PCB AND PCT IN COMMERCIALLY AVAILABLE PRODUCTS

AND IN SAMPLES OF GARBAGE

Reports by
L.M. Reynolds, Ph. D.,
Ontario Research Foundation,
Sheridan Park Research Community, Mississauga

To

M. Gilbertson, Scientific Authority,
Contaminants Control Branch,
Environmental Impact Control Directorate,
Environmental Protection Service

in fulfillment of

Department of Supply and Services
Contract OSS 76-00323

Report Number EPS 5-EC-77-2

February 1978

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Cat. No. En 46-5/77-2
ISBN 0-662-01649-1

ABSTRACT

Samples of commercially available products and of garbage were analysed for polychlorinated biphenyls (PCB) and for polychlorinated terphenyls (PCT). PCB was found in some products particularly in those composed of paper. PCT was absent from all the products tested except one sample of corrugated cardboard. PCB and PCT were found in most samples of garbage.

RESUME

Des échantillons de produits commerciaux et de déchets ont été analysés en vue de déterminer la présence de biphényles polychlorés (PCB) et de triphényles polychlorés (PCT). Les PCB étaient surtout présents dans les produits composés de papier. Les PCT étaient absents de tous les produits sauf d'un échantillon de carton ondulé. Les deux groupes de composés étaient présents dans la plupart des échantillons de déchets.

PREFACE

Polychlorinated biphenyls (PCB) and terphenyls (PCT) have been found extensively in the North American environment. Regulations restricting uses of PCBs are being introduced in Canada. Because PCBs and PCTs were formerly widely used in manufactured products, the Environmental Protection Service required information on their occurrence in a range of recently manufactured goods. A large part of the output of manufacturing industries is disposed of at municipal solid waste facilities. Samples of composited pulverized garbage were available from cities across Canada and were analysed for PCB and PCT.

The Ontario Research Foundation selected the products and analysed the products and the garbage samples under contract. The two reports form the substance of this document. Because only one sample of each selected brand and only a limited number of brands were analysed and because the significance of trace quantities of PCBs and PCTs is unknown, the brand identification, the manufacturer's name and the name of the retail outlet involved have been deleted. Where duplicated analyses were carried out, both results are included.

The results in this report show that the levels of PCB in this range of samples were low but indicate that PCBs are commonly present in many products in everyday use. An extensive survey of PCB and PCT content of food-packaging materials undertaken in Canada in 1972 (JAOAC 56:999-1001. 1973) showed levels generally below 1 ppm but a substantial fraction of the samples contained 1 to 10 ppm; some were above 10 ppm. The limited survey reported here found only one sample (cork wall tiles) that contained more than 1 ppm PCB.

Both PCB and PCT were detected in every garbage sample with the exception of one sample from Edmonton - West End. This limited number of results suggests that PCB and PCT levels, as expected, are very variable.

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Report ORF 77-1

PCB Survey of Commercially Available Products

DSS Contract OSS76-00323

Introduction

This is the first formal report covering work carried out under the above contract on behalf of EPS, Department of the Environment. The main purpose of the survey was to determine if commercially available materials are currently contributing PCBs (polychlorobiphenyls) to the environment. Within the initial limit of 100 samples, we attempted to cover the widest possible range of materials which were judged more likely to contain PCBs. The samples were purchased during December 1976, and in January 1977, we began the analyses as well as methodology work on materials which we had not analysed previously.

Because of the very wide variety of materials, even within the same product category, several different methods were used for the analyses.

PCTs (polychloroterphenyls) were not requested, but we endeavoured to include it in the analyses, assuming that the PCB extraction and cleanup methods would be adequate.

Methods of Analyses

Following preliminary methodology and recovery studies, the samples were extracted and cleaned-up according to the following procedures:

(1) Sample (3 g) weighed accurately in a 50 ml volumetric flask and made up to volume with hexane. Mixed well and pipetted 5 mls onto a 2% deactivated Florisil column for cleanup.

(2) Same as method 1 except that 5.0 g sample was shaken with 50 ml hexane for 1/2 hour before putting aliquot onto Florisil column.

(3) Sample (0.5 g) weighed accurately and mixed with 5.0 g 2% deactivated Florisil. Packed column with 25.0 g of 2% deactivated Florisil and added Florisil/sample mixture. Eluted with hexane, concentrated to incipient dryness and made up to 5 mls with hexane for injection on G.C.

