

Pollution Prevention For First Responders

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Session Overview

- Cases where Pollution Prevention (P2) might have helped
- Why P2 should be important for responders
- P2 overview and examples
- What you can do
- Resources

Response Probability

- HazMat Incident at Facility - ?
- HazMat Transport Incident - ?
- Natural Disaster - ?
- WMD Attack - ?
- Terrorist Incident - ?

What Happened in Henderson in 1988?

Hint: Kaboom!!

Sequence of Events

- Welding torch starts fire
- Fiberglass walls in steel frame building spread fire
- Fire spreads to 55 gallon drums containing ammonium perchlorate next to building
- Fire consumes thousands of 55 gallon drums stacked in storage, explosion results
- Greater secondary explosion of aluminum shipping totes

PEPCON Explosion



Why was 8.5 million pounds of
ammonium perchlorate staged
onsite?

What happened in 1986?

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Space Shuttle Challenger Explosion



What Happened in India in 1984?



Union Carbide Plant, Bhopal

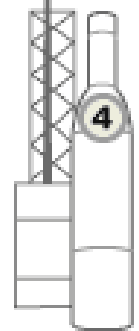
- 41 Tons of Methyl Isocyanate – Chemical Intermediary
- Used to make SEVIN and TEMIK pesticides
- Water introduced to 20 ton MIC tank causes exothermic reaction
- 3,000+ people killed, 300,000+ people with long term injuries

What Happened?

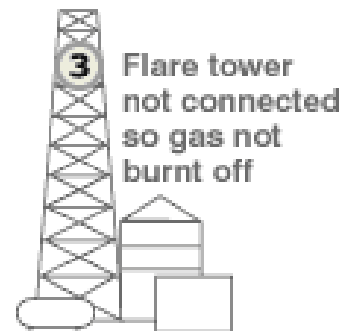
- 1 Runaway reaction
in tank 610



- 2 Cooling system not
in use so fails to
slow reaction



- 4 Vent scrubber
not operating so
gas can't be
neutralised with
caustic soda.
Gas escapes from
30m high vent



- 3 Flare tower
not connected
so gas not
burnt off



- 5 Water curtain set at
12-15m so can't
neutralise gas with
spray

SOURCE : India Today

Causes of Disaster

- Water introduced to MIC tank
- Lack of immediate management response
- Temp and pressure gauges unreliable
- MIC refrigeration unit shut off
- MIC gas scrubber shut off
- MIC flare tower shut off
- Water curtain inadequately designed
- Lack of effective warning systems
- MIC storage tank filled above capacity
- Reserve MIC tank already full

