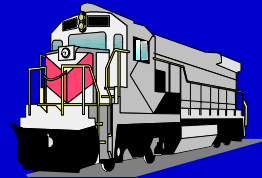
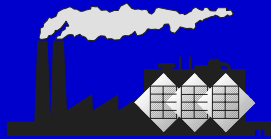


**Hazardous Substances Emergency
Events Surveillance (HSEES)
1993 - 1997
in Harris and Surrounding Counties**

**presented to the TNRCC
Emergency Spill Response Team
July 26, 2000**



Year states entered HSEES system

1990	1992	1993	1994	1995	1999
CO	NY	AL	MO	MN	NJ
IA	NC	TX		MS	UT
NH*	OR				
WS	RI				
	WA				

*New Hampshire withdrew in 1996.

Goals:

- Describe the distribution and characteristics of hazardous substances emergencies
- Describe the injury (morbidity) and death (mortality) experienced by:
 - Employees
 - Responders
 - General Publicas a result of hazardous substances releases

Goals continued:

- Identify risk factors associated with the morbidity and mortality.
- Identify strategies to reduce future morbidity and mortality resulting from the release of hazardous substances.

Types of information collected:

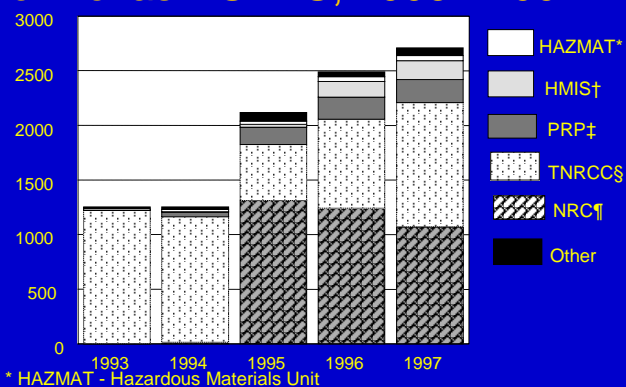
- General information on the event
- Substances released
- Victims (Employees, First Responders, General Public)
- Injuries and deaths
- Evacuations
- Estimates of number of people at risk of exposure during a specific event.

Texas definition of a HSEES event:

- Uncontrolled or illegal release, or threatened release, of hazardous substances (excluding events that exclusively involve petroleum products) that are over one gallon or ten pounds or exceed the CERCLA reportable quantity (RQ).

1. Where do we obtain our information?

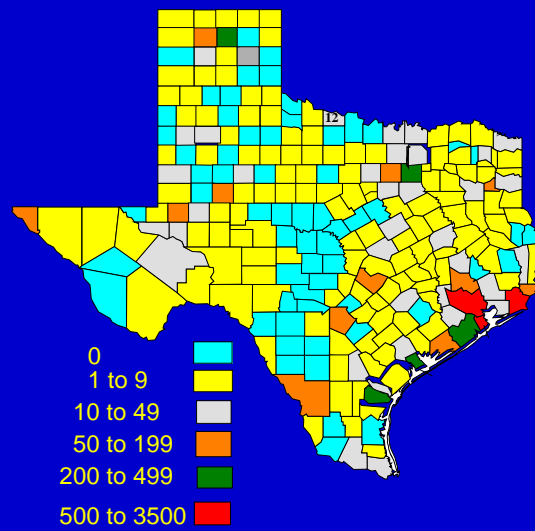
Distribution of events by data source for Texas HSEES, 1993 - 1997



* HAZMAT - Hazardous Materials Unit
† HMIS - Hazardous Materials Incident System
‡ PRP - Primary Responsible Party
¶ NRC - National Response Center
§ TNRCC - Texas Natural Resource Conservation Commission
01-26-2000 Preliminary Data

