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Measurement and Estimated Health Risks of Semivolatile Organic Compounds (PCBs, PAHs, Pesticides, and Phthalates) in Ambient Air at the Hanford Site

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September 1997

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Summary

Air samples for polychlorinated biphenyls (PCBs), chlorinated pesticides, phthalate plasticizers, and polycyclic aromatic hydrocarbons (PAHs) were collected at three Hanford Site locations (300-Area South Gate, southeast of 200-East Area, and a background location near Rattlesnake Springs). Samples were collected using high-volume air samplers equipped with a glass fiber filter and polyurethane foam plug sampling train. Target compounds were extracted from the sampling trains and analyzed using capillary gas chromatography with either electron capture detection or mass selective detection.

Twenty of the 28 PCB congeners analyzed were found above the detection limits, with 8 of the congeners accounting for over 80% of the average PCB concentrations. The average sum of all individual PCB congeners ranged from 500 -740 pg/m³, with little apparent difference between the sampling locations. Twenty of the 25 pesticides analyzed were found above the detection limits, with endosulfan I, endosulfan II, and methoxychlor having the highest average concentrations. With the exception of the endosulfans, all other average pesticide concentrations were below 100 pg/m³. There was little apparent difference between the air concentrations of pesticides measured at each location.

Sixteen of the 18 PAHs analyzed were found above the detection limit. Phenanthrene, fluoranthene, pyrene, fluorene, chrysene, benzo(b)fluoranthene, and naphthalene were the only PAHs with average concentrations above 100 pg/m³. Overall, the 300 Area had higher average PAH concentrations compared to the 200-East Area and the background location at Rattlesnake Springs; however, the air concentrations at the 300-Area also are influenced by sources on the Hanford Site and from nearby communities.

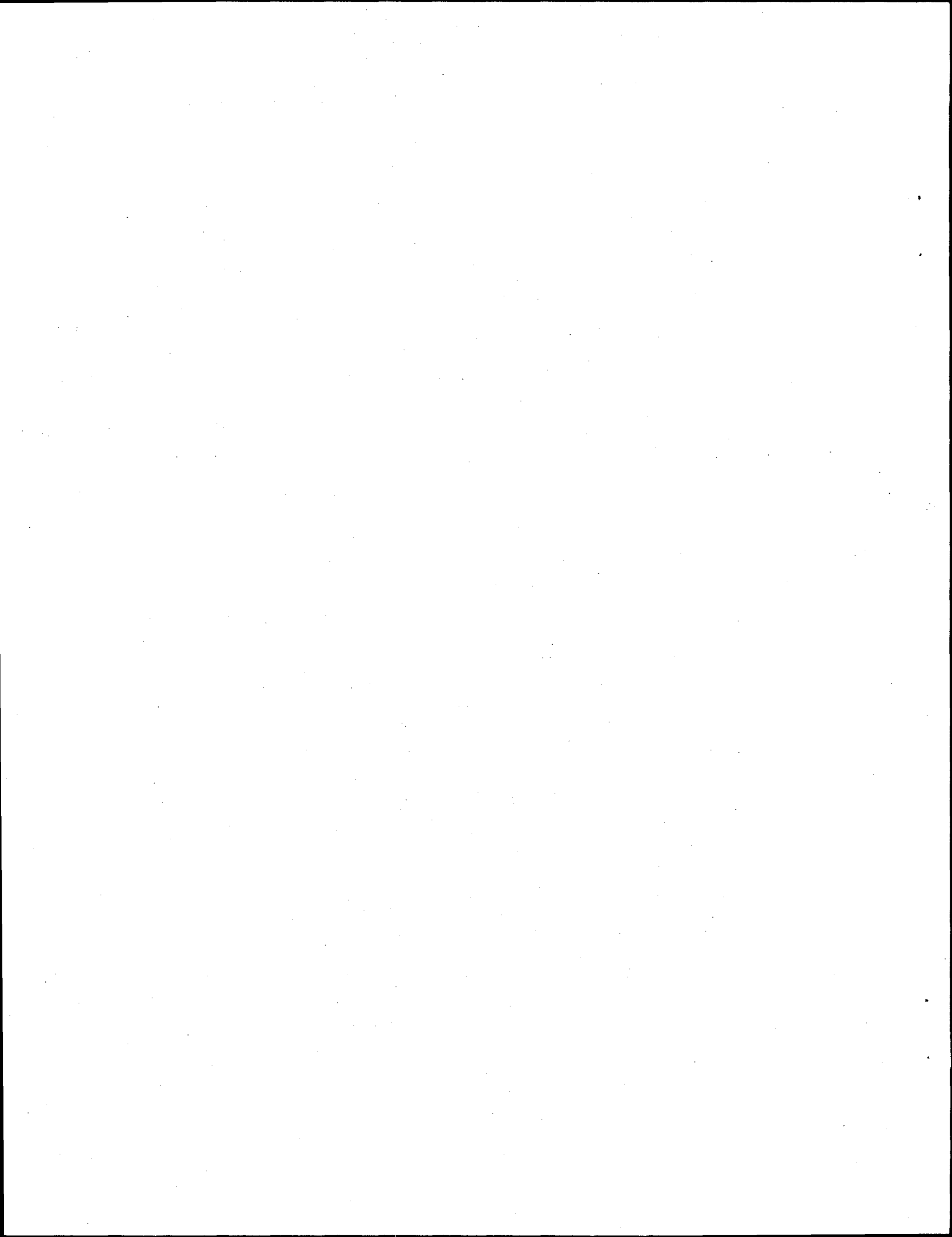
Two phthalate esters (PEPs) [bis(2-ethylhexyl)phthalate and di-n-octyl phthalate], were found for a few samples; however, both compounds had high concentrations in the sample blanks, and the data should be used with caution. Despite the high blank contribution, the PEP results provided information on the upper limit air concentrations, which was useful for evaluating potential human health effects.

No ambient air quality standards exist for the semivolatile organic compounds measured in this study. Therefore, the ambient air concentrations were compared to carcinogenic and non-carcinogenic risk-based concentrations.^(a) Ambient air concentrations below the risk-based concentrations have associated risks that are less than 1×10^{-6} for cancer risk and less than 1.0 of hazard quotient for non-cancer risk. All pesticide, PAH, and phthalate ester air concentrations were below the risk-based concentrations. All individual congener PCBs and average total PCB concentrations were below the risk-based concentrations. However, the maximum concentrations for total PCBs exceeded the risk-based concentrations for all three locations. A more detailed risk evaluation may be required for PCBs using individual congener air concentrations and individual congener toxicity data; however, currently this toxicity information is not available.

(a) U.S. EPA 1995. EPA Region III Risk Based Concentration Table, Background Information, R. L. Smith, February 7, 1995.

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1.0 Introduction

A variety of radioactive and nonradioactive chemicals have been released in effluent streams and discharged to waste disposal facilities at the Hanford Site. Organic compounds have been detected by Hanford Site subsurface chemical monitoring programs at some locations in the ground water; however, only limited data exist to demonstrate whether elevated concentrations of organic chemicals exist in surface environmental media (Riley et al. 1986; Glantz and Laws 1990; Dirkes et al. 1993; Patton et al. 1994). A review of chemicals of concern for environmental surveillance at the Hanford Site identified Aroclor 1254 [a polychlorinated biphenyl (PCB) technical mixture], benzo(a)pyrene [a polycyclic aromatic hydrocarbon (PAH)], and bis(2-ethylhexyl)phthalate [a phthalate ester plasticizer (PEP)] as possible candidates for additional monitoring (Blanton et al. 1995).

Some potential mechanisms leading to surface exposure from airborne contaminants may be direct releases to the atmosphere from facilities, fugitive dust sources, and remediation activities. This report describes a set of ambient air samples collected for the Hanford Site Surface Environmental Surveillance Project, provides data concerning the types and concentrations of airborne semivolatile organic compounds (SVOCs) at the Hanford Site, and estimates potential human health effects from exposure to the measured concentrations.

2.0 Background

Organic air pollutants can be grouped into three broad categories (volatile, semivolatile, and non-volatile) based on chemical vapor pressure. At ambient temperature, the volatile organic compounds are present in the atmosphere as vapors whereas the non-volatile compounds are entirely associated with airborne particulate. Semivolatile organic compounds are found both as vapors and associated with airborne particulates. An understanding of the vapor/particle distribution of organic pollutants is necessary to design appropriate air sampling systems and understand the environmental fate of these pollutants (Bidleman 1988).

The SVOCs present a unique air sampling challenge because both vapor phase and particle phase material must be collected. Neither traditional volatile nor non-volatile sampling approaches can adequately determine the concentration of SVOCs. The volatile compound sampling methods are not effective for collecting SVOCs because of the low air concentrations of SVOCs typically encountered and the inability of thermal techniques to adequately desorb these compounds from the adsorption traps. The non-volatile sampling techniques are not appropriate for SVOC because the vapor phase material is not collected by the filter. Traditionally, air samples for SVOCs are collected using a sampling train that uses a combination sampling head loaded with a filter for the particle phase and an adsorbent bed for the vapor phase material (Bidleman 1985). Polyurethane foam has been widely used as the adsorbent of choice for compounds with vapor pressures below 1×10^{-6} torr (0.0001 Pa).

The PCBs are a group of 209 SVOCs composed of from 1 to 10 chlorine atoms attached to biphenyl. The PCBs have tremendous commercial use and were widely used as dielectric fluids for capacitors and coolants for transformers, with other uses as plasticizers, hydraulic and heat transfer fluids, inks, paints, and adhesives (Erickson 1992). The PCBs were not produced as discrete compounds (referred to as congeners) but as technical mixtures of PCB congeners in varying proportions. The production of PCBs in the United States from 1930 to 1974 is estimated at 590 million kg, with most of the material marketed by Monsanto under the tradename Aroclor (National Research Council 1979). The U.S. production of PCBs peaked in 1970 (38 million kg/yr), and production had essentially stopped by the late 1970's (Bidleman et al. 1990). World production of PCBs is estimated at 1.2 billion kg, with an estimated 65% still in use or in landfills, 4% degraded or incinerated, and 31% released and cycling in the global environment (Bidleman et al. 1990). Once released into the environment, PCBs are persistent, lipophilic, toxic at high doses, and possible human carcinogens. The environmental toxicology is complicated by the large number of congeners in the technical mixtures and the potential presence of other toxic compounds.

Organochlorine pesticides are another group of SVOC that can be found in ambient air samples. Most organochlorine pesticides are no longer used in the United States; however, global use of many of these compounds continue, and many of these pollutants have been found in remote regions (Bidleman et al. 1990; Patton et al. 1991). In general, the organochlorine pesticides are persistent, lipophilic, toxic in high doses, and potential carcinogens.

The PAHs, sometimes referred to as polynuclear aromatic hydrocarbons, are another group of SVOCs. Most environmental PAHs are products of incomplete combustion processes, and both biogenic and anthropogenic sources exist. Most PAHs are persistent and lipophilic, and several PAHs are carcinogenic (Levin et al. 1978).

Another group of SVOCs are PEPs. The PEPs are widely used chemicals added to soften plastics and make them more pliable and are found in most consumer goods. The U.S. production of PEPs was estimated at over 450 million kg in 1972, with di-(2-ethylhexyl)phthalate and di-n-butylphthalate having the highest production (Graham 1973). The PEPs are distributed throughout the environment and also have been reported in environmental samples in remote regions (Hites 1977; Giam et al. 1978; Atlas and Giam 1988). The physical properties and environmental fate of 18 PEPs were reviewed by Staples et al. (1997). In general, the acute toxicities of the PEPs are generally low (DEHP has been used as an additive for plastic food wrapping); however, some studies have shown impacts from the chronic exposure of some organisms to low concentrations of PEPs (Menzer and Nelson 1980). The ubiquitous presence of PEPs in environmental samples, the large annual production, and possible toxic effects for some organisms at low concentrations make PEPs a concern for environmental monitoring studies.

3.0 Experimental

3.1 Sample Collection

General Metal Works PS-1 high-volume air samplers (Figure 3.1) equipped with dual (particle/vapor) sampling modules (Figure 3.2) were used to collect the samples. Air volumes of 670 - 1100 m³ were pulled through 10.5-cm-diameter glass fiber filters (GFF) [Reeve Angle, Grade 934AH] and a 7.6-cm thick by 6.5-cm diameter polyurethane foam plug [PUF] [polyether-type, density = 0.0225 g/cm³] at flow rates of 0.206 - 0.288 m³/min. For each sampling period, at least one sample had a second 7.6-cm thick PUF plug directly behind the primary PUF to monitor for breakthrough. Flow rates were determined by measuring the pressure drop behind the GFF/PUF traps with the Magnehelic gauge supplied with the PS-1 sampler. This pressure drop was related to volumetric flow by using the PS-1 calibration orifice.

Before sampling, the PUF plugs were cleaned by Soxhlet extraction using 5% diethyl ether in hexane. The filters were wrapped in aluminum foil and baked overnight in a muffle furnace at 350°C. Clean PUF plugs were stored in glass jars with Teflon lids. The aluminum foil packets containing the GFF were stored in plastic bags. Sampling trains were loaded with GFF/PUF in the laboratory and transported to the field in plastic bags. Blank samples were carried to the field and handled in the same manner as the actual samples. After sample collection, the sampling trains were returned to the lab, and the GFF/PUF was removed and transported to the analytical lab. Samples were temporarily stored in a freezer before shipment on dry ice or Blue Ice to the analytical lab where the samples were stored in a freezer until analysis.

Air samples were collected at the 300 Area South Gate, southeast of 200-East, and at a background location near Rattlesnake Springs (Figure 3.3). The Rattlesnake Springs location is typically upwind of major Hanford Site facilities (see wind roses in Figure 3.4). Samples collection dates and sampling parameters are given in Table 3.1.

3.2 Sample Analysis

Air samples were analyzed at Battelle Pacific Northwest National Laboratory's Marine Sciences Laboratory in Sequim, Washington. PCB #103 and PCB #198 were added as surrogate internal standards for each sample analyzed for PCBs and chlorinated pesticides. For samples analyzed for PAHs, deuterated surrogate internal standards were added (d8-naphthalene, d10-acenaphthene, d10-phenanthrene, d12-chrysene, d12-perylene, d14-dibenzo(a,h)anthracene). Both PUF and GFF were Soxhlet-extracted using 5% diethyl ether in hexane. Sample extracts were passing through a silica/alumina cleanup column, followed by an additional cleanup using high-pressure liquid chromatography. The cleaned sample extracts were analyzed by gas chromatography using either electron capture detection or mass spectrometry detection. For some samples, the GFF and front PUF were combined for a single analysis to improve the overall analytical detection limit and reduce cost.

