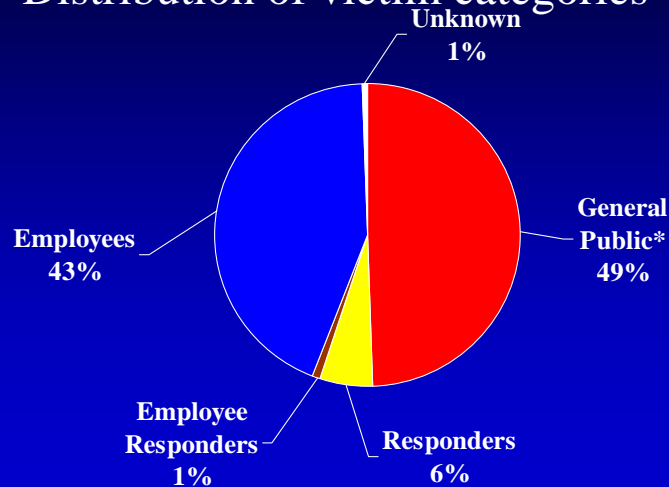


***TxHSEES Responder
Case Studies
1993-2001***

Julie Borders
Texas Department of Health
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TxHSEES 1993 - 2001

Distribution of victim categories



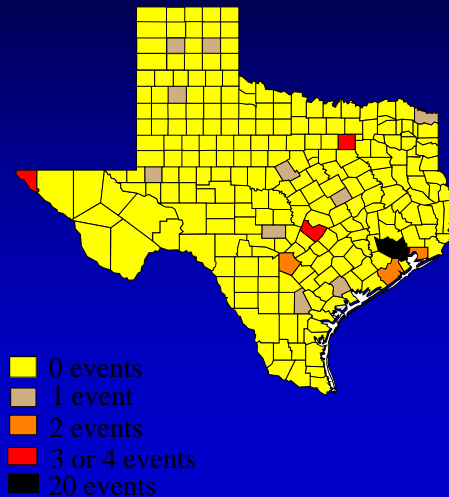
* General Public includes students (n=2).

TxHSEES 1993-2001

- **Limit presentation to 49 events with 144 victims (4% all victims) meeting following criteria:**
 - All unknown responders using Level A, B, C, or firefighter turnout gear
 - All professional firefighters
 - All volunteer firefighters
 - All firefighters, unknown type
 - All employee-responders

TxHSEES 1993-2001

Counties with events associated with victims

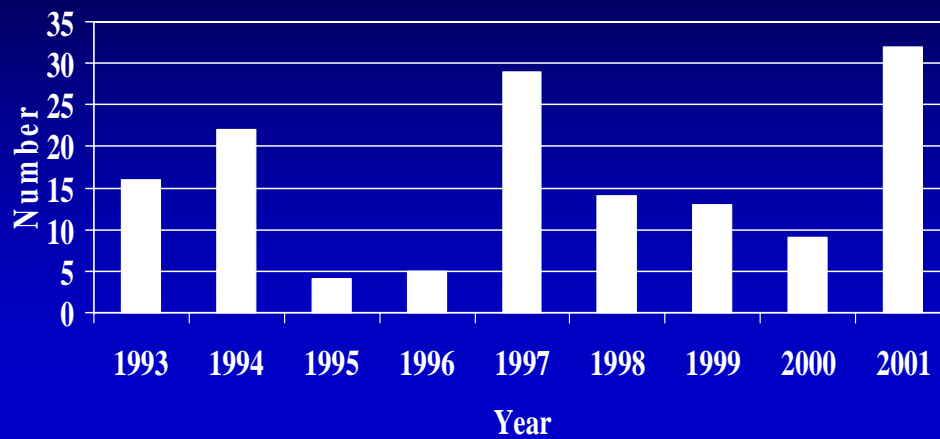


TxHSEES 1993-2001

- **Distribution of victims by type of event**
 - 45 fixed-facility events = 130 victims
 - 4 transportation events = 14 victims

