February 4, 1972

Briefing Memorandum -- PCB's (Prepared by the Office of Research)

For the last several months there has been an interagency task force on PCB's. It is now drawing together a document for publication. While there are many gaps in information about sources, occurrence, and effects of PCB's there is enough known that we probably should consider some actions in EPA at this time. The salient facts follow:

Amounts Manufactured

Monsanto is the sole manufacturer of PCB's in the United States. In 1970 its domestic sales were about 36,000 tons in a number of different grades. That was approximately twice the amount manufactured in 1960. 1971 expected sales were down to about half the 1970 figure. While formerly used as a dielectric fluid in transformers and capacitors, as a hydraulic fluid and lubricant where fire retardant characteristics are important, as a plasticizer, as an additive to paints, pesticides and numerous other products, and in encapsulating for carbonless carbon paper most uses have now been eliminated by Monsanto. Continued use is expected only in some transformers and capacitors.

Sources to the Environment

Air. There are no reliable data on PCB concentrations in air. Four measurements have been made that suggest presence in three different cities. There is also a reference to the presence of PCB's below quantifiable levels in precipitation in Great Britain. In this country, the Geological Survey of Interior has looked for PCB's in precipitation samples in Florida but they are not certain of their results. Certainly PCB's are not present in levels as high as 0.1 of a part per billion (ppb). Through the Pesticide Air Monitoring Program some samples will be combined and analyzed for PCB's and we will have some quantitative information within a month or so. The point for now is that PCB's in air are below levels that would cause us to need to regulate. We do need to learn about PCB's in air as a transport mechanism.

Sources in air probably include open burning at dumps and possibly unburned particulates from incinerators. Vaporization is known to occur from plastics. Complete incineration is not likely to result in PCB residues in air.

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Water. PCB's enter the aquatic environment from both industrial and municipal sewer outfalls. The usual treatment of municipal sewage (including combined industrial-municipal) results in PCB's being present in both sludge and liquid effluent. The total amount of municipal effluent ranges from less than 1 ppb to a few tens of ppb. Some industrial outfalls contain hundreds of ppb. The estimate of the total input to the aquatic environment by Dr. Sarofim of Harvard is 4,000 tons per year. I think that number may be high, particularly with the decreased use of PCB's. Furthermore, Dr. Sarofim's estimate includes accidental discharges.

Dumps. Dr. Sarofim estimates the largest amount of PCB's ends up in dumps -- 20,000 tons in 1970. So long as the dumps are not burned, there probably is relatively little transfer to other parts of the environment.

Effects of PCB's

PCB's have been shown experimentally to kill shrimp and some fish at concentrations as low as 1 ppb in water. The Food and Drug Administration has established a guideline of 5 ppm in fish. Japanese experience with the Yushu incident suggests that a total intake of 1/2 gram was enough to cause overt symptoms in man.

Concentration Factors. Fish, shrimp, and crabs are known to concentrate PCB's from levels in water by factors of up to 75,000 with exposure levels as low as 0.1 ppb for fish and .06 for shrimp.

Recommendations

EPA should establish guidelines for PCB's in water of 0.01 ppb which will be sufficiently low that concentrations in fish should not exceed 5 ppm. 0.01 ppb is 1/500,000 of 5 ppm, and thus this concentration should not result in PCB levels in fish as high as the 5 ppm guideline of FDA. The 0.01 ppb level is sufficiently low that fish and other aquatic organisms should not be damaged.

In operational terms, we should limit PCB discharges under the 1899 permit procedures. The allowable discharge should not be more than an amount that will result in .01 ppb in the receiving water at mean annual flow, assuming uniform mixing. After Monsanto's sales restrictions become fully effective, there will be relatively few plants that discharge PCB's in substantial quantity. Those will principally be electrical manufacturing concerns that manufacture capacitors and transformers. Electrical utilities may also be sources if they refill their own transformers. (PCB's are manufactured in other countries. So far as we know, they are not imported, except as components of plastics, electrical equipment, etc. With Monsanto's restrictions on sales in the U.S., there may be a desire to import the materials for uses that Monsanto does not provide for.)

Monsanto, as the sole U.S. manufacturer, will be another company requiring effluent permits. At least for a while, some paper companies may have relatively high PCB residues from recycled paper, but these concentrations should diminish since PCB's are no longer used in carbonless carbon paper, the principal source in recycled paper.

EPA should encourage reduction in use of PCB's wherever there are acceptable substitutes. When there are no acceptable substitutes, and when it is used in closed systems, we should encourage adequate industrial sanitation to minimize leakage to the environment.

We should sample sewage sludges from time to time now that PCB use is decreasing and should consider prohibiting dumping of such sludges at sea if the PCB levels do not drop. We should also prohibit dumping of PCB-containing industrial wastes in the oceans.