

Helicopter Logging

This section will describe a successful partnership, developed in the early to mid 1990s, that resulted in increased safety for a high-risk occupation. The first major focused prevention effort of NIOSH came during the establishment of the Alaska Occupational Injury Surveillance System (AOISS) in 1992. Because of increasing and changing environmental restrictions on road building in Alaska's national forests in the late 1980s, helicopters emerged as a major transportation mode for moving cut logs by the early 1990s. Amid the rapid growth of this new industry in Alaska, between January 1, 1992, and June 30, 1993, there were 6 helicopter crashes (see Table 2), with 9 fatal injuries (including 4 pilots) and 10 severe nonfatal injuries, out of only 25 helicopters flying in logging operations. These events led to an extraordinarily high annual crash rate of 16 percent and a catastrophic pilot fatality rate of 5,000/100,000/year.¹² Investigation revealed that all crashes involved improper operation and/or maintenance practices.

Table 2: Alaska Helicopter Logging Incidents, 1/1/92-6/30/93

| Date | Number Killed | Number Injured | Type of Helicopter | Logging Company |
|-------------|-------------------------------|----------------------------|---|------------------------|
| 2/23/1992 | 6 (Co-pilot and 5 loggers) | 5 (Pilot and 4 loggers) | Manufacturer A Type A Single engine | Company A |
| 3/6/1992 | 0 | 2 (Pilot and Co-Pilot) | Manufacturer A Type A Single engine | Company A |
| 11/10/1992 | 0 | 0 | Manufacturer A Type B Single engine | Company A |
| 2/19/1993 | 2 (Pilot and Co-Pilot) | 0 | Manufacturer A Type A Single engine | Company B |
| 5/2/1993 | 1 (Solo Pilot) | 1 (Ground Crew Logger) | Manufacturer A Type C Single engine | Company B |
| 5/8/1993 | 0 | 2 (Pilot and Co-Pilot) | Manufacturer A Type A Single engine | Company B |

After the occurrence of two serious helicopter logging crashes during one week in May 1993, NIOSH began a series of urgent consultations, culminating in convening an emergency session of the Alaska Interagency Working Group for the Prevention of Occupational Injuries in early July 1993. Prior to this meeting, the first helicopter logging matrix was developed to identify risk factors contributing to these events. (See Table 3.) Based on the collaborative efforts of the Working Group, there were tangible outcomes:

1. All parties had rough agreement on what had happened in these events;
2. The US Forest Service knew the timber sale locations, AKDOL knew the ramp (maintenance) and hangar locations, and both agencies were willing to share this information with the FAA and to collaborate and share costs in making site visits to each in the ensuing weeks. [Due to a peculiarity of CFR Part 133, the regulation for aerial lift-load operations, the FAA only had the chief pilot/headquarter location for each operation, and all of these were out of state.]
3. The Working Group arrived at preliminary consensus recommendations.

Table 3: Potential Risk Factors of Alaska Helicopter Logging Events

| | Host/Human | Agent/Vehicle | Environment |
|----------------------------------|--|--|--|
| Pre-event/ Pre-injury | Pilot Training Experience Fatigue Stress Alcohol Ground crew Training Experience | Helicopter design Lift & durability Maintenance & repairs Engines & controls Ergonomics Unstable work platform Surplus/improvised equipment | Terrain Weather Landing zones Oversight FAA (CFR pt 133) Industry |
| Event/Injury | Pilot Reaction to emergency situation (i.e., autorotation) Task overload Ground Crew Reacting & avoiding | Helicopter Autorotation performance Deformation on impact Fires & explosions | Terrain Weather |
| Post-event | Types of injury Severity | | Little assistance available EMS not available |



Photo 5: A helicopter crash at Dora Bay, Alaska

The prevention-matrix approach resulted in recommendations including more vigorous oversight; development of rigorous voluntary industry standards for equipment, maintenance, and training; exclusive use of multi-engine rotorcraft; and more stringent controls on alcohol and drug use in this industry. (See Table 4.)

Table 4: Alaska Helicopter Logging Injury Recommended Countermeasures
(From Alaska Interagency Working Group for the Prevention
of Occupational Injuries, July 1993)

| | Host/Human | Agent/Vehicle | Environment |
|----------------------------------|--|---|---|
| Pre-event/ Pre-injury | Increased training for pilots and ground crew Improved work/rest cycles | Maintenance per manufacturer's recommendations Impact (g)- resistant seats NTSB - to prohibit surplus equipment | Improved interagency communication Increased FAA oversight |
| Event/Injury | Practical training in autorotation | | Emergency (backup) landing zones |
| Post-event | | | |

By late July 1993, all helicopter logging sites and ramps in the state had been visited by the jurisdictional agencies, with a number of these operations being curtailed or entirely shut down for irregularities. Since that intervention and the implementation of the Working Group's recommendations during July 1993, there were no additional helicopter logging crashes or fatalities in Alaska until July 1996, when a single crash occurred, with one fatality. (See Figure 8.) There have been no more since (through December 2001), despite continuation of large-scale helicopter logging in Alaska.