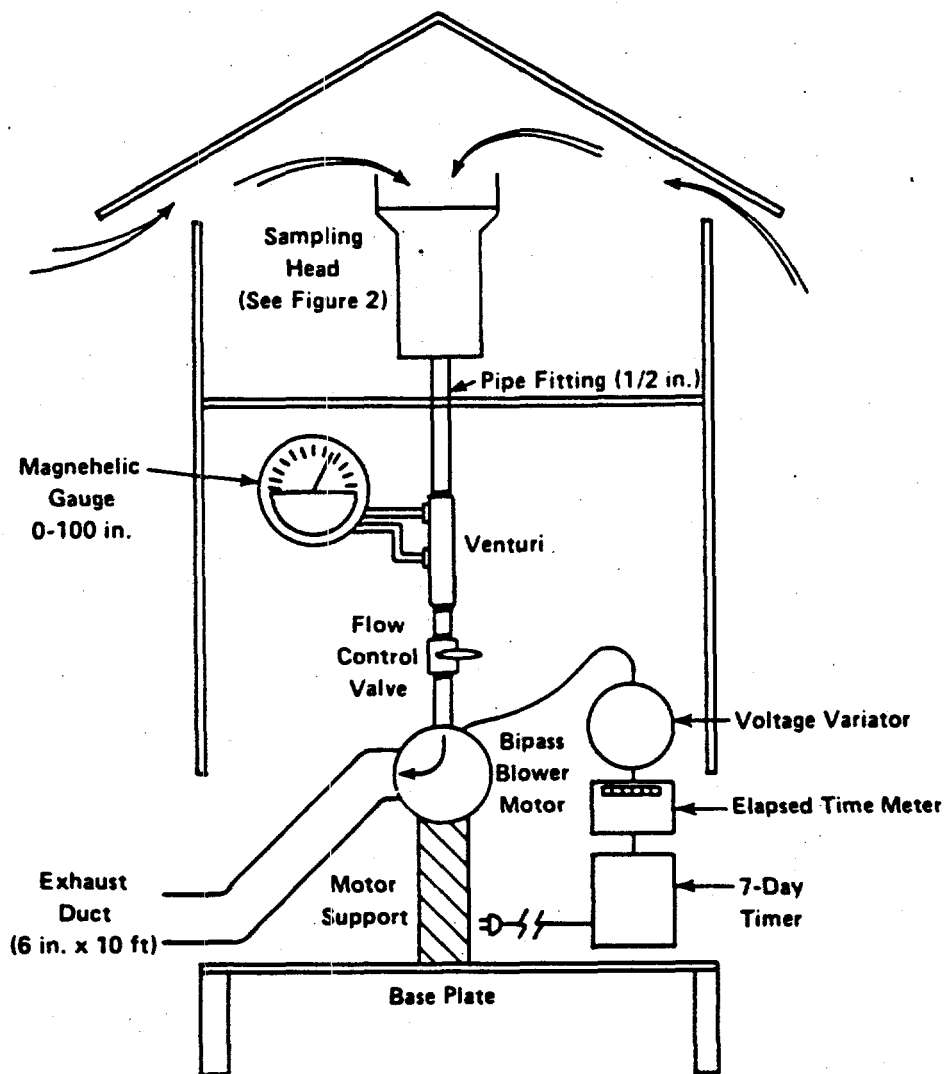


Figure 3.1. High-Volume Air Sampler for Semivolatile Organic Compounds (PS-1)
(from Winberry et al. 1988)

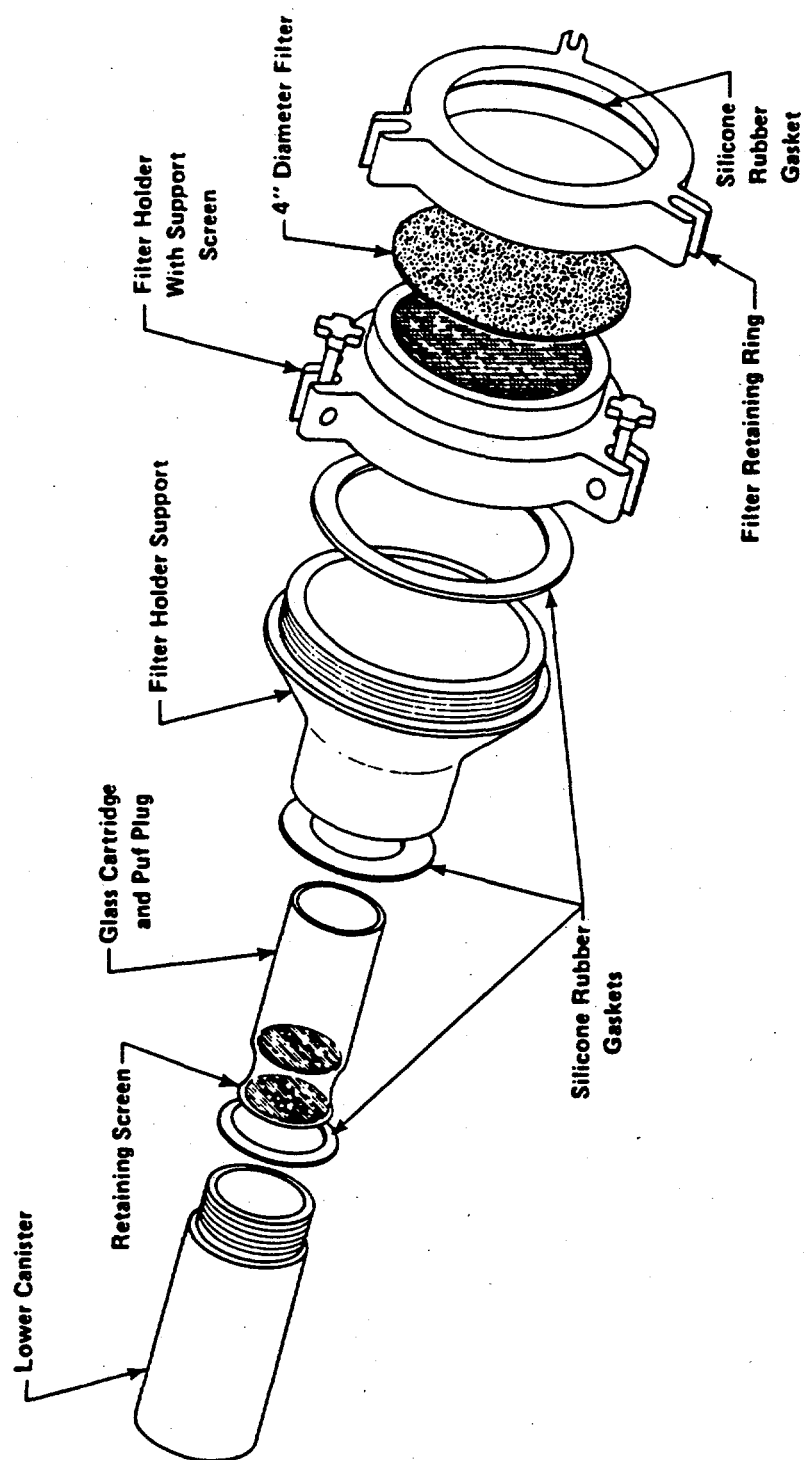
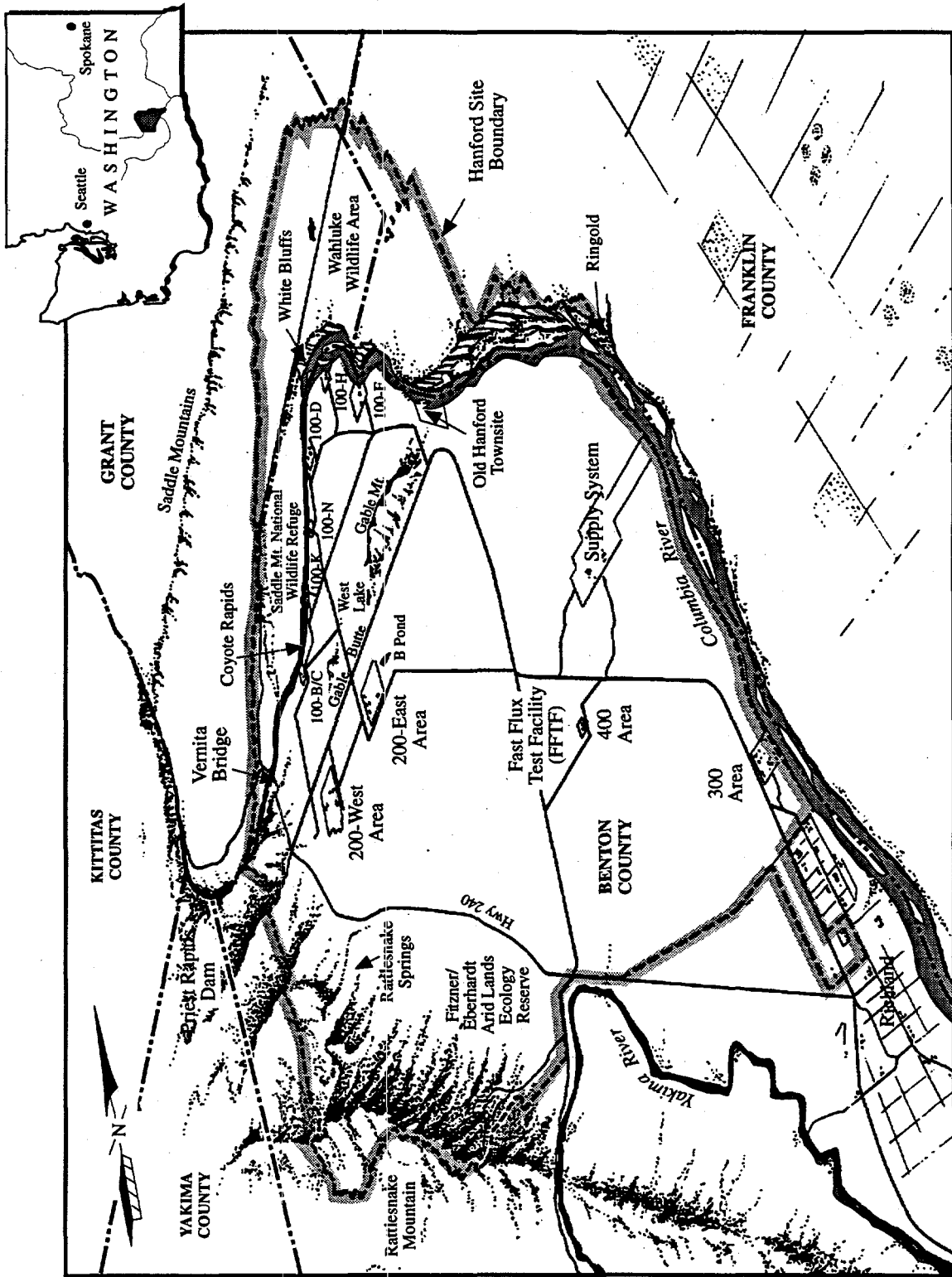


Figure 3.2. Exploded View of PS-1 Air Sampling Head (from Winberry et al. 1988)



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Figure 3.3. U.S. Department of Energy's Hanford Site and Surrounding Regions

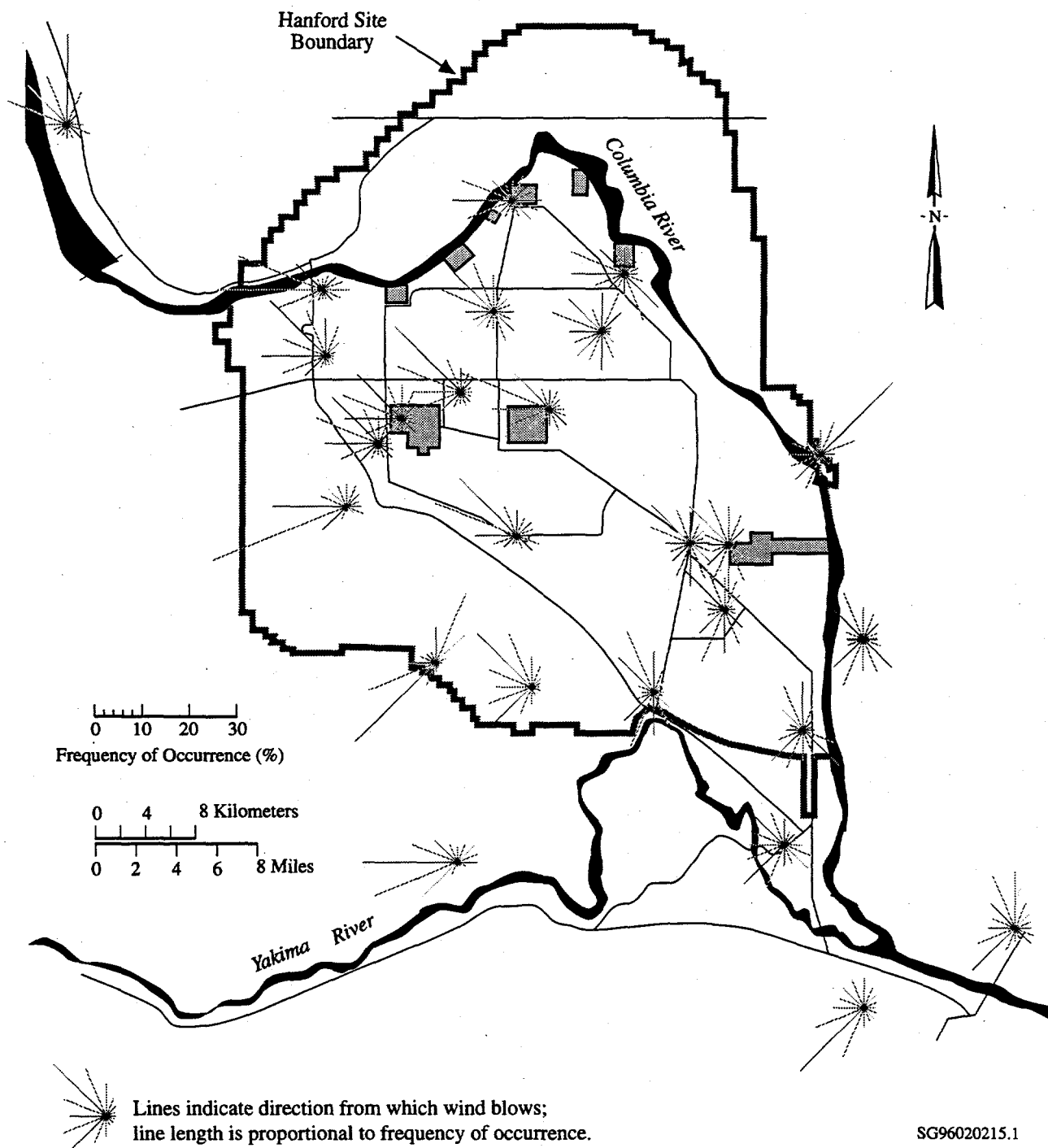


Figure 3.4. Hanford Meteorology Monitoring Network Wind Roses for 1995

Table 3.1. Air Sample Collection Dates and Experimental Parameters

On Date	Off Date	200 ESE	300 Area	Rattlesnake Spr.
4/4/95	4/7/95	GFF FPUF BPUF 1100 m ³	Combined 980 m ³	Combined 1100 m ³
5/22/95	5/25/95	Combined 1100 m ³	GFF FPUF BPUF 970 m ³	Combined 1100 m ³
8/15/95	8/17/95	GFF FPUF BPUF 700 m ³	Combined 670 m ³	Combined 770 m ³
8/29/95	8/31/95	Combined 700 m ³	GFF FPUF BPUF 690 m ³	Combined 720 m ³
GFF = Individual Analysis of Glass Fiber Filter. FPUF = Individual Analysis of Front Polyurethane Foam Plug. BPUF = Individual Analysis of Back Polyurethane Foam Plug. Combined = Analysis of Combined Extract from GFF and FPUF.				

