



## Hazardous Chemical Incidents in Schools United States, 2002-2007

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## Hazardous Chemical Incidents in Schools—United States, 2002-2007

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2 tables omitted

CHEMICALS THAT CAN CAUSE ADVERSE health effects are used in many elementary and secondary schools (e.g., in chemistry laboratories, art classrooms, automotive repair areas, printing and other vocational shops, and facility maintenance areas).<sup>1</sup> Every year, unintentional and intentional releases of these chemicals, or related fires or explosions, occur in schools, causing injuries, costly cleanups, and lost school days.<sup>1</sup> The federal Agency for Toxic Substances and Disease Registry (ATSDR) conducts national public health surveillance of chemical incidents through its Hazardous Substances Emergency Events Surveillance (HSEES) system. To identify school-related incidents and elucidate their causes and consequences to highlight the need for intervention, ATSDR conducted an analysis of HSEES data for 2002-2007. During that period, 423 chemical incidents in elementary and secondary schools were reported by 15 participating states. Mercury was the most common chemical released. The analysis found that 62% of reported chemical incidents at elementary and secondary schools resulted from human error (i.e., mistakes in the use or handling of a substance), and 30% of

incidents resulted in at least one acute injury. Proper chemical use and management (e.g., keeping an inventory and properly storing, labeling, and disposing of chemicals) is essential to protect school building occupants. Additional education directed at raising awareness of the problem and providing resources to reduce the risk is needed to ensure that schools are safe from unnecessary dangers posed by hazardous chemicals.

ATSDR established HSEES in 1990 to collect data about acute hazardous substances releases.<sup>2</sup> HSEES funds state health departments through a competitive program announcement to collect information about eligible events and enter the data into a standardized, ATSDR-provided web-based system. Each of these states employs a state HSEES coordinator. Under HSEES, a substance is considered hazardous if it might reasonably be expected to cause adverse health effects to humans. The HSEES protocol defines an eligible event as an uncontrolled or illegal release, or threatened release, of one or more hazardous substances in a quantity sufficient to require removal, cleanup, or neutralization according to federal, state, or local law. However, the definition of an eligible incident varies among HSEES states because minimum reporting requirements vary according to state and local laws. State health department programs actively gather information for HSEES by negotiating agreements with state and local agencies that are notified routinely when hazardous substances emergencies occur. Among these agencies are police and fire departments, environmental agencies, and various emergency response offices. The states also use news reports for identifying events. In each state, the HSEES coordinator reviews the circumstances surrounding each event, including the factors that contributed to school-related events.

In 2002, HSEES began collecting information to identify the primary contributing factors associated with chemical incidents. During 2002-2007, HSEES

collected data from 15 states that reported school-related chemical events. Eleven state health departments (Colorado, Iowa, Minnesota, New Jersey, New York, North Carolina, Oregon, Texas, Utah, Washington, and Wisconsin) reported school-related events for all 6 years, and four additional state health departments reported events for some of those years (Mississippi: 2003, Missouri: 2002-2005, and Florida and Michigan: 2005-2007).

During 2002-2007, a total of 43,766 events involving a chemical incident were reported to HSEES in the 15 states. Of these, 423 occurred in elementary and secondary schools. The annual proportion of all events that were school related for each state was consistent across the reporting period and ranged from 1% to 3%. School-related events most often resulted from human error (62%) (e.g., improper chemical storage and unsafe, improper use of materials or equipment), equipment failure (17%) (e.g., broken hoses, valves, or pipes), or intentional acts (17%) (e.g., using homemade chemical bombs [bottle bombs]<sup>3</sup> or 2-chloroacetophenone [i.e., mace or pepper spray pranks]). Among the 423 chemical incidents in elementary and secondary schools, 31% resulted in at least one acute injury and 52% resulted in an evacuation. Of the 74 incidents caused by intentional acts, 43% were associated with an injury.

A total of 895 persons were injured in the 423 school-related incidents. No injuries were fatal, but 11 persons were admitted to a hospital. Most injured persons received first aid on the scene, sought care from a private physician, or were treated at a hospital but not admitted. The health effects most commonly associated with the short-term release of carbon monoxide were nausea, dizziness, and headache. The release of acids and mace or pepper spray resulted primarily in respiratory and eye irritation. Most (86%) HSEES school incidents involved the release of only one chemical. Although mercury was the most common hazardous substance re-

leased (29%), only 2% of mercury-related incidents caused an injury. Conversely, although 4% of releases were mace or pepper spray by students, these incidents were associated with a high rate of injury (86%) and evacuation (90%). Releases (usually spills) of hydrochloric acid, commonly found in chemistry classrooms, also resulted in a significant rate of injury (58%). Carbon monoxide releases, caused primarily from equipment failure in old air-conditioning and heating systems, also resulted in a high rate of incidents with injury (48%) and evacuation (81%).

