

**NATIONAL INSTITUTE OF PUBLIC HEALTH
AND ENVIRONMENTAL PROTECTION
AMERSFOORT**

File nr 776201011

**Physical investigation of the composition
of household waste in the Netherlands
RESULTS 1993**

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March 1995

This investigation was conducted on the order and to the account of the Directorate-General of Environment, Department Waste Materials, and was described in MAP 1993 (the National Long-term Activity Programme) under file nr 776201.

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TABLE OF CONTENTS

	Page
MAILING LIST	ii
TABLE OF CONTENTS	iv
SUMMARY AND CONCLUSIONS	vi
1 INTRODUCTION	1
1.1 General	1
1.2 Background data on sampling and representativeness	2
2 WORKING METHOD	6
2.1 Sorting by main component and subcomponent	6
2.2 Analyzing method with regard to chemical composition	8
3 RESULTS MAIN ANALYSIS	9
3.1 Composition household waste (moist)	9
3.2 Composition household waste (dry/dry)	10
3.3 Chemical composition and calorific value	12
4 RESULTS FOR EACH MAIN COMPONENT	14
4.1 General explanation of the results and interpretation of the trend discerned	14
4.1.1 Bio-waste and Undefined Residue	16
4.1.2 Paper/cardboard	17
4.1.3 Plastics	19
4.1.4 Glass	21
4.1.5 Ferrous metals	23
4.1.6 Non-ferrous metals	24
4.1.7 Textiles	25
4.1.8 Bread	26
4.1.9 Animal refuse	26
4.1.10 Ceramics	27
4.1.11 Carpeting/mats	27
4.1.12 Leather/rubber	28
4.1.13 Wood	29
4.1.14 Small Chemical Waste/Special Waste	30
4.2 Subanalysis of packaging materials	33
4.3 Laminates	36

	Page
4.4 Batteries	37
4.4.1 Introduction	37
4.4.2 Results	37
4.4.3 Comparison results 1993 to preceding years	39
4.4.4 Equipment with built-in ni-cad batteries	40
4.4.5 National situation	41
4.4.6 Discussion	42
5 REFERENCES	43
ANNEXES:	45
1. List of concepts and abbreviations	45
2. Analysis Diagram 1993	46
3. Diagram pre-treatment samples	48
4. Method for the chemical analysis of household waste	49
5. Analysis results household waste per area	50
6. Review household waste 1971-1993	57
7. Selection criteria Small Chemical Waste/Special Waste	58

SUMMARY AND CONCLUSIONS

This report presents the results of an investigation on the composition of (residual) household waste collected from eleven neighbourhoods. The waste from these areas offers a rather accurate picture of the waste collected nationwide. The areas were selected from the following municipalities: Almere, Amersfoort (2 areas), Arnhem, Heerenveen, Hengelo, Malden (municipal borough of Heumen), Rijsbergen, Veendam, Venlo and Waddinxveen.

The following table presents the composition of household waste in percentages (1993), characterized by 14 main components. The distribution for each component is also shown. The percentage of packaging materials is indicated separately for a number of main components.

Average composition household waste 1993 (in weight percentage of total)

Component	percentage of total			Packaging percentage of total		
	<i>Average</i>	<i>Distribution*</i>		<i>Average</i>	<i>Distribution*</i>	
Bio-waste and undef. res.	39.8	26.0	53.6			
Paper/cardboard	27.1	22.2	32.0	7.4	5.6	9.2
Plastics	8.9	6.1	11.7	5.8	4.1	7.5
Glass	4.2	2.7	5.7	3.5	2.3	4.8
Ferrous metals	4.1	3.0	5.2	2.0	1.4	2.7
Non-ferrous metals	0.6	0.3	1.0	0.25	0.2	0.3
Textiles	2.3	1.6	2.9			
Bread	1.9	1.3	2.6			
Animal refuse	1.7	1.1	2.3			
Ceramics	3.7	0.1	7.3			
Carpeting/mats	0.6	0.0	1.1			
Leather/rubber	1.0	0.5	1.4			
Wood	3.3	1.9	4.7	0.12	0.0	0.2
SCW/Special waste	0.8	0.3	1.3	0.09	0.0	0.1
Total household waste	100			19.2	14.5	24.0
Average quantity of household waste offered (in kg/connection/week)**	12.5	9.2	15.9	2.4	1.8	3.0

*) Distribution: the 95% confidence interval of the eleven sampled areas

***) Based on the average quantities of waste samples collected weekly from 50 households

1 INTRODUCTION

1.1 General

Analyses of household waste aimed at determining its composition (STANDARD INVESTIGATION HOUSEHOLD WASTE) are conducted by the Monitoring Section¹ of the Laboratory for Waste Materials and Emissions (LAE) of the National Institute of Public Health and Environmental Protection (RIVM) (see Annex 1 for concepts and abbreviations).

The state policy for waste materials is based - amongst other things - on the composition of household waste, which therefore has to be monitored. This policy has been laid down in the Memorandum on the Prevention and Re-use of Waste Substances, in the National Plan on Environmental Policy (NMP) and, more detailedly, in the National Plan on Environmental Policy Plus (NMP+).

The successful implementation of this policy depends on many factors, including an understanding of the following aspects:

- which substances/materials the waste consists of
- which substances are detrimental to the environment
- which substances are used to which objectives
- the emissions resulting from each processing method. Knowledge of the substances in the waste will enhance the knowledge of emissions
- the calorific value in case of combustion
- which part can be used for recycling.

Furthermore, the government and the trade and industry in the Netherlands have reached an agreement on objectives and measures for the prevention and recycling of packaging waste. This Covenant for Packaging became effective in 1991. The establishment of a measuring and monitoring system was laid down in Section 18 of this Covenant to ensure the continuity of its execution.

The output of packaging waste, including assessment of the quantities, composition and processing methods, is monitored annually by RIVM. In this context, the analyses of household waste form an integrated part of the measuring system mentioned before.

The investigation described in this report focused on household waste **EXCLUSIVE OF** the waste which was collected separately and recycled.

¹ The Monitoring Section of the Laboratory for Waste Materials and Emissions (LAE) meets the recognition standards for the field of activity described in authenticated specifications according to STERLAB (Dutch Laboratory Standards), and has been entered in the Dutch Registry for Laboratories under nr L 018.

1.2 Background data with regard to sampling and representativeness

RIVM/LAE has been monitoring the average composition of the household waste in the Netherlands since 1971.

This concerns the composition with the exclusion of recycling matter, which mostly regards the separate collection of used paper and, since the beginning of the eighties, glass. Until 1993, 4 neighbourhoods were sampled thrice annually.

But over the past few years, two developments have taken place.

First, a wide investigation on representativeness brought up the question of whether the prevailing sampling methods could still be considered representative of the average composition of the household waste in the Netherlands.

Secondly, the separate collection of bio-waste (fruit, vegetable and garden waste) became increasingly widespread, changing the composition of the residual waste.

With regard to the question of representativeness, the decision was made in 1992 to change to a new method of sampling, which was developed in cooperation with NSS (Dutch Agency for Marketing Research) (18).

The data on 1993 was the first to be based on this new sampling method. This should be taken into account when comparisons are made with data from the previous years.

The old method included three samplings taken annually from four locations (3,4), whereas with the new method eleven locations were sampled. The selection of the latter was based on differentiation in the type of household (socio-economic strata), derived from the MOSAIC-postal code segmenting system, as well as differentiation in the local methods of collecting the household waste. Each of the fifty households sampled at every location represented a specific segment in the Dutch population. Upgrading to a national scale was then based on the proportional share of the segment within the entire Dutch population.

Until recently, the separate collection of certain waste streams from the households were mostly limited to used paper and glass.

Compared to the increase of the total quantities of household waste, the separate collections of these two components may have increased slightly over the years. Because the increases were so small, it was possible to compare the collection of household waste with collections in the preceding years. But the collection of bio-waste increased considerably over a short period of time (840 kilotonnes in 1993 alone).

These two aspects should be taken into consideration when interpreting the data in this report. Allowing for a correction with a view to the collection of bio-waste, the two types of sampling did not appear to yield any substantial differences.

This was not the case, however, for the component of plastics.

In many cases, the introduction of the separate collection of bio-waste entailed the use of mini-containers, diminishing the use of plastic waste bags.

The separate collection of bio-waste meant that the remaining components in the household waste each took up a relatively larger share. Actually, only 3.93 million tonnes of (residual) household waste were offered for final processing in 1993. The proportional share for each component had to be related to this total for conversion to absolute quantities. It should, however, be noted that the new sampling method was implemented in neighbourhoods where, due to the late introduction, the separate collection of bio-waste remained **below the national average** for 1993. The resulting correction set the quantity of residual waste for these sampling areas at 4.35 million tonnes. In other words: the percentages mentioned in this report must be related to 4.35 million tonnes of household waste to determine nationally valid absolute quantities.

It may be concluded from the above that, with regard to the analyses in the next few years, it is important that the development of the collection of bio-waste in the sampling areas be monitored intensively. The quantities of bio-waste, used paper and glass collected separately from Dutch households should also be charted meticulously.

The sampled locations are summarized and presented in further detail in the following tables and figures.

