

# Hazardous Substances Emergency Events Surveillance (HSEES)

What Can We Learn from Tropical Storm Allison  
and Other Adverse Weather Events in Texas?



Data and case studies from Texas HSEES  
(TxHSEES) preliminary data 1996-2001

# **Hazardous Substances Emergency Events Surveillance System (HSEES)**

**Established in 1990 by the Agency for  
Toxic Substances and Disease Registry  
(ATSDR) to collect and analyze data on  
hazardous substance release events to  
provide information to improve  
preparedness, prevent future events, and  
reduce the public health impact of events  
that do occur. TDH has participated in  
HSEES since 1993.**

# Objectives of This Presentation

- Review data from TxHSEES fixed-facility events that occurred during adverse weather conditions
- Compare those events to events that occurred during clear weather conditions
- Provide examples from Tropical Storm Allison
- Identify lessons to be learned

# Texas Weather Can be Volatile

Weather conditions such as:

- rain
- lightning
- high winds
- flooding
- extreme temperatures



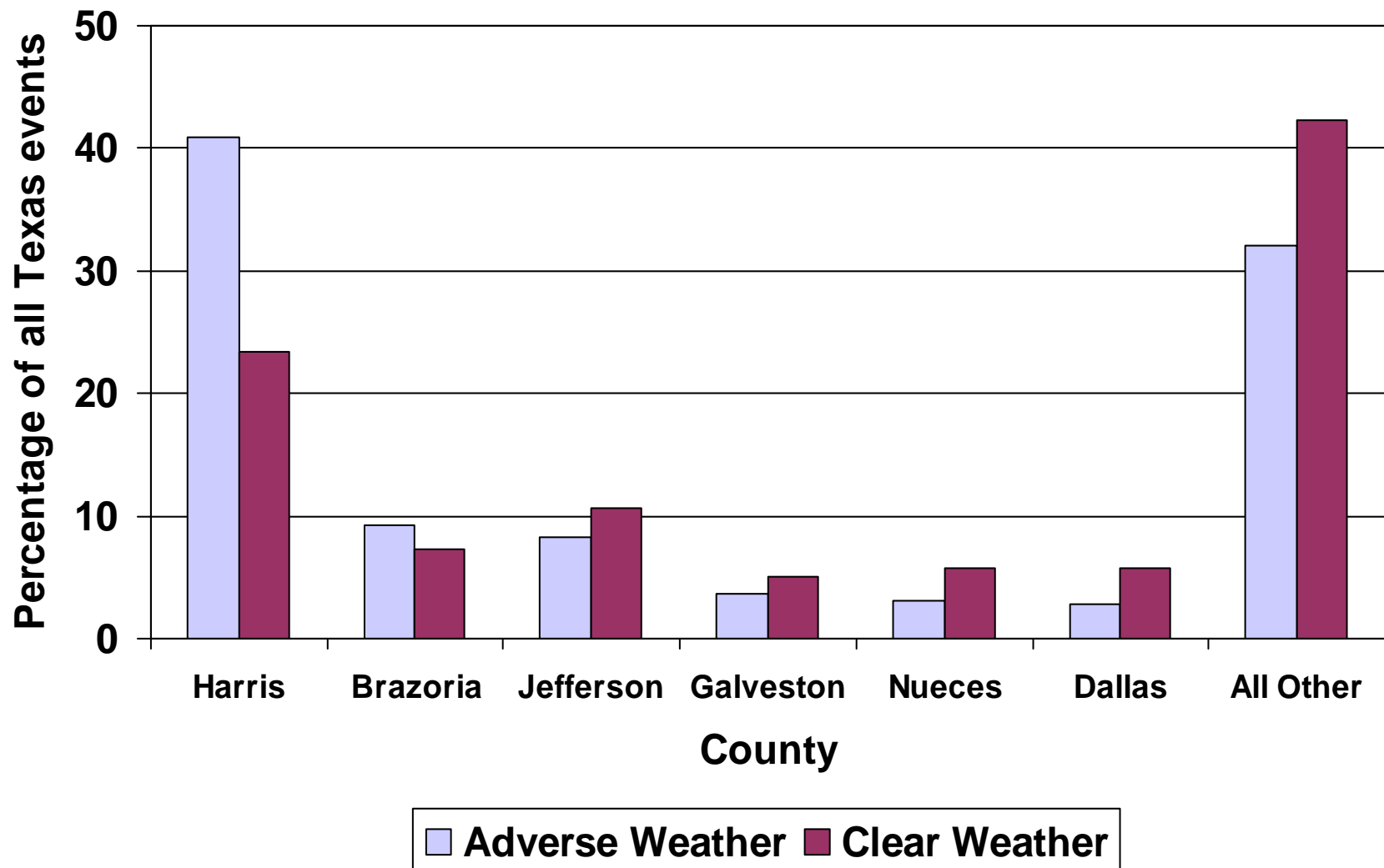
# **Adverse weather can result in:**

- Power outages**
- Plant shutdowns**
- Process upsets**
- Equipment failures**

# **Adverse Weather Related HSEES Events From 1996 to 2001:**

- 15,732 TxHSEES events of which 89%  
occurred at fixed facilities**
- 803 (5%) events occurred during adverse  
weather of which 701 (87%) occurred  
at fixed facilities**
  - 101 injured people in 17 events  
included employees, firefighters, and  
general public**
  - 2,283 people evacuated in 23 ordered  
evacuations**

# Geographic Comparison Between Adverse and Clear Weather Events



# Comparison of Percentage of Events by Industry (Adverse vs. Clear Weather Conditions)

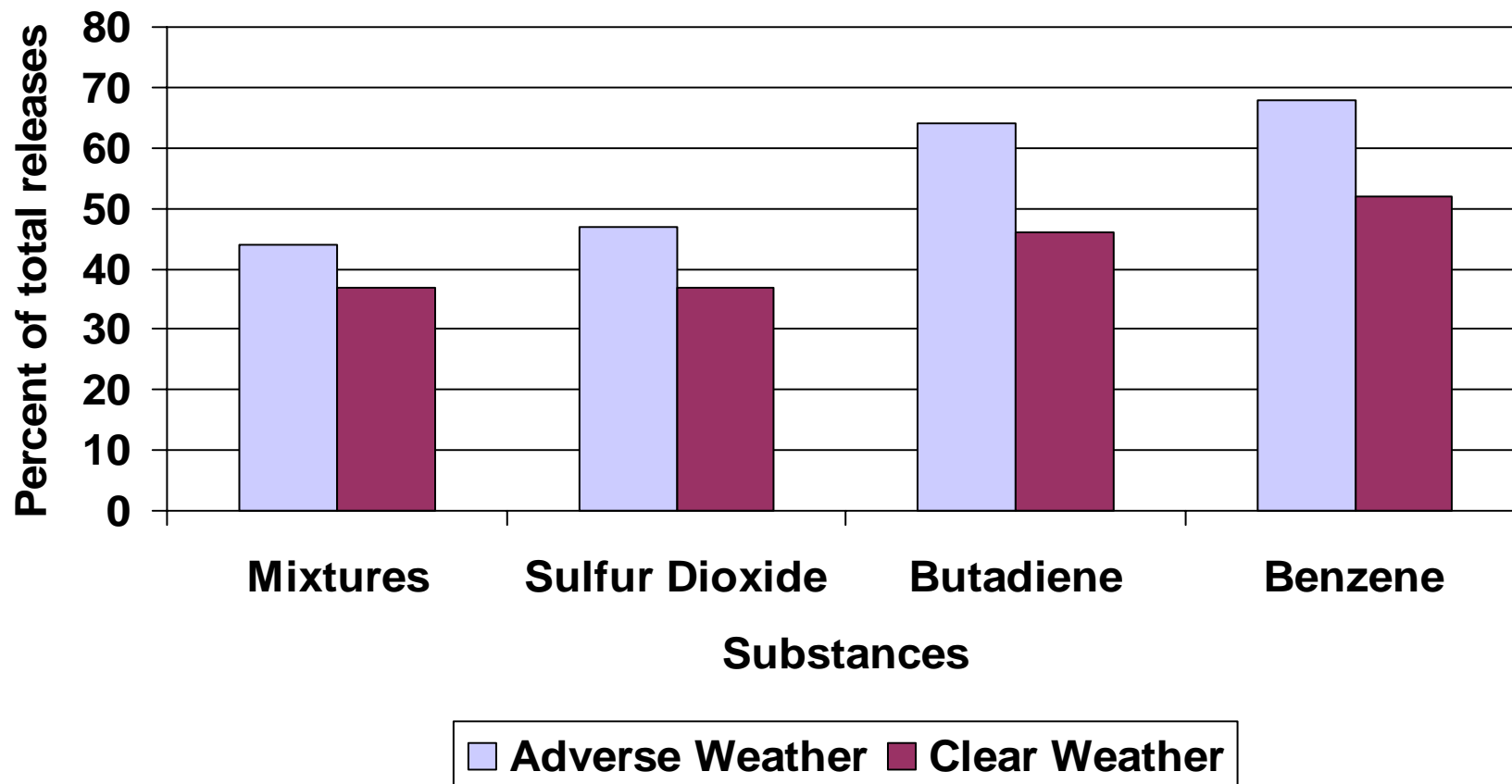
<u>Industry</u>	<u>Adverse Weather</u>	<u>Clear Conditions</u>
Industrial & misc. chemical mfg.	37%	30%
Petroleum refining	15%	16%
Plastics, synthetics, & resin mfg.	11%	13%
All other	38%	41%