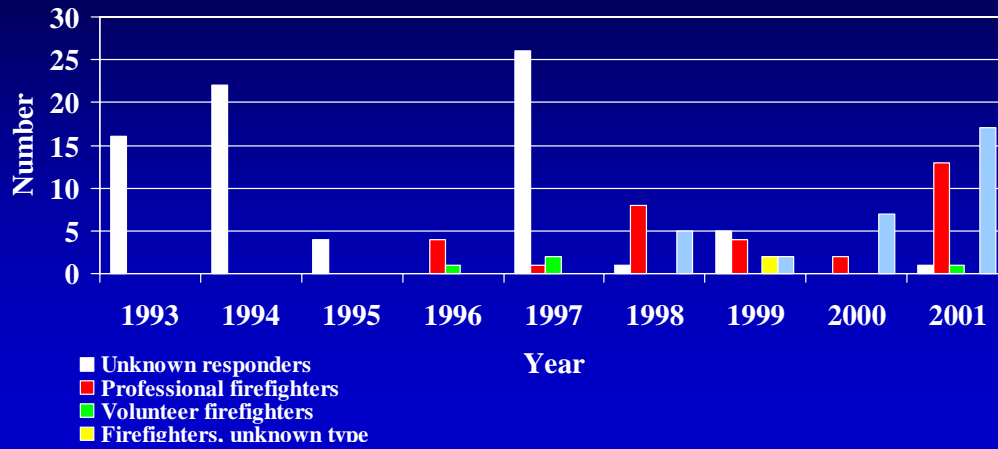
TxHSEES 1993-2001

Distribution of victims by year



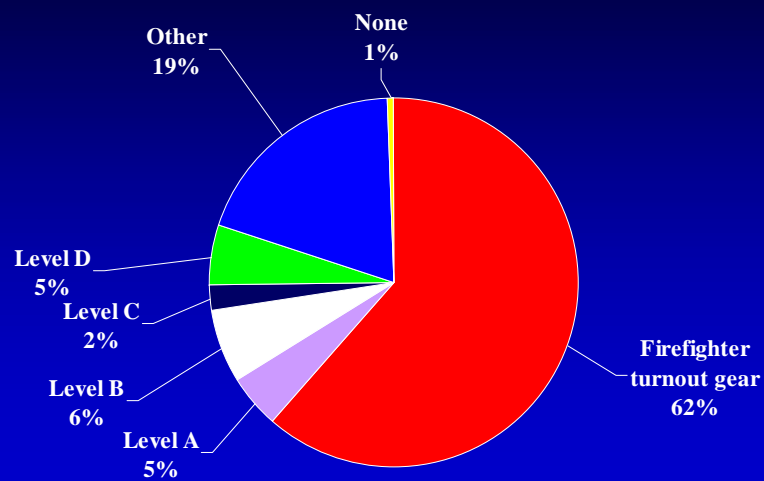
TxHSEES 1993-2001

Distribution of victims by category and year



TxHSEES 1993-2001

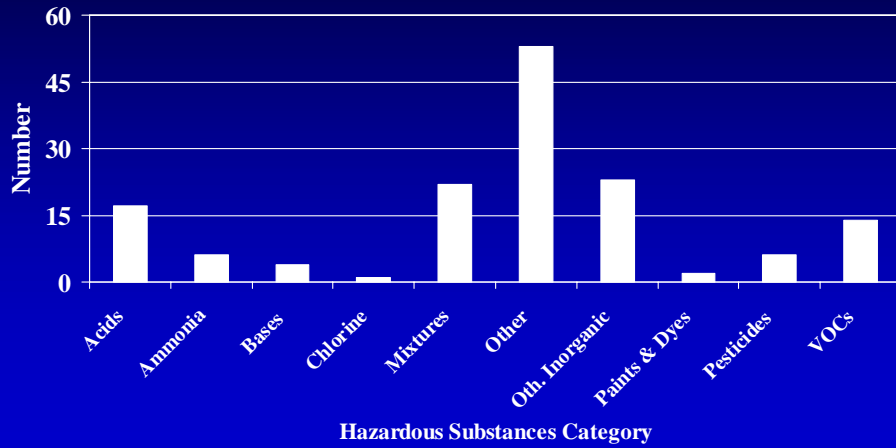
Distribution of PPE*



*Personal protective equipment.