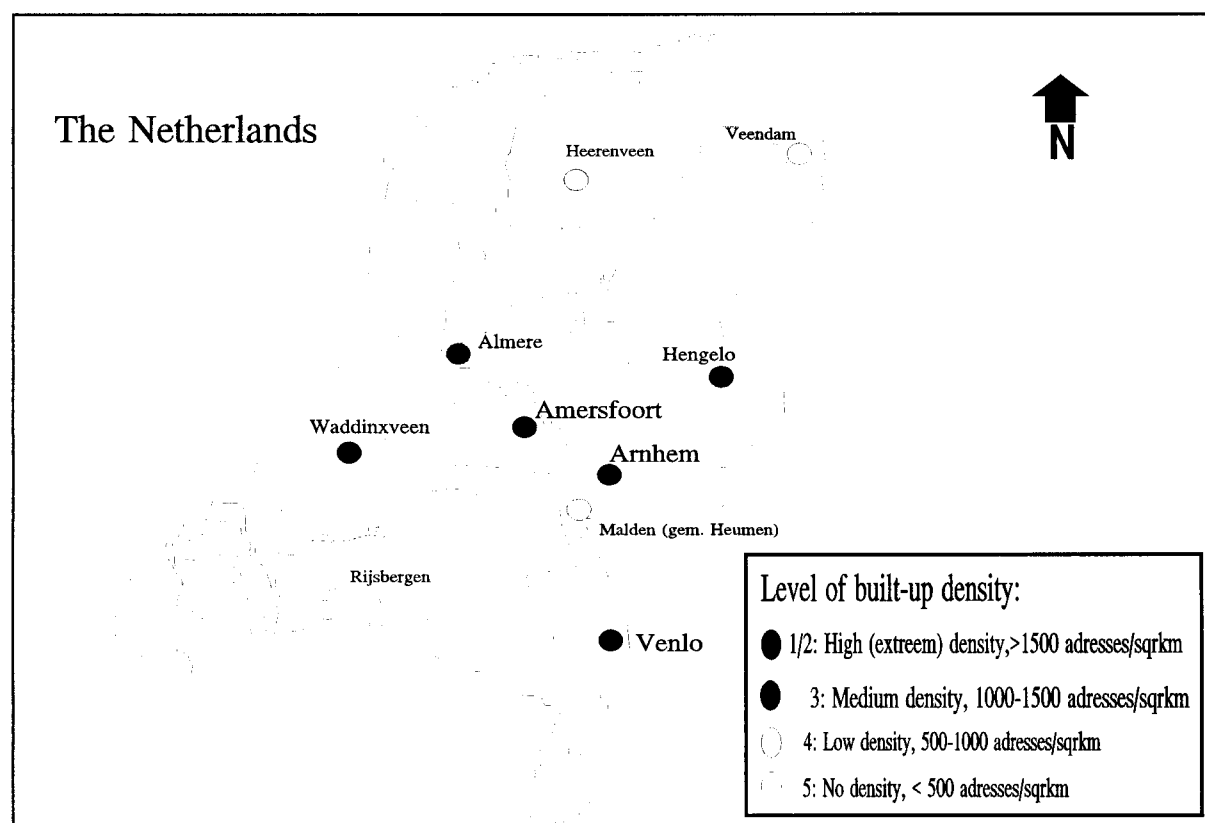


Figure 1: Review sampled municipalities

TABLE 1: Characteristics of the sampled municipalities (per 1-1-'93)

Municipality	Built-up density *)	Degree of urbanization	Number inhabitants	Number households
Malden (mun. Heumen)	4	B3	13664	4724
Waddinxveen	3	B3	25653	9322
Hengelo	3	C4	77270	32068
Almere	3	B2	91689	35145
Arnhem	2	C5	133272	59410
Veendam	4	C2	28260	11269
Venlo	2	C4	65172	27494
Amersfoort	2	C4	106923	43064
Heerenveen	4	B2	38728	15667
Rijsbergen	5	A3	5642	2044

Source: Central Statistical Office (16)

*) CSO in the Netherlands used to characterize municipalities according to the degree of urbanization. This method of categorization was recently replaced by the degree of built-up density, i.e. the density of adresses per km².

TABLE 2: Characteristics of the neighbourhoods (18)

Main - group	Municipality	Description	percent. (nation-wide)
1	Malden	Suburban, highest incomes, spatial housing	6.6%
2	Waddinxveen	Better neighbourhoods, often determined by children	9.0%
3	Hengelo	Stable middle class	9.7%
4	Almere	New housing	6.9%
5	Arnhem	Apartments, town centres	8.5%
6	Veendam	Elderly, lower middle class	12.2%
7	Venlo	Flats, lower middle class	10.9%
8	Amersfoort	Flats, higher middle class	14.2%
9	Amersfoort	Houses without front gardens	3.6%
10	Heerenveen	Traditional rural areas (farmers)	13.9%
11	Rijsbergen	Rural inhabitants (commuters)	3.9%
	THE NETHERLANDS	number of connections (in millions) per 31/12/93 number of inhabitants (in millions)	6.372 15.354

TABLE 3: Quantities collected in sampled neighbourhoods

Main - group	Municipality	Coll.Method resid. HH waste*	separate collection bio-waste	analyzed quantities (kg)
1	Malden	b	✓	537
2	Waddinxveen	mc	✓	426
3	Hengelo	b		939
4	Almere	mc		644
5	Arnhem	b		289
6	Veendam	b		1010
7	Venlo	cc		461
8	Amersfoort	cc		535
9	Amersfoort	mc		332
10	Heerenveen	mc	✓	668
11	Rijsbergen	b		946
	Weighed average			627

- *) b bags
mc mini-containers
cc collective containers

2 WORKING METHOD

2.1 Sorting by main and subcomponents

The physical composition of household waste was determined through sorting analyses, categorizing the waste into 15 main components. Each main component was further studied in one to four subanalyses, depending on which classifying standards were met.

Annex 2 shows the complete analysis diagram.

The first subanalysis was conducted to determine the kind of substances/materials which the main component consisted of.

The second subanalysis focused on the packaging aspect of the component, subdivided according to use.

The third and fourth subanalyses were more specifically aimed at assessing parts of the main component by their use. The subanalyses also yielded an indication as to which part of a particular component might be the cause of changes in the composition of the household waste.

After collection of the household waste, the sample was delivered to the 'Sorting Unit' of the Laboratory for Waste Materials and Emissions in Amersfoort, where it was stored under refrigerated conditions. The waste was introduced into the analysis system through a sorting box (see Figure 2), where a first categorization for glass, textiles, bulky paper/cardboard and plastics was executed. At this stage, the 'special waste' and small chemical waste (SCW), including batteries, drugs, cosmetics, aerosol sprays etcetera, were also separated from the main waste as far as possible.

The remainder was then transported by a conveyor belt to a vibrating trough. Ferrous metals were removed by an overhead magnet fitted over the front end of the belt. In the vibrating trough, light materials (e.g. paper and plastics) were sucked up by an air classifier (vacuum wind sifter) suspended above the trough. The remaining materials were transported to a triple drum sieve, dividing bio-waste and undefined substances by particle size.

Lastly, the components of non-ferrous metals, bread, animal refuse, ceramics, carpeting/mats, leather/rubber and wood were sorted manually. At the end of the process, the bio-waste particles > 20 mm were the only residual waste left.

Quite often, products were composed of various substances or materials. Insofar as these could not be separated, the product was allotted to the component representing the largest weight.

After sorting, all components were weighed to determine the proportional share of the composition that was taken up by each component.

