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Chambers Works PFOA Recycle

Prior to start-up of the PFOA Recycle process, baseline blood samples were collected on workers who would be assigned to the recycle process and its support operations so that future sampling could be compared to the baseline levels. Blood monitoring is conducted as an industrial hygiene tool to evaluate the effectiveness of the controls. Baseline samples of 42 workers were collected in 1999. Samples were analyzed as whole blood for PFOA by a contract laboratory using gas chromatography with electron capture detector. This laboratory had been analyzing blood samples for Washington Works for several years. Workers who volunteered for testing included operators, mechanics and laboratory personnel involved with the PFOA recycling process. A second round of sampling was conducted in 2000 which included 30 people from the original 1999 group and 34 newly assigned workers. DuPont analytical chemists found that in both the 1999 and 2000 blood monitoring campaigns, the lowest calibration standard used by the lab was 100 ppb. PFOA was detected in many of the Chambers Works samples, but it could not be reliably quantified at concentrations less than 100 ppb. All of the samples in both the 1999 and 2000 blood monitoring campaigns showed results <100 ppb.

This experience led DuPont to work with a different contract analytical laboratory on another method that would be more sensitive and provide more scientifically accurate and reliable data at the low levels in which we were interested.

DATA SUMMARY

Chemical: Perfluorooctanoic Acid

Site: Chambers Works, Deepwater, NJ

Date of Monitoring: September - October 2002

Matrix: Blood Serum

Operation: PFOA Recycle

Job Title	Number Sampled	# of Samples <LOQ (50 ppb)	Minimum Concentration (ppb)	Mean (ppb)	Median (ppb)	Maximum Concentration (ppb)	Standard Deviation
Entire Cohort	62	21	50	172	78.8	1650	286
Males	61	21	50	173	78.8	1650	288
Females	1	0	57.6	57.6	57.6	57.6	0
Operators	17	0	52.7	373	175	1650	461
Males	17	0	52.7	373	175	1650	461
Females	0	-	-	-	-	-	-
Mechanics	18	3	59.8	168	122	658	156
Males	18	3	59.8	168	122	658	156
Females	0	-	-	-	-	-	-
Laboratorians	21	15	50	35	<50	88.5	17
Males	21	15	50	35	<50	88.5	17
Females	0	-	-	-	-	-	-
Supervision	6	3	57.6	92	~54	313	113
Males	5	3	106	98.8	<50	313	113
Females	1	0	57.6	57.6	57.6	57.6	0

Comments:

- Samples analyzed by Advion Laboratories using LC/MS/MS
- Means and standard deviations were calculated using 25 ppb (1/2 of the LOQ) for those samples reported as less than the LOQ.

Prepared by: Barbara J. Dawson, CIH, CSP
Date of Preparation: November 17, 2004

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DuPont Company
PFOA in Blood
Chambers Works
September - October 2002

Analyte	Biological Matrix	Subject	Concentration (µg/ml)	Concentration Units	Job Assignment
PFOA	Serum	57178	0.168	µg/ml	Operator
PFOA	Serum	57179	0.175	µg/ml	Operator
PFOA	Serum	57180	0.0788	µg/ml	Operator
PFOA	Serum	57181	1.65	µg/ml	Operator
PFOA	Serum	57187	1.13	µg/ml	Operator
PFOA	Serum	57188	1.11	µg/ml	Operator
PFOA	Serum	57198	0.0978	µg/ml	Operator
PFOA	Serum	57199	0.347	µg/ml	Operator
PFOA	Serum	57201	0.0834	µg/ml	Operator
PFOA	Serum	57202	0.277	µg/ml	Operator
PFOA	Serum	57204	0.297	µg/ml	Operator
PFOA	Serum	57205	0.233	µg/ml	Operator
PFOA	Serum	57206	0.0527	µg/ml	Operator
PFOA	Serum	57207	0.174	µg/ml	Operator
PFOA	Serum	57208	0.125	µg/ml	Operator
PFOA	Serum	57211	0.210	µg/ml	Operator
PFOA	Serum	57200	0.127	µg/ml	Operator
AVG			0.388		
STDEV			0.472		
MIN			0.053		
MAX			1.650		
MEDIAN			0.193		
PFOA	Serum	57182	0.025	µg/ml	JL Technician
PFOA	Serum	57183	0.025	µg/ml	JL Technician
PFOA	Serum	57184	0.025	µg/ml	JL Technician
PFOA	Serum	57185	0.0561	µg/ml	JL Technician
PFOA	Serum	57186	0.025	µg/ml	JL Technician
PFOA	Serum	57189	0.025	µg/ml	JL Technician
PFOA	Serum	57190	0.025	µg/ml	JL Technician
PFOA	Serum	57191	0.025	µg/ml	JL Technician
PFOA	Serum	57192	0.025	µg/ml	JL Technician
PFOA	Serum	57193	0.025	µg/ml	JL Technician
PFOA	Serum	57194	0.025	µg/ml	JL Technician
PFOA	Serum	57195	0.05	µg/ml	JL Technician
PFOA	Serum	57196	0.0543	µg/ml	JL Technician
PFOA	Serum	57197	0.025	µg/ml	JL Technician
PFOA	Serum	57203	0.0506	µg/ml	JL Technician
PFOA	Serum	57209	0.025	µg/ml	JL Technician
PFOA	Serum	57210	0.0565	µg/ml	JL Technician
PFOA	Serum	57212	0.025	µg/ml	JL Technician
PFOA	Serum	57213	0.025	µg/ml	JL Technician
PFOA	Serum	98049	0.025	µg/ml	JL Technician
PFOA	Serum	98134	0.0885	µg/ml	JL Technician

