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U.S. Chemical Safety and Hazard Investigation Board
Submitted to the Committee on Health, Education, Labor And Pensions
Subcommittee on Employment, Safety and Training
United States Senate
Hearing on "Hazard Communication in the Workplace"
March 25, 2004

Mr. Chairman and members of the Committee, thank you for the opportunity to submit written testimony on behalf of the U.S. Chemical Safety and Hazard Investigation Board (CSB) for this hearing to discuss the communication of hazards in the workplace.

This is an issue of great interest to the CSB as the independent federal agency that investigates major chemical accidents at fixed facilities around the country. The CSB became operational in 1998 and is governed by a five-member board of technical experts, appointed by the president and confirmed by the U.S. Senate. Since opening its doors, the Board has investigated and issued reports on 19 major accidents that killed or injured workers, impacted communities, and caused property or environmental damage. CSB has also issued several studies and bulletins on broader chemical safety issues.

Our investigations show that lives continue to be lost in accidents because chemical hazards are not being effectively communicated in the workplace. Among accidents we have investigated, faulty communication of material hazards contributed to 12 deaths among workers and 79 injuries to workers, first responders, and members of the public.

Ongoing CSB investigations also raise serious concerns whether the hazards of combustible dust products are being communicated effectively to users. The Board is currently investigating three catastrophic dust explosions that occurred in 2003; together these explosions caused 14 deaths and scores of injuries.

Summary of Findings

Accidents rarely result from a single cause, and CSB investigations usually uncover several root causes and contributing factors behind each accident. In ten of the 19 cases investigated, deficiencies in hazard communication were identified. In nine of these ten investigations, the deficiencies were found to be a root cause, contributing cause, or significant causal factor. In eight cases, CSB identified specific deficiencies in Material Safety Data Sheets (MSDSs) or found that the required MSDSs did not exist. Descriptions of specific accidents follow.

I. No MSDSs Provided for Hazardous Materials

BLSR Operating Ltd.: On January 13, 2003, a vapor cloud fire erupted at the BLSR Operating Ltd. oilfield waste disposal facility in rural Texas, south of Houston. The fire occurred as two tank trucks were delivering flammable gas condensate waste for disposal at the facility. Three workers were killed, and four others suffered serious burns. CSB's investigation found neither the truckers nor the disposal company workers knew that the wastes were highly flammable, and allowed the waste to run over open ground into a trench, which was their usual practice for nonflammable drilling mud. CSB found that the company that generated the flammable wastes had not provided any MSDSs to either the truck drivers or the disposal company where the fire occurred.

What CSB Recommended: The Texas Railroad Commission, which regulates oil and gas operations in the state, should require that all drillers and producers provide accurate MSDSs on waste liquid hazards to workers and contractors, in languages they can understand. This action would allow state inspectors to help enforce basic MSDS requirements. In addition, the Board recommended that OSHA issue a Safety and Health Information Bulletin emphasizing the responsibility of drillers and producers to identify waste hazards and provide workers with MSDSs.

Kaltech Industries: On April 25, 2002, an explosion occurred at Kaltech Industries, a sign manufacturer in the Chelsea neighborhood of New York City, injuring 36 people, including 14 members of the public. The explosion, which was the result of a reaction between waste chemicals, originated in the basement of a mixed-use commercial building and caused damage as high as the fifth floor. CSB's investigation found that the company had not provided any MSDSs to its workers, including the MSDS for nitric acid, the highly reactive chemical CSB found was involved in the explosion. CSB also found that OSHA had never inspected Kaltech Industries in the previous ten years. Investigators noted that many Kaltech workers had limited proficiency in English.

What CSB Recommended: OSHA Region II should disseminate information on the Hazard Communication Standard in the major non-English languages spoken by workers in New York City. The Board also recommended that New York City modernize its 1918-era fire code to include modern hazardous materials controls, such as the requirement that MSDSs be made available to the workforce. In March 2004, following two hearings of New York City Council where the CSB testified, the New York Fire Department said it would institute a modern model fire code, such as the International Fire Code. With a modern code in place, city fire inspectors would be authorized to enforce MSDS requirements during their annual inspections of workplaces.

II. Despite MSDSs, Workers Not Trained on Hazards

Georgia-Pacific: On January 16, 2002, highly toxic hydrogen sulfide gas leaked from a process sewer manhole at the Georgia-Pacific paper mill in Pennington, Alabama. The gas was formed because sodium hydrosulfide – a feedstock chemical used at the mill —

had been spilled and released into an acidic sewer system, where a chemical reaction occurred to produce hydrogen sulfide gas. Two contract construction workers who were near the sewer were overcome by the gas and killed; seven other construction workers and a truck driver were injured.