(4) Same as method 3 except that after Florisil column, concentrated on steam bath using Snyder column.

(5) Chopped sample with scissors and blended with dry ice in an IKA Universal Mill M20. Let dry ice sublime. Weighed 5.0 g sample accurately, mixed with Na_2SO_4 and extracted on Soxhlet with hexane for 6 hours. Concentrated and put through 2% deactivated Florisil column.

(6) Chopped sample with scissors and blended in a Waring Blendor. Weighed 5.0 g sample accurately and extracted on Soxhlet with hexane for 6 hours. Concentrated and put through 2% deactivated Florisil column.

(7) Same as method 6 except that 10.0 g blended sample extracted on Soxhlet with hexane for 2 hours.

(8) Same as method 7 except that after extraction on Soxhlet, concentrated on steam bath using Snyder column. Added 100 ml 5% benzene in acetone, placed in dry ice/methanol bath for 10 minutes and filtered through glass wool. Repeated with 50 mls 5% benzene in acetone. Concentrated and put through 2% deactivated Florisil column.

(9) Same as method 8 except that after Soxhlet extraction, sample was concentrated on rotovapor instead of steam bath.

(10) Sample (5.0 g) weighed accurately into 500 ml flask. Added 150 ml hexane and left standing overnight. Put on wrist-action shaker for 1 hour and filtered through glass wool. Repeated with 75 mls

hexane, shaking for 10 minutes. Concentrated and put through 2% deactivated Florisil column.

(11) Same as method 10 except that 5.0 g sample shaken with 100 ml hexane for 20 minutes and filtered. Repeated with 50 ml hexane. Sample was not left overnight in contact with hexane.

(12) Sample (2.0 g) weighed accurately and shaken with 25 ml hexane on wrist-action shaker for 20 minutes. Centrifuged for 10 minutes at 4600 r.p.m. and filtered through glass wool. Repeated centrifuge step with 25 ml hexane. Concentrated and put through 2% deactivated Florisil column.

(13) Sample (0.5 g) mixed with 5 ml hexane and put through 2% deactivated Florisil column.

(14) Sample (0.5 g) weighed into an Eberbach stainless steel microblender jar containing 100 ml 5% benzene in acetone and blended at high speed for 1 minute. Transferred extract and repeated with a further 100 ml solvent. Pooled extracts, placed in a dry ice/methanol bath for 10 minutes and filtered through glass wool. Repeated with 50 mls solvent. Concentrated on steam bath using Snyder column and put through 2% deactivated Florisil column.

(15) Added 5 ml benzene to 0.5 g sample and placed on hot plate to dissolve sample. Added 95 ml acetone and placed in a dry ice/ methanol bath for 10 minutes. Filtered through glass wool and repeated with 50 ml solvent. Concentrated on Rotovapor and put through 2% deactivated Florisil column.

(16) Same as method 15 except that the filtered sample after immersion in dry ice/methanol bath was concentrated on steam bath using Snyder column.

(17) Sample (1.0 g) extracted on Soxhlet with hexane for 4 hours. Concentrated and put through 2% deactivated Florisil column.

(18) Sample (1.0 g) mixed with 500 ml water and 10 ml saturated sodium chloride. Extracted with 100 ml, 75 ml and 75 ml hexane. Pooled

extracts, concentrated and put through 2% deactivated Florisil column.

(19) Sample (5.0 g) extracted for 2 hours with hexane on Soxhlet. Concentrated on steam bath using Snyder column, added 100 ml 5% benzene in acetone, and placed in dry ice/methanol bath for 10 minutes. Filtered through glass wool and repeated with 50 mls solvent. Concentrated and put through 2% deactivated Florisil column.

(20) Sample (0.5 g) weighed into a 200 ml centrifuge bottle containing 75 ml hexane. Blended at high speed for 1 minute on Polytron, filtered through No. 1 filter paper and sodium sulphate. Repeated with 100 ml solvent. Concentrated on steam bath using Snyder column and put through 2% deactivated Florisil column.

