Carolyn W. Merritt
Chairman
U.S. Chemical Safety and Hazard Investigation Board
Testimony before the
U.S. Senate Homeland Security and Government Affairs Committee

Madam Chairman, Senator Lieberman, and members of the Committee, thank you for the opportunity to testify this morning. I commend you for your leadership in convening this hearing. Protecting the public from chemical emergencies is an important responsibility of the federal government.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) is an independent, non-regulatory, federal agency that investigates major chemical accidents at fixed industrial facilities, determines root causes, and issues safety recommendations. Our recommendations go to the companies that have the accidents, other government agencies, and trade and labor organizations. We currently have three Board members of five authorized; we are appointed by the president and confirmed by the Senate. We have a professional staff of engineers and safety experts.

The Board does not have primary jurisdiction over transportation-related chemical accidents, and we also do not have jurisdiction over industrial site security or criminal acts that cause a chemical release.

Since we opened our doors in 1998, we have launched investigations of approximately 35 major chemical accidents at fixed industrial facilities to determine their root causes, and we have issued almost 300 safety recommendations designed to prevent future accidents.

In the time we have been in existence, we have learned something very troubling. The incidents we have investigated at the U.S. Chemical Safety Board have revealed serious gaps in the preparations for major chemical releases by companies, emergency responders, government authorities, and the public. These gaps in preparedness leave Americans vulnerable.

Madam Chairman, in December of last year, I traveled to Kanpur, India, to a conference marking the twentieth anniversary of the chemical plant tragedy in Bhopal, India. In that accident on December 3, 1984, about 43 tons of toxic methyl isocyanate, which is actually not a large quantity, were released into the air from a U.S.-owned pesticide plant. Several hundred thousand people were exposed to the gas. About three thousand people died within a few weeks, and more than 200,000 sustained permanent injuries.

For me, it was an extremely sobering experience to meet with some of the plant operators, residents, health professionals, and public officials from this ill-fated city. On the eve of the disaster, these were just ordinary people going about their lives, as we all do. Although many showed tremendous courage and heroism when the gas release was impacting a panicked population, overall the residents and the city were caught totally unprepared. It was the lack of preparation that made this accident particularly devastating and added to the casualties in what became the worst industrial accident in history.

Residents and community officials were unaware of the toxic hazard from the nearby facility and had not planned an appropriate emergency response. When the time came, the wrong actions were taken. For example, many who were told to evacuate ran directly into the toxic cloud and died in the street while those who stayed in their shanty homes survived. I do not suggest that the accident was the fault of residents or public officials. However, if they had been able to prepare for such event, the impact of the release could have been mitigated. That is the conclusion reported by local officials in Bhopal today.

The consequences of the Bhopal accident were extraordinary, but the accident itself was not. The amount of toxic material released, forty-three tons, would fit comfortably into just one rail car. Safety experts have concluded that the Bhopal gas release was caused by a combination of poor operating practices, poor maintenance, and the deterioration of safety equipment designed specifically to prevent this kind of release. In our investigations, the Chemical Safety Board regularly finds deficiencies similar to those at Bhopal at major incidents in this country – including the failure to prepare the public for chemical emergencies.

In the U.S. in the past few years, we have had several chemical releases that have similarities to Bhopal. Fortunately, the consequences, though tragic, have been far less severe than Bhopal. One reason is that they occurred in more sparsely populated areas. The most recent was the release of about 60 tons of chlorine from the rail car crash in Graniteville, South Carolina, in January, now under investigation by the NTSB. An area two miles downwind of the derailment was affected, and the accident took ten lives. This was not even a worst-case event since the gas release was not instantaneous but occurred over several days.

A similar-size chlorine release occurred in a sparsely populated, rural area outside San Antonio last year, when two freight trains collided. A conductor and two residents were killed by chlorine gas, and people 10 miles away reported symptoms of exposure. Of course chlorine is but one of a number of high-volume hazardous chemicals, including ammonia, hydrofluoric acid, and others that pose a potential danger to those who live near fixed chemical facilities or along rail or pipeline routes that transport the chemicals.

Clearly, if a major release occurred in a densely settled urban area, it would have the potential to cause large-scale casualties. Following Bhopal, in the 1990s the EPA began requiring that more than 15,000 hazardous chemical sites begin planning for disasters and file worst-case scenario data with local and federal authorities. Some in industry noted that these scenarios – which often indicated that thousands of people within a certain radius would be imperiled by a single release – could be unduly alarming. The predictions were known to be very conservative and were intended to be used for planning purposes by emergency response organizations and government agencies. The scenarios were unlikely or overly simplistic, and they did not take account of real-world factors such as topography and wind conditions, critics said.

In today's climate the potential for a catastrophic event is more real than when these arguments were first made. Today an intentional criminal act is a real possibility.