CSB's investigation showed that although the supplier's MSDS for sodium hydrosulfide contained warnings about its reaction with acid, the mill's procedures and training did not include this information. Investigators concluded that if workers had understood the risk, they would likely have prevented the sodium hydrosulfide from entering the sewer system. CSB also found that the construction workers lacked appropriate training on the hazards of hydrogen sulfide — such as how to identify and respond to a leak of the gas — and did not attempt to evacuate the area when the leak began.

What CSB Recommended: Georgia-Pacific Corporation should require all its paper mills to identify hydrogen sulfide risk areas and train personnel who work in those areas on how to respond to leaks of the gas. The CSB also recommended that the construction company provide similar training to its employees.

Environmental Enterprises: On December 11, 2002, a maintenance worker at the Environmental Enterprises hazardous waste treatment plant collapsed after he walked near a waste treatment tank and inhaled toxic hydrogen sulfide. The worker stopped breathing but was later pulled to safety and resuscitated by fellow employees. The gas formed because another worker earlier had added sodium sulfide and an acidic substance to the treatment tank, causing a chemical reaction. Although the MSDS for sodium sulfide warned about this potential reaction, not all workers were aware of the hazard or were trained on the warning signs of hydrogen sulfide, such as its characteristic rotten-egg odor. The victim did not recognize this odor as a sign of life-threatening danger.

III. Product Flammability Not Described in MSDSs

Bethlehem Steel: On February 2, 2001, a flash fire at the Bethlehem Steel Corporation mill in Chesterton, Indiana, killed two workers and injured four others. Workers were attempting to remove a cracked valve from a coke oven gas line, when they were suddenly sprayed with highly flammable liquid gas condensate, which ignited. CSB's investigation found that the workers expected the line to contain condensate but believed it was essentially made of water and not flammable. The company's own MSDS had not indicated any potential flammability for gas condensate, whereas CSB's testing found that material in the line was highly flammable with a flash point of 29 °F.

What CSB Recommended: Bethlehem Steel Corporation should revise the Material Safety Data Sheet (MSDS) for gas condensate to highlight its potential flammability and provide training and information for its workers and contractors.

Motiva Enterprises: On July 17, 2001, a large sulfuric acid storage tank exploded at Motiva Enterprises' Delaware City refinery, killing one worker, injuring eight others, and

releasing more than a million gallons of acid. The work crew had been repairing an overhead catwalk when a spark from their welding equipment ignited flammable vapors in the tank below. The tank had holes in its roof and shell due to corrosion. CSB's investigation found that although the used sulfuric acid in the tank was known to contain a significant percentage of flammable hydrocarbons, the company's MSDS indicated a flammability rating of "0" [zero] and stated "the product is not combustible."

What CSB Recommended: The refinery should upgrade its system of reporting unsafe conditions to ensure communication of hazards to affected plant personnel.

IV. Product Reactivity Not Described in MSDSs

BP Amoco Polymers: On March 13, 2001, three people were killed as they opened a process vessel containing hot plastic at the BP Amoco Polymers plant in Augusta, Georgia. They were unaware that the vessel was pressurized due to a decomposition reaction affecting the plastic inside. The workers were killed when the partially unbolted cover blew off the vessel and expelled the hot plastic. CSB's investigation found that the MSDS for the plastic Amodel, which BP Amoco produced, stated it should not be heated above 660 °F to avoid product decomposition but did not warn of the hazards of doing so.

What CSB Recommended: BP Amoco should revise the MSDSs for Amodel plastics to warn of the hazards of accumulating large molten masses.

Morton International: On April 8, 1998, an explosion and fire occurred at Morton International's plant in Paterson, New Jersey, when a runaway chemical reaction over-pressurized and ruptured a 2,000-gallon chemical vessel used to produce dye. Nine workers were injured, and the surrounding community was showered with chemical residues. CSB's investigation found that the dye was chemically reactive and could decompose and release heat and gas just above the normal processing temperature. However, the company's MSDS for the dye indicated "0" [zero] reactivity. Investigators found that plant personnel were generally unaware of the hazards of a runaway reaction.

What CSB Recommended: Morton should revise the MSDS for the dye to correctly identify its reactivity.

