

Risk Assessment 101

- *what are we afraid of?*
- *why?*
- *what can we and what should we do about it?*

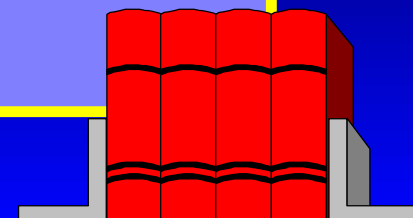
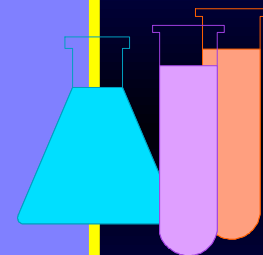
Mike Jayjock
Rohm and Haas Company

There are Different Types of Risk

- Tom Cruise in “*Risky Business*”
- Dial Soap Advertisement:
“Don’t you use no deodorant?”
- Insurance “Your in good hands with Allstate.”
- Antacid “My doctor said Mylanta”
- “I’ve fallen and I can not get up!”
- “Friends don’t let friends use Windows 3.1”

OUR DEFINITION OF RISK

- Risk is the Probability or Likelihood that an Adverse Outcome will Occur in a Person or Group that is Exposed to a Particular Concentration or Dose of a Hazardous Agent.
- The Process used to Estimate the Likelihood that Humans will be Affected Adversely by a Chemical or Physical Agent Under a Specific Set of Conditions is Called Human Health Risk Assessment.



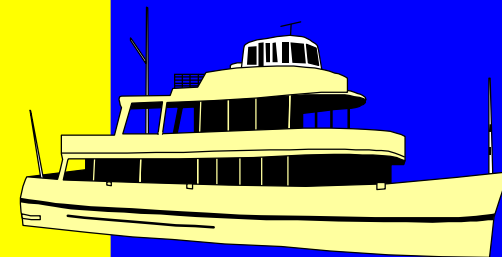
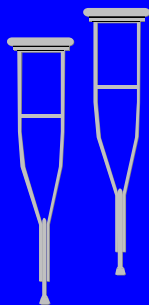
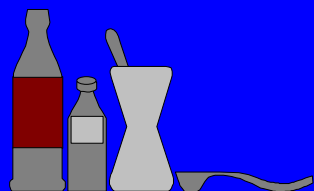
RISK IS UNAVOIDABLE IN OUR EVERYDAY LIVES

Annual Risk of Death in the US.

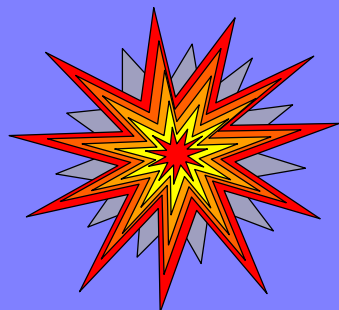
Hazard

Risk per Million Persons

All Causes	9,000.0
Motor Vehicle Accidents	210.0
Work Accidents	150.0
Homicides	93.0
Falls	74.0
Drownings	37.0
Fires	30.0
Poisonings	17.0
Civil Aviation	0.8
Boating	0.6
Tornadoes	0.4
Bites and Stings	0.2



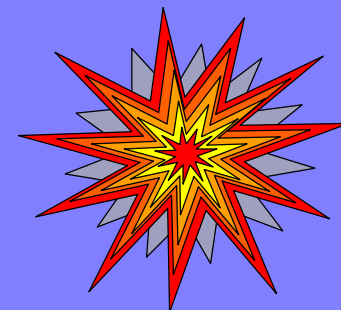
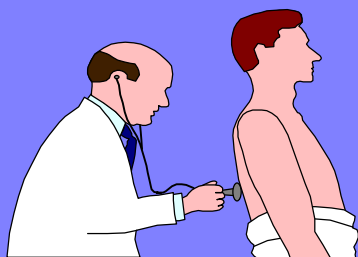
RISK COMPARISONS FOR INVOLUNTARY RISKS