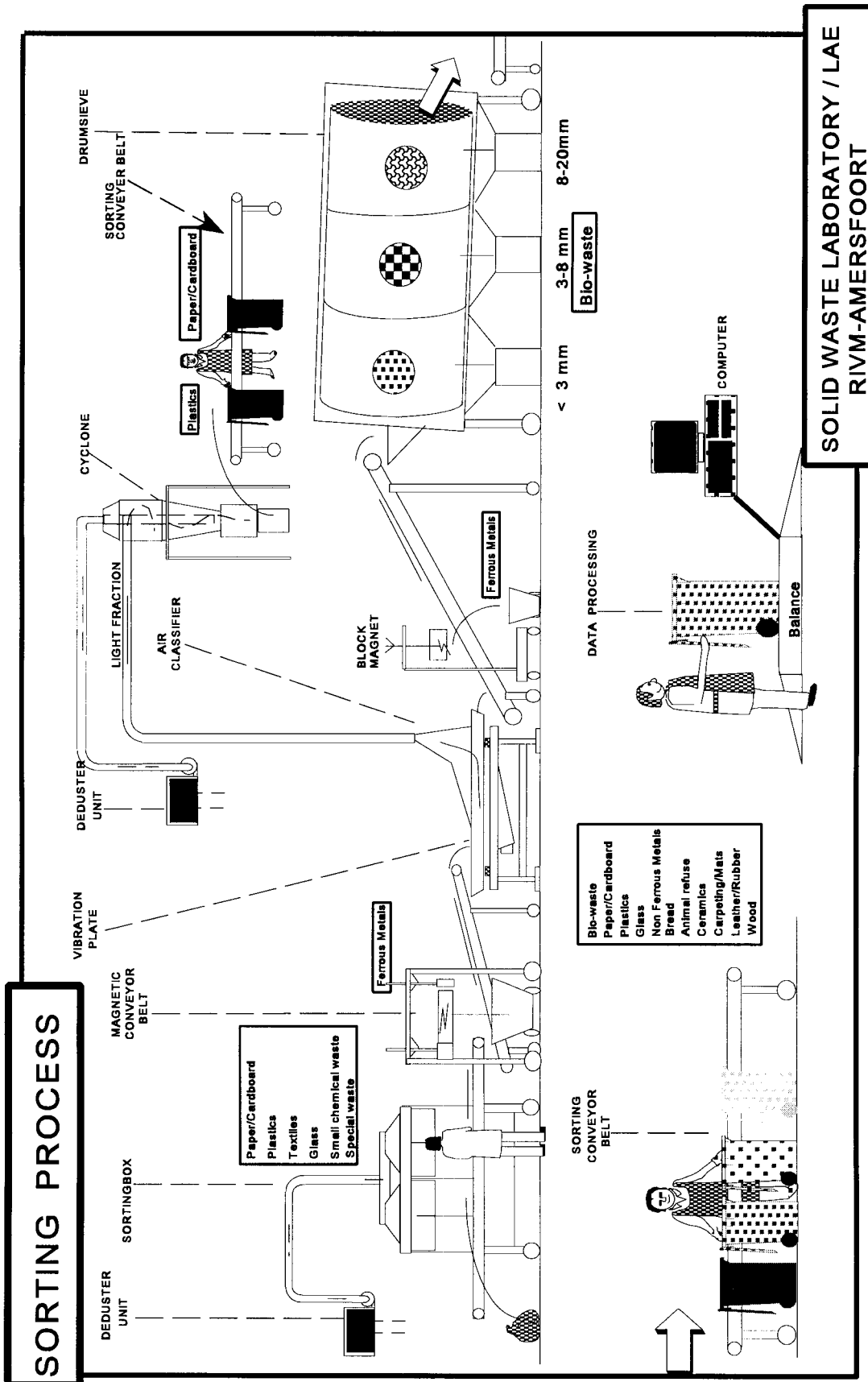


Figure 2: The sorting process

2.2 Method of analysis with regard to chemical composition

Contiguous to physical analyses of the household waste, the Monitoring Section also investigated its chemical composition, with the aim, amongst other things, of tracking developments in the field of qualitative prevention and product policy.

After the sampling material had been sorted into the 14 main components, it was dried, de-ironized, pulverized and homogenized.

The resulting product was then analyzed for concentrations of a number of elements, as well as their calorific values.

A diagram of the pre-treatment of the samples is presented in Annex 3.

The methods used to determine the concentrations of various metals and their calorific values are discussed in Annex 4.

Chapter 3.3 includes the results of one of the recently analyzed samples, i.e. Amsterdam 'old quarter' (1992).

3 RESULTS MAIN ANALYSIS

3.1 Composition household waste (moist)

The results indicated in Table 4 show the average values for the sorting analyses of household waste. For each component, the results have been expressed as the percentage of the total. The average is a 'weighed average' from 11 samples. The weighing factor of each sample is given in Table 2.

The sampling materials were analyzed as they were presented, i.e. not dried.

TABLE 4: Average Composition Household Waste 1993

Component	Weight (%)			Volume (%)			Specific weight (kg/m ³)		
	Average	Distribution		Average	Distribution		Average	Distribution	
Bio-waste and u.r.	39.8	26.0	53.6	17.5	10.9	24.1	343	318	369
Paper/cardboard	27.1	22.2	32.0	33.3	26.3	40.3	123	107	138
Plastics	8.9	6.1	11.7	29.2	22.0	36.4	46	41	51
Glass	4.2	2.7	5.7	2.7	1.6	3.8	233	194	273
Ferrous metals	4.1	3.0	5.2	5.2	4.0	6.3	119	97	142
Non-ferrous metals	0.6	0.3	1.0	1.3	1.0	1.5	77	49	105
Textiles	2.3	1.6	2.9	2.6	2.0	3.2	131	112	151
Bread	1.9	1.3	2.6	1.6	1.1	2.0	185	171	198
Animal refuse	1.7	1.1	2.3	0.6	0.3	0.8	465	392	537
Ceramics	3.7	0.1	7.3	1.0	0.2	1.8	560	416	704
Carpeting/mats	0.6	0.0	1.1	0.8	0.3	1.3	110	21	199
Leather/rubber	1.0	0.5	1.4	1.1	0.6	1.6	134	88	179
Wood	3.3	1.9	4.7	2.9	1.7	4.1	175	134	217
SCW/Spec. Waste	0.8	0.3	1.3	0.3	0.2	0.5	388	84	691

*) The waste was slightly compressed

Weighed average quantity of household waste from 50 households:

Component	Weight (kg)			Volume (m ³)			Specific weight (kg/m ³)		
	Average	Distribution		Average	Distribution		Average	Distribution	
Average Household	627	458	769	4.2	3.2	5.1	151	137	165

3.2 Composition household waste (dry/dry)

Table 5 shows the average moisture contents of household waste from five neighbourhoods. Table 6 shows the composition of household waste with regard to dried samples (average percentage by weight; dry weight of component/dry weight of complete sample * 100%).

TABLE 5: Moisture content (%)

Component	Sampled neighbourhoods*					Average (N=5)
	<i>Malden</i>	<i>Almere</i>	<i>Arnhem</i>	<i>Amersfoort</i>	<i>Heerenveen</i>	
Bio-waste and u.r.	46	61	60	55	50	54
- bio-waste and u.r. < 3 mm	21	37	36	39	28	31
- bio-waste and u.r. 3-8 mm	28	38	37	37	35	35
- bio-waste and u.r. 8-20 mm	51	63	59	42	51	53
- bio-waste > 20 mm	56	71	69	69	57	66
Paper/cardboard	39	31	20	30	39	32
Plastics	10	13	7	15	6	11
Glass	2	2	2	2	1	2
Ferrous metals	5	4	4	4	1	3
Non-ferrous metals	20	15	14	15	11	14
Textiles	17	19	27	20	19	19
Bread	33	36	33	34	37	35
Animal refuse	53	44	41	47	46	46
Ceramics	3	3	1	1	2	2
Carpeting/mats	-	5	-	4	2	2
Leather/rubber	8	5	6	7	4	5
Wood	18	8	11	13	11	12
Small Chemical Waste (SCW) / Special Waste	- not analyzed -					--
Average Household Waste	34	40	35	31	31	33

*) Malden and Heerenveen: res. waste after separate collection bio-waste.

TABLE 6: Composition dry-dry (%)

Component	Sampled neighbourhoods*					Average (N=5)
	<i>Malden</i>	<i>Almere</i>	<i>Arnhem</i>	<i>Amersfoort</i>	<i>Heerenveen</i>	
Bio-waste and u.r.	27.4	27.8	25.3	20.0	25.8	24.8
- bio-waste and u.r. < 3 mm	6.9	4.5	4.3	2.7	4.0	4.9
- bio-waste and u.r. 3-8 mm	5.0	7.4	5.3	6.4	5.2	6.6
- bio-waste and u.r. 8-20 mm	2.1	2.3	2.6	3.5	2.1	2.8
- bio-waste > 20 mm	13.5	13.6	13.1	7.4	14.5	10.5
Paper/cardboard	34.0	34.5	40.4	33.2	22.1	30.0
Plastics	18.8	10.9	12.6	10.6	12.6	11.6
Glass	1.9	6.3	6.7	6.6	5.5	5.9
Ferrous metals	5.5	6.1	4.4	5.6	9.2	7.2
Non-ferrous metals	0.6	0.5	0.9	0.5	0.8	0.7
Textiles	3.7	1.6	1.7	3.3	4.2	3.4
Bread	1.8	2.4	2.3	1.1	1.7	2.0
Animal refuse	1.1	1.7	2.1	0.9	0.8	1.4
Ceramics	2.1	1.2	1.9	7.2	4.0	3.9
Carpeting/mats	0.0	0.5	0.0	1.0	4.0	1.5
Leather/rubber	0.7	2.5	0.5	1.7	2.3	1.9
Wood	2.5	4.1	1.3	8.3	7.0	5.7
SCW/Special Waste	- not analyzed -					--

*) Malden and Heerenveen: res. waste after separate collection bio-waste

3.3 Chemical composition and calorific value

The results of the chemical analyses of one sample of household waste, taken in 1992 in the Amsterdam 'old quarter', are indicated in Tables 7 and 8. These analyses were conducted of a mixed sample composed of the material of 3 samplings.

The results of the *physical* investigation of these samples have already been described in the RIVM-report *Physical investigation of the composition of household waste in the Netherlands* (4).

TABLE 7: Moisture contents and physical composition calculated for household waste (wet and dry weights) from Amsterdam old quarter', 1992.

Component	% dry substance (50 °C)	composition based on wet weight (%)	composition based on dry weight (%)
Bio-waste and u.r.	46	45.1	33.0
Paper/cardboard	67	25.8	27.9
Plastics	78	8.3	10.5
Glass	99	4.5	7.2
Ferrous metals	93	4.7	7.3
Non-ferrous metals	83	0.60	0.8
Textiles	82	2.1	2.7
Bread	69	2.6	2.9
Animal refuse	49	2.6	2.0
Ceramics	97	1.6	2.6
Carpeting/mats	97	0.30	0.5
Leather/rubber	91	0.65	1.0
Wood	90	0.94	1.4
Special Waste / SCW	86	0.24	0.3

TABLE 8: Contents of various elements (in mg/kg dry component) and calorific values in household waste.

element	cal.v. MJ/kg	Sb	As	Be	Cd	Co	Cr	Cu	Hg	Pb
Bio-waste and u.r.	8.0	0.5	4.0	0.5	<1.0	32	208	90	<0.1	153
Paper/cardboard	16.6	<0.5	<0.5	<0.1	<1.0	1.3	6.0	30	<0.1	<10
Plastics	35.8	18	1.2	<0.2	105	9.0	70	450	-	40
Glass	<0.5	27	19	0.2	<1.0	9.0	313	23	<0.1	170
Textiles	21.2	10	<0.5	<0.2	<1.0	1.7	59	186	<0.1	38
Ceramics	0.7	2.0	9.3	1.2	<1.0	21	104	44	<0.1	1600
Carpeting/mats	18.3	<0.5	0.5	1.4	<1.0	2.7	19	11	-	23
Leather/rubber	24.0	15	0.5	0.1	35	0.7	977	35	-	<10
Wood	19.1	1.2	0.7	<0.2	<1.0	16	51	19	0.1	270

element	Mn	Mo	Ni	Sn	Ti	V	Fe	Zn	Ag
Bio-waste and u.r.	150	<6	182	8.7	220	32	9700	375	2.0
Paper/cardboard	29	<6	4.3	3.0	8.3	<1	365	76	<1
Plastics	13	<6	55	-	4133	<1	837	443	3.3
Glass	127	<6	13	<8.0	237	4.0	1150	132	4.0
Textiles	8.3	<6	7.3	10	3.3	<1	327	328	<1
Ceramics	450	<6	18	<8	1167	32	14333	417	1.7
Carpeting/mats	58	<6	5.0	<10	1617	<1	470	343	8.3
Leather/rubber	16	<6	7.0	<10	970	2.7	442	1700	9.7
Wood	77	<6	17	<8	20	<1	1100	293	<1

The following components were not analyzed: Ferrous metals, Non-ferrous metals, Bread, Animal refuse, Special Waste and Small Chemical Waste.

