

WASHINGTON OCCUPATIONAL HEALTH ASSOCIATES, INC.

Suite 410
1120 19th Street, N.W.
Washington, D.C. 20036

Consultants in Occupational
and Environmental Health

(202) 463-6698

PCB MEDICAL SURVEILLANCE PROGRAM
FOR
SEPTA EMPLOYEES

Management Report - May 8, 1986

132855
ORIGINAL
(Red)
Rec'd

Nov. 3, 1986

1.0 INTRODUCTION

Southeastern Pennsylvania Transportation Authority (SEPTA) employees who work at the Paoli transit car maintenance and repair facility were offered a PCB Medical Surveillance Program under the direction of Kenneth H. Chase, M.D., F.A.C.P.M., of Washington Occupational Health Associates, Inc. (WOHA). This program was initiated by SEPTA as follow-up to surveys reporting elevated levels of polychlorinated biphenyls (PCBs) at the Paoli maintenance facility.

2.0 PROCEDURES

Clinical examinations were conducted on 60 SEPTA employees (all from Paoli) on March 24 and 25, 1986. The examinations were performed in SEPTA's Medical Department, by members of WOHA's staff with the assistance of SEPTA medical personnel. An overview of the PCB medical surveillance program was verbally communicated to the participants in each examination group. The examinations included:

- (1) Completion of the following forms (by employees): Registration and Participation Form for PCB Testing of SEPTA Employees (See Attachment I); Form A - Work History (See Attachment II); and, completion of the following forms (in conjunction with examiner): Form B - Prevalence of Symptoms and Findings (See Attachment III); and Clinical record - including Past Medical and Social History (See Attachment IV).
- (2) Physical examination - with particular attention to the skin, liver, and nervous system.
- (3) Routine laboratory testing (Smith-Kline Laboratories, King of Prussia, PA) - Routine Urinalysis, Complete Blood Count (CBC), and Chemzyme Evaluation: Triglycerides, Cholesterol, Alkaline Phosphatase, LDH, SGOT, SGPT, Bilirubin, Protein (total), Albumin, Globulin, Sodium, Potassium, Chloride, CO₂, Calcium, Phosphorus, Uric Acid, Glucose, Creatinine, Urea Nitrogen (See Attachment VIII for detailed explanations of tests).

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- (4) Serum PCB Level (National Medical Services Laboratories, Willow Grove, PA, see Attachment V).

3.0 FINDINGS

A summary of the data can be found on the SEPTA PCB Status Sheet (Attachment VI) - the following parameters are included on this report for all sixty participants:

Name
Exam Date
Age
Employment Duration
PCB Level
Job Title
PCB Contact Frequency
Comments

Limited descriptive and analytical statistics (Attachment VII) were performed on this data and are presented in Table 1 and Table 2, respectively, as follow:

Table 1 - Descriptive Analyses for Selected Data

<u>Variable</u>	<u>n</u>	<u>Mean</u>	<u>Range</u>	<u>Normal Range</u>
Age of Worker (years)	60	44.4	(25-61)	N/A
Length of Employment (years)	60	15.7	(1-44.7)	N/A
PCB Level (ppb)	60	42.1	(0-280)	0-30
Triglycerides (mg/dl)	60	144.5	(42-336)	20-140
Cholesterol (mg/dl)	60	219.4	(133-310)	135-245
LDH (U/L)	60	176.9	(136-287)	0-250
SGOT (U/L)	60	25.6	(9-62)	0-50
SGPT (U/L)	60	31.7	(1-97)	0-55

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Table 2 - Correlation Coefficients (r)
and Probabilities for Selected Data

<u>Variables</u>	<u>r</u>	<u>p</u>
Age and Length of Employment	.68	<.0001
Plasma PCB and Age	.47	<.0003
Plasma PCB and Length of Employment	.53	<.0001
Triglyceride and Age	.46	<.001
Cholesterol and Age	.44	<.001
Plasma PCB and Triglyceride	.30	<.02
Plasma PCB and Cholesterol	.18	NS*
Plasma PCB and SGOT	.08	NS*
Plasma PCB and SGPT	.12	NS*

* NS indicates not significant; p values less than .05 have increasing statistical significance.

4.0 DISCUSSION

It is understood that the data reported above include subjective responses by employees concerning age, length of employment, job title, and PCB contact frequency. No attempt was made to verify these results through personnel records or other methods. Nevertheless, these findings serve to demonstrate that occupational exposure to PCBs has occurred, although it is not clear whether this exposure took place in the recent or remote past. These conclusions are based on the following observations:

1. Length of Employment at the Paoli Facility - these employees have remained at the same facility for a mean duration of 15.7 years, with a range of a few months to forty years. This represents the traditional stability in the crafts represented by this group.
2. Serum PCB Levels - the average serum PCB value for this group was 42 ppb with a range of 0-280 ppb. In the general (non-exposed) population, serum PCB levels generally run in the 5-30 ppb range. The observed elevation in PCB levels in this group of workers supports the premise that occupational exposure to PCB's can lead to increased PCB absorption and retention. This relationship is further strengthened by the highly significant statistical correlation between length of employment and serum PCB level described earlier.
3. Organ Toxicity - review of medical histories and physical exam findings failed to reveal any consistent pattern of organ toxicity conceivably related to PCB exposure. The most frequent

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symptoms reported by this group were skin and eye irritation. However, these symptoms are known to be prevalent in any worker group, including railroad maintenance shop employees, engaged in the handling of industrial solvents and related agents in significant quantities.

4. Serum PCB and Triglyceride Levels - This relationship demonstrated a weak, but significant, positive correlation. Elevation of serum triglyceride levels in association with exposure to PCB's has been described in several published reports. Caution is needed in interpreting this correlation due to the known increase in serum triglyceride levels with age.

5.0 RECOMMENDATIONS

1. Personal Protection

An industrial Hygiene Study should be performed at the Paoli Site and the subsequent recommendations considered for implementation. Those recommendations should include personal protective equipment for all workers whose activities may lead to significant PCB exposure. PCBs are readily absorbed through the skin and can be absorbed through inhalation.

In the selection of protective clothing, consideration should be given to the utilization of disposable apparel because of the uncertainty of decontaminating reusable clothing. Those employees who may be directly contacting PCBs in highly contaminated soil or transformer fluids should use gloves and boots made of neoprene, nitrile, butyl rubber, or viton. Guidelines for the use of respiratory protective equipment should be developed based on the results of appropriate air sampling studies currently underway.

2. Medical Surveillance

A PCB medical surveillance program should consist of the following components:

- a. Initial Examination - as described in section 2 of this report.
- b. Interval Examination - to include serum PCB level and chemzyme laboratory analysis to be performed at least annually. This provides a measure of the adequacy of personal protective measures and other controls instituted to reduce PCB exposure. Additionally, it provides a screening method for early identification of organ toxicity.

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- c. Termination Examination (termination or retirement) - the scope should be similar to the initial examination with emphasis on organ system abnormalities reported to be associated with PCB toxicity.

3. Employee Education

The potential adverse health effects of PCBs and mechanisms for the absorption of PCBs should be presented to the employees. Concepts such as bioaccumulation, background level, and dose response should be addressed in a manner which can be understood by the employees at the time they receive the results of their examinations.

A discussion of the adverse health effects known to be associated with PCB overexposure allows for early worker detection of possible PCB-related signs or symptoms. An education program further provides the opportunity for employees to express any individual concerns or questions regarding PCBs in the workplace. This approach reinforces upon workers the need to properly utilize personal protective equipment.

The role of the comprehensive PCB medical surveillance program as an indicator of the adequacy of personal protective measures should be stressed. This will be responsive to the on-going concerns of workers at potential exposure to PCBs.



National Medical Services, Inc.

P.O. Box 433A, 2300 Stratford Ave.

Willow Grove, Pennsylvania 19090

(215) 657-4900

ORIGINAL
(Red)

SPECIAL CHEMISTRY STANDARD OPERATING PROCEDURES

TEST NAME: PCB'S

TEST #: 3370

DESCRIPTION: The PCB undergo a liquid-liquid extraction with petroleum ether and isopropanol cleaned up on Florosil column, evaporated to dryness, reconstituted and injected in to the GC.

SPECIMEN TYPE: Recommended serum or plasma; submit 4 ml
Other whole blood; submit 6ml EDTA or HEP
Not recommended : urine

STANDARDS USED: 10, 40, & 100 ppb of Aroclor 1254 aqueous. Response factors are calculated and used to calculate patient samples. Concentrations of the three significant peaks are summed and the mean used as the reported concentration. The three peaks are present in both Aroclor 1254 & 1260.