Risk

Risk of Death / Person / Year

<i>Influenza</i>	<i>1 in 5000</i>
<i>Leukemia</i>	<i>1 in 12,500</i>
<i>Struck by Automobile</i>	<i>1 in 20,000</i>
<i>Floods</i>	<i>1 in 455,000</i>
<i>Tornadoes (Midwest)</i>	<i>1 in 455,000</i>
<i>Earthquakes (California)</i>	<i>1 in 588,000</i>
<i>Nuclear Power Plant</i>	<i>1 in 10 million</i>
<i>Meteorite</i>	<i>1 in 100 billion</i>



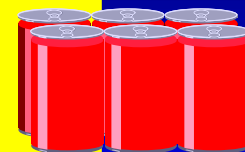
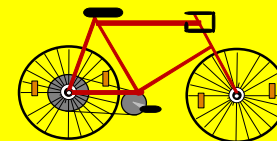
Source: Dinman, B.D., "The Reality and Acceptance of Risk," Journal of the American Medical Association, Vol. 244 (11): 1126-1128, 1980.

RISKS THAT INCREASE PROBABILITY OF DEATH BY ONE IN A MILLION

Activity

Cause of Death

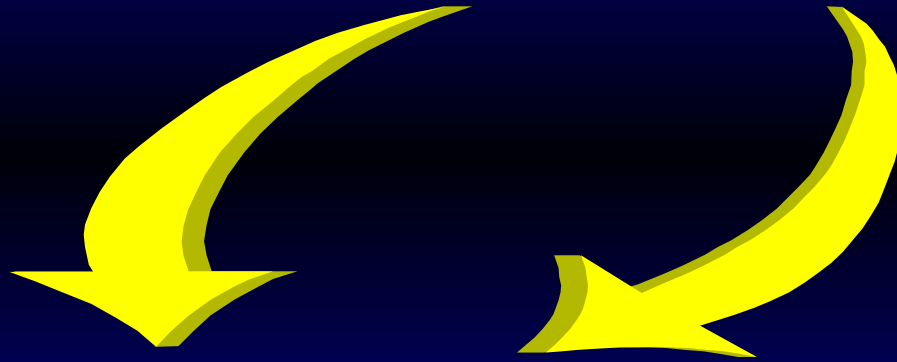
Smoking 1.4 Cigarettes	Cancer, Heart Disease
Drinking 0.5 Liter of Wine	Cirrhosis of the Liver
Traveling 10 miles by Bicycle	Accident
Traveling 300 miles by Car	Accident
Flying 1000 miles by Jet	Accident
One Chest X-Ray	Cancer from Radiation
Eating 40 Tablespoons of Peanut Butter	Liver Cancer from Aflatoxin
Eating 100 Charcoal-Broiled Steaks	Cancer from Benzopyrene
Drinking 30 Cans of Diet Soda	Cancer from Saccharin
Living 150 years within 20 miles of a Nuclear Power Plant	Cancer from Radiation
Risk of Accident by Living within 5 Miles of a Nuclear Reactor for 50 Years	Cancer from Radiation



Source: Wilson, R., "Analyzing the Risks of Daily Life," *Technology Review*, 81, (1979)

“There is no point in getting into a panic about the risks of life until you have compared the risks which worry you with those that don't, but perhaps should.”

(Lord Rothschild, *The Wall Street Journal*, 1979).



The 1 in a million risk level used to regulate some chemicals and other hazards is many times below risks which people face every day.

