Testimony of

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Before the Senate Committee on Homeland Security and Government Affairs

July 13, 2005

Thank you Madam Chairman, Senator Lieberman, and members of the Committee, for the opportunity to testify before this committee. I commend you for your leadership in convening a series of hearings, as a prelude to considering new federal policies to strengthen the security of the chemical sector. As repeated Iraqi incidents and last Thursday's events in London tell us, terrorism is an all too frequent, emergent global hazard and must be addressed in the next generation of risk assessment and mitigation in all sectors of U.S. society. The chemical sector bears special attention given its history of catastrophic fires, explosions and toxic releases whose outcome can precipitate a sense of public terror.

My testimony focuses upon the chemical risks to communities, the need for new policies to consider the interface between safety and security and the recommendation to promote coordination across facilities, emergency responders, at-risk communities with and among federal agencies. Although known to me, others can provide specific illustrations of security weaknesses that support the call for a national approach to regulations. Much effort has already been expended in developing and using model vulnerability assessments and in implementing security programs that also should be considered by the Committee.

My professional competency is in the field of toxicology and chemical safety policy. Until last November, I served as a board member of the U.S. Chemical Safety and Hazard Investigation Board (the Board or the CSB). My tenure began with the agency's inception and remains the longest duration of any board member. The CSB is an independent federal agency whose primary mission is to investigate and promote the prevention of unintentional, major chemical incidents at industrial facilities. In addition to conducting root cause investigations and reporting on findings, the Board has been directed by Congress to conduct special studies that encompass analyses of policy, guidelines, regulations and laws governing chemical safety.

Prior to joining the CSB, I directed international programs and public health for the National Institute of Environmental Health Sciences, an institution that also has lead responsibility for the National Toxicology Program, the premier governmental approach for elucidating chemical hazards, and the Worker Education and Training Program, a leading peer-reviewed, competitive grants program for ensuring training of emergency responders to manage hazardous material incidents.

Safety and Security Risks Surrounding the Chemical Industry

The chemical sector is an important component of the American economy and fundamental to our current quality of life. Less than
a year ago, The American Chemistry Council provided a detailed economic analysis of the chemical sector, estimating its business value as $459 billion, providing 900,000 direct jobs, supporting employment for nearly 700,000 suppliers and contributing nearly $30 billion in income and property taxes.[1]

However, as painful experiences have taught us, special risks are associated with this sector. Many American communities have suffered localized chemical releases from routine chemical processing, distribution, product usage or waste disposal that, in limited ways, contaminate air, water, or soil. Much larger societal use of specific chemicals over longer periods of time have resulted in releases with widespread regional and global impacts, such as food chain contamination by persistent, bioaccumulative, toxic chemicals and even holes in the stratospheric ozone layer.

Germane to the thrust of this hearing are catastrophic chemical risks that have proved costly in lives lost and livelihoods and property destroyed. This class of problems include major episodic explosions, fires and toxic releases that are generally characterized as low probability – high consequence (LP-HC) events. Low probability does not mean no probability, just very infrequent events at any single facility and within any given process at that facility. However, given the great diversity of facilities and processes across America, the aggregate annual, number of events are nationally quite significant.

U.S Chemical Accident Patterns and Costs

Despite valuable surveillance efforts among some states and federal agencies,[2] the true number, severity and trends of U.S. chemical incidents is not known.[3] Nationally, among 14,500 high hazard chemical-handling facilities required to file risk management plans with the U.S. Environmental Protection Agency (EPA) in 1999, more than 1100 of these facilities reported approximately 1,900 incidents over the five-year period from 1994 through 1999 – more than one incident per day. These incidents resulted in a total of 33 deaths and 1,897 injuries, to workers/employees and evacuation or sheltering in place of over 200,000 members of the public.[4,5]

[1] American Chemistry Council. 2004 Guide to the business of chemistry. Arlington, VA

[2] Horton, DK et al., "Surveillance of hazardous materials events in 17 states, 1993-2001: a report from the Hazardous Substances Emergency Events Surveillance (HSEES) System." Am J Ind Med 2004, 45:539-548.

[3] Mannan, S. et al, "National Chemical Safety Program, Annual Assessment Report – 2001" Publication of the Mary Kay O'Connor Process Safety Center at Texas A&M University.