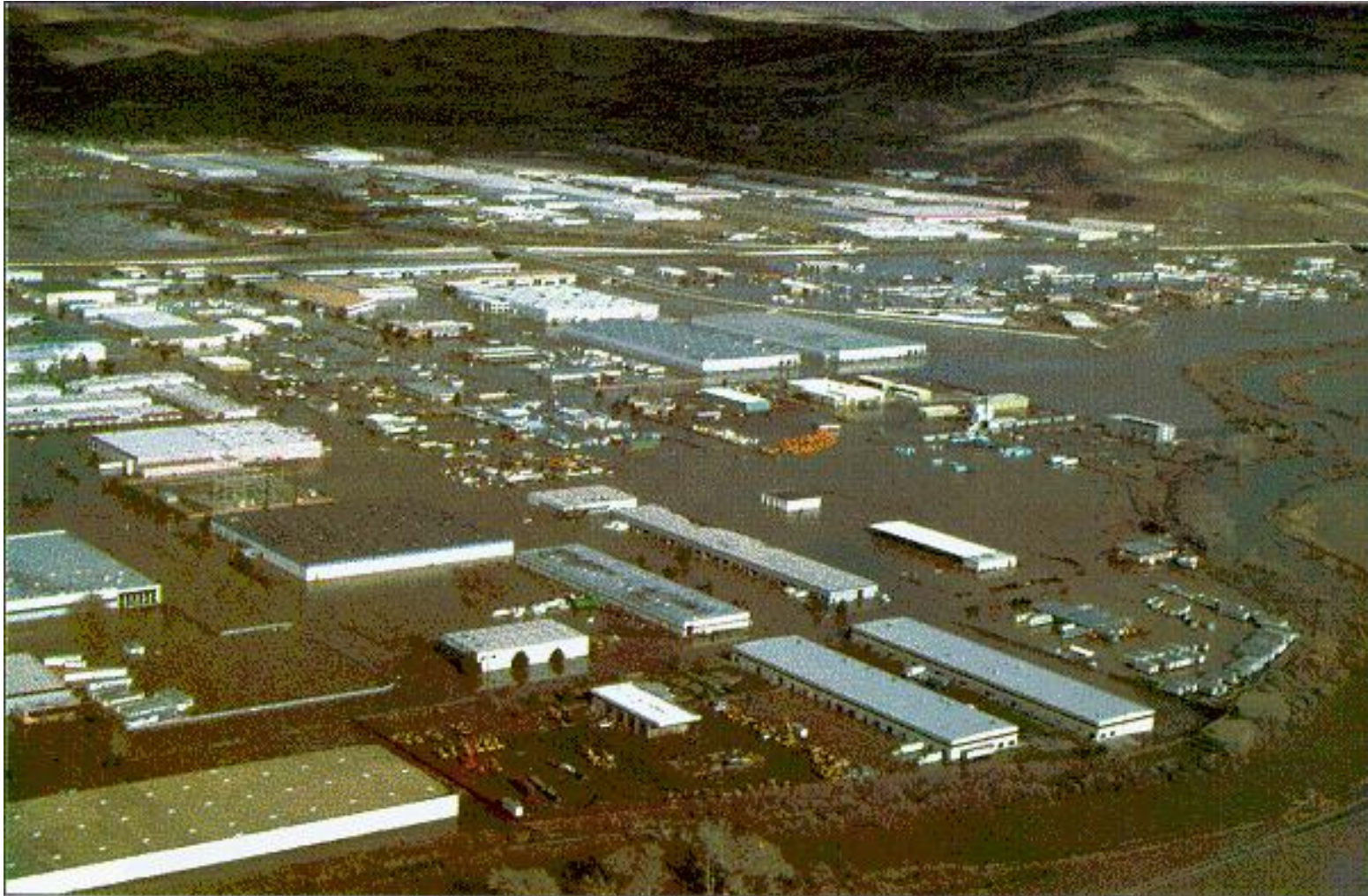
Pollution Prevention View

- 41 Tons of MIC was the cause of the disaster.
- Process integration on the Bhopal facility could have reduced MIC inventories from 41 tons to < 10 kg.

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Sparks, NV 1997



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1997 Flood



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1997 Flood



Problems Waiting to Happen



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And, Then They Do



What is Pollution Prevention?

- Material Utilization Efficiency
- Source Reduction
- Waste Minimization
- Avoiding/minimizing the use of hazardous materials and the generation of wastes, discharges and emissions
- Focus on material use, processes, and products