QUALITY CONTROL: An elevated pedigree positive serum is diluted with blank serum and is run with each batch to monitor precision from run to run.

REAGENTS & SUPPLIES:

- a) Petroleum ether (residue analysis grade)
- b) t-butylmethylether (glass distilled)
- c) Isopropanol
- d) Hexane (residue analysis)
- e) Deionized water
- f) Florosil PR grade
- g) Glass chromatography columns (240mm X 8mm ID)
- h) 15 ml glass disposable screw top tubes
- i) 13 X 100 disposable test tubes

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EXTRACTION METHOD:

To a 15 ml screw top tube add 1 ml of specimen
-add 1 ml of deionized water
-vortex 10 seconds

Add 5 ml of petroleum ether: isopropanol::98:2
Cap and shake for 60 minutes on mechanical
shaker

Centrifuge 5 minutes at 2500 rpm

Transfer top organic layer to a 13 X 100
disposable test tube

Evaporate to dryness at 55C and a stream of
nitrogen

Reconstitute with 1 ml of petroleum ether

PREPARATION OF FLOROSIL COLUMN:

- a) pack the bottom of column with pesticide
grade glass wool
- b) rinse with 4 ml of petroleum ether
- c) when column is dry pack with 2.5cc of
florsil with tapping to settle
- d) add 0.5cc of sodium sulfate
- e) rinse column with 5 ml of petroleum ether

Florosil

EXTRACTION METHOD con't:

Transfer 1 ml of extract to Florosil column
Elute column with 6 ml 7% t- butylmethylether
Evaporate to dryness at 55C and a stream of
nitrogen

Reconstitute with 0.5ml hexane and cork

Inject 5 microliters of each extract on to the
gc column

INSTRUMENT PARAMETERS:

Type: Tracor 540 with electron capture detector

Column: 6ft x 2mm id glass

Packing: 3% OV-1 on 100/200 Suplecoport

Column temp: 230C isothermal

Injector: 240C

Detector: 325C

Run time: 9 minutes

Carrier gas: Argon/methane/95/5

Column flow : 48 ml/min

ACTION IF CONTROL IS OUT OF LIMITS:

- a) Compare response factors to previous runs
- b) Consult supervisor on action to be taken
 - 1) recalculate
 - 2) check for outliner standards
 - 3) rerun batch with fresh

CRITICAL VALUES:

Normal serum values: up to 30 ppb
 average 6 ppb
Call client on values exceeding 100ppb.

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ATTACHMENT VII

SEPTA PCB Status Sheet
for
PAOLI RAILYARD EMPLOYEES
April 22, 1986

NAME	EXAM DATE	AGE	EMPL. YRS.	DUR. MOS.	PCB LEVEL (ppb)	JOB TITLE	CONTACT FREQUENCY	UNION	COMMENTS
	03/25/86	26	2	5	10		3		Skin irritation, nausea, dizziness, Exam -> hyperpigment hand
	03/24/86	53	35	3	48		4		Skin irritation, Exam -> hypertension
	03/24/86	61	30	0	220		4		Skin irritation, eye irritation, Exam -> negative
	03/24/86	55	44	8	58		2		Exam -> negative
	03/25/86	53	30	0	270		1		No physical complaints, Exam -> negative
	03/25/86	31	11	9	24		3		Exam -> negative
	03/24/86	56	35	2	46		4		Nausea, vomiting, headache, lightheadedness, skin and eye irritation, Exam -> negative
	03/24/86	52	3	3	20		2		Exam -> negative
	03/25/86	33	0	8	6		3		No physical complaints, Exam -> negative
	03/24/86	60	39	6	15		3		History of ulcer, <u>liver dysfunction</u> , cough, tremor, nervousness, fatigue, skin irritation, Exam -> negative
	03/25/86	41	3	10	5				Exam -> R hand dermatitis
	03/25/86	57	40	0	75		4		No physical complaints, Exam -> hypertensive 168/112
	03/25/86	57	41	8	68		4		Skin rash, dizziness, Exam -> mildy hypertensive
	03/25/86	57	42	6	70		3		Eye irritation, Exam -> diminished breath sounds post R lung
	03/25/86	45	28	0	48		4		Skin and eye irritation, sore throat, Exam -> negative
	03/24/86	34	0	4	7		2		Rash with "pentatone," Exam -> negative
	03/25/86	37	10	1	9		3		Sinus problems, Exam -> negative
	03/25/86	49	26	0	280		3		No physical complaints, Exam -> negative

Legend: 1-Never 2-Rarely 3-Occas. 4-Freq.

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ORIGINAL
(Red)

SEPTA Status Sheet
for
PADLI ROADWARD EMPLOYEES
April 22, 1986

Legend: 1-Never 2-Rarely 3-Occas. 4-Freq.

NAME	EXAM DATE	AGE	EMPL. DUR. YRS. MOS.	PCB LEVEL (ppb)	JOB TITLE	CONTACT FREQUENCY	UNION	COMMENTS
	03/25/86	60	39 5	120		4		Skin irritation, eye irritation, nausea, dizziness, occasional cough, Exam -> negative
	03/24/86	48	30 0	15		4		Cough, burning face and eyes, itching, sore throat, lightheaded, Exam -> negative
	03/24/86	20	10 3	16		4		Throat irritation and rash on forehead for past 6 months, Exam -> papular rash on forehead
	03/24/86	43	6 0	16		2		Exam -> negative
	03/25/86	51	1 9	5		4		Skin and eye irritation, rash, HA, Exam -> negative
	03/24/86	34	15 5	40		2		Exam -> negative
	03/24/86	51	3 1	9		1		Exam -> negative
	03/24/86	28	5 4	24		4		Rash, acne, Exam -> negative
	03/24/86	58	16 8	53		4		Exam -> negative
	03/24/86	49	0 3	0	n.	2		Watery eyes, Exam -> negative
	03/24/86	54	13 3	10		2		Dizziness, nervousness, Exam -> spots on arms (previously a welder)
	03/25/86	36	10 0	7		4		Skin and eye irritation, chloracne, nausea/vomiting, HA, infertility, Exam -> negative
	03/24/86	61	15 5	160		4		Watery eyes, headache, dyspnea, Exam -> negative
	03/25/86	33	0 5	5		1		HA, Exam -> negative
	03/25/86	26	1 0	0		4		No physical complaints, Exam -> negative
	03/25/86	43	0 6	0		1		Acne, cough, Exam -> negative
	03/25/86	59	39 2	40		2		No physical complaints, Exam -> negative

AR100010

ORIGINAL
(Red)

SEPTA PCB Status Sheet
for
PAOLI RAILYARD EMPLOYEES
April 22, 1986

NAME
EXAM DATE
AGE
EMPL. YRS.
DUR. MOS.
PCB LEVEL (ppb)
JOB TITLE
CONTACT FREQUENCY
UNION
COMMENTS

Legend: 1-Never 2-Rarely 3-Occas. 4-Freq.

03/24/86	31	0	1	0			Exam -> negative
03/25/86	40	12	0	29			Dizziness, Exam -> negative
03/24/86	57	3	9	0			Skin Irritation, Exam -> slight rales in upper chest
03/24/86	45	0	3	5			Infrequent cough, rash, Exam -> contact dermatitis
03/25/86	23	0	2	0			Facial rash, Exam -> negative
03/25/86	34	12	7	8			Neck rash, eye Irritation, eye lid edema, cough, Exam -> negative
03/25/86	58	41	3	17			No complaints, Exam -> rash beneath gynecostasia, brwny edema
03/25/86	35	4	1	11			Eye Irritation/dischARGE, HA, Exam -> negative
03/24/86	44	3	3	13			Headaches, Exam -> negative, hypertension
03/24/86	56	31	0	06			Rash, dry skin, missing 3rd digit R hand. Exam -> hepatomegaly
03/24/86	55	3	1	51			Skin Irritation, rash on neck, occasional headache, dizziness, Exam -> negative
03/24/86	25	0	8	5			Eye Irritation while replacing degreaser, Exam -> negative
03/24/86	47	6	0	36			Exam -> Psoriasis on leg and scalp
03/24/86	50	3	2	14			Exam -> erythema, face and neck
03/25/86	59	39	8	40			Eye Irritation, cough, dyspnea, Exam -> wheezing
03/24/86	33	3	2	5			Exam -> negative
03/25/86	25	0	0	0			Acne worsened since employment, Exam -> negative
03/24/86	55	3	0	9			Exam -> negative

AP100011

ORIGINAL
(Red)

SEPTA PCB
PAOLI RAILYARD EMPLOYEES
Apr 11 22, 1986
Sheet

NAME	EXAM DATE	AGE	EMPL. YRS.	DUR. MOS.	PCB LEVEL (ppb)	JOB TITLE	CONTACT FREQUENCY	UNION	COMMENTS
	03/25/86	49	30	5	114		2		No physical complaints, Exam -> negative
	03/25/86	31	1	1	9		4		Rash, acne, eye irritation and discharge, nausea, dizziness, cough, dyspnea, Exam -> chloracne over shoulders bilat.
	03/24/86	60	43	0	150		4		Winter rash on arms, occasional itye, Exam -> tinea vesicolor
	03/25/86	34	3	4	6		3		Eye irritation, Exam -> negative
	03/25/86	30	1	2	6		1		Exam -> negative
	03/24/86	53	25	2	19		4		Eye irritation in A.M., dyspnea, Exam -> negative
	03/25/86	57	42	6	82		3		No complaints, Exam -> negative

Legend: 1-Never 2-Rarely 3-Occas. 4-Freq.