[4] See, Kleindorfer, P. et al., Center for Risk Management and Decision Processes, The Wharton School, University of Pennsylvania, http://opim.wharton.upenn.edu/risk/downloads/00-1-15.pdf

In similar fashion, the Hazardous Substances Emergency Events Surveillance (HSEES) system established by the Agency for Toxic Substances and Disease Registry (ATSDR) within the Centers for Disease Control and Prevention collects and analyzes information about acute releases of hazardous substances that need to be cleaned up or neutralized according to federal, state, or local law, as well as threatened releases that result in a public health action such as an evacuation.[6,7] HSEES events are defined as any release or threatened release of at least one hazardous substance.[8]

For a five year period (1996-2001) surveillance systems from 13 state recorded 39,766 incidents (29, 994 at fixed facilities) of which 2,964 involved evacuations of up to 11,000 people. HSEES captures data on approximately 9,000 events annually – nearly 25 per day, however it is not a comprehensive tally of U.S. incidents.[9] Over the years the ATSDR aggregate data has remained fairly consistent, while individual states vary.

Direct losses from chemical releases have been estimated as about $1 billion dollars per year.[10] Taking into account indirect losses and other losses not covered by insurance companies, the losses would be conservatively estimated as three to four times larger, or additionally three to four billion dollars annually.

Role of Management Systems in Incident Prevention

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[5] Note: during my tenure as a board member, CSB was involved in 33 investigations from 1998 through 2004 that resulted in 58 deaths and 199 injuries. Fewer than 10 percent of incidents investigated by the CSB involve RMP-covered processes (3 RMP covered incidents).

[6] See, http://www.atsdr.cdc.gov/HS/HSEES/hsees.html

[7]Data collected include: time, date, and day of the week; geographic location and place within the facility where the event occurred; event type (fixed-facility or transportation-related event); factors contributing to the release; environmental sampling and follow-up health activities; specific information on injured persons: age, sex, type and extent of injuries, distance from spill, population group (employee, general public, responder, student), and type of protective equipment used ; information about decontaminations, orders to evacuate or shelter-in-place ; land use and population information to estimate the number of persons at home who were potentially exposed; whether a contingency plan was followed and which plan.

[8] Unlike the EPA RMP program with a defined list of covered chemicals, HSEES program considers a substance hazardous if it might reasonably be expected to cause adverse human health effects. It also has a major exception in rejecting incidents involving releases of petroleum products.

[9]Funding limitations allow only fifteen state health departments currently to have cooperative agreements with ATSDR to participate in HSEES: Colorado, Florida, Iowa, Louisiana, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Oregon, Texas, Utah, Washington, and Wisconsin. Many of these states have contributed independently to support this program.

[10] "Economic Analysis in Support of Final Rule on Risk Management Program Regulations for Chemical Accident Release Prevention, As Required by Section 112 r of the Clean Air Act", CEPPO, US EPA, Section 6-p. 21, Exhibit 6-10, June 1996.

The avoidance of safety problems requires management's demonstration of commitment, a well trained, educated and knowledgeable workforce, effective supervisory process, and employee involvement and commitment. Since the early 1980s private practice, professional engineering guidance and governmental policy have evolved to address LP-HC problems from a simple system of technical requirements to control hazards into a newer management systems paradigm of prevention.

Whether by the Chemical Safety Board, by a major governmental safety agency or by a leading corporation, the best investigations of LP-HC events examine specific safety management systems for the root causes underlying chemical process incidents, since rectifying these causes will do the most to prevent recurrence of the incident.

Terrorism has added another risk factor to LP-HC events. In response, many practitioners of process safety have incorporated the new hazard into the existing hazard assessment approach that must be addressed as part of a larger management system to prevent chemical releases.

Special features of terrorist risks demand closer coordination with governmental security expertise about threat potential and additional capacity for on-site physical security assuredness. However, chemical security is linked inextricably to chemical safety. I urge the committee to see the development and maintenance of competent management systems for safety as essential underpinnings to enhance security.