Benefits to Responders

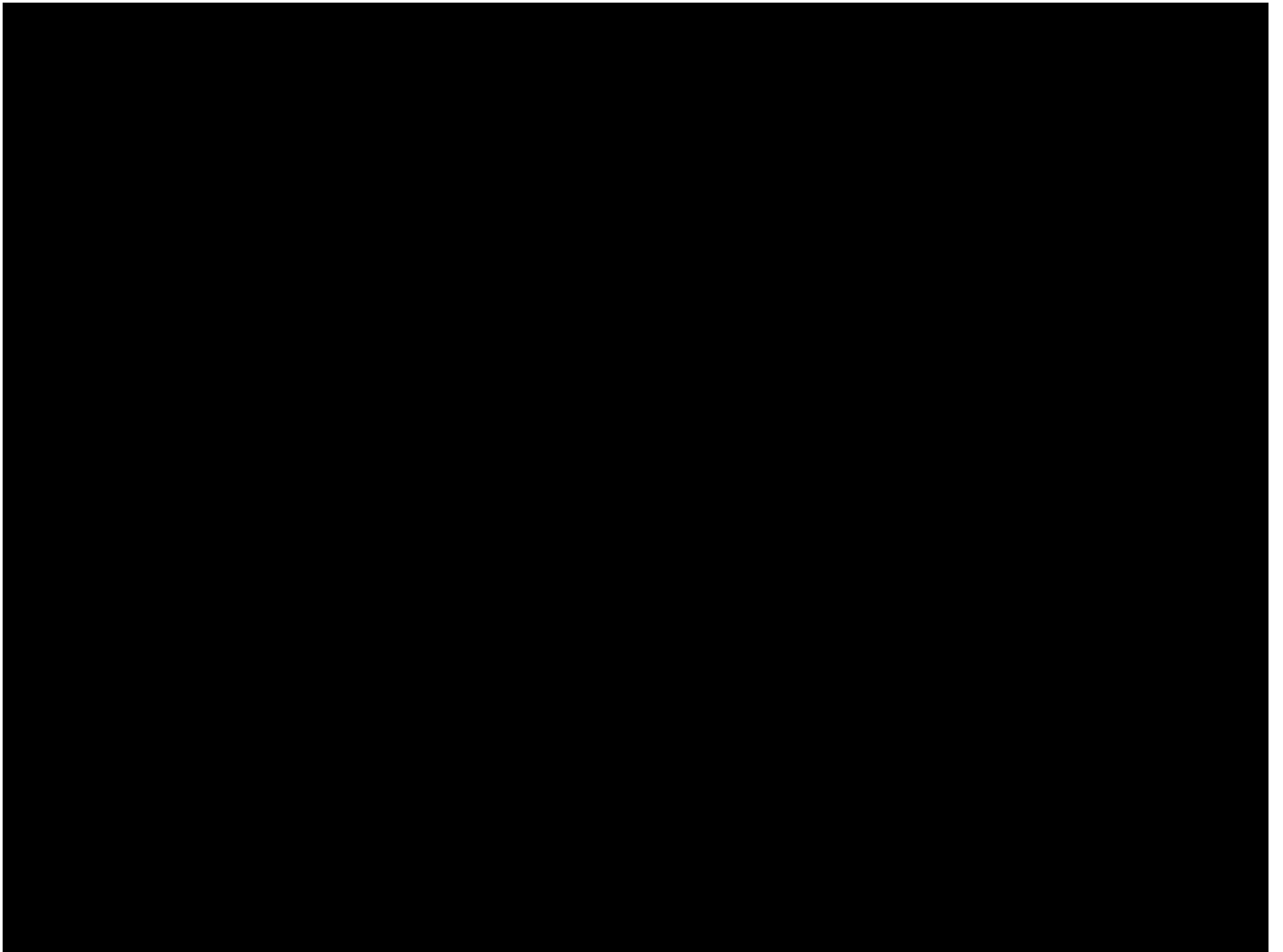
- Fewer hazardous materials at facilities
- Lower quantities of hazardous materials
- Better information on hazardous material inventories
- Less hazardous materials in transport
- Reduced risk of release
- Smaller releases

Benefits to Facilities

- Reduced environmental, health, and safety risks
- Reduced regulatory compliance requirements and costs
- Materials handling and waste management costs reduced
- Increased efficiency

A Role for Responders

- Understand P2 Benefits and Opportunities
- Influence Your Organizations
- Influence Your Communities



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Inventory Control to Reduce....



Inventory Control

- Just in Time (JIT)
- First In, First out (FIFO)





First In First Out

- Materials management
- Reduces spoilage
- Helps in inventory control and losses
- Hand in hand with JIT concepts



Just In Time

- The Japanese system of inventory control
 - Toyota system
 - just-in-time system
 - Kanban system
- A company receives it's shipment of chemistry or materials "just in time" to use them

Just In Time

- Minimizes “stockpiling” of chemicals
- Reduces potential for accidents
- Maintains “fresh” chemistry
- Lowers possibility for “spoilage”

Pharmacy Operations of Hazardous Materials



Management Theory

- Check out- Check in (library concept)
- Better chemical management
- Reduce or eliminate redundant chemistry
- Up-to-date chemical inventories
- Monitor usages
- Approve all chemical purchase

Chemical Inventories....

Why?

