PCBs in School Buildings

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Polychlorinated biphenyls (PCBs) is a generalized term, encompassing over 200 chemicals which, more or less, break down into two categories as they relate to human risk: dioxins and furans. The real risk is not with the general soup of PCBs, but if they are either manufactured inappropriately or heated up accidentally causing certain sub-chemicals or isomers to be produced. One of the sub-chemicals, 2378 dioxin, is probably the most toxic man-made compound on earth in terms of impacting both animals and plants at a low dose. It is one of the constituents used to manufacture the defoliant, Agent Orange, used extensively in Vietnam and now clearly connected to a defined set of birth defects and cancers.

Part of the general fear relative to PCBs relates to confusion between PCBs and 2378 dioxin. While one can evolve from the other, they are profoundly different chemicals and have a huge difference in human health impact as related to dose. Inappropriate levels of fear and concern can come from the public (or regulators and the media), confusing the two.

During World War II, PCBs were put into general use since they were both fire retardants and could stabilize military electrical equipment, especially in planes and ships. A few years after the war, the huge wartime production capacity of PCBs was turned toward commercial use and the chemicals were blended into many commercial products from plastic fabric softener to fire retardants. The most extensive use, however, involved PCBs being incorporated as part of the new mass production of electrical equipment. Rather than using extensive wire insulation in capacitors and transformers, manufacturers could simply pour in PCBs and cost effectively insulate and prevent fire and overheating. Nearly every florescent light ballast in every school in America contained PCBs.

In school buildings mass constructed in response to the baby boom after World War II, PCBs were used indiscriminately and en masse (similar to asbestos and formaldehyde). When a capacitor would blow or a transformer heated up and leaked PCBs, the spilled fluid would be tracked around the building. Because of the chemical persistence of PCBs, a low level background level of PCBs was present in virtually all American schools. The use of PCBs only became restricted because of concerns more directed toward dioxin than PCBs, and following several accidents involving PCBs, superheated and converted into dioxins and furans, with a consequence of chronic disease including birth defects.

Today there is a substantially reduced PCB background contamination in school buildings. It actually has not been much of an issue until recently with the discovery of what appears to be some alleged elevated blood levels in young children with the potential exposure route coming from degrading window caulking.

In terms of regulation and concern, there is at least one active civil suit against a school district for not controlling PCB exposure through responsible hygiene and maintenance of window caulking. The EPA also has built several documents which set up research parameters for PCBs and disease, and comment

on possible responses for schools. At this point there is no regulation, although the EPA has established a PCB/school window caulking staff person in each of its regional offices. Regulation is anticipated.

Testing procedures can involve bulk testing the actual caulking to benchmark the PCB content. The physical chemical methodology for solid caulking testing is identified as SW-846. This process involves a responsible chain of custody and identifying thresholds in parts per million (ppm). This bulk sampling procedure conducted by the EPA in school buildings has shown that about one-third of the school buildings tested have caulking with a PCB content over the EPA's allowable authorized limit of 50 ppm and, in some cases, up to 5,000 ppm. School administration has to decide whether or not it makes sense to conduct the bulk testing. Since the control procedures are minimal, excluding costs for removing windows, that is an important policy call.

EPA also has a recommended wipe sampling threshold although it has not been formalized. This means that one can sample surface dust in a controlled way to obtain a benchmark. This typically has value only to pre-school or elementary schools, based on hygiene and pica (compulsive hand mouth contact). The issue for most properties is how much dust goes into ambient air and is inhaled.

The EPA has developed air tests which can be important to facility managers. There are two compendium methods, TO-4A and TO-10A, which can be used to determine whether or not someone is likely to inhale PCBs as part of the dust matrix. Although research is limited, we suspect that inhalation is not a major route of exposure. We could be wrong and that is one of the first things the EPA has begun testing following the focus on school window caulking. Air testing will probably help to demonstrate that there is limited exposure if normal hygiene is implemented even if there is a presence of PCBs in window caulk.

Finally, there are blood test procedures which can document the threshold of PCB exposures in an individual. What is important to recognize is that because of the persistence of PCBs in the environment and tissue, a high blood count may relate to past exposures that did not occur in a school facility. There is still a lot of electrical equipment around that leaches PCB fluids which can find their way into buildings and people.

In our view, until there is a formal set of regulations, the EPA general guidelines should be followed which are spelled out in some depth with a solid set of referral research information on the EPA's new website for this issue:

http://www.epa.gov/pcbsincaulk/

Like most complicated issues that hit school facility administrators, this one is best served by calmly surveying the situation, moving first to protect occupants and, in the end, selecting the most realistic response that protects the occupants and responds to regulation and/or current best practices.