for results less than limit of quantitation (0.050 µg/ml),
one half of the LOQ is used for statistical analysis (0.025 µg/ml)

Prepared by Barbara J. Dawson, CIH, CSP
November 17, 2004

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DuPont Company
PFOA in Blood
Chambers Works
September - October 2002

Analyte	Biological Matrix	Subject	Concentration (µg/ml)	Concentration Units	Job Assignment
AVG			0.035		
STDEV			0.017		
MIN			0.025		
MAX			0.089		
MEDIAN			0.025		
PFOA	Serum	57214	0.658	µg/ml	Mechanic
PFOA	Serum	57215	0.0910	µg/ml	Electrician
PFOA	Serum	57216	0.0750	µg/ml	Mechanic
PFOA	Serum	98039	0.025	µg/ml	Mechanic
PFOA	Serum	98041	0.244	µg/ml	Mechanic
PFOA	Serum	98047	0.0598	µg/ml	Mechanic
PFOA	Serum	98048	0.137	µg/ml	Mechanic
PFOA	Serum	98056	0.199	µg/ml	Lagger
PFOA	Serum	98135	0.242	µg/ml	Inst. Mechanic
PFOA	Serum	98136	0.226	µg/ml	Mechanic
PFOA	Serum	98137	0.359	µg/ml	Mechanic
PFOA	Serum	98138	0.122	µg/ml	Mechanic
PFOA	Serum	98139	0.0629	µg/ml	Electrician
PFOA	Serum	98140	0.025	µg/ml	Inst. Mechanic
PFOA	Serum	98141	0.127	µg/ml	Mechanic
PFOA	Serum	98142	0.264	µg/ml	Mechanic
PFOA	Serum	98143	0.0807	µg/ml	Mechanic
PFOA	Serum	98040	0.025	µg/ml	Mechanic
AVG			0.168		
STDEV			0.156		
MIN			0.025		
MAX			0.658		
MEDIAN			0.125		
PFOA	Serum	98009	<LLQ	µg/ml	BLANK
PFOA	Serum	98010	<LLQ	µg/ml	BLANK
PFOA	Serum	98055	0.106	µg/ml	1st line super
PFOA	Serum	98133	0.025	µg/ml	Engineer
PFOA	Serum	98144	0.025	µg/ml	Chemist
PFOA	Serum	98145	0.025	µg/ml	Area Mgr
PFOA	Serum	98146	0.0576	µg/ml	ATO
PFOA	Serum	98147	0.313	µg/ml	Unit Tech Ldr
AVG			0.092		
STDEV			0.113		
MIN			0.025		
MAX			0.313		
MEDIAN			0.0413		

for results less than limit of quantitation (0.050 µg/ml),
one half of the LOQ is used for statistical analysis (0.025 µg/ml)

Prepared by Barbara J. Dawson, CIH, CSP
November 17, 2004

000239

DATA SUMMARY

Chemical: PFOA

Site: Chambers Works

Date of Monitoring: 2004

Matrix: Human Blood Serum

Operation: Secure Environmental Treatment

Job Title	Number Sampled	Minimum Concentration	Mean	Median	Maximum Concentration	Standard Deviation
Entire Cohort	29	13.3	46.48	37.9	174	36.05
Males	29	13.3	46.48	37.9	174	36.05
Females	0	-	-	-	-	-
Operators	10	15.7	70.31	71.8	174	51.53
Males	10	15.7	70.31	71.8	174	51.53
Females	0	-	-	-	-	-
Mechanics	19	13.3	33.94	36.1	65.55	14.59
Males	19	13.3	33.94	36.1	65.55	14.59
Females	0	-	-	-	-	-
Laboratorians	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Supervision	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-

