

Chemical Management: Planning for Toxic Materials in School Laboratories and the Accidental Release of Hazardous Materials From Within the School



READINESS AND EMERGENCY MANAGEMENT FOR SCHOOLS TECHNICAL ASSISTANCE CENTER

The Incident

The Robin Ridge School serves students in grades K–8 and is one of the oldest school buildings in the Willow Heights District, located in a large Midwestern city. During a holiday break, a former teacher at the school came to clean out some items from the school basement. During his visit, he told a current teacher at Robin Ridge School about a mercury spill that occurred approximately seven years before in his classroom but was never reported to district officials by him or the principal for reasons unknown. The current teacher shared this information with the current principal, who activated the district's emergency operations plan (EOP). The principal first called the district's Environmental Health and Safety Department (EHS) to report the incident. EHS advised the principal not to use the classroom and to lock the door until EHS staff members could measure the level of mercury vapor in the classroom. The principal met with staff members to inform them of the report; teachers expressed concern about why the previous principal had not informed them of the incident when it occurred. The principal told them that EHS and the state's Pollution Control Agency (PCA) would be coming to the school soon to assess the mercury levels.

The next day, staff members from EHS and PCA came to assist the school in responding to the incident. The agencies used an instrument to monitor the classroom for mercury vapor. The recommended standard for safe occupancy is a reading of 300 nanograms (ng) of mercury per cubic meter of air or less. Mercury

vapor in the room was measured at 40 ng; however, elevated levels of mercury, ranging from 1,000 to 2,000 ng, were found in a 1-foot-wide strip of carpeting that ran parallel to a blackboard. While it was estimated that the spill involved no more than 20 mL of mercury, a spiked reading of 29,000 ng was found in half of this strip.

In addition to measuring the mercury vapor, EHS obtained contact information for the teacher who was assigned to the room at the time of the spill. EHS contacted the former teacher, who confirmed that the incident occurred almost seven years ago when a substitute teacher was in the classroom. When the teacher returned from his absence, he learned that a student had tipped an open-ended barometer that



The lessons learned in this document are the reflections of one school and are based on one chemical spill. They are suggestions to consider when developing an emergency operations plan that incorporates planning for hazardous chemicals; they are not prescriptive best practices for every school or school district. The names of the school and school district have been changed to protect identities.

was hung from the blackboard to pour a small amount of mercury into a cup, and the mercury spilled onto the carpet. The Willow Heights EOP had policies and procedures in place for dealing with chemicals such as mercury, including one policy that stipulated that teachers of grades K–8 cannot use chemicals with high levels of toxic substances for instructional purposes. However, this policy did not state that the same rules applied to substitutes.

The day after EHS's and PCA's tests, school district staff members determined that cleaning the spill and replacing the carpet would not require an outside vendor. Thus, trained district staff members wearing protective equipment (e.g., rubber gloves, eye protection, respirators with mercury and chlorine cartridges, and suits with attached hoods and booties) began the cleanup process. Carpet, backing materials, and nail strips were removed and placed into sealed plastic bags labeled "Mercury-Contaminated Waste." Based on the previous day's tests, there were no visible droplets of mercury; therefore, amalgamating powder was sprinkled on the floor and dampened with water to bind any mercury residue. Residual materials were added to the sealed plastic bags. To ensure that all traces of mercury were removed, the area of the carpet that contained the spill was removed entirely and the floor was wiped with damp paper towels soaked with vinegar. Once the floor was completely dry, a final wipe was performed using fresh paper towels dampened with hydrogen peroxide. All contaminated wipes were added to the waste bags. Finally, a mercury indicator powder was spread over the floor to determine whether additional cleanup was needed; after two days, the powder had not changed color, indicating that no further sanitation was necessary.

The district staff members who cleaned the room took the bags to a hazardous waste shed for evaluation and storage prior to off-site disposal. The mercury levels were assessed after the cleanup and were found to be in the safe range for mercury exposure. Another current teacher expressed concerns that the student may have taken some mercury into one of the computer rooms. She informed the principal, and as a precaution, EHS monitored all computer rooms and found no traces of mercury.

Letters, written in collaboration with the district's public information officer (PIO) and EHS, were sent home with students, outlining the incident and how it was resolved and assuring families that the school environment was safe. When giving students the letters, the teachers talked with them about the incident. Most likely in part because of the extensive amount of time that had passed since the spill, neither the students nor their parents expressed concerns about the incident or how it was resolved. The PIO also issued a press release about the incident, which was reported by one radio station.

