Testimony of:

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To:

Senate Environment and Public Works Committee
Subcommittee on Transportation Safety, Infrastructure Security, and Water Quality

"Lessons Learned from Chemical Safety Board (CSB) Investigations, Including Texas City, Texas."

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Chairman Lautenberg, Ranking Member Vitter, Subcommittee members, and fellow panelists, I am Scott Berger, Director of the Center for Chemical Process Safety (CCPS). CCPS is organized with the American Institute of Chemical Engineers (AIChE) to serve as the world-wide engineering profession's leading effort to combat tragic process safety incidents such as occurred at Bhopal, India, Jilin, China, and Texas City, Texas. CCPS is sponsored by nearly 100 organizations worldwide, including most of the world's leading chemical, petroleum, and pharmaceutical producers, as well as other leading manufacturers and engineering firms. Governmental and other organizations also participate and sponsor the important work of CCPS.

Over the past 22 years, CCPS has published over 100 process safety guidelines and other resources which are used the world over to help companies implement and improve process safety programs. For example, Guidelines for Hazard Evaluation Procedures is the most widely used process safety book of all time and is cited in both Risk Management Plan (RMP, 40§CFR 68) and Process Safety Management (PSM, 29§CFR 1910.119) regulations. CCPS has also published the leading books on Chemical Process Risk Analysis, Inherently Safer Design, and Process Safety Management. Recently, CCPS published Guidelines for Risk Based Process Safety, which has incorporated a significant amount of practical learning by process safety managers over the past 19 years since CCPS published the first Guideline for Process Safety Management. We fully expect Guidelines for Risk Based Process Safety to serve as the path forward for process safety management and culture efforts around the world in the coming years. CCPS also publishes the Process Safety Beacon, a free monthly lesson/newsletter for plant operators, distributed to ¾ million plant workers worldwide in more than 20 languages. CCPS is also currently working to drive an important cross-association effort with the American Petroleum Institute, the American Chemistry Council, and others to develop standard leading and lagging process safety metrics.

The mission of CCPS is very compatible with the mission of the US Chemical Safety and Hazard Investigation Board (CSB). CCPS and AIChE have been supportive of CSB since it was first authorized as part of the Clean Air Act Amendments. It should therefore be no surprise that CSB participates in the global CCPS community and assists with CCPS efforts in ways appropriate to the Board's guiding principles, or that CCPS helps CSB disseminate its investigation reports and videos.

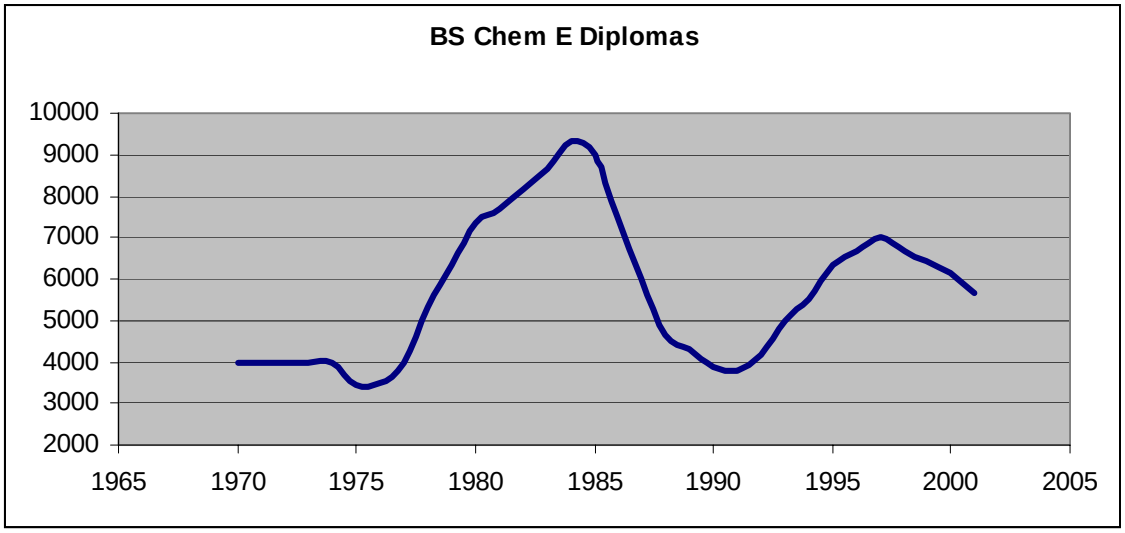
The mission of CSB is vitally important; by understanding the causes of process incidents and communicating them broadly to industry, all stakeholders – companies, workers, advocates, and regulators – have the opportunity to better understand the risks and potential consequences of similar processes. They can then take the technical and management actions necessary to avoid repeating the same incidents in their own facilities. It is therefore vitally important that the Chemical Safety Board and its staff be adequately funded and adequately staffed with sufficiently experienced engineers to enable it to carry out in depth incident investigations, capture the learning, and communicate that learning to the industry, technical associations, regulators, and the public. It is my observation that the engineers and the other professional staff of CSB are dedicated and extremely hard-working, but the number of experienced engineers is insufficient to fully meet society's expectations for investigating incidents in depth and communicating the learning broadly.

Likewise, only the chair and two of the other four Board members are either engineers or have had similar significant senior management responsibility for process safety in industrial or military roles. The terms of the Chair and one of the Board members will end shortly; we recommend that the White House put top priority on selecting two experienced chemical engineers to fill these vacancies.

It will be challenging for CSB to bolster its staff. Today, there is a shortage of experienced chemical engineers who have the training and experience to practice in the challenging field of process safety. This is partly due to the wake up call that CSB helped issue to all of industry following the tragic incident at BP Texas City. However, a significant cause of this shortage is simple baby-boom demographics. The promising young

engineers who were trained in process safety in the 1980's following the industry's first wakeup call, the Bhopal tragedy; i.e. the engineers who created the entire practice of process safety and who gained experience implementing process safety programs over the ensuing twenty years, are retiring today.

The following figure underscores this problem. It shows the number of BS degrees in Chemical Engineering in the United States peaking in the early 1980's and then dropped significantly over the following ten years. As it takes 15 years of engineering experience or more to gain the needed expertise in process safety, we are now feeling the effects of the low graduation rates, unfortunately coinciding with increasing retirement rates.



The problem is exacerbated by the fact that so many engineers were committed to process safety all at once in the 1980's. These mid-career engineers remained in place doing their important jobs; there were few vacancies created that the next generations experts-to-be could fill. In retrospect, these vacancies should have been created more proactively. Now, with the experienced engineers retiring, there is a shortage of experienced engineers and significant competition for hiring any that is available. And

the problem will only grow with time given the overall drain of engineering talent in our country.

These comments also apply to obtaining process safety expertise to support the process safety compliance enforcement activities of OSHA and EPA, and to maintain industry's process safety programs.

If anything will make or break the future of the US Chemical Safety and Hazard Investigation Board, it will be putting in place the engineering experience and expertise necessary to conduct in depth investigations, extract key learnings, and communicate them expertly to the engineering community. Therefore, I would like to reemphasize that:

- The White House should put top priority in filling all CSB vacancies with highly experienced engineering leaders well-versed in process safety
- The CSB should put top priority in increasing its complement of expert chemical engineers
- Congress should put top priority on providing CSB the funds to grow the expertise of its staff and to enable it to have access to outside expertise as needed
- Congress should consider all appropriate measures to encourage bright young people to pursue chemical engineering as a career