

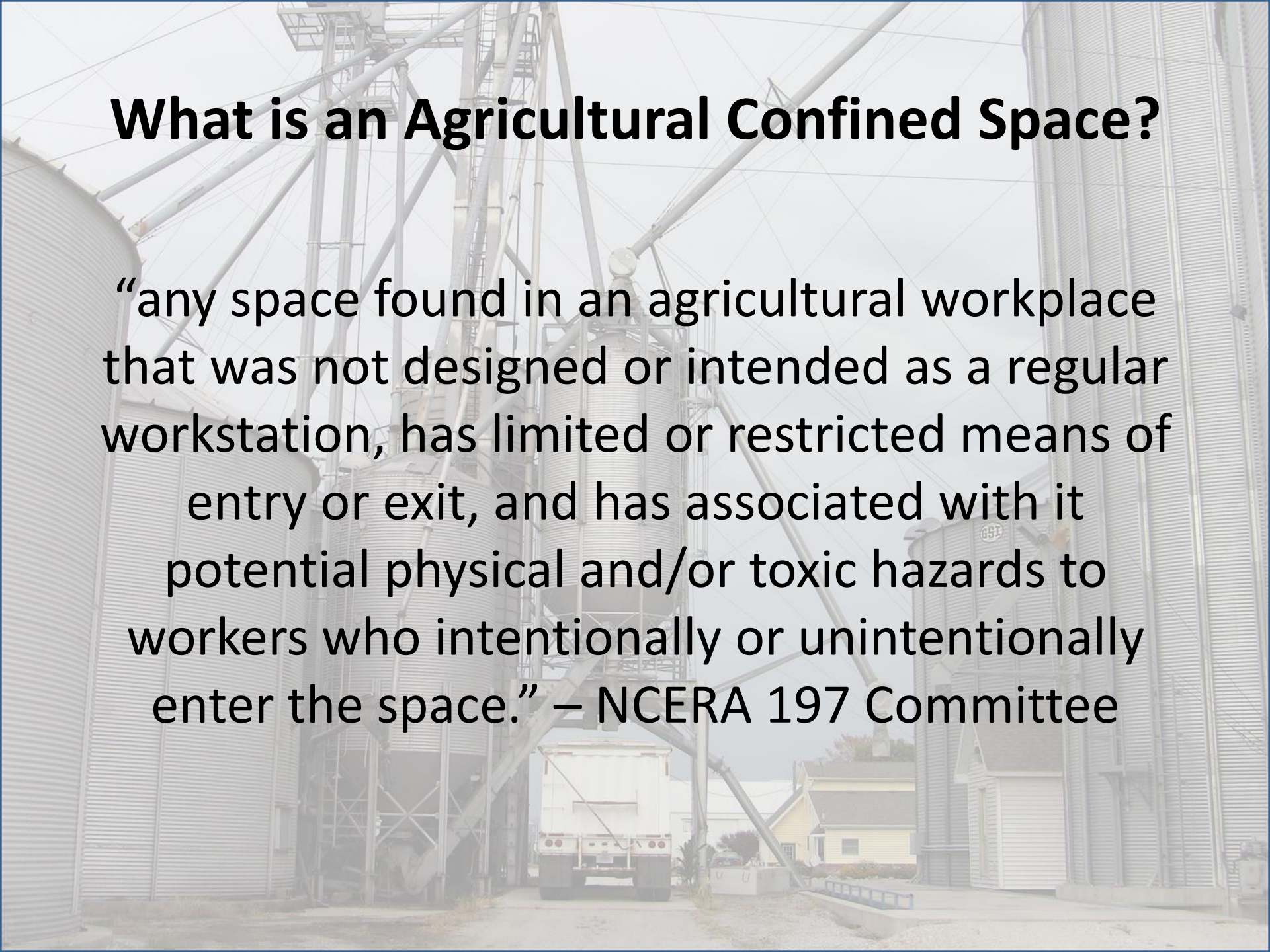
Safety Stand Down for Preventing Grain Entrapment

Agricultural Confined Space-Related Injuries and
Fatalities – A Growing International Issue

Dr. William Field, Ed.D.

What is an Agricultural Confined Space?

