

# THE UNITED STATES' CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD

## A NEW INTERNATIONAL RESOURCE FOR ENHANCING SAFETY IN THE CHEMICAL INDUSTRY

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### ABSTRACT

On November 15, 1990, the United States took a bold step forward to make the world safer for workers and communities. On that day it enacted amendments (Public Law 101-549, 1990) to the United States' Clean Air Act, amongst which was a provision authorizing creation of an unprecedented, independent federal agency, the *Chemical Safety and Hazard Investigation Board* (Board). By their respective actions, the Congress and the President of the United States acknowledged the growing risk that chemicals present and the need to work in partnership with industry to reduce the likelihood and effects of chemical-related accidents. Consistent with its charter to promote chemical safety by conducting independent accident investigations and preparing safety recommendations, the vision of the Board...whose first Chairman was confirmed by Congress on October 6, 1994...is to be the world leader in industrial chemical safety information and services.

The Board's mission is to provide any and all industries that use or otherwise handle chemicals...not just chemical manufacturers...with information and tools to enable identification and mitigation of operational conditions that compromise safety. Congress directed the Board to accomplish its mission by (1) conducting investigations and reporting on findings regarding causes of chemical accidents at fixed facilities as well as "on the road", (2) evaluating the effectiveness of other federal government agencies in preventing industrial chemical accidents, (3) conducting special studies, and (4) developing and communicating recommended actions (based on research and investigative findings) to improve the safety of operations involved in the production, transportation, and industrial handling, use and disposal of chemicals.

The Board's focus extends beyond the United States' borders. Recognizing that chemical accidents may have global effects, Congress encouraged the Board to offer investigative assistance to other countries, both as a means of helping and as a method of learning. Through its international outreach efforts to government and industry, the Board will be better able to ensure its safety research program, professional services and technical information accurately and adequately address the world's chemical safety needs.

This paper details the basis for creation of the Board, its legislated authorities and responsibilities, and its domestic and international role in promoting industrial chemical safety.

### NEED FOR THE BOARD

Chemicals are what we must endure for a modern society. While some might deem it desirable to do so, we truly cannot live today without chemicals. They are an integral and ever-increasing part of our complex technological world, making it possible for us to have many of the trappings of the good life we have come to expect and would fight to retain. Yet, as the 1984 catastrophe in Bhopal, India dramatically and tragically demonstrated, those same chemicals are the source of danger to those in the workplace and surrounding locales who are regularly exposed to them. We have seen how their improper use and handling have a chronic impact and exact unacceptable human and economic costs on families, industries, communities, and nations. As a result, we have learned that correcting situations that could lead to disasters and catastrophes is more responsible and less expensive than hoping inevitable accidents will not occur.

In creating the Board, the United States acknowledged the growing hazard that chemicals represent within our worldwide society. It recognized the need to identify and

address the causes of the thousands of chemical accidents that occur annually, as well as the need to protect life, property and the environment. from the costly consequences of those accidents. The magnitude of the problem and the challenge facing the Board can best be understood by examining statistics on the number, nature and results of hazardous materials accidents in the United States.

#### **How Pervasive Is The Chemical Hazard?**

As of February 1993, the United States Environmental Protection Agency's (EPA) Resource Conservation and Recovery Information System (RCRIS) reported the existence of **278,755 facilities** that generate, transport, treat, store and/or dispose of regulated hazardous waste. At these locations substances exist whose nature and quantities pose significant risk to the workers, general public and environment. As not all dangerous chemicals or wastes or facilities that handle chemicals are regulated, the actual number of locations may be much higher. In addition, according to the United States' National Transportation Safety Board (NTSB), *"about four billion tons of regulated hazardous materials are shipped each year with more than 250,000 shipments of hazardous materials entering into the U.S. transportation system daily"* (NTSB 1992).

#### **How Many Chemical Accidents Occur?**

The universe of chemical accidents within the United States cannot now be accurately tallied. No comprehensive, reliable historical records exist. Further, EPA acknowledges that many accidents occurring today at fixed facilities and during transport are not reported to the federal government. This underreporting is documented by several studies (National Environmental Law Center et al. 1994). What is known, however, is that in 1991 the National Response Center received over 16,300 calls reporting the release or potential release of a hazardous material (US EPA 1993). Also, NTSB's statistics indicate that, in 1992, chemicals were involved in 3,500 fatal highway accidents and 6,500 railroad accidents (NTSB 1992).

One study analyzed information contained in EPA's Emergency Response Notification System (ERNS) database. ERNS (even with its significant limitations) is acknowledged to be the largest and most comprehensive United States database of chemical accident notifications, covering both transportation and fixed facility accidents. The study found that from 1988 through 1992 an average of 19 accidents occurred each day...6,900 per year, with more than 34,500 accidents involving toxic chemicals occurring over the five-year period. The study's report emphasized that the findings gravely understated the severity of the United

States' chemical accident picture (National Environmental Law Center et al. 1994).