**Your Lifetime Risk of Dying in an
Automobile Accident is 1 in 65 !!!**

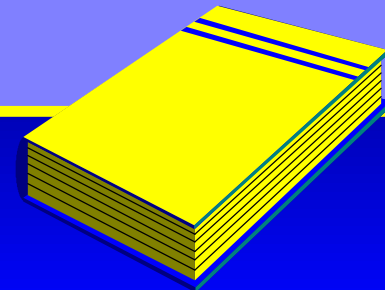
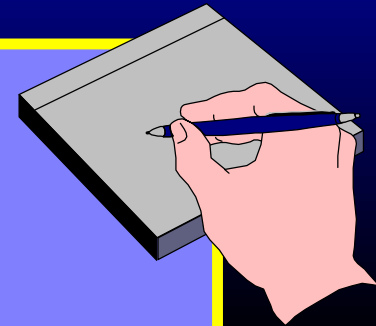




**Your Lifetime Risk of Dying from
being Hit by an Airplane while you're
on the Ground is 4.5 in a Million!!**

ELEMENTS OF RISK ASSESSMENT

- Anticipate the Potential for Risk
- Recognize and Identify the Hazard
- Evaluate the Hazard
- Recommend Ways to Control and Manage the Risk to Acceptable Levels



BASIC PRINCIPLE OF HUMAN HEALTH RISK ASSESSMENT

Risk is a Function of Exposure and Toxicity. The Toxicity of a Chemical and the Potential for Exposure to that Chemical are Equal Partners in Risk Assessment .



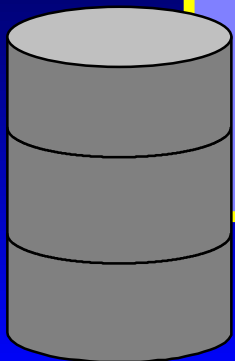
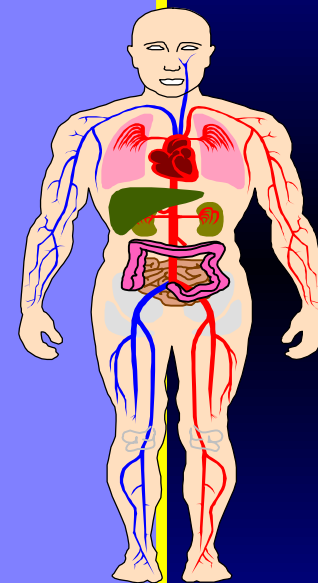
Human Health Risk Assessment

The final step in the overall evaluation of the safety of our products. It is the combined evaluation of all available toxicology and exposure information relating to the intended use of the chemical.

EXPOSURE ASSESSMENT

Three Different Areas of Potential Human Exposure to a New Substance Must be Evaluated:

1. Potential for Inhalation of Vapors
2. Potential for Absorption thru Skin
3. Potential Ingestion of the Substance either Intentionally or by Accident.

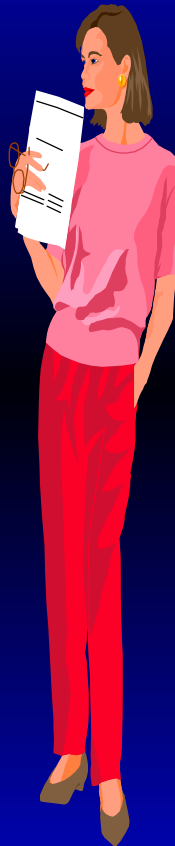


EXPOSURE LIMITS IN RISK ASSESSMENT

- Toxicity Testing is Done on a Substance in Order to Determine the Hazard which the Substance may Present to Humans.
- Based on its Toxicity Profile, Exposure Limits are Established for the Substance.
- If Exposure to the Substance is Kept Below its Exposure Limit, the Risk from the Substance is Considered to be Acceptable.

THE ESSENCE OF RISK ASSESSMENT

- A Risk Assessment Compares the Predicted Human Exposure vs. the Established Exposure Limit for a Substance.
- The Lower the Exposure in Comparison to its Exposure Limit, the Lower the Associated Risk from the Substance.



Levels of Risk

- **De Minimis**
- **Significant**
- **Acceptable**

CONCEPT OF A *DE MINIMIS* RISK

- *De minimis* risks are those risks judged to be too small to be of social concern, or too small to justify the use of risk management resources for control.
- The *De minimis* risk level frequently used by government agencies (EPA, FDA) is 1 in 1,000,000 or “1 in a million” increased risk of an adverse effect occurring over a 70 year lifetime in a large population.