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Item ID Number	02206
Author	
Corporate Author	
Report/Article Title	BSOB Medical Surveillance Program: Status Report on Blood Studies, October 21, 1982
Journal/Book Title	
Year	1982
Month/Day	October 21
Color	☐
Number of Images	8
Description Notes	

BSOB Medical Surveillance Program:
Status Report on Blood Studies
October 21, 1982

Current Status

The data from interviews, physical examinations, medical histories, and laboratory tests which were conducted as part of the medical surveillance program for the 482* persons associated with the Binghamton State Office Building (BSOB) fire have been coded and keypunched, and are now fully ready for statistical analysis.

The serum PCB levels are the only outstanding data. Nine hundred and fifty-eight specimens, representing every available sample containing at least 2.5 ml, the minimum quantity for analysis, have been sent to the contract laboratory, Hazelton Raltech. Three hundred and fifty-two initial samples, i.e., those ordered by the Broome County Health Department at the time of or soon after the fire were included. Also included were 427 follow-up samples, collected by the State Health Department approximately nine to thirteen months after the fire. Three hundred and twelve persons had both initial and follow-up samples. One hundred sixty-nine quality control samples were added to monitor the laboratory's performance. Samples from six Binghamton residents not associated with the BSOB were included for comparison purposes. The results for 917 (96%) of the samples have been received to date. Hazelton Raltech plans to complete the work by October 31, 1982.

Regarding communications of the results, copies from the physical examinations, medical histories, and laboratory tests have been sent to each person's private physician. If the individual did not indicate a private physician, the results were sent to either the Broome County Health Department (if the person resided in that county) or the Employee Health Service (if the person was a state worker). Letters were then mailed to each person informing them of this procedure and requesting

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* Excludes the 39 persons who worked for NEPCO, the professional pollution control company which was involved in the initial clean-up.

that they contact their physician to discuss the results. Follow-up correspondence has also been sent to the physicians to confirm that they received the appropriate information. Duplicate copies were sent if they indicated that they were missing any results.

Preliminary Results - Serum PCB Levels

488 PCB specimens from individuals have currently been analyzed. This includes 199 samples from the initial series and 289 samples from the follow-up medical study. The mean PCB value for these samples is 6.90 ppb, a value well within the normal range of 5 to 20 ppb. Combining both the initial and follow-up results revealed that only seven persons (2.4%) of the 243 whose serum has been analyzed to date have at least one value greater than or equal to 20 ppb. Five of the seven have values which exceed 20 ppb by no more than 3.1 ppb. Three of the seven are employed in electrical work, an occupational group which has high background occupational exposures to PCB's.

The two most elevated values (35.5 and 47.0 ppb) were found in individuals with triglyceride (blood fat) level greater than normal by tenfold or more. Both individuals also had elevated levels of other pesticides such as DDE when their serum was reanalyzed. These pesticides are fat soluble like PCB's but were not associated with the BSOB fire. In both individuals, available medical information indicates other medical reasons for their hyperlipidemia and resultant elevated PCB levels. The private physicians of both individuals have been advised of the situation.

Preliminary Results - Other Laboratory Tests

Twenty other laboratory tests were also conducted upon the initial and follow-up sera. Some of these tests (e.g., liver enzymes and triglycerides) have been related to PCB exposures in the scientific literature. Others (e.g., total protein, calcium, and iron) were performed to complete each person's clinical profile.

For the possible PCB-related biochemical tests (SGOT, SGPT, GGTP, triglycerides), the mean values for these tests were within the laboratory's range of normal except for the initial triglyceride tests. For this test, the mean value was 192.60 mg/dl, compared to the upper range of normal of 180 mg/dl. This elevation is most likely due to the fact that some of the subjects had not fasted prior to the testing, a factor which would raise the serum triglyceride levels significantly.