The 2% Water-deactivated Florisil Method for Cleanup and Separation of PCBs

Reagent:- Florisil, regular grade, 60/100 mesh (Travelon Oil Co.). Heated at 300°C overnight, 2% water added.

Procedure:- Pack 1" diameter glass wool plugged column with 6" of 2% deactivated Florisil. Settle column by gentle tapping. Add 0.5" sodium sulphate. Rinse column with 100 ml hexane. Add 5 ml hexane to concentrated sample extract. Pour sample solution onto column and elute with ≈150 ml hexane, using eluant to rinse flask onto column. (The exact volume of hexane is determined for each new jar of 2% deactivated Florisil.) Eluant should pass through at a rate of 5 ml/min. Concentrate to incipient dryness, add 5 ml hexane and inject.

Gas Chromatographic Conditions

(1) PCBs

H/P Model 5700, with linear Ni^{63} EC detector and Model 7671A automatic sample injector; glass column 6'x1/4"x4 mm I.D. packed with 3% OV-101/6% OV-210 on Chromosorb W H.P. 80-100 mesh; column 215°C; detector 350°C; 5% methane in argon carrier at 60 ml/min.

(2) PCTs

Tracor 560 with linear Ni^{63} EC detector; glass column 6'x1/4"x4 mm I.D. packed with 3% OV-101 on Chromosorb W H.P. 80-100 mesh; column 280°C; injector 280°C; detector 350°C; 5% methane in argon carrier at 50 ml/min.

Results and Comments

The PCB, PCT results of the first three sample categories (oils and lubricants, plastics, papers) are given in Table I. The sensitivities and recoveries of the methods are summarized in Table II.

The PCB, PCT levels reported have not been corrected for recoveries which were generally essentially complete.

Recoveries were not carried out for PCTs but from previous experience, these usually follow the PCB recoveries closely.

In general, the Soxhlet extraction gave slightly higher values than the shaking and blending methods, but it also showed somewhat higher background from coentractives.

Figure 1 shows a typical PCB gas chromatogram of a sample and the reference standard against which it was quantitated. The method of quantitation is by reference to the peak heights of three major peaks and averaging the results.

LMR:evdm
Attach.

L.M. Reynolds, Ph.D.
Principal Scientist,
Pesticide & Trace Analytical Lab,
Department of Applied Chemistry.

Table 1.1: PCB Levels in Commercially Available Materials

Oils and Lubricants

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Boiled Linseed Oil	D1	1		ND(c)	ND
Raw Linseed Oil	D2	1		ND, ND	ND
Machine Oil	D3	1		ND	ND
Penetrating Oil	D4	1		ND	ND
Brake Fluid	D5	1		ND	ND
Lemon Oil	D6	1		ND	ND
Tung Oil	D7	1		ND	ND
Oil Additive	D8(d)	1		ND	ND
Outboard Gear Oil EP90	D9(e)	1		ND	ND
Weatherstripping Lubricant	D10	3		ND	ND
Open Gear Lubricant	D11	1		ND	ND
Metal Cutting Lubricant	D12	1	1248	0.07, 0.09	ND
White Lithium Grease	D13	1		ND	ND
Wheel Bearing Grease	D14	1		ND	ND
Motor Oil	D15(f)	1		ND	ND

Table 1.2: PCB Levels in Commercially Available Materials

Plastics

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Toy	D31	5		ND	ND
Drinking Straw	D32	6	1242	0.30	ND
Coffee Cup Refill	D33(g)	6	1242	0.29	ND
Kitchen Film Wrap	D34(h)	5	1242	0.72	ND
Baby's Plastic Pants	D35	5	1242	0.47	ND
Plastic Bag	D36	10	1248	0.09	ND
Freezer Bag	D37	10	1242	0.26	ND
Garbage Bag	D38	10	1248	0.07	ND
Plastic Foam Weatherstripping	D39	6	1242	0.53	ND
Plastic Table Cover	D40	10	1248	0.13, 0.10	ND
Vinyl Floor Tread	D41	5	1248	0.32	ND
Plastic Wrap from D54	D42	5	1248	0.78	ND
Plastic Container from D68	D43	5	1248	0.43	ND