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(Red)

BRC-02

List of Data - 04/22/86

ATTACHMENT VII

Number	Name of Worker	Age of Worker (months)	Length of Employment (months)	PCB Level (ppb)	Frequency of Contact	Triglyc-erides (mg/dl)	Choles-terol (mg/dl)	LDH (U/L)	SGOT (U/L)	SGPT (U/L)
01										
02		312	029	010	B	124	243	180	039	097
03		636	423	048	A	319	260	187	025	031
04		732	360	220	A	233	184	217	023	043
05		660	536	058	C	077	214	178	020	025
06		636	360	270	D	186	277	238	029	058
07		372	141	024	B	096	160	196	020	032
08		672	422	046	A	069	256	162	026	018
09		624	039	020	C	145	239	201	025	017
10		396	008	006	B	069	172	107	022	019
11		720	474	015	B	143	210	211	019	028
12		492	046	005	Missing	106	240	147	025	028
13		684	480	075	Missing	265	283	159	025	042
14		684	500	058	A	148	277	156	024	027
15		540	510	070	B	333	229	179	027	029
16		408	336	048	A	162	262	155	041	072
17		444	004	007	Missing	158	204	170	022	030
18		588	121	009	B	186	225	157	022	016
19		720	312	280	B	080	170	160	013	022
20		576	473	120	Missing	232	294	125	022	049
21		348	360	015	A	077	281	166	009	017
22		516	123	016	A	048	189	150	014	025
23		612	072	016	C	137	177	140	027	027
24		408	021	005	A	048	289	182	017	022
25		612	185	040	C	121	199	215	028	035
26		612	037	009	D	155	199	220	024	018
27		336	064	024	A	150	144	162	024	024
28		696	200	053	A	174	203	225	025	025
29		588	003	000	C	074	191	246	037	053
30		648	159	010	C	090	169	287	062	060
31		232	120	007	A	046	144	136	024	025
32		732	185	160	A	200	310	184	024	030
33		396	005	005	D	081	167	148	015	023
34		312	012	000	A	065	213	198	033	034
35		516	006	000	C	166	285	197	014	025
36		708	006	040	C	232	209	163	028	026
37		372	471	000	Missing	163	220	142	024	017
38		180	001	029	A	168	249	199	028	041
39		144	144	000	C	163	220	142	024	026
40		340	045	000	D	209	220	142	024	026
41		176	003	005	D	039	206	147	017	001
42		196	002	000	D	076	167	184	033	019
43		049	151	008	Missing	082	241	146	024	020
			495	017	A	132	191	211	033	038
			049	011	B		214	175	029	032

AR100013

ORIGINAL
(Red)

BRC-02

List of Data - 04/22/86

Name of Worker	Age of Worker (months)	Length of Employment (months)	PCB Level (ppb)	Frequency of Contact	Triglycerides (mg/dl)	Cholesterol (mg/dl)	LDH (U/L)	SGOT (U/L)	SGPT (U/L)
	528	039	013	B	329	297	216	033	044
	672	372	096	A	336	236	212	034	038
	660	037	051	C	224	243	176	026	027
	300	008	005	B	180	245	177	026	041
	564	072	036	B	095	203	149	015	016
	600	038	014	A	082	190	195	023	029
	708	476	040	C	182	272	138	012	016
	396	038	005	C	064	154	142	023	012
	300	009	000	D	101	181	110	015	022
	660	045	009	B	102	231	193	020	026
	588	365	114	C	092	141	172	026	029
	372	013	009	A	071	197	211	053	061
	720	516	150	A	231	259	191	028	029
	408	040	006	B	130	172	153	031	038
	360	014	006	D	042	133	138	027	017
	636	302	019	A	228	256	233	036	071
	684	510	082	B	153	247	159	025	021

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(Red)

Simple Correlation Analysis

Variables in the analysis - Descriptive statistics

Variable label	N	Mean	Std. Dev.
V3 Age of Worker (months)	60	541.2000	141.7571
V4 Length of Employment (months)	60	189.6833	190.1292
V5 PCB Level (ppb)	60	42.0667	62.0467
V7 Triglycerides	60	144.4667	76.2306
V8 Cholesterol	60	219.3833	44.0247
V10 LOH	60	176.9167	34.7052
V10 S60T	60	25.6333	8.9366
V11 S9PT	60	31.7000	16.4938

AR100015

ORIGINAL (Red)

Correlation matrix

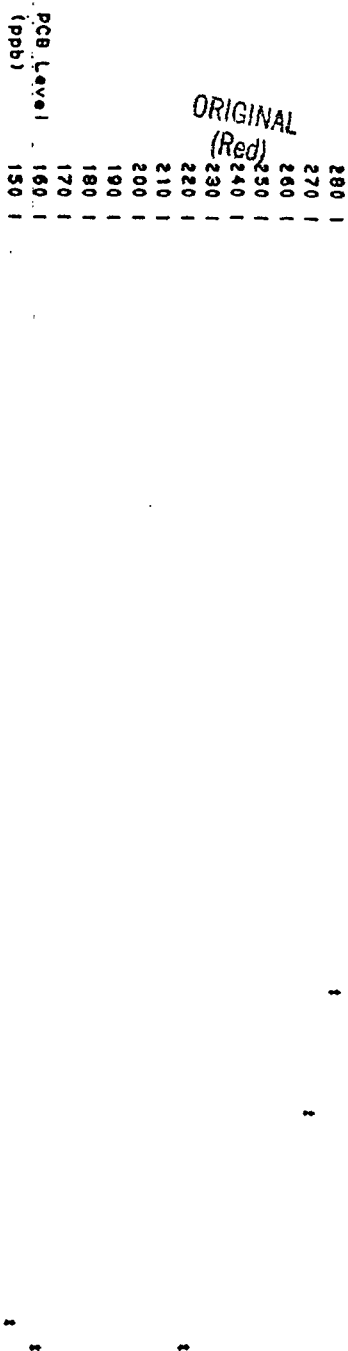
	V3	V4	V5	V7	V8	V9	V10
V3	r 0.6876						
	N 60						
	SE						
	t 7.2113						
	p 0.0000						
V4	r 0.4709	0.5302					
	N 60	60					
	SE 55.2069	53.0605					
	t 4.0651	4.7620					
	p 0.0003	0.0001					
V5	r 0.4567	0.3814	0.3035				
	N 60	60	60				
	SE 68.3974	71.0734	73.2594				
	t 3.9100	3.1421	2.4254				
	p 0.0005	0.0030	0.0175				
V7	r 0.4435	0.3312	0.1863	0.5011			
	N 60	60	60	60			
	SE 39.7966	41.8959	43.6250	38.4266			
	t 3.7686	2.6736	1.4443	4.4094			
	p 0.0007	0.0095	0.1504	0.0002			
V8	r 0.2953	0.0768	0.1478	0.1710	0.0884		
	N 60	60	60	60	60		
	SE 23.4418	34.8998	34.6187	34.4874	34.8661		
	t 2.3541	0.3863	1.1381	1.3220	0.6757		
	p 0.0207	0.5669	0.2587	0.1884	0.5089		
V9	r -0.0457	-0.0468	-0.0898	0.0663	-0.0813	0.5405	
	N 60	60	60	60	60	60	
	SE 9.0039	9.0035	8.9769	8.9935	8.9935	7.5831	
	t 0.3486	0.3565	0.6868	0.5061	0.6210	4.8931	
	p 0.7287	0.7281	0.5019	0.6206	0.5440	0.0001	
V10	r 0.0022	0.0516	0.1206	0.1704	0.1988	0.4892	0.6725
	N 60	60	60	60	60	60	60
	SE 16.6353	16.6132	16.5140	16.3744	16.3032	14.5092	12.3118
	t 0.0164	0.3933	0.9250	1.3649	1.5450	4.2713	6.9202
	p 0.9843	0.6977	0.3585	0.1743	0.1239	0.0002	0.0000