Comments:

- Analysis by Exygen
- Where duplicate samples were run, averages of two were used for statistical analysis
- Descriptive statistics calculated using Microsoft Excel

Prepared by: Barbara J. Dawson, CIH, CSP
Date of Preparation: December 9, 2004

000240

DuPont Company
PFOA in Blood
Chambers Works
2004 Secure Environmental Treatment

	Operator	Mechanic
	65.8	26.55
	132	36.1
	174	55.8
	20.6	16.9
	15.7	22.75
	80.8	65.55
	80	23.4
	22.7	22.85
	77.8	33.6
	33.7	47.4
		46.1
		37.9
		43.3
		13.3
		40.3
		42.35
		16.3
		38.9
		15.5
Count	10	19
Min	15.70	13.30
Avg	70.31	33.94
Median	71.80	36.10
Max	174.00	65.55
Std Dev	51.53	14.59

	All
	65.8
	132
	174
	20.6
	15.7
	80.8
	80
	22.7
	77.8
	33.7
	26.55
	36.1
	55.8
	16.9
	22.75
	65.55
	23.4
	22.85
	33.6
	47.4
	46.1
	37.9
	43.3
	13.3
	40.3
	42.35
	16.3
	38.9
	15.5
Count	29
Min	13.30
Avg	46.48
Median	37.90
Max	174.00
Std Dev	36.05

DATA SUMMARY

Chemical: PFOA

Site: Chambers Works

Date of Monitoring: 2004

Matrix: Human Blood Serum

Operation: Non-PFOA/Non-Telomers

Job Title	Number Sampled	Minimum Concentration	Mean	Median	Maximum Concentration	Standard Deviation
Entire Cohort	8	5.55	14.97	11.3	43.2	11.92
Males	8	5.55	14.97	11.3	43.2	11.92
Females	0	-	-	-	-	-
Operators	6	5.55	14.91	10.15	43.20	14.05
Males	6	5.55	14.91	10.15	43.20	14.05
Females	0	-	-	-	-	-
Mechanics	2	13.2	15.15	15.15	17.1	2.76
Males	2	13.2	15.15	15.15	17.1	2.76
Females	0	-	-	-	-	-
Laboratorians	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Supervision	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-

Comments:

- Analysis by Exygen
- Where duplicate samples were run, averages of two were used for statistical analysis
- Descriptive statistics calculated using Microsoft Excel

Prepared by: Barbara J. Dawson, CIH, CSP
Date of Preparation: December 9, 2004

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DuPont Company
PFOA in Blood
Chambers Works
2004 Non-PFOA/Non-Telomers

	Operator	Mechanic
	12.3	13.2
	43.2	17.1
	5.55	
	8.11	
	10.3	
	10	
Count	6	2
Min	5.55	13.20
Avg	14.91	15.15
Median	10.15	15.15
Max	43.20	17.10
Std Dev	14.05	2.76

All	
12.3	
43.2	
5.55	
8.11	
10.3	
10	
13.2	
17.1	
8	Count
5.55	Min
14.97	Avg
11.30	Median
43.20	Max
11.92	Std Dev

DATA SUMMARY

Chemical: PFOA

Site: Chambers Works

Date of Monitoring: 2004

Matrix: Human Blood Serum

Operation: Former PFOA Recycle Operations

Job Title	Number Sampled	Minimum Concentration	Mean	Median	Maximum Concentration	Standard Deviation
Entire Cohort	23	17.2	241.3	95.7	1605	387.3
Males	23	17.2	241.3	95.7	1605	387.3
Females	0	-	-	-	-	-
Operators	15	37.9	330.05	170	1605	458.39
Males	15	37.9	330.05	170	1605	458.39
Females	0	-	-	-	-	-
Mechanics	8	17.2	74.89	59.3	163	51.63
Males	8	17.2	74.89	59.3	163	51.63
Females	0	-	-	-	-	-
Laboratorians	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Supervision	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-

Comments:

- Analysis by Exygen
- Where duplicate samples were run, averages of two were used for statistical analysis
- Descriptive statistics calculated using Microsoft Excel