Why Lessons Learned need to be considered from major chemical incidents
Unfortunately, major LP-HC incidents have happened in America. They have occurred with extremely deadly consequences in premier multinational corporations. And, they have occurred recently. Three incidents bear specific consideration from this committee about causes, consequences and coordination needs: the ammonium nitrate explosion in Texas City in 1947; the methyl isocyanate release at Bhopal, India in 1984 and the fertilizer factory explosion in Toulouse, France in September 2001.

With 20/20 hindsight and an understanding of current terrorist threat potential, each of these incidents could easily be considered as realistic scenarios for security incidents (in fact, each has had to bear allegations of intentional human causation). Furthermore, each incident provides details about infrastructural issues that must be addressed if we hope to manage effectively the consequences of either chemical security or process safety incidents.

1. Texas City, Texas - April 16-17, 1947
Anchored in the harbor of Texas City on the bright spring Tuesday morning of April 16, 1947 was a liberty class cargo ship, the “Grand Camp.” During the previous few days it had been loaded with tons of an ammonium nitrate fertilizer, a cargo destined for European post war redevelopment as part of the Marshall Plan. Texas City was a boom

town, having rapidly developed as a major port, petroleum refiner and petrochemical producer during the war.[11]

For several possible reasons the warm fertilizer began to smolder, emitting a reddish-orange ‘pretty’ smoke, mobilizing the under-trained and under-equipped fire department,[12] and engendering a crowd of school children and adult spectators. Rather that douse the cargo with water, emergency responders were directed to close the hatches and the hot cargo was subject to ships steam heat, in a misperception that such action would starve the fire of available oxygen and preserve the economic value of the cargo. Shortly thereafter the fertilizer exploded, destroying the ship, the entire volunteer fire department and all arrayed alongside the dock.[13]

The detonation was heard in Houston and 150 miles away. A smoke plume 2000 feet high was observed from Galveston and Shrapnel rained upon the nearby petrochemical complex. Like falling dominos, pipelines broke and storage tanks were breached, triggering fires and secondary explosions in numerous businesses, and multiplying the fatalities and injuries. The casualties swamped the response capacity of Texas City Hospital, a small 20-bed clinic, serving a city of 18,000.

The carnage reigned throughout the day and into the night, culminating in a smoldering fire in the cargo hold of a second liberty ship, the High Flyer, a vessel that also contained ammonium nitrate fertilizer. Damaged and unable to be towed away from the dockside, the High Flyer exploded in the early morning of April 17, killing and injuring others, including emergency responders that had recently arrived from throughout the surrounding area. Fear deepened and Texas City fires burned for a week.

When the dust finally had settled, the toll was tallied at nearly 600 killed,[14] 3500 injured, homes and schools extensively damaged, making the Texas City event America’s largest chemical disaster. Subsequent analyses and investigations demonstrated that the emergency response infrastructure was under prepared and quickly overwhelmed. Hazards were neither assessed, nor understood by all who could have demanded

[11] The majority of the very large petrochemical complex was located in an unincorporated area and not subject to local taxes. The residential population had grown so rapidly that the under-resourced elementary school operated in split sessions.

[12] Shortly before the event the town sold its only fire boat in a cost cutting measure.

[13] For more detailed analyses of the Texas City incident, see: Minituglia, Bill. 2003. City on Fire: The Forgotten Disaster that Devistated a Town and Launched a Landmark Legal Battle, HarperCollins Press, NY; Stephens, Hugh W., 1996. The Texas City Disaster, 1947, University of Texas Press.; http://www.chron.com/content/chronicle/metropolitan/txcity/ and http://sdsd.essortment.com/texascityexplo_rkvi.htm

[14] Scores of victims were never identified, having been burned beyond the detection capacities of the forensic technologies of that era.

operations with a greater sense of precaution.[15] Private practice and public regulations were woefully deficient to manage the hazards and respond to the emergency. The U.S. Coast Guard that had established and enforced much stronger safety precautions with ammonium nitrate when it was shipped as explosive material during WWII, had relaxed its vigilance when the same material from the same factories was shipped as fertilizer.

