

A DISTURBING TREND

U.S. Grain Entrapments on the Increase

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Purdue University's Agricultural Safety and Health Program has been documenting grain entrapment cases since 1978. These cases include fatal engulfments as well as partial entrapments that required assistance in order for the victim to be extricated. In addition, nearly 800 fatal and non-fatal grain entrapment cases have been documented and entered into a national grain entrapment database, with the earliest case dating back to 1964. This article summarizes the reported grain entrapment cases documented during 2009, with some observations concerning the increasing frequency of these events.

29.2 recorded entrapments per year to 18.8 (the lowest since 1987). However, since 2002, the five-year average has increased steadily to 28.4 incidents per year in 2008 and 31.2 in 2009—an increase of nearly 66 percent.

As in past years, it should be noted that this summary does not reflect all grain-related entrapments, fatal or non-fatal, that have occurred, due to the lack of a comprehensive reporting system and a continued reluctance on the part of some victims and employers to report partial entrapments where extrication was required but no public report was made. Based on the ratio of non-fatal to fatal incidents docu-

By the numbers

Based on the cases documented to date, no fewer than 38 grain entrapments occurred in 2009. This is the highest recorded number since 1993, when 42 were documented. The 2009 total also exceeds the 33 and 34 cases documented during 2007 and 2008, respectively (fig. 1).

Disturbingly, the trend for this type of incident, unlike many other types of farm-related injuries and fatalities, is not improving. Between 1994 and 2002, the five-year average decreased from a record of

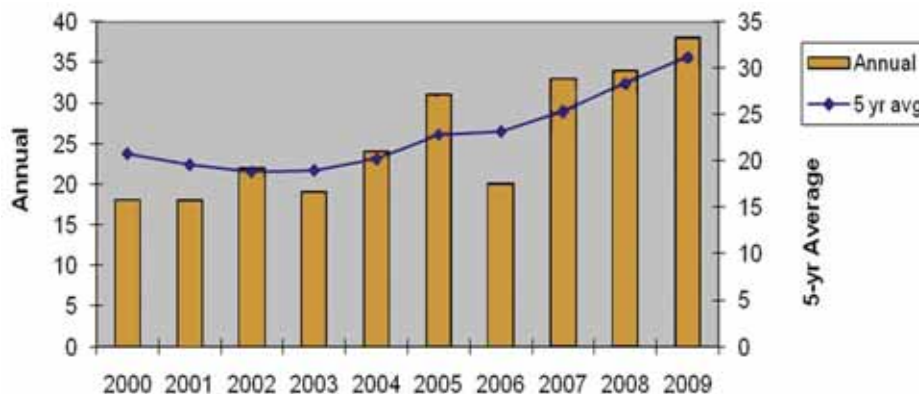


Figure 1. Number of annual grain entrapments recorded in the National Grain Entrapment Database and 5-year average between 2000 and 2009.

mented in Indiana over the past 30 years, which has had an aggressive surveillance program to identify these events, the total number of actual cases could be 20 to 30 percent greater nationwide.

In 2009, the states with the most documented grain entrapments, fatal and non-fatal, were Minnesota (9), Iowa (5), Illinois (5), and Indiana (5). This geographic distribution parallels the long-term trend for these events to occur primarily in the Corn Belt. Overall, entrapments were documented in 13 states in 2009.

By the location and gender

Historically, 70 percent of all documented entrapments have occurred on farms, with the balance taking place at commercial grain facilities. Beginning in 2007 and 2008, this distribution of cases changed substantially, with 49 percent occurring on farms and 51 percent taking place at commercial sites. For 2009, though, the cases reflect more historic trends. For cases where the location is known, 11 (37 percent) entrapments occurred at commercial facilities and 19 (63 percent) entrapments were on farms. For the remaining eight cases documented in 2009, the location is unknown. All documented victims were male, and there is a trend toward more managerial-level employees, operators, or owners being involved in entrapments.

Fatality percentages

In 2008 and 2009, the ratio of fatalities to non-fatal incidents decreased when compared to earlier years. From 1964 to 2005, 74 percent of entrapments resulted in death. During 2008, 45 percent resulted in death, and in 2009, 42 percent. More entrapment victims may be surviving these incidents due to increased emphasis on safer procedures, such as using an observer during confined space entry, and an increased emphasis on first responder training for grain entrapment extrication. At least three of the incidents documented in 2009 involved extrication using commercially available grain rescue tubes, which were not widely available until 2007 or 2008.

By the grain

During 2009, the primary medium of entrapment remained yellow corn. Over the past 30 years, corn has been involved in approximately 45 percent of the grain-related entrapments where the medium was known. Other bulk materials that have been documented in entrapments included soybeans, wheat, milo, processed feed, and soybean meal.

The primary causes leading to entrapment of most victims were identified as entering a bin to loosen crusted, spoiled, or frozen grain while unloading equipment was

running, or falling into grain transport vehicles while they were being either loaded or unloaded. There continues to be a direct relationship between out-of-condition grain and a greater probability of entrapment.

The 2009 corn crop was of record size. According to the USDA, corn harvested in 2009 amounted to 13.15 billion bushels, and soybeans harvested were 3.36 billion bushels. In several regions, the crop was harvested under less-than-ideal conditions, resulting in more reports of out-of-condition or spoiled grain in storage and increased incidents of plugged flow. In addition, the domestic corn demand for ethanol has resulted in the largest buildup of storage capacity across the Midwest in history. These factors will result in more corn being stored for longer periods of time than in past years, and an increased potential for grain entrapments, unless there is a change in current work practices. An industry-wide consensus should be reached on the development of an engineering safety standard for grain storage structures. The commercial grain industry and grain bin manufacturers are urged to increase their employee and farmer/customer education efforts to prevent grain entrapments from occurring.

An ounce of prevention worth a bushel of cure

In addition, there is a need to strengthen employee and first responder training to ensure that appropriate response strategies are in place in case of grain entrapments. Excellent training resources, such as the videos “Don’t Go with the Flow” and “Your Safety Matters,” are available from the National Grain and Feed Association (www.ngfa.org). These materials were developed in response to the observed upswing in grain entrapment incidents at commercial fatalities during the early 1990s. More farmer/producer-oriented safety resources are now available from many county-level Extension offices and from programs such as Purdue’s Post-Harvest Grain Quality and Stored Product Protection Program (www.grainquality.org).

Every flowing grain entrapment is a preventable incident. The 2009 record crop should be a reason to celebrate, not a cause for tragedy and sorrow. The grain entrapment problem can be addressed through the use of appropriately designed storage facilities, proper use of personal protective equipment, implementation of safe work practices, and having in place effective emergency response capabilities. Let’s reverse the trend in grain entrapments, starting now.

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