4 RESULTS FOR EACH MAIN COMPONENT

4.1 General explanation of the results and interpretation of the trend discerned.

The results of the investigation of the composition of the residual household waste are given in weight percentages of the total quantity of studied samples, including the 'naturally' occurring moisture contents.

When interpreting these results, it should be noted that, as mentioned in Chapter 1.2, the composition of the household waste is indicated *exclusive of* separately collected waste streams such as bio-waste, used paper and glass. Therefore it would be more accurate to call it the composition of *residual household waste*.

The large-scale introduction of the separate collection of bio-waste in 1993 strongly influenced the composition of residual household waste, as was also demonstrated in the sampled areas where such collecting was started (see Annex 5: Analysis results household waste per neighbourhood).

The decrease of the quantity of bio-waste in the residual household waste obviously resulted in a corresponding decrease of the absolute total quantity of this waste, thereby proportionally increasing the percentages of the other components. This effect should be taken into account when assessing the data in this report and interpreting any trends.

Calculation of the absolute quantities of household waste (in kgs per household per week) shows that these were in no way affected by the separate collection of bio-waste.

For a fair assessment of the results it should also be taken into account that the introduction of this separate collection in 1993 occurred neither simultaneously nor uniformly all over the country. This makes it rather premature to talk about change of direction with regard to certain components in the waste, and thus it will remain until the results over a number of years become available for further study.

The 1993 average of the 11 sampled locations, for each separate component, is indicated in Sections 4.1.1 through 4.1.14.

The tables show the average composition in percentages by weight, taking into account the various weighing factors for each location, as mentioned in Table 2.

The absolute quantity of waste, expressed in kg per household per week, has also been calculated, based on the fact that each sample consisted of the waste over one week from 50 households.

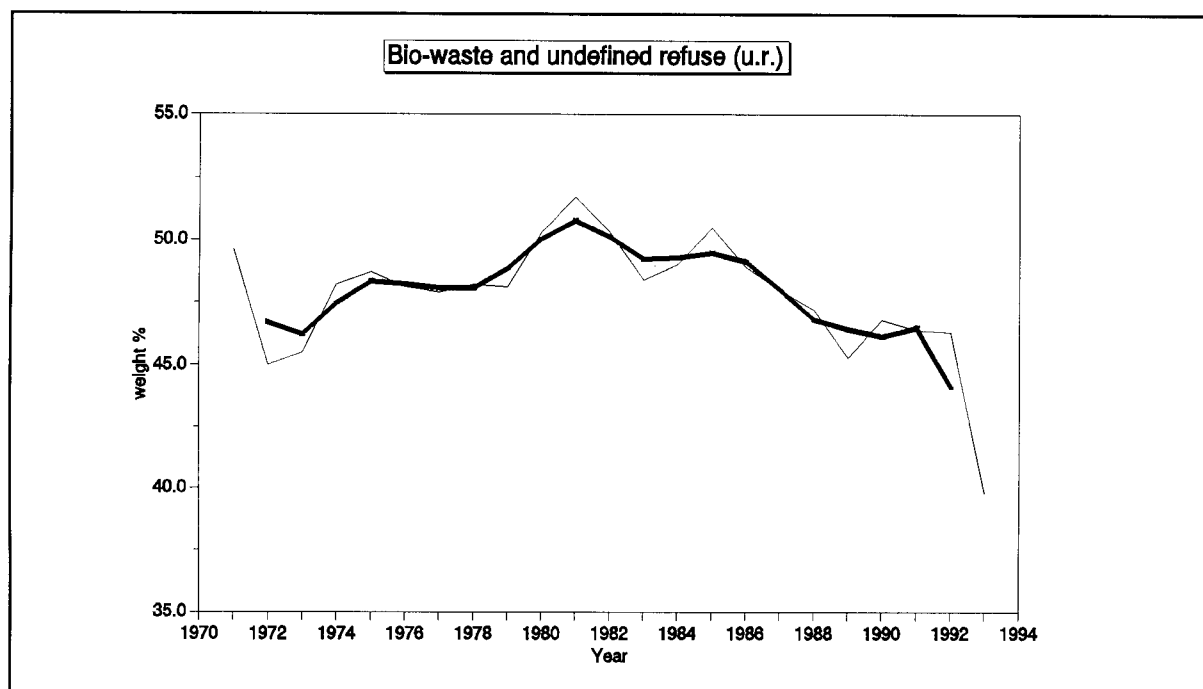
The *distribution* indicates the 95% confidence interval of the results of the samples from the eleven neighbourhoods. This means that the certainty that an observation will remain within certain limits is 95%.

Accompanying graphs show the trend for the components from (residual) household waste over a large number of years, expressed in percentages by weight of the total.

The bold line in the graphs shows the progressing average taken every three years.

For transposition of the results to a national level, please see remarks in Chapter 1.2: Sampling, representativeness and interpretation.

4.1.1 Bio-waste and unidentified residual waste (u.r.)



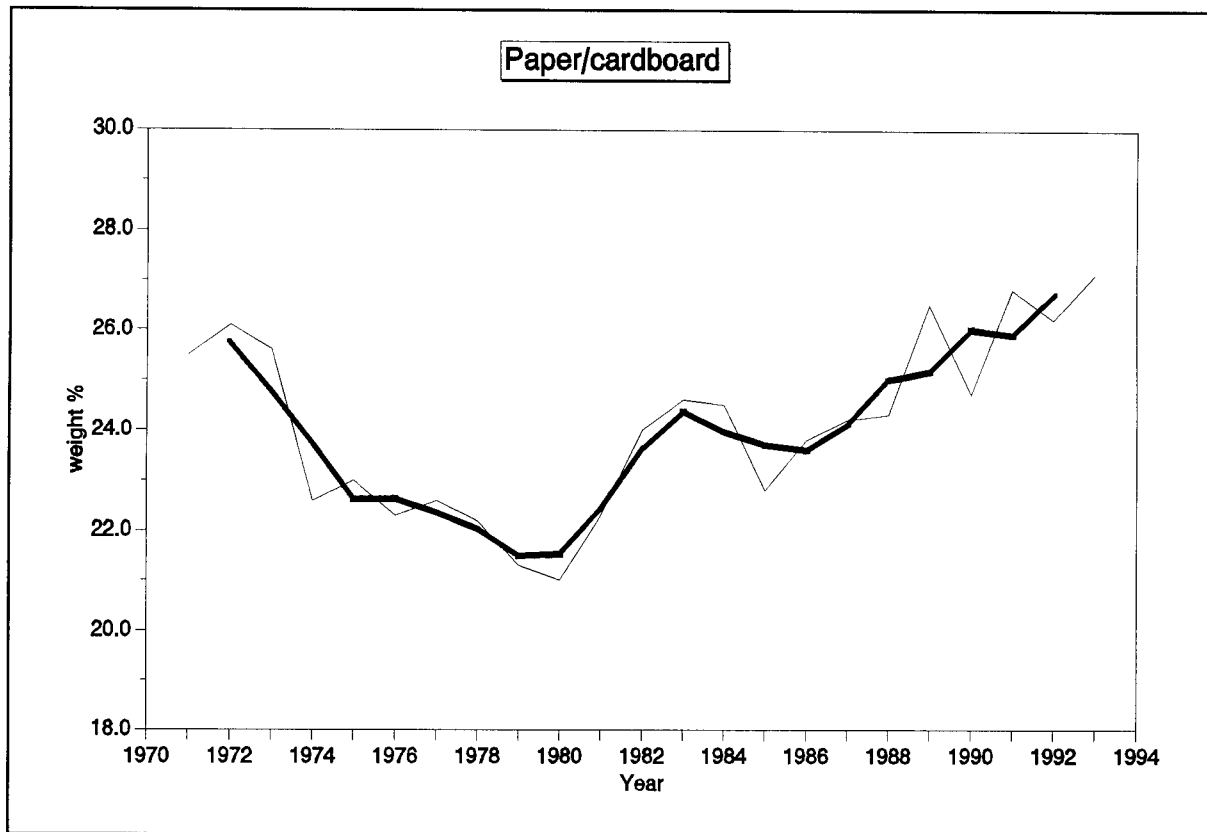
Graph 1: Bio-waste and Undefined Refuse (u.r.) in household waste (weight %)*.