Since the incident, the state has planned to make all schools mercury-free by removing products used in schools that contain mercury.

Lessons Learned

Mercury is one example of a toxic material that may be present in a school laboratory, but it is not the only chemical that may be found within the school building or on school grounds. The Robin Ridge School's experience illustrates how an EOP that addresses spills of mercury and other chemicals is key to maintaining a safe learning environment. Appropriate prevention, protection, mitigation, response, and recovery measures can help to safeguard the school community from exposure, poisoning, and injuries resulting from chemical mismanagement or hazardous materials. Consider the lessons learned below for improving your school's preparedness for chemical-related incidents.

Collaborate With Partners to Develop Strategies for Managing Chemicals

The Willow Heights School District worked with state and local partners — PCA and EHS — to develop the chemical management plan in its EOP and to respond to the mercury spill incident. In addition to state and local agencies dedicated to pollution control and environmental safety, relevant partners related to addressing chemicals might also include agencies dedicated to hazardous materials in particular, emergency medical services, public health services, police and fire departments, businesses, and universities. Schools should engage with partners that

can make meaningful contributions and are committed to continuous involvement in preventing and addressing chemical incidents in school environments.

As the Robin Ridge School principal discovered, collaborating with partners from both the school district and relevant state agencies is key, as these partners will have specialized knowledge of aspects related to the incident, such as compositions of different chemicals, adverse health effects of exposure to these chemicals, chemical compatibility of chemicals with other materials present at the school, effects of these chemicals on the environment, and relevant regulatory standards. When developing these partnerships, it is useful to [develop memoranda of understanding \(MOUs\)](#) to define roles, responsibilities, and resource allocations. For example, the MOU signed by the Willow Heights School District and PCA was instrumental in obtaining specialized equipment, such as the instrument used at Robin Ridge School, for detecting and disposing of toxic materials and in training district and school staff members on the procedures related to preparing for and managing chemical incidents. Community partners can be especially helpful when conducting site assessments (described in further detail later) to identify inappropriate use, storage, or disposal of chemicals.

Community Partners That Can Help Schools Prepare for Chemical-Related Incidents

Potential community partners are listed below. Examples of how these community partners can contribute to planning and help schools address chemical-related hazards can be found in the Environmental Protection Agency's [Building Successful Programs to Address Chemical Risks in Schools: Recommendations from an Evaluation of Selected Schools Chemical Management Programs](#).

- Fire, police, and emergency medical services departments
- Environmental and public health agencies
- Institutions of higher education
- Chemical suppliers and manufacturers
- Waste handlers and environmental service providers

Provide Consistent Training

In the incident at Robin Ridge School, the current teacher who was told about the mercury spill shared this information with the current principal, who then called EHS to report the incident. The educator and the principal in this instance were both trained on proper reporting procedures. This flow of information engendered a timely response from EHS and PCA. To facilitate these procedures, the Willow Heights School District conducts trainings no less than annually and provides its staff with practical information about standard management procedures, including ordering, handling, storing, and disposing of chemicals. All trainings include the criteria for reporting an incident involving exposure to a chemical to the principal or district office, resources for additional information, and contact information for appropriate district and state offices that can support schools with such incidents.

Additionally, the Robin Ridge School learned that clear policies about which staff members should participate in chemical management trainings are needed. The mercury incident involved a substitute teacher; it is important to train all support staff members and substitute teachers who could be assigned to classes in which chemicals are used. Another alternative is to have a set policy in place, as the Willow Heights School District does now, prohibiting the use of hazardous chemicals in classrooms when a substitute teacher is present.

Reaching out to partners in the business community who are knowledgeable about the school curricula and environments and proper chemical management practices and asking whether they are willing to serve as trainers could lead to cost-effective training. In addition to existing training for each type of professional (e.g., the nurse, food service staff members, and science teachers), opportunities to provide training might include teacher in-service days or online trainings. District- and school-based administrators who have the direct responsibility of implementing and monitoring the EOP also should participate in annual trainings. Topic-specific information in articles, on Websites, or in other written or electronic resources from Federal agencies (e.g., the Environmental Protection Agency and the Centers for Disease Control and Prevention), state-level

sources (e.g., the state’s department of health and department of public safety), and public sources (e.g., poison control centers) can supplement the training. Conducting training on chemical management and the EOP will increase staff and community awareness about the correct management of the chemicals used and stored in schools.

