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WASHINGTON WORKS

C-8

INDUSTRIAL HYGIENE

A. J. Playtis, 6/30/99

CONTAINS NO CBI

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C-8 IN BLOOD - HISTORICAL

- 1978 Informed by 3M that C-8 is found in the blood of exposed workers and persists for a long time.
- 1979 C-8 found in blood of DuPont workers.
- 1980 Workers with blood C-8 found to have normal liver function.
- 1981 Birth defects scare - additional sampling.
- 1982 Blood program continues on voluntary basis - no trends noted.
- 1986 Formal review of blood data.
- 1993 Journal Of Occupational Medicine study of 3M workers.
- 1993 No connection found between MM cancer cases and C-8 exposure.
- 1995 First 5-year "snapshot".
- 1996 No excess disease incidence found in 51 MM employees with highest C-8 blood levels.
- 1996-7 Follow-up from 1995 blood study.

Comparison of 1995 and 1996-7 data
 → 4 with 5 ppm

→ 4 with 5 ppm

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PNNM2771R

C-8 DOCUMENT LIST

Liver Function Study Of Washington Works Employees Exposed To C-8.
M. E. Fayerweather, 1/28/81

Review Of Washington Works C-8 Data. Personal Air Monitoring And
Blood Data.

H. A. Smith, 3/19/90

Work Histories Of Specific Cancer Cases.

A. J. Playtis, 11/15/93

Summary Of 1895 C-8 Blood Testing.

A. J. Playtis, 5/7/98

C-8 Study.

Y. L. Power, 8/5/98

Washington Works Response to Ramirez/Reinhardt O.H. Review.

A. J. Playtis, 12/12/98

C-8 Industrial Hygiene Follow-Up.

A. J. Playtis, 12/18/98

Summary Of Special C-8 Sampling Project.

J. Nichols, 9/16/97

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1990 C-8 INDUSTRIAL HYGIENE DATA REVIEW

(HA Smith, JG Loschiavo, RD Lanyon, WE Crawley)

CONCLUSIONS (Recognizing the data limitations)

There is a correlation between blood and air C-8 levels that is confused by dermal exposure.

Exposure at the AEL of 0.56 ^{ppb} mpb would result in a blood level of about 3 ppm.

Background blood level for the Teflon* area is between 0.1 and 0.5 ppm.

Dermal exposure is the cause for higher blood levels.

Half life for C-8 in blood is about 4 to 5 years.

Annual blood testing is not useful and should be replaced by "snapshots" at longer intervals.

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1995 C-8 IN BLOOD "SNAPSHOT"

PURPOSES

Monitor the overall effectiveness of our C-8 industrial hygiene programs.

Create and maintain a continuous data base for epidemiologic surveillance of our exposed population.

Provide closure for issues raised by the 1990 data review.

Honor employee requests for voluntary testing.

TEST POPULATIONS

Employees in C-8 jobs (82 of 140)

Employees not in C-8 jobs with a previous result >3 ppm (9 of 12)

Pensioners with a high previous result (9 of 19)

Volunteers (18)

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1995 C-6 BLOOD STUDY CONCLUSIONS

- o AVERAGE BLOOD LEVELS FOR DIFFERENT JOBS RANGE FROM 0.5 TO 3.5 PPM
- o MOST JOB AVERAGE BLOOD LEVELS HAVE GONE DOWN FROM 1989 TO 1995, PROBABLY DUE TO REDUCED SKIN CONTACT
- o NO ONE TESTED HAD A BLOOD LEVEL >5 PPM
- o TWO PEOPLE IN THE SAME JOB FOR MANY YEARS CAN HAVE VERY DIFFERENT BLOOD LEVELS
- o MECHANICS AVERAGE ABOUT 1 PPM
- o PENSIONER DATA INDICATES A BLOOD HALF-LIFE OF ROUGHLY 4 YEARS, BUT WITH WIDE INDIVIDUAL VARIATION.
- o THE CORRELATION BETWEEN AIR LEVELS AND BLOOD LEVELS IS WEAK
- o BETTER DATA COULD CHANGE MANY OF THESE CONCLUSIONS