Photo 6: A long line load of logs being lifted by a multi-engine, heavy-lift helicopter

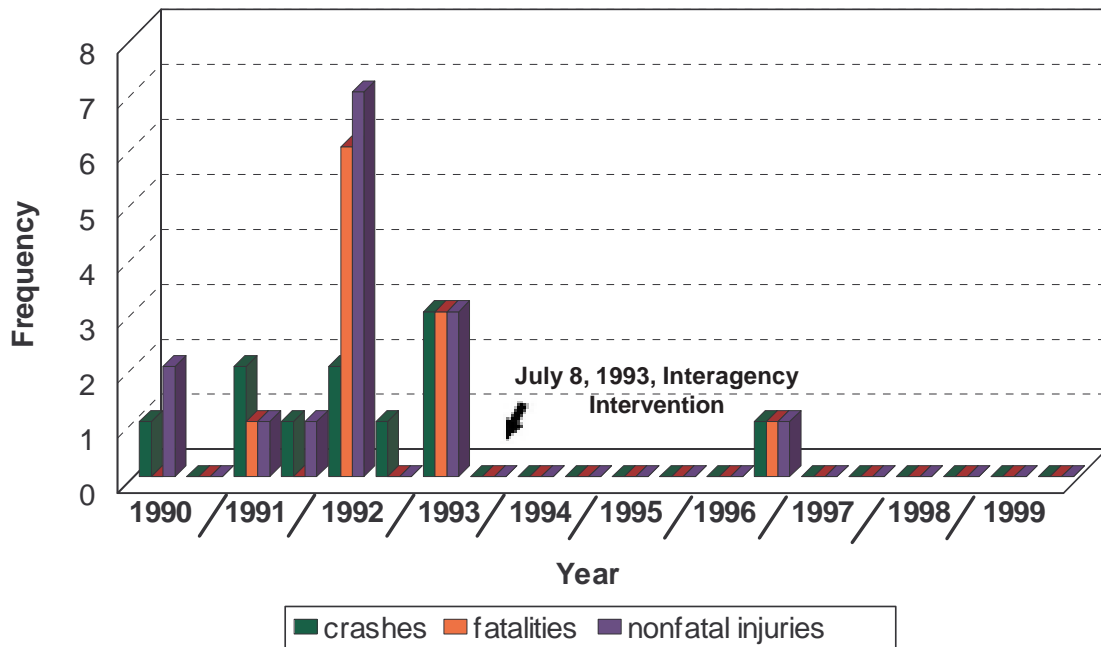


Figure 8: Crashes, Fatalities, and Nonfatal Injuries in Alaska Helicopter Logging Operations, 1990-1999 (By 6-Month Intervals)

This effective application of surveillance data in an interagency intervention for helicopter logging-related crashes has continued. In March 1995, the Alaska Interagency Working Group for the Prevention of Occupational Injuries and NIOSH cosponsored a Helicopter Logging Safety Workshop. An additional prevention matrix was developed to further refine safety countermeasures in the industry. (See Table 5.)

Table 5: Alaska Helicopter Logging Injury Countermeasures

| | Host/Human | Agent/Vehicle | Environment |
|----------------------------------|--|--|---|
| Pre-event/ Pre-injury | Qualified second pilot Flight/duty time limits Drug/alcohol/testing Availability of alcohol/drug rehabilitation | Multi-engine only Dual drive train Improved controls Improved crash worthiness Limit to certified parts with valid FAA history | Industry SOPs for maintenance safety culture & management Education by helicopter logging association Improve communications among management & crews |
| Event/Injury | Qualified second pilot | Crash-resistant fuel tanks Controlled deformation | |
| Post-event | | EPIRBs (emergency position indicating radio beacons) | Improve EMS availability CPR/first aid training for crews |

Additional workshops were held in 1996 and 1997. (The proceedings of these workshops have been combined and published in one volume.)¹³ Building on Alaska’s leadership in this area, a Helicopter Logging Safety Committee was formed under the auspices of the Helicopter Association International (HAI), “...to help promote the safe use of helicopters in all aspects of the helicopter logging industry.” The committee has established its own “Helicopter Logging Guidelines,” which address four issues: (1) general helicopter safety for forestry operations; (2) integration of ground and flight activities; (3) helicopter specific planning; and (4) a pre-accident plan (HAI, 1997).¹⁴ More detailed accounts of these data, events, and interventions have been published elsewhere.^{13,15,16} The insurance industry has also played a major role in progress made in helicopter logging by substantially discounting helicopter insurance costs for operators adhering to standards developed by the Helicopter Logging Safety Committee.

The partnership developed among government agencies, HAI, and insurance underwriters has demonstrated the value of joint efforts to address specific occupational safety problems to workers in Alaska.