To assess analytical recovery during the extraction process, a set of blank PUF plugs were spiked with a mixture of analytes and analyzed in the same manner as ambient air samples. Because of a shortage of blank PUF plugs, some back PUF plugs from ambient samples also were spiked with analytes and used in the recovery study. The use of back PUF plugs from ambient samples is appropriate for most analytes because the filter and primary PUF plug should retain all but the most volatile pollutants.

Blank (clean and unused media) filters and PUF plugs were analyzed in the same manner as ambient air samples to assess any contamination in the sampling media.

A National Institute of Standards and Technology standard reference material (NIST SRM#1649 Urban Dust/Organics, Gaithersburg, Maryland) was analyzed in the same manner as the air samples for selected PAH compounds; certified values were not available for the PCBs, pesticides, or phthalates.

Extracts for 28 individual PCB congeners and 25 chlorinated pesticides were analyzed on a capillary gas chromatograph with a ⁶³Ni electron capture detector. All PCB congeners and pesticides were confirmed using a second analytical column with a different stationary phase. The compounds were initially separated on a DB-1701 capillary column, with a confirmational analysis using a DB-17 capillary column (both columns were 60-m x 0.25 mm I.D.). As will be discussed in Section 4.0, some samples had elevated concentrations of endosulfan components; confirmation of the elevated results was carried out using a capillary gas chromatograph-mass spectrometer operating with a negative ionization source and selected ion monitoring. Sample extracts were analyzed for 18 PAHs, and two phthalates using capillary gas chromatography-mass spectrometry using an electron impact source and selected ion monitoring.

4.0 Results and Discussion

4.1 Quality Control Results for PCB/Pesticide Samples

For ambient air samples, the detection limit generally is limited by the blank contribution of the sampling media (filters and polyurethane foam plugs). A number of PCBs and chlorinated pesticides were detected in the blank filter and PUF samples (Table 4.1). Results for ambient samples were considered positive if the collected amount was larger than the average plus the standard deviation of the analytical blank (mean blank + standard deviation of the blank). Positive samples were blank corrected by subtracting the corresponding average analytical blank value from the sample result.

Two surrogate internal standards (PCB #103 and PCB #198) were added to all samples before extraction. The surrogate recoveries were used to correct the sample results for any losses during the extraction process. Recoveries of the surrogates ranged from 55% to 90%, with average recoveries of $74 \pm 6.4\%$ and $70 \pm 4.8\%$, respectively (mean ± 1 standard deviation). One blank filter sample in the final analysis batch had very low recoveries for the surrogate standards ($\leq 25\%$); however, all other samples analyzed in this batch had acceptable recoveries and no further action was taken.

Spike recoveries for pesticides and PCBs ranged from 74% (endosulfan II) to 145% (PCB 138), excluding two values for α -BHC (169% and 241%) and PCB 101 (124% and 204%). The elevated α -BHC and PCB 138 results were found on spiked back PUF plugs from ambient air samples, and likely, are the result of breakthrough during sampling. Average spike recoveries ranged from $80\% \pm 5\%$ to $129\% \pm 11\%$; thus, no corrections were made to the ambient air results (Table 4.2).

4.2 Quality Control Results for PAH/Phthalate Samples

A number of PAHs and phthalates were detected in the blank samples (Table 4.3). The sample results were tested for positive detections and corrected for analytical blanks in the same manner as the PCBs and pesticides (Section 4.1).

Six deuterated surrogate internal standards were added to all samples before extraction to correct the sample results for any losses during the extraction process. Average recoveries of the surrogates for the 22 ambient air samples (GFF, PUF, or combination GFF + PUF) analyzed were $71\% \pm 12\%$ for d8-naphthalene, $68\% \pm 5.2\%$ for d10-acenaphthene, $71\% \pm 8.0\%$ for d10-phenanthrene, $73\% \pm 5.4\%$ for d12-chrysene, $47\% \pm 7.4\%$ for d12-perylene, and $56\% \pm 15\%$ for d14-dibenzo(a,h)anthracene.

Average spike recoveries for the PAHs are given in Table 4.4 and ranged from $96\% \pm 4\%$ (benzo(a)anthracene) to $173\% \pm 13\%$ (naphthalene). Naphthalene, acenaphthalene, acenaphthene, fluorene, and phenanthrene detected on spiked back PUF plugs from ambient air samples were excluded from spike recovery averages because of possible breakthrough during sampling. Naphthalene (173%);

Table 4.1. Blank Values for PCBs and Pesticides

Analyte	(All units in ng)			
	Matrix	Average	Standard Dev.	Ave + Std. Dev.
2,4'-DDD	GFF	1.27	0.47	1.74
4,4'-DDE	GFF	0.57	0.48	1.05
	PUF	2.15	2.15	4.30
	Combination	2.71	2.63	5.35
Aldrin	GFF	8.15	9.82	17.97
	PUF	4.18	2.14	6.32
	Combination	12.32	11.97	24.29
Endosulfan I	PUF	0.78	0.64	1.42
Endosulfan Sulfate	GFF	0.85	0.62	1.47
G-BHC	GFF	1.62	2.05	3.67
Heptachlor Epoxide	PUF	1.75	2.24	4.00
Hexachlorbenzene	PUF	0.68	0.72	1.41
PCB 101	PUF	14.47	14.84	29.31
PCB 105	GFF	1.33	1.76	3.09
	PUF	3.03	2.70	5.73
	Combination	4.36	4.46	8.82
PCB 118	PUF	4.63	6.05	10.68
PCB 128	PUF	0.39	0.28	0.67
PCB 138	GFF	3.82	5.76	9.58
	PUF	2.15	2.25	4.40
	Combination	5.97	8.02	13.98
PCB 153	PUF	0.65	0.51	1.16
PCB 170	GFF	0.80	1.03	1.83
PCB 18	GFF	1.26	0.25	1.51
	PUF	3.55	3.26	6.82
	Combination	4.82	3.51	8.33
PCB 184	PUF	0.58	0.03	0.62
PCB 28	GFF	1.15	0.69	1.83
	PUF	0.83	0.12	0.96
	Combination	1.98	0.81	2.79
PCB 29	GFF	2.68	3.62	6.30
	PUF	0.87	0.39	1.27
	Combination	3.55	4.01	7.57
PCB 44	GFF	5.85	9.56	15.40
PCB 49	GFF	0.80	0.40	1.20
	PUF	1.07	0.80	1.87
	Combination	1.87	1.20	3.07
PCB 52	PUF	3.77	4.67	8.44
PCB 8	PUF	5.02	4.41	9.43
PCB 87	PUF	5.61	6.20	11.80

Table 4.2. Spike Recovery Values for PCBs and Pesticides

Media	Back PUF	Back PUF	Blank PUF	Blank PUF		
Units	Percent Recovery	Percent Recovery	Percent Recovery	Percent Recovery	Mean %	Standard Deviation
a-BHC	169% ^(a)	241% ^(a)	114%	131%	122%	12%
G-BHC	76%	87%	109%	127%	100%	23%
Heptachlor	94%	108%	108%	112%	106%	8%
Aldrin	89%	97%	97%	106%	97%	7%
b-BHC	99%	Not Spiked	Not Spiked	114%	107%	11%
D-BHC	88%	113%	122%	118%	110%	15%
Heptachlor Epoxide	92%	111%	107%	114%	106%	10%
Endosulfan I	88%	112%	102%	97%	100%	10%
g-Chlordane	90%	111%	103%	99%	101%	9%
a-Chlordane	85%	99%	76%	83%	86%	10%
4,4'-DDE	83%	126%	79%	85%	93%	22%
Dieldrin	89%	101%	100%	94%	96%	6%
Endrin	108%	107%	116%	104%	109%	5%
4,4'-DDD	94%	104%	111%	116%	106%	9%
Endosulfan II	82%	77%	86%	74%	80%	5%
4,4'-DDT	87%	118%	100%	96%	100%	13%
Methoxychlor	87%	95%	124%	133%	110%	22%
Endosulfan Sulfate	89%	82%	87%	79%	84%	5%
Endrin Ketone	85%	88%	91%	87%	88%	3%
PCB 28	79%	90%	87%	99%	89%	8%
PCB 52	109%	138%	124%	110%	120%	14%
PCB 101	124% ^(a)	204% ^(a)	133%	123%	128%	7%
PCB 153	103%	123%	103%	100%	107%	11%
PCB 138	125%	145%	123%	121%	129%	11%
Back PUF = Spiked Back PUF from an Ambient Air Sample.						
Blank PUF = Clean and Unused PUF.						
(a) Result not used in mean or standard deviation, because of possible breakthrough to Back PUF during sampling.						

benzo(b)fluoranthene (158%); and benzo(k)fluoranthene (169%) had average recoveries above 150%. The cause of these elevated recoveries is not clear. No spike recovery corrections were made to the ambient air results.

Average percent recoveries for certified PAHs in the four samples of reference material NIST 1649 (urban dust) were flouranthene $110\% \pm 16\%$, benzo(a)anthracene $89\% \pm 6\%$, benzo(a)pyrene $104\% \pm 17\%$, indeno(1,2,3-cd)pyrene $107\% \pm 27\%$, and benzo(g,h,i)perylene $73\% \pm 22\%$ (Table 4.5).

Table 4.3. Blank Values for PAHs and Phthalates

Analyte	(All units in ng)			Ave + Std. Dev.
	Matrix	Average	Standard Dev	
Benzo(a)pyrene	GFF	94.70	129.30	224.00
	PUF	19.66	3.20	22.86
	Combination	114.36	132.50	246.86
Benzo(e)pyrene	GFF	75.63	103.37	179.01
	PUF	15.66	2.51	18.17
	Combination	91.29	105.88	197.17
Naphthalene	GFF	38.03	10.87	48.91
	PUF	251.28	184.82	436.10
	Combination	289.31	195.70	485.01
Perylene	GFF	8.45	3.62	12.07
	PUF	11.34	2.60	13.94
	Combination	19.79	6.22	26.01
Phenanthrene	GFF	9.88	1.71	11.59
	PUF	35.61	35.93	71.54
	Combination	45.49	37.64	83.12
Pyrene	GFF	27.33	11.31	38.65
bis(2-Ethylhexyl) Phthalate	GFF	9590.00	6930.81	16520.81
	PUF	19558.00	11768.74	31326.74
	Combination	29148.00	18699.55	47847.55
Di-n-octyl Phthalate	GFF	323.00	287.15	610.15
	PUF	186.80	92.66	279.46
	Combination	509.80	379.81	889.61

4.3 Polychlorinated Biphenyls

Twenty of the 28 PCB congeners analyzed were found above the detection limit for the Hanford Site samples (Table 4.6, Table A.1). Eight congeners (#101, #138, #87, #118, #105, #153, #28, and #52) accounted for over 80% of the average PCB concentrations at all three sampling locations (Figure 4.1). The average total PCB concentrations for sampling locations (i.e., average of the sum of all individual PCB congeners detected in a sample) ranged from 500 - 740 pg/m³, which were similar to previous values reported at the Hanford Site (Patton et al. 1994). The maximum concentrations of total PCBs (maximum sum of PCB congeners in an individual sample) ranged from 1,100 to 1,700 pg/m³, with the 300-Area having the highest concentration. In general, little difference was apparent in PCB concentrations at the

Table 4.4. Spike Recovery Values for PAHs and Phthalates

Media	Spike Conc.	Result Back PUF	Percent Recovery	Result Back PUF	Percent Recovery	Result Back PUF	Percent Recovery	Result Back PUF	Percent Recovery	Result Back PUF	Percent Recovery	Mean Recovery	Standard Deviation
Units	ng	ng	%	ng	%	ng	%	ng	%	ng	%	%	%
Naphthalene	250	375	150% a	331	132%	456	182%	409	164%	409	173%	173%	13%
Acenaphthylene	250	288	115% a	223	89%	304	122%	274	110%	274	116%	116%	8%
Acenaphthene	250	370	148% a	268	107%	295	118%	263	105%	263	112%	112%	9%
Fluorene	250	798	319% a	448	179%	297	119%	274	110%	274	114%	114%	7%
Phenanthrene	250	669	268% a	366	146%	303	121%	272	109%	272	115%	115%	9%
Anthracene	250	299	120%	225	90%	308	123%	272	109%	272	110%	110%	15%
Fluoranthene	250	269	108%	208	83%	276	110%	238	95%	238	99%	99%	12%
Pyrene	250	263	105%	204	82%	289	116%	247	99%	247	100%	100%	14%
Benzo(a)anthracene	250	249	100%	231	92%	246	98%	230	92%	230	96%	96%	4%
Chrysene	250	266	106%	241	96%	281	112%	268	107%	268	106%	106%	7%
Benzo(b)fluoranthene	250	439	176%	297	119%	458	183%	385	154%	385	158%	158%	29%
Benzo(k)fluoranthene	250	469	188%	314	126%	488	195%	417	167%	417	169%	169%	31%
Benzo(a)pyrene	250	411	164%	277	111%	432	173%	367	147%	367	149%	149%	27%
Indeno(123-cd)pyrene	250	386	154%	177	71%	534	214%	347	139%	347	144%	144%	59%
Dibenzo(a,h)anthracene	250	393	157%	205	82%	528	211%	372	149%	372	150%	150%	53%
Benzo(g,h,i)perylene	250	291	116%	130	52%	345	138%	221	88%	221	99%	99%	37%

Back PUF = Spiked Back PUF from an Ambient Air Sample.
Blank PUF = Spiked Blank PUF (Clean and Unused Media).
(a) Result not used in mean or standard deviation, because of possible breakthrough to Back PUF during sampling.