SDPT

SDOT

LDH

ORIGINAL
(Red)



Summary Statistics (N = 60)

IV = Age of Worker (months) Mean of residuals = -0.000000
 Mean of IV = 541.200000 S.D. of residuals = 54.737062
 S.D. of IV = 141.757109

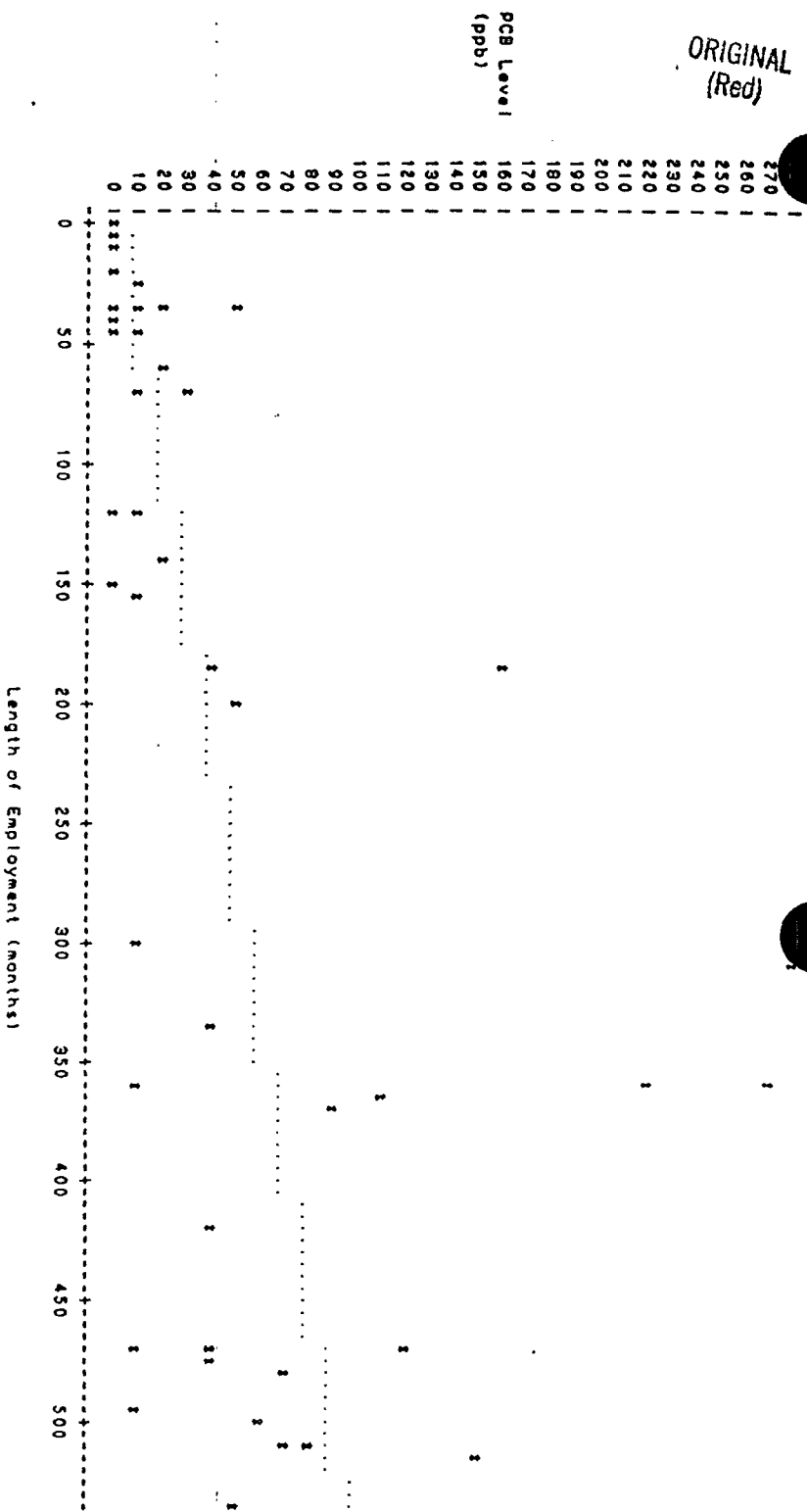
DV = PCB Level (ppb) Mean Abs. X Error = 165.399179
 Mean of DV = 42.066667 Mean X Error = -118.907628
 S.D. of DV = 62.046693 Mean Square Error = 2946.210170

Correlation coefficient = 0.470891 Degrees of freedom = 58
 R-Squared = 0.221738 S.E. of estimate = 55.206916

Coefficient	Est'd Std Error	T-Value	Significance	
Intercept	-69.478790	28.350266	-2.450728	0.0164
Slope	0.206108	0.050702	4.065102	0.0003

ORIGINAL
(Red)

Scattergram of Data & Regression Line



Summary Statistics (N = 60)

IV = Length of Employment (months) Mean of residuals = 0.00000
 Mean of IV = 189.689333 S.D. of residuals = 52.608994
 S.D. of IV = 190.129170

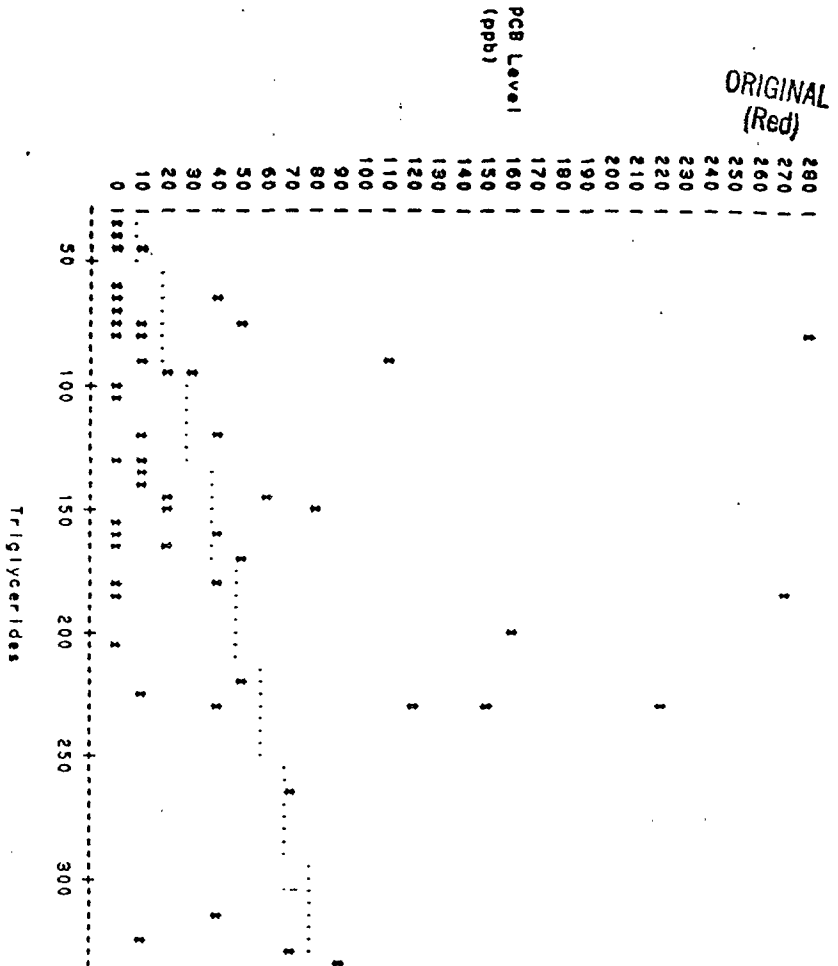
DV = PCB Level (ppb) Mean Abs. X Error = 109.212490
 Mean of DV = 42.066667 Mean X Err/r = -87.609536
 S.D. of DV = 62.046693 Mean Square Error = 2721.567425

Correlation coefficient = 0.530169 Degrees of freedom = 58
 R-Squared = 0.281079 S.E. of estimate = 53.060480

Coefficient	Std Error	T-Value	Significance
Intercept	9.248569	-9.716941	0.951798
Slope	0.173015	0.036393	4.761983

AR100018

ORIGINAL
(Red)