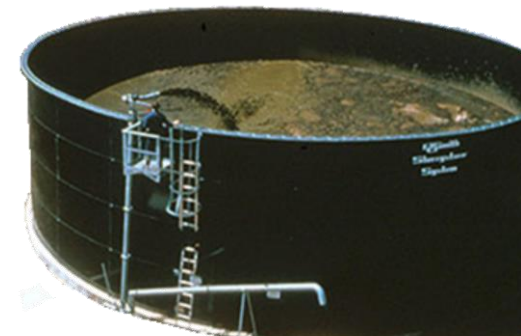
“any space found in an agricultural workplace that was not designed or intended as a regular workstation, has limited or restricted means of entry or exit, and has associated with it potential physical and/or toxic hazards to workers who intentionally or unintentionally enter the space.” – NCERA 197 Committee



Examples of Confined Spaces

- Grain bin
- Silo
- Manure storage facilities
- Hopper bottom feed bin

- Grain transport vehicle
- Septic tank
- Fertilizer storage tank
- Fermentation tank



Purdue's Work

- Started collecting data in 1977
- Initially focused on grain entrapments, expanded focus to all confined spaces by 2011
- Cases are collected from Google alerts, web searches, news clipping services, death certificates, OSHA database, NIOSH-FACE database, and interviews
- All confined space incidents collected are entered in the Purdue University's Agricultural Confined Space Incident Database (PACSID)
- Summaries on incidents have been published annually for the last decade
- Papers on grain entrapments, incidents involving youth, grain transport vehicles, grain vacuum machines, and more have been published based on data analysis of the PACSID database