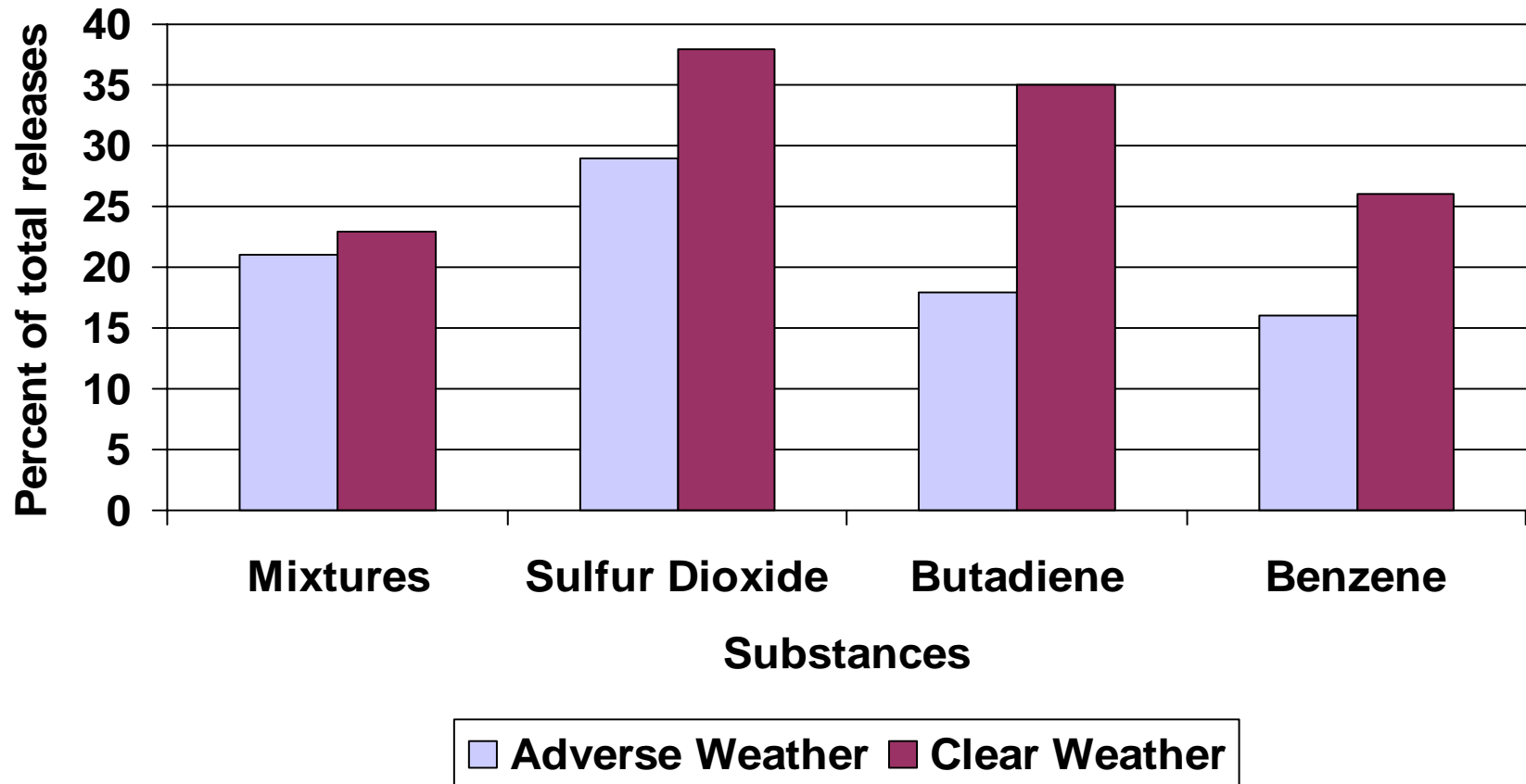
# **Substances Most Frequently Released by the top 3 Industries**