Prepare Information to Be Shared by the Public Information Officer

It is important to work with the district PIO to establish protocols and procedures for communicating timely and consistent information to staff members, students, families, and the surrounding community during and after a chemical incident. These protocols and procedures should be documented in the EOP’s [Communications and Warning Annex](#). For example, as was stipulated in the Willow Heights School District EOP, the Robin Ridge School principal worked with the district PIO to take the preexisting template of a letter to families and customize it for the situation, providing a brief but clear description of the incident in nontechnical language, explaining the cleanup procedures, discussing new preventive measures the school would undertake moving forward, and reassuring families that the school environment was clean, healthy, and safe.

As a best practice, all communications should account for access or functional needs of the whole school community. For example, for those with limited English proficiency, written communications should be translated into the other language(s) spoken by the school community in which the incident occurred. Schools might also want to consider creating a short video explaining the incident in the other language(s) spoken by the community and posting it on the school’s or district’s Website or having staff members or interpreters who speak the language(s) call families to inform them of the incident. In consideration of school community members who are deaf or hard of hearing, the short video about the incident should also include closed-captioning or an interpreter using American Sign Language.

After a chemical incident, it might be helpful for these communications to include a brochure or Website from the Federal or state health department or environmental agency with additional information about how such an incident should be handled, any risks or impacts associated with the chemical(s) involved, and how such an incident could be prevented in the future.



Address Chemicals in the School EOP

The Willow Heights School District EOP is tailored to the unique characteristics of its schools (e.g., grades served, curricula offerings, size, age of buildings, and location) and integrates a chemical management plan, which proved useful in the mercury spill incident. For example, its EOP stipulates that only those teachers in grades 9–12 who have been trained by district curriculum supervisors and other community partners can incorporate those types of chemicals into classroom instruction. The Willow Heights School District EOP also includes specific procedures and recommendations for purchasing, tracking, storing, using, and disposing of chemicals that may be used in science laboratories, vocational and trade shops, visual and performing arts studios, and photo laboratories. Read about more considerations for developing a high-quality EOP in the following section.

More Best Practices

The [Guide for Developing High-Quality School Emergency Operations Plans \(School Guide\)](#) and [The Role of Districts in Developing High-Quality School Emergency Operations Plans \(District Guide\)](#) outline how core planning teams can develop and maintain a comprehensive, high-quality school EOP. These guides recommend that school districts and individual schools use the [six-step planning process](#); create a customized EOP that addresses what to do before, during, and after an emergency; and consider all hazards, threats, settings, and times. Examples of threats and hazards that relate to chemicals and may be addressed within EOPs can be found on the next page.

Hazard Type	Hazard	Example
Biological hazard	Toxic materials present in school laboratories	Mercury spill
Technological hazard	Accidental release of hazardous materials from within the school	<ul style="list-style-type: none"> • Lead exposure or poisoning • Cleaning supplies leak

Develop Hazard-Specific Annexes

Members of a core planning team are tasked with developing a comprehensive list of possible threats and hazards that face their school community, evaluating their risks and vulnerabilities, prioritizing them, and then addressing them in the EOP. The team may identify specific chemicals — such as mercury, lead, and asbestos — or address toxic and hazardous materials more generally. It is up to the planning

team on how threats and hazards are categorized and selected, and the decision will depend on the chemicals that are used or found within the school. Regardless, the planning team should develop goals (broad, general statements that indicate a desired outcome), objectives (specific, measurable actions that are necessary to achieve the goals), and courses of action (specific procedures used to accomplish the goals and objectives) that address how the district or individual school should act before, during, and

Considerations for Annex Development

Each annex should reflect an understanding of the five [national preparedness mission areas](#) and detail the district's or the individual school's approach to preventing, protecting the school community from, mitigating the impacts of, responding to, and recovering from a chemical-related emergency. Below are considerations for developing a hazard-specific annex involving toxic and/or hazardous materials.