- Assists with proper reporting to local/state/federal (Tier 2 Report)
- Information needed by emergency personnel
- Avoid excess stock when ordering



Hazardous Materials Tracking Log

- Employees initial log at pharmacy issue
- Employees fill out whenever a container is:
 - Emptied
 - Transferred to another room
 - Turned in through the HWTS



Pharmacy Theory

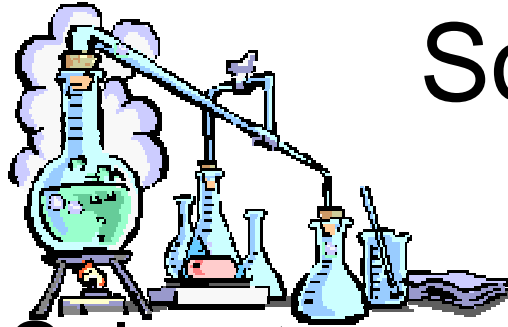
- Minimize hazardous materials (and cost)
- Reduce HW Disposal cost
- Provide customer easy access to supplies, materials, & MSDSs
- Better control over materials used in work processes



Product Substitution...Solvents

- They're everywhere
- Health Effects
- Flammable/Ignitable
- Air, Water, Soil
Pollution
- P2 Opportunities





Solvents Types

- Chlorinated Solvents
- Petroleum hydrocarbon based
 - Low flash (<140°F)
 - High flash (>140°F)
- Terpene (plant derived)
- Aqueous
 - Non-microbial
 - Microbial

More
Problematic



Less Problematic

Aqueous Cleaners

- Improves workers safety/productivity
- Low or no VOC's
- Eliminates hazmat/hazwaste storage and transport



Solvents

- The key questions that need to be asked?
 - Can I reduce the amount of solvent I use?
 - Can I consolidate the different kinds of solvents I use; only one solvent for several purposes?
 - Is there a less toxic alternative?
 - Can I save money by investing in Pollution prevention (“P2”) measures?

Solvent Filtration

- Removes contaminants from solvent
- Extends solvent life
- Minimizes hazmat and hazwaste transport
- Saves Money



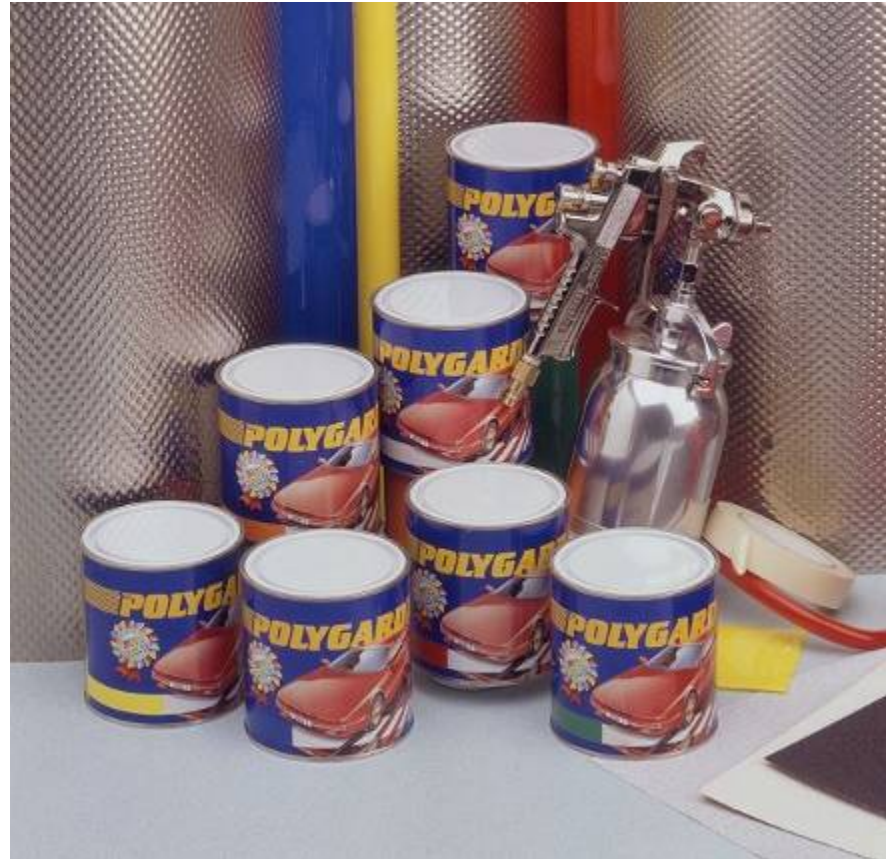
Solvent Distillation



- Autobody shops
- Cabinet shops
- Industrial Solvents
- Distills solvent for reuse on-site
- Minimize hazmat/hazwaste transport
- Save money