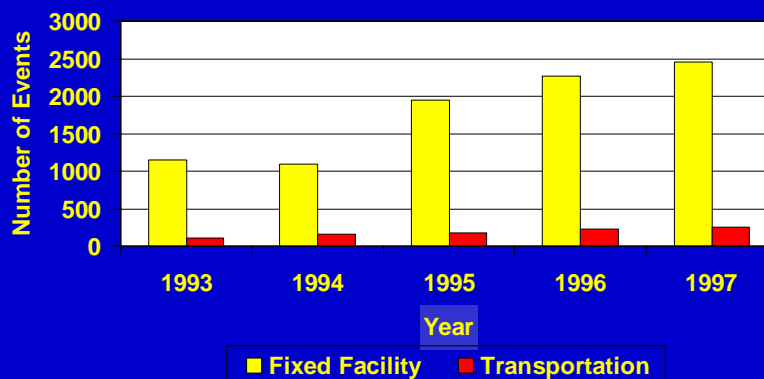
1. Where do we obtain our information?
2. Where are these events occurring?

Number of reported events by county,
Texas HSEES 1993 - 1997



1. Where do we obtain our information?
2. Where are these events occurring?
3. What is the proportion of fixed-facility events compared to transportation events?

Distribution of type of event by year for Texas HSEES, 1993 - 1997



Distribution of fixed-facility and transportation events in Harris and surrounding counties

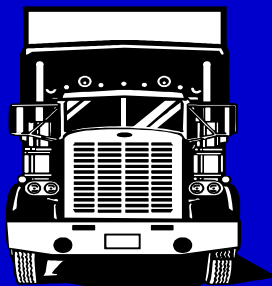
County	Fixed Facility	Transportation	Total
Harris	3148	248	3396
Galveston	1043	18	1061
Jefferson	875	29	904
Brazoria	458	15	473
Orange	66	12	78
Montgomery	50	7	57
Chambers	43	1	44
Fort Bend	35	4	39
Walker	31	3	34
Waller	14	1	15
Liberty	11	3	14
Total	5774	341	6115

1. Where do we obtain our information?
2. Where are these events occurring?
3. What is the proportion of fixed-facility events compared to transportation events?
4. How many events involve victims?

Comparison of Harris and surrounding counties with statewide numbers

	Texas	Harris and Surrounding Counties Number (%)
Total no. of events	9817	6115 (62%)
Total no. of events with victims	312	135 (43%)
Total no. of victims	2507	1198 (48%)