- Designate the staff members responsible for implementing the policies and procedures described in the annex.
- Include contact information for those to whom school staff members should report incidents involving toxic or hazardous materials.
- Document the location of all toxic and hazardous materials found in the school building(s).
- Include information on the effects of those specific chemicals on the school community, including health and environmental impacts, and how to address them.
- Create a training plan on the proper management, use, storage, and disposal of toxic and hazardous materials. Include a training schedule that designates who should be trained on procedures for each annex, as well as when and how often such trainings will take place.
- Outline policies and procedures for managing, using, storing, and disposing of chemicals that are present at the school(s).
- Include information on educating students about how to safely handle toxic substances used as part of school curricula.
- Include information on how to prepare for incidents involving the accidental release of hazardous materials (e.g., the improper use or storage of cleaning materials used by facilities maintenance or food service staff members and accidental exposure to hazardous materials, such as lead and asbestos, that could be released during cleaning or construction in a school building).
- Address how a chemical-related incident that occurs outside of normal school hours — such as after school, during summer break, or on the weekend — should be handled.

after an incident. This information will become a [hazard-specific annex](#) that sets forth how the district or individual school should plan for a specific emergency and manage it when it is happening and afterward.

One approach is to develop two hazard-specific annexes that relate to chemicals: a Toxic Materials Annex and a Hazardous Materials Annex. The Toxic Materials Annex could outline the school's approach to addressing toxic materials present in school laboratories, whereas the Hazardous Materials Annex could outline the school's approach to addressing the accidental release of hazardous materials from within the school. Specific chemicals may be addressed by name throughout each annex or via subsections within each annex. It is likely that there are specific considerations your district or individual school will take for each chemical, as well as cross-cutting actions that apply to a range of chemicals.

Train Students on How to Handle Chemicals

Students who are enrolled in classes that include chemicals in the curriculum should receive instruction prior to using these materials. For example, a discussion could be held with students at the start of



Related Functional Annexes

Emergency management functions are activities that apply to more than one threat or hazard. Ideally, each function has its own annex in the EOP and is found within the Functional Annexes section. The following functional annexes may be activated before, during, and/or after a chemical-related incident. This list is not exhaustive.

- [Communications and Warning Annex](#) — notifying parents and families of the chemical hazard, how the school is managing the incident, and how students may be affected.
- [Continuity of Operations Annex](#) — ensuring teaching and learning continues despite the closure of a building or room because of a chemical hazard.
- [Evacuation Annex](#) — emptying a building or room of students, staff members, and visitors when a chemical hazard exists indoors.
- [Public Health, Medical, and Mental Health Annex](#) — reporting information about the chemical incident to the local health department.
- [Shelter-in-Place Annex](#) — remaining safely inside and/or sealing a building or room when a chemical hazard exists outdoors.
- [Recovery Annex](#) — restoring buildings, equipment, and supplies through facility cleaning and removing chemical hazards.

the school year regarding which chemicals are used for different lessons within the curriculum and why such materials are used; educators could also provide guidance on how to safely handle, store, and dispose of such materials. Educational materials could be distributed to students, and posters with easy-to-read safety instructions could be posted in the classroom. Then, before each specific lesson that involves the use of a chemical, educators could reiterate or explain in further detail the safety practices and procedures for the specific chemical being used in that day's lesson. Providing instruction and guidance to students before

allowing them to handle chemicals can be a helpful strategy for preventing or mitigating the impacts of accidents involving such materials.

Conduct Site Assessments

Site assessments should be conducted on at least an annual basis. They help schools examine the safety, security, accessibility, and emergency preparedness of their buildings and grounds. They can also provide a core planning team with data on the school community's vulnerability to toxic and hazardous materials. A site assessment team can collect information on where and how chemicals are stored in a school, how they are used, and what the current policies and procedures are for handling, using, storing, maintaining, and disposing of these chemicals. Schools should use this information to understand the potential impacts of hazards and threats and identify gaps and areas of improvement.

The site assessment team should be multidisciplinary and composed of school and/or district personnel, as well as community partners. It is especially important

Potential School Locations of Products Containing Toxic Substances

Areas within school campuses that should be examined by site assessment team members, in consideration of chemical products and chemical-related hazards, are listed below. The product types and hazardous ingredient examples that are potentially found in the below areas can be explored in the Environmental Protection Agency's [Chemical Management Resource Guide for School Administrators](#).

- Science laboratories
- Vocational and trade shops
- Visual and performing arts studios
- Custodial and maintenance areas
- Kitchens and cafeterias
- Nurses' offices
- Photography laboratories
- Athletic fields and lawns
- Administrative offices



to have representation from at least one member of the school community with knowledge of chemical incidents. This might include the [facilities manager](#), a custodial or maintenance staff member, a science [teacher](#), a vocational or trade teacher, a visual or performing arts teacher, the [nutrition director](#), a food management staff member, the athletic director, an athletic coach, the [school nurse](#), a health teacher, the secretary, an office assistant, a [public health official](#), etc.