Painting and Coating

- Paint/Coating Type
- Application Equipment
- Technology





Paints



- Automotive Clear Coats – up to 7lbs/gal VOCs
- High Solids Paints -2-3lbs/gal. VOCs
- Industrial Polyurethanes – 3-4 lbs/gal. VOCs
- Waterborne – less than 1lb/gal VOCs
- Powdercoat - Zero



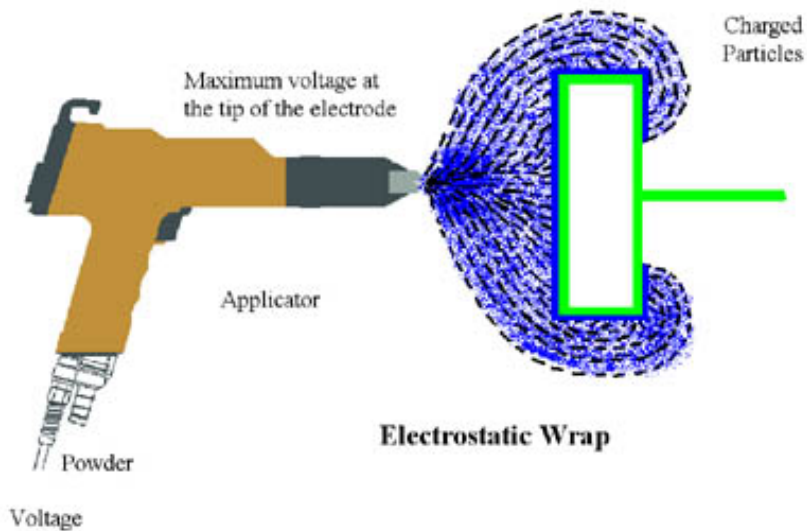
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Table 1: Spraying Techniques used in Surface Coating

Technique	Description	Advantages	Disadvantages	Transfer Efficiency
Compressed air atomization	Conventional: 50 to 100 psi	Fine finish	Lowest transfer efficiency. Poor application in recesses and cavities.	25%-30%
	High volume, low pressure: Under 10 psi	Fine finish. High transfer efficiency.	Requires training. Poor application in recesses and cavities.	45%-55%
Air-assisted airless (sic)	Small orifice: 450 psi	Fine finish. High transfer efficiency. Moderately fast application. Good penetration into recesses and cavities. Works on a wide variety of applications.	Best with slow to medium production line speeds. Best with low viscosity materials.	40%-50%
Airless	Small orifice: 2,000 to 3,000 psi	Fastest application. Good penetration into recesses and cavities.	Coarser finish. Moderately poor transfer efficiency.	30%-35%

