Communicating Safety Information

How far have we come?
Not-So-Great Moments in Chemical Safety

Excerpts from Chemical Heritage Magazine

Gay-Lussac was temporarily blinded as a result of a potassium explosion in 1808

Bunsen lost the use of his right eye as a result of an explosion of a flask of cocadyl chloride ($C_2H_6AsCl$) – additionally he was nearly killed by inhalation of vapors from arsenic compounds

Davy working to isolate fluorine had numerous injuries to his eyes and fingers, the Knox brothers also working to isolate fluorine both suffered from severe hydrogen fluoride poisoning, and two other chemists died in their attempts to isolate the compound
Other notable laboratory hazards

Mercury poisonings – including Karen Wetterhahan

Laboratory fires – Nikola Tesla, 1895; and Thomas Edison, 1914

Laboratory-Associated Infections – Review published in the 1979 Annual Review of Microbiology by Robert M. Pike and a review in Public Health Briefs – a 1986 Survey by Vesley and Hartmann (injury rates were 3.5/1000 FTE aggregate)

Explosions – 3-Post Docs died at Harvard, 1998; 6 injured at Lehigh in 1999; Univ. of Chicago in 1990; Univ. of Utah in 1992
Chemical Lab Safety Problems Spaw New Laws, Practices

In July 1973, while driving home from his job as a chemist at Dow Chemical Co.’s Wayland, Mass., research facility, James Kaufman heard on the radio that there had been a serious explosion at nearby Worcester Polytechnic Institute. Kaufman, who had been working there for only a few weeks, had recently completed postdoctoral work at Worcester Polytechnic and had earned his Ph.D. there a few years before. Upon hearing the news of the accident, he bypassed his house, driving straight to the Worc.

By Rebecca Andrews | February 18, 1991

April 14, 1981, OSHA published a Request for Comment and Information concerning health hazards of toxic substances in laboratories (46 FR 21785). This action was taken to gain further insight into the problems OSHA health standards might pose for laboratories. Interested parties were invited to submit comments, views and data concerning issues which OSHA needed to assess in deciding whether a special laboratory policy was necessary. Some 200 comments were received in response to this.

July 24, 1986, on the basis of information received in response to the Request for Comments and other considerations, OSHA issued a notice of proposed rulemaking (NPRM) entitled “Occupational Exposures to Toxic Substances in Laboratories” (51 FR 6660). OSHA received 129 comments in response to the NPRM.
This combined with accidents like

- Flixborough – 1974
- Seveso - 1976
- Bophal -1984
- Piper Alpha - 1988
- Houston Chemical Complex – 1989
- Sterlington - 1991
- Texas City – 2005
- West Texas – 2013

Not to mention local events such as train derailments, tractor-trailer rig accidents, and other smaller accidents which hit close to home.
Additionally -

You have superfund sites –
  Love Canal; Picher, Oklahoma; Anniston, Alabama

All of these have combined to make communication about possible hazards essential.
But There are the Unintended Consequences -

All Chemicals are Hazardous

One page of instructions – fifty pages of cautions

It’s too dangerous to allow that ..... 

We can add an alarm for that...

You can’t put that pipeline through here because...

There should be a law.....
Understanding the Meaning of the Words

**Hazard** – a situation or status that poses a level of treat to life, health, property, or the environment.

**Risk** – the potential of losing something of value or the deviation from the expected

**Perception of Risk** – a subjective judgment about the severity of a risk
The Challenge in the Communication of Safety Information

Dealing with the biases and perceptions of the user of the information

Communicating the information needed to be safe

Putting the information in terms that are understandable based upon the known biases and in a context that is relatable.
Comparisons are a means of communicating acceptable risk

From which injury are you most likely to die from:

A fall on the same level from slipping, tripping or stumbling

OR

Excessive Heat

OR

Fire and Flames

OR

Poisoning by solid and liquid
A fall on the same level from slipping, tripping or stumbling
  Lifetime Odds 1 in 163

OR

Excessive Heat
  Lifetime Odds 1 in 3,217

Fire and Flames
  Lifetime Odds 1 in 1,344

OR

Poisoning by solid and liquid
  Lifetime Odds 1 in 126

From the 2012 Injury Facts from
Multiple Definitions of Risk

- Risk as hazard
- Risk as probability
- Risk as consequence
- Risk as potential adversity or threat
The Perception of Risk

- It is very subjective
- Based on characteristics and severity.
- Personal history
- Sense of control
- Perceived benefits
Laws of Acceptable Risk

- Roughly proportional to the cube of the benefits.
- Voluntary risks are 1000 times more likely to be accepted than involuntary ones.
- Inversely related to the number of persons exposed to that risk.
- The level of risk for voluntarily accepted hazards is similar to the level of risk from disease.

*The Perception of Risk*, Paul Slovic, credited to Starr 1969
We as safety communicators have to:

1. Make clear the difference between a hazard and a risk.

2. Expose our students to safety information routinely so that reviewing and understanding the hazards becomes part of the overall laboratory process.

3. Put risks in terms that are understandable.

4. Put risks in terms of what they can control.
Genie – You’re Free"