#### **What Human Consequences Result From Chemical Accidents?**

Although the absolute numbers vary depending on the source of statistics and period of time examined, there is no doubt about the effects of chemical accidents on human life...year after year, large numbers of people are killed and injured.

During the years 1988 through 1992, six percent, or 2,070, of the 34,500 accidents that occurred resulted in immediate death, injury and/or evacuation; an average of two chemical-related injuries occurred every day during those five years (National Environmental Law Center et al. 1994).

During the years 1987 through 1991, chemical accidents resulted in 453 deaths and 1,576 injuries at fixed facilities, while transportation accidents involving chemicals claimed 55 lives and injured 1,252 persons (US EPA 1993).

Within a five-year period in the mid-1980's, EPA's Acute Hazard Events database...which contains information only for chemical accidents having acute hazard potential...indicates there were 10,933 such accidents, of which 135 resulted in fatalities, 1,020 resulted in injuries and 500 resulted in evacuations (US EPA 1993).

#### **AUTHORITIES OF THE BOARD**

As the Board's legislative history clearly documents, Congress intends the Board to be a powerful voice in the effort to improve the safety of chemical operations.

**With only the single prohibition on investigating chemical accidents occurring on waterways, Congress did not restrict the scope of work in which the Board may engage.**

*"The principal role...is to investigate accidents to determine the conditions and circumstances which led up to the event and to identify the cause or causes so that similar events might be prevented. The accidents...to investigate are those which result from...a chemical substance (not limited to the extremely hazardous substances...)" "...is to investigate accidents resulting from the production, processing, handling or storage of chemical substances causing*

death, serious injury, or substantial property damage (including damage to natural resources)" (Senate Report 1989). "Substantial damage would include fires, explosions, and other events which cause damages that are very costly to repair or correct..." (House Report 1990). "...the phrase "producing, processing, handling or storing an extremely hazardous substance" used throughout this section is to be read in the broadest way to include the transportation of such materials from one site to another." "...may also conduct investigations and studies at sites where...extremely hazardous substances are present, whether or not an accident has occurred when there is evidence of a hazard or potential hazard" (Senate Report 1989).

**Congress made the Board independent in order to ensure it would be able to accomplish its mission.**

*"The independence of the Board in its official duties...is essential for several reasons. First, it is unlikely that an agency charged both with rule-making and investigating functions would be quick to acknowledge that existing requirements were insufficient to prevent an accident. ....Second, the Board is intended as an organizational stimulus to an appropriate amount of regulatory activity by the Environmental Protection Agency in this area" (Senate Report 1989).*

**Congress charged the Board to think expansively, and adhere tenaciously to the tenet of objectivity, when conducting investigations.**

*"The Board should take an 'all cause' theory in discharging its investigatory duties. It is not the single, necessary or sufficient cause which is to be the focus of the Board's inquiry, but all circumstances which contributed to the accident...." "It is not the role of the Board to apportion blame or to affix liability;.... Rather, the Board is to identify those actions, omissions, events, and conditions (or combination thereof) which led to the accident or incident for the purpose of recommending modifications to processes, equipment, and procedures to prevent similar accidents or incidents in the future." "...it is not expected that the Board will accuse any party or fix fault. Rather, and to the extent practical, the Board is to give a precise and factual statement of why the event occurred." "It is to be emphasized again that the purpose of the Board's investigation is not to buttress the case for a remedy to those injured or suffering loss by allocating liability, rather it is to provide remedy for the community as a whole by identifying those factors which caused the accident and which may be modified to prevent a*

*recurrence" (Senate Report 1989).*

## ROLE OF THE BOARD

In contrast to the primary "add-on safety and mitigation" focus of other government agencies involved with chemical accidents, the Board's complementary emphasis is on encouraging adoption of what is commonly referred to as the "inherent safety" approach to accident prevention: preventing a problem by modifying the source of the problem. The Board serves as an independent, investigatory body, examining accidents to determine causes and performing other work designed to help industry reduce the possibility of future accidents and, as a result, the possibility of future disasters or catastrophes. Worker training, regulatory requirements, management practices, operational policies and procedures, equipment maintenance, emerging process-related technologies...all these matters and more are legitimate areas of investigation for the Board as it attempts to identify ways in which chemical safety can be improved.

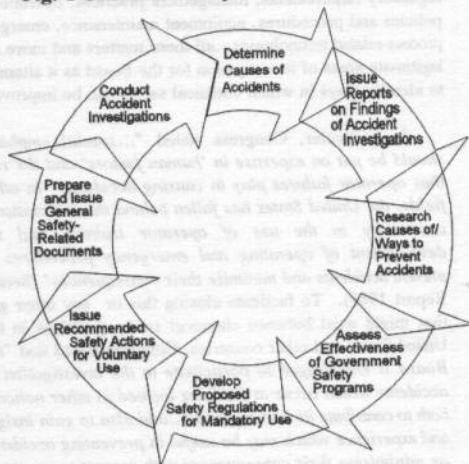
In particular, Congress stated "...special emphasis should be put on expertise in 'human factors' and the role that operator failures play in causing accidents. In other fields, the United States has fallen behind the international community in the use of operator training and the development of operating and emergency procedures to prevent accidents and minimize their consequences" (Senate Report 1989). To facilitate closing this or any other gap that might exist between chemical safety practices in the United States and other countries, Congress stated that "the Board is encouraged to participate in the investigation of accidents which occur at facilities located in other nations, both to contribute its own expertise...and also to gain insight and experience which may be useful in preventing accidents or minimizing their consequences with respect to events or facilities of a similar type located in the United States" (Senate Report 1989).