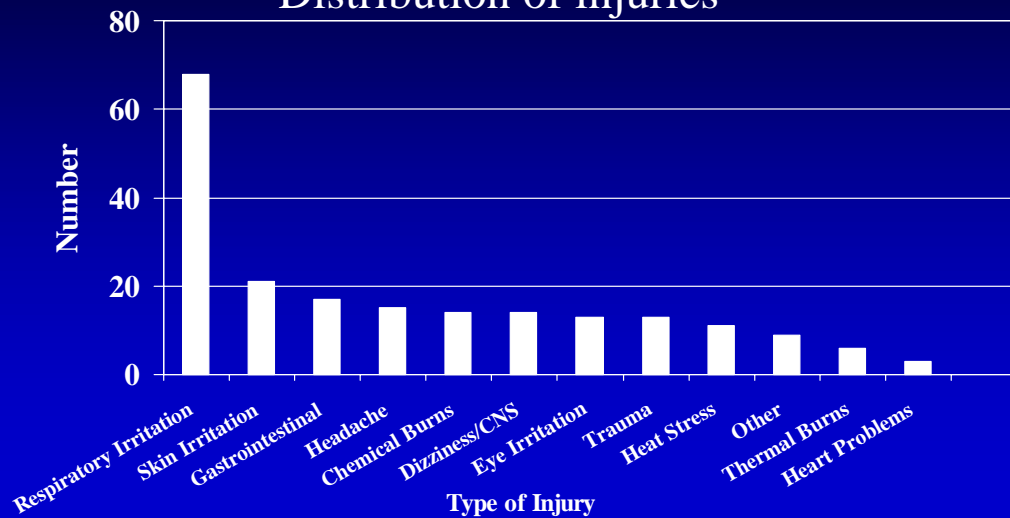
TxHSEES 1993-2001

Distribution of hazardous substances by category



TxHSEES 1993-2001

Distribution of injuries



TxHSEES 1993-2001

Victim's Severity/Treatment

- 86 treated and released from hospital
- 35 treated on scene (first aid)
- 9 treated by private physician*
- 8 admitted to the hospital
- 3 hospital observation, no treatment
- 3 injuries reported by official*

* Within 24 hours.

Chemical Plant 1, 1993

- **Storage tank explosion released 100 gallons of a mixture of benzyl chloride/diethylenetriamine.**
- **Underlying cause: Human error. Diethylenetraimine was loaded into the storage tank containing benzyl chloride.**
- **1000 people evacuated for 4 hours.**

Chemical Plant 1, 1993

- **Injured onsite**
 - 3 employees
 - 8 responders
- **Injured offsite**
 - 73 general public
 - 14 unknown victim category

Chemical Plant 1, 1993

- **8 responders treated and released**
- **Injuries (some multiple)**
 - 7 respiratory irritation
 - 5 eye irritation
 - 4 headache
 - 3 gastrointestinal problems
 - 1 skin irritation
 - 1 dizziness/CNS

Private Residence and Hospital ER, 1993

- **A person was transported to an urban hospital ER after inhaling and ingesting 1 gallon of dimethyl aniline, a brown poisonous liquid, in a suicide attempt.**
- **Injuries caused by secondary exposure**
- **Fire Department's Hazardous Materials Unit evacuated and sealed the hospital ER for 3 hours, and a third party remediation company provided decontamination.**

Private Residence and Hospital ER, 1993

- **11 injured responders**
 - **2 professional firefighters**
 - **2 police officers**
 - **7 hospital personnel**
 - All had gastrointestinal problems, dizziness, and headache
 - All were decontaminated at the hospital, treated, and released