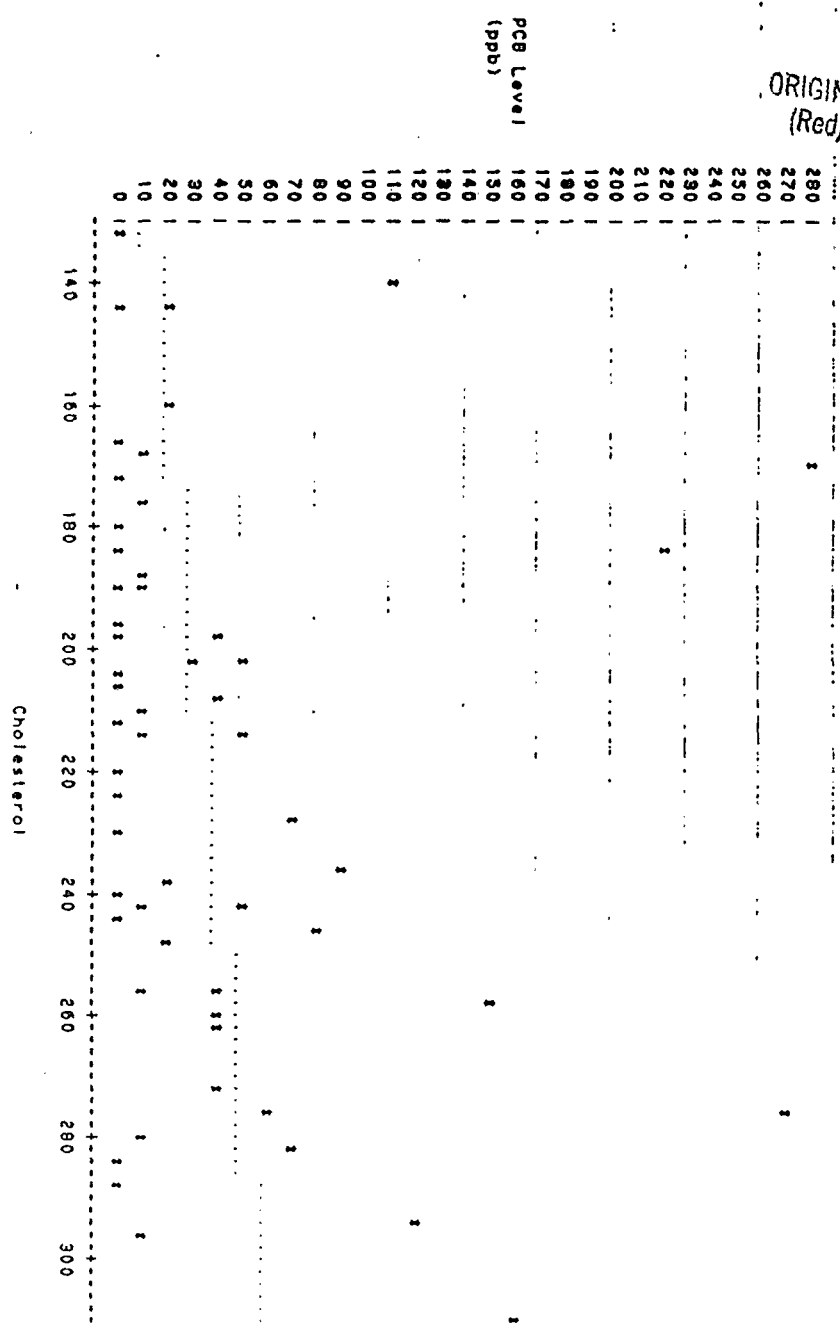
Summary Statistics (N = 60)

IV = Triglycerides Mean of residuals = -0.000000
 Mean of IV = 144.466667 S.D. of residuals = 59.120891
 S.D. of IV = 76.230575

 DV = PCB Level (ppb) Mean Abs. X-Error = 190.138237
 Mean of DV = 42.066667 Mean X Error = -162.875991
 S.D. of DV = 68.046693 Mean Square Error = 3437.025035

ORIGINAL
(Red)

Scattergram of Data & Regression Line



Summary Statistics (N = 60)

IV = Cholesterol
 Mean of IV = 219.383333
 S.D. of IV = 44.024682
 Mean of residuals = -0.000000
 S.D. of residuals = 60.960166

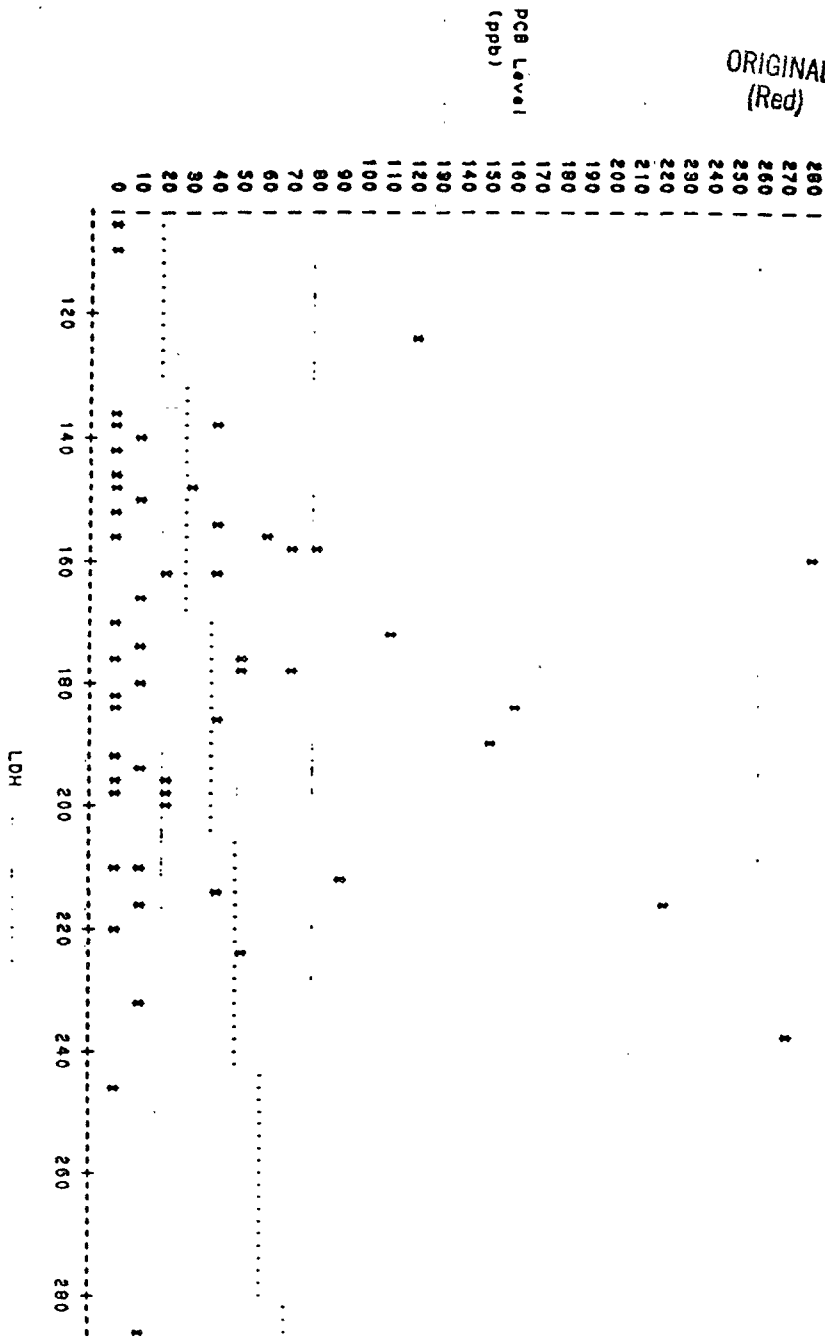
DV = PCB Level (ppb)
 Mean of DV = 42.066667
 S.D. of DV = 62.046693
 Mean Abs. X Error = 215.896524
 Mean X Error = -187.400904
 Mean Square Error = 3654.206129

Correlation coefficient = 0.186923
 Degrees of freedom = 58
 R-Squared = 0.034716
 S.E. of estimate = 61.489439

Coefficient	Est'd Std Error	T-Value	Significance	
Intercept	-15.542597	40.669844	-0.392165	0.7054
Slope	0.262596	0.181818	1.444285	0.1504

ORIGINAL
(Red)

Scattergram of Data & Regression Line



IV = LDH
 Mean of IV = 176.916667
 S.D. of IV = 34.705195

Mean of residuals = -0.000000
 S.D. of residuals = 61.365269

Summary Statistics (N = 60)

DV = PCB Level (ppb)
 Mean of DV = 42.066667
 S.D. of DV = 62.046693

Mean Abs. X Error = 225.022730
 Mean X Error = -191.745662
 Mean Square Error = 3702.934586