A goal of the Board is to serve as industry's chemical safety research arm, bringing together in a single location and making sense of a vast amount of information that, historically, has been difficult to obtain, comprehend and utilize. As there are tangible economic incentives for companies to improve operational safety, providing them easy access to Board resources is crucial.

Although the Board's primary task is to conduct investigations and report on its findings regarding the cause(s) of chemical accidents, it also has other significant responsibilities. As the federal government's primary information center for documents, data and other intelligence dealing with chemical safety and chemical accidents, it

performs research and conducts special studies into the (technological, operational, managerial and other) causes and methods of preventing or reducing the severity of chemical accidents. It prepares and disseminates a wide variety of technical and educational documents: accident reports, safety studies and recommendations, statistical analyses. It performs an oversight role, evaluating the effectiveness of other federal government agencies in preventing industrial chemical accidents and promoting industrial chemical safety. Although not an enforcement agency, it is empowered to develop and communicate recommended mandatory government regulations...for others to promulgate...and voluntary industry actions to improve the safety of operations and minimize recurrence of chemical accidents.

Fig. 1 Chemical Safety Board's Functions



The Board's efforts are designed to enable it to answer a single stakeholder question: *Where am I vulnerable today and what should I do differently tomorrow to attain the highest level of chemical safety possible within economic, technological and human limitations?*

## CONCLUSIONS

Unlike disasters which may have dramatic but short-lived or relatively localized effects, impacts associated with chemical accidents may be long-lived and extremely costly. The Board is mindful of the devastation that can follow a chemical accident, and recognizes it is battling time in its efforts to reduce the number and severity of such accidents. A chemical accident does not just affect employees and locations directly involved with the accident. Chemical

releases may render large geographic areas uninhabitable, cause debilitating or life-threatening illnesses and genetic abnormalities in multiple generations of humans and animals, result in wide-spread contamination of food supplies and water, and require the expenditure of millions of public dollars over many years to clean up affected environments and care for affected individuals. In short, social disruption of the over many years to clean up affected environments and care for affected individuals. In short, social disruption of the family unit and community structure may occur, and economic losses, environmental degradation, and deterioration of human health may result.

Causes of chemical accidents are many, complex and interrelated. Regulations, management practices, worker skills and knowledge, training, operating policies and procedures, equipment, technical processes, and the chemical itself may all play a role. Unlike an airplane accident, a chemical accident yields no "black box" holding clues to the final moments preceding the accident. Unlike floods, tornadoes or other natural disasters, chemical accidents occur without warning, although their precursors may be in evidence if but one knows what to look for.

In executing its responsibilities, the Board must wrestle with incomplete and sometimes inaccurate historical accident data, confusing and often contradictory regulatory requirements, and a business world comprised more of smaller companies with limited resources than larger ones with unlimited resources. Given the fact that chemicals will not disappear from our lives, the Board realizes we must make their use safer for all. By understanding what could go wrong in the future, as well as what has gone wrong in the past, steps can be taken to identify and correct systemic weaknesses leading to the thousands of chemical accidents that occur annually. The Board's mission is to work in concert with industry, labor and government to help prevent those accidents by determining and addressing their causes...causes which, if not addressed, could result in another Bhopal catastrophe.

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## **BIOGRAPHY**

Paul L. Hill, Jr. is the Chairman and a Member of the United States' Chemical Safety and Hazard Investigation Board. Prior to accepting the President of the United States' offer of this position and being unanimously confirmed for the position by the full United States Senate, he served as the President and Chief Executive Officer of the National Institute for Chemical Studies (NICS), a non-profit public interest research group focusing on public education, emergency preparedness, community safety, pollution prevention, hazard assessment and risk communication regarding hazardous chemicals. Dr. Hill received his Bachelor's and Master's degrees from Marshall University, and a Ph.D. in biology and systems management from the University of Louisville. In addition to working with private and public organizations involved with the environment, Dr. Hill has served as Deputy Administrator for Environmental and Regulatory Affairs in West Virginia's Department of Natural Resources where he authored environmental regulations and legislation. Dr. Hill, who has carried his message of collaboration between industry and government and the public to major metropolitan centers throughout the United States and to Europe, is a frequent speaker before national forums and symposia. His views on chemical industry policy and related issues have been presented in television, radio and newspaper interviews, and his writings and positions on environmental issues have been carried in scientific journals, national trade magazines, government publications and conference proceedings.

