by Dick Wright

# Air Medical Service, An Industry Under Scrutiny

Whether fairly or not, Helicopter Emergency Medical Service (HEMS) is once again under scrutiny, by the industry itself, by the Federal Aviation Administration (FAA), and by the public. Each time there is an accident involving a HEMS aircraft, it is headline news. In actuality, more accidents in the helicopter community are experienced during personal flights, instructional flights, or a host of other activities, than during air medical flights. However, there seems to be something about accidents that involve lifesaving operations that heightens the sensitivities to these tragedies. Air medical aircraft are supposed to save lives, not lose them. Those of us in the rotorcraft industry know that thousands of patients are safely transported and numerous lives are saved every year by HEMS aircraft. We also know that air medical flight operations are conducted by professionals who are dedicated to safety. The number of lives that are unfortunately lost as a result of accidents during HEMS operations remains truly low when the total scale of operations is considered. However, even one life lost is too many, particularly when post-accident analysis indicates that virtually every accident could have been prevented. Perceptions can play an important part in the public's acceptance of this vitally important segment of the industry. On several occasions, the FAA has "thrown down the gauntlet" to air medical operators to improve their safety record, which appears to have suffered alarmingly in the past five or six years. In raw numbers, yes, the number of HEMS accidents has increased, but is this due to a failure of safety within the industry, or is it perhaps due to an increase in flight operations and thus greater exposure to risk?

What, indeed, is the true nature of safety within the air medical service industry, and what can be done to improve it further? Consider the safety statistics of the air medical industry over the past 14 years. In 1991, there were approximately 225 helicopters dedicated to air medical service. Today, that number is in excess of 650 helicopters, an increase of 288 percent. The number of HEMS flight hours in 1991 was approximately 162,000. In 2002, the last year for which flight hour statistics are available, the number of HEMS flight hours increased by 161 percent two 261,000. In 2004, the total is expected to approach 285,000 hours. As stated, the number of HEMS accidents in recent years has been increasing, which obviously is not good. So, are the accidents due to a decrease in safety or an increase in the tempo of operations? The following statistics illustrate the steady growth in flight hours, as well as a noticeable increase in accidents, fatal accidents, and fatalities in the second seven year period (1998 through 2004) compared to the first seven year period (1991 through 1997).

**Figures for 2004 are calculated through November 30, 2004.*

Taking a look at the seven years from 1991 and 1997, there were 33 air medical accidents, for an average of 4.7 accidents per year. By contrast, over the seven years between 1998 and 2004, there were 88 accidents for an average of 12.6 accidents per year. This represents an increase of 268 percent. During the 1991 to 1997 period, there were 16 fatal accidents involving 44 fatalities. For the period 1998 to 2004, there were 29 fatal accidents involving 77 fatalities. Thus, over the past seven years, fatal accidents increased by 181 percent and the number of fatalities increased by a nearly comparable rate of 175 percent. One can conclude, therefore, that the total accident rate is indeed increasing, as the relative number of accidents is increasing at a faster rate than the increase in flight hours. The fatal

continued on page 8

| Year | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flt Hrs 100K[1] | 1.624 | 1.691 | 1.662 | 2.268 | 1.582 | 1.707 | 1.756 | 1.784 | 1.848 | 1.879 | 2.502 | 2.611 | 2.725 | 2.488 |
| Accidents | 6 | 6 | 2 | 6 | 7 | 2 | 4 | 9 | 10 | 14 | 15 | 15 | 15 | 10 |
| Fatal Accidents | 4 | 2 | 2 | 4 | 1 | 1 | 2 | 4 | 3 | 4 | 4 | 5 | 4 | 5 |
| Fatalities | 14 | 3 | 5 | 11 | 3 | 3 | 5 | 14 | 10 | 11 | 5 | 13 | 7 | 17 |
| | | | | | | | | | | | | | | |
| Accident Rate | 3.69 | 3.55 | 1.2 | 2.65 | 4.42 | 1.17 | 2.28 | 5.04 | 5.41 | 7.45 | 6 | 5.74 | 5.5 | 4.02 |
| Fatal Rate | 2.46 | 1.18 | 1.2 | 1.76 | 0.63 | 0.59 | 1.14 | 2.24 | 1.62 | 2.13 | 1.6 | 1.91 | 1.47 | 2.01 |
| Fatalities Rate | 8.62 | 1.77 | 3.01 | 4.85 | 1.9 | 1.76 | 2.85 | 7.85 | 5.41 | 5.85 | 2 | 4.98 | 2.57 | 6.83 |