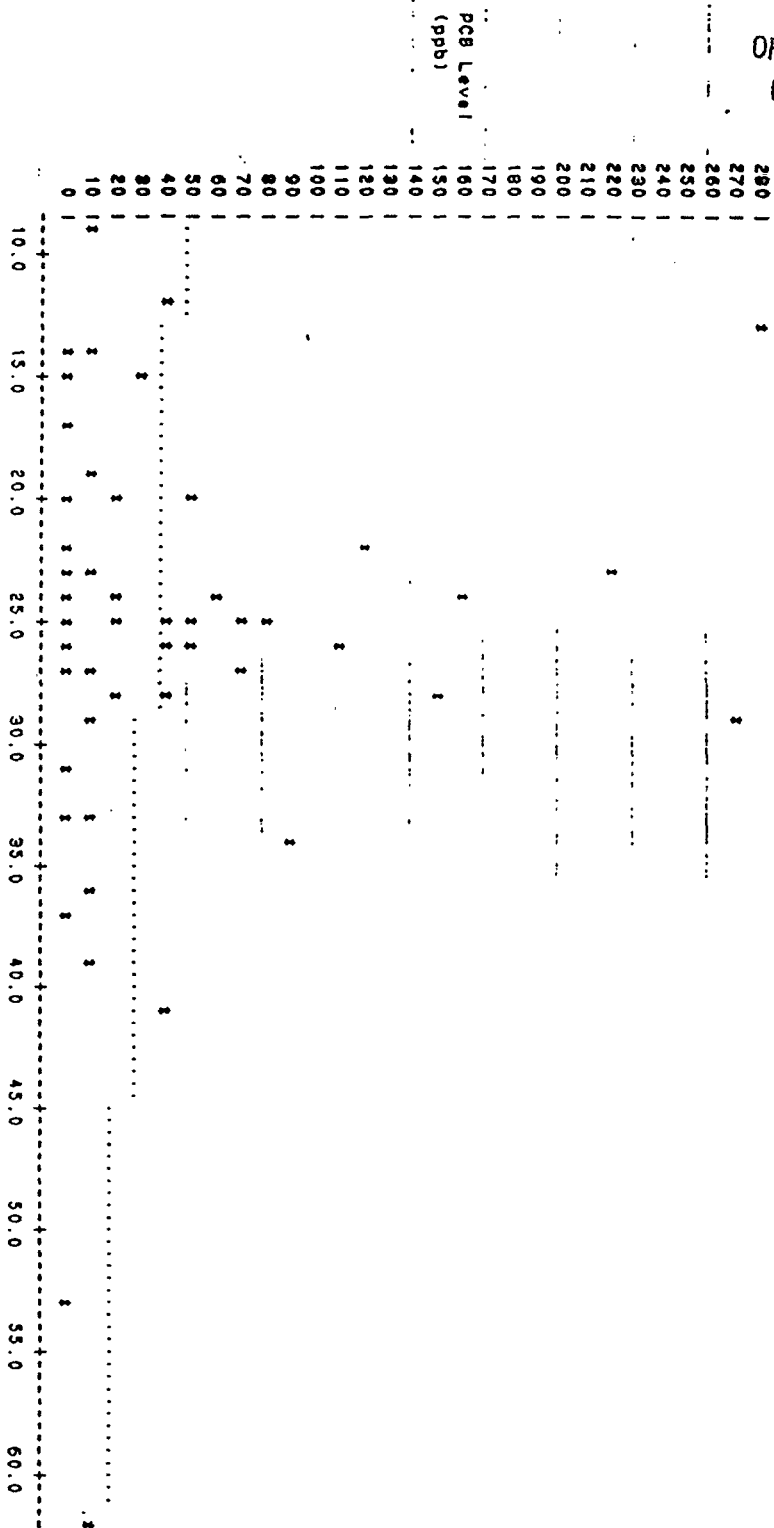
Correlation coefficient = 0.147798
 Degrees of freedom = 58
 R-Squared = 0.021644
 S.E. of estimate = 61.892019

	Coefficient	Std Error	T-Value	Significance
Intercept	-4.681187	41.845439	-0.111869	0.9073
Slope	0.264237	0.232174	1.138096	0.2587

AR100021

ORIGINAL
(Red)

Scattergram of Data & Regression Line



Summary Statistics (N = 60)

IV = SGOT
 Mean of IV = 25.633333
 S.D. of IV = 8.936626

Mean of residuals = -0.000000
 S.D. of residuals = 61.795886

DV = PCB Level (ppb)
 Mean of DV = 42.066667
 S.D. of DV = 62.046693

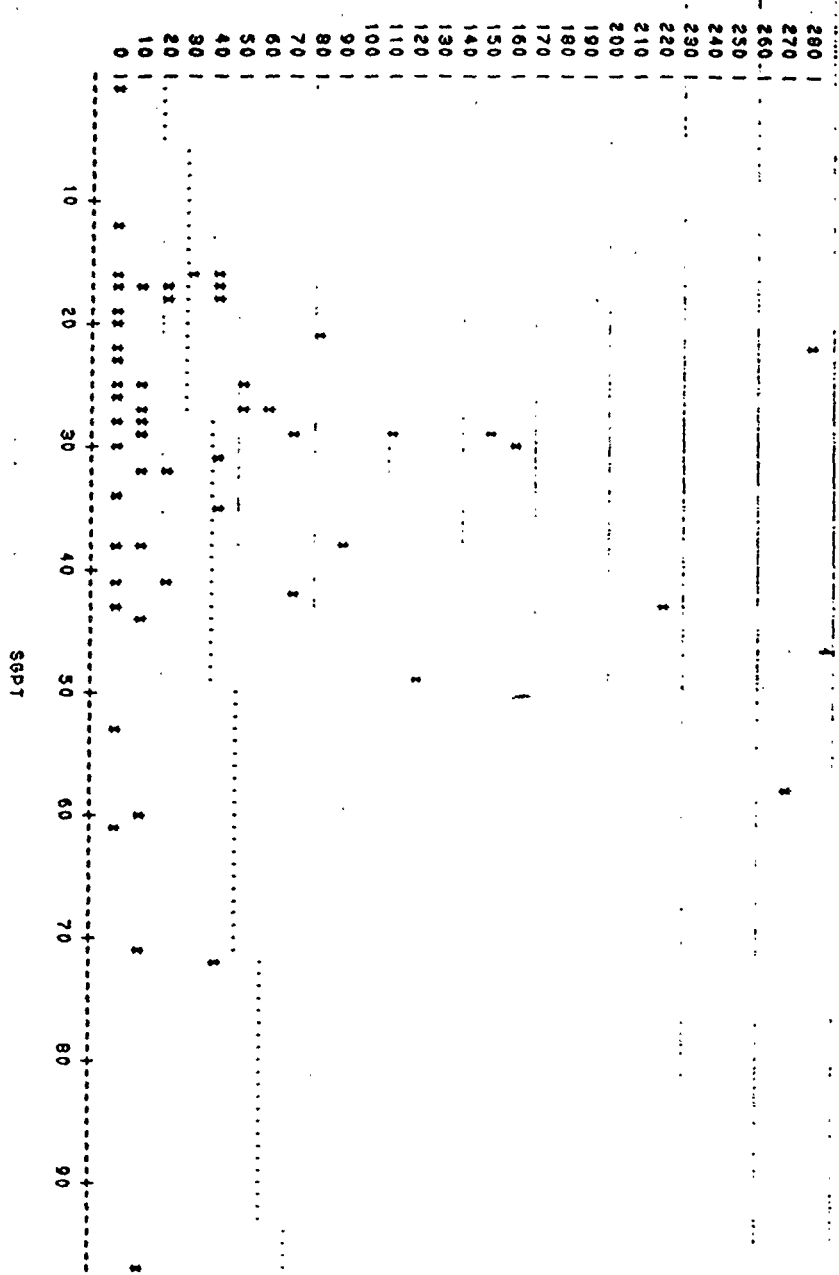
Mean Abs. X Error = 240.164985
 Mean X Error = -207.598434
 Mean Square Error = 3735.085948

Correlation coefficient = -0.089823
 R-Squared = 0.008068
 Degrees of freedom = 58
 S.E. of estimate = 62.326332

Coefficient	Std Error	T-Value	Significance
Intercept	58.052547	24.625942	2.957374
Slope	-0.623696	0.907971	-0.686846

ORIGINAL
(Red)

Scattergram of Data & Regression Line



Summary Statistics (N = 60)

IV = SGP7
 Mean of IV = 31.700000
 S.D. of IV = 16.493758
 Mean of residuals = 0.000000
 S.D. of residuals = 61.594023