Table 4.5. Analysis of Urban Dust Standard for PAHs

	Certified Value	SRM 1649		Percent Recovery		SRM 1649		Percent Recovery		SRM 1649		Percent Recovery		Mean Recovery	Standard Deviation
		Urban Dust	ng/g	%	Urban Dust	ng/g	%	Urban Dust	%	Urban Dust	ng/g	%	Urban Dust		
Matrix															
Units	ng/g													%	%
Naphthalene	NA	428				402				370			472		
Acenaphthylene	NA	90.8				97.7				79.8			99.3		
Acenaphthene	NA	154				161				129			159		
Fluorene	NA	184				197				159			201		
Phenanthrene	NA	4070				4540				3560			4530		
Anthracene	NA	404				350				257			443		
Fluoranthene	7100	7400		104%		9070		128%		6480		91%	8390	110%	16%
Pyrene	NA	5820				7000				5040			6540		
Benzo(a)anthracene	2600	2200		85%		2460		95%		2120		82%	2430	89%	6%
Chrysene	NA	4620				5010				4070			4680		
Benzo(b)fluoranthene	NA	11400				13300				8440			11700		
Benzo(k)fluoranthene	NA	2690				3310				2040			3340		
Benzo(e)pyrene	NA	4330				5020				3130			4390		
Benzo(a)pyrene	3300	3410		103%		3980		121%		2680		81%	3630	104%	17%
Perylene	NA	660				826				545			730		
Indeno(123-cd)pyrene	3300	3500		106%		4450		135%		2330		71%	3800	107%	27%
Dibenzo(a,h)anthracene	NA	473				629				305			515		
Benzo(g,h,i)perylene	4500	3370		75%		4340		96%		1980		44%	3510	73%	22%

NA = Not available as a certified value.

Table 4.6. Concentrations of PCBs in Ambient Air at the Hanford Site and Comparative Risk-Based Concentrations

pg/m ³ Analyte	200 ESE				300 Area				600 Area			
	Count	Max	Average	2SEM	Count	Max	Average	2SEM	Count	Max	Average	2SEM
PCB 118	3	220	91	130	3	300	150	160	4	250	87	110
PCB 138	5	180	66	72	3	240	130	120	4	210	98	82
PCB 101	3	140	79	71	2	270	150	220	3	180	100	83
PCB 153	3	140	53	85	5	190	55	69	4	160	53	69
PCB 105	3	120	45	71	5	160	44	57	4	130	42	57
PCB 87	3	110	55	62	5	190	66	73	3	140	68	74
PCB 28	1	89	89		2	70	36	70	2	39	38	1.4
PCB 52	3	46	27	21	5	81	44	25	3	27	20	9.1
PCB 128	3	45	16	29	5	58	16	21	4	51	17	23
PCB 180	3	34	12	22	6	41	10	13	4	36	13	16
PCB 187	1	25	25		4	35	9.9	17	1	29	29	
PCB 49	2	14	8	13	3	73	30	44	2	8.1	5.6	5
PCB 170	2	14	7.8	12	4	17	7.3	6.7	3	15	6	8.6
PCB 183	1	13	13		3	19	8	11	4	16	4.7	7.4
PCB 44	1	9.9	9.9		2	42	40	4.3	2	16	15	2.7
PCB 195	1	1.2	1.2		1	1.3	1.3		1	1.1	1.1	
PCB 184	1	0.29	0.29		2	1.2	0.77	0.92	1	0.54	0.54	
PCB 104	0	0			0	0			1	1.2	1.2	
PCB 18	0	0			1	3.6	3.6		1	6	6	
PCB 29	0	0			1	2.5	2.5		0	0		
Total PCBs	3	1100	550	600	4	1700	660	740	4	1300	500	540

Total PCBs are the sum of the individual congeners for each sample (i.e., not the sum of the columns above).

three sampling locations and, because of the limited number of samples, a statistical comparison of difference was not conducted. An evaluation of the potential human health impacts for exposure to PCBs in Hanford Site air is given in Section 5.0.

4.4 Chlorinated Pesticides

Twenty of the 25 chlorinated pesticides analyzed were found above the detection limits for Hanford Site air samples (Table 4.7, Appendix A). Endosulfan I, endosulfan II, and methoxychlor had the highest average air concentrations, with mean values for endosulfan I ranging from 470 - 2400 pg/m³, endosulfan II ranging from 66 - 560 pg/m³, and methoxychlor ranging from 42 - 99 pg/m³. The maximum concentrations of endosulfan I and endosulfan II were for an August 1995 sample from the 300 Area. This sample

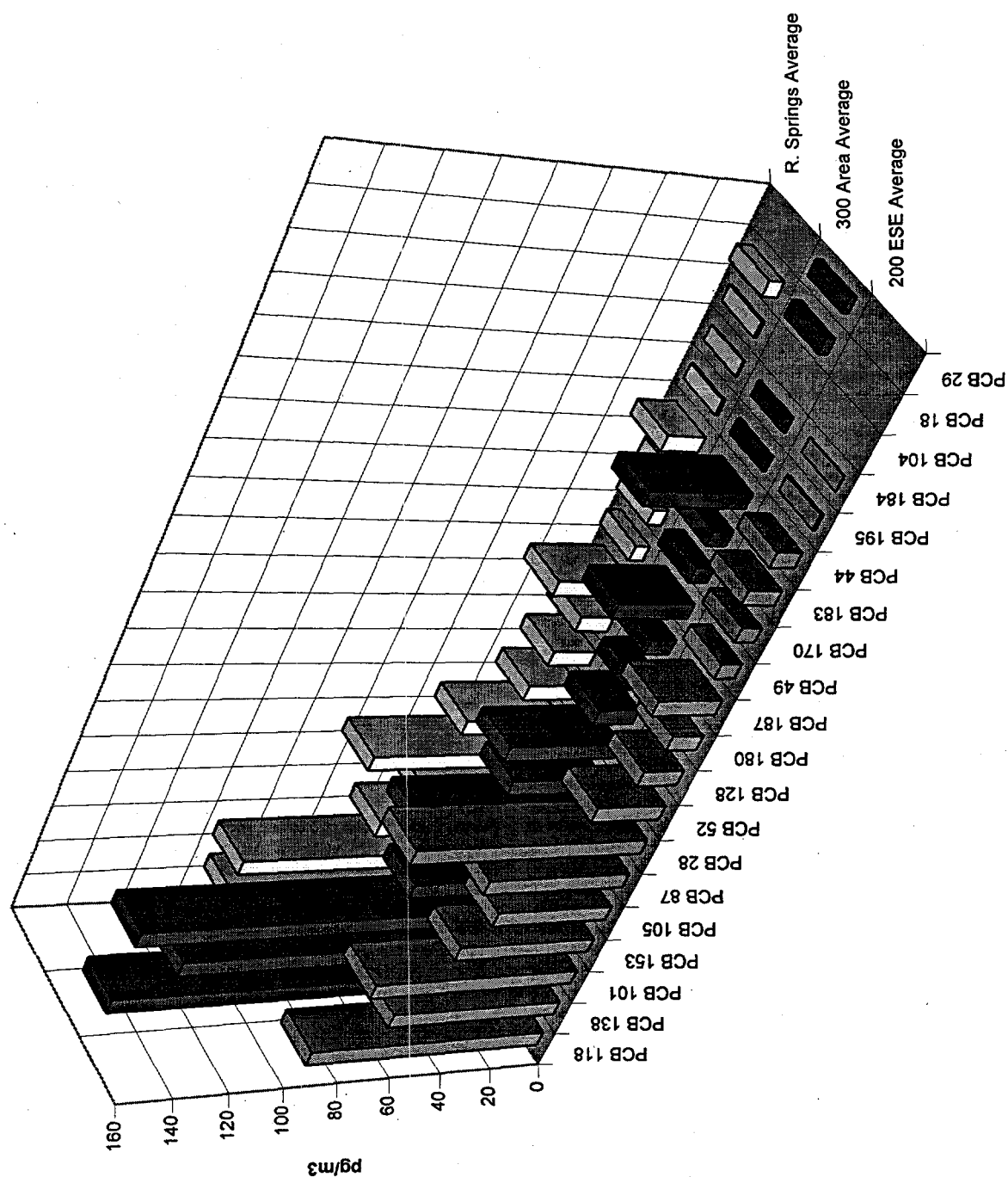


Figure 4.1. Average Concentrations of PCBs in Hanford Air, 1995

was re-analyzed using gas chromatography-negative chemical ionization mass spectroscopy, which confirmed the elevated concentrations. All other average pesticide concentrations were below 100 pg/m³ (Figure 4.2). On average, there was little apparent difference in chlorinated pesticide concentrations at the three sampling locations and because of the small number of samples a statistical comparison of difference was not conducted. An evaluation of the potential human health impacts for exposure to chlorinated pesticides in Hanford Site air is given in Section 5.0.

4.5 Polycyclic Aromatic Hydrocarbons

Sixteen of the 18 PAHs analyzed were found above the detection limits for the ambient air samples (Table 4.8, Table A.3). Phenanthrene was the only PAH with average air concentrations above 500 pg/m³, with average values ranging from 330 - 1100 pg/m³. Fluoranthene, pyrene, fluorene, chrysene, benzo(b) fluoranthene, and naphthalene were the only other PAHs with average concentrations above 100 pg/m³ (Figure 4.3). Benzo(a)pyrene, which was identified as a contaminant of concern by Blanton et al. (1995), was not detected in any air samples, with a nominal detection limit of 20 pg/m³ for a 1000 m³ air sample. Overall, the 300 Area had higher average PAH concentrations compared to the 200-Area and the background location near Rattlesnake Springs. The air concentrations at the 300 Area are influenced by sources on the Hanford Site and from nearby communities. A statistical comparison of difference between sampling locations was not conducted because of the limited number of samples. An evaluation of the potential human health impacts for exposure to PAH in Hanford Site air is given in Section 5.0.

4.6 Phthalates

The ambient air samples were analyzed for two PEPs, [bis(2-ethylhexyl)phthalate and di-n-octyl phthalate]. Both compounds had high concentrations in the sample blanks, which resulted in elevated detection limits; the data should be used with caution. Despite the high blank contribution, the results do provide information on the upper limit concentrations of these compounds that is useful for evaluating potential human health effects. Bis(2-ethylhexyl) phthalate was found above the detection limit for 3 of 12 samples with a maximum concentration of 89,000 pg/m³ (300 Area sample). Di-n-octyl phthalate was found for 2 of 12 samples with a maximum concentration of 2700 pg/m³ (Rattlesnake Springs sample). An evaluation of the potential human health impacts for exposure to phthalates in Hanford Site air is given in Section 5.0.

Table 4.7. Concentrations of Chlorinated Pesticide in Ambient Air at the Hanford Site and Comparative Risk-Based Concentrations

pg/m ³ Analyte	200 ESE Count	Max	Average	2SEM	300 Area Count	Max	Average	2SEM	600 Area Count	Max	Average	2SEM	Risk-Based Concentrations
Endosulfan I	5	1300	470	460	6	13000	2400	4300	4	1300	550	490	22,000,000 N
Methoxychlor	2	160	99	130	5	55	42	12	3	100	43	61	NA
Endosulfan II	5	120	72	45	4	1800	560	830	3	120	66	53	22,000,000 N
a-BHC	7	97	49	19	7	99	45	23	5	94	54	22	990 C
Hexachlorbenzene	5	75	32	26	7	140	31	38	3	63	28	35	3,900 C
G-BHC	4	70	39	29	5	110	64	33	4	65	29	30	4,800 C
4,4'-DDE	4	37	20	19	4	97	51	37	4	41	21	16	18,000 C
4,4'-DDT	3	30	13	17	4	49	27	15	4	37	15	15	18,000 C
Endosulfan Sulfate	4	17	6.4	7	3	62	27	35	4	16	7.7	7.4	NA
d-BHC	2	16	9.5	12	3	30	15	16	2	7.4	5.7	3.3	3,500 C
Dieldrin	3	15	9.9	4.9	5	80	33	27	2	8.7	7.7	1.8	390 C
g-Chlordane	4	12	7	4.7	4	29	13	12	2	4.5	4	1	4,900 C
2,4'-DDT	2	5	4.3	1.4	4	13	8.9	3.7	2	4	3.4	1.1	18,000 C
Trans Nonachlor	1	3.9	3.9		4	18	9.1	5.9	1	1.6	1.6		NA
a-Chlordane	2	2.3	1.9	0.71	3	8.8	4.3	4.5	0	0			4,900 C
Mirex	1	1.7	1.7		2	6	3.9	4.1	0	0			3,500 C
Heptachlor	1	0.71	0.71		0	0			0	0			1,400 C
Aldrin	0	0			1	3.5	3.5		0	0			370 C
b-BHC	0	0			1	53	53		0	0			3,500 C
Heptachlor Epoxide	0	0			1	4.8	4.8		0	0			690 C

(a) From U.S. EPA Region III, R. L. Smith, 2/9/95. The listed value is the lowest of the carcinogenic risk (1 e-6 target risk) and non-carcinogen (target hazard quotient of 1.0) risk-based concentrations.

