

Effectiveness of Shelter-In-Place: Examples from across the Country

Shelter in Place is used across the country as a protective action for the public. But even before formal sheltering in place was common, examples of the effectiveness of staying indoors during chemical emergencies exist. Following are a few examples from around the United States:

- **Labarre, LA in 1961**
There was a 30 ton chlorine release which immediately surrounded the house of a young family. After about 15-20 minutes, the father panicked and carried his young son outdoors. The rest of the family stayed inside. The family and the father survived, but the young boy died from the chlorine exposure he received outside.
- **Houston, TX on May 11, 1976**
A tank truck carrying anhydrous ammonia wrecked on an exit ramp and toppled onto a freeway below. On impact, the tank ruptured and released about 7,500 gallons of ammonia. The ammonia immediately vaporized and formed a thick plume. With winds of about 7 mph, most of the ammonia cloud had dispersed after 5 minutes. The cloud surrounded the nearby Houston Post newspaper building – birds on the roof were killed. For people within 1,000 feet of the release point, 78 were hospitalized for symptoms of ammonia exposure, 100 were treated for less severe injuries, and 4 died as a result of ammonia exposure. The National Transportation Safety Board (NTSB) investigation concluded that people who sheltered and stayed inside buildings (including workers in the Houston Post building) received no harm from the ammonia release. NTSB also concluded that people who stayed in their cars generally received less severe injuries than those who left their cars and tried to escape.
- **Pensacola, FL on November 9, 1977**
A railroad tank car carrying anhydrous ammonia derailed and was punctured resulting in a release of ammonia vapors. Two deaths and 46 injuries were reported for those who were evacuated. In six houses that were very close to the accident site, there was no time to evacuate. Those residents closed their windows and doors and stuffed towels under doors and around windows. NTSB concluded that a breathable and survivable atmosphere was maintained in those houses where the residents were not harmed.
- **Miamisburg, OH on July 8, 1986**
A CSX rail tank car derailed releasing liquid phosphorus. About 30,000 people were evacuated from the surrounding area. However, a local hospital near the accident site was unable to evacuate. The hospital staff and patients sheltered in place and were not injured. (Information from a telephone interview with Lt. Andy Harp, Miamisburg Fire Department, one of the first responders on the scene)

- Texas City, TX on October 30, 1987
An accident at a Marthon Oil refinery released a large amount of hydrogen fluoride (HF). About 3,000 people evacuated. Of those, 500 were treated for burns and respiratory problems. People who stayed in their homes and refused to evacuate were not injured by the HF. In addition, pets and plants that were left inside the homes that were evacuated were not injured while pets and plants left outside perished.
- Planquemine, LA in 1987
A Dow Chemical Company accident released chlorine. All of the employees who stayed in buildings were unaffected. Two employees who tried to evacuate from the cafeteria suffered respiratory problems from inhaling the chlorine. Trees near the gate of the facility were damaged, while houseplants in offices near the accident site were not.
- Henderson, NV on May 6, 1991
Corrosion in a steel piping system caused a failure that released 70 tons of chlorine gas. Two hundred people were hospitalized. Investigators from the U.S. Fire Administration concluded that people who evacuated were exposed to greater risk than those who stayed indoors. (Cited in a Michigan State Police report)
- Ludington, MI on February 7, 1993
Michigan State Police reported that a pipe fitting failed releasing bromine gas. Shelter in place was utilized successfully for 3 hours with no injuries. Michigan State Police concluded that in this incident, sheltering in place was an effective protective action and that it was preferred to risking exposure during an evacuation.
- Richmond, CA on July 26, 1993
A tank car carrying oleum overheated and ruptured sending a cloud of sulfur trioxide into the air. The Contra Costa County Health Services Department reported that 22,000 people in the community sought medical attention, 22 were hospitalized. Employees of a nearby plant, in the direct path of the plume, sheltered in place and were not injured.
- Nitro, WV on December 5, 1995
A process vessel at an FMC chemical plant overpressurized and released a phosphorus chloride compound into the diked area around the vessel. In the rain, a hydrochloric acid cloud was formed which drifted offsite into an adjacent office and commercial area.. More than 800 employees of a neighboring chemical plant and several offices sheltered in place while the plume passed over the area. No injuries were reported. Businesses in the area had been trained in sheltering for employees.
- Pittsburg, CA in 1998
At a refinery, an accident released 900 pounds of chlorine. About 7,000 people in the immediate community were alerted to shelter in place. One employee was injured in the incident, but no injuries were reported from offsite.