DV = PCB Level (ppb)
 Mean of DV = 42.066667
 S.D. of DV = 62.046693
 Mean Abs. X Error = 239.214009
 Mean X Error = -199.780438
 Mean Square Error = 3750.593239

Correlation coefficient = 0.120574
 Degrees of freedom = 58
 R-Squared = 0.014538
 S.E. of estimate = 62.122736

Coefficient	Est'd Std Error	T-Value	Significance
Intercept	27.688242	17.491086	1.582992
Slope	0.453578	0.490349	0.925011

Attachment VIII - Explanation of Blood Tests

<u>PARAMETER</u>	<u>EXPLANATION</u>
Calcium	Mineral needed for teeth and bones, blood clotting, muscle contraction, and nerve impulses.
Phosphorus	Mineral needed for bones and teeth.
Glucose	"Sugar" - an energy source - increased levels associated with diabetes.
Urea Nitrogen	"Blood urea nitrogen" - reflects kidney function.
Creatinine	Reflects kidney function - increased levels seen in severe muscle diseases.
Uric Acid	Metabolic waste product - increased levels associated gout.
Cholesterol	Building block of cell structure - high levels associated with arteriosclerosis and heart disease.
Triglycerides	Blood fat used as an energy source - often related to obesity and alcohol intake.
Total Protein	Building block of tissues - abnormal in inflammatory and chronic disease.
Albumin	Component of total protein - often low in liver disease, malnutrition, and chronic illness.
Globulin	Component of total protein - abnormal in inflammatory and infectious disease and certain cancers.
Total Bilirubin	Product of red blood cell breakdown - elevation produces jaundice in liver dysfunction and hemolysis.
Alkaline Phosphatase	An enzyme reflecting liver and bone disorders.
SGOT	An enzyme reflecting liver and muscle damage.

AR100024

ORIGINAL
(Red)

PARAMETER

EXPLANATION

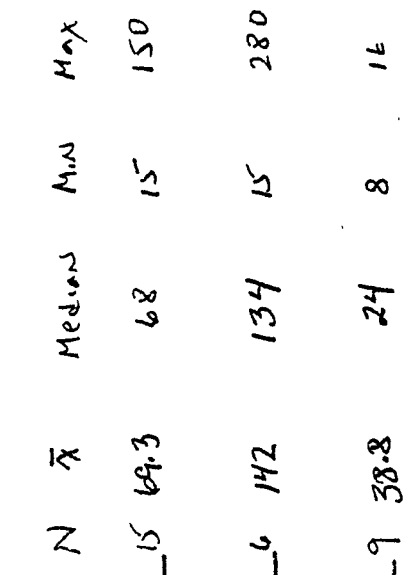
SGPT	An enzyme reflecting liver damage.
Sodium	Electrolyte (salt) related to fluid balance.
Chloride	Electrolyte related to fluid balance.
LDH	An enzyme in liver, muscle, and blood cells.
Carbon dioxide	Important in controlling blood acidity.

AR100025

SEPTA PCB Levels

Duration of
Employment

N	\bar{x}	Median	Min	Max
15	69.3	68	15	150



20-30 years

6	142	134	15	280
---	-----	-----	----	-----



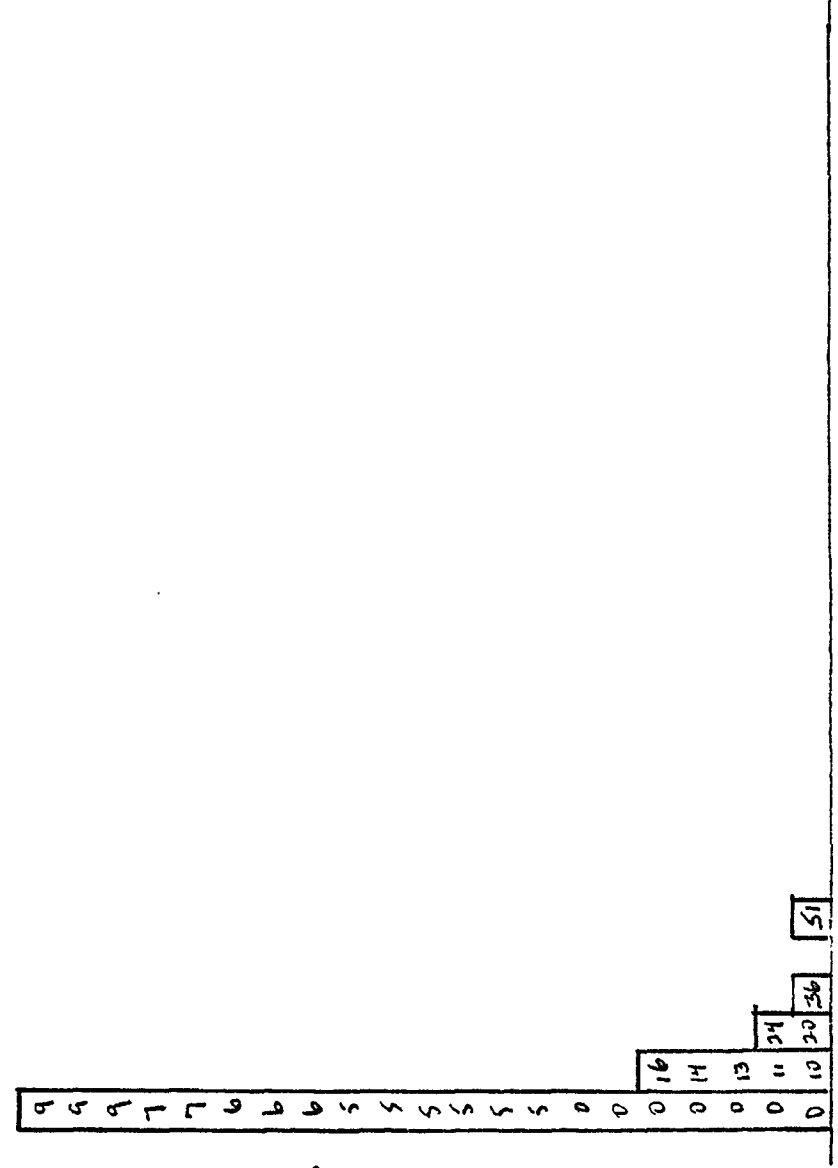
10-20 years

9	38.8	24	8	14
---	------	----	---	----



0-10 years

30	9.4	6	0	51
----	-----	---	---	----



Overall $\bar{x} = 42$
Median = 16

ORIGINAL
(Red)

AR100026

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280



National Medical Services, . c.

ATTACHMENT V

2300 Stratford Ave.
P.O. Box 433A,
Willow Grove, Pennsylvania 19090
(215) 657-4900

ORIGINAL
(Red)

4/8/86

RECEIVED

APR 10 1986

Dr. Chase
1120 19th, N.W.
Washington, DC 20036

KENNETH H. CHASE, M.D.

Dear Dr. Chase:

I am including in the short time frame the most inclusive information I have available concerning the PCB run on the Septa workers. I have included in detail the methodology and quality control data from this and past runs. The quality control specimen I mentioned on the phone was a pedigree specimen we diluted to be within the normal range.

The quality control specimen we ran in 1985 for 43 runs, the mean was 5.7. The maximum being 9 ppb and the minimum 3 ppb. Coefficient of variation 26%.

For this run, the 20 ppb spike we analyze and run at the end of the run to check for detector drift. The 20 ppb calculated to 19.5 ppb to indicate no drift.

If there is any other assistance you need feel free to call.

Sincerely yours,

Paul T. Delaney

PD/mmb

AR100027

WASHINGTON OCCUPATIONAL HEALTH ASSOCIATES, INC.

Suite 410
1120 19th Street, N.W.
Washington, D.C. 20036

ORIGINAL
(Red)

Consultants in Occupational
and Environmental Health

(202) 463-6698

REGISTRATION AND PARTICIPATION FORM
FOR PCB TESTING OF SEPTA EMPLOYEES

Name : _____ Date : _____

ID Number : _____ Social Security Number : _____

Age : _____ Date of Birth : _____

Address : _____

Telephone : _____

Present Work Location : _____

Occupation : _____

SEPTA has arranged for monitoring of employees at the Paoli Maintenance Facility for past and present exposure to polychlorinated biphenyls (PCBs). This program is intended to determine the effectiveness of SEPTA's handling procedures for PCBs as well as the degree of past exposure. The limited physical examination and laboratory tests which you will undergo as part of the program are not intended to substitute for the care provided by your personal physician. The examinations themselves are not complete physicals but, rather, limited to those symptoms and findings that might conceivably be related to PCB exposure and absorption. Following the completion of your examination and the results of all lab test determinations you will be informed of your PCB level(s) as well as any other abnormalities noted as part of this program.

