

US EPA ARCHIVE DOCUMENT

*- Temporal Considerations -*

# Evaluating EJ and Disproportionate Impacts Over Time Within a Cumulative Risk Framework

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# What is Risk?

# What is Risk?

Potential for detrimental human health or environmental impacts

Voluntary vs Involuntary

# Quantifying Risk

Exposure x Hazard = Risk

# Cumulative Risk

The combined threats from exposure to multiple stressors including biological, chemical, physical, and psychosocial.

combined at one time and over time

# Quantifying Risk

Exposure x Hazard = Risk

## Quantifying Cumulative Risk

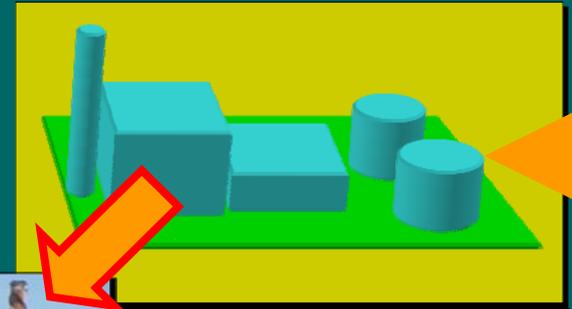
Exposure x   
 Solvents  
 Pesticides  
 Metals  
 Etc. = Risk

# Including EJ in Cumulative Risk?

$$\begin{array}{l} \text{Exposure } \times \\ \text{Solvents} \\ \text{Pesticides} \\ \text{Metals} \\ \text{Etc.} \end{array} \times \begin{array}{l} \text{Race} \\ \text{Education} \\ \text{Econ. Status} \\ \text{Employment} \\ \text{Language} \\ \text{Literacy} \\ \text{Language} \\ \text{Citizenship} \\ \text{Etc.} \end{array} = \text{Risk}$$

# Lifecycle of a Typical Industrial Facility

1. Planning and Installation



2. Operation



3. Cleanup and Closure



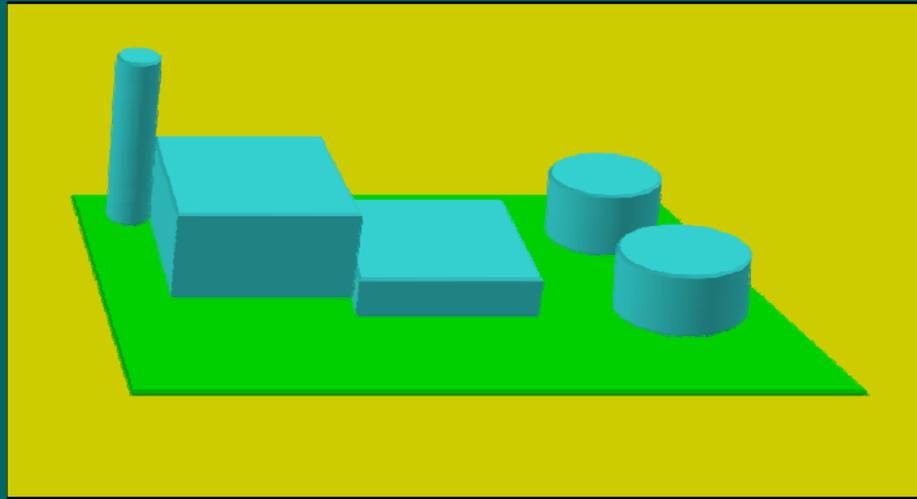
4. Property Reuse



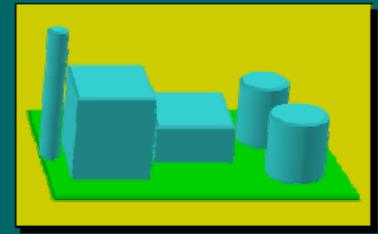
# Changing Risk Issues Over Facility Lifecycle

- Sources of Risk
- Risk Management Goals and Options
- Risk Assessors
- Risk Managers
- Risk Assessment and Risk Management Tools

# 1. Facility Planning and Installation



# 1. Facility Planning and Installation



- Sources of Installation Risk

- Construction activities
- Traffic
- Lack of political power
- Race
- Etc.