2. Bhopal, India – December 2-3, 1984

Safely conducting chemical reactions is a core competency of the chemical manufacturing industry. Reactivity is not necessarily an intrinsic property of a chemical substance. The hazards associated with reactivity are related to process-specific factors, such as operating temperatures, pressures, quantities handled, concentrations, the presence of other substances, and impurities with catalytic effects. Chemical reactions can rapidly release large quantities of heat, energy, and gaseous byproducts. Uncontrolled chemical reactions have led to serious explosions, fires, and toxic emissions, that kill and injure, damage property and threaten the environment.

The world's worst chemical disaster began as a violent runaway reaction within a methyl isocyanate (MIC) storage tank in the late Sunday evening of December 2,1984 at the Bhopal Union Carbide pesticide plant in Madhya Pradesh, India. After ~ 1,500 lbs of water entered the MIC tank, possibly caused by a routine line washing procedure, an exothermic reaction ensued. Excessively heated and pressurized gases burst through a rupture disk and opened a pressure relief valve, allowing ~ 54,000 lbs of MIC and reactants to be released through an elevated scrubber vent system. Cooling gases formed a dense, low lying cloud that in the early morning of December 3 slowly and quietly drifted through adjacent housing and circulated throughout much of the central city, including the railway station.

MIC is a highly reactive, irritating and toxic gas that is soluble in the aqueous fluid of membranes surrounding eyes and lungs. Victims awoke gasping for painful breathes and stumbled bleary eyed into the darkened streets with no indication of which direction to seek relief. The government of India estimated 1754 immediate fatalities. Others estimate initial fatalities as high as 3000 and an accumulation of 15-20,000 disaster related deaths in subsequent years, based upon elevated mortality rates among hundreds of thousands of injured people.[16]

Injuries have been estimated to range from 200,000 to 500,000, with the Bhopal Directorate of Claims having registered medical folders for 361,966 exposed persons by 1990. These casualties overwhelmed the city's four hospitals and several clinics that supplied a total of 1800 hospital beds and 300 doctors. Mitigation of the damages from the toxic chemical exposures were exacerbated by the city's inability to provide water to

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[15] Unlike Texas City, the city of Houston had refused to accept the high volume of dangerous , ammonium nitrate fertilizer for loading as their docks.

[16] Dhara, V. R., and Dhara, R. 2002. The Union Carbide Disaster in Bhopal: A Review of Health Effects. Archives of Environmental Health 57(5): 391-404.

residential taps for more than a few hours per day, and the meager water supplied had quality problems.

Underlying systemic problems at the Bhopal facility and community included the following management system issues noted by several reports and analyses: [17]

- **Lack of awareness and knowledge of hazards**. MIC was produced and utilized as a high volume intermediate chemical, and yet its hazards under specific process conditions were not well understood by workers and emergency responders. Company personnel, nearby inhabitants and emergency responders were unaware of MIC toxicity. Medical and toxicological professionals debated appropriate treatment for months following the crippling exposures of Dec. 3. Citizen watchdog groups were lacking prior to the incident.
- **Deficient process hazard assessment**. The hazards associated with contamination of MIC storage tanks and their operations under higher temperatures and pressures were poorly assessed, and therefore abnormal situations were not managed safely.
- **Inadequacy of operating procedures**. Operating procedures were insufficient, poorly written, understood and executed. MIC tanks at the facility were filled above their recommended volume levels. A spare storage tank, intended to be empty for emergency dumping, instead contained high hazard intermediate chemicals.
- **Staffing insufficiency and lack of preparedness for abnormal situation**. Managers and staff were relatively new to the facility and unfamiliar with all the systems and personnel. Responsibilities of various employees were not clearly established. The facility staffing had been downsized. Staff turnover was high, and critical functions were severely undermanned. Staff training was not maintained.
- **Failure to maintain essential design and safety equipment**. Significant facility changes were not assessed for their safety impact and therefore not managed appropriately. The refrigeration unit designed to stabilize the pressure and temperature of the MIC in the storage tank was shutdown and the coolant was drained months earlier. The flare tower had been shut off for maintenance and was not operational at the time of the event. The scrubber system, which had the ability to detoxify smaller amounts of the MIC, was also turned off at the time of the event. Regardless, the system was not capable of neutralizing the quantity of MIC that escaped.
- **Investigation inadequacy and failure to implement audit recommendations**. Prior deadly incidents that caused fatalities, injuries and evacuations and smaller

