The Facts on PVC & the Environment
What do the following have in common?
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What do the following have in common?

- A firefighter
- A hospital operating room
- A United Center arena
- A glass of water
All are made of, or are produced, using chlorine
Chlorine....

• Is the 11th most common of the 107 elements

• Is found in:
  – Rocks
  – Plants
  – Animals
  – Humans
Chlorine is the building block for PVC materials.

- Crude Oil
- Ethylene
- Rock Salt
- Chlorine
- Sodium Hydroxide
- Vinyl Chloride Monomer
- Polyvinyl Chloride
- Hydroxide
Polyvinyl chloride (PVC) is...

- The second most commonly used plastic in the world (after polyethylene)
- The most widely used plastic in construction applications
Over more than half a century, PVC has established itself as one of the most versatile materials known to man.
Unfortunately, Greenpeace has mounted a misguided and misinformed attack on PVC.
Greenpeace alleges that PVC:

- Plasticizers are a health hazard
- Is a major source of dioxins
- Cannot be recycled
- Is a hazard in building fires
- Has been banned in Europe
PHTHALATES

• Also known as “plasticizers”
• Phthalates are a family of products used to make PVC flexible
Blue Ribbon Panel

- American Council on Science and Health
- 17 experts from the USA, Canada, Europe
- Led by Dr. C. E. Koop, past Surgeon General
- Primarily baby toys, medical devices (e.g. IV bags)
The panel was unequivocal in their conclusions...

• “...the expert panel could find no solid scientific support for such a claim”

• “...is not harmful for children in the normal use of these toys...”

• “...as used in medical devices, is not harmful to humans even under chronic or higher than average conditions of exposure”
CPSC Upholds Use of DINP in Children’s Vinyl Toys!

• “...no demonstrated health risk...”

• “...exposure to DINP would not pose a risk to children...”

• “...voted unanimously to deny an activist petition to ban vinyl from products for children ages 5 and under.”
Plasticizers in Medical Devices

- “...the risk in connection with plasticizers is clearly exaggerated...”
- DEHP has been removed from the list of “possibly carcinogenic for humans” materials
- “…a clear green light for the use of PVC products in medical applications”

Swedish National Board of Health and Welfare, January, 2001
PVC, a major source of dioxins?
Dioxin-Like Compound Emissions, 1995
Grams, TEQ, 1995
Source: EPA, Vinyl Institute

- Municipal sludge solids: 207 grams
- Wood, Coal, Vehicles: 205 grams
- Cement Kilns: 171 grams
- Other: 42 grams
- Water Emissions: -20 grams
- Municipal Incineration: 1100 grams
- Medical Incineration: 477 grams
- Metal Smelting: 543 grams
- Forest, brush & straw fires: 208 grams
- Vinyl Manufacturing: 16 grams
Dioxins from the incineration of PVC?

- ASME study
- 1,900 sets of data
- 169 incinerators worldwide
- Conclusion:
  - “there is no statistical relationship between chlorine in waste streams and dioxin emissions’
Conflicting trends?

Dioxin Emissions Declining as Vinyl Production Rises

- Hagenmaier, 1996
- Hites, 1990
- Vinyl Production (Chemical Manufacturers Association, 1995)

1 picogram (pg) = 0.000000000001 gram
Recycling PVC, Walkway Pads
Recycling PVC, Pavement Patch
Recycling at the end of the life cycle
AfDR, Germany
PVC generates toxic HCL in fires?

- Harvard U/ Boston FD
- Southwest Research Inst./ San Antonio FD
  - Real building fires generate
  - <3% HCL estimated to be required to cause incapacitation/ death
- CO is the killer in fires
- No known deaths related to PVC in building fires
Fires involving vinyl are no more toxic than any other building fires.
Fact: PVC is the top performing material in fire situations

- PVC
  - Burns slowly
  - Does not support combustion
  - Extinguishes when source of flame is removed
To run video, click on black square while PowerPoint is in Slide mode.
PVC banned in Europe?

- A few high profile cases in the late 1980s and the early 1990s (e.g. Berlin, Germany)
- In all cases bans have been overturned
  - PVC “risks” were found to be exaggerated
  - PVC’s record with regards to safety, performance and environmental profile
Flat Roofing Market Europe
Polymeric Membranes in Millions

Total 70 Million

- PVC 62%
- EPDM 12%
- ECB / EVA / CPE 13%
- FPO 10%
- PIB 4%

“TPOs share has yet to reach 10%, despite a massive build up of capacity by established producers of both polymeric and bitumen systems. There have been some reservations over the material’s handling and installation characteristics but with the direct threats to PVC evaporating, the role and position of TPOs is less clear than seemed likely 2-3 years ago.”