(b) N = noncancer risk.

(c) NA = not available.

(d) C = cancer risk.

(e) Risk-based value for technical BHC.

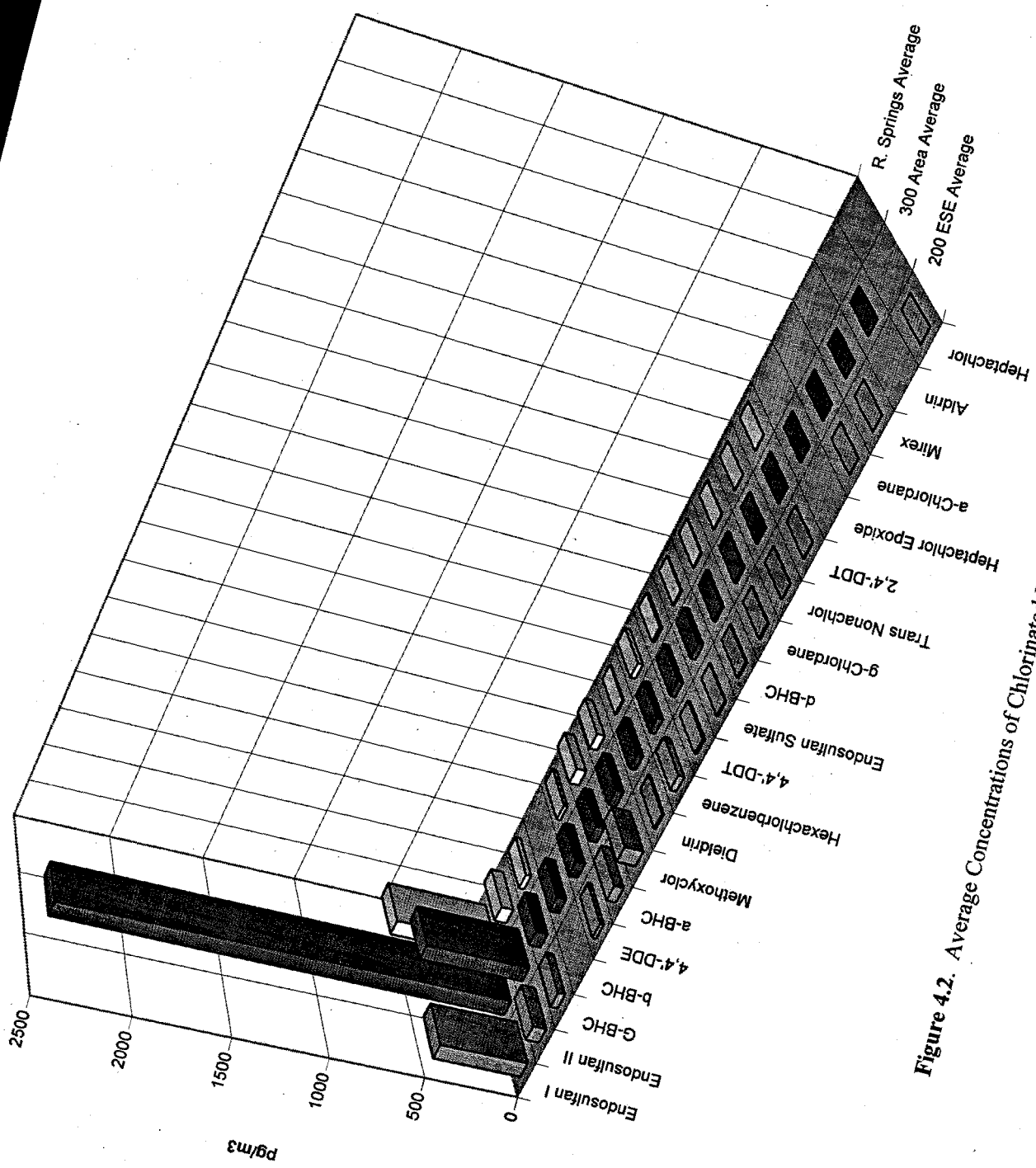


Figure 4.2. Average Concentrations of Chlorinated Pesticides in Hanford Air, 1995

Table 4.8. Concentrations of PAH and Phthalates in Ambient Air at the Hanford Site and Comparative Risk-Based Concentrations

pg/m ³ Analyte	200 ESE Count	Max	Average	2SEM	300 Area Count	Max	Average	2SEM	600 Area Count	Max	Average	2SEM	Risk-Based Concentration
Phenanthrene	9	760	330	200	8	2900	1300	670	5	2100	1100	570	NA
Fluoranthene	6	200	100	57	6	590	320	180	4	670	330	220	150,000,000 N
Fluorene	6	200	97	62	6	630	200	180	5	150	60	46	150,000,000 N
Pyrene	4	85	61	21	5	520	300	140	4	230	100	88	11,000,000 N
Benzo(b)fluoranthene	4	83	53	25	4	250	140	96	4	58	42	15	10,000 C
Chrysene	5	60	30	16	5	410	130	140	4	45	33	11	1,000,000 C
Anthracene	3	26	21	6.3	6	170	88	41	5	100	41	32	1,100,000,000 N
Benzo(k)fluoranthene	3	23	18	7.1	4	53	35	21	3	16	13	2.6	100,000 C
Acenaphthene	1	21	21		7	51	21	11	3	15	12	4	220,000,000 N
Benzo(g,h,i)perylene	1	19	19		3	68	49	20	0	0			NA
Indeno(123-cd)pyrene	2	16	15	1.7	3	72	48	25	1	17	17		10,000 C
Perylene	3	8.5	6	2.6	0	0			0	0			NA
Acenaphthylene	0	0			2	32	26	12	0	0			220,000,000 N
Benzo(a)anthracene	0	0			2	95	64	63	0	0			10,000 C
Dibenzo(a,h)anthracene	0	0			1	22	22		0	0			1,000 C
Naphthalene	0	0			1	150	150		0	0			150,000,000 N
bis(2-Ethylhexyl) Phthalate	0	0			2	89000	56000	66000	1	24000	24000		450,000 C
Di-n-octyl Phthalate	0	0			1	140	140		1	2700	2700		73,000,000 N

(a) From U.S. EPA Region III, R. L. Smith, 2/9/95. The listed value is the lowest of the carcinogenic risk (1e-6 target risk) and non carcinogenic (target hazard quotient of 1.0) risk-based concentrations.
 (b) NA = not available.
 (c) N = non-cancer risk.
 (d) C = cancer risk.

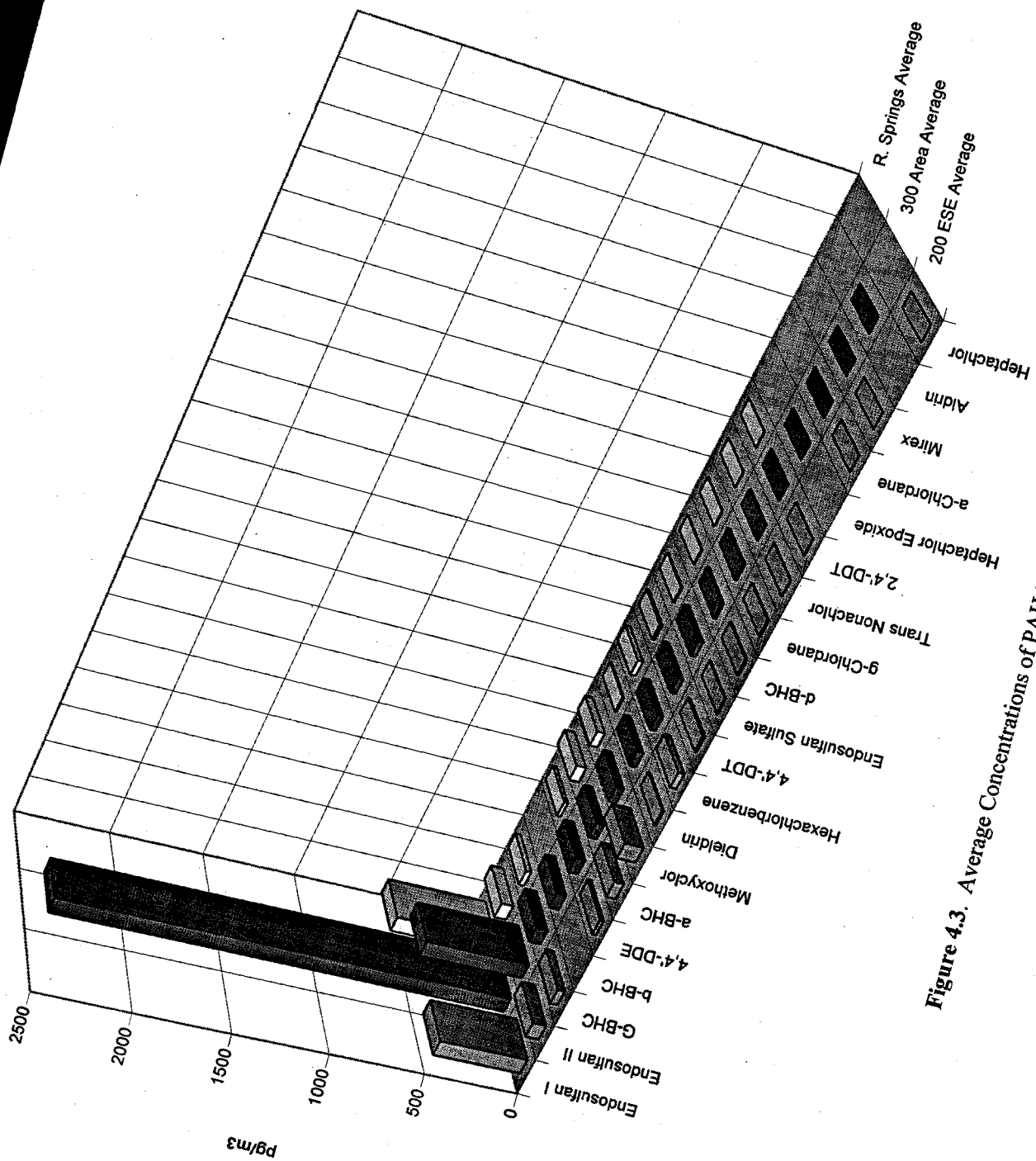


Figure 4.3. Average Concentrations of PAH in Hanford Air, 1995

5.0 Estimated Human Health Evaluation

No ambient air quality standards exist for the SVOC measured in this study. Therefore, the ambient air concentrations were compared to carcinogenic and non-carcinogenic risk-based concentrations.^(a) Ambient air concentrations below the risk-based concentrations have associated risks that are less than 1×10^{-6} for carcinogenic risk and less than 1.0 of a hazard quotient for non-carcinogenic risk. These risk-based concentrations are used as a screening tool to evaluate if additional monitoring or more detailed risk estimates should be undertaken. These risk estimates are indicative of the regional air quality and do not necessarily imply a Hanford source for these pollutants, because similar air concentrations were measured on the Hanford Site and at the Rattlesnake Springs background location. A more realistic estimate of the Hanford source term would require the subtraction of the background concentration from the Hanford Site values; however, this was not attempted because of the limited number of samples.

Risk estimates for PCBs are complicated by the fact that PCBs were used as technical mixtures that contained varying amounts of the 209 possible PCBs. Toxicity for the individual PCBs varies widely and is influenced by a number of factors, including the total number of chlorine atoms present and the positions of the chlorine atoms on the biphenyl ring. Much of the early toxicity testing on PCBs used the technical mixtures (Aroclors); however, once released into the environment, the relative proportions of PCBs can change because of varying environmental fate (e.g., for a PCB mixture applied to dirt roads for dust suppression, the more volatile PCBs will vaporize and leave the less volatile, but often more toxic PCBs). The PCB concentrations reported in this study were given as individual congeners and as the sum of individual congeners in each sample. For PCBs, the risk-based concentrations were given for PCBs (810 pg/m^3), Aroclor 1016 ($260,000 \text{ pg/m}^3$), and Aroclor 1254 ($73,000 \text{ pg/m}^3$). All individual PCB concentrations and average total PCB concentrations measured at the Hanford Site were below the risk-based concentrations. However, the maximum concentrations ($1100 - 1700 \text{ pg/m}^3$) for total PCBs for each of the three locations exceeded the risk-based concentrations. The average total PCB concentrations at the three locations were 62% to 82% of the risk-based concentrations. A more detailed risk evaluation may be required using individual congener air concentrations and individual air concentration toxicity data; however, currently this comparison is not possible.

All measured organochlorine pesticide concentrations were below the risk-based concentrations, including the maximum endosulfan I and endosulfan II values (Table 4.7).

All PAH air concentrations were below the risk-based concentrations (Table 4.8). Benzo(a)pyrene (the PAH identified in Blanton et al. (1995) as a candidate for environmental monitoring) was not detected, and the detection limit (approximately 20 pg/m^3) was well below the risk-based concentration.

(a) U.S. EPA 1995. EPA Region III Risk Based Concentration Table, Background Information, R. L. Smith, February 7, 1995.

The PEP concentrations were influenced by a large blank contribution; however, even the maximum concentrations measured for each compound (89,000 pg/m³ for bis(2-ethylhexyl) phthalate and 2700 pg/m³ for di-n-octyl phthalate) were well below their respective risk-based concentrations of 450,000 pg/m³ and 73,000,000 pg/m³.