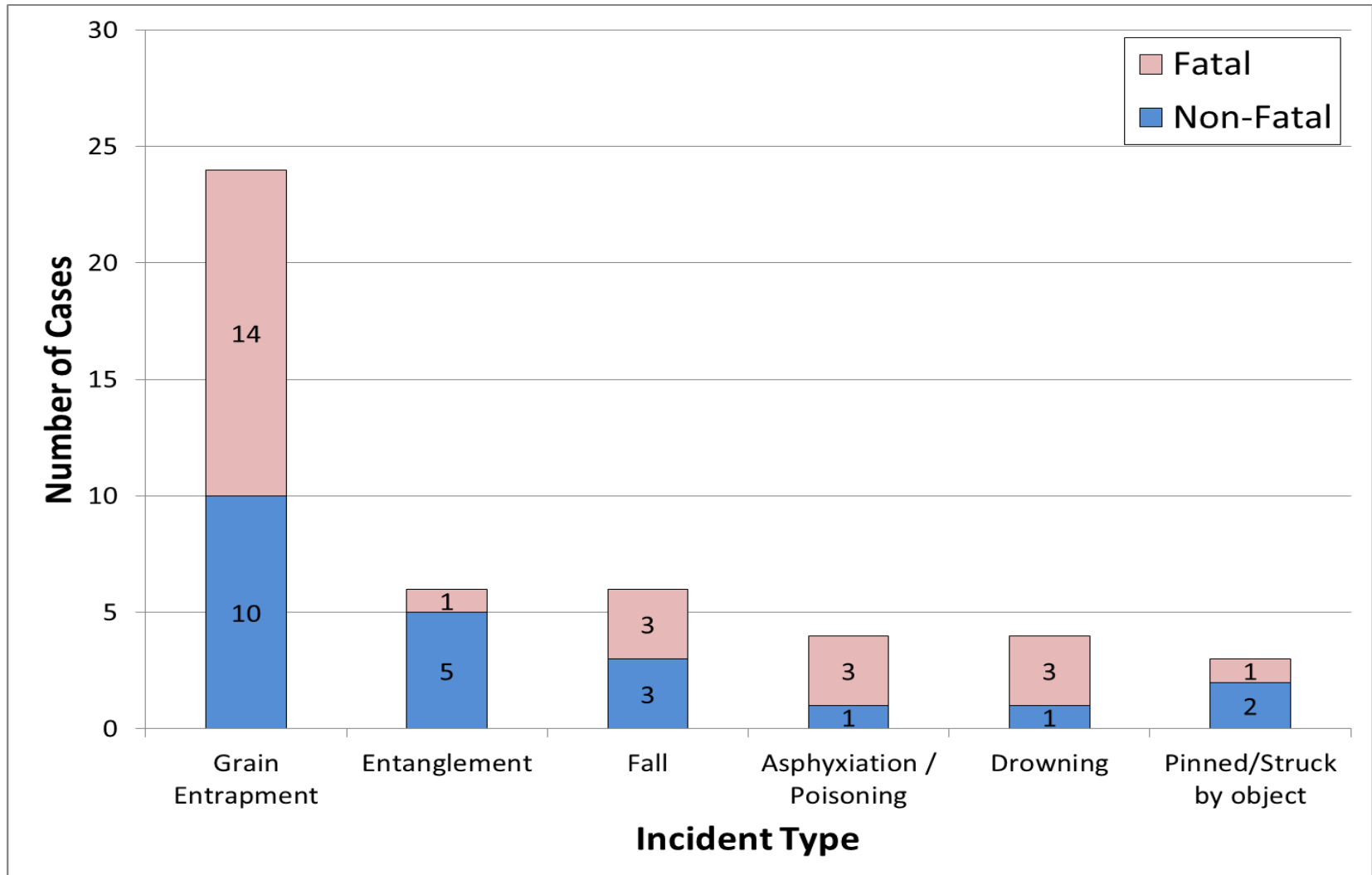
Summary of U.S. Findings

- A total of 1,873 confined space cases documented between 1962 and 2015.
- Majority of the cases are grain entrapments (about 1100 cases)
- Children and youth account for approximately 20% of documented cases
- Nearly all victims are male
- Data represents about 70% of actual cases
- About 400 cases have been added since 2011
- Not comprehensive, but best available data
- 47 cases were documented in 2015 and 25 (54%) were fatal

