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Are there PCB's in my Renovation Project?

What are PCB's? What does PCB stand for? Why are PCB's bad? These are the questions I most often hear from contractors, facilities personnel, building owners, and pretty much anyone that come in contact with a "Warning, PCB abatement activities in progress" or "Caution, contains PCB's". In this brief article I would like to discuss what PCB's are, how they came to be, human interactions, and ways to manage.

PCB's or "Poly Chlorinated Biphenyls" are man-made organic chemicals consisting of carbon, hydrogen, and chlorine atoms. Originally derived from coal tars in the late 1800's, PCB's were first synthetically produced in 1929 when the need arose for a stable cooling compound to replace an insufficient mineral oil coolant primarily used in the cooling of transformers and capacitors. It was quickly realized that this long lasting chemical had a wide range of industrial applications. The industrial use of PCBs is based mostly on their chemical stability, which includes a very high flash point, low flammability, and high dielectric constant. PCBs generate incombustible gases which makes them viable in electric arc uses. The use of PCBs is commonly divided into closed, or sealed enclosures, and open applications. Closed applications include coolants and insulating fluids in transformers and capacitors (PCB fluorescent light ballasts), hydraulic fluids, lubricating and cutting oils. Open applications of PCBs include carbonless copy paper or "NCR" paper, plasticizers in paints and cements, stabilizing additives in flexible PVC coatings of electrical cables and electronic components, pesticides, flame retardants, and sealants for caulking, adhesives, and waterproofing compounds. Perhaps one of the greatest use of PCB's was as a plasticizer in paints but more specifically in "coal tars", the paints used to coat water tanks, bridges, and infrastructure pieces. What we see from the building science aspect of PCB's is mainly directed towards its use in fluorescent light ballasts, caulks, paints, and water proofing compounds. PCBs do not easily break down or degrade, PCB's are hydrophobic meaning they repel water, and PCB's are resistant to acids, bases, oxidation, hydrolysis, and temperature change, all features which make them highly attractive for industrial usage. The production of PCB's was banned in 1979 yet many of the products we find today in most building renovations contain PCB containing materials or materials that have come in contact with PCB containing materials and are now themselves contaminated with PCB's

Why are PCB's hazardous? PCB's closely resemble dioxins. Dioxins are a by-product in the production of PCB's. Dioxins are chemical compounds which are highly toxic environmental persistent organic pollutants. They enter the body through interactions with a specific intracellular protein, the aryl-hydrocarbon receptor. The AHR regulates xenobiotic-metabolizing enzymes. In theory, dioxins are ingested through human consumption of plants, fish, and animal proteins. Once they enter the body, they bond with the proteins in our bodies that fight off caustic chemicals that would be normally be metabolized and excreted. These various chemicals that are shown to cause cancer. This is extremely important in the understanding of the effects of PCB's and human interaction as the chemical composition and molecular structures of both dioxins and PCBs are closely related. The major difference is the chlorine atom. The arrangement and quantity of chlorine atoms determines the characteristics of the type of PCB produced and varying levels of toxicity and consistencies. As

the level of chlorine atoms increase, its ability to bond to fatty acids, oils, and lipids increase. The more chlorine atoms, the easier it bonds to human and animal proteins. Much like dioxins, the greatest route of exposure is through consumption, however, PCB's can also be inhaled through off gassing and absorbed through contact with the skin. PCB's can even pass through porous gloves like latex and PVC gloves. By 1936 this synthesized chemical had already been identified as a carcinogen. The largest producer of PCB's in the United States knew of the harmful health effects on humans and the environment in the 60's.

Today we primarily find PCB's in buildings constructed between 1920 and 1980 as open applications such as caulks, paints, and waterproofing tars, and closed applications such as sealed coolants and oils. Some examples of products containing PCB's are:

- Window caulking and sealants,
- Expansion joint caulking and sealing,
- Foundation damp proofing,
- Roof penetration caulks and sealants,
- Mastics and glues used on for floors on concrete,
- Paints,
- Transformers,
- Light ballasts,
- Wire coatings and insulation,
- Electrical switch gear,
- Oils,
- Coolants,

But what most people fail to understand is that PCB's can leach or spread to building components they come in contact with, primarily porous products like wood and masonry. These may include:

- Concrete walls, floors, and ceilings
- Decorative masonry,
- Bricks and mortars,
- Granite steps, curbs, and walks
- Wood door and window trimming both exterior and interior,
- Wood framing,

PCB's can off gas and actually float through the air contaminating products and systems such as:

- Ceiling tiles,
- Window blinds,
- HVAC systems,
- Books and paper products,
- Clothing,

Anything that comes in contact with PCB's can become contaminated via physical contact or airborne contact. The questions become "What do we do?" and "How do we deal with this?" In most cases a licensed, trained, experienced, hazardous material abatement contractor can remove and dispose of the direct source of PCB's and the products that have now become contaminated from exposure to them.

Avoid construction and renovation delays by testing for PCB's during your investigation and design phase.