- Mixtures**
- Sulfur dioxide**
- Butadiene**
- Benzene**

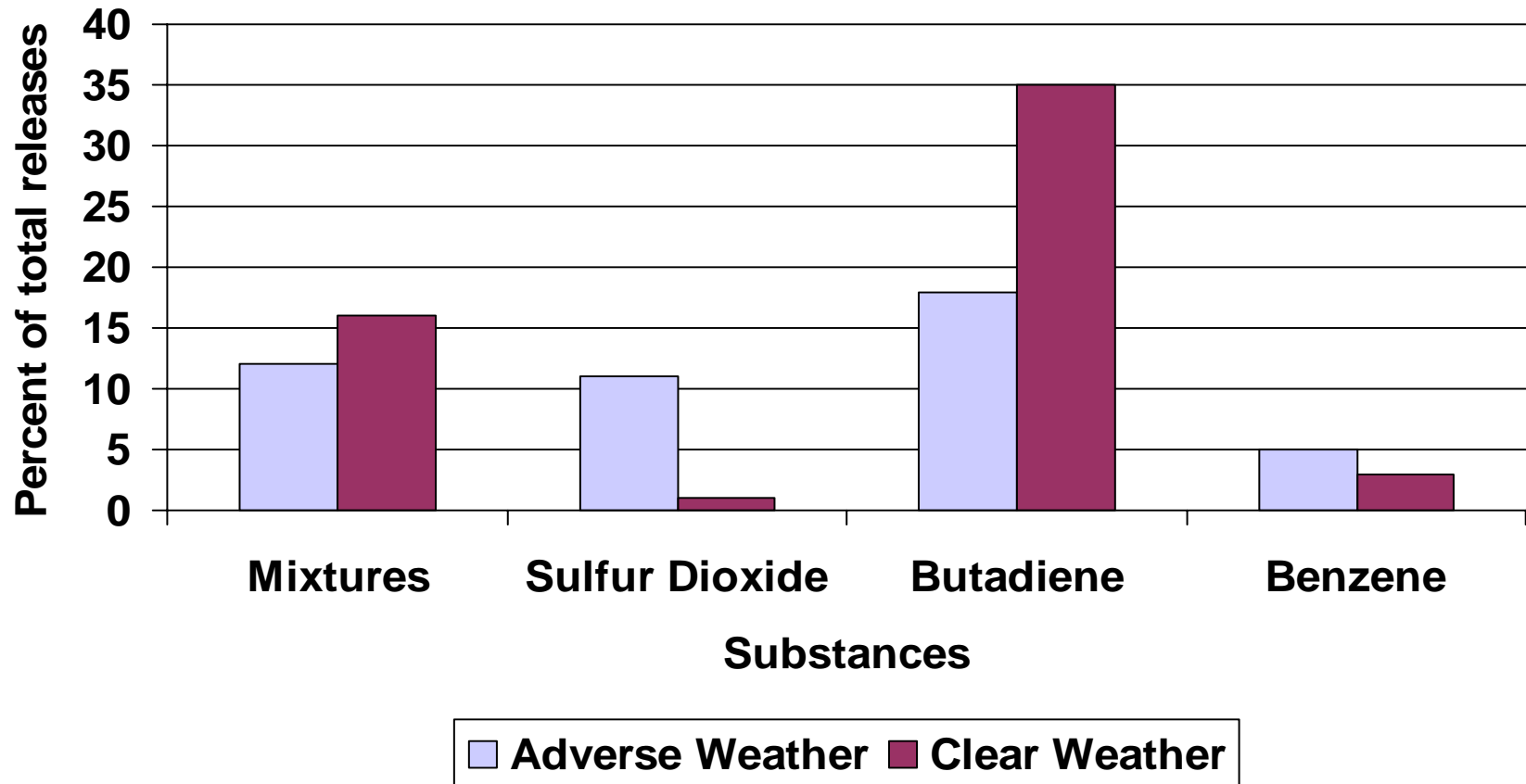
# Comparison of the Percentage of Releases by Select Substances for the Industrial & Misc. Chemicals Industry (Adverse vs. Clear Weather Conditions)