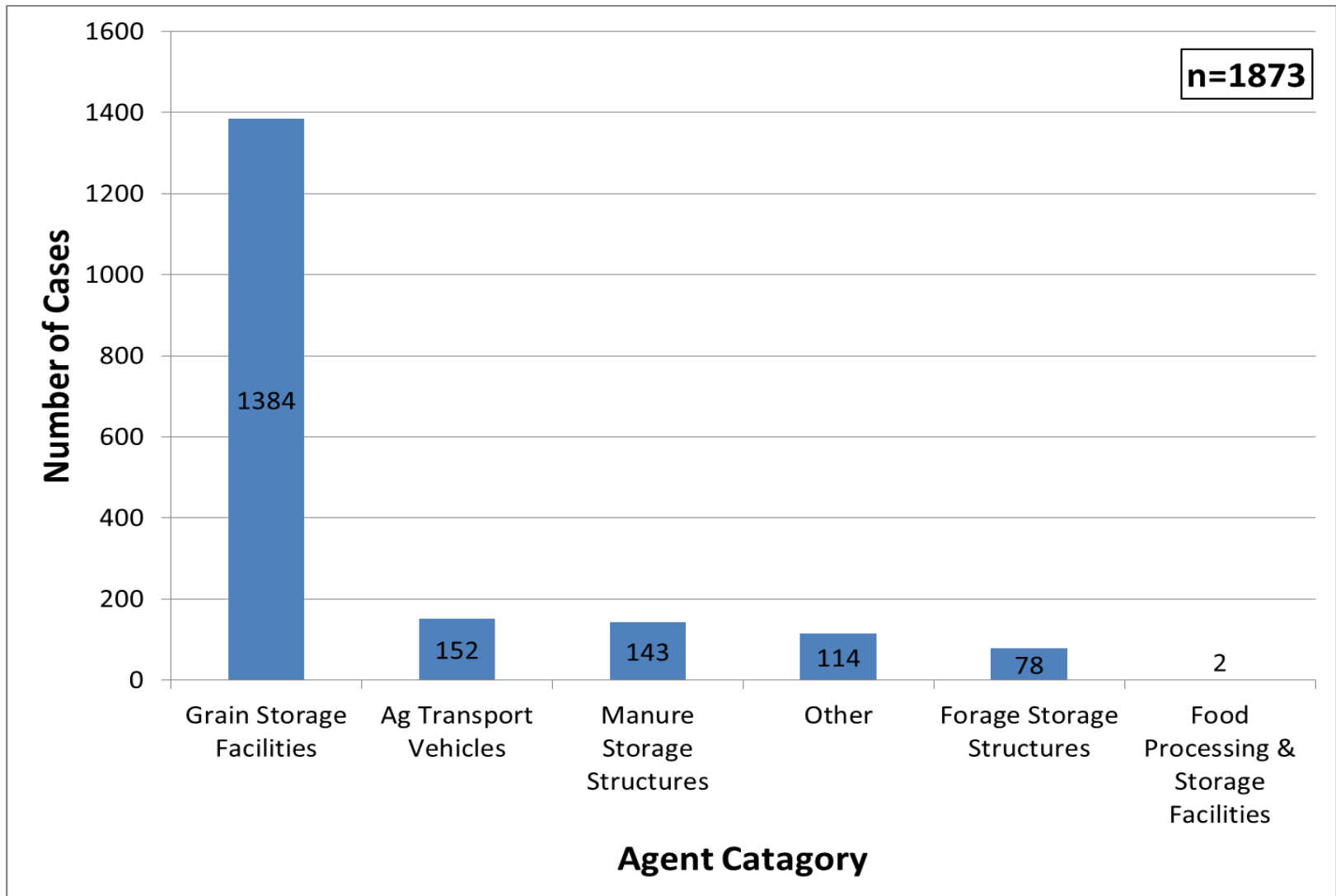


RESULTS:
Agricultural Confined Space Cases

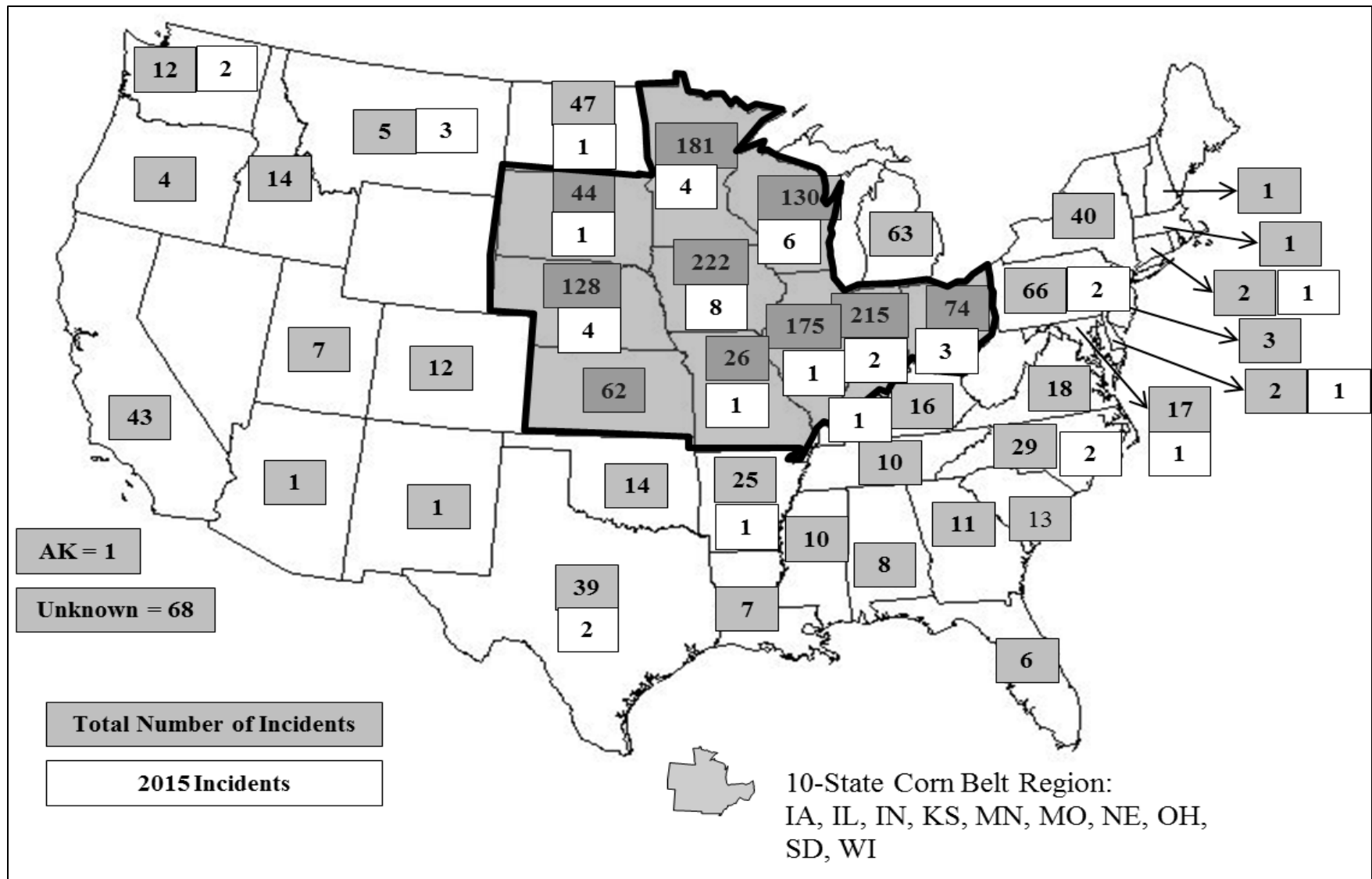
Distribution of 2015 Agricultural Confined Space-related Cases by Type of Incident