6.0 References

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Appendix A

Concentrations of PCBs Chlorinated Pesticides, PAHs, and Phthalates in Ambient Air at the Hanford Site

Table A.1. Concentrations of Semivolatile Organic Compounds in Ambient Air at the Southeast of 200-East Location

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
200 ESE	1,4-Dichlorobenzene	gff	0.019	U			0.029	U		
	1,4-Dichlorobenzene	puf	0.019	U			0.029	U		
	1,4-Dichlorobenzene	puf	0.019	U			0.029	U		
	1,4-Dichlorobenzene	combination			0.019	U			0.029	U
	2,4'-DDD	gff	0.00093	U			0.0014	U		
	2,4'-DDD	puf	0.00093	U			0.0014	U		
	2,4'-DDD	puf	0.00093	U			0.0014	U		
	2,4'-DDD	combination			0.00095	U			0.0014	U
	2,4'-DDE	gff	0.00022	U			0.00034	U		
	2,4'-DDE	puf	0.00022	U			0.00034	U		
	2,4'-DDE	puf	0.00022	U			0.00034	U		
	2,4'-DDE	combination			0.00023	U			0.00035	U
	2,4'-DDT	gff	0.00043	U			0.00066	U		
	2,4'-DDT	puf	0.005				0.00066	U		
	2,4'-DDT	puf	0.00043	U			0.00066	U		
	2,4'-DDT	combination			0.00044	U			0.0036	
	4,4'-DDD	gff	0.00045	U			0.00069	U		
	4,4'-DDD	puf	0.00045	U			0.00069	U		
	4,4'-DDD	puf	0.00045	U			0.00069	U		
	4,4'-DDD	combination			0.00046	U			0.00069	U
	4,4'-DDE	gff	0.00027	U			0.00041	U		
	4,4'-DDE	puf	0.039				0.007			
	4,4'-DDE	puf	0.0042	B			0.0016			
	4,4'-DDE	combination			0.038				0.0064	
	4,4'-DDT	gff	0.0004	U			0.00061	U		
	4,4'-DDT	puf	0.0051				0.00061	U		
	4,4'-DDT	puf	0.0004	U			0.00061	U		
	4,4'-DDT	combination			0.03				0.005	
	a-BHC	gff	0.00046	U			0.0007	U		
	a-BHC	puf	0.097				0.063			
	a-BHC	puf	0.023				0.028			
	a-BHC	combination			0.052				0.045	
	a-Chlordane	gff	0.00082	U			0.0013	U		
	a-Chlordane	puf	0.0023				0.0013	U		
	a-Chlordane	puf	0.00082	U			0.0013	U		
	a-Chlordane	combination			0.00084	U			0.0016	
	Acenaphthene	gff	0.0072	U			0.011	U		
	Acenaphthene	puf	0.0072	U			0.011	U		
	Acenaphthene	puf	0.021				0.011	U		
	Acenaphthene	combination			0.0073	U			0.011	U
	Acenaphthylene	gff	0.0077	U			0.012	U		
	Acenaphthylene	puf	0.0077	U			0.012	U		
	Acenaphthylene	puf	0.0077	U			0.012	U		
	Acenaphthylene	combination			0.0079	U			0.012	U
	Aldrin	gff	0.0047	B			0.00059	U		
	Aldrin	puf	0.0057	B			0.007	B		
	Aldrin	puf	0.00038	U			0.00059	U		
	Aldrin	combination			0.00039	U			0.00059	U
	Anthracene	gff	0.011	U			0.018	U		
	Anthracene	puf	0.015				0.026			
	Anthracene	puf	0.011	U			0.018	U		
	Anthracene	combination			0.012	U			0.023	
	b-BHC	gff	0.00046	U			0.0007	U		
	b-BHC	puf	0.00046	U			0.0007	U		
	b-BHC	puf	0.00046	U			0.0007	U		
	b-BHC	combination			0.00047	U			0.00071	U
	Benzo(a)anthracene	gff	0.021	U			0.031	U		
	Benzo(a)anthracene	puf	0.021	U			0.031	U		
	Benzo(a)anthracene	puf	0.021	U			0.031	U		
	Benzo(a)anthracene	combination			0.021	U			0.032	U

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.

(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.1. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	Benzo(a)pyrene	gff	0.0074	B			0.013	B		
	Benzo(a)pyrene	puf	0.014	B			0.031	B		
	Benzo(a)pyrene	puf	0.014	B			0.032	B		
	Benzo(a)pyrene	combination			0.01	B			0.016	B
	Benzo(b)fluoranthene	gff	0.062				0.035			
	Benzo(b)fluoranthene	puf	0.0073	U			0.011	U		
	Benzo(b)fluoranthene	puf	0.0073	U			0.011	U		
	Benzo(b)fluoranthene	combination			0.031				0.083	
	Benzo(e)pyrene	gff	0.033	B			0.017	B		
	Benzo(e)pyrene	puf	0.011	B			0.025	B		
	Benzo(e)pyrene	puf	0.011	B			0.026	B		
	Benzo(e)pyrene	combination			0.017	B			0.036	B
	Benzo(g,h,i)perylene	gff	0.019				0.028	U		
	Benzo(g,h,i)perylene	puf	0.018	U			0.028	U		
	Benzo(g,h,i)perylene	puf	0.018	U			0.028	U		
	Benzo(g,h,i)perylene	combination			0.019	U			0.028	U
	Benzo(k)fluoranthene	gff	0.023				0.011	U		
	Benzo(k)fluoranthene	puf	0.0074	U			0.011	U		
	Benzo(k)fluoranthene	puf	0.0074	U			0.011	U		
	Benzo(k)fluoranthene	combination			0.011				0.02	
	bis(2-Ethylhexyl) Phthalate	gff	5	B			11	B		
	bis(2-Ethylhexyl) Phthalate	puf	8.4	B			13	B		
	bis(2-Ethylhexyl) Phthalate	puf	28	B			14	B		
	bis(2-Ethylhexyl) Phthalate	combination			10	B			21	B
	Chrysene	gff	0.032				0.02			
	Chrysene	puf	0.013				0.0086	U		
	Chrysene	puf	0.0056	U			0.0086	U		
	Chrysene	combination			0.024				0.06	
	d-BHC	gff	0.00046	U			0.0007	U		
	d-BHC	puf	0.016				0.0007	U		
	d-BHC	puf	0.00046	U			0.0007	U		
	d-BHC	combination			0.0034				0.00071	U
	Di-n-octyl Phthalate	gff	0.11	B			0.22	B		
	Di-n-octyl Phthalate	puf	0.093	U			0.14	U		
	Di-n-octyl Phthalate	puf	0.093	U			0.21	B		
	Di-n-octyl Phthalate	combination			0.1	B			0.4	B
	Dibenzo(a,h)anthracene	gff	0.0036	U			0.0055	U		
	Dibenzo(a,h)anthracene	puf	0.0036	U			0.0055	U		
	Dibenzo(a,h)anthracene	puf	0.0036	U			0.0055	U		
	Dibenzo(a,h)anthracene	combination			0.0037	U			0.0056	U
	Dieldrin	gff	0.00012	U			0.00019	U		
	Dieldrin	puf	0.015				0.0064			
	Dieldrin	puf	0.00012	U			0.00019	U		
	Dieldrin	combination			0.00012	U			0.0087	
	Endosulfan I	gff	0.0017				0.0007	U		
	Endosulfan I	puf	1.3				0.094			
	Endosulfan I	puf	0.00046	U			0.0007	U		
	Endosulfan I	combination			0.41				0.57	
	Endosulfan II	gff	0.009				0.0007	U		
	Endosulfan II	puf	0.11				0.026			
	Endosulfan II	puf	0.00046	U			0.0007	U		
	Endosulfan II	combination			0.12				0.091	
	Endosulfan Sulfate	gff	0.00046	U			0.0007	U		
	Endosulfan Sulfate	puf	0.0053				0.0013			
	Endosulfan Sulfate	puf	0.00046	U			0.0007	U		
	Endosulfan Sulfate	combination			0.017				0.0038	
	Endrin	gff	0.00046	U			0.0007	U		
	Endrin	puf	0.00046	U			0.0007	U		
	Endrin	puf	0.00046	U			0.0007	U		
	Endrin	combination			0.00047	U			0.00071	U

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.
(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.1. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	Endrin Ketone	gff	0.00046	U			0.0007	U		
	Endrin Ketone	puf	0.00046	U			0.0007	U		
	Endrin Ketone	puf	0.00046	U			0.0007	U		
	Endrin Ketone	combination			0.00047	U			0.00071	U
	Fluoranthene	gff	0.031				0.019			
	Fluoranthene	puf	0.15				0.1			
	Fluoranthene	puf	0.012	U			0.018	U		
	Fluoranthene	combination			0.1				0.2	
	Fluorene	gff	0.02	U			0.031	U		
	Fluorene	puf	0.18				0.038			
	Fluorene	puf	0.2				0.049			
	Fluorene	combination			0.02	U			0.031	
	G-BHC	gff	0.00041	U			0.00063	U		
	G-BHC	puf	0.057				0.011			
	G-BHC	puf	0.00041	U			0.00063	U		
	G-BHC	combination			0.072				0.02	
	g-Chlordane	gff	0.00046	U			0.0007	U		
	g-Chlordane	puf	0.012				0.0016			
	g-Chlordane	puf	0.00046	U			0.0007	U		
	g-Chlordane	combination			0.0099				0.0047	
	Heptachlor	gff	0.00047	U			0.00071	U		
	Heptachlor	puf	0.00047	U			0.00071			
	Heptachlor	puf	0.00047	U			0.00071	U		
	Heptachlor	combination			0.00048	U			0.00072	U
	Heptachlor Epoxide	gff	0.00011	U			0.00017	U		
	Heptachlor Epoxide	puf	0.00011	U			0.0042	B		
	Heptachlor Epoxide	puf	0.0036				0.00017	U		
	Heptachlor Epoxide	combination			0.00011	U			0.00017	U
	Hexachlorbenzene	gff	0.00034	U			0.00051	U		
	Hexachlorbenzene	puf	0.075				0.00051	U		
	Hexachlorbenzene	puf	0.051				0.018			
	Hexachlorbenzene	combination			0.0084				0.00052	U
	Indeno(123-cd)pyrene	gff	0.014				0.014	U		
	Indeno(123-cd)pyrene	puf	0.0091	U			0.014	U		
	Indeno(123-cd)pyrene	puf	0.0091	U			0.014	U		
	Indeno(123-cd)pyrene	combination			0.0093	U			0.016	
	Methoxychlor	gff	0.00046	U			0.0007	U		
	Methoxychlor	puf	0.00046	U			0.0007	U		
	Methoxychlor	puf	0.00046	U			0.0007	U		
	Methoxychlor	combination			0.16				0.036	
	Mirex	gff	0.00042	U			0.00064	U		
	Mirex	puf	0.00042	U			0.00064	U		
	Mirex	puf	0.00042	U			0.00064	U		
	Mirex	combination			0.0017				0.00065	U
	Naphthalene	gff	0.035	B			0.028	U		
	Naphthalene	puf	0.029	B			0.039	B		
	Naphthalene	puf	0.034	B			0.035	B		
	Naphthalene	combination			0.028	B			0.047	B
	PCB 101	gff	0.00048	U			0.00074	U		
	PCB 101	puf	0.091	B			0.0027	B		
	PCB 101	puf	0.032	B			0.006	B		
	PCB 101	combination			0.16				0.007	
	PCB 104	gff	0.00033	U			0.0005	U		
	PCB 104	puf	0.00033	U			0.0005	U		
	PCB 104	puf	0.00033	U			0.0005	U		
	PCB 104	combination			0.00033	U			0.0005	U
	PCB 105	gff	0.0027				0.00046	U		
	PCB 105	puf	0.019	B			0.00046	U		
	PCB 105	puf	0.0068	B			0.0042	B		
	PCB 105	combination			0.12				0.00046	U

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.
 (d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.1. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	PCB 118	gff	0.00047	U			0.00071	U		
	PCB 118	puf	0.046				0.0017			
	PCB 118	puf	0.014				0.0027			
	PCB 118	combination			0.23				0.00072	U
	PCB 128	gff	0.00024	U			0.00037	U		
	PCB 128	puf	0.0032	B			0.00037	U		
	PCB 128	puf	0.0013	B			0.00037	U		
	PCB 128	combination			0.045				0.00037	U
	PCB 138	gff	0.013				0.00051	U		
	PCB 138	puf	0.12				0.02			
	PCB 138	puf	0.0065				0.0013	B		
	PCB 138	combination			0.19				0.00052	U
	PCB 153	gff	0.00039	U			0.0006	U		
	PCB 153	puf	0.02	B			0.0006	U		
	PCB 153	puf	0.0033	B			0.0006	U		
	PCB 153	combination			0.14				0.00061	U
	PCB 154	gff	0.00055	U			0.00084	U		
	PCB 154	puf	0.00055	U			0.00084	U		
	PCB 154	puf	0.00055	U			0.00084	U		
	PCB 154	combination			0.00056	U			0.00085	U
	PCB 170	gff	0.0002	U			0.0003	U		
	PCB 170	puf	0.0018				0.0003	U		
	PCB 170	puf	0.0002	U			0.0003	U		
	PCB 170	combination			0.015				0.0003	U
	PCB 18	gff	0.0014	B			0.0016	U		
	PCB 18	puf	0.0053	B			0.0034	B		
	PCB 18	puf	0.001	U			0.0016	U		
	PCB 18	combination			0.002	B			0.0033	
	PCB 180	gff	0.00027	U			0.00041	U		
	PCB 180	puf	0.0017				0.00041	U		
	PCB 180	puf	0.00052				0.00041	U		
	PCB 180	combination			0.034				0.00042	U
	PCB 183	gff	0.00053	U			0.00081	U		
	PCB 183	puf	0.00053	U			0.00081	U		
	PCB 183	puf	0.00053	U			0.00081	U		
	PCB 183	combination			0.013				0.00082	U
	PCB 184	gff	0.00053	U			0.00081	U		
	PCB 184	puf	0.00083	B			0.00081	U		
	PCB 184	puf	0.00053	U			0.00081	U		
	PCB 184	combination			0.00054	U			0.00082	U
	PCB 187	gff	0.00038	U			0.00059	U		
	PCB 187	puf	0.00038	U			0.00059	U		
	PCB 187	puf	0.00038	U			0.00059	U		
	PCB 187	combination			0.025				0.00059	U
	PCB 188	gff	0.00022	U			0.00034	U		
	PCB 188	puf	0.00022	U			0.00034	U		
	PCB 188	puf	0.00022	U			0.00034	U		
	PCB 188	combination			0.00023	U			0.00035	U
	PCB 195	gff	0.00027	U			0.00041	U		
	PCB 195	puf	0.00027	U			0.00041	U		
	PCB 195	puf	0.00027	U			0.00041	U		
	PCB 195	combination			0.0012				0.00042	U
	PCB 200	gff	0.0014	U			0.0022	U		
	PCB 200	puf	0.0014	U			0.0022	U		
	PCB 200	puf	0.0014	U			0.0022	U		
	PCB 200	combination			0.0014	U			0.0022	U
	PCB 206	gff	0.00039	U			0.0006	U		
	PCB 206	puf	0.00039	U			0.0006	U		
	PCB 206	puf	0.00039	U			0.0006	U		
	PCB 206	combination			0.0004	U			0.00061	U