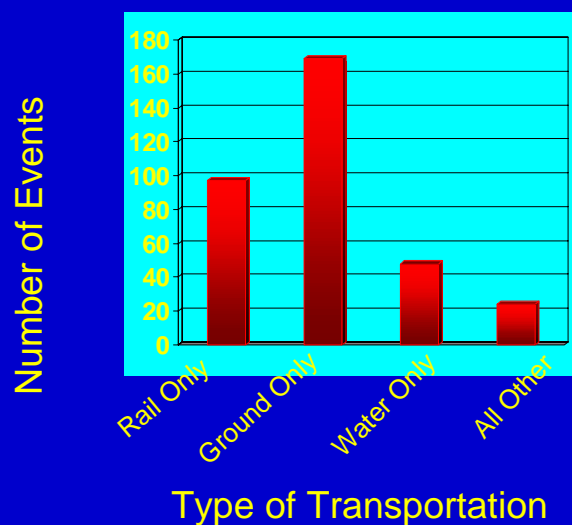
5. Transportation events

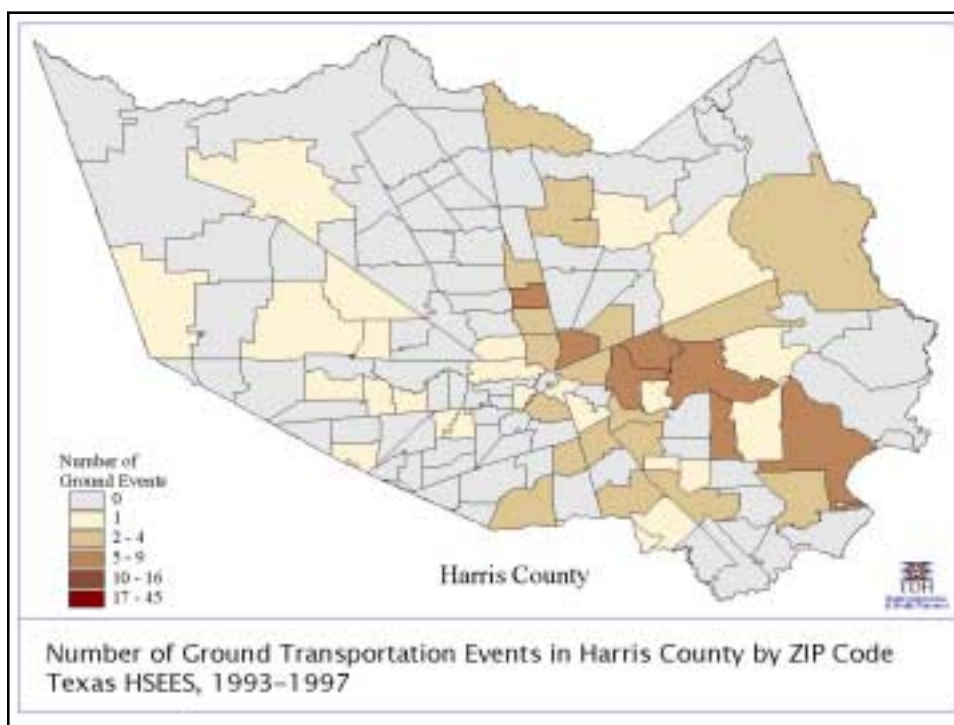
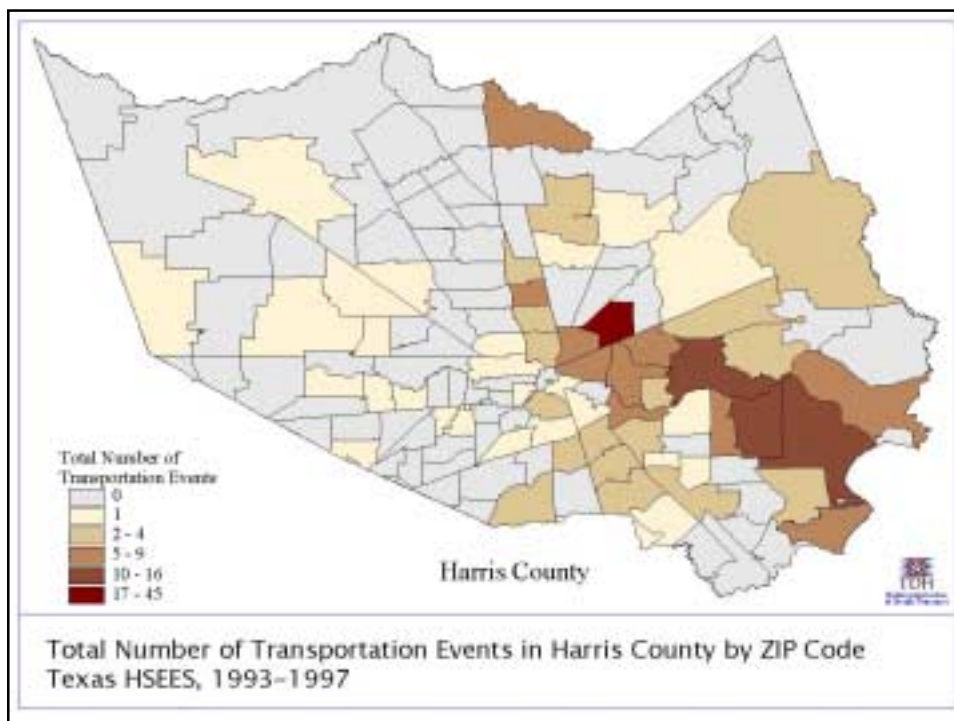