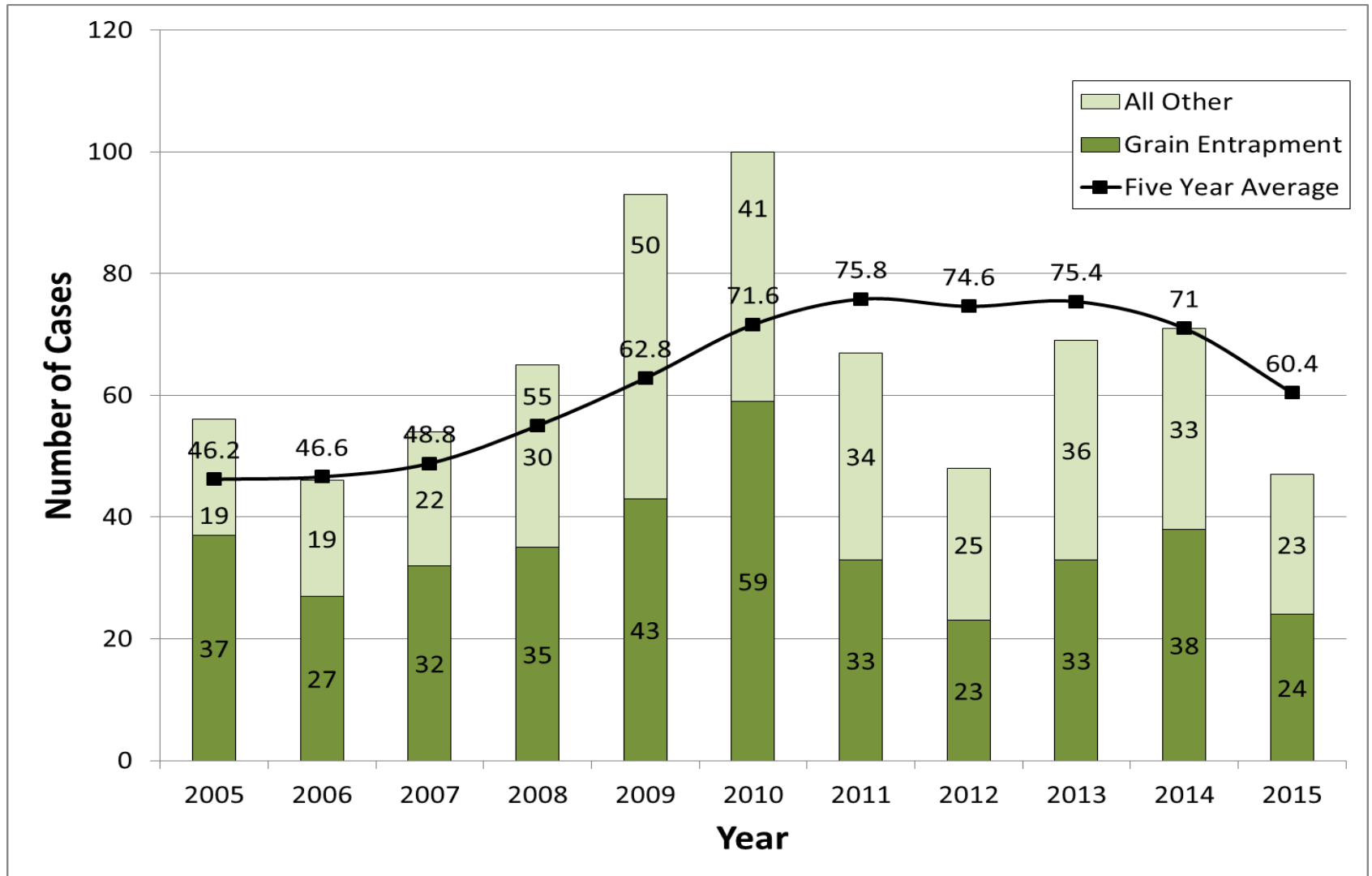
Agricultural Confined-space Related Cases by Agent Category (1962-2015)



Geographic Distribution of Confined Space Cases for 2015 and Previous years (n=1873)