Prepared by: Barbara J. Dawson, CIH, CSP
Date of Preparation: December 9, 2004

000244

DuPont Company
PFOA in Blood
Chambers Works
2004 Former PFOA Recycle Operation

	Operators	Mechanics
	Male	Male
	412	72.2
	84.3	46.4
	174	163
	95.7	44.4
	77.4	73.8
	1605	142.5
	53.4	39.6
	241	17.2
	188	
	56.6	
	37.9	
	1200	
	170	
	441	
	114.5	
Count	15	8
Min	37.90	17.20
Avg	330.05	74.89
Median	170.00	59.30
Max	1605.00	163.00
Std Dev	458.39	51.63

All
412
84.3
174
95.7
77.4
1605
53.4
241
188
56.6
37.9
1200
170
441
114.5
72.2
46.4
163
44.4
73.8
142.5
39.6
17.2
23
Count
17.20
Min
241.30
Avg
95.70
Median
1605.00
Max
387.30
Std Dev

DATA SUMMARY

Chemical: PFOA

Site: Chambers Works

Date of Monitoring: 2004

Matrix: Human Blood Serum

Operation: Controls

Job Title	Number Sampled	Minimum Concentration	Mean	Median	Maximum Concentration	Standard Deviation
Entire Cohort	13	3.66	7.73	7.55	13.95	3.42
Males	10	3.66	8.32	7.98	13.95	3.63
Females	3	3.92	5.77	5.76	7.62	1.85
Operators	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Mechanics	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Laboratorians	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Supervision	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-

Comments:

- Analysis by Exygen
- Where duplicate samples were run, averages of two were used for statistical analysis
- Descriptive statistics calculated using Microsoft Excel

Prepared by: Barbara J. Dawson, CIH, CSP
Date of Preparation: December 9, 2004

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DuPont Company
PFOA in Blood
Chambers Works
2004 Controls

	Male	Female
	7.55	7.62
	9.59	5.76
	4.82	3.92
	13.95	
	8.41	
	5.72	
	3.66	
	4.88	
	12.6	
	12	
Count	10	3
Min	3.66	3.92
Avg	8.32	5.77
Median	7.98	5.76
Max	13.95	7.62
Std Dev	3.63	1.85

All Controls	
7.55	
9.59	
4.82	
13.95	
8.41	
5.72	
3.66	
4.88	
12.6	
12	
7.62	
5.76	
3.92	
13	Count
3.66	Min
7.73	Avg
7.55	Median
13.95	Max
3.42	Std Dev

DATA SUMMARY

Chemical: PFOA

Site: Chambers Works

Date of Monitoring: 2004

Matrix: Human Blood Serum

Operation: Jackson Laboratory

Job Title	Number Sampled	Minimum Concentration	Mean	Median	Maximum Concentration	Standard Deviation
Entire Cohort	12	5.5	18.27	12.95	67.8	16.75
Males	10	7.16	20.23	15.8	67.8	17.76
Females	2	5.5	8.5	8.5	11.5	4.24
Operators	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Mechanics	0	-	-	-	-	-
Males	0	-	-	-	-	-
Females	0	-	-	-	-	-
Laboratorians	6	7.16	24.35	18.05	67.8	22.59
Males	6	7.16	24.35	18.05	67.8	22.59
Females	0	-	-	-	-	-
Supervision	6	5.5	12.2	11.85	18.8	4.28
Males	4	11.5	14.05	12.95	18.8	3.5
Females	2	5.5	8.5	8.5	11.5	4.24

Comments:

- Analysis by Exygen
- Where duplicate samples were run, averages of two were used for statistical analysis
- Descriptive statistics calculated using Microsoft Excel

Prepared by: Barbara J. Dawson, CIH, CSP
Date of Preparation: December 9, 2004

000248

DuPont Company
PFOA in Blood
Chambers Works
2004 Jackson Laboratory

	Technician	Supervision	
	Male	Male	Female
	7.63	18.8	5.5
	17.9	12.2	11.5
	18.2	13.7	
	27.4	11.5	
	7.16		
	67.8		
Count	6	4	2
Min	7.16	11.50	5.50
Avg	24.35	14.05	8.50
Median	18.05	12.95	8.50
Max	67.80	18.80	11.50
Std Dev	22.59	3.30	4.24

	All	All Male	All Sup
	7.63	7.63	18.8
	17.9	17.9	12.2
	18.2	18.2	13.7
	27.4	27.4	11.5
	7.16	7.16	5.5
	67.8	67.8	11.5
	18.8	18.8	
	12.2	12.2	
	13.7	13.7	
	11.5	11.5	
	5.5		
	11.5		
Count	12	10	6
Min	5.50	7.16	5.50
Avg	18.27	20.23	12.20
Median	12.95	15.80	11.85
Max	67.80	67.80	18.80
Std Dev	16.75	17.76	4.28