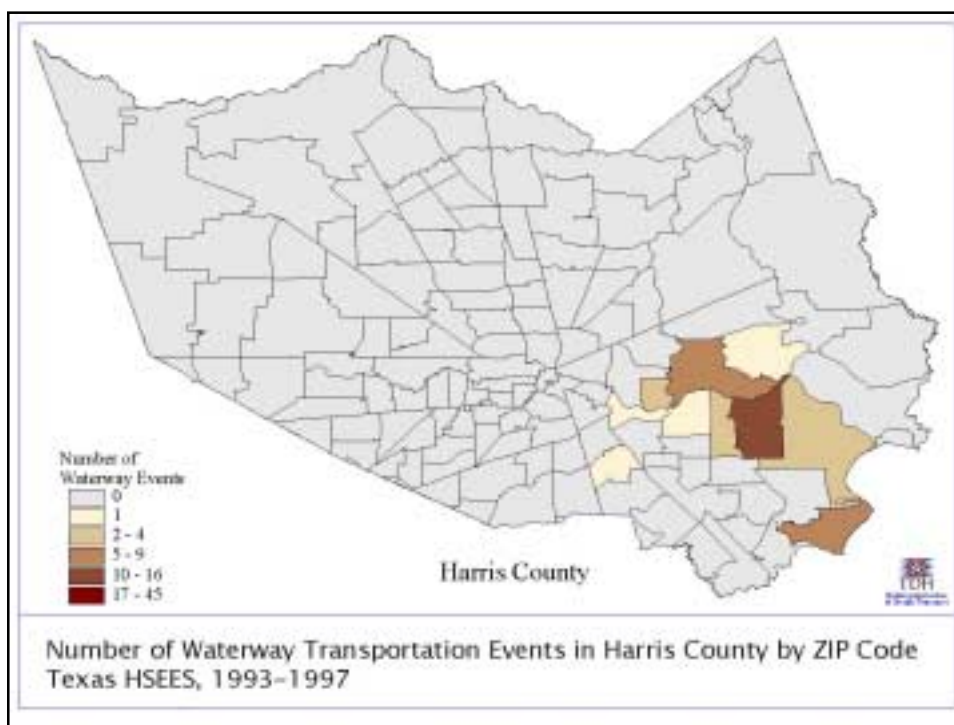
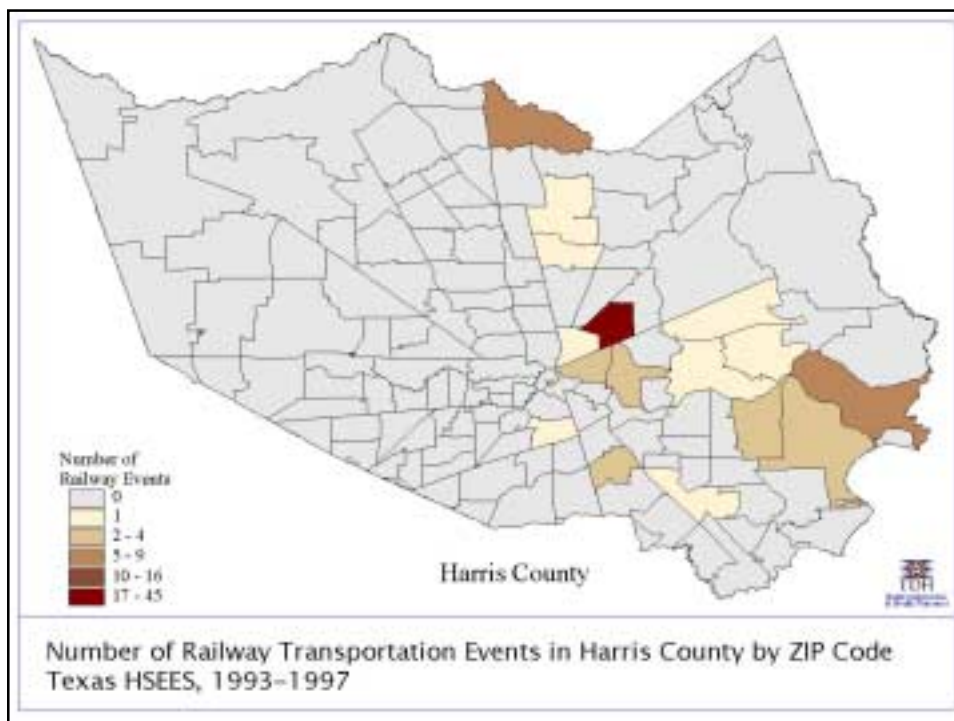
Comparison of Harris and surrounding counties with statewide numbers for transportation events