Railcar 1, 1994

- **Container failure released 65 gallons of cresol**
- **100 people evacuated for 13 hours**
- **45 responders deconned at the scene**
- **11 injured responders**
 - 3 in level A
 - 8 in firefighter turnout gear

Railcar 1, 1994

Treatment

- 8 treated and released
- 3 observed

Injuries (some had multiple)

- 6 respiratory irritation
- 4 skin irritation
- 2 headache
- 2 had chemical burns

Agricultural Chemical Distributor, 1996

- **Transfer hose ruptured, releasing 7,000 pounds of ammonia**
- **1 volunteer firefighter wearing firefighter turnout gear received first aid at the scene for skin irritation**
- **Local highway closed for 30 minutes**

Battery Mfg, 1996

- **1,000 gallons of sulfuric acid spilled in an urban battery manufacturing plant**
- **2 professional firefighters injured**
 - **1 with twisted ankle and 1 with electrical shock**
 - **Both treated and released**
 - **Both wore level B PPE**

Paint Company, 1997

- A paint vat containing 154 gallons of a mixture of toluene/methyl isobutyl ketone/nitrocellulose started smoking and erupted into flames
- 1 professional firefighter wearing firefighter turnout gear admitted to the hospital for respiratory irritation and gastrointestinal problems
- 25 people evacuated for 3 hours

Ag Shop, 1997

- Rural farm shop with 4 gallons of a mixture of Treflan and Roundup herbicides caught fire
- 2 volunteer firefighters injured
 - Both wearing Level B PPE
 - Both experienced respiratory irritation and gastrointestinal problems
 - Both received oxygen for 30 minutes (1 at the scene (first aid) and 1 at the fire station)

Grocery Store Fire, 1997

- **Refrigerant piping broke during a fire in an urban grocery store, releasing refrigerant, SUVA 404A, which decomposed into hydrofluoric acid**
- **21 firefighters injured**
 - All wore firefighter turn-out gear
 - All experienced respiratory irritation
 - 5 were admitted to the hospital
 - 16 were treated and released

Frozen Food and Ice Warehouse, 1998

- **A storage building containing 5 gallons of naphtha caught fire, and an unknown amount of anhydrous ammonia was released**
- **2 professional firefighters were injured**
 - Both wearing firefighter turnout gear
 - Both had chemical burns
 - Both were treated and released
- **100 people evacuated for 16 hours**

Teflon Plant, 1998

- **An industrial oven overheated to >1,000 F**
- **2,915 pounds of hydrofluoric acid released**
- **2 professional firefighters injured**
 - Both with respiratory irritation
 - Both wearing Level A PPE
 - Both treated and released

Teflon Plant, 1998

- **27 firefighters and 2 additional people brought to the hospital for observation. They had no symptoms, but were given calcium gluconate respiratory therapy as a prophylactic.**

Railcar 2, 1998

- **Polymerization of 1,000 pounds of acrylamide in a railcar in an urban area caused release**
- **2 professional firefighters injured**
 - Both wearing Level A PPE
 - Both received first aid at the scene
 - 1 had respiratory irritation
 - 1 had headache
- **64 people evacuated for 7 hours**

Railcar 2, 1998

- **The tank was cooled by water and the spilled chemical was neutralized**
- **Possible reasons for the polymerization:**
 - Not enough inhibitor in the tank
 - The inhibitor in the tank was contaminated
 - Some residual left in the tank car triggered the polymerization

Warehouse Fire, 1998

- A warehouse fire caused a release of an unknown amount of a mixture of silica and sulfur
- 1 professional firefighter wearing Level A PPE treated and released for respiratory irritation
- An acid mist cloud covered the business district and the people were told to shelter-in-place

Food Preparation Fire, 1998

- A turkey fryer caught fire and triggered an air release of 11,000 pounds of anhydrous ammonia
- 4 professional firefighters injured
 - All wearing Level A PPE
 - All were treated and released
 - 3 had respiratory irritation
 - 1 had heat exhaustion
- 2,000 people evacuated for 14 hours

