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Taking the Sting Out of PCBs

Michael J. Clark



For more than two years, scientists like Dr. Oscar Norman worked to disarm an environmental threat

"PCBs are Seeping Toward Town in Pennsylvania," read a recent headline in the *Wall Street Journal*.

"PCB Contamination is Reported in Food Produced in Four States," stated another headline in the *New York Times*.

PCBs, or polychlorinated biphenyls, seem to be mentioned with almost the same hysteria that the media usually reserve for nuclear accidents. Indeed, PCB contamination does present a problem. However, "the chemical problem that won't go away" is one giant step toward being solved.

Approval has been received from the Environmental Protection Agency (EPA) to start using a chemical process to destroy PCBs. While the approval currently limits the use of the process to those states in the Atlanta and Kansas City regions, nationwide approval is expected.

PCBs are highly toxic compounds that, among other things, are suspected of causing cancer. Incidents of PCB ingestion in substantial amounts have resulted in numbness, skin, nerve and liver damage. Unfortunately, PCB contamination is wide spread. Scientists have estimated that probably 90 percent of all people in the United States have small but detectable levels of PCBs in their body tissue, leading those scientists to consider PCB contamination as a potentially major environmental problem facing the United States.

The giant step in stemming the PCB crisis was taken by scientists from Sun Company's research and development labs, Suntech, in conjunction with Sunohio, an oil reclamation partnership located in Canton, Ohio. Together they developed a process that destroys PCBs and allows the valuable oil in which they reside to be reused.

The process, called PCBX, rapidly and completely destroys PCBs (located mostly in electrical transformers) by converting polychlorinated biphenyls into other harmless chemicals. It was developed over more than a two-year period by Suntech researchers Dr. Oscar L. Norman and Laurence H. Hanner and personnel from Sunohio.

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"When we first started thinking about this process, we theorized that PCBs were made by a chemical process," said Dr. Donald E. Jost, a Suntech chemical engineer who initiated the project. "It seemed logical that a chemical process could be used to 'unmake' them."

The entire process takes place inside a standard-size tractor trailer which is anything but standard inside. Crammed with equipment, the rig is as compact as a submarine.

When the rig arrives on the scene, technicians hook up two hoses. The PCB-contaminated oil is pumped into a mixing chamber where a special chemical is added to begin the detoxification process.

After thorough mixing, it passes into a reactor where the actual detoxification process occurs. From that point, the material is passed through a series of filters that removes all impurities. The now-clean oil moves into a holding tank where it is tested then pumped back into the original transformer.

Regulations from the EPA require the transformer oil be retested for PCBs after 90 days of in-service use. If, at that time, the oil contains less than 50 parts per million (ppm) PCBs, the transformer can be reclassified as a non-PCB transformer.

When PCBs were first discovered by research scientists in the late 1920s, they solved a heat problem that had plagued industry for years.

Electricity is transported through lines at extremely high voltages. However, industry, the average business or home cannot use these high levels. Therefore, transformers are used to reduce voltage to more usable levels. Unfortunately, this step creates large amounts of heat.

Oil is used in transformers which have no moving parts for electrical insulating and cooling. The oil promotes movement of the heat away from the central core of the transformer to its cooler outside walls, much like the coolant in an automobile engine transfers heat from the engine block to the radiator.

PCBs are essentially synthetic transformer oils and have superior electrical insulating and cooling properties. In addition, PCBs, unlike oil, are fire resistant.

"You can see how valuable this quality is," Jost noted. "If heat builds up, there is the possibility of an explosion."

While industry, through the use of PCBs, solved one problem, it inadvertently created another: PCB contamination through vaporization, spills and leaks.

PCBX — the portable solution



"There are a number of advantages to the PCBX process over incineration, which is the only other disposal method approved by the EPA," Jost pointed out. "In the first place, it's portable. Secondly, incineration destroys the PCBs, but with the loss of hundreds of millions of gallons of valuable transformer oil. And nobody wants an incinerator in his back yard."

Estimates vary as to the total amount of PCBs in existence today. However, Jost said one government report estimated that a half-billion gallons of PCB-contaminated oil are present in transformers today.

"That's a lot of oil to be cleaned up," Jost said. "It's equivalent to a five-year supply of the total U.S. demand for transformer oil."

According to Jost, Sunohio plans to market the process by servicing customers with its own rigs as well as licensing it to interested companies.

The EPA praised Sunohio for its efforts, calling the PCBX process "a significant step forward," and asking the private business sector to continue developing solutions to this country's environmental problems.

Adds Jost: "We feel we have the best alternative for dealing with the problem. The PCBX process will allow the reuse of a commodity."

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