[17] For more detailed analyses of the Bhopal incident, see: Kharbhanda, O., and Stallworthy, E. 1988. Safety in the Chemical Industry. Townbridge, Wiltshire: Redwood Burn Ltd.; Shrivastava, P. 1992. Bhopal: Anatomy of a Crisis (2nd ed). London: Paul Chapman Publishing Ltd.; Lees, F. 1996. Loss Prevention in the Process Industries (2nd ed: Vol. 2&3). Great Britain: Reed Educational and Professional Publishing. Kletz, T. 1999. What Went Wrong: Case Histories of Process Plant Disasters (4nd ed). Houston: Gulf Publishing Company.

MIC releases at the facility were not fully investigated and root and contributing causes established.[18] Significant safety audit recommendations had not been enacted.

- **Failure to maintain equipment mechanical integrity**. Valves and pipes were corroded and leaking. Many of the instruments and gauges such as pressure indicators were defective to the extent that workers did not trust them, thereby exacerbating problems of operating procedure adherence.
- **Inadequacy of emergency planning and response**. The scrubber system was not designed to handle the amount of MIC that breached containment. The water curtain system was not positioned high enough to contain escaping gas. Staff was confused as to whether or not to turn on the public emergency evacuation siren, and during the leak the alarm remained off for a matter of hours. No clear method of evacuation was established to manage such a release. Local zoning permitted dense, shanty dwellings to be close to the Union Carbide facility thereby increasing the population at risk.
- **Lack of Public Authority and Oversight**. As a emergent industrial nation, the government of India did not have laws, regulations and trained staff to ensure compliance with appropriate safety practice.

The Bhopal disaster prompted various assessments of causation, including one that speculated sabotage[19] and serious questions about the adequacy of international legal systems regarding responsibilities of multinational corporations.[20]

Union Carbide Corporation (UCC), a major multinational chemical corporation, headquartered in Danbury, CT had multiple U.S. production facilities, including those handling large amounts of MIC. Concerned about domestic chemical safety, Congress held hearings on chemical safety. UCC and the Occupational Safety and Health Administration (OSHA) conducted safety assessments of MIC operations at UCC's Institute, WV facility in late 1984 and early 1985 with generally favorable accounts of safety management. However, an aldicarb oxime release from the same Institute, WV facility in August 1985 sent over 130 people to the hospital, fueled widespread public doubts about the adequacy of high hazard chemical management by large corporations,

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[18] In Dec. 1981 3 workers were exposed to phosgene, 1 died; 2 weeks later 24 workers were overcome by another phosgene leak. In February 1982 18 workers were affected by an MIC leak. In October 1982 3 workers and nearby residents were affected by a leak of hydrochloric acid and chloroform.

[19] See, for example: 1985 Report of International Confederation of Free Trade Unions International Federation of Chemical, Energy, and General Workers Unions (ICFTU-ICEF) mission to study the causes and effects of the methyl isocyanate gas leak at the Union Carbide pesticide plant in Bhopal, India on December 2-3, 1984, at: http://bhopal.net/oldsite/documentlibrary/unionreport1985.html; and Ashok S. Kalelkar, Investigation of Large-Magnitude Incidents: Bhopal as a Case Study, Arthur D. Little, Inc., Cambridge Massachusetts, USA, May 1988, at http://www.bhopal.com/pdfs/casestdy.pdf

[20] Despite its magnitude, the full circumstances and consequences of the Bhopal incident have not been deliberated in a court of law. For a fuller examination of the legal dilemma, see: Cassels, J. 1993. The Uncertain Promise of Law. Toronto: University of Toronto Press Inc.

oversight competency of federal agencies and precipitated significant changes in domestic policy regarding high hazard chemicals.[21]

3. Toulouse, France – September 21, 2001

While most Americans vividly remember the events of 9/11/2001, few recall the major chemical catastrophe that occurred just 10 days later. Mid-Thursday morning on September 21, a huge explosion tore through the AZF (Azote de France) fertilizer factory in Toulouse, France.[22] Nearly 400 tons of off specification granular ammonium nitrate (and perhaps contaminated with a reactive agent) stored in a warehouse detonated with the force of 20-40 tons of TNT and equivalent to an earthquake measuring 3.4 on the Richter scale.. AZF is owned by Atofina, the chemicals unit of TotalFinaElf one of the world's largest petroleum and petrochemical producers.[23]