Chemical Plant 2, 1999

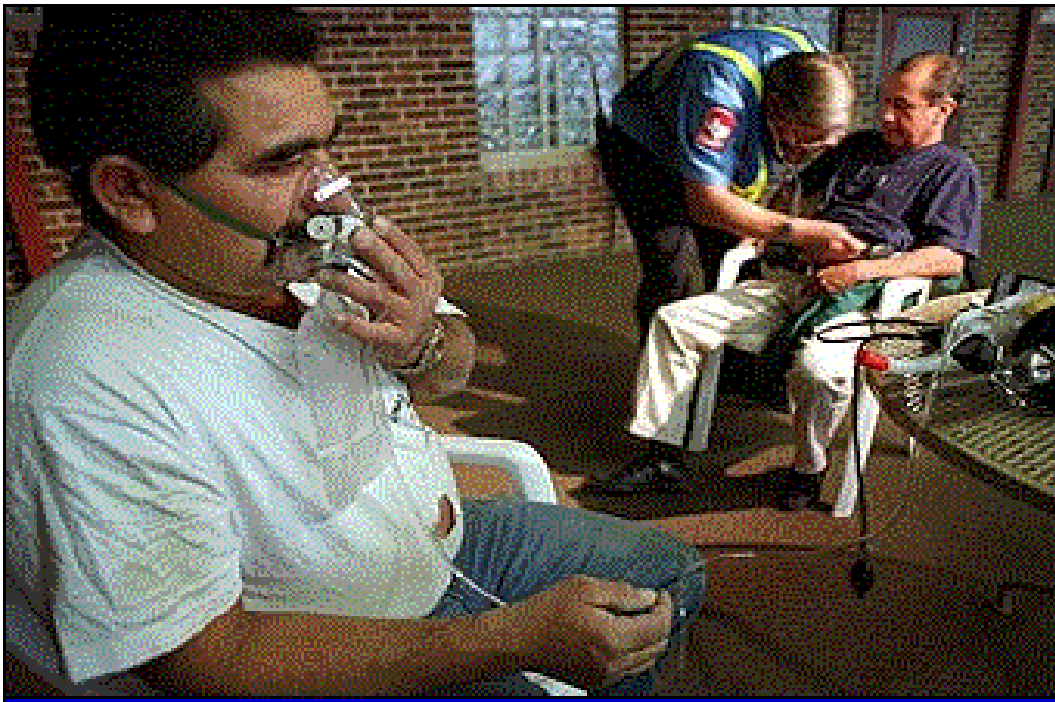
- **A gauge failed on an above-ground storage tank releasing 500 pounds of benzene**
- **Facility personnel sheltered-in-place**
- **There was no evacuation**
- **Injured 8 employee-responders and 50 employees**
 - All 58 received first aid at the scene
 - All had respiratory irritation and dizziness

Chemical Tanker Motor Vehicle Accident, 1999

- **Tanker truck overturned on an urban highway and released 5,000 gallons of hydrochloric acid**
- **5,000 people evacuated (including school children) for 24 hours**
- **Surrounding community sheltered-in-place**
- **2 firefighters injured**
 - Both treated and released
 - Both respiratory irritation











Chemical Plant 3, 2000

- A chemical reaction of 11,492 pounds of butadiene with 3,265 pounds of polymer NOS caused an initial explosion, subsequent fires, and secondary explosions at an urban chemical plant

Chemical Plant 3, 2000

- A chain reaction was triggered involving above-ground storage tanks releasing:
 - 25,454 pounds cyclohexane
 - 1,801 pounds styrene
 - 344 pounds pentane
 - 278 pounds propane
 - 144 pounds “Irganox C 630”
 - 136 pounds soybean oil
 - <10 pounds ethyl benzene
 - <10 pounds 4-vinyl cyclohexene
 - <10 pounds wax
 - 2,031 pounds of a mixture of CO and NO_x produced by the fire