One method of determining the effects of various scenarios is called "dispersion modeling," and it has been widely used over the past decade. For example, in 1998 the Chlorine Institute, an industry trade group, published a pamphlet entitled "Estimating the Area Affected by a Chlorine Release." The institute used dispersion modeling to calculate the effect of worst-case releases from tank trucks, rail cars, and other common containers under typical atmospheric conditions. According to this publication, the total failure of a chlorine rail car could produce a plume four miles wide by 15 miles long with concentrations exceeding 20 parts per million (ppm) – higher than what the federal government terms "immediately dangerous to life and health." Naturally, closer in than 15 miles, the levels can be much higher, exceeding the 430 ppm concentration that is rapidly fatal. While these dispersion models may prove to be overly cautious, they do indicate the potential magnitude of the problem.

The overall message is clear: a large-scale instantaneous toxic gas release is quite capable of causing thousands of casualties if the conditions are right and the release occurs near a population center. We have seen it overseas; we have seen it projected in computer models; and we could see it in the future here in the United States as the result of a terrorist act or perhaps an accident.

At many fixed industrial sites, there are chemical storage tanks that are far larger than any rail car. In my years as an industrial safety and environment executive, we were certainly aware of some large storage tanks that could cause catastrophic toxic releases affecting thousands of residents. In one case, we knew of an ammonia storage tank in a major port that could have jeopardized nearly a million people in case of a total failure or attack.

In addition to large storage tanks, there are also large numbers of stationary rail tank cars parked at chemical plants, freight yards, and other sites. In fact, the CSB has investigated three chlorine releases that involved stationary rail cars at chemical plants in Missouri, Louisiana, and Arizona. There were injuries in each case but fortunately no fatalities.

Overall, we have an excellent record in this country of minimizing off-site fatalities from chemical releases at fixed industrial sites. A lot of the credit is due to those companies that have diligently implemented the process safety and emergency planning requirements established under the 1986 Emergency Planning and Community Right-to-Know Act and the 1990 Clean Air Act Amendments. Some companies have gone above and beyond the requirements through voluntary programs, including joint planning and cost sharing with local emergency response organizations.

But some of our "success" is also due to luck and good fortune. In our investigations, we continue to observe companies and communities that were caught unprepared for even small-scale chemical releases. From time to time we find companies that have large quantities of toxic materials close to residential neighborhoods, schools, or other businesses and have few if any functional safety procedures or devices in place – and their communities are not prepared for a chemical emergency.

Among the accident cases we investigate, a deficient emergency response is more often the rule than the exception. I will briefly discuss a half dozen cases that illustrate this point. All of these cases were investigated by the Board over the past three years.

In August 2002, a chemical repackaging facility in a St. Louis suburb had a release of chlorine gas from a failed transfer hose connected to a rail car. Four out of five emergency shutoff valves failed to close properly when the automatic shutdown system detected chlorine because they were not properly maintained or tested. Emergency protective equipment was not available to plant personnel as it was stored too close to the rail car and became immediately inaccessible when the release started. In addition, the community's volunteer hazardous materials team had never practiced at the site for such an accident. Volunteer responders took 90 minutes to assemble the team, 45 minutes to get suited and plan entry to the site, and another 45 minutes to reach the rail car and shut off manual valves, stopping the leak. Over that three-hour span, some 48,000 pounds of chlorine gas had been released to the surrounding area.

Although some companies unload chlorine cars indoors and also have scrubber systems for leaks of the gas, there were no such measures in place here. The rail car was outdoors, unprotected, and a short distance away from a 100-unit mobile home park and other businesses. Under the worst case, hundreds of people could have been rapidly exposed to toxic concentrations of gas. There were no warning sirens or telephone call-down systems, and firefighters had to go door-to-door with bullhorns in an effort to evacuate residents.

A series of fortuitous circumstances, however, including the time of the day and the wind direction, spared local residents and prevented a catastrophe. Many residents said they did not even know that the chlorine repackaging facility was nearby. Neither the company nor local authorities had developed effective means of notifying neighbors about the release, produced any plans for shelter-in-place or evacuation, or performed any simulation exercises to prepare for even the most probable of events, let alone the worst-case scenario.

Later that year, in Pascagoula, Mississippi, there was a massive explosion in a chemical plant distillation tower. The upper 35 feet of the tower were blown skyward and heavy pieces of metal debris – some weighing up to six tons – were hurled up to a mile away. The facility was in the center of a massive chemical complex that included a petrochemical refinery and a fertilizer plant, all with large storage tanks of toxic and flammable materials. A 100,000-gallon storage tank, 500 feet away from the tower, was pierced and ignited by debris from the blast.

As in other cases, emergency notification was not effective. A precautionary shelter-in-place was ordered, but not everyone was notified or knew how to respond.

Once again, fortunate circumstances prevented a greater disaster. The tower broke at the top, preventing damage to much of the ground-level equipment. The most hazardous storage vessels, including a 500,000-pound anhydrous ammonia tank, were narrowly spared by the debris and the blast wave from the explosion.

The accident highlighted an interesting problem in emergency planning: few companies if any, in planning for a worst case, consider the effect on their own operations from explosions or chemical releases at neighboring chemical plants.