	Texas	Harris and Surrounding Counties Number (%)
No. of transportation events	908	341 (38%)
No. of transportation events with victims	94	25 (27%)
No. of victims from transportation events	409	36 (9%)

Distribution of transportation type in Harris and surrounding counties







Chemical categories associated with transportation events in Harris and surrounding counties

Chemical Category	No. of Events	No. of Events with Victims	No. of Victims
Other	113	8 (7.1%)	10
Volatile organic compounds	67	4 (6.0%)	8
Acids	51	3 (5.9%)	3
Mixture across categories	30	3 (10.0%)	6
Other inorganic substances	28	2 (7.1%)	2
Bases	16	0 (0.0%)	0
Paints and dyes	9	0 (0.0%)	0
Pesticides	6	2 (33.3%)	3
Ammonia	3	0 (0.0%)	0
Polychlorinated biphenyls	1	0 (0.0%)	0
Chlorine	0	0 (0.0%)	0
Total	324	22 (6.8%)	32

Most frequent single substances associated with transportation events in Harris and surrounding counties

Chemical	Number of Events
Sulfuric acid	16
Hydrochloric acid	13
Sodium hydroxide	10
Xylene	8
Paint or coating NOS	7
Styrene	7
Ethylene glycol	6
Phosphoric acid	6
Benzene	5
Propylene	5

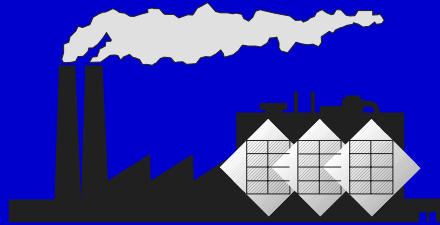
Substances associated with transportation events involving the largest number of victims in Harris and surrounding counties

Chemical	Number of Events	Total Number of Victims
Propylene	1	4
MIX: Ethylene glycol/polyethylene nonyl phenol	1	3
Multiple chemical	3	3

Distribution of victims (n=36) by transportation type and victim group



6. Fixed-facility events



Comparison of Harris and surrounding counties with statewide numbers for fixed-facility events

	Texas	Harris and Surrounding Counties Number (%)
No. of fixed-facility events	8909	5774 (65%)
No. of fixed-facility events with victims	218	110 (50%)
No. of victims for fixed facilities	2098	1162 (55%)

Distribution of fixed-facility events involving victims by location within fixed facility

Location	No. of Events at that Location	No. of Events with Victims at that Location No. (%)	No. of Victims
Process vessel	3490	33 (0.9%)	802
Material handling	387	21 (2.9%)	107
Ancillary process equipment	492	8 (1.6%)	81
Storage above ground	459	21 (4.6%)	65
Piping	726	21 (2.9%)	61
Transportation within fixed facility	77	2 (2.6%)	5
Dump/waste area	58	1 (1.7%)	1
Other	367	10 (3.6%)	65
Missing information	46	0	0
Total*	6102	117	1187

*Total exceeds number of events because each event may involve up to two location types. There were 135 events involving 1198 victims.

Chemical categories associated with fixed-facility events in Harris and surrounding counties

Chemical Category	No. of Events	No. of Events with Victims	No. of Victims
Volatile organic compounds	1724	12 (0.7%)	75
Other inorganic substances	1403	10 (0.7%)	109
Mixture across categories	958	12 (1.3%)	55
Other	777	23 (3.0%)	92
Acids	246	14 (5.7%)	56
Ammonia	111	8 (7.2%)	626
Bases	105	5 (4.8%)	23
Pesticides	82	0 (0.0%)	0
Chlorine	69	7 (10.1%)	31
Polychlorinated biphenyls	52	0 (0.0%)	0
Paints and dyes	13	0 (0.0%)	0
Total	5540	91 (1.6%)	1067