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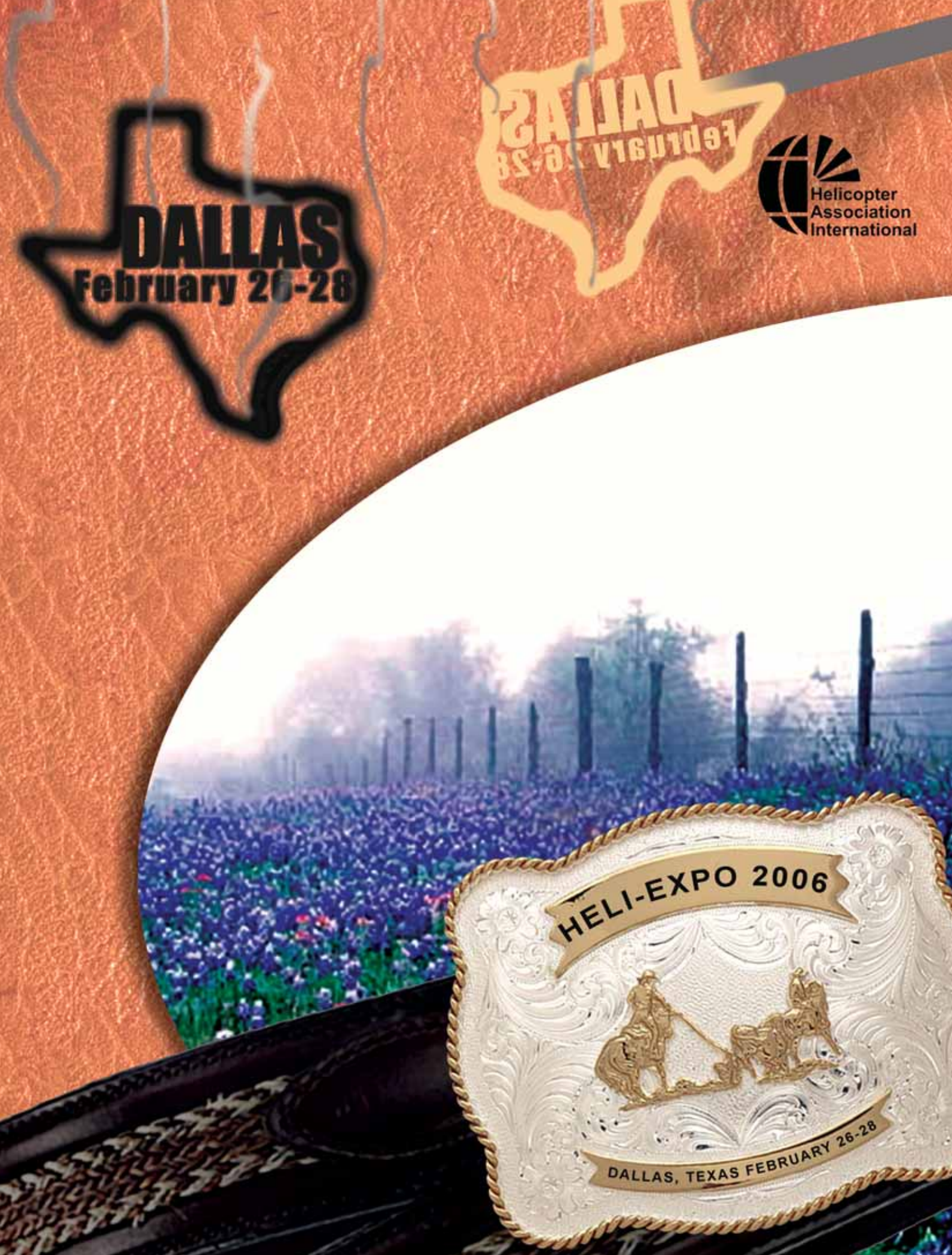

continued from page 6

accident rate and the fatalities rate, however, are very comparable to a similar increase in flight hours.