Powder Coating – 60-93% Transfer Efficiency



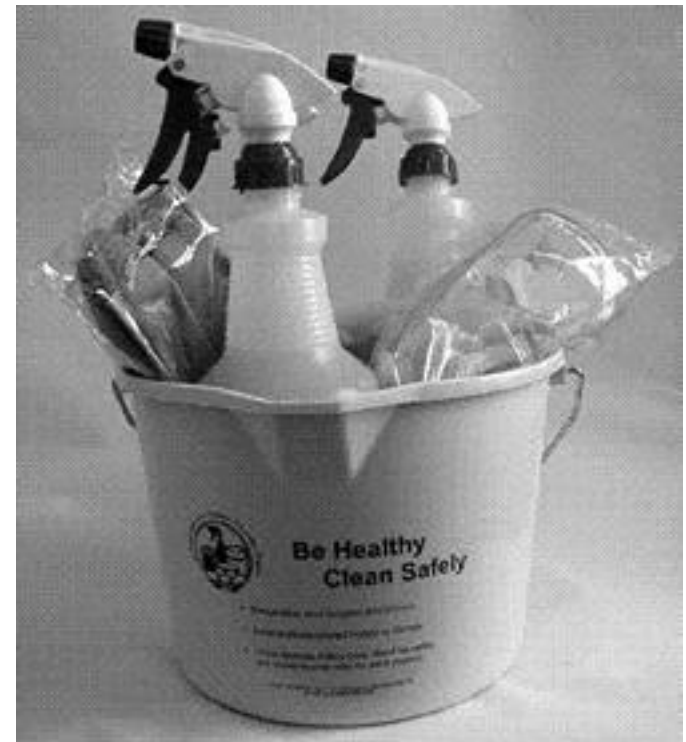
Chlorine Gas

- Calcium or sodium hypochlorite has replaced chlorine gas for pool maintenance applications at many facilities.



Janitorial Dangers

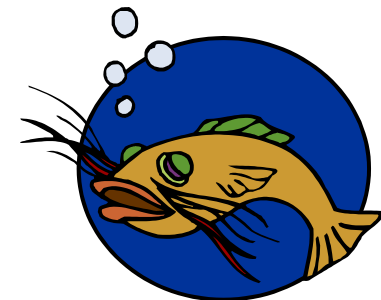
- Six out of every hundred professional janitors are injured by the chemicals that they use each year.
 - Burns to the eyes and skin
 - Breathing toxic vapors.





Facts

- Harmful Chemicals
- Physical Incompatibilities
- Some Chemistry Increase BOD
- Some Chemistry is Toxic to Aquatic life



Janitorial Dangers

- One third of the cleaning chemicals used today have ingredients that can harm you.
 - **Butoxyethanol** -Window Cleaners
 - **Hydrochloric/ Phosphoric Acid**- Toilet Cleaners
 - **Sodium Hydroxide**- Oven Cleaners/ Degreasers

Cleaning National Parks

A photograph of a wooden sign for Yellowstone National Park. The sign is weathered and features the text 'YELLOWSTONE NATIONAL PARK' in white capital letters. To the right of the text is a circular emblem with a landscape scene. The sign is set against a backdrop of rolling hills and a clear blue sky with some light clouds. The foreground shows a paved road.

Using Environmentally Preferable
Janitorial Products at Yellowstone and
Grand Teton National Parks