Table 1.3: PCB Levels in Commercially available Materials

Paper

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Bathroom Tissue	D44	7	1248	0.12	ND
Paper Towel	D45	7	1242	0.09	ND
Paper Cup	D46	9	1248	0.12	ND
Tissue Handkerchief	D47	7	1248	0.08	ND
Feminine Personal Hygiene Products	D48	7	1248	0.05	ND
Filter Bag	D49	7	1248	0.11	ND
Cloth Towels	D50(j)	7	1248	0.05	ND
Writing Paper	D51(k)	7	1242	0.18	ND
Lunch Sack	D52	7	1248	0.02	ND
Wax Paper	D53	8	1248	0.05	ND
Disposable Plate	D54	9	1248	0.31	ND
Vacuum Cleaner Bag	D55	7	1242	0.78	ND
Freezer Paper	D56	8	1248	0.15	ND
Serviettes	D57	7	1242	0.12	ND
Brown Wrapping Paper	D58	7	1242	0.06	ND
Advertising Newspaper	D59	7	1248	0.03	ND
Corrugated Cardboard	D60(l)	7	1248	0.17, 0.15	0.09, 0.07

Deletion of product brand identifiers necessitated rearrangement of pagination and elimination of page 9.

FOOTNOTES TO TABLES 1.1 to 1.3

(a) The PCB reference used was dictated according to the GC pattern observed. The p.p.m. values are given on "as purchased" basis, and the commas indicate duplicate values.

(b) Aroclor 5460 was used as the PCT reference.

(c) ND = none detected = < the sensitivity values (0.005-0.05 ppm) as given in Table II.

(d) Small unidentified peak (UIP) with relative retention time to DDE (RRT) of 0.60 observed in the sample.

(e) Small UIP observed at RRT of 1.99.

(f) Large UIP observed at RRT of 0.67.

(g) Small UIP observed at RRT of 0.62.

(h) Small UIP observed at RRT of 0.66.

(j) Large UIP observed at RRT of 0.62.

(k) Large UIP observed at RRT of 0.77.

(l) Large UIP observed at RRT of 0.64.

Table 1.4 Summary of the Recoveries and Sensitivities of the PCB Methods

Methods Used for PCB Survey[a]			Fortification Experiments	
Principle of Extraction/Cleanup	Method #s	Sensitivity[b] (ppm)	Spiking Levels (ppm)	% Recovery[c]
A. Sample mixed with hexane and aliquot put through Florisil cleanup	1, 2, 13	0.01 - 0.05	1 - 1.7	105 (102-107)
B. Sample mixed with Florisil and eluted from column	3, 4	0.05	2.5	105
C. Sample extracted with hexane followed by Florisil cleanup	5, 6, 7, 17 (Soxhlet) 10, 11, 12 (Shaker) 20 (Blander)	0.005 - 0.04	0.5 - 1.0	91 (81-104)
D. Sample extracted with hexane, with cleanup by freezing-out and Florisil column	8, 9, 19 (Soxhlet) 14 (Blender)	0.005 - 0.05	1.0	105
E. Sample dissolved in benzene, with cleanup by freezing-out and Florisil column	15, 16	0.05	10	99
F. Sample mixed with water, partitioned into hexane and cleanup by Florisil	18	0.04	5.0	100

(a) Details of the methods used are given under "Methods of Analyses".

(b) The sensitivities depend on the weights analysed, hence ranges are given in certain categories. Note that ND = none detected = < the given values.

(c) Method recoveries were carried out in duplicates and the average values are given. The brackets indicate the ranges for the methods of the same category.