The blast created a crater 50 meters in diameter and 10 meters deep. Windows shattered in buildings throughout the city center three kilometers away. Thirty people were killed: 22 on the site, 8 members of the public. National and local authorities estimated that 10,000 people were physically injured, and a further 14,000 sought treatment for acute post-traumatic stress for months following the explosion. Over 500 homes were rendered uninhabitable, some 27,000 other dwellings were damaged, and almost 11,000 pupils had their educations interrupted since 85 schools and colleges sustained damage. Insurers estimated the costs at 1.5 billion euros.

Alarm systems were rendered inoperable and telephone lines were severed, frustrating the public communications of safety messages. Telecommunications were affected as far as

[21] Most prominent policy changes were reflected in the Emergency Planning and Community Right-To-Know Act of the Superfund Amendments and Reauthorization Act (1986) and the chemical accident prevention provisions of the Clean Air Act (1990).

[22] For more information about the Toulouse incident see: Dechy, N., T. Bourdeaux, N. Ayrault,, M-A. Kordek, J-C. Le Coze. 2004. First lessons of the Toulouse ammonium nitrate disaster, 21st September 2001, AZF plant, France. J. Hazardous Materials 111 (2004) 131–138; Dechy, N. and Y. Mouilleau , 2004. Damages of the Toulouse Disaster, 21st September 2001. In Loss Prevention and Safety Promotion in the Process Industries, 11th International Symposium - Loss Prevention 2004, Praha Congress Center, Prague, Czech Republic. 31 May – 3 June, 2004.; also, http://www.uneptie.org/pc/apell/disasters/toulouse/home.html; http://www.environmenttimes.net/article.cfm?pageID=131; http://www.icem.org/update/upd2001/upd01-68.html;

[23] Just two months earlier the CSB directed an investigation team to assess an event on July 14, 2001, at the ATOFINA Chemicals, Inc., (ATOFINA) plant in Riverview, Michigan. Ultimately the National Transportation Safety Board found that a pipe attached to a fitting on the unloading line of a railroad tank car fractured and separated, causing the release of methyl mercaptan, a poisonous and flammable gas. The gas ignited, engulfing the tank car in flames and sending a fireball about 200 feet into the air. Fire damage to cargo transfer hoses on an adjacent tank car resulted in the release of chlorine, a poisonous gas that is also an oxidizer. Three plant employees were killed in the accident, several were seriously injured and nearly 2,000 residents were evacuated in Michigan and into Ontario. See: http://www.ntsb.gov/publictn/2002/HZM0201.pdf and http://www.semcosh.org/atofina_explosion.htm.

100 km away. Air traffic was rerouted away from Toulouse. A nearby business collapsed 45 minutes after the explosion and others were subjected significant, long term business interruptions.

Thousands of tons of liquefied ammonia, solid ammonium nitrate and solid fertilizer were stored in other portions of the AZF facility, and nearby chemical businesses stored others toxic and hazardous chemicals, prompting additional concerns about domino effects throughout the industrial park. Because so many windows and building structure were damaged, sheltering in place would not have been possible if toxic chemicals were released.

The event greatly exceeded the consequences of the scenarios that had been used for emergency planning. More than 1500 fireman and special emergency personnel and 950 policemen responded to the event. Yet early responders arrived lacking exposure assessment equipment and the personal protective equipment to cope with a toxic cloud. Communications among responders suffered because of severed land lines and saturated cellular networks.

The AZF facility had been inspected seven times in three years by local authorities, but not for the adequacy of ammonium nitrate fertilizer management. Within a few weeks of the incident, the European Parliament issued a resolution calling for member states to provide themselves with sufficient numbers of competent inspectors trained to the specific technological hazards of the regulated facilities.[24,25]

The Toulouse disaster engaged the highest levels of French governmental leaders and prompted nationwide debate through many formal dialogues in communities near the 1200+ high hazard French facilities. The French legislature conducted an extensive review and deliberations on policies and practices. New legislation[26] has focused on strengthening the safety management systems of technological risks, including:

- Enhanced participation of employees in risk prevention and enhanced training of those working at at-risk sites.
- Improved safety management, coordination and roles/responsibilities of contract workers.[27]
- Expanded requirements to inform the public and to involve it more closely in the prevention of industrial risks

[24] See: http://europa.eu.int/abc/doc/off/bull/en/200110/p104028.htm

[25] Some experts called for a doubling of the French inspectors, and the French Administration plans to have 1400 inspectors by 2007, up from 800 at the time of the incident.

