

Model Document: Laboratory Report

Heading includes report title, name of recipient, and names of authors.

PCB Exposure from Oil Combustion
Wayne County Professional Firefighters

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Introduction provides background and reason for test(s).

INTRODUCTION

Waste oil used to train firefighters was suspected of containing polychlorinated biphenyls (PCBs). According to information provided by Mr. Philip Landowe, President of the Wayne County Professional Firefighters Association, it has been standard practice in training firefighters to burn 20-100 gallons of oil in a diked area of approximately 25-50m³. Firefighters would then extinguish the fire at close range. Exposure would last several minutes, and the exercise would be repeated two or three times each day for one week.

Oil samples were collected from three holding tanks near the training area in Englewood Park on November 11, 20--. To determine potential firefighter exposure to PCBs, bulk oil analyses were conducted on each of the samples. In addition, the oil was heated and burned to determine the degree to which PCB is volatilized from the oil, thus increasing the potential for firefighter exposure via inhalation.

TESTING PROCEDURES

Bulk oil samples were diluted with hexane, put through a cleanup

Specific details are used to explain testing procedures.

step, and analyzed in electron-capture gas chromatography. The oil from the underground tank that contained PCBs was then exposed to temperatures of 1008°C without ignition and 2008°C with ignition. Air was passed over the enclosed sample during heating, and volatized PCB was trapped in an absorbing medium. The absorbing medium was then extracted and analyzed for PCB released from the sample.

Test results, with references to tables, explain laboratory findings.

RESULTS

Bulk oil analyses are presented in Table 1. Only the sample from the underground tank contained detectable amounts of PCB. Aroclor 1260, containing 60 percent chlorine, was found to be present in this sample at 18 mg. Concentrations of 50 mg PCB in oil are considered hazardous. Stringent storage and disposal techniques are required for oil with PCB concentrations at these levels.

Results for the PCB volatilization study are presented in Table 2. At 1008°C, 1 mg PCB from a total of 18 mg PCB (5.6 percent) was released to the air. Lower levels were released at 2008°C and during ignition, probably as a result of decomposition. PCB is a mixture of chlorinated compounds varying in molecular weight; light-weight PCBs were released at all temperatures to a greater degree than the high-molecular-weight fractions.

TABLE 1. Bulk Oil Analysis

Source	Sample #	PCB Content (mg/g)
Underground tank (11' deep)	6062	18*
Circle tank (3' deep)	6063a	<1
	6063b	<1
Square pool (3' deep)	6064a	<1
	6064b	<1

Tables organize data for quick access.

*Aroclor 1260 is the PCB type. This sample was taken for volatilization study.

TABLE 2. PCB Volatilization Study
for the 11-Foot-Deep Underground Tank*

Outgassing Temp (°C)	Outgassing Time (min.)	Sample Outgassed (g)	PCB Total (mg)	PCB Outgassed (mg)
100	30	1	18	1
200	30	1	18	0.6
200 w/ ignition	30	1	18	0.2

*Bulk analysis of 18mg/g PCB.

DISCUSSION AND CONCLUSIONS

At a concentration of 18 mg/g, 100 gallons of oil would contain approximately 5.5 g of PCB. Of the 5.5 g of PCB, about 0.3 g would be released to the atmosphere under the worst conditions.

The American Conference of Governmental Industrial Hygienists has established a threshold limit value (TLV)* of 0.5 mg/m³ air for a PCB containing 54 percent C1 as a time-weighted average over an 8-hour work shift and has stipulated that exposure over a 15-minute period should not exceed 1 mg/m³. The 0.3 g of released PCB would have to be diluted to 600 m³ air to result in a concentration of 0.5 mg/m³ or less. Since the combustion of oil lasted several minutes, a dilution to more than 600 m³ is likely; thus, exposure would be less than 0.5 mg/m³. Since an important factor in determining exposure is time and the firefighters were exposed only for several minutes at intermittent intervals, adverse effects from long-term exposure to low-level concentrations of PCB should not be expected.

It should be stressed, however, that these conclusions are based solely on oil containing 18 mg/g PCB. If, on previous occasions, the PCBs content of the oil was much higher, greater exposure could have occurred. PCBs is a known liver toxin and has also been classified as a

*The safe average concentration that most individuals can be exposed to in an 8-hour day.

Discussion puts test results in broader context.

suspected carcinogen. Although the primary route of entry into the body is by inhalation, PCBs can be absorbed through the skin. PCBs can cause a skin condition known as *chloracne*, which results from a clogging of the pores. This condition, which is often associated with a secondary infection, should not occur at the PCB concentration found in this oil. A clinical test exists for determining if PCB has been absorbed by the liver.

In summary, because exposure to this oil was limited and because PCB concentrations in the oil were low, it is unlikely that exposure from inhalation would be sufficient to cause adverse health effects. However, we cannot rule out the possibility that excessive exposure may have occurred under certain circumstances, based on factors such as excessive skin contact and the possibility that oil with a higher-level PCB concentration could have been used earlier. The practice of using this oil should be terminated.

Report concludes with recommendations on how to proceed.