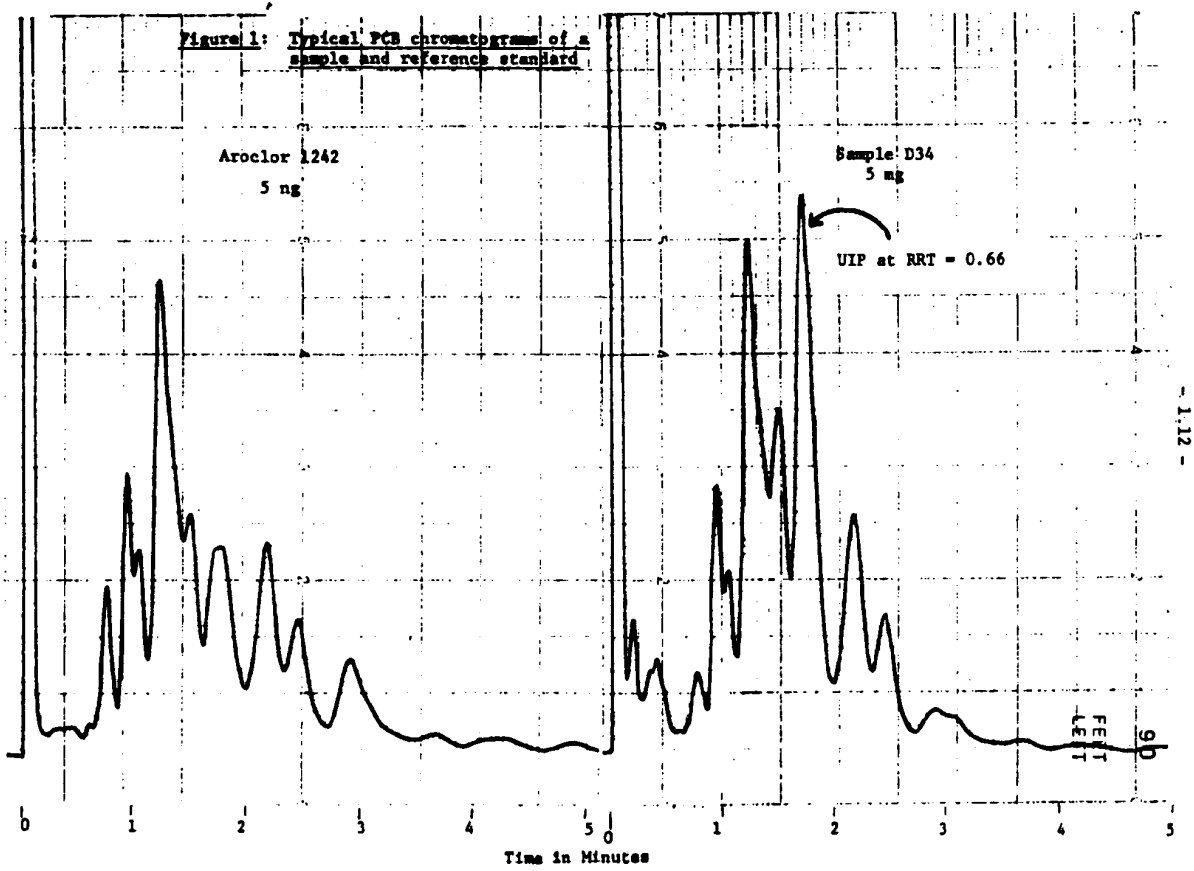

Figure 1: Typical PCB chromatograms of a sample and reference standard

EPS-ECCB

Report ORF 77-2

PCB Survey of Commercially Available Products and Garbage Samples

DSS Contract OSS76-00323

Introduction

This report covers the final phase of work carried out under the above contract. Our earlier report, ORF 77-1, described the purpose of the survey, analytical methodology used, as well as the PCB and PCT results on 45 of the samples. Our present report gives the residue results for the remaining 55 sample materials and for 21 garbage samples collected across Canada.

Methods of Analyses

The analytical methodology is described in report ORF 77-1. This included twenty different extraction and cleanup schemes. The following two additional methods have been used also:

(21) Sample (2.0 g) weighed accurately and mixed well with 25 g Florisil (regular grade, heated at 300°C overnight). Packed column with 3 g Florisil and added Florisil/sample mixture. Eluted with 200 ml 5% water/acetonitrile and allowed eluant to pass through column at a fairly steady pace (≈5 ml/min). Shook eluant with 100 ml hexane. Added 600 ml water and 10 ml saturated sodium chloride and shook vigorously. Washed hexane layer twice with 100 ml water and filtered through sodium sulphate. Concentrated and put through 2% deactivated Florisil column.

(22) Sample (5.0 g) extracted on Soxhlet with hexane for 3 hrs. Concentrated and put through 2% deactivated Florisil column.

Results and Comments

The PCB, PCT results on the final five sample categories (paints, etc., waxes, soaps, etc., building materials, adhesives) are given in Table I. The results on the garbage samples are presented in Table II.