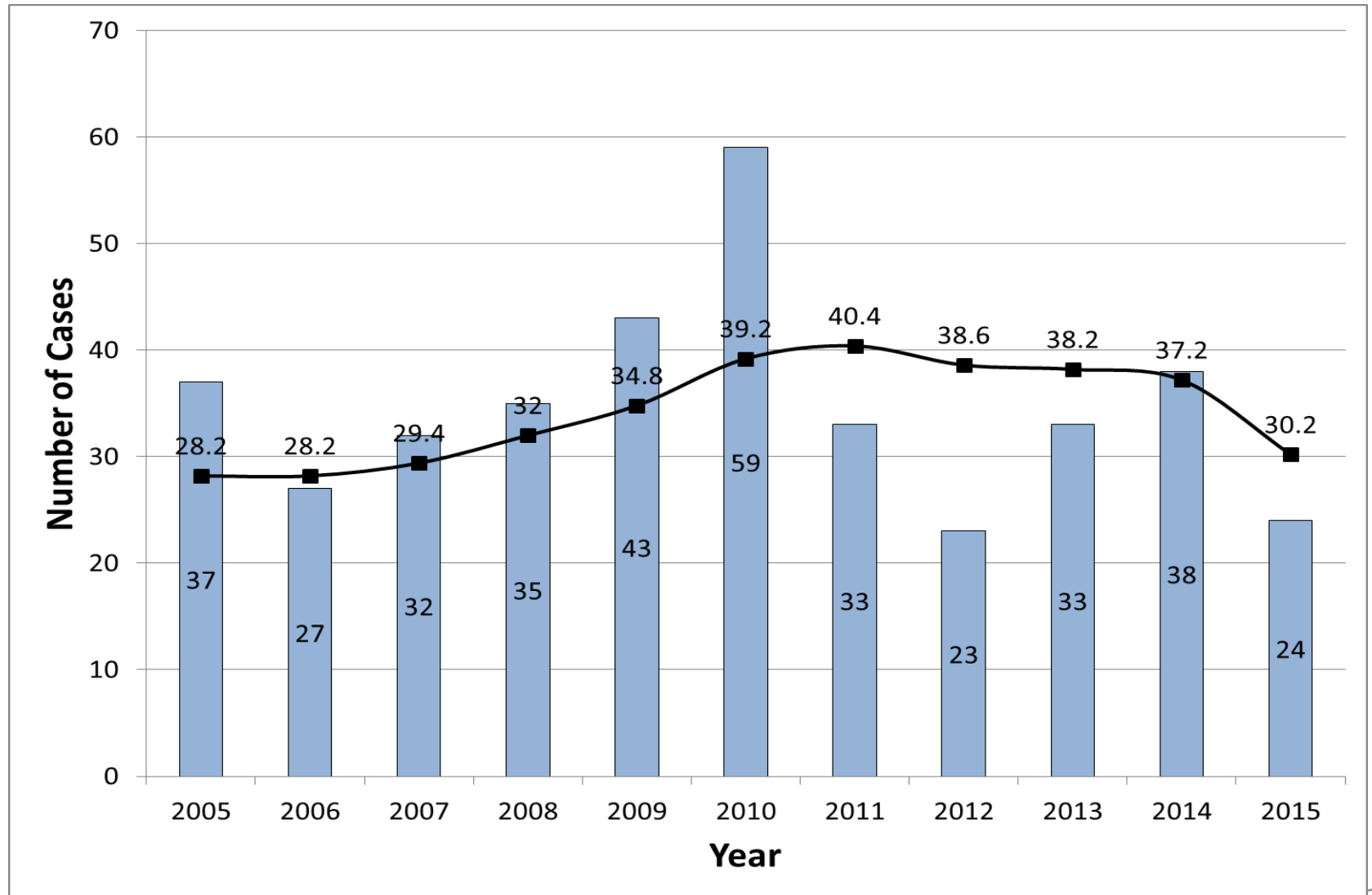
Number of Annual Confined Space Cases Recorded Between 2005 and 2015