Purpose- Safer Cleaning Products

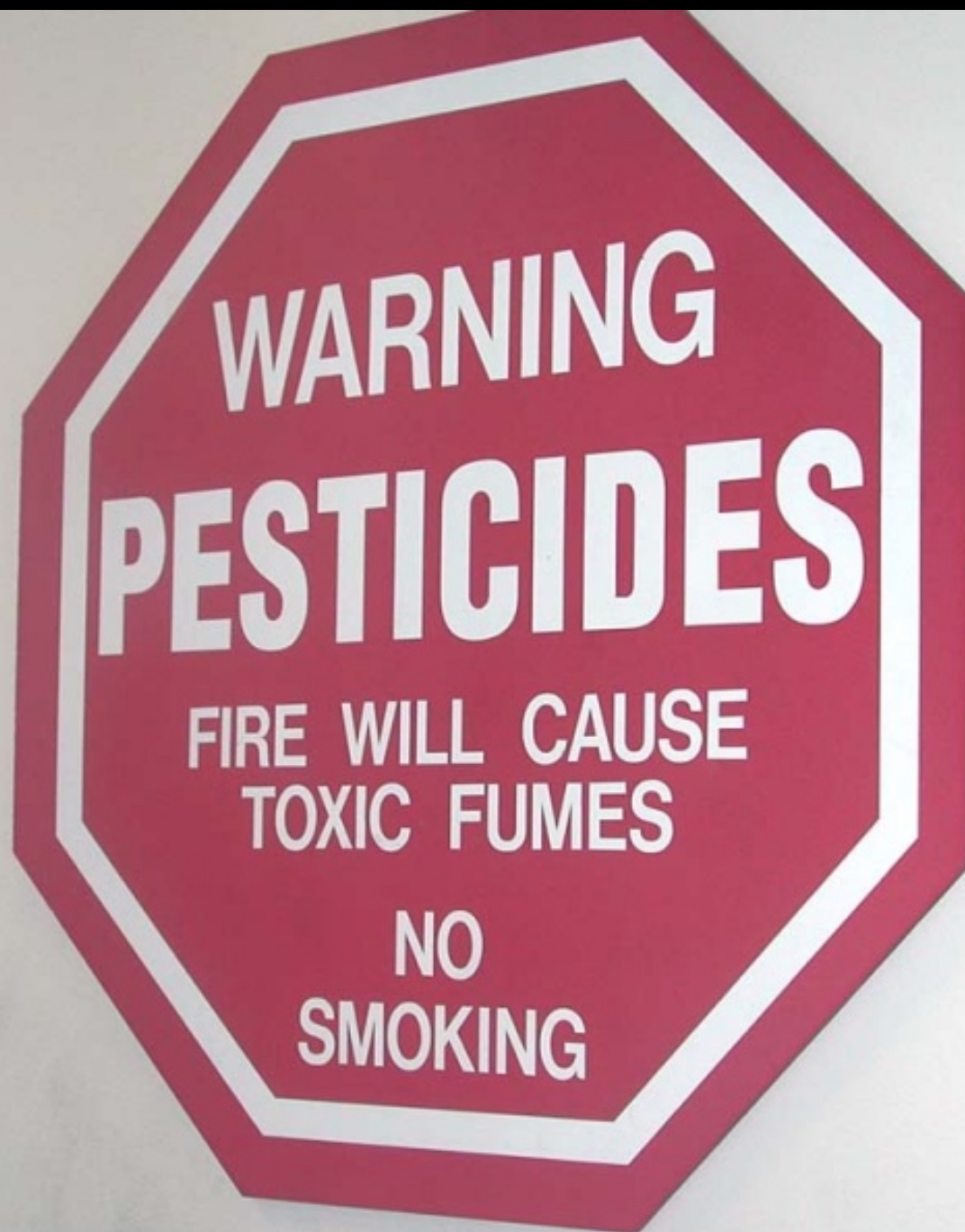
- Eliminate
- Reduce
- Choose
- Involvement



Did it Succeed?



- You Bet!
- Reduction of products used by 80%
- 130 Different Products to 15 Products that are Environmentally Preferable



WARNING

PESTICIDES

**FIRE WILL CAUSE
TOXIC FUMES**

**NO
SMOKING**

What Happened in 1991?

Hint: Upper Sacramento River

Sacramento River Spill

- Southern Pacific Railroad train derailed on Cantara Loop bridge
- Tanker carrying metam sodium punctured spilling 19,500 gallons soil fumigant into the river.
- I-5 closed, citizens evacuated
- Killed all aquatic life for 38 miles downstream to Lake Shasta.







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Pesticides

- 3 million people are severely sickened by pesticides
- 220,000 die from pesticides each year worldwide
- In the U.S. alone, 110,000 people are poisoned by pesticides annually

World Health Organization

Integrated Pest Management

IPM is:

- eliminating insect, disease and weed pest problems — not eradicating all pests
- applying pesticides, fertilizers or irrigation only when the benefits outweigh the costs
- considering all of your pest management options, including natural, biological, cultural and chemical methods

What is IPM

- IPM reduces risk by
 - reducing overall pesticide use,
 - using least risk pesticides when there is a demonstrated need
 - taking special protective measures to reduce pesticide contact with living organisms and the environment