It should be emphasized that quantitation of the PCBs is by reference to the peak heights of three major peaks and averaging the total value obtained with each peak. The values obtained for Aroclor 1242 or 1248 as reference, should be added to the 1254 or 1260 or the 1:1 mixture of 1254/1260 to give a total PCB content. Note, however, that because of overlapping of the major peaks, i.e. response from the same isomers, 1242 and 1248 are not additive; also 1254, 1260 and the 1:1 mixture of 1254/1260 are not additive.

The recovery and sensitivity of method 22 used for the composited waste samples are as follows:

	Sensitivity (ppm)	Spiking Level (ppm)	% Recovery
PCB	0.005	1.0	87.6
PCT	0.005	1.0	97.6

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L.M. Reynolds, Ph.D.
Principal Scientist,
Pesticide & Trace Analytical Lab,
Department of Applied Chemistry.

EPS-ECCB Report ORF 77-2

Table 2.1: PCB Survey of Commercially Available Products

Paints, Varnish, Etc.

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Stamp Pad Ink	D16	11		ND(c)	ND
Shellac	D17	11		ND	ND
Wood Stain	D18	4		ND, ND	ND, ND
Varnish	D19	4		ND	ND
Auto & Marine Enamel	D20	4		ND	ND
Polyurethane Finish	D21	4		ND	ND
Rust Paint	D22	4		ND	ND
Gloss Enamel	D23	12		ND	ND
Latex	D24	4		ND	ND
House Paint	D25	4		ND	ND
Epoxy/Ester Enamel	D26	4		ND	ND
Creosote Wood Preservative	D27(d)	4		ND	ND
Wood Preservative & Sealer	D28(e)	4		ND	ND
Colorant	D29(f)	4	1248	0.30	ND
			1254/1260 (1/1)	0.62	

Table 2.2: PCB Survey of Commercially Available Products

Waxes

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Floor Wax	D61	13		ND	ND
Car Wax	D62	14		ND	ND
Paraffin wax	D63	15		ND, ND	ND, ND
Candle	D64	15		ND	ND
Paste Wax	D65	16		ND	ND

Table 2.3: Soaps, Detergents and Cleaners

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Laundry soap	D66	17	1248	0.42, 0.33	ND, ND
Detergent	D67	18		ND	ND
Rug Cleaner	D68	18		ND	ND
All Purpose Cleaner	D69	18		ND	ND
Fabric Softener Paper	D70	19		ND, ND	ND, ND

Table 2.4: PCB Survey of Commercially Available Products

Building Materials

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Wallpaper	D71	7	1242	0.57	ND
Veneer Trim	D72	7	1248	0.16	ND
Drywall Tape	D73	7	1248	0.12	ND
Fibreboard Ceiling Tile	D74	9		ND	ND
Wall filler powder	D75	11	1248	0.03	ND
Wall filler powder	D76	11	1248	0.03	ND
Silicone Sealer	D77	21		ND	ND
Plastic Wood	D78	4		ND, ND	ND, ND
Putty	D79	4		ND	ND
Sealing Compound	D80	4		ND	ND
Tile Grout	D81	11	1248	0.02	ND
Cork Wall Tiles	D82	7	1242	1.13	ND
Floor Tiles	D83	7	1248	0.01	ND
Caulking Sealant	D84	1		ND	ND
Rubberized Caulk	D85	4		ND	ND

Table 2.5: PCB Survey of Commercially Available Products

Adhesives and Rubbers

Item	ORF#	Method#	PCB(a)		PCT(b)
			Aroclor	ppm	ppm
Wall Size	D86	2		ND	ND
Contact Cement	D87	20		ND	ND
Mucilage for Paper	D88	3		ND	ND
Plastic Model Cement	D89	3	1248	0.01	ND
Gasket Cement	D90	2		ND	ND
Nipples	D91	5		ND	ND
Latex Gloves	D92	5		ND	ND
Epoxy Adhesive	D93(g)	(A) 3 (B) 3		ND	ND
Roofing Cement	D94	2		ND	ND
All Purpose Resin Glue	D95	3		ND	ND
Pencil Eraser	D96(h)	10		ND, ND	ND, ND
Household Ceramic Adhesive	D97	20		ND	ND
Floor Tile Cement	D98	3		ND	ND
Carpenters Glue	D99	20	1248	0.12	ND
Adhesive Wood to Concrete	D100	20		ND	ND
Windshield Sealant	D30	4		ND	ND

Deletion of product brand identifiers necessitated rearrangement of pegination and elimination of page 7.