# Comparison of the Percentage of Releases by Select Substances for the Petroleum Refining Industry (Adverse vs. Clear Weather Conditions)



# Comparison of the Percentage of Releases by Select Substances for the Plastics, Synthetics, and Resins Industry (Adverse vs. Clear Weather Conditions)



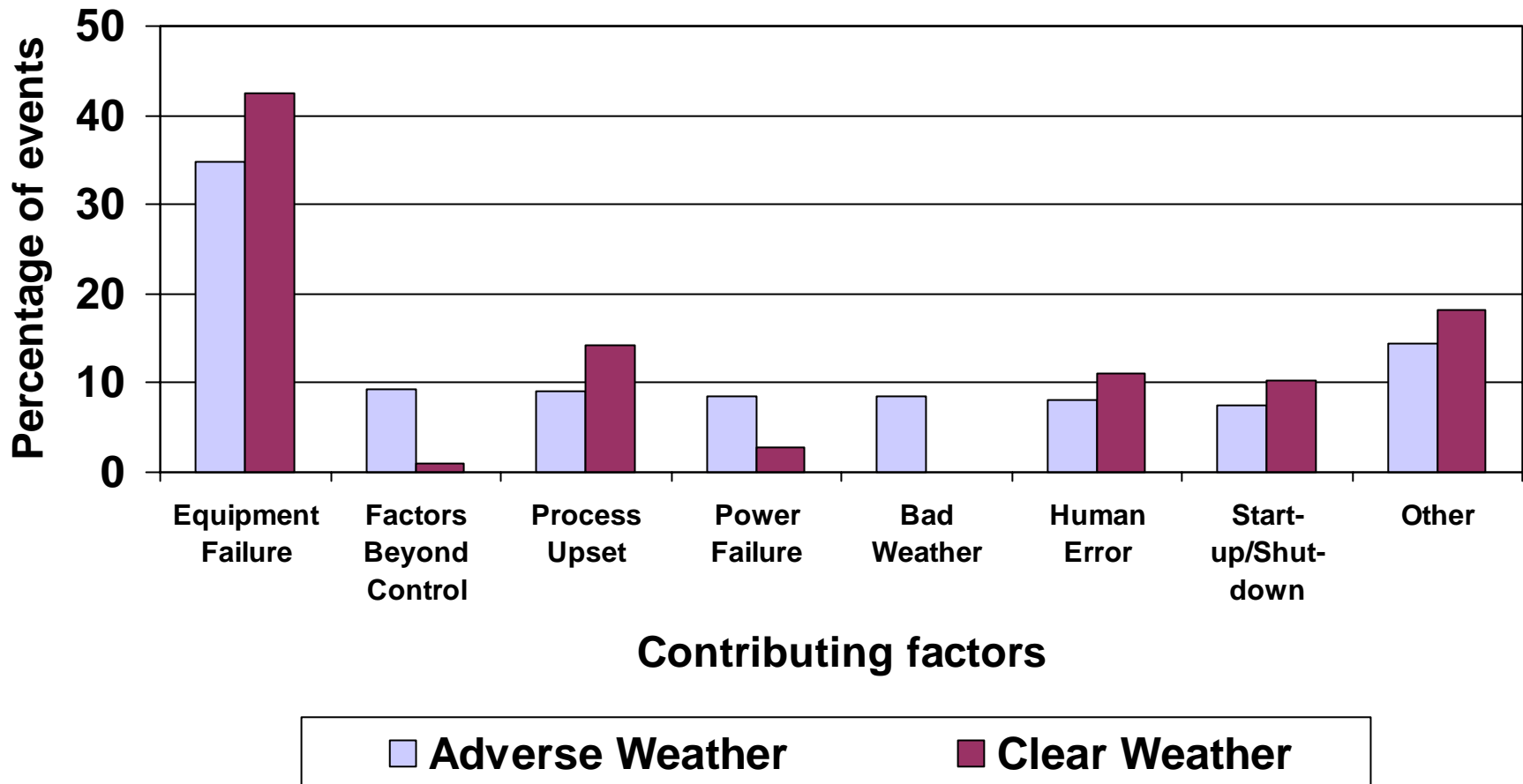
# Comparison of the Percentage of Reported Injuries by Weather Condition