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.
 (d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.1. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	PCB 209	gff	0.00027	U			0.00041	U		
	PCB 209	puf	0.00027	U			0.00041	U		
	PCB 209	puf	0.00027	U			0.00041	U		
	PCB 209	combination			0.00028	U			0.00042	U
	PCB 28	gff	0.0007	U			0.0011	U		
	PCB 28	puf	0.09				0.0011	U		
	PCB 28	puf	0.0007	U			0.0011	U		
	PCB 28	combination			0.00071	U			0.0011	U
	PCB 29	gff	0.00055	U			0.00084	U		
	PCB 29	puf	0.00055	U			0.00084	U		
	PCB 29	puf	0.00055	U			0.00084	U		
	PCB 29	combination			0.00056	U			0.00085	U
	PCB 44	gff	0.00031	U			0.00047	U		
	PCB 44	puf	0.00031	U			0.00047	U		
	PCB 44	puf	0.00031	U			0.00047	U		
	PCB 44	combination			0.016	B			0.00048	U
	PCB 49	gff	0.00053	U			0.00081	U		
	PCB 49	puf	0.015				0.00081	U		
	PCB 49	puf	0.0014				0.00081	U		
	PCB 49	combination			0.0033	BB			0.0016	
	PCB 50	gff	0.00093	U			0.0014	U		
	PCB 50	puf	0.00093	U			0.0014	U		
	PCB 50	puf	0.00093	U			0.0014	U		
	PCB 50	combination			0.00095	U			0.0014	U
	PCB 52	gff	0.046				0.00054	U		
	PCB 52	puf	0.03				0.0033	B		
	PCB 52	puf	0.013				0.0019	B		
	PCB 52	combination			0.00036	U			0.0074	
	PCB 66	gff	0.00038	U			0.00059	U		
	PCB 66	puf	0.00038	U			0.00059	U		
	PCB 66	puf	0.00038	U			0.00059	U		
	PCB 66	combination			0.00039	U			0.00059	U
	PCB 8	gff	0.00099	U			0.0015	U		
	PCB 8	puf	0.00099	U			0.0015	U		
	PCB 8	puf	0.00099	U			0.0015	U		
	PCB 8	combination			0.001	U			0.0015	U
	PCB 87	gff	0.00035	U			0.00054	U		
	PCB 87	puf	0.049	B			0.00087			
	PCB 87	puf	0.013	B			0.0017			
	PCB 87	combination			0.12				0.0015	
	Perylene	gff	0.0073	B			0.021	B		
	Perylene	puf	0.011	B			0.021	B		
	Perylene	puf	0.01	B			0.021	B		
	Perylene	combination			0.0045	U			0.012	B
	Phenanthrene	gff	0.024	B			0.023			
	Phenanthrene	puf	0.8				0.61			
	Phenanthrene	puf	0.098				0.26			
	Phenanthrene	combination			0.33				0.8	
	Pyrene	gff	0.025				0.025	U		
	Pyrene	puf	0.068				0.054			
	Pyrene	puf	0.016	U			0.025	U		
	Pyrene	combination			0.062				0.12	
	Trans Nonachlor	gff	0.0011	U			0.0017	U		
	Trans Nonachlor	puf	0.0039				0.0017	U		
	Trans Nonachlor	puf	0.0011	U			0.0017	U		
	Trans Nonachlor	combination			0.0011	U			0.0017	U

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.

(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.2. Concentrations of Semivolatile Organic Compounds in Ambient Air at the 300-Area Location

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
300 Area	1,4-Dichlorobenzene	gff			0.021	U			0.029	U
	1,4-Dichlorobenzene	puf			0.021	U			0.029	U
	1,4-Dichlorobenzene	puf			0.021	U			0.029	U
	1,4-Dichlorobenzene	combination	0.02	U			0.03	U		
	2,4'-DDD	gff			0.001	U			0.0015	U
	2,4'-DDD	puf			0.001	U			0.0015	U
	2,4'-DDD	puf			0.001	U			0.0015	U
	2,4'-DDD	combination	0.001	U			0.0015	U		
	2,4'-DDE	gff			0.00025	U			0.00035	U
	2,4'-DDE	puf			0.00025	U			0.00035	U
	2,4'-DDE	puf			0.00025	U			0.00035	U
	2,4'-DDE	combination	0.00025	U			0.00036	U		
	2,4'-DDT	gff			0.00048	U			0.00067	U
	2,4'-DDT	puf			0.013				0.0074	
	2,4'-DDT	puf			0.00048	U			0.00067	U
	2,4'-DDT	combination	0.011				0.0044			
	4,4'-DDD	gff			0.0005	U			0.0007	U
	4,4'-DDD	puf			0.0005	U			0.0007	U
	4,4'-DDD	puf			0.0005	U			0.0007	U
	4,4'-DDD	combination	0.00049	U			0.00072	U		
	4,4'-DDE	gff			0.0003	U			0.00042	U
	4,4'-DDE	puf			0.068				0.031	
	4,4'-DDE	puf			0.0016	B			0.00042	U
	4,4'-DDE	combination	0.1				0.019			
	4,4'-DDT	gff			0.00044	U			0.00063	U
	4,4'-DDT	puf			0.049				0.013	
	4,4'-DDT	puf			0.00044	U			0.00063	U
	4,4'-DDT	combination	0.024				0.022			
	a-BHC	gff			0.0032	B			0.00071	U
	a-BHC	puf			0.053				0.04	
	a-BHC	puf			0.031				0.031	
	a-BHC	combination	0.099				0.061			
	a-Chlordane	gff			0.00091	U			0.0013	U
	a-Chlordane	puf			0.00091	U			0.0021	
	a-Chlordane	puf			0.00091	U			0.0013	U
	a-Chlordane	combination	0.0088				0.0021			
	Acenaphthene	gff			0.008	U			0.013	
	Acenaphthene	puf			0.011				0.018	
	Acenaphthene	puf			0.012				0.019	
	Acenaphthene	combination	0.051				0.021			
	Acenaphthylene	gff				U			0.012	U
	Acenaphthylene	puf			0.0085	U			0.012	U
	Acenaphthylene	puf			0.0085	U			0.012	U
	Acenaphthylene	combination	0.032				0.02			
	Aldrin	gff			0.0049	B			0.0006	U
	Aldrin	puf			0.0078	B			0.0006	U
	Aldrin	puf			0.005	B			0.0006	U
	Aldrin	combination	0.016	B			0.0095	B		
	Anthracene	gff			0.013	U			0.018	U
	Anthracene	puf			0.049				0.12	
	Anthracene	puf			0.055				0.045	
	Anthracene	combination	0.17				0.082			
	b-BHC	gff			0.00051	U			0.00071	U
	b-BHC	puf			0.00051	U			0.00071	U
	b-BHC	puf			0.00051	U			0.00071	U
	b-BHC	combination	0.053				0.00073	U		
	Benzo(a)anthracene	gff			0.023	U			0.032	U
	Benzo(a)anthracene	puf			0.023	U			0.032	U
	Benzo(a)anthracene	puf			0.023	U			0.032	U
	Benzo(a)anthracene	combination	0.033				0.095			

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.

(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.2. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	Benzo(a)pyrene	gff			0.01	B			0.026	B
	Benzo(a)pyrene	puf			0.012	B			0.023	B
	Benzo(a)pyrene	puf			0.015	B			0.017	B
	Benzo(a)pyrene	combination	0.042	B			0.066	B		
	Benzo(b)fluoranthene	gff			0.032				0.098	
	Benzo(b)fluoranthene	puf			0.0081	U			0.011	U
	Benzo(b)fluoranthene	puf			0.0081	U			0.011	U
	Benzo(b)fluoranthene	combination	0.18				0.25			
	Benzo(e)pyrene	gff			0.019	B			0.055	B
	Benzo(e)pyrene	puf			0.0022	U			0.0031	U
	Benzo(e)pyrene	puf			0.012	B			0.013	B
	Benzo(e)pyrene	combination	0.094				0.18			
	Benzo(g,h,i)perylene	gff			0.02	U			0.036	
	Benzo(g,h,i)perylene	puf			0.02	U			0.028	U
	Benzo(g,h,i)perylene	puf			0.02	U			0.028	U
	Benzo(g,h,i)perylene	combination	0.068				0.043			
	Benzo(k)fluoranthene	gff			0.0095				0.026	
	Benzo(k)fluoranthene	puf			0.0082	U			0.012	U
	Benzo(k)fluoranthene	puf			0.0082	U			0.012	U
	Benzo(k)fluoranthene	combination	0.053				0.052			
	bis(2-Ethylhexyl) Phthalate	gff			10	B			17	B
	bis(2-Ethylhexyl) Phthalate	puf			18	B			15	B
	bis(2-Ethylhexyl) Phthalate	puf			11	B			120	B
	bis(2-Ethylhexyl) Phthalate	combination	53	B			21	B		
	Chrysene	gff			0.028				0.068	
	Chrysene	puf			0.019				0.0088	U
	Chrysene	puf			0.0062	U			0.0088	U
	Chrysene	combination	0.11				0.41			
	d-BHC	gff			0.00051	U			0.00071	U
	d-BHC	puf			0.011				0.00071	U
	d-BHC	puf			0.003				0.00071	U
	d-BHC	combination	0.03				0.00073	U		
	Di-n-octyl Phthalate	gff			0.15	B			0.35	B
	Di-n-octyl Phthalate	puf			0.1	U			0.37	B
	Di-n-octyl Phthalate	puf			0.16	B			0.41	B
	Di-n-octyl Phthalate	combination	0.14	B			0.22	B		
	Dibenzo(a,h)anthracene	gff			0.004	U			0.0056	U
	Dibenzo(a,h)anthracene	puf			0.004	U			0.0056	U
	Dibenzo(a,h)anthracene	puf			0.004	U			0.0056	U
	Dibenzo(a,h)anthracene	combination	0.004	U			0.022			
	Dieldrin	gff			0.00013	U			0.00019	U
	Dieldrin	puf			0.042				0.029	
	Dieldrin	puf			0.0033				0.00019	U
	Dieldrin	combination	0.08				0.011			
	Endosulfan I	gff			0.00051	U			0.056	
	Endosulfan I	puf			0.42				13	
	Endosulfan I	puf			0.00051	U			0.01	
	Endosulfan I	combination	0.55				0.18			
	Endosulfan II	gff			0.00051	U			0.33	
	Endosulfan II	puf			0.00051	U			1.8	
	Endosulfan II	puf			0.00051	U			0.00071	U
	Endosulfan II	combination	0.071				0.065			
	Endosulfan Sulfate	gff			0.00051	U			0.0018	
	Endosulfan Sulfate	puf			0.016				0.062	
	Endosulfan Sulfate	puf			0.00051	U			0.00071	U
	Endosulfan Sulfate	combination	0.0052				0.002			
	Endrin	gff			0.00051	U			0.00071	U
	Endrin	puf			0.00051	U			0.00071	U
	Endrin	puf			0.00051	U			0.00071	U
	Endrin	combination	0.0005	U			0.00073	U		

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.
 (d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank > 5 amount in sample.

Table A.2. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	Endrin Ketone	gff			0.00051	U			0.00071	U
	Endrin Ketone	puf			0.00051	U			0.00071	U
	Endrin Ketone	puf			0.00051	U			0.00071	U
	Endrin Ketone	combination	0.0005	U			0.00073	U		
	Fluoranthene	gff			0.033				0.15	
	Fluoranthene	puf			0.33				0.23	
	Fluoranthene	puf			0.013	U			0.018	U
	Fluoranthene	combination	0.56				0.59			
	Fluorene	gff			0.022	U			0.031	U
	Fluorene	puf			0.071				0.056	
	Fluorene	puf			0.2				0.11	
	Fluorene	combination	0.63				0.13			
	G-BHC	gff			0.00045	U			0.00064	U
	G-BHC	puf			0.11				0.045	
	G-BHC	puf			0.046				0.00064	U
	G-BHC	combination	0.1				0.026			
	g-Chlordane	gff			0.00051	U			0.00071	U
	g-Chlordane	puf			0.00051	U			0.012	
	g-Chlordane	puf			0.0013				0.00071	U
	g-Chlordane	combination	0.029				0.0083			
	Heptachlor	gff			0.00052	U			0.00073	U
	Heptachlor	puf			0.00052	U			0.00073	U
	Heptachlor	puf			0.00052	U			0.00073	U
	Heptachlor	combination	0.00051	U			0.00075	U		
	Heptachlor Epoxide	gff			0.00012	U			0.00017	U
	Heptachlor Epoxide	puf			0.00012	U			0.00017	U
	Heptachlor Epoxide	puf			0.0025				0.00017	U
	Heptachlor Epoxide	combination	0.00012	U			0.0075	B		
	Hexachlorbenzene	gff			0.00037	U			0.0014	
	Hexachlorbenzene	puf			0.014				0.014	
	Hexachlorbenzene	puf			0.017				0.018	
	Hexachlorbenzene	combination	0.14				0.015			
	Indeno(123-cd)pyrene	gff			0.01	U			0.03	
	Indeno(123-cd)pyrene	puf			0.01	U			0.014	U
	Indeno(123-cd)pyrene	puf			0.01	U			0.014	U
	Indeno(123-cd)pyrene	combination	0.072				0.041			
	Methoxychlor	gff			0.033				0.055	
	Methoxychlor	puf			0.054				0.044	
	Methoxychlor	puf			0.00051	U			0.00071	U
	Methoxychlor	combination	0.0005	U			0.022			
	Mirex	gff			0.00046	U			0.00066	U
	Mirex	puf			0.0019				0.00066	U
	Mirex	puf			0.00046	U			0.00066	U
	Mirex	combination	0.00046	U			0.006			
	Naphthalene	gff			0.047	B			0.21	B
	Naphthalene	puf			0.031	B			0.057	B
	Naphthalene	puf			0.036	B			0.046	B
	Naphthalene	combination	0.086	B			0.11	B		
	PCB 101	gff			0.00054	U			0.00076	U
	PCB 101	puf			0.28				0.064	
	PCB 101	puf			0.01	B			0.00076	U
	PCB 101	combination	0.00053	U			0.042	B		
	PCB 104	gff			0.00036	U			0.00051	U
	PCB 104	puf			0.00036	U			0.00051	U
	PCB 104	puf			0.00036	U			0.00051	U
	PCB 104	combination	0.00036	U			0.00052	U		
	PCB 105	gff			0.0055	B			0.00047	U
	PCB 105	puf			0.16				0.018	
	PCB 105	puf			0.004	B			0.00047	U
	PCB 105	combination	0.041				0.014	B		

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.

