Research on PCBs in Caulk
September 2009

Overview

Caulk containing polychlorinated biphenyls (PCBs) was used in some buildings, including schools, in the 1950s through the 1970s. EPA is taking action to respond to this potential problem in multiple ways. To aid schools in the near term, EPA is providing schools with information to determine if they have PCBs in caulk and tools to properly manage contaminated caulk to help minimize exposures. To better understand the problem, EPA plans to conduct research on PCB-contaminated caulk and other potential sources of PCBs in schools.

Research Goals

EPA research on PCBs in schools is being designed to identify and evaluate potential sources of PCBs in order to better understand exposures to children, teachers, and other school workers, and to improve risk management decisions. EPA will investigate PCB-contaminated caulk, as well as other potential sources of PCBs in schools. Specifically, EPA's Office of Research and Development will:

- characterize potential sources of PCB exposures in schools (caulk, coatings, light ballasts, etc.)
- investigate the relationship of these sources to PCB concentrations in air, dust, and soil
- evaluate methods to reduce exposures to PCBs in caulk and other sources

Proposed Research

Sources of PCBs and the Relationship to PCB Concentrations in Air, Dust, and Soil

To understand the significance of PCB-contaminated caulk as a source of PCB exposures in school buildings, research is needed to better characterize the sources of PCBs in buildings and the potential exposures in schools. EPA is developing a research plan to: (1) characterize PCB-contaminated caulk and other potential sources of PCBs in schools; (2) measure PCB concentrations in air, dust and soil in selected schools and investigate relationships to the potential sources (e.g., caulk, other building materials, coatings, ballasts); (3) evaluate which routes of exposure (e.g., inhalation, contact with dust) are most important; and, (4) collect data to assist in developing risk management practices for reducing exposure to PCBs in schools.

This research will consist of both field and laboratory components. The field research will involve data collection and environmental measurements at selected schools. This will include collection of materials at the schools for laboratory analyses and subsequent chamber tests to characterize PCBs in contaminated caulk and other PCB sources. The field measurement study will involve recruitment of a limited number of schools with PCB-contaminated caulk to participate in the study. This will allow more intensive characterization of PCB sources and environmental measurements that can be used to better understand the relationships between sources, environmental concentrations in selected media (dust and air), and potential exposure estimates. At each school, PCBs will be measured in indoor and outdoor air, in soil adjacent to the building, and in dust on floors and other surfaces at multiple locations within the school building. Sources of PCBs, such as caulk around windows and doors, will be sampled and returned to the laboratory for analyses. Information will be collected at each school on building characteristics, building materials, ventilation systems, and other factors that may affect the distribution of PCBs in the school building and the potential for exposure. EPA will use the measurement study information as input data into ORD's Stochastic Human Exposure and Dose Simulation (SHEDS) model to predict population distributions of multi-media exposures for school-age children, teachers, and other workers under selected scenarios. The field study is planned to begin once schools have been identified and access has been granted. It is expected that this portion of the research will be completed in 12 to 18 months. A critical element for success of the field research effort will be for EPA to identify schools that will participate in the research study.

In the laboratory, EPA will conduct tests on materials collected in the field to address several key questions regarding the PCB sources, including: (1) determination of PCB off-gassing from caulk and

other PCB sources collected from buildings; (2) determination of PCB distribution between sources and indoor media (air, dust, and interior surfaces); and, (3) determination of PCB migration rates from sources to settled dust. The laboratory tests will determine how PCBs in caulk and other sources have migrated to adjacent materials, interior sources and settled dust over time to allow EPA to better understand the distribution of PCBs inside buildings. These results will also help EPA improve monitoring practices and reduce uncertainties in exposure assessments. Data collected in both the field and laboratory will be used by EPA to assist in the development of improved management practices for reducing exposure to PCBs in schools.

Mitigation Methods to Reduce Exposures to PCBs in Caulk and Other Sources

EPA recognizes that when PCB-contaminated caulk is identified in buildings, resources are sometimes not available to immediately remove all of the caulk. Interim methods are sometimes needed to reduce human exposure to PCBs during the time before the caulk is removed. For example, PCB-contaminated caulk may be temporarily covered with a barrier or a coating to prevent people from coming into contact with PCBs. After the removal of caulk, a related issue is that surrounding building materials may be contaminated with PCBs that have migrated from the caulk. Surrounding materials such as wood and wallboard can be removed in some cases, but materials such as concrete, brick, and mortar are more difficult to remove. PCBs from these surrounding materials can then leach into newly applied caulk. Therefore, coatings might also be employed to encapsulate surrounding materials contaminated by PCBs to prevent future migration and release of PCBs into new caulk or the environment.

To determine effective mitigation methods, EPA is planning to evaluate coatings that may be used to encapsulate materials contaminated by PCBs from caulk. Initial laboratory screening tests will be used to evaluate many types of coatings, including epoxy, polyurethane, polyurea, lacquer, oil-based paint, latex paint, and others. These coatings will be screened for their ability to resist penetration by PCBs. The most promising coatings identified in the screening tests will then be more rigorously tested in the laboratory to evaluate short- and long-term encapsulation abilities, cost, and feasibility for use in buildings. ORD will evaluate other techniques, along with coatings used as encapsulants, as potential mitigation methods.

EPA plans to begin mitigation testing in 2009. Once testing is complete, EPA will prepare a summary report that combines results from these EPA studies with information from the literature. The report will be available to the public. The information will also be used by EPA to develop guidance on mitigation methods for PCB-containing caulk and to inform future risk management decisions.