I agree to participate in SEPTA's PCB Medical Surveillance Program and hereby authorize Washington Occupational Health Associates, Inc. (WOHA) to release all medical records to SEPTA. I further release from liability WOHA, its employees, and agents for gathering and supplying such information.

I decline to participate in the PCB Medical Surveillance Program.

signed

date

AR100028

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY
EMPLOYEE HISTORY FORM

ORIGINAL
(Red)

FORM A

WORK HISTORY

This form is a part of SEPTA's program to evaluate Polychlorinated Biphenyl (PCB) exposure among employees at the Paoli Maintenance Facility (PMF). Your help in carefully completing this form will be of assistance to this project. If you are uncertain about the information required for a particular question, please bring it to the examiner's attention. Upon completion please return this form to the nurse or examiner.

- 1. Employee Name 1. _____
- 2. Date Form Completed 2. ____/____/____
mo. day yr.

A. Employment

- 3. Length of Employment 3. ____ years, ____ months.
at PMF

Employee Name _____

Date ____/____/____
mo. day yr.

4. Breakdown of PMF positions held (from most recent to first).

A. Position	B. Duration (month/year) mo/yr to mo/yr	C. DESCRIPTION OF DUTIES	D. Shop Location	E. Any toxic exposure or health effects? / if yes	F. Specify what ma- terials you were exposed to	G. Specify what health effects reported	H. More reported to main- agement?
Present position							
Position before that							

ORIGINAL
(Red)

(Continue on back if necessary.)

Employee Name _____

Date _____ / _____ / _____
mo. day yr.

5. Employment before PMF.

A. Position/Employer	B. Duration (month/year) mo/yr to mo/yr	C. Location City, Town, State	C. DESCRIPTION OF DUTIES	E. Any toxic materials or health hazards? / if yes	F. If yes in E., specify materials.	G. If yes in E., specify what health effects
Last job before joining MIF						
Job before that						
Job before that						

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(Continue on back if necessary.)

ORIGINAL
(Red)

ORIGINAL
(Red)

Employee Name _____
Date ____/____/____
mo. day yr.

B. PCB Exposure

6. During any of your regular tasks at PMF do you (have you) come in contact with transformer fluid? yes no

If the answer to 6 is yes, answer questions 7 thru 10.

If the answer to 6 is no, go on to question 11.

7. Specify the operation(s) in which you were exposed: _____

8. How long does (did) each of these operations last? Answer in the same order as in 7.

9. How frequently do (did) you perform these operations? Answer in the same order as in 7.

10. When was the last time you came in contact with transformer fluid? Give as specific a date as possible.

mo. day yr.

AR100032

Employee Name _____

Date ____/____/____
mo. day yr.

11. Have you ever filed an accident report? yes no

If the answer to 11 is yes, complete questions 12 and 13.
If the answer to 11 is no, go to question 14.

12. What was the reason for filing an accident report? Please be specific as possible.

13. On what date was the accident report filed?
mo. day yr.

14. Are you aware of any medical (not traumatic) illnesses among your co-workers which might be work related? yes no

15. If the answer to 14 is yes, please describe any relevant medical problems.

C. Work Habits

(To be completed if you had contact with transformer fluid.)

16. When handling equipment which had transformer fluid in it:

a. How often do (did) you get it on your hands?

- Frequently.
- Occasionally.
- Rarely.
- Never

ORIGINAL
(Red)

Employee Name _____

Date ____/____/____
mo. day yr.

16. b. How often do (did) you get it on your clothing?

- Frequently.
- Occasionally.
- Rarely.
- Never

c. What is the usual amount of transformer fluid which touches your person? (When working around transformer fluid.)

- Drenching
- Moderate splash
- Small splash.
- None.

d. When you work with transformer fluid containing equipment, how often do you get it on your face and mouth?

- Frequently.
- Occasionally.
- Rarely.
- Never

17. When handling equipment containing transformer fluid:

a. Do (did) you wear gloves?

- Always.
- Usually
- Sometimes
- Rarely.
- Never

AR100034

Employee Name _____

Date ____/____/____
mo. day yr.

17. b. Do (did) you wear a respirator?

- Always
- Usually
- Sometimes
- Rarely
- Never

c. Do (did) you wear an impermeable suit?

- Always
- Usually
- Sometimes
- Rarely
- Never

d. If you get transformer fluid on your skin, do you wash it off:

- Immediately
- When time allows
- Wait until end of day
- Doesn't apply
(never get transformer
fluid on skin)

Employee Name _____

Date ____/____/____
mo. day yr.

D. Non-Work Exposures

18. Does anyone in your family work in a trade where hazardous materials are brought home (such as asbestos, lead, beryllium, vinyl chloride, etc.)?
 yes no

19. If answer to 18 is yes, describe: _____

20. Have you ever lived near a plant, shipyard, mine or other facility that could release hazardous materials?
 yes no

21. If the answer to 20 is yes, describe: _____

22. Do (did) you have any hobbies involving toxic exposures?
 yes no

23. If the answer to 22 is yes, describe: _____

Form 8

Employee Name _____

Date 3/24/86

Prevalence of Symptoms and Findings

completed
- in conjunction
EXAMINER
ORIGINAL (Red)

I. General

- A) Does employee believe he/she has been exposed to PCBs? No Yes
- B) If yes, what is believed to be the route of exposure?
- direct contact (dermal)
 - inhalation
 - ingestion
 - unknown
- C) Does employee perceive past/present adverse health effect(s)? No Yes
- D) If yes, describe: _____
- _____
- _____
- _____

II. Does employee report any of the following symptoms in association with PCB exposure or not otherwise explained:

- A) Dermatologic
- 1) Skin irritation or burning Yes No
 - 2) Rash (especially hands, arms, face) Yes No
 - 3) Acne or chloracne (especially face, torso, thighs) Yes No
 - 4) Thickening (especially hands) Yes No
 - 5) Hyperpigmentation (especially hands) Yes No
 - 6) Nail discoloration Yes No
- B) Ophthalmic
- 1) Eye irritation or burning Yes No
 - 2) Eye discharge Yes No
 - 3) Swelling of eyelids Yes No
- C) Gastrointestinal
- 1) Nausea Yes No
 - 2) Vomiting Yes No
 - 3) Abdominal pain Yes No
 - 4) Weight loss Yes No
 - 5) Any history of liver dysfunction Yes No
- D) Neurological
- 1) Headache Yes No
 - 2) Dizziness or lightheadedness Yes No
 - 3) Nervousness Yes No
 - 4) Tremor Yes No
 - 5) Fatigue Yes No
- E) Pulmonary
- 1) Cough Yes No
 - 2) Expiration Yes No
 - 3) Dyspnea on exertion Yes No
 - 4) Wheezing Yes No
- F) Reproductive
- 1) Any history of infertility Yes No
 - 2) Describe: _____

AR100037

3) Any history of miscarriages (spontaneous) Yes No

4) Describe: _____

5) Any history of stillbirths Yes No

6) Describe: _____

7) Any history of birth defects Yes No

8) Describe: _____

9) How many marriages _____

10) How long for each _____

11) How many live births _____

C) Miscellaneous

1) Persistent body odor Yes No

2) History of hyperlipidemia Yes No

3) History of cancer Yes No

4) Type: _____

III. Are any of the following physical findings present?

A) Dermatologic

1) Erythema Yes No

2) Rash Yes No

3) Chloracne Yes No

4) Hyperpigmentation Yes No

5) Thickening Yes No

6) Nail discoloration Yes No

B) Ophthalmic

1) Conjunctival infection Yes No

2) Eye discharge Yes No

3) Swelling of eyelids Yes No

C) Hepatic

1) Jaundice Yes No

2) Hepatomegaly Yes No

3) Other: _____ Yes No

D) Miscellaneous

1) Tremor Yes No

2) Weakness Yes No

3) Pulmonary: _____ Yes No

4) Other: _____ Yes No

neth H. Chase, M.D.
Suite 410
0 19th Street, N.W.
hington; D.C. 20036

CLINICAL RECORD
ATTACHMENT IV

r./Mrs./Miss _____ Date _____ ORIGINAL (Red)

NT
ILNESS

Last First Initial

PAST
ISTORY

INJURIES TRANSFUSIONS OPERATIONS

ALLERGIES MEDICATIONS ILLNESSES

FAMILY
ISTORY

HTN: CHD:
DM: OTHER:

SOCIAL
ISTORY

SMOKING: DRUGS:
ALCOHOL: OTHER:

REVIEW
OF

HEENT: NM:
BREASTS: E&M:
RESP: B&J:
CV: HEME:
GI: GU:

AR100039