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TABLE I
RESULTS SUMMARY - OPERATORS

<u>JOB</u>	<u>DESCRIPTION</u>	<u>1995 AVERAGE (n)</u>	<u>1989 AVERAGE (n)</u>
08PE	autoclave	2.5 (6)	4.7 (7)
08PF	polykettle	2.9 (7)	4.0 (4)
08PH	dispersion	2.2 (2)	3.2 (3)
08PI	FP finishing	2.2 (5)	2.0 (6)
08PJ	FP packout	0.6 (5)	
08PM	C-B dryer recovery	1.7 (2)	
18PA	FEP polykettle	2.3 (4)	
18PB	FEP extruder/oven	1.6 (5)	0.5 (3)
18PC	FEP wet finishing	3.3 (2)	
18PD	FEP packout	0.1 (3)	
18PJ	PFA/FEP bead	0.7 (2)	
18PK	FEP safety/disp	2.1 (2)	

RESULTS SUMMARY - MECHANICS

58MC	FP/disp/gran/TA	1.4 (1)
58MD	general shift	1.1 (8)
58MG	process E&I	0.8 (7)
68MA	general shift	1.1 (5)
68MB	FEP E&I	0.9 (7)

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HALF LIFE RESULTS FROM PENSIONERS

<u>C8</u> <u>DATE</u> <u>PPM</u>	<u>RET.</u> <u>DATE</u>	<u>C8</u> <u>DATE</u> <u>PPM</u>	<u>1/2 LIFE</u> <u>(YEARS)</u>
4/89 5.7	4/91	3/95 4.3	9.7
3/87 1.2	6/92	3/95 1.1	22
9/81 6.5	4/85	3/95 1.1	3.9
3/88 2.8	12/92	3/95 2.2	6.5
8/84 2.4	4/85	3/95 .72	5.7*
7/84 5.9	12/81	3/95 .94	4.0*
3/85 3.0	4/85	3/95 .14	2.3*
9/82 6.3	12/82	3/95 .57	3.5*
3/88 1.7	12/93	3/95 2.4	---

For * results, n = 4
 average = 3.9
 sigma = 1.4

using $\log \frac{n}{n_0} = \frac{-.301 t}{t_{1/2}}$

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WASHINGTON WORKS
AIR SAMPLING RESULTS

PERSONAL SAMPLES

	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999*</u>
<10% AEL	40	15	48	60	50	30
<50% AEL	14	14	19	31	18	11
<100% AEL	3	1	2	10	9	1
>100% AEL	0	0	0	1	0	0
TOTAL	57	30	69	102	77	42

AREA SAMPLES

<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999*</u>
43	26	20	171	48	18

*through 5/31

- o PERS (DOHMS) system used to determine where personal samples are needed.
- o S12T used to determine sampling frequencies, usually 90, 180, or 360 days.
- o Area samples have support role, identifying locations where C-8 levels are high.

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1996

PATH FORWARD

Finish Data Analysis

Employee Communication

Site Industrial Hygiene Efforts

Toxicology Work (Do we need a BEI?)

Continue Annual Voluntary Testing

Take Another Snapshot In 2000

CONTAINS NO CBI

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WASHINGTON WORKS C-8 INDUSTRIAL HYGIENE - LOOKING FORWARD

ONGOING SITE PROGRAMS

- o AIR MONITORING
- o BLOOD MONITORING
- o EPIDEMIOLOGY
- o CONTINUOUS IMPROVEMENT OF CONTROL MEASURES

QUESTIONS TO BE ANSWERED

- o DO WE HAVE SUFFICIENT TOXICOLOGY DATA?
- o SHOULD WE DO ADDITIONAL MEDICAL SURVEILLANCE?
- o DO WE NEED A BEI?
- o ARE WE SATISFIED WITH OUR CURRENT AEL?
- o SHOULD BLOOD TESTING BE MANDATORY?

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