So, where are the HEMS accidents occurring? Of the total number of 121 accidents since 1991, 106 were precipitated by some failure in human factors, which includes not only pilot error but also improper maintenance or quality assurance, inadequate crew or ground coordination, and perhaps, more subtly, inadequate supervision or management. Of the total, 28 accidents were precipitated by engine failure (12), mechanical failure of some system or component (10), or structural failure (6). Of these, six accidents are still under investigation by the NTSB. Among the remaining 22 accidents precipitated by a system failure, 13 are identified as having improper or inadequate maintenance, maintenance procedures, or manufacturing standards. Even among these accidents, in all but two instances where there was an inflight breakup of the aircraft (one due to the failure of a TT strap in the rotor blade grip and the other to the failure of the swashplate), an emergency landing was not adequately performed by the pilot.

The remaining 93 accidents, or 77 percent, were the direct result of pilot or crew error. These errors can be broadly categorized as poor pilot technique, a lack of situational awareness, loss of control, poor aeronautical decision-making, controlled flight into terrain, water or objects, or perhaps a combination of these. The vast majority of these accidents are a result of running into something! Fifty-one (51), or 55 percent, of pilot-induced accidents are a result of either controlled flight into terrain, water, or obstacle, or striking an object with either the main or tail rotor. In addition, there were two loss-of-control accidents resulting in impact with terrain due to spatial disorientation, and three hard landings due to brown out conditions. Of these 56 accidents, 40 occurred at night. Thus, a full third of all HEMS accidents between 1991 and 2004 involved impacting terrain or objects at night! Further, of these 40 accidents, 23, or over half, involved intentional or inadvertent continued VFR flight into IMC conditions.

As mentioned at the beginning of this article, the FAA has on several occasions challenged the HEMS industry to improve its safety record, with the underlying threat that, if it did not, the FAA might regulate safety into the industry. This, unfortunately, would not be the best avenue. Regulations affect everyone, but serve only to restrict the way in which we operate. Instead, based upon the data, it might be far more appropriate to throw the challenge in the other direction and challenge the FAA to work with the industry and take action, based on the accident statistics, that would truly benefit the HEMS industry and improve its culture of safety.

Recent history, coupled with the accident data, suggest a feasible two-fold solution to start the process of reducing the HEMS accident rate. First, we need to address the aeronautical decision-making process by which pilots, aircrew and supervisors conduct the evolution of every flight, from standard operating procedures, to preflight planning and to final landing. After the intense discussions in 1987 on the state of HEMS safety, nearly a dozen manuals and Advisory Circulars were published to assist commercial helicopter pilots in general and HEMS pilots in particular in their decision making. This effort resulted in a dramatic, but temporary, reduction in accidents. These materials, which still contain valuable material, must be reviewed and brought up to date with current information on human factors and the way we make decisions. Once updated, they must be given broad dissemination within the industry.

A second approach the FAA could take to meet the challenge leaps out of recent accident data, particularly regarding night accidents. The fact that over one-third of all air medical accidents are caused by impacting terrain or objects at night, suggests that it is imperative for the FAA to make it feasible and more cost-effective for HEMS operators to utilize the advanced technology that is available today. This means night vision enhancing equipment, or NVGs. Currently, operators must go through a lengthy and expensive Special Type Certificate (STC) process to equip their aircraft, train their pilots, and utilize this safety enhancing technology. The STC process is cumbersome, haphazard and expensive, and is a disincentive.

Several years ago, RTCA convened a committee, SC-196, on which I served, to study the feasibility of implementing NVG use in commercial aviation. This committee had initially considered tailoring its end product toward regulatory change. At that time, the rulemaking process through the Aviation Rulemaking Advisory Committee (ARAC) was, for all practical purposes, broken. Rule change through ARAC was at best a "long term" process that could be measured in decades. Thus, RTCA SC-196 instead developed proposals for inclusion into an Advisory Circular. To date, their work still has not resulted in a quicker or more effective means of implementing NVGs. Recognizing that the ARAC process no longer works, the FAA has instituted several Aviation Rulemaking Committees (ARCs) to focus on more narrow, but accomplishable, regulatory changes. This was first done with the Terminal Area Operations ARC (TAOARC), which then evolved into the Performance-Based Navigation ARC (PARC). With success in these, the FAA then convened the FAR Part 135 Rewrite ARC. Though still a complicated process, these ARCs appear to be meeting with success. I call on the FAA to convene an Aviation

purpose of taking over where the RTCA SC-196 left off, and develop a new FAR regulation that will provide the guidance and authority for operators to implement night vision equipment. This, more than anything else, added to improvements in our aeronautical decision-making skills and processes will enhance safety for the helicopter air medical service industry. This is the true challenge to be answered. **R**

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