[26] See: http://mahbsrv.jrc.it/downloads/frenchlegisEN/30july_law_on_risk_prevention.pdf

[27] At AZF, 250 regular employees worked alongside 100 subcontractors who were drawn from 25 different companies. Three different subcontractors worked in the warehouse where the explosion occurred . Some characterized AZF as having ‘lost control’ of the work of the warehouse contractors.

- Better control over land use planning and urbanization around the at-risk sites

The Toulouse disaster also influenced policies in a larger European context by stimulating amendments to the Seveso directive that governs each member country's approach towards chemical incident prevention, preparedness and response.[28] Among other amended provisions, facilities handling the forms of ammonium nitrate and ammonium nitrate fertilizer involved in the AZF event were made subject to the Seveso II requirements [29].

Summary: U.S. policy needs to establish and define a new federal role in chemical security that is consonant with the management systems approach in chemical safety.

Philosopher, poet, literary and cultural critic, George Santayana speaks to our current situation in his often quoted statement: "Progress, far from consisting in change, depends on retentiveness. Those who cannot remember the past are condemned to repeat it."[30]. As a CSB Board member, I was intimately involved in 33 field investigations and eight safety studies, many of which illustrated the systemic problems of Texas City, Bhopal and Toulouse. I urge the committee to seek progress in formulating new federal chemical security policy, but by building upon experiences in chemical safety.

While much more remains to be accomplished in setting, strengthening and enforcing standards, existing laws and regulations that govern the occupational and environmental safety of highly hazardous chemicals provide a good framework for considering federal role in chemical security. OSHA and EPA establish general duties for employers to safely manage specified hazards and the specific elements of process safety and risk management for regulated facilities to comply. Existing training and information access requirements for emergency preparedness and response provide a road map for new needs to enhance security.

Recommendations for Consideration in Federal Chemical Security Legislation

1. Monitor the Scope of Chemical Sector Problems
Thankfully, in the wake of 9/11 America has not become the victim of a terrorist initiated catastrophe in the chemical sector. However, our vulnerabilities are manifest. As noted above, approximately 9000 incidents occur annually in just 15 states, but a nationwide surveillance system is lacking.

[28] See: http://europa.eu.int/comm/environment/seveso/#2.14

[29] See: http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_345/l_34520031231en00970105.pdf

[30] From The Life of Reason (1905)

At a minimum. comprehensive surveillance of chemical incidents whether due to safety or security management system failures would help inform policy makers and the public about sector vulnerabilities , such as which chemicals, processes, facilities and companies are involved in releases, what competencies and capacities are needed to respond to emergencies and what are the changing patterns of incidents. Armed with this perspective, policymakers could better set priorities for improving federal, state and local resource allocations.

2. Establish Department of Homeland Security Responsibility and Promote Coordination with Other Agencies

In a time of large budget deficits I urge Congress not to rob from Peter to pay Paul. Under-investing in programs for public health, occupational safety and environmental protection to resource a narrowly defined chemical security need, will backfire. The quickest return on investment will come from building upon existing strengths and promoting accountability for effective collaboration and coordination.

The Department of Homeland Security should have primary federal expertise is in assessing and addressing chemical security. However, the lessons learned from chemical incidents show that many other agencies have essential roles and responsibilities that need to be employed if we hope to protect the chemical sector comprehensively. OSHA and EPA have set standards for occupational process safety and risk management with the community at large. The Department of Health and Human Services has responsibility for public health protection and promotion. The CSB sets the standards for investigating and gathers important information about process incidents and their community impacts.

3. Set Requirements for a Security Management System

Much work has been accomplished on defining hazards of concern, developing vulnerability assessments tools, implementing security plans; auditing, testing and response exercises; employing inherently safer chemicals and processes, and coordinating with local response agencies and mutual response entities. Establishing strong policy that defines primary and secondary federal responsibilities for security management systems that complements safety management systems is needed.