Most frequent single substances associated with fixed-facility events in Harris and surrounding counties

Chemicals	Number of Events
Sulfur dioxide	576
Benzene	255
Butadiene	233
Ethylene	159
Sulfuric acid	125
Carbon monoxide	119
Ammonia	108
MIX: H2S/SO2	105
Hexane	87
Hydrocarbon NOS	75

Most frequent single substances in fixed-facility events with victims in Harris and surrounding counties

Chemicals	Number of Events	Total No. of Victims
Ammonia	7	625
Chlorine	7	31
Sulfuric acid	7	23
Hydrochloric acid	4	10
Benzene	3	7
Hydrogen sulfide	3	7

Single substances associated with fixed-facility events involving the largest number of victims in a single event in Harris and surrounding counties

Chemicals	Total No. of Victims
Ammonia	583
Nitrogen dioxide	68
Diketene	58
Nickel carbonyl	41
Ammonia	28
Hydrofluoric acid	21
MIX: Butyl acrylate/butyl alcohol	20

Multiple substances associated with fixed-facility events involving the largest number of victims in a single event in Harris and surrounding counties

Chemicals	Total No. of Victims
Ammonia; Nitrogen dioxide; Sulfuric acid	39
Nitric Oxide (NO); Nitrogen fertilizer; Perlite	12
Ethylene dichloride; Hydrochloric acid; Vinyl chloride	9
Chlorine; Vinyl chloride	5

6. Transportation events

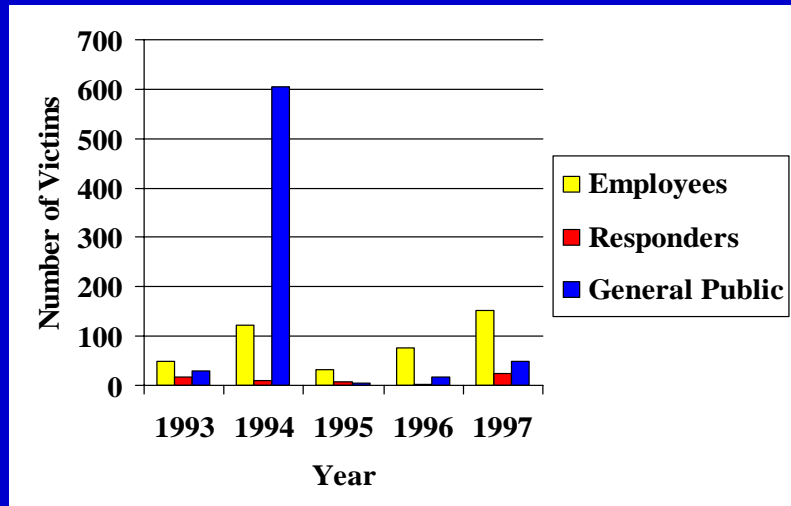
7. Fixed-facility events

8. Who are the victims?

Distribution of victims by victim category in Harris and surrounding counties

Victim Category	Fixed Facility	Transportation	Total
Employee	408	24	432
Responder	59	1	60
General Public	694	11	705
Missing	1	0	1
Total	1162	36	1198

Distribution of victim category by year for Harris and surrounding counties



6. Transportation events

7. Fixed-facility events

8. Who are the victims?

9. Injury severity?

Severity by victim category* for Harris and surrounding counties

	Responders	Employees	General Public	Total
Fatality	0	16	1	17
First aid	6	124	23	153
Treated and released**	41	151	668	860
Admitted**	6	46	11	63
Observed only**	4	50	0	54
Private physician within 24 hours	3	45	2	49
Total	60	432	705	1197

*One victim with unknown category was treated and released from the hospital. **At hospital

6. Transportation events
7. Fixed-facility events
8. Who are the victims?
9. Injury severity?
10. Types of injuries

Types of injuries reported by victims (n=36) in transportation events in Harris and surrounding counties