(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.2. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	PCB 118	gff			0.00052	U			0.00073	U
	PCB 118	puf			0.31				0.00073	U
	PCB 118	puf			0.0041	B			0.00073	U
	PCB 118	combination	0.1				0.047			
	PCB 128	gff			0.0014				0.00038	U
	PCB 128	puf			0.058				0.0072	
	PCB 128	puf			0.00054				0.00038	U
	PCB 128	combination	0.0097				0.0054			
	PCB 138	gff			0.0073	B			0.00052	U
	PCB 138	puf			0.25				0.00052	U
	PCB 138	puf			0.0021	B			0.00052	U
	PCB 138	combination	0.082				0.066			
	PCB 153	gff			0.0012	B			0.00061	U
	PCB 153	puf			0.19				0.022	
	PCB 153	puf			0.0011	B			0.00061	U
	PCB 153	combination	0.046				0.017			
	PCB 154	gff			0.00061	U			0.00086	U
	PCB 154	puf			0.00061	U			0.00086	U
	PCB 154	puf			0.00061	U			0.00086	U
	PCB 154	combination	0.0006	U			0.00088	U		
	PCB 170	gff			0.00022	U			0.00031	U
	PCB 170	puf			0.017				0.0038	
	PCB 170	puf			0.00022	U			0.00031	U
	PCB 170	combination	0.004				0.006			
	PCB 18	gff			0.0012	U			0.0016	U
	PCB 18	puf			0.0073	B			0.0016	U
	PCB 18	puf			0.0012	U			0.0016	U
	PCB 18	combination	0.0011	U			0.0049	B		
	PCB 180	gff			0.0016				0.00077	
	PCB 180	puf			0.041				0.0066	
	PCB 180	puf			0.0003	U			0.00042	U
	PCB 180	combination	0.0048				0.0059			
	PCB 183	gff			0.00059	U			0.00083	U
	PCB 183	puf			0.019				0.0016	
	PCB 183	puf			0.00059	U			0.00083	U
	PCB 183	combination	0.00058	U			0.003			
	PCB 184	gff			0.00059	U			0.00083	U
	PCB 184	puf			0.00059	U			0.00083	U
	PCB 184	puf			0.00059	U			0.0012	
	PCB 184	combination	0.0018	B			0.00085	U		
	PCB 187	gff			0.00042	U			0.0006	U
	PCB 187	puf			0.035				0.0014	
	PCB 187	puf			0.00042	U			0.0006	U
	PCB 187	combination	0.0017				0.0013			
	PCB 188	gff			0.00025	U			0.00035	U
	PCB 188	puf			0.00025	U			0.00035	U
	PCB 188	puf			0.00025	U			0.00035	U
	PCB 188	combination	0.00025	U			0.00036	U		
	PCB 195	gff			0.0003	U			0.00042	U
	PCB 195	puf			0.0013				0.00042	U
	PCB 195	puf			0.0003	U			0.00042	U
	PCB 195	combination	0.0003	U			0.00043	U		
	PCB 200	gff			0.0016	U			0.0022	U
	PCB 200	puf			0.0016	U			0.0022	U
	PCB 200	puf			0.0016	U			0.0022	U
	PCB 200	combination	0.0015	U			0.0023	U		
	PCB 206	gff			0.00043	U			0.00061	U
	PCB 206	puf			0.00043	U			0.00061	U
	PCB 206	puf			0.00043	U			0.00061	U
	PCB 206	combination	0.00043	U			0.00063	U		

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.
 (d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank > 5 amount in sample.

Table A.2. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	PCB 209	gff			0.0003	U			0.00042	U
	PCB 209	puf			0.0003	U			0.00042	U
	PCB 209	puf			0.0003	U			0.00042	U
	PCB 209	combination	0.0003	U			0.00043	U		
	PCB 28	gff			0.002	B			0.0011	U
	PCB 28	puf			0.071				0.0011	U
	PCB 28	puf			0.00077	U			0.0011	U
	PCB 28	combination	0.00077	U			0.0011	U		
	PCB 29	gff			0.00061	U			0.00086	U
	PCB 29	puf			0.00061	U			0.00086	U
	PCB 29	puf			0.0034	B			0.00086	U
	PCB 29	combination	0.0006	U			0.0034	B		
	PCB 44	gff			0.00034	U			0.00048	U
	PCB 44	puf			0.038	B			0.00048	U
	PCB 44	puf			0.00034	U			0.00048	U
	PCB 44	combination	0.048				0.00049	U		
	PCB 49	gff			0.00059	U			0.00083	U
	PCB 49	puf			0.018				0.0029	
	PCB 49	puf			0.0019	B			0.00083	U
	PCB 49	combination	0.075				0.0024			
	PCB 50	gff			0.001	U			0.0015	U
	PCB 50	puf			0.001	U			0.0015	U
	PCB 50	puf			0.001	U			0.0015	U
	PCB 50	combination	0.001	U			0.0015	U		
	PCB 52	gff			0.00039	U			0.00055	U
	PCB 52	puf			0.066				0.045	
	PCB 52	puf			0.015				0.00055	U
	PCB 52	combination	0.085				0.033			
	PCB 66	gff			0.00042	U			0.0006	U
	PCB 66	puf			0.00042	U			0.0006	U
	PCB 66	puf			0.00042	U			0.0006	U
	PCB 66	combination	0.00042	U			0.00061	U		
	PCB 8	gff			0.0011	U			0.0015	U
	PCB 8	puf			0.0011	U			0.0015	U
	PCB 8	puf			0.0011	U			0.0015	U
	PCB 8	combination	0.0011	U			0.0016	U		
	PCB 87	gff			0.00069				0.00055	U
	PCB 87	puf			0.19				0.029	
	PCB 87	puf			0.002	B			0.00055	U
	PCB 87	combination	0.11				0.018			
	Perylene	gff			0.0078	B			0.0068	U
	Perylene	puf			0.0084	B			0.012	B
	Perylene	puf			0.011	B			0.014	B
	Perylene	combination	0.016	B			0.0088	B		
	Phenanthrene	gff			0.036	B			0.15	
	Phenanthrene	puf			1.2				1.8	
	Phenanthrene	puf			1.2				1	
	Phenanthrene	combination	3				2			
	Pyrene	gff			0.026				0.18	
	Pyrene	puf			0.22				0.23	
	Pyrene	puf			0.018	U			0.025	U
	Pyrene	combination	0.42				0.56			
	Trans Nonachlor	gff			0.0012	U			0.0017	U
	Trans Nonachlor	puf			0.008				0.0053	
	Trans Nonachlor	puf			0.0012	U			0.0017	U
	Trans Nonachlor	combination	0.018				0.0054			

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.

(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.3. Concentrations of Semivolatile Organic Compounds in Ambient Air at the Rattlesnake Springs Location (600 Area)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
600 Area	1,4-Dichlorobenzene	combination	0.019	U	0.019	U	0.026	U	0.028	U
	2,4'-DDD	combination	0.00093	U	0.00095	U	0.0013	U	0.0014	U
	2,4'-DDE	combination	0.00022	U	0.00023	U	0.00031	U	0.00033	U
	2,4'-DDT	combination	0.00043	U	0.0029		0.0006	U	0.004	
	4,4'-DDD	combination	0.00045	U	0.00046	U	0.00063	U	0.00066	U
	4,4'-DDE	combination	0.043		0.028		0.014		0.01	
	4,4'-DDT	combination	0.037		0.0076		0.0069		0.0071	
	a-BHC	combination	0.052		0.094		0.058		0.037	
	a-Chlordane	combination	0.00082	U	0.00084	U	0.0011	U	0.0012	U
	Acenaphthene	combination	0.0081		0.015		0.01	U	0.012	
	Acenaphthylene	combination	0.0077	U	0.0078	U	0.011	U	0.011	U
	Aldrin	combination	0.00038	U	0.0054	B	0.00054	U	0.00057	U
	Anthracene	combination	0.013		0.043		0.02		0.1	
	b-BHC	combination	0.00046	U	0.00047	U	0.00064	U	0.00068	U
	Benzo(a)anthracene	combination	0.02	U	0.021	U	0.029	U	0.03	U
	Benzo(a)pyrene	combination	0.0057	B	0.015	B	0.0087	B	0.0091	B
	Benzo(b)fluoranthene	combination	0.024		0.058		0.037		0.05	
	Benzo(e)pyrene	combination	0.01	B	0.026	B	0.017	B	0.022	B
	Benzo(g,h,i)perylene	combination	0.018	U	0.019	U	0.025	U	0.027	U
	Benzo(k)fluoranthene	combination	0.0074	U	0.016		0.011		0.012	
	bis(2-Ethylhexyl) Phthalate	combination	9.3	B	14	B	13	B	64	B
	Chrysene	combination	0.022		0.039		0.024		0.045	
	d-BHC	combination	0.0041		0.0074		0.00064	U	0.00068	U
	Di-n-octyl Phthalate	combination	0.093	U	0.095	U	0.13	U	3.4	B
	Dibenzo(a,h)anthracene	combination	0.0036	U	0.0037	U	0.0051	U	0.0053	U
	Dieldrin	combination	0.00012	U	0.00012	U	0.0087		0.0068	
	Endosulfan I	combination	0.44		1.3		0.12		0.4	
	Endosulfan II	combination	0.00046	U	0.12		0.039		0.04	
	Endosulfan Sulfate	combination	0.017		0.013		0.0022		0.0029	
	Endrin	combination	0.00046	U	0.00047	U	0.00064	U	0.00068	U
	Endrin Ketone	combination	0.00046	U	0.00047	U	0.00064	U	0.00068	U
	Fluoranthene	combination	0.24		0.24		0.19		0.67	
	Fluorene	combination	0.031		0.15		0.036		0.033	
	G-BHC	combination	0.066		0.045		0.006		0.007	
	g-Chlordane	combination	0.00046	U	0.00047	U	0.0045		0.0035	
	Heptachlor	combination	0.00047	U	0.00047	U	0.00065	U	0.00069	U
	Heptachlor Epoxide	combination	0.00011	U	0.00011	U	0.0045	B	0.0043	
	Hexachlorbenzene	combination	0.0089	B	0.064		0.013		0.0005	U
	Indeno(123-cd)pyrene	combination	0.0091	U	0.017		0.013	U	0.014	U
	Methoxycor	combination	0.1		0.0023		0.00064	U	0.023	
	Mirex	combination	0.00042	U	0.00043	U	0.00059	U	0.00062	U
	Naphthalene	combination	0.029	B	0.04	B	0.031	B	0.052	B
	PCB 101	combination	0.19		0.1		0.055		0.023	
	PCB 104	combination	0.00033	U	0.00033	U	0.00046	U	0.00048	U
	PCB 105	combination	0.13		0.024		0.015	B	0.015	
	PCB 118	combination	0.25		0.061		0.029		0.028	
	PCB 128	combination	0.052		0.0054		0.0056		0.0062	
	PCB 138	combination	0.21		0.12		0.039		0.048	
	PCB 153	combination	0.16		0.027		0.015		0.016	
	PCB 154	combination	0.00055	U	0.00056	U	0.00077	U	0.00081	U
	PCB 170	combination	0.015		0.0019	B	0.0033		0.00029	U
	PCB 18	combination	0.0036	B	0.0011	U	0.0036	B	0.013	
	PCB 180	combination	0.036		0.0021		0.0052		0.0068	
	PCB 183	combination	0.016		0.00086		0.0011		0.0011	
	PCB 184	combination	0.00053	U	0.0011		0.00074	U	0.00079	U
	PCB 187	combination	0.029		0.00039	U	0.00054	U	0.00057	U
	PCB 188	combination	0.00022	U	0.00023	U	0.00031	U	0.00033	U

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurathane foam, Combination = a GFF PUF combined for one analysis.
(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank >5 amount in sample.

Table A.3. (contd)

Sample Site	Analyte	Media ^(a)	4/4/95	Qualifier ^(b)	5/22/95	Qualifier	8/15/95	Qualifier	8/29/95	Qualifier
	PCB 195	combination	0.0011		0.00028	U	0.00038	U	0.0004	U
	PCB 200	combination	0.0014	U	0.0014	U	0.002	U	0.0021	U
	PCB 206	combination	0.00039	U	0.0004	U	0.00055	U	0.00058	U
	PCB 209	combination	0.00027	U	0.00028	U	0.00038	U	0.0004	U
	PCB 28	combination	0.039		0.041		0.00098	U	0.001	U
	PCB 29	combination	0.00055	U	0.0023	B	0.00077	U	0.00081	U
	PCB 44	combination	0.019		0.022	B	0.00043	U	0.00046	U
	PCB 49	combination	0.0048		0.0099		0.0014		0.00079	U
	PCB 50	combination	0.00093	U	0.00095	U	0.0013	U	0.0014	U
	PCB 52	combination	0.03		0.024		0.016	B	0.0057	
	PCB 66	combination	0.00038	U	0.00039	U	0.00054	U	0.00057	U
	PCB 8	combination	0.00099	U	0.001	U	0.0014	U	0.0015	U
	PCB 87	combination	0.14		0.063		0.017		0.0088	
	Perylene	combination	0.012	B	0.0086	B	0.019	B	0.012	B
	Phenanthrene	combination	0.52		1.1		0.75		2.2	
	Pyrene	combination	0.095		0.08		0.086		0.27	
	Trans Nonachlor	combination	0.0011	U	0.0016		0.0015	U	0.0016	U

(a) Collection Medias are : GFF = glass fiber filter, PUF = polyurethane foam, Combination = a GFF PUF combined for one analysis.

(d) Qualifiers are defined as : U = undetected, B = found in blank, BB = amount in blank > 5 amount in sample.

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