- Installation Risk Assessors

- Facility owners
- Financial institutions
- Politicians
- Regulatory agencies
- Environmental groups
- The community

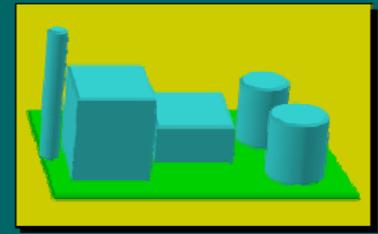
- Risk Management Goals

- Minimize ecosystems impacts
- Avoid environmental degradation
- land-use plan objectives
- Increase jobs and economy
- Minimize impacts to local population

- Installation Risk Managers

- Politicians (City Council)
- Construction company
- Urban planners
- Financial institutions
- Local permit agencies
- The community

# 1. Facility Planning and Installation



- Tools for Risk Assessment and Risk Management
  - Land use permits
  - TMDL requirements (Rapanos Decision)
  - National Environmental Protection Act (NEPA) and similar state programs
  - C-Ferst, EJSEAT, Social vulnerability indices
  - Monitoring and sampling prior to installation, community and environment
  - Empower Communities when considering new facilities
  - Include Communities as full partners and decision-makers in risk assessment and risk management process
  - Include Communities in research and modeling efforts

## 2. Facility Operation



## 2. Facility Operation



- Sources of Operation Risk

- Resource use, eco-risk
- Worker OSHA risks
- Traffic
- Catastrophic releases
- Multiple facilities
- Operating emissions
- Facility induced changes

- Operation Risk Assessors

- Regulatory agencies
- Facility
- Environmental groups
- The community

- Risk Management Goals

- Minimize ecosystems impacts
- Avoid environmental degradation
- Increase jobs and economic activity
- Minimize impacts to local population

- Operation Risk Managers

- Regulatory agencies
- Facility
- Employees
- Local permit agencies
- The community

## 2. Facility Operation

# Tools for Risk Assessment and Risk Management



- Tools for Risk Assessment and Risk Management
  - OSHA
  - Employee education and safety programs
  - Emissions permits
  - Inspections
  - Enforcement actions
  - Monitoring and sampling, facility and community
  - Epidemiological studies of actual exposures
  - Community awareness and response plans
  - Community hiring programs and other investments
  - Community information, review, and oversight

# 3. Cleanup and Closure



# 3. Cleanup and Closure



- Sources of Cleanup Risk

- Primary sources
- Secondary sources
- Completed pathways
- Breakdown products
- Changing toxicity over time
- Residual contamination
- Prior exposure to facility construction and operation

- Cleanup Risk Assessors

- Regulatory agencies
- Facility, consultant
- Environmental and citizen groups
- The community

- Risk Management Goals

- Exposure prevention or exposure management
- Don't make the situation any worse
- Establish “acceptable” risk range
- Define how much contaminant can “safely” be left in place below the “acceptable” risk
- Containment, migration control

- Cleanup Risk Managers

- Regulatory agencies
- Facility, cleanup contractor
- Local permit agencies
- The community

### 3. Cleanup and Closure

# Tools for Risk Assessment and Risk Management



- Tools for Risk Assessment and Risk Management
  - RAGS
  - RBCA
  - Screening levels
  - Spreadsheet tools
  - Natural attenuation
  - Institutional and engineering controls
  - Removal and treatment technologies
  - Monitoring and sampling of community
  - Community right to know
  - Empower communities
  - Cumulative risk assessment, including facility lifetime

# 4. Property Re-use



# 4. Property Reuse

## Sources of Risk



- Sources of Reuse Risk

- Breakdown products
- Changing toxicity over time
- Surrounding facilities still operating
- Surrounding facilities undergoing cleanup
- Residual contamination
- Prior exposure to facility

- Reuse Risk Assessors

- Regulatory agencies
- Environmental and citizen groups
- Facility
- Financial institutions,
- The community

- Risk Management Goals

- Exposure prevention or management
- Institutional and engineering controls
- Urban development plan objectives
- Economy housing, jobs
- Community health

- Reuse Risk Managers

- Construction company
- Urban planners
- Financial institutions
- Local permit agencies
- The community

# 4. Property Reuse



- Tools for Risk Assessment and Risk Management
  - Institutional and engineering controls
  - land use permits
  - NEPA and similar state programs
  - C-Ferst, EJSEAT, Social vulnerability indices
  - Redevelopment funding (Brownfields)
  - Monitoring and sampling
  - Community involvement
  - Affordable and workforce housing
  - Economic development

# Conclusions

- Protect health for ALL human and enviro. Receptors
- Cumulative risk assessment for multiple hazards and stressors at one time and over time
- Empower Communities when considering new facilities
- Include Communities as full partners and decision-makers in risk assessment and risk management process during all lifecycle stages for facilities
- Community information, review and oversight
- We can change risk evaluation and perception in spite of the status quo (example: smoking in the U.S.)

# EPA Workshop: Advancing the Science of Cumulative Risk

- Fact sheet coming soon!
- Detailed document will discuss Environmental Justice Issues and information on Tools.



<http://epa.gov/osp/regions/workshops.htm>