

## PCBs Hazard After a Transformer Caught Fire

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### Transformer 火災後 PCB 被害

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### 要 約

캠덴 카운티 청사에 있는 transformer에 火災가 난 後 建物內에 있는 60名의 血液에서 PCB를 測定하였다. 火災가 發生한 建物內의 空氣에서는 거의 檢出되지 않았으나 transformer가 있는 房의 Swab Sample에서는  $52.6 \mu\text{g}/\text{cm}^2$ 가 檢出되었다. 建物을 再使用하기 前에 換氣를 最大로 시킨後 다시 Swab Sample을 取했을때 12 Sample中 10個에서 PCB가 檢出되지 않았다. 또한 血液에서 PCB水準은 未檢出에서 16ppb 였으나 一般人에서도 69.2 ppb 까지 檢出된것과 그밖에 17.6 ppb 까지 檢出된 것으로 보아 火災後 PCB가 血液中에서 增加했다는 증거는 없다고 본다. 이와같이 혈청내에서 PCB가 增加하지 않은것은 火災後 即時 清掃와 換氣를 實施한 結果로 본다.

### Introduction

On April 6, 33 days after a transformer caught fire in the Camden County Municipal Building, blood levels for polychlorinated biphenyl were measured in 60 individuals who have spent varying amounts of time in the building since the fire.

The fire took place on March 4, 1982 at approximately 6:00 p.m. The building was closed except for clean-up crews and maintenance workers until Thursday, March 11. The transformer was located in a room on the penthouse. Smoke and fumes escaped out vents directly outside to the ambient air. The clean air intake for the building is approximately

150 feet away and faces away from the transformer room.

Environmental samples taken the day after the fire showed nondetectable air levels of PCB's in the 1st, 2nd and 3rd floors, and a level of  $3.4 \mu\text{g}/\text{m}^3$  in the penthouse. Swab samples taken at the same time were  $52.6 \mu\text{g}/\text{cm}^2$  inside the transformer room,  $.01 \mu\text{g}/\text{cm}^2$  at the air intake precipitator and .025 and .065 on the 3rd floor. During cleanup procedures, which involved washing the surfaces of the transformer room with kerosene, a leak was noted in the floor of the transformer room to the underlying rooms. Samples from March 8th in the graphics room on the 3rd floor, beneath the penthouse were .05, 2.22 and  $5.55 \mu\text{g}/\text{cm}^2$ . This was subsequently cleaned. Before

the building was reopened, the ventilation system was run to maximize air exchange with outside air. Of the nine air samples taken 3/10 after the cleanup was completed, three showed detectable levels of PCB's. One sample on the 2nd floor .154  $\mu\text{g}/\text{m}^3$ , and two in the penthouse .615 and .623  $\mu\text{g}/\text{m}^3$ . Further swab samples taken on 3/11, in the basement, 1st, 2nd and 3rd floor, were nondetectable ( $< .01 \mu\text{g}/\text{cm}^2$ ) for ten out of twelve samples. The two positive samples were on a cabinet on the 3rd floor (.045  $\mu\text{g}/\text{cm}^2$ ), and on a desk in the basement (.025  $\mu\text{g}/\text{cm}^2$ ).

### Methods

Blood for PCB's was analysed for 46 samples by the methods of Webb and McCall (1) at the

Mt. Sinai Medical Center in New York City (MSM).

The other 14 samples were analysed by the New Jersey State Department of Health laboratory (NJDOH), according to the method used by Harold Price, PhD. of the Michigan Department of Public Health. Blood analysed by MSM was spun down at the examination site and the serum was pipetted into specially prepared vials. Blood analysed by the NJDOH was left in the venopuncture tube and brought back to the State lab, after which the serum was removed and analysed.

All participants were interviewed with a standard questionnaire. Information obtained included age, sex, race, work history, history of previous exposure to PCB's, present work duties in the building, time and frequency of

Table 1 Serum PCB's by Reported Job Title  
(Values in parts per billion)

	Number Workers	Mean	Median	Range	#	$\geq 10$ ppb %
Maintenance or Engineering	36	6.59	5	ND* - 16	7	19.4
Office	11	5.99	5.2	2 - 12	2	18.2
Firemen	12	6.17	5.8	3 - 13	1	8.3
Unknown	1	9	9	9	0	0
Total	60	6.44		ND - 16	10	16.7

\* ND = Non Detectable, Lower limit of detection 1 ppb.

Table 2 Serum PCB's by Reported Time of Entry Into Building

	Number Workers	Mean	Median	Range	#	$\geq 10$ ppb %
Entered Building During Fire	6	4.65	4.45	3 - 8	0	0
Same Night	20	6.03	5	ND - 12.4	4	20
All others	34	6.99	6	2.1 - 16	6	17.6

entry, smoking history, amount of alcohol and fish ingestion.

### Results

Results of the PCB analysis by job title, time of entry, frequency of entry, and location of office are presented in Table 1-4. Although

small differences in means were noted between the various groups, no differences were statistically significant.

### Discussion

The majority of individuals have measurable

Table 3 Serum PCB 's By Reported Frequency of Entry

	Number Workers	Mean	Median	Range	≥ 10 ppb	
					#	%
Daily Entry	21	6.71	6	ND-14	4	19
Other than Daily Entry	39	6.29	5.1	ND-16	6	15.4

Table 4 Serum PCB 's By Reported Frequency of Entry and Location of office

	Number Workers	Mean	Median	Range	> 10 ppb	
					#	%
Office in Building and Daily Entry	16	7.12	6.85	ND-14	4	25
Office Not In Building	44	6.19	5.8	ND-16	6	13.6

Table 5 PCB Results From Reference Populations

Non-PCB Exposed Individuals	Number	Median PCB	Range	> 10 N	ppb %
I Water Department Workers Perth Amboy	11	6.33	ND*-12.42	1	9.1
II Sample of General Population of Michigan	1032	6.8	4-69.2	258	25
III Sample of General Population of Pittsfield, MA	16	7.6	3.2-17.1	4	25
PCB Exposed Individuals					
I Workers with heavy exposure to PCB Glen Falls, N. Y.	290	20.5	1-546	217	75

\* ND-None detected. Lower limit of detection 5 parts per billion (ppb)

quantities of PCB's in their serum from industrial contamination of the food supply. Background levels up to 20 parts per billion (ppb) are commonly found in the general population (Table 5). No individual tested in Camden had levels greater than 16 ppb (Table I). None of the measures used to estimate exposure showed a significant increase in PCB's in individuals who would have been suspected to have a higher exposure. We therefore, have found no evidence that individuals who worked at the Camden County Municipal building, after the fire, had increased PCB levels.

We think the absence of positive findings was a combination of the location of the transformer on the top floor, which minimized exposure in the building, and the prompt cleanup and ventilating procedures instituted after the fire. The substitution of non PCB cooling fluids in the remaining transformers is recommended. This would eliminate the potential for a repetition of a similar problem in case of future fires.

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