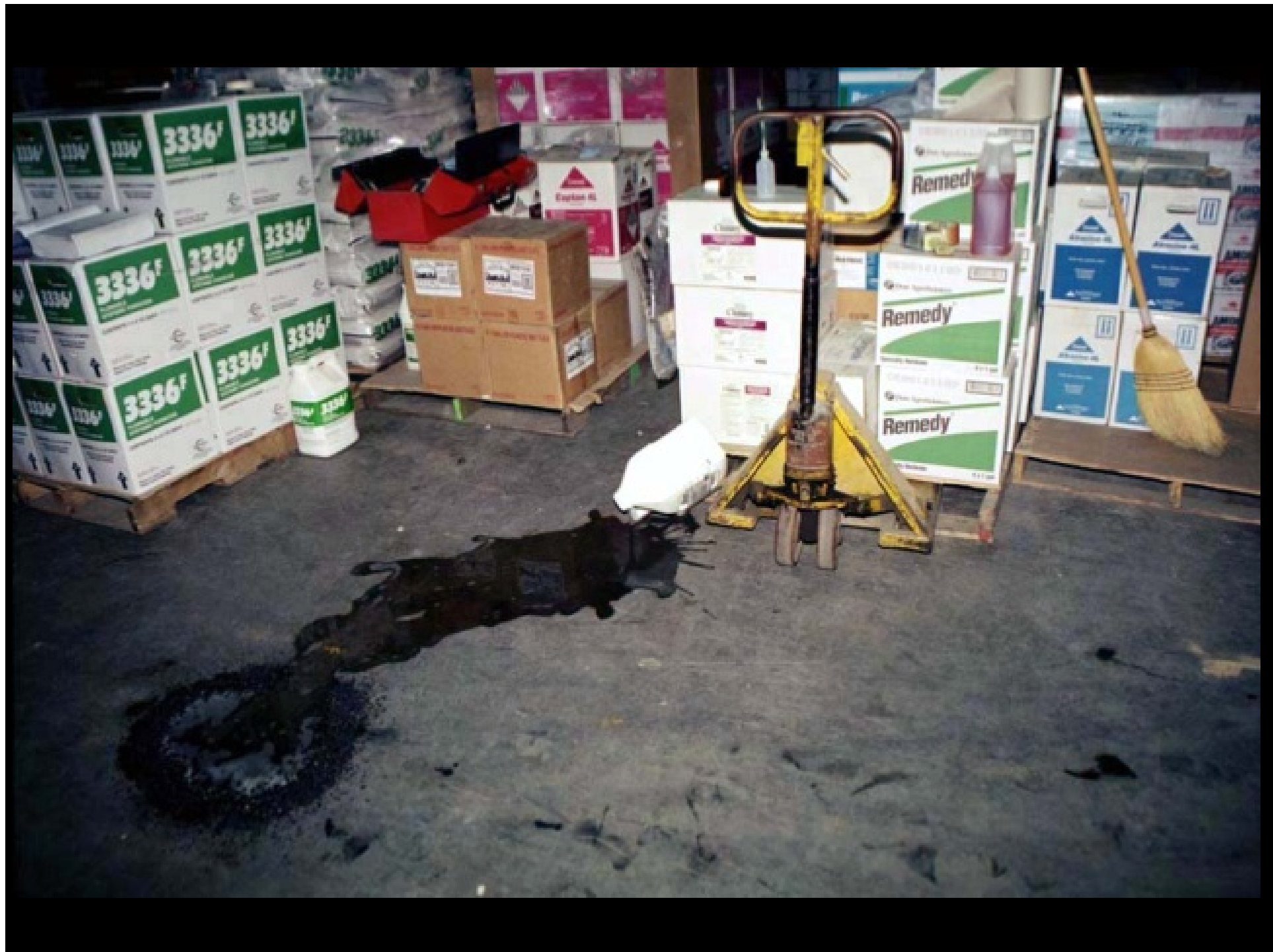
IPM Benefits

- Fewer pesticides/herbicides stored/used
- Reduced potential for spills either during use or during transport
- Minimizes potential impact to a community or special populations
- Pest resistance is avoided or delayed











What You Can Do...

- Identify resources available to assist pollution prevention efforts
- Communicate with your co-workers
- Integrate P2 in release prevention and communication activities
- Advise facilities in your communities of P2 advantages and opportunities
- Refer them to assistance

P2 Resources

- In Nevada:
 - Business Environmental Program
 - (800) 882-3233
 - www.nsbdcbebep.org
- AZ, CA, NV, HI – Western Regional Pollution Prevention Network
 - (775) 689-6675, www.wrppn.org
- National – Pollution Prevention Resource Exchange – www.P2Rx.org