“PVC remains the overwhelming popular material, accounting for 61.6% of the total. The recent concerns over PVC’s environmental credentials have largely been withstood, rebuffed and placed in a more sober context. The material has emerged as the most cost effective and proven single ply option.”
Environmental News
Checklist for Environmentally Resonsible Design & Construction

MATERIALS
Environmental News
Checklist for Environmentally Responsible Design & Construction

13 Durability

Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. All available evidence indicates that the PVC Roof Covering System should have a life in excess of 25 years.
Environmental News
Checklist for Environmentally Responsible Design & Construction

Durable Materials: ✓
Low Maintenance:
**Environmental News**
**Checklist for Environmentally Responsible Design & Construction**

**Durable Materials:** ✓
**Low Maintenance:** ✓
**Low Embodied Energy:**

PVC requires less energy than other plastics to produce, significantly less than metal and other construction materials.
Environmental News
Checklist for Environmentally Responsible Design & Construction

Durable Materials: ✔
Low Maintenance: ✔
Low Embodied Energy: ✔
Recycling:
Environmental News
Checklist for Environmentally Responsible Design & Construction

Durable Materials: ✓
Low Maintenance: ✓
Low Embodied Energy: ✓
Recycling: ✓
Avoid VOCs:
PVC roof membranes stack up well ....

Durable Materials: ✓
Low Maintenance: ✓
Low Embodied Energy: ✓
Recycling: ✓
Avoid VOCs: ✓

PVC roof membranes also....
- uses less non renewable raw materials
- is highly reflective, resulting in energy savings and a reduction in the urban heat island effect
What is the reflectivity of some of the most common roofing products on the market today?
The DOE and EPA have established an ENERGY STAR Roofs Products Program. ENERGY STAR is an innovative government/industry partnership that makes it easy for businesses to save substantially on their bills and protect the environment. In the year 2000, these savings equaled more than $5 billion dollars.
Leadership in Energy and Environmental Design (LEED)

• All Energy Star rated materials contribute one point

• If the project is within 500 miles of PVC membrane manufacturers, that will contribute towards another point

• PVC roofing membranes have been used on many LEED certified projects
The Donald Bren Center
U of C, Santa Barbara

Platinum Level Certified
Hewlett Foundation, Menlo Park, CA

Gold Level Certified
Ford Motor Company
Premier Automotive Group N.A.
HQ
Irvine, CA
Chicago City Hall
Green Roof Pilot Project
“This ceaseless obsession with ousting the frequently non-existent bogeyman from our chemical cornucopia does quite a lot to strengthen the ranks of consumer groups, but very little to actually improve the health and quality of our lives”

“I urge the nation’s consumer watchdogs not to drop their vigilance but to raise their standards”

Dr. C. Everett Koop, former Surgeon General
PVC’s future is cooler than ever

Scientists, NASA, the Environmental Protection Agency, the Department of Energy and the U.S. Government are recognizing the benefits of white reflective roofing.
In 2000, the U.S. Department of Energy and the Environmental Protection agency conducted a study where a large retail store replaced a 100,000 sq. ft. black EPDM roof with a white PVC roof. The study confirms that the roof membrane reduced average summertime air conditioning peak demand (1-4pm) by 14 percent and the total daily air conditioning energy usage by 11 percent.

Furthermore, researchers estimated the total annual air-conditioning savings to be $7,200 or 7.2 cents per square foot.
White Reflective Roofs Provide the Following Benefits:

- Provide energy savings to the owner because white roofs reflect heat from building.
- Reduce ambient air temperature (major factor in reducing urban heat islands).
- Improve air quality (reduces smog formation).
Growth which is outpacing the industry and the segment

SPRI 2002 Shipments (Square Footage) SPRI = Single Ply Roofing Institute

Percent Increase or Decrease from prior year

<table>
<thead>
<tr>
<th>Product Type</th>
<th>% Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermoplastic Membranes</td>
<td>8.6%</td>
</tr>
<tr>
<td>Thermoset</td>
<td>-13.2%</td>
</tr>
<tr>
<td>SBS Mod. Bit.</td>
<td>5.2%</td>
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PVC, Environmentally Safe and Sound!

- Energy Efficient
- Improves Air Quality
- Long Lasting
- Solvent Free Applications
- Low Maintenance
- Recycling Options
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