RESULTS: Grain Entrapments Cases



U.S. Grain Entrapments Between 2005 and 2015



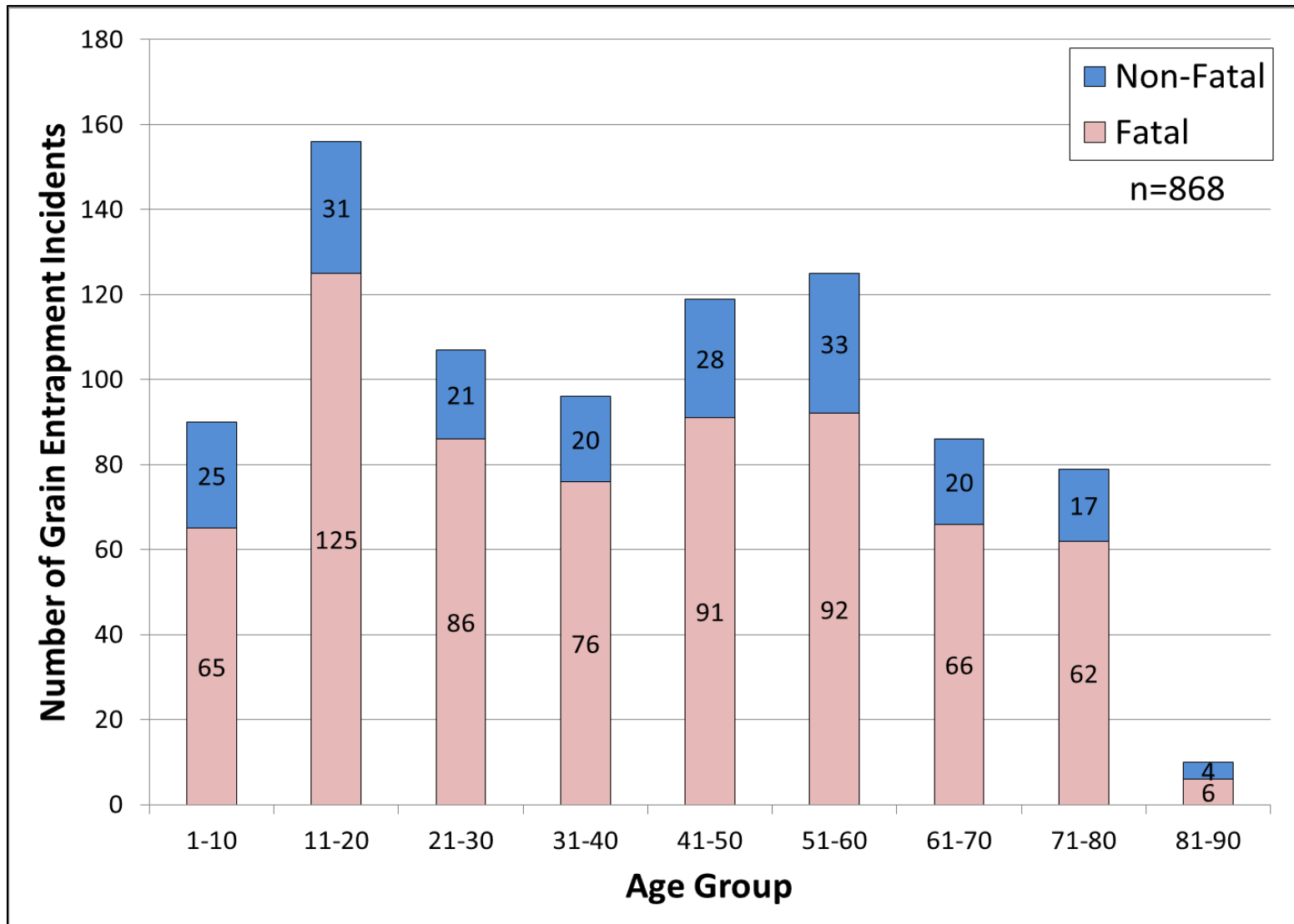
Record Numbers ?



The image shows two overlapping screenshots of news articles. The background article is from 'The Banner-Press' and is titled 'Record number of grain entrapment in 2014'. It is dated February 23, 2015, at 5:32 pm, and is attributed to the Nebraska Corn Board. The article discusses the rise in on-farm grain storage and the record number of grain entrapment accidents in Nebraska, highlighting the dangers of grain bin safety during Grain Bin Safety Week (February 22-28, 2015). It mentions that agricultural leaders are placing special emphasis on handling safety and that the Nebraska Corn Board and Nebraska Corn Growers Association are encouraging elevators and other grain handlers to slow down and take a second look at grain. A quote from Larry Mussack, president of the Nebraska Corn Growers Association, states: "We feel it is increasingly important to promote grain bin safety awareness and the hazards of working around grain." He adds that with just one moment of distraction, you could find yourself or someone you know in a grain entrapment. The article also notes that National statistics show that farming is one of the most dangerous occupations, with more than 900 cases of grain engulfment reported in the past 50 years.

The foreground article is from the 'Iowa Work Injury Blog' and is titled 'NUMBER OF GRAIN BIN ACCIDENT FATALITIES SOARS IN 2014'. It is posted by Corey Walker on January 1, 2015, and includes a 'Leave a comment' link. The article describes grain bin accidents as some of the most horrific workplace accidents in Iowa, citing the Purdue University Agricultural Safety and Health Program's findings that Iowa is the largest producer of grain and has seen over 25 grain entrapment accidents from 2005 until the time of the report, with more than 15 of those accidents being fatal. It explains that grain bin accident deaths typically occur when persons are working inside a grain bin and become voided in the grain, sucking them underneath it. The article states that when a person steps on grain, they are at risk of falling into a hollow space and being sucked under. The person may become buried under the grain within seconds and can suffocate before help arrives. It concludes that rescue of a person buried in grain is extremely difficult, which is why so many of these entrapment incidents result in death.