First Chemical Corporation: On October 13, 2002, a violent explosion occurred in a nitrotoluene distillation tower at First Chemical Corporation in Pascagoula, Mississippi, sending heavy debris over a wide area. The control room was damaged and explosion debris narrowly missed a large storage tank that contained highly toxic anhydrous ammonia. A nitrotoluene storage tank at the site was punctured by debris, igniting a fire that burned for several hours. CSB's investigation found that First Chemical's MSDS for nitrotoluene lacked warnings about the chemical's tendency to decompose and explode when subjected to prolonged heating.

What CSB Recommended: First Chemical Corporation (now a Dupont subsidiary) should revise its warnings about nitrotoluene and other process chemicals and train workers appropriately.

V. Language Barriers Prevent Understanding MSDSs

Sierra Chemical: On January 7, 1998, two massive explosions destroyed the Sierra Chemical munitions reclamation plant in Mustang, Nevada, killing four workers and injuring six others. The company used reclaimed military munitions to produce explosive boosters for the mining industry. The accident likely occurred when a worker restarted a mixer containing solidified explosive material. CSB's investigation found that Spanish was the only language understood by most plant workers, but MSDSs for the chemicals used on-site were only in English. CSB found that workers were not aware of the specific hazards of materials at the plant.

What CSB Recommended: Sierra Chemical should ensure that hazard information and safety procedures are communicated in the language understood by workers.

VI. MSDSs Not Reliable for Reactive Hazard Information

In September 2002, the CSB completed a two-year study of serious incidents that resulted from uncontrolled chemical reactions, which can occur when chemicals are improperly combined or heated. The study uncovered 167 serious incidents in the U.S. over a twenty-year period that caused 108 deaths and extensive injuries and property damage. The CSB investigation pointed out that OSHA's Process Safety Management standard – the main safety standard for highly hazardous chemical processes – allows companies to use MSDSs to compile hazard information. But in 1996, OSHA itself issued a Hazard Bulletin stating that MSDSs do not always contain information about the hazards from mixing or blending chemicals.

CSB Investigating Adequacy of MSDSs for Chemical Powders

CSB is currently investigating three major dust explosions that occurred in 2003 at factories in North Carolina, Kentucky, and Indiana. In two of these cases, CSB is investigating the adequacy of MSDSs that should have warned of the explosion hazards of fine chemical powders used at the plants.

West Pharmaceutical Services: On January 29, 2003, an explosion and fire destroyed the West Pharmaceutical Services medical rubber plant in Kinston, North Carolina, causing six deaths, dozens of injuries, and hundreds of job losses. CSB investigators have found that the fuel for the explosion was a fine plastic powder used in producing rubber goods. Combustible polyethylene dust — accumulated over a manufacturing area at the plant — ignited and exploded.

The company that produced the powdered polyethylene understood its potential to explode and included a warning in the MSDS. However, West purchased polyethylene from a formulation company, which bought the polyethylene powder and then prepared a slurry with water. Although the formulation company was aware of how West intended to ultimately use the material, the MSDS for the slurry did not indicate that once it dried, potentially explosive dust could be released.

CTA Acoustics: On February 20, 2003, an explosion and fire damaged the CTA Acoustics manufacturing plant in Corbin, Kentucky, killing seven workers and injuring more than 30 others. The facility produced fiberglass insulation for the automotive industry, using a powdered resin as a binder. CSB investigators have found that the explosion was fueled by resin dust accumulated in a production area. Although the MSDS for the resin powder indicated it was “combustible,” it did not describe the catastrophic potential if the dust was allowed to accumulate, and many plant personnel remained unaware of the danger.

Based on these events, CSB is concerned that neither the OSHA Hazard Communication Standard nor the corresponding American National Standards Institute (ANSI) standard contains a definition for combustible dust. MSDSs for combustible dusts often lack critical technical information on the hazards, including what are known as the deflagration index, minimum ignition energy, minimum explosive concentration, and volume resistivity. Employers need this information to accurately assess the hazards of dust in the workplace.

In written comments to ANSI on the upcoming revision to the consensus standard on preparing MSDSs, the CSB staff on August 22, 2003, recommended that ANSI incorporate a definition for combustible dust. However, on November 19, 2003, ANSI declined to do so stating that OSHA had not yet incorporated the concept of combustible dusts into the Hazard Communication Standard.

Conclusion

Deficiencies in hazard communication and Material Safety Data Sheets are among the common causes of major chemical accidents that result in loss of life, serious injuries, and damage to property and the environment. Approximately half of the CSB’s root-cause investigations of major accident uncover such deficiencies. Since 1998, the Board has identified ten specific accidents where chemical hazard communication was inadequate.

The CSB believes that improving the quality of hazard communication and Material Safety Data Sheets will help prevent major chemical accidents and should be an important goal of government agencies as well as the producers and users of hazardous materials.