Less than one year later, another distillation column exploded at a chemical plant in Miamisburg, Ohio, outside of Dayton. Once again heavy debris damaged nearby equipment, including a 52,000-pound storage tank of toxic and flammable carbon monoxide gas. A one-mile radius evacuation was ordered, involving some two thousand residents. Police had to go door-to-door notifying many of the evacuees, and some people were never notified at all. Evacuation instructions were unclear, and some residents were not told where to go to safety. Many were unaware that the plant even existed or had potential explosion hazards.

The same year, a large chemical refrigerant plant in Baton Rouge was caught unprepared when chlorine unloaded from a rail car began leaking through corroded process equipment at the facility. The ventilation system for the control room had not been properly maintained, and chlorine gas quickly entered the room forcing the operators to flee before they could shut down the process. With the controls abandoned, the leak continued for several hours, and nearby residents were forced to take shelter. The chlorine leak also destroyed the electronic control system at the plant and caused a prolonged shutdown of the facility.

Later that year in Glendale, Arizona, a densely populated city adjacent to Phoenix, there was another chlorine release from a chemical plant scrubber system fed by a chlorine rail car. Up to 3,500 pounds of the gas were released, forcing the evacuation of four thousand residents. In addition, students at two elementary schools had to shelter in place. Once again, local authorities were not fully prepared for the release, and some of the emergency notification was done door-to-door by police officers who were not wearing respiratory protection. In the end, ten officers needed to go to the hospital themselves for chlorine-related symptoms. The notification system and emergency response were not completely effective. For example, evacuees were told where to go to shelter safely, but they were not given a route to get there, and the most direct path for some was directly through the plume.

Probably the most significant incident of all occurred in the northwest Georgia community of Dalton just a year ago, in April 2004. A small chemical company there decided to make a new product, a chemical called triallyl cyanurate (TAC). To make TAC, the company needed a toxic and volatile raw material, allyl alcohol. The company ordered the delivery of a 31,000-pound tank truck container of the highly toxic and flammable liquid. But company personnel had not fully researched the chemistry of the reaction process, and during the very first production batch the reactor overheated and began spewing toxic and flammable chemicals into the air. There was no safety equipment in place to contain the release, and a toxic vapor cloud formed and began drifting toward a residential community.

The quantity of allyl alcohol at the plant was well above the threshold of 15,000 pounds under the EPA's Risk Management Program (RMP) rule, but company managers did not even know that the rule existed, did not take required steps to prevent or contain a release, and did not develop a required emergency response plan for the toxic hazard.

Problems with preparedness were not confined to the company, however. Even in this relatively industrialized region, the fire department lacked equipment or protective clothing for a large toxic chemical release. They did not have encapsulating suits or appropriate air monitoring gear. In fact, the community had no hazardous materials unit at all, and in case of a toxic emergency the plan was to bring in contractors from elsewhere in the state, up to 90 miles away.

The community had not planned for sheltering residents in-place, and when the release occurred an evacuation was attempted. There were no warning sirens, either at the plant or in the community, and so unprotected police personnel went door-to-door notifying people to leave. The evacuation exposed responders and residents to the toxic gas. A total of 154 people were decontaminated and evaluated at an overwhelmed local hospital, including 13 police officers and four ambulance personnel. Fortunately, all the residents and responders survived. Fortuitous circumstances, including a heavy rainstorm that helped scrub the toxic gas from the air, may have prevented more serious consequences.

At a public hearing the Board convened in Dalton last fall, we heard how Georgia has not implemented some key provisions of the 1986 Emergency Planning and Community Right-to-Know law. Georgia designated a single Local Emergency Planning Committee (LEPC) for the entire state, and jurisdictions like Whitfield County where Dalton is located are without a functioning LEPC.

The whole purpose of LEPCs, as designed by Congress, is to coordinate emergency planning among companies, police, fire, community groups, local officials, and the news media. Arguably, it was exactly the kind of planning and coordination that was missing in Dalton. But there is no designated federal funding for the LEPC program, little national coordination, and no sanction against states and localities that do not implement these requirements.

I am disturbed by what the CSB's investigations have shown. In the cases we have examined, preparations for chemical emergencies were found to be uneven and inadequate. While we do not know how representative these six cases are, at a minimum they point to the need for a comprehensive national review of chemical preparedness.

The lack of preparation potentially leaves our country vulnerable to the effects of both chemical accidents and possible acts of terrorism. As we learned from the Bhopal tragedy, effective planning can greatly mitigate the effects of a devastating chemical release. Until we have effective safety systems at all chemical facilities, effective mitigation and containment systems, and effective emergency preparedness at every community from coast to coast, our people will continue to be vulnerable, exposed to preventable risks.

We all hope and pray such accidental releases or acts of terrorism never occur. But if such a disaster should happen, we must be prepared to respond quickly and effectively to save every life we can and to limit the damage. The time for planning is now, not after a tragedy. I commend you for your leadership in convening this hearing today before such a tragedy has occurred. Thank you.