4 Evaluate Security Management Systems Effectiveness When Failures Occur

While all stakeholders hope for effective assessment planning and management to avoid LP-HC events, experience tells us that some entities will not succeed on their own. Investigating the root causes of chemical incidents has proven quite valuable for strengthening the management systems to prevent recurrences. When wielded effectively by public agencies, such investigations have proven extremely valuable for educating the agency and the larger community about preventable causes of incidents.

Effective programs set standards and routinely audit for compliance on schedules designed to maximize responsiveness from the regulated community. However, more can be done to promote security vigilance. For the Department of Homeland Security to wait for a verified terrorist incident before thoroughly investigating management system competencies at a chemical facility would be a strategic mistake, since chemical incidents occur frequently and these incidents manifest systemic problems that need to be solved for both safety and security. The CSB has had significant success in promoting prevention by widely publicizing the results of a few well selected, noteworthy incidents, and has had much success in collaborating with other relevant entities during the course of an investigation.

5. Support Research, Development and Technology Transfer for Safer Chemicals and Processes

The ultimate solutions to security and safety risks will be found in reducing the volume and toxicity of the chemical hazards, an inherently safer approach. Following the Bhopal tragedy a few major corporations developed aggressive programs to evaluate their storage and use of extremely toxic chemicals, resulting in important process changes that reduced the volume and use of high hazard intermediate chemicals. The American Institute of Chemical Engineers produced good guidance documents on inherently safer chemical processes.

Some chemical processes are overdue for implementing inherently safer technologies. However, if America is to maintain its leadership role in field of chemistry broader support is needed for Green Chemistry Principles that include inherently safer chemistry for incident prevention.[31] The Congress should seek to involve the Department of Homeland Security with the National Science Foundation, the National Institute of Science and Technology, the Department of Energy, and the Environmental Protection Agency National Research Council to enhance research, development and technology transfer whose outcome will enhance safety, security and economic prospects for the chemical sector.

6. Employ Effective Training Approaches

An absolutely critical step to improve the security at chemical plants is to properly train the workers who respond to plant disruptions – both external responders like fire fighters, emergency medical personnel and police, but also workers inside the plant whose immediate reaction to a crisis can make an enormous difference in whether the crisis is controlled quickly with a minimum number of injuries and damage to the facility. The possibility of a plant suffering an unintentional mishap currently is much more realistic than a terrorist attack. Whether a mishap at a plant results from an intentional versus unintentional act, the release consequences are generally the same.

This country - through the private sector and public organizations like the National Institute of Environmental Health Sciences and the National Fire Academy - has trained millions of workers to safely handle uncontrolled hazardous waste sites as well as

[31] Anastas, P. T.; Warner, J. C. 1998. *Green Chemistry: Theory and Practice*, Oxford University Press: New York, and see: http://www.epa.gov/greenchemistry/principles.html

hazardous materials emergencies, in transportation and in fixed facilities.[32] Most of this training has been done under the OSHA Hazardous Waste Worker and Emergency Response standard (HAZWOPER, 29 CFR 1910.120), which was promulgated in 1989.[33] Workers trained under this standard represent a potent force already in place in fire houses, on trains hauling chemicals, in chemical plants, in waste water treatment, and in the nation's nuclear weapons facilities.

Other key consensus standards that have served this nation well and must not be relegated a lesser status through any new efforts to legislate greater chemical security . Firefighters have relied upon standards from the National Fire Protection Association, particularly NFPA 472, 473, and 1600. FEMA, through the National Response Team, has developed a set of training guidelines that have been recognized as definitive among emergency response experts.

Thank you again for the opportunity to testify before you.

[32] NIEHS has successfully supported twenty primary awardees, representing over one hundred different institutions that have trained more than 1.2 million workers across the country and presented 69,000 classroom and hands-on training courses, which have accounted for nearly 18 million contact hours of actual training. Awardees developed the official safety and health training for site workers at the cleanup of the World Trade Center, and first reported on site health and safety issues.

[33] See: http://www.osha.gov/Publications/OSHA3114/osha3114.html