TABLE 9: Results subanalysis bio-waste and u.r.

(Sub)component	<i>kg/connection/week</i>			<i>weight percentage</i>		
	<i>average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
Bio-waste and u.r.	4.99	3.26	6.72	39.8%	25.9%	53.6%
<i>Sift-fractions bio-waste:</i>						
fraction < 3 mm	0.58	0.27	0.89	4.6%	2.2%	7.1%
fraction 3-8 mm	0.71	0.50	0.93	5.7%	4.0%	7.4%
fraction 8-20 mm	0.58	0.36	0.81	4.6%	2.8%	6.4%
fraction > 20 mm	3.12	1.98	4.26	24.8%	15.7%	33.9%
<i>Bio-waste > 20mm:</i>						
garden waste	0.80	0.37	1.23	6.4%	2.9%	9.8%
food waste	2.05	1.27	2.82	16.3%	10.1%	22.5%
remaining bio-waste	0.23	0.15	0.31	1.8%	1.2%	2.5%
<i>Food waste:</i>						
Leftovers	0.30	0.16	0.43	2.4%	1.3%	3.4%
Peels/cuttings	1.51	0.90	2.12	12.1%	7.2%	16.9%
grease/oil/dairy	0.15	0.10	0.21	1.2%	0.8%	1.7%
other foodstuffs	0.08	0.05	0.11	0.7%	0.4%	0.9%

*) From 1993 onward, the separately collected bio-waste was no longer included in the calculation of the proportional composition

4.1.2 Paper/cardboard

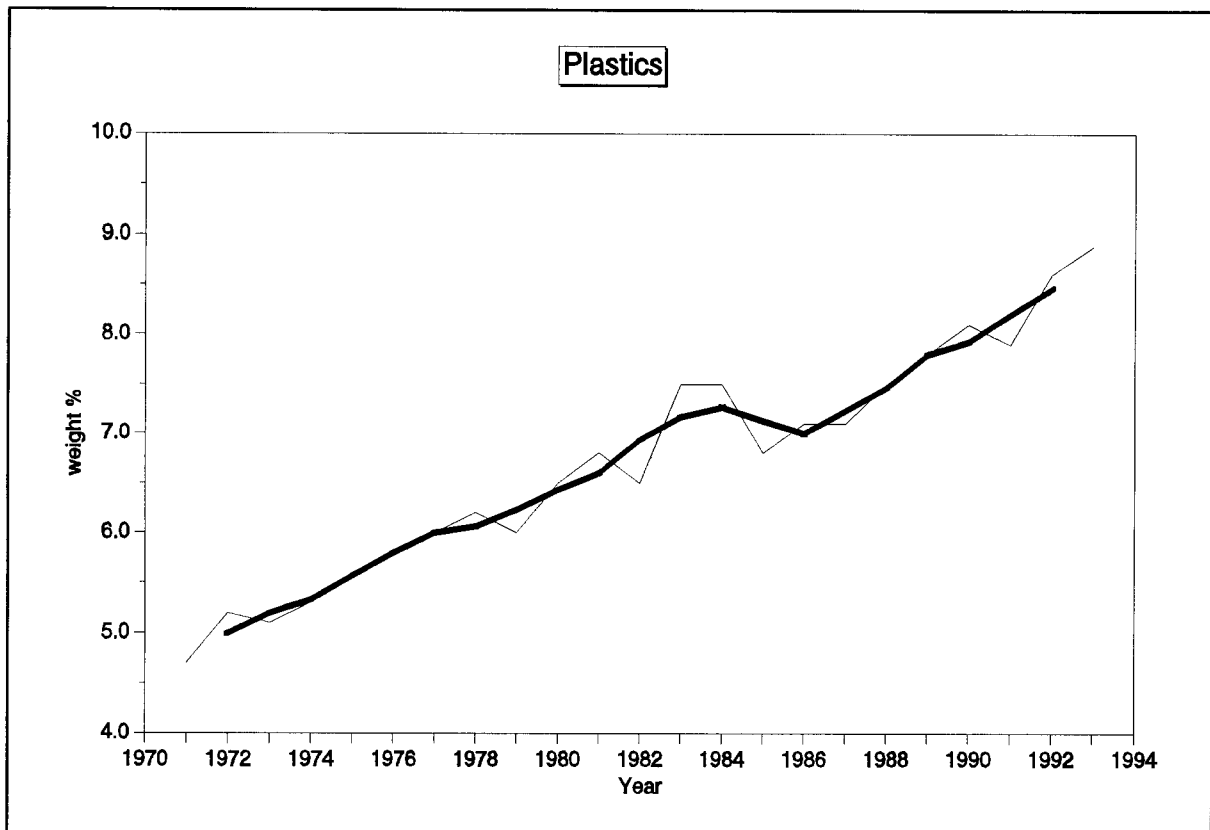


Graph 2: Paper/cardboard in household waste (weight %).

TABLE 10: Results subanalysis paper/cardboard

(Sub)component	<i>kg/connection/week</i>			<i>weight percentage</i>		
	<i>average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
Paper/cardboard	3.4	2.8	4.0	27.1%	22.2%	32.0%
cardboard	0.83	0.65	1.01	6.6%	5.2%	8.1%
newspaper	0.54	0.40	0.67	4.3%	3.2%	5.3%
printed matter/magazines	0.54	0.38	0.69	4.3%	3.1%	5.5%
sanitary paper	1.05	0.69	1.42	8.4%	5.5%	11.3%
other paper	0.44	0.32	0.55	3.5%	2.6%	4.4%
<i>subanalysis packaging:</i>						
packaging foodstuffs	0.46	0.34	0.57	3.6%	2.7%	4.6%
packaging drinks	0.17	0.11	0.23	1.3%	0.9%	1.8%
other packaging	0.30	0.21	0.40	2.4%	1.7%	3.2%
Total packaging	0.93	0.71	1.2	7.4%	5.6%	9.2%
<i>subanalysis laminates:</i>						
laminates fruitjuices	0.04	0.03	0.05	0.3%	0.2%	0.4%
laminates solid dairy products	0.09	0.05	0.13	0.7%	0.4%	1.1%
laminates drinkable dairy products	0.13	0.08	0.18	1.0%	0.6%	1.4%
other laminates paper/plastics	0.03	0.02	0.04	0.2%	0.1%	0.3%
other laminates paper/aluminium	0.03	0.02	0.04	0.2%	0.2%	0.3%
Total laminates	0.32	0.21	0.43	2.5%	1.6%	3.4%
Paper exclusive of laminates/sanitary p.	2.03	1.63	2.43	16.2%	13.0%	19.4%

4.1.3 Plastics

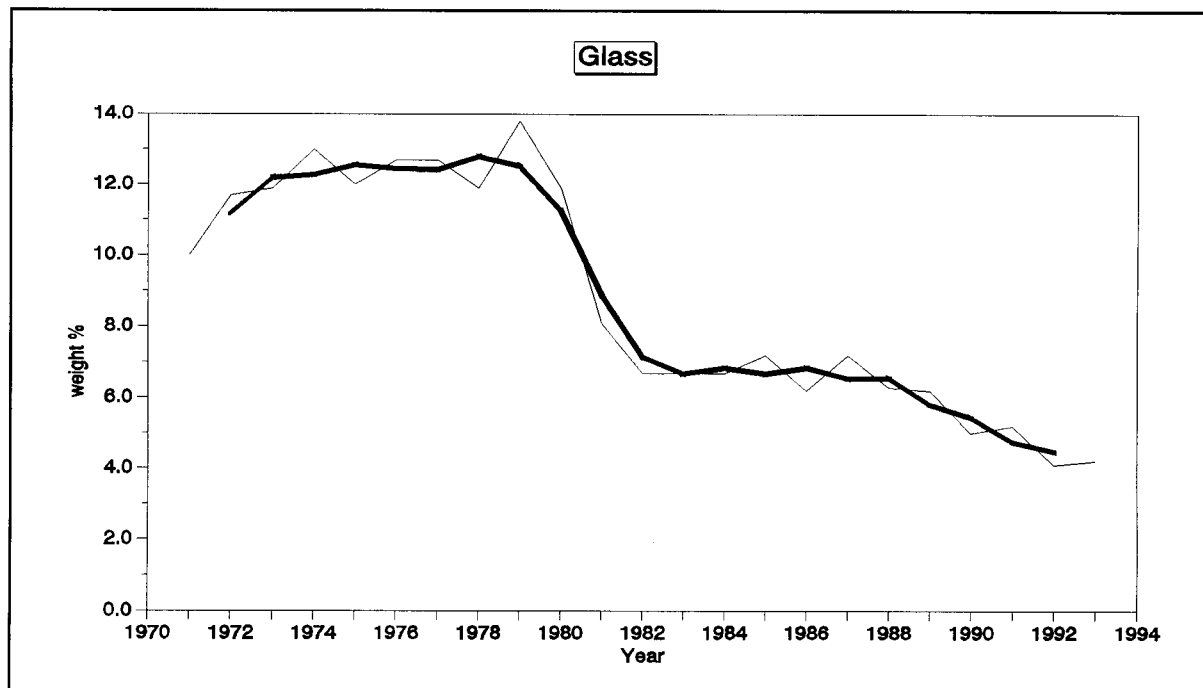


Graph 3: Plastics in household waste (weight %).