Allocate Resources

All science, vocational, visual and performing arts, and photography curricula should include budgets for the proper disposal of accumulated chemicals and spill cleanup. The budget should account for performing routine disposals, purchasing specialized monitoring and cleanup supplies and equipment, maintaining equipment, and staff training. Partnerships with state agencies, local businesses, and local institutions of higher education can help to minimize how much a school district or individual school spends on training and specialized equipment needed to monitor and detect any spills.

Establish a Partnership With Media Representatives

[Developing relationships with the media](#) in advance of an emergency incident helps facilitate the dissemination of timely information about an incident, efforts to respond to the incident, and plans for preventing future incidents. A school district or individual school might consider sharing with the media select portions of its EOP's Toxic Materials Annex, Hazardous Materials Annex, and Communications and Warning Annex to help the media understand the district's or school's established policies on such incidents, as well as its policies on the media's interviewing staff members (and not students), visiting the site of an incident, and obtaining reliable and up-to-date information.

Conclusion

Integrating chemical management into a comprehensive EOP, including through the creation of

a Toxic Materials Annex and a Hazardous Materials Annex, helps improve a school district's or individual school's preparedness for a chemical-related incident. To ensure the annexes remain relevant and useful, districts and individual schools should practice them through [emergency exercises](#) and make revisions based on lessons learned. Additionally, districts and individual schools should [review, update, and strengthen](#) these annexes regularly. This is especially true when aspects of the school environment change, such as the location of stored chemicals, curricula that include the use of chemicals, a budget, and MOUs. In some of these situations, a district or individual school might also want to consider conducting a new site assessment.

Creating Toxic Materials and Hazardous Materials annexes as part of a comprehensive EOP, as well as maintaining and updating these annexes routinely, can help a district or individual school minimize disruptions to the learning environment caused by a chemical-related incident and safeguard the health and safety of staff members, students, visitors, and the community.



Resources

Further Reading – REMS TA Center

- [Building Your Preparedness for Hazardous Materials, Toxins, and Toxic Materials](#), Announcement
- [Addressing Biological Hazards That May Impact Students, Staff, and Visitors](#), Web Page
- [Addressing Technological Hazards That May Impact Students, Staff, and Visitors](#), Web Page
- [SITE ASSESS](#), Mobile Application

Training Opportunities – REMS TA Center

- [The Role of School Facility Managers in School Safety Efforts](#), Webinar
- [Designing Safe Schools: Planning and Retrofitting for Safety in Education Facilities](#), Webinar
- [Using SITE ASSESS for Higher Ed and K-12 Schools: Overview and Updates](#), Webinar
- [Conducting K-12 Site Assessments With SITE ASSESS](#), Specialized Training Package

Further Reading – Chemicals, Toxic Materials, and Hazardous Materials

- [Toolkit for Safe Chemical Management in K-12 Schools](#), Web Page (U.S. Environmental Protection Agency [EPA])
- [Toxic Substances Portal](#), Web Page (U.S. Department of Health and Human Services [HHS], Centers for Disease Control and Prevention [CDC], Agency for Toxic Substances and Disease Registry [ATSDR])

- [America's Poison Centers](#), Web Page (American Association of Poison Control Centers)
- [Hazardous Waste Management for School Laboratories and Classrooms](#), Publication (EPA)
- [Don't Mess with Mercury – A Mercury Spill Prevention Initiative for Schools](#), Web Page (HHS, CDC, ATSDR)
- [Sensible Steps to Healthier School Environments](#), Publication (EPA)
- [EPA's Healthy Schools Checklist](#), Publication (EPA)
- [What Should you do in a Chemical Emergency?](#), Web Page (HHS, CDC)
- [Chemicals and Hazardous Materials Incidents](#), Web Page (U.S. Department of Homeland Security, Federal Emergency Management Agency)
- [Reducing Pesticide Exposure at Schools](#), Publication (HHS, CDC)

Further Reading – EOP Development

- [Guide for Developing High-Quality School Emergency Operations Plans](#), Publication (U.S. Department of Education; U.S. Department of Health and Human Services; U.S. Department of Homeland Security, led by the Federal Emergency Management Agency; and U.S. Department of Justice, led by the Federal Bureau of Investigation)
- [The Role of Districts in Developing High-Quality School Emergency Operations Plans](#), Publication (U.S. Department of Education, U.S. Department of Justice, U.S. Department of Health and Human Services, and the U.S. Department of Homeland Security)



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