Age Distribution for All Grain Entrapment (1964-2014)





Medium

- During 2015 the primary medium was corn (52%) and soybeans (17%).
- 792 of the 1096 grain entrapment cases the medium was known.
- The vast majority was corn with 486 cases
- Soybean was the second most with 120 cases
- Wheat was third with 36 cases
- Remaining medium (150 cases) included Silage, Milo, Rice, Sunflowers, Cotton Seed, Barley, Sorghum, Peanuts, Hay, Cotton, Beans, etc

Factors Influencing the Trend in Grain-Related Entrapments

- Increasing production of grain
- Longer term storage of grain increasing potential for spoilage
- More storage being built at exempt facilities
- Increased rate of grain handling
- Increased size of storage structures
- Expanded use of grain for energy production
- Changing workforce
- Reluctance to invest in drying grain (time/money)
- Genetic modifications that increase drying time

International Incidents

- No known international effort to document incidents involving agricultural confined spaces
- International cases documented most frequently involved:
 - Grain storage and handling
 - Manure storage
- Grain-related cases have been identified around the world
- Most documented cases involve multiple workers
- The frequency of cases being documented is increasing
- Cases involving biogas generation have been documented.

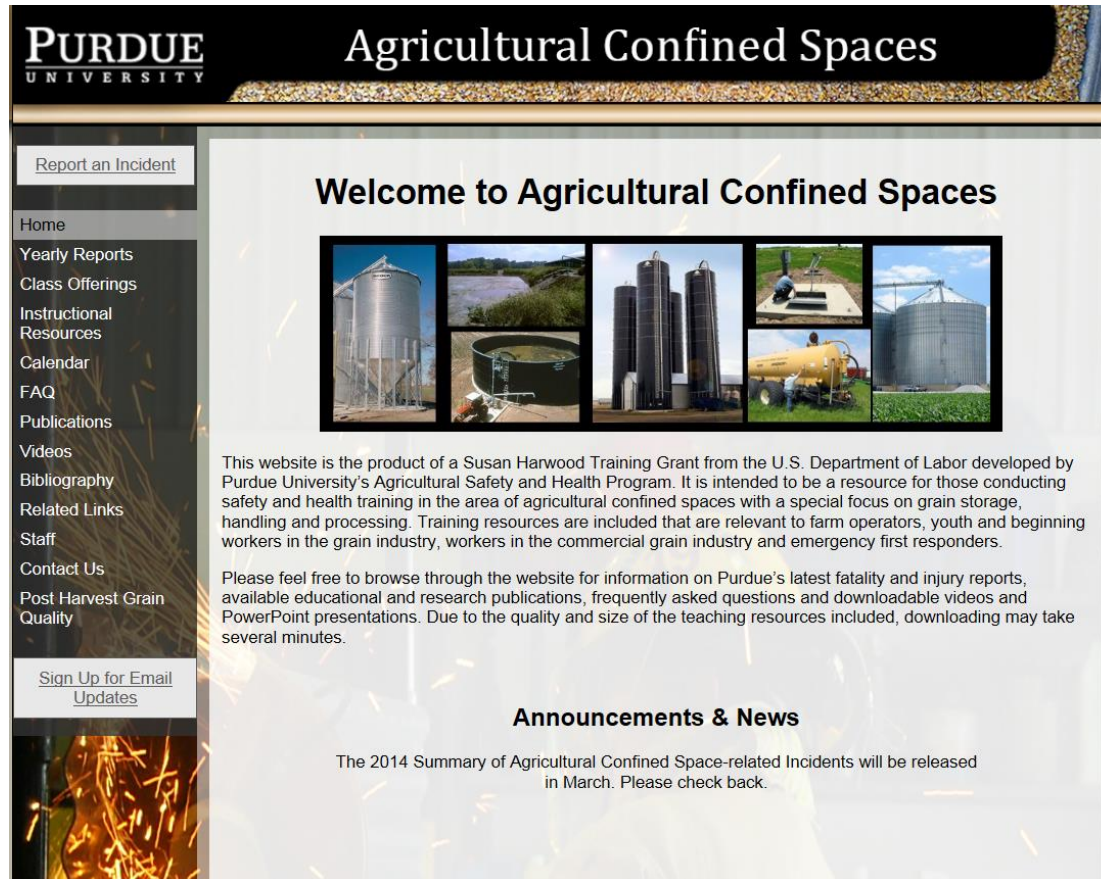
Global Ag confined Space-Related Fatalities



Conclusions

- Slightly more than half of all agricultural confined space-related incidents are grain entrapments
 - Falls and Entanglements represent next largest incident categories in confined spaces
- Seven documented incidents involving youth under the age of 21 occurred in 2015 in sharp contrast with 0 incidents in 2013
 - Overall 20% of all incidents involve youth under age of 21
- Additional 71 cases from prior years yet to be catalogued
- Increased number of cases being documented internationally
- Still large amount of unknowns

Check Out Our Website



www.agconfinedspaces.org

Questions?

E-mail:
field@purdue.edu