Chemical Plant 3, 2000

- It took 3 hours to extinguish the fires
- >500 people were evacuated
- The surrounding community sheltered-in-place

Chemical Plant 3, 2000

- 6 employee-responders injured
 - 1 wore firefighter turnout gear
 - 5 wore eye protection, hard hat, and steel-toed shoes
 - 1 admitted to the hospital with dizziness, gastrointestinal and heart problems
 - 5 treated and released (some multiple injuries)
 - 4 with trauma
 - 2 with respiratory irritation
 - 2 with headache
 - 2 with chest pain
 - 1 with eye irritation
 - 1 with hypertension
 - 1 with post-traumatic stress

Chemical Plant 3, 2000

- **79 non-responder employees injured**
 - 1 died at scene
 - 45 year old male with trauma and chemical and thermal burns
 - 12 admitted to the hospital; 7 stayed for 2 to 14 weeks due to chemical and thermal burns over 15% to 50% of their bodies
 - Injuries (some multiple)
 - 9 thermal burns
 - 5 trauma
 - 3 PTS*
 - 2 chemical burns
 - 2 eye irritation
 - 1 GI** symptoms
 - 1 heart problems
 - 1 dizziness
 - 1 chest pain

*PTS = Post-traumatic stress syndrome. **GI = Gastrointestinal.

Chemical Plant 3, 2000

- **47 treated and released**
 - Injuries (some multiple)
 - 35 trauma
 - 16 headache
 - 13 respiratory
 - 12 PTS*/anxiety
 - 9 shortness of breath
 - 8 dizziness/CNS[†]
 - 7 thermal burns
 - 6 chest pain
 - 5 hypertension
 - 3 GI** problems
 - 3 heart problems
 - 2 eye irritation
 - 1 skin irritation
- **19 given first aid at the scene**
 - Injuries (some multiple)
 - 13 trauma
 - 10 post traumatic stress

*PTS = Post-traumatic stress syndrome. **GI = Gastrointestinal. [†] CNS = Central Nervous System.

Chemical Plant 3, 2000

- **4 injured general public**
 - All treated and released
 - Injuries (some multiple)
 - 2 headache
 - 2 trauma
 - 2 shortness of breath
 - 1 respiratory irritation
 - 1 dizziness

NOTE: Some victims more than one injury.

Plastics Mfg. Plant, 2001

- **Unstable organic peroxide triggered an urban warehouse fire involving**
 - 133,000 pounds acrylic resin with xylene
 - 133,000 pounds alkyd resin with mineral spirits
 - 133,000 pounds unsaturated polyester resin with styrene
 - unknown quantity of styrene monomer (inhibited)
 - unknown quantity of t-butylperoxybenzoate

Plastics Mfg. Plant, 2001

- **4 professional firefighters wearing firefighter turnout gear received first aid at the scene for skin irritation**
- **8 people evacuated for 7 hours**

Refinery, 2001

- **Equipment failure caused a rural refinery plant upset and shutdown releasing 94,251 pounds of a mixture of CO/Hydrogen fluoride/NO_x/SO₂/VOC NOS**
- **528 people evacuated for 30 hours**
- **2 professional firefighters injured**
 - Both wearing firefighter turnout gear
 - Both received first aid at the scene
 - 1 had eye irritation and 1 had chemical burns

Refinery, 2001

- **17 employees injured**
 - 13 received first aid at the scene
 - 4 saw a private physician within 24 hours of the event
 - **Injuries**
 - 5 chemical burns
 - 4 heat stress
 - 4 respiratory irritation
 - 1 eye irritation
 - 1 skin irritation
 - 1 heart problem
 - 1 trauma

Refinery, 2001

- **PPE**
 - 6 in level B
 - 1 in level C
 - 6 in level D
 - 4 in firefighter turnout gear

Conclusions

- **If at all possible, it is essential to know which chemical(s) are involved in the chemical emergency.**
- **Respiratory irritation was the most common injury for Texas responders. Use the appropriate PPE. Be particularly aware of respiratory protection.**