TABLE 11: Results subanalysis plastics

(Sub)component	<i>kg/connection/week</i>			<i>weight percentages</i>		
	<i>average</i>	<i>Distribution</i>		<i>average</i>	<i>distribution</i>	
Plastic	1.11	0.77	1.46	8.9%	6.1%	11.7%
<i>type of material:</i>						
PE + PP	0.73	0.43	1.04	5.9%	3.4%	8.3%
PET	0.02	0.01	0.02	0.1%	0.1%	0.2%
PS	0.15	0.12	0.18	1.2%	1.0%	1.4%
PVC	0.12	0.06	0.19	1.0%	0.5%	1.5%
other plastics	0.09	0.03	0.15	0.7%	0.2%	1.2%
<i>subanalysis packaging:</i>						
packaging foodstuffs	0.33	0.22	0.45	2.7%	1.7%	3.6%
packaging drinks	0.02	0.01	0.03	0.2%	0.1%	0.2%
other packaging	0.37	0.28	0.47	3.0%	2.2%	3.7%
Total packaging	0.73	0.51	0.94	5.8%	4.1%	7.5%
<i>subanalysis product categories:</i>						
Foils:	0.51	0.25	0.76	4.0%	2.0%	6.1%
- waste bags	0.10	0.05	0.14	0.8%	0.4%	1.1%
- carrying bags	0.07	0.06	0.09	0.6%	0.5%	0.7%
Utensils	0.15	0.08	0.22	1.2%	0.6%	1.8%
Clothing	0.001	0.000	0.002	0.01%	0.00%	0.02%
Bottles:	0.10	0.07	0.13	0.8%	0.5%	1.1%
- mineral water	0.000	0.000	0.000	0.00%	0.00%	0.00%
- soft drinks	0.004	0.002	0.005	0.03%	0.02%	0.04%
- dairy products	0.016	0.008	0.024	0.13%	0.06%	0.19%
- toiletries/cosmetics	0.024	0.015	0.033	0.19%	0.12%	0.26%
- detergents	0.015	0.009	0.022	0.12%	0.07%	0.17%
- cleaning products	0.021	0.011	0.030	0.16%	0.09%	0.24%
- other bottles	0.019	0.013	0.026	0.16%	0.10%	0.21%
- subtotal bottles	0.099	0.065	0.134	0.79%	0.52%	1.07%
of which returnable bottles (with deposit):	0.001	0.000	0.002	0.01%	0.00%	0.02%
Laminate plastic/aluminium	0.04	0.03	0.05	0.3%	0.2%	0.4%

4.1.4 Glass



Graph 4: Glass in household waste (weight %).

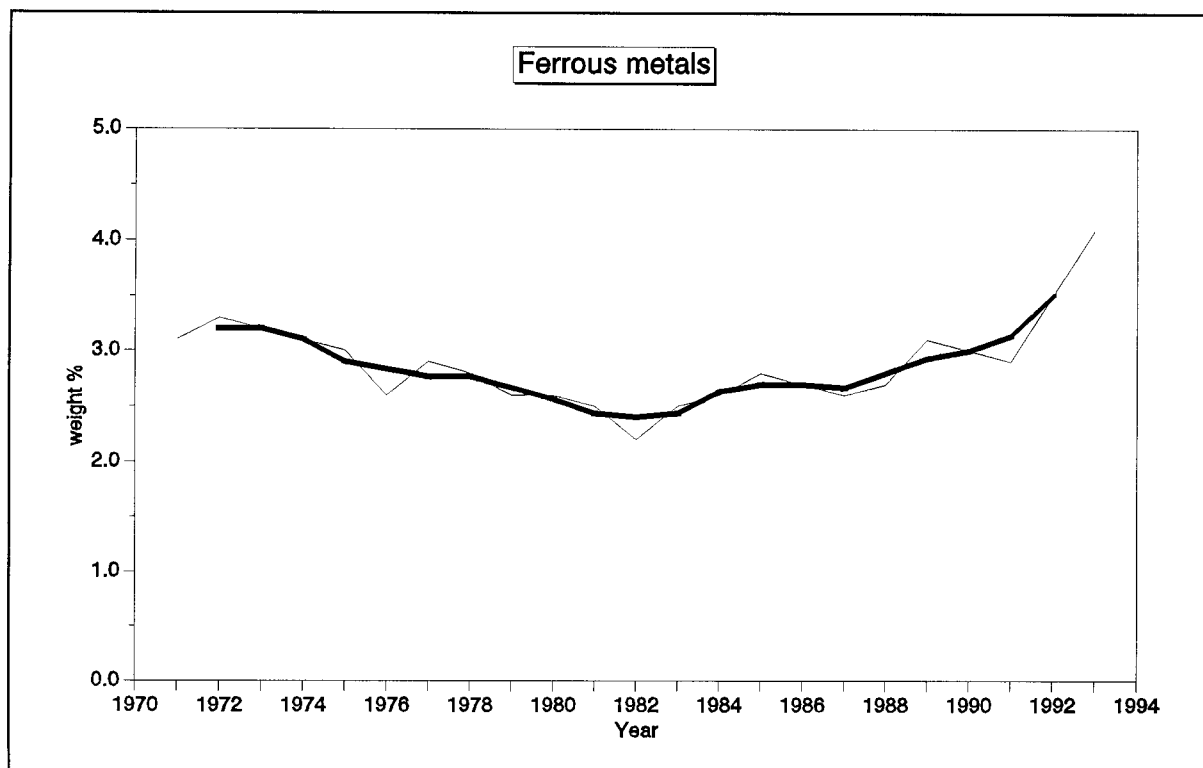
TABLE 12: Results subanalysis glass

(Sub)component	<i>kg/connection/week</i>			<i>weight percentages</i>		
	<i>average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
Glass	0.53	0.34	0.71	4.2%	2.7%	5.7%
<i>by colour:</i>						
clear	0.35	0.22	0.48	2.8%	1.7%	3.8%
green	0.07	0.04	0.11	0.6%	0.3%	0.9%
brown	0.06	0.03	0.08	0.5%	0.3%	0.7%
other glass	0.05	0.00	0.11	0.4%	0.0%	0.8%
<i>subanalysis packaging:</i>						
packaging foodstuffs	0.27	0.16	0.37	2.1%	1.3%	3.0%
packaging drinks	0.16	0.09	0.22	1.2%	0.8%	1.7%
other packaging	0.02	0.01	0.03	0.2%	0.1%	0.3%
Total packaging	0.44	0.28	0.60	3.5%	2.3%	4.8%
<i>product categories packaging</i>						
fruit & vegetables	0.11	0.06	0.16	0.88%	0.49%	1.28%
sandwich fillings	0.044	0.030	0.058	0.35%	0.24%	0.47%
sauces	0.035	0.007	0.064	0.28%	0.05%	0.51%
fish preserves	0.004	0.001	0.007	0.03%	0.01%	0.05%

TABLE 12: Results subanalysis glass

(Sub)component	<i>kg/connection/week</i>			<i>weight percentages</i>		
	<i>average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
<i>(pack.food contin.)</i>						
baby food	0.010	0.005	0.015	0.08%	0.04%	0.12%
pickles	0.018	0.010	0.026	0.14%	0.08%	0.21%
Asian foodstuffs	0.009	0.004	0.014	0.07%	0.03%	0.11%
mushrooms	0.001	0.000	0.002	0.01%	0.00%	0.02%
instant coffee	0.002	0.000	0.005	0.02%	0.00%	0.04%
solid dairy prod.	0.013	0.000	0.026	0.11%	0.00%	0.21%
other foodstuffs	0.019	0.005	0.033	0.15%	0.04%	0.26%
<i>product categories packaging</i>						
wine	0.060	0.037	0.083	0.48%	0.29%	0.66%
distilled	0.048	0.015	0.082	0.39%	0.12%	0.65%
beer	0.025	0.011	0.039	0.20%	0.09%	0.31%
soft drinks	0.009	0.001	0.018	0.07%	0.01%	0.14%
mineral water	0.000	0.000	0.000	0.00%	0.00%	0.00%
fruit juices/	0.009	0.000	0.017	0.07%	0.00%	0.14%
tinned milk/	0.000	0.000	0.001	0.00%	0.00%	0.00%
coffee creamer	0.003	0.000	0.009	0.02%	0.00%	0.07%
other drinks	0.000	0.000	0.000	0.00%	0.00%	0.00%
<i>product categories other</i>						
pharmaceuticals	0.007	0.000	0.016	0.05%	0.00%	0.13%
cosmetics	0.012	0.006	0.018	0.10%	0.05%	0.14%
other products	0.002	0.000	0.004	0.02%	0.00%	0.04%
<i>Non-packaging:</i>						
light bulbs	0.007	0.002	0.012	0.06%	0.02%	0.09%
utensils/appliances	0.037	0.022	0.052	0.30%	0.18%	0.42%
other glass products	0.040	0.000	0.098	0.32%	0.00%	0.78%
<i>subanalysis bottles/jars:</i>						
Bottles:	0.20	0.12	0.27	1.6%	0.9%	2.2%
- deposit	0.01	0.00	0.02	0.1%	0.0%	0.1%
- no deposit	0.19	0.11	0.26	1.5%	0.9%	2.1%
Jars:	0.24	0.15	0.33	1.9%	1.2%	2.6%
- deposit	0.00	0.00	0.01	0.0%	0.0%	0.0%
- no deposit	0.24	0.14	0.33	1.9%	1.2%	2.6%