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**CDC Editorial Note:** During 2002-2007, a total of 423 chemical incidents in schools were reported by the 15 states participating in HSEES. The findings indicate that approximately 30% of chemical exposures resulted in acute injury. Mercury was the most commonly reported chemical released, but the rate of injury associated with mercury was low. This might be explained by the fact that HSEES captures acute health effects and mercury is only immediately toxic at extremely high doses, which would not be expected at schools. Before the dangers associated with mercury were fully understood, mercury was commonly used in thermometers, sphygmomanometers, and barometers and was used in science experiments in schools. Eleven states (Indiana, Illinois, Maryland, Michigan, Minnesota, New York, North Carolina, Ohio, Rhode Island, South Carolina, and Wisconsin) have enacted legislation that bans or requires reduced use of mercury in schools.<sup>4</sup> HSEES data indicate, however, that mercury is still present in many schools and spills continue to cause school lock-downs, dangerous exposures, and costly cleanups.

Like an earlier analysis of 1993-1998 HSEES data,<sup>5</sup> this analysis for 2002-2007 indicates that most school-related chemical incidents continue to

be the result of mistakes in the handling or use of a substance. These data suggest school staff members might benefit from additional training on how to use and handle hazardous chemicals to reduce injuries occurring at schools.

HSEES data are used to guide intervention strategies to reduce the occurrence of chemical incidents and subsequent injuries.<sup>2</sup> For example, data from HSEES indicating that mercury is the most commonly reported chemical released in school chemical incidents have been used to actively promote the removal of mercury-containing equipment from schools. New York state has developed information resources to guide proper cleanup of mercury spills, thereby reducing the risk for exposure and the on-site costs associated with cleanup.\* These resources, and others, are available to all states. *The School Chemical and Laboratory Safety Guide*,<sup>†</sup> from CDC, also is a valuable resource that provides teachers with information to prevent or minimize harmful exposures in high school chemistry laboratories. Reducing unnecessary hazardous substances in schools, along with proper labeling and education on the proper use of potentially dangerous substances, is imperative to ensure school safety.

The findings in this report are subject to at least three limitations. First, reporting of events to HSEES is not mandatory, and reporting sources vary among the states participating in HSEES. Therefore, some school events likely are not reported, and reporting of school events to HSEES might be more complete for some states than for others. Second, the definition of eligible events varies among states according to their reporting resources, state and local laws, and capacity to follow up on events. As such, some states might capture more events that are less severe (i.e., events that do not result in serious injury or evacuation) than others. Finally, other factors might result in underreporting of school chemical incidents.

CDC's School Health Policies and Programs Study 2006 found that most school districts in the United States had policies on how to use (81%), label (85%), store (88%), and dispose of (87%) hazardous materials.<sup>7</sup> An even greater percentage of schools nationwide had plans on how to use (92%), label (90%), store (93%), and dispose of (93%) hazardous materials, and 78% of schools kept an inventory of hazardous materials.<sup>7</sup> However, to support those policies and plans, school districts and schools need resources to ensure proper chemical management. For example, school districts need assistance in building their capacity to systematically inventory, remove, and manage potentially dangerous chemicals.

To reduce chemical misuse and improve chemical management in schools, the Environmental Protection Agency developed the Schools Chemical Cleanout Campaign and Prevention Program (SC3), a national strategy that incorporates models, tools, and guidance from pilot programs, along with building a national network of community partners to assist schools.<sup>‡</sup> Using this program, government agencies, private companies, and community leaders can work with schools to (1) increase awareness about the risks associated with chemicals in schools; (2) facilitate the removal of outdated, unknown, unneeded, and potentially dangerous chemicals; (3) prepare teachers and schools to use less dangerous chemicals and in smaller quantities where appropriate; and (4) provide inventory tools and information to better manage chemicals that cause safety and health concerns in schools.

#### REFERENCES

7 Available.

\*Available at <http://www.health.state.ny.us/environmental/chemicals/hsees/mercury/index.htm>.

†Available at <http://www.cdc.gov/niosh/docs/2007-107>.

‡Additional information available at <http://www.epa.gov/sc3>.