Unintended Consequences

By Lisa Alexander

Starting in 1929, Polychlorinated Biphenyl compounds (PCBs) were used as electrical insulators in plastics and in ballasts for fluorescent light fixtures and transformers. They were eventually added to caulking compounds (sometimes at percent levels), adhesives, mastics, paints, coatings, sealants, plastics, wallboard and building materials including roofing and siding materials. In the mid-1960s, researchers investigating the effects of the pesticide DDT began detecting persistent peaks of a then unidentified compound in fish, plants, birds, animals and humans. Those compounds turned out to be PCBs. Finally, in 1979, the production of PCBs in the US was banned. [Source: "The New Due Diligence: PCBs in Building Materials," *Connecticut Lawyer*, April 2010, this article evaluates the USEPA's emerging concerns with, and focus on, PCBs in building materials, debating the pros and cons of whether it should be standard practice to test building materials for PCBs, given the potential legal and financial consequences if USEPA should step in and find "significant" risks to public health in any given situation. At the time of publication, it was expected that USEPA would spend a few years of conducting their own research on concentrations of PCBs in building materials. They also noted that part of USEPA's focus was the potential for PCBs in building materials to break down and move into air or dust through ventilation systems.]

In 21e assessments, PCBs have typically been found in the "expected" places such as waste oil storage facilities, at the bases of utility poles or sometimes in junkyards during general assessment activities. In some ways, they can seem more like a nuisance in these locations because they can move a site from the "petroleum" category to the "hazardous materials" category, and the lower cleanup standards for these compounds may create an additional headache for property owners, depending on future use. PCBs from transformers, or co-mingled in small amounts of waste oil are seldom at Imminent Hazard levels beyond a hot spot. But, since they are known to bioaccumulate in living organisms to harmful levels, they change assessment and cleanup requirements at what otherwise might be a "simple" petroleum contaminated site.

Various articles discussing the history of PCB manufacturing suggest that while the potential health risks were recognized very early, in accordance with the practices of the day, many contaminants, including PCBs, were often freely dumped into pits on land, rivers, wetlands and estuaries. Over time they migrated into nearly every ecosystem and every living animal. Unfortunately, those PCBs are ubiquitous still, despite a 22 year ban on manufacturing.

Some of the locations where PCBs were directly discharged as the primary contaminant are some of the "worst" or "biggest" and/or "most expensive" sites within the universe of federal Superfund sites today. This leads to an odd sort of fame for some of the associated sites: the

PCBs in New Bedford Harbor were the highest ever found in marine sediments; the PCBs in the Hudson River in New York extend for over 200 miles.

During the 1970s, the public reacted to stories of rivers catching on fire, dead birds, fishing bans, Love Canal surprises and contaminated drinking water. The outcry for environmental protection led to the end of using rivers and estuaries as industrial dumping grounds. Finally, in 1976, Congress directed USEPA to ban the manufacture of PCBs and to regulate their use and disposal. It was a only a first step. It’s been twenty-two years and USEPA is now addressing PCBs that were added to building materials. It is unknown at present whether this will eventually lead to additional requirements and bans.

Improvements in analytical methods during the 1990s underscored how PCBs were still very much with us. New research indicated that even when specific Arochlors™ could not be found, the 209 breakdown products or “congeners” could be present. Additionally, of the 209 congeners, thirteen are considered “dioxin-like” congeners with endocrine disruptor effects. Complicating the matters even further, the early research was showing that any *one* congener *may* or *may not* impact any particular subgroup of a species: e.g., brown trout might be affected but not rainbow trout, or rainbow trout but not bass. Even to this writer, it sounded like a regulatory (and ecological) nightmare. Many of these effects and concerns were documented in a 1996 book, *Our Stolen Future* by Theo Colburn, Dianne Dumanoski and John Peterson Myers (their website http://www.ourstolenfuture.org updates the research). PCBs have been on a lot of radar screens ever since.

When I began the research for this article, one of the first things I learned was that after some business mergers, essentially all the PCBs made in the US were made by one company. I also learned that there is evidence suggesting that ventilation of buildings containing PCB-laden materials allows PCBs to get into the atmosphere. In some cases, some buildings have been completely closed down and sealed, awaiting further assessment. Not only have PCBs not gone away, there are plenty still “out there” and they are still migrating into the ecosystems around us. Based on their stability, one researcher estimated that nearly all the PCBs that were ever manufactured are still in existence in one form or other, some 1.5 million of tons worldwide, and over 600,000 tons in the US.

When I mentioned some of these findings to a co-worker, he pointed out that, prior to the widespread use of electricity, what people used for light at night was gas from coal gasification, kerosene lamps, and of course, whale oil. So even though industry “knew” there were potential health risks, the widespread use of nonflammable, non-conductive PCBs in the early electrical equipment probably prevented countless fires. And, ironically, the PCBs that made that electricity safe, also made the oceans safer for whales again, and began the inadvertent restoration of those magnificent mammals.

When I remarked on this to yet another person, she launched into the problems of excavating rare earth minerals needed for magnets in windmills, cell phones and solar panels or hybrid car batteries from politically unstable (or hostile) places or fragile ecosystems in their own right. Or the hazards of nuclear fuels, and the impacts from gas fracking on drinking water wells. She didn't have to remind me about the rush to get the lead out of gasoline, or the discovery that MtBE traveled further and faster in groundwater than benzene and the difficulty of cleaning that up. Never mind the complex impact of ethanol on benzene migration or food supplies.

For those of us in this business, these are the sobering complexities of modern living.

Today, we have a whole host of "new" miracle products being churned out from many different sectors, sometimes containing chemicals that could become the "emerging" contaminants. For example, things that may be safe in small doses for humans, but devastating to the early life stages of amphibians. Chemicals commonly used in shampoos and skin care creams, including some sunscreens, that in the presence of ultraviolet light may actually be carcinogens. Chemicals in sunscreens that appear to hurt coral. And there is growing volume on debates against fluoridation.

In the world of risk assessment, the dose makes the poison, but the active dose also varies depending on the receptor.

M.G.L., 21e does not regulate PCBs in building materials still intact and in use (Department of Public Health may have a role however). Nevertheless, some LSPs are aware of the USEPA's renewed interest in these "other" sources of PCBs and have contacted BWSC about PCBs found in painted surfaces and taken proactive "extra steps" ahead of property transfers.

We are all in this together, regulators and clean up professionals and the general public that depends on decisions and research and cleanup standards set by all of us – whether on the basis of what is possible, numbers from a generic risk assessment table, or a site-specific Method 3 Risk Characterization.

Working on a recent project, a look at a GIS map of sites that are "cleaned up" or "closed" in any way (RAO, NFA, Waiver, etc), versus those that are still open in any way (e.g., Tier Classified, Unclassified or with AULs or ROS), reminded me of a box of spilled blueberries, appropriate for late August. Almost all blue (closed) sites, a few open (red) sites and even fewer green (AUL) sites. It's an interesting image. As some of the more problematic chemicals are phased out, and cars get more efficient, and the number of gas stations decrease, and homes move from oil to natural gas, it almost makes one wonder – what's left for an environmental professional to do?

Lots. Restoration. Resurrecting sites from contaminated eyesores into new development OR into new natural resource areas. Starting to look into these emerging contaminants. And finding new ways to get at and clean up those old, persistent chemicals, like PCBs, that are still out there and still doing harm.