goggles, thus allowing us to "see through" light snow. As we fly in remote country areas with ambient light sources few and far between, during times of low moon illumination from one second to the next, the snow can increase and when viewed unaided, we can quickly be in an inadvertent IFR situation. Crew coordination becomes critical, as any unaided crewmember should advise the flight crew of diminishing visibility.

Whiteout situations, low visibility, CFIT, inadvertent IMC and resultant loss of control deserve our attention, as these preventable accidents continue to occur. When faced with inadvertent IMC conditions, hopefully a situation we constantly train for, it is important to note that accidents occur when attempting a turn, as a further loss of situational awareness often happens.

Having this knowledge, obstructions permitting, climb straight and advise air traffic control you have an inadvertent IMC emergency condition. Let the TFO tune any radios. As the pilot in command, concentrate on straight and level flight.

Today, many pilots have never heard of the no-gyro and/or radar surveillance approach that controllers used to provide. While very few air traffic control facilities now train for or provide true ASR approaches, they are able to help by advising you of turns, climbs and descents, and by issuing commands such as "turn/stop turn," "climb/stop climb." Therefore, vector onto and down a localizer approach during IMC conditions. Check with your local controller to see what services are available in your area. If you have a military base located near you, it most likely can provide you with a true ASR approach. You just listen and fly to its commands.

Again, good judgment, early on, is the best prevention. If you are in diminishing visibility and ceiling, land as soon as possible, in any parking lot, field, etc., being mindful of obstructions. During these landings, slow is good and slower is better.

Many in law enforcement have been flying with NVGs for some time, so it's important to remember that the moon phase, azimuth and relative position are all very critical factors influencing image quality and operational capability. Once the moon is less than 20 percent above the horizon, the atmosphere begins absorbing more lunar energy, resulting in less image detail. It is interesting to note that most military recorded accidents while operating on NVGs occurred when the angle of the moon was less than 30 degrees above the horizon. Lunar levels can be obtained at the NOAA.gov website.

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*Author Note: Special thanks goes to ALEA for the NVG and winter operations knowledge obtained during my attending various regional safety seminars and annual convention safety briefings. Special thanks also goes to Kevin Means, San Diego Police Aviation Unit, for his endless helicopter operations experience, tactical and NVG instruction.*