4.1.5 Ferrous metals

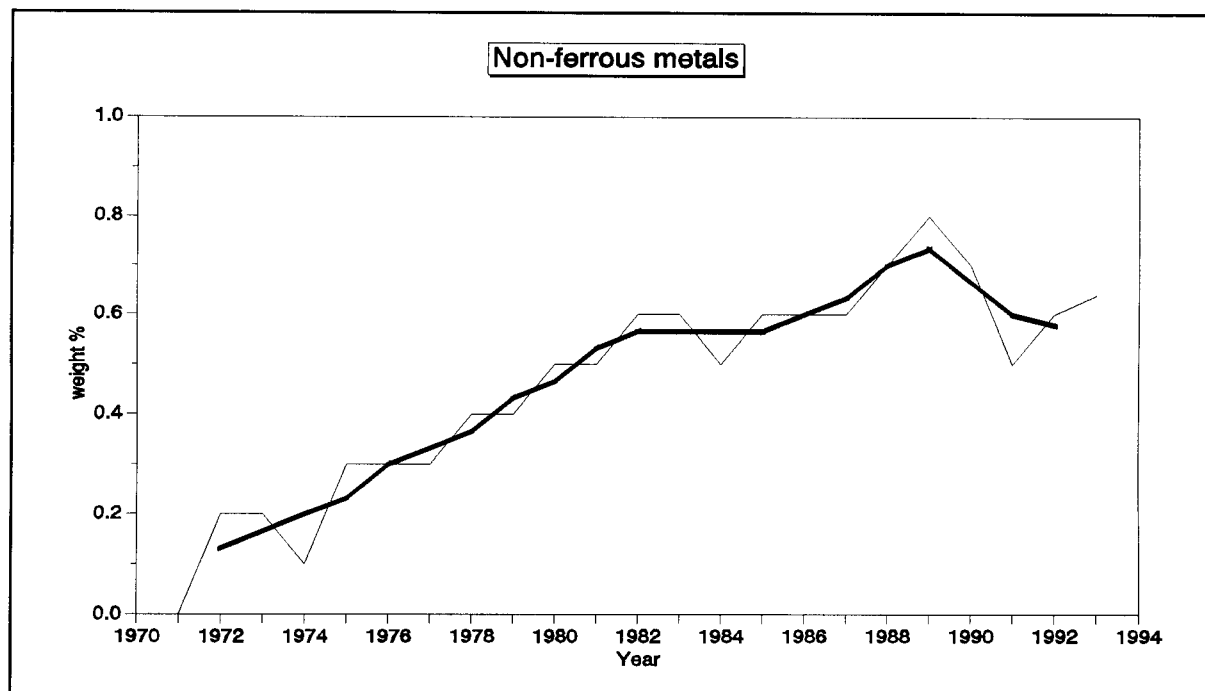


Graph 5: Ferrous metals in household waste (weight %).

TABLE 13: Results subanalysis ferrous metals

(Sub)component	<i>kg/connection/week</i>			<i>weight percentages</i>		
	<i>Average</i>	<i>Distribution</i>		<i>average</i>	<i>distribution</i>	
Ferrous metals	0.51	0.38	0.65	4.1%	3.0%	5.2%
<i>subanalysis packaging:</i>						
packaging foodstuffs	0.20	0.12	0.27	1.6%	1.0%	2.2%
packaging drinks	0.04	0.03	0.05	0.3%	0.2%	0.4%
other packaging	0.02	0.01	0.02	0.1%	0.1%	0.2%
Total packaging	0.26	0.17	0.34	2.0%	1.4%	2.7%
containers	0.22	0.14	0.30	1.8%	1.1%	2.4%
aerosol containers	0.01	0.00	0.02	0.1%	0.0%	0.1%

4.1.6 Non-ferrous metals

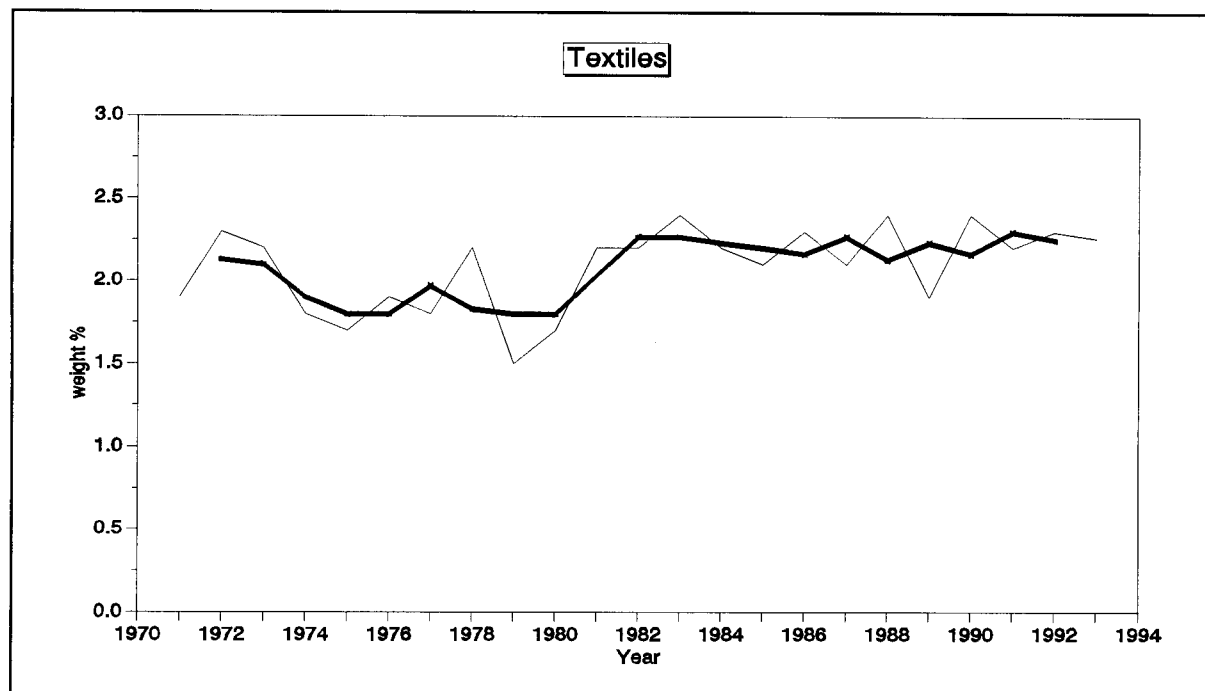


Graph 6: Non-ferrous metals in household waste (weight %).

TABLE 14: Results subanalysis non-ferrous metals

(Sub)component	<i>kg/connection/week:</i>			<i>weight percentages</i>		
	<i>Average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
Non-ferrous metals	0.08	0.04	0.12	0.64%	0.30%	0.98%
<i>Type of material:</i>						
aluminium foil	0.009	0.007	0.012	0.08%	0.05%	0.10%
other aluminium	0.046	0.016	0.076	0.37%	0.13%	0.61%
copper	0.005	0.002	0.007	0.04%	0.02%	0.06%
lead	0.000	0.000	0.000	0.00%	0.00%	0.00%
other non-ferrous metals	0.020	0.006	0.034	0.16%	0.05%	0.27%
subanalysis packaging:						
packaging foodstuffs	0.013	0.008	0.018	0.10%	0.07%	0.14%
packaging drinks	0.001	0.001	0.002	0.01%	0.01%	0.02%
other packaging	0.016	0.010	0.022	0.13%	0.08%	0.18%
Total packaging	0.031	0.021	0.041	0.25%	0.17%	0.32%
containers	0.008	0.002	0.014	0.07%	0.02%	0.11%
aerosol containers	0.004	0.000	0.009	0.03%	0.00%	0.07%

4.1.7 Textiles

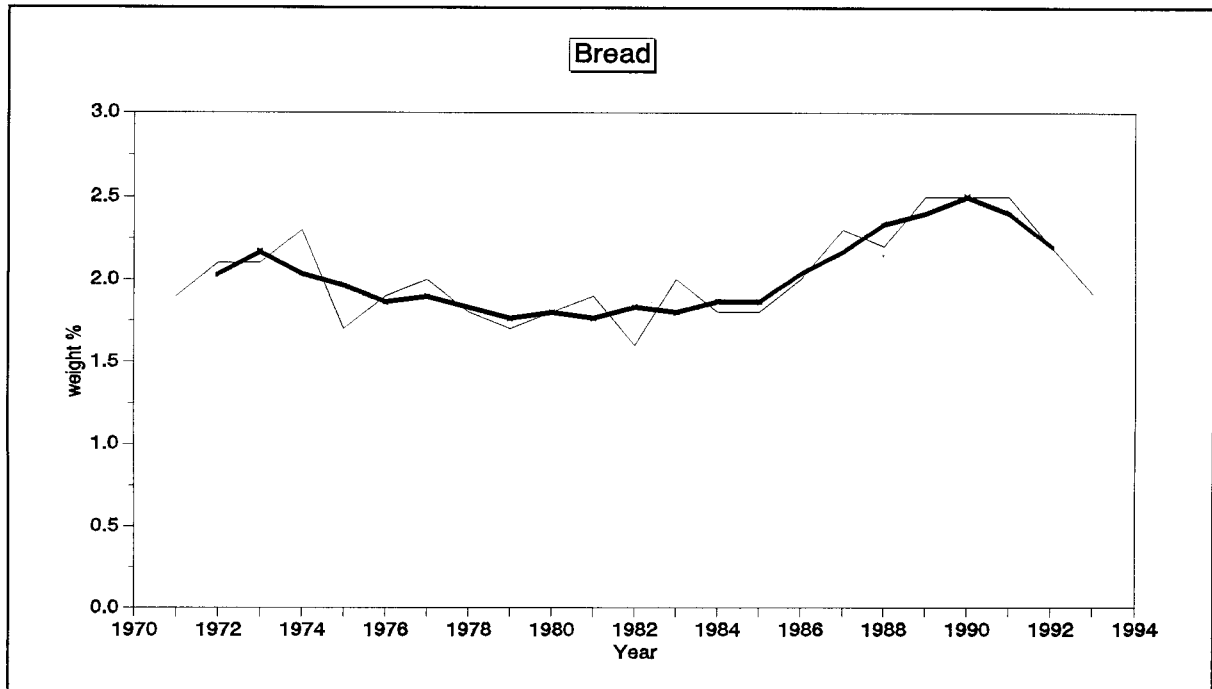


Graph 7: Textiles in household waste (weight %).