<u>Injury</u>	<u>Adverse Weather</u>	<u>Clear Conditions</u>
Respiratory irritation	30%	34%
Nausea	17%	4%
Trauma	15%	9%
Headache	10%	8%
Eye irritation	9%	12%
Dizziness/CNS	9%	9%
Other	10%	24%

# Factors Most Frequently Identified as Contributing to a Release During Adverse Weather

Equipment Failure	35%
Factors beyond human control	9%
Process upset	9%
Power failure	9%
Bad weather/natural disaster	8%
Human error	8%
Startup/shutdown	7%

# Comparison of Contributing Factors Between Adverse and Clear Weather Events



# How Bad Can The Weather Be? Tropical Storm Allison

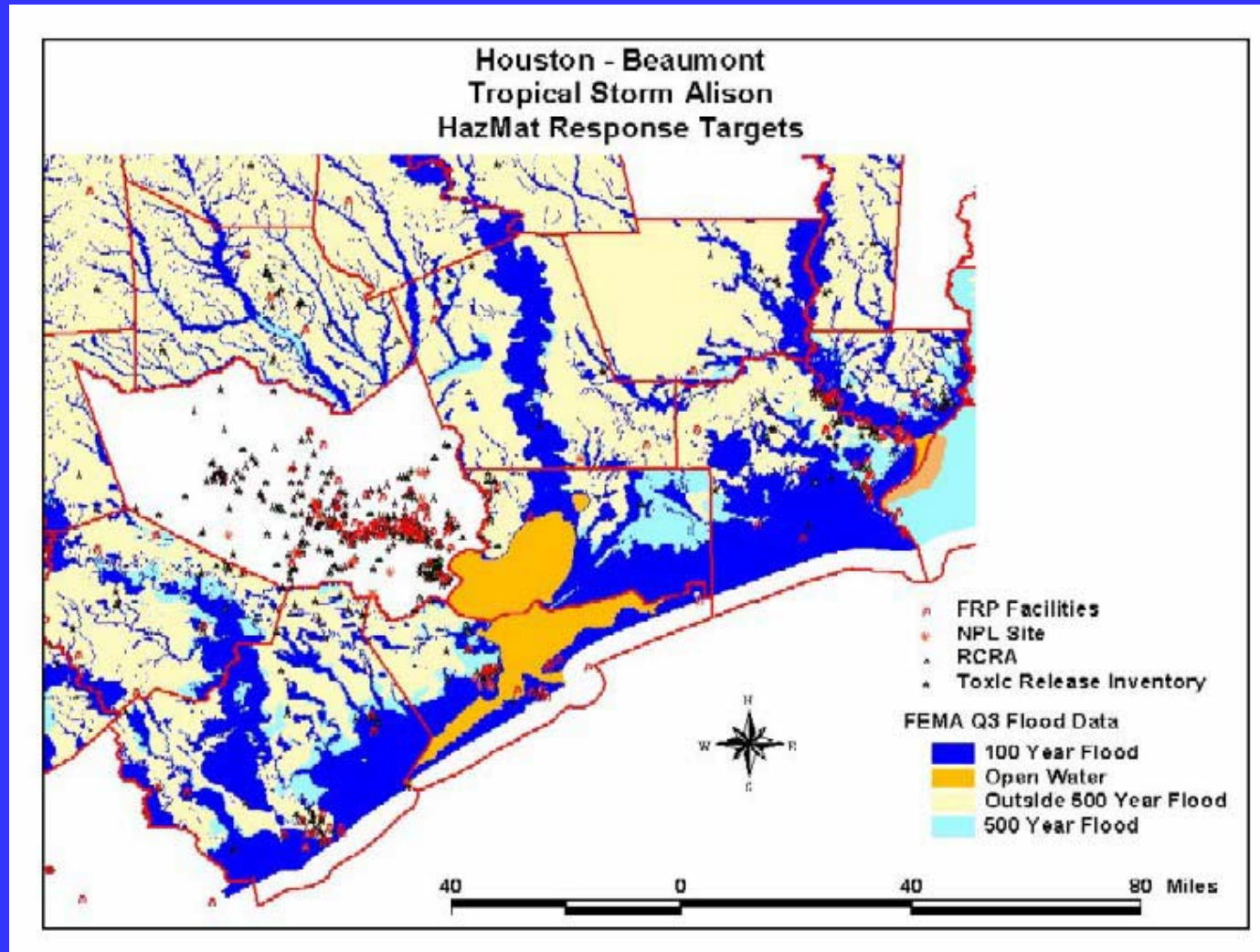




# **Agencies Involved in Responding to Tropical Storm Allison**

- Environmental Protection Agency (EPA) Region VI**
- United States Coast Guard (USCG)**
- Harris County Pollution Control**
- Local Health Departments**
- Texas Department of Health (TDH)**
- Texas Commission on Environmental Quality (TCEQ)**

# Hazmat Response Targets Identified During Tropical Storm Allison



# Substances Released During Tropical Storm Allison

## Releases to air:

- Over 200,00 pounds of mixtures containing alcohol, benzene, butadiene, carbon monoxide, ethylene, hydrogen sulfide, nitrogen oxides, propylene, sulfur dioxide, and volatile organic compounds (VOCs)

# Substances Released During Tropical Storm Allison

## Releases to water:

- 15,000,000 gal. of phosphoric acid
- 850,000 gal. of sulfuric acid

## Other Releases:

- 1,000 tons of urea fertilizer
- 3,600 gal. of ammonium nitrate fertilizer

# During Tropical Storm Allison

## 18 fixed-facility air emission events:

- 5 events with power outages/plant shutdowns
- 10 events with equipment failures
- 3 events involving 8 storage tank floating roofs that sank