Future Analysis

The statistical analyses conducted to date have been primarily descriptive. They focus upon the number and percent of persons with test values above normal limits, or deal with summary statistics such as means and standard deviations. Additional abalyses need to determine more precisely the association between work history and health outcomes. The first stage of this task must center upon the development of an exposure index which combines the intensity of a person's experience (e.g., date of first entry and use of protective gear) with its duration (e.g., total number of hours in the BSOB). This index will then be examined in relation to the physical examination, laboratory tests, and serum PCB results. It may also be necessary to adjust for variables such as age, occupation, and pre-existing medical conditions. These factors are associated with health status, and if they are also linked to exposure, then the relationship between the exposure index and health status may be confounded. Changes in serum PCB level and the laboratory

tests must also be investigated more thoroughly by taking into account the length of time between the date of first exposure to the BSOB and the date the blood was drawn, and the "fasting" status of the subjects at each test date which may affect both the serum lipid values and the serum PCB values.

Conclusions

Based on review of the medical histories, physical examination findings, and available laboratory tests, there does not appear to be any evident PCB-related health effects in the medical study group.

Addendum to BSOB Medical Surveillance
Program Report: Quality Control Results
for Serum PCB Analysis

The quality control program developed to monitor Hazelton Raltech's performance in the analysis of serum samples for PCB level consisted of inserting three to five specimens prepared with known concentrations of PCB Aroclor 1254 with each batch of 25 samples. Every batch contained at least one 20 ppb sample which was revealed to the laboratory a priori as a quality control specimen or "bench" control. Every batch also contained two or more quality control specimens prepared at 10, 30, or 50 ppb PCB. These samples were submitted without the laboratory's knowledge as "blind" controls. Some additional 20 ppb samples were also included as blind controls. The rationale for this system was to develop a quality control program which would span the likely range of PCB values in this population, and which would enable Hazelton Raltech to determine immediately if their analysis was faulty through the use of bench controls, while simultaneously providing the investigators with a cross-check of the laboratory's performance through blind controls. All blind and bench controls were randomly placed within each batch.

Table 1 gives descriptive statistics for the 130 quality control samples received as of October 8, 1982. The bias, as determined by the difference between the mean and target values, varied from 1% for the 30 ppb samples to 7.0% for the 10 ppb samples. Their precision, as indicated by the coefficient of variation, ranged from 12.2% for the 20 ppb samples to 17.7% for the 10 ppb samples. According to our consultants who helped develop the quality control program (Dr. Brian Bush of the NYSDOH, Dr. John Liddle of CDC, and Dr. James Melius of NIOSH), these results are "state of the art" for PCB analysis and indicate that

Raltech is performing reasonably well.

Table 2 shows means and standard deviations by batch number and target value. This analysis was undertaken to detect changes in the laboratory's performance over time, since the batches are run in numeric order. The numbers are small and not all batches have quality control samples at all levels, but the general pattern suggests random variation around the target values with no systematic trend evident.

Table 1. Descriptive Statistics for Quality Control Samples by Target Value

	Target Value (ppb)			
	10	20	30	50
N	29	59	23	19
$\bar{x}$	10.70	20.84	30.31	48.3
$\frac{\bar{x} - \text{target}}{\text{target}}$	7.0%	4.2%	1.0%	-3.4%
sd	1.89	2.55	4.75	8.31
coefficient of variation	17.7%	12.2%	15.7%	17.2%
minimum	5.0	12.5	17.0	32.3
maximum	14.5	29.3	38.0	68.6

Table 2. Means and Standard Deviations for Quality Control Samples by Batch Number and Target Value

	Target Value											
	10			20			30			50		
Batch Number	N	$\bar{x}$	sd	N	$\bar{x}$	sd	N	$\bar{x}$	sd	N	$\bar{x}$	sd
1 to 4	6	11.40	2.21	12	21.27	1.79	-	-	-	6	48.00	11.76
5 to 8	3	12.03	1.76	8	20.40	0.40	3	32.80	1.75	-	-	-
9 to 12	3	11.20	0.98	8	20.90	2.58	3	28.40	8.39	-	-	-
13 to 16	6	10.42	1.09	8	20.58	2.99	2	29.85	0.21	2	41.50	4.24
17 to 20	3	9.27	3.83	8	22.24	3.63	4	33.15	3.34	5	51.64	2.78
21 to 24	4	9.93	1.80	8	19.70	3.77	6	28.75	6.80	2	54.45	4.03
25 to 28	4	10.40	1.12	7	20.57	1.21	5	29.74	1.27	4	44.98	8.48