Type of Injury	Number of Times Reported
Trauma	22
CNS* or dizziness	5
Chemical burns	4
Thermal burns	4
Skin irritation	4
Headache	3
Gastrointestinal problem	2
Respiratory irritation	1
Other	1
Total**	46

*Central Nervous System

**Total number of injuries exceeds number of victims because some people sustained more than one type of injury.

Types of injuries reported by victims (n=1162) in fixed-facility events in Harris and surrounding counties

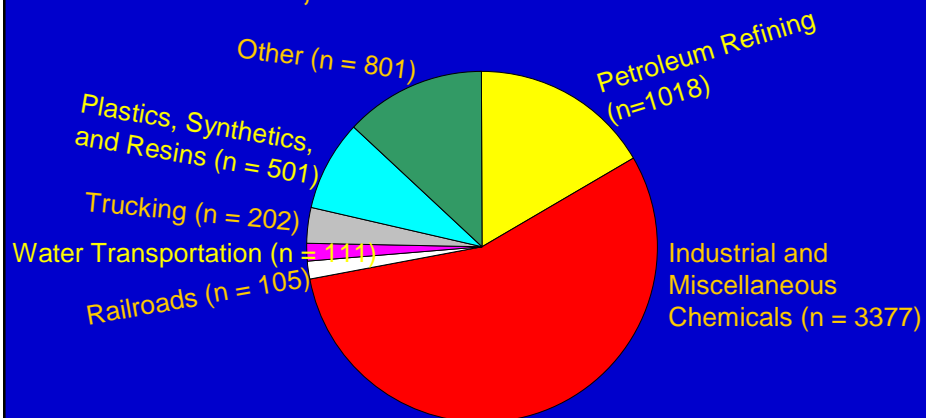
Types of Injuries	Number of Times Reported
Respiratory irritation	715
Eye irritation	350
Gastrointestinal problems	326
Headache	210
Skin irritation	138
CNS*/dizziness	103
Heart problems	55
Chemical burns	36
Trauma	32
All other	40
Total**	2005

*Central Nervous System

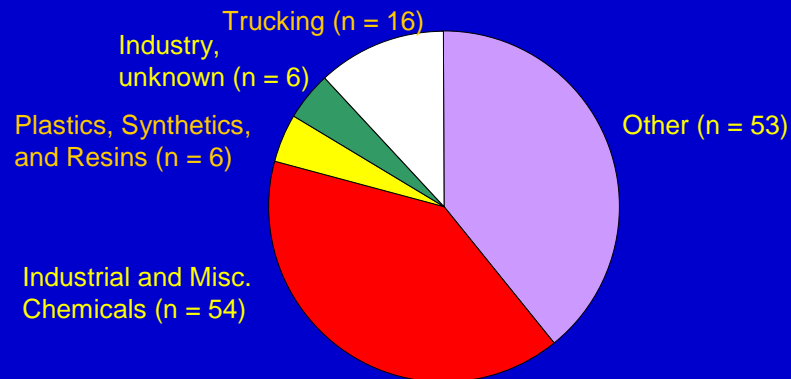
**Total number of injuries exceeds number of victims because some people sustained more than one type of injury.

6. Transportation events
7. Fixed-facility events
8. Who are the victims?
9. Injury severity?
10. Types of injuries
11. Industries associated with HSEES events

Distribution of industries in HSEES events
(n = 6115) in Harris and surrounding counties,
Texas HSEES, 1993 - 1997



Distribution of events with victims* by industry in Harris and surrounding counties, Texas HSEES, 1993 - 1997



*There were 135 events involving 1198 victims.

In Conclusion:

- Keep up the training and good work and safety practices.
- In fixed facilities be especially aware of situations involving ammonia, other inorganic substances, VOCs, acids, chlorine, or bases.
- VOCs, pesticides, and propylene were associated with victims in transportation events.
- In fixed facilities, be aware of process vessels, material handling (loading/unloading), ancillary process equipment, storage above ground, and piping. These areas are associated with large numbers of victims.
- Statewide data show that explosions and crashes causing trauma injuries often result in fatalities.

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