# During Tropical Storm Allison

## 15 fixed-facility spill events:

- 5 events had secondary containment failures
- 3 events had wastewater overflows
- 3 events involved floods
- 3 events had piping/valve failures
- 1 event involved flood debris











## Conclusions

- Power failure and factors beyond human control were identified more often during adverse weather events.**
- Three industries accounted for the largest percentage of events, regardless of weather conditions.**

## Conclusions

- The compounds most frequently released were the same regardless of weather conditions.**
- Extreme adverse weather events can result in multiple releases requiring a multi-agency response.**

## Conclusions

- When there is a hazardous substance release, there is a potential for negative public health impact such as victims and evacuations.**
- Releases may contribute to lost product, reduced employee productivity, injuries, potential litigation and negative financial impacts on companies.**

# Recommendations

**Identifying the circumstances under which releases occur may help:**

- Develop processes to reduce the likelihood of future releases,**
- Improve plant safety, and**
- Reduce the likelihood of injuries**



# Recommendations

**Industry may benefit from targeted design modifications such as:**

- improved back up power generation**
- improved secondary containment**
- improved/re-designed floating roofs on storage tanks**

## **Contact information:**

**Julie Borders, MS  
Bureau of Epidemiology, TxHSEES  
Texas Department of Health  
Austin, Texas**

**512-458-7631**

**[julie.borders@tdh.state.tx.us](mailto:julie.borders@tdh.state.tx.us)**