Footnotes for Tables 2.1 to 2.5

(a) The PCB reference used was dictated according to the GC pattern observed. The p.p.m. values are given on "as purchased" basis, and the commas indicate duplicate values.

(b) Aroclor 5460 was used as the PCT reference.

(c) ND = none detected = < the sensitivity values (0.005-0.05 ppm) as given in Table II of report ORF 77-1.

(d) Sample showed one large UIP at RRT of 0.34 and one small UIP at 0.43 RRT.

(e) Sample showed UIPs at 0.14 (large), 0.27 (large), and 1.53 (small).

(f) The two PCB values should be added to give a total PCB content.

(g) The two portions of this sample were analysed separately. A = Resin; B = Hardener.

(h) Sample showed UIP at 0.56 (large).

Table 2.6 PCB Levels in Pulverized Total Waste Composites[a]

ORF #	Sample #	Location	Collection Date	Sorting Date	PCB[b]		PCT[c]
					Aroclor Ref.	ppm	
D101	1A	Vancouver - Burns Bog	21-10-76	27-10-76	1248	0.68	0.42
D102[d]	2A	Victoria - Transfer Stn.	19-10-76	28-10-76	1248 1254/1260	0.13 1.04	0.09
D103	3A	Edmonton - Clover Bar	23-10-76	1-11-76	1254/1260	32.5, 28.3	0.06, 0.07
D104	4A	Edmonton - West End	25-10-76	1-11-76	1248	0.12	2.31
D105	5A	Regina Landfill		4-11-76	1254/1260	0.21	0.43
D106	6A	Winnipeg Dist. #1	28-10-76	4-11-76	1248 1254/1260	0.29 0.67	0.27
D107	7A	Montreal		10-11-76	1248 1254/1260	0.14 0.12	0.09
D108	8A	Quebec		10-11-76	1248 1254/1260	0.32 0.44	5.46
D109	9A	Halifax		26-11-76	1248 1254/1260	0.39 0.53	10.5
D110	10A	Newfoundland		1-12-76	1254/1260	0.08	0.38
D111	11A	Toronto - Dufferin Trans.	5-1-77	6-1-77	1254/1260	0.39	0.13
D112	12A	Toronto - Beare Rd.	7-1-77	13-1-77	1254/1260	0.12	0.09
D113	13A	Winnipeg #1	20-1-77	26-1-77	1254/1260	0.05	0.05
D114	14A	Winnipeg #4	22-1-77	31-1-77	1242	0.30	0.12
D115	15A	Vancouver - Burns Bog	24-1-77	2-2-77	1242	0.70	0.09
D116	16A	Edmonton - West End Grinder	26-1-77	3-2-77		ND[e]	0.07
D117	17A	Edmonton - Inland Cement	28-1-77	9-2-77	1242	9.07, 8.31	1.03, 0.63
D118	18A	Edmonton - Strathcona Grinder	31-1-77	9-2-77	1242	3.10	0.14
D119	19A	Montreal	8-2-77	15-2-77	1242	35.3	0.09
D120	20A	Halifax Landfill	17-2-77	1-3-77	1242	1.03	0.10
D121	21A	Halifax Incinerator	18-2-77	2-3-77	1248 1254/1260	0.30 0.17	0.09

Footnotes for Table 2.6

(a) These garbage samples (20 g aliquots of dried, pulverized total composites) were received from L.S. Love and Associates Ltd., as directed by EPS. The samples were extracted and cleaned-up by method 22. It was difficult to get fully homogenous samples and this is reflected in the differences between duplicate analyses.

(b) The PCB reference used was dictated according to the GC pattern observed. The 1254/1260 indicates a 1:1 mixture of Aroclor 1254/1260. The p.p.m. values are given on "as received" basis, and the commas indicate duplicate values.

(c) Aroclor 5460 was used as the PCT reference.

(d) This sample showed UIPs at RRTs of 16.7 (large) and 18.8 (large). Note that the PCB values should be added to give a total PCB content.

(e) ND = none detected = <0.005 ppm.