TABLE 15: Results subanalysis textiles

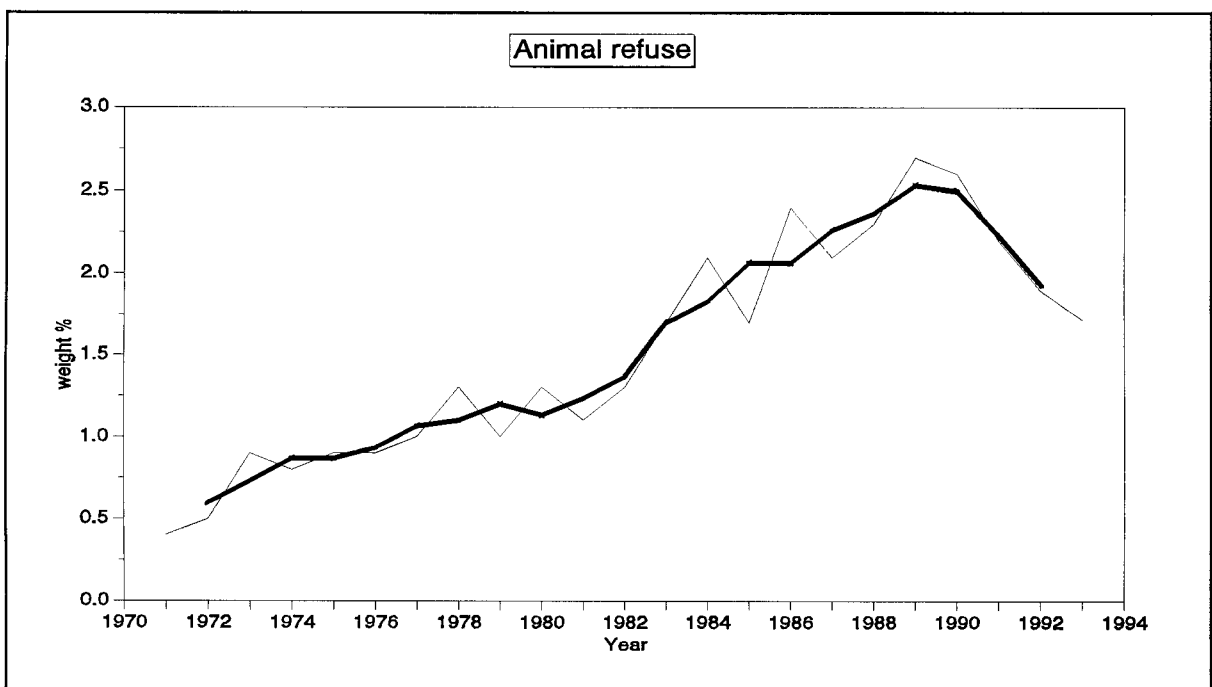
(Sub)component	<i>kg/connection/week:</i>			<i>weight percentages</i>		
	<i>Average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
Textiles	0.28	0.20	0.36	2.26%	1.61%	2.90%
natural fibres	0.054	0.025	0.083	0.43%	0.20%	0.66%
synthetic fibres	0.012	0.007	0.017	0.10%	0.06%	0.14%
mixed fibres	0.217	0.143	0.292	1.73%	1.14%	2.32%
clothing	0.141	0.098	0.183	1.12%	0.78%	1.46%
other textiles	0.142	0.089	0.196	1.14%	0.71%	1.56%

4.1.8 Bread



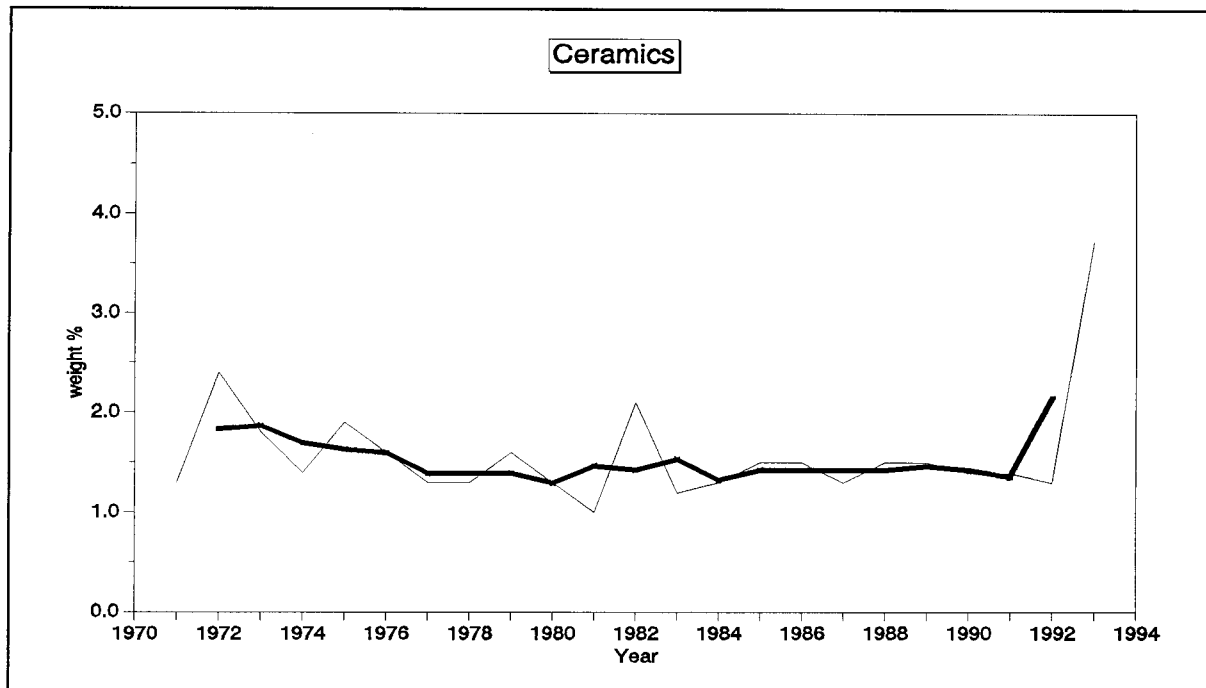
Graph 8: Bread in household waste (weight %).

4.1.9 Animal Refuse



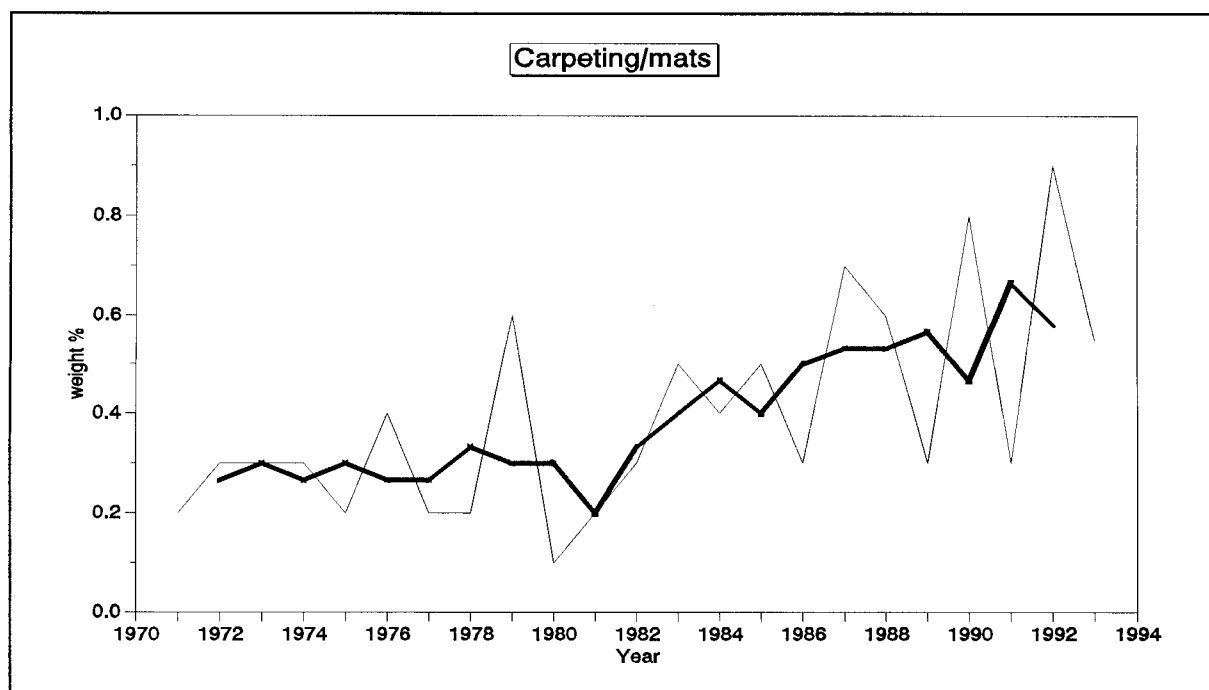
Graph 9: Animal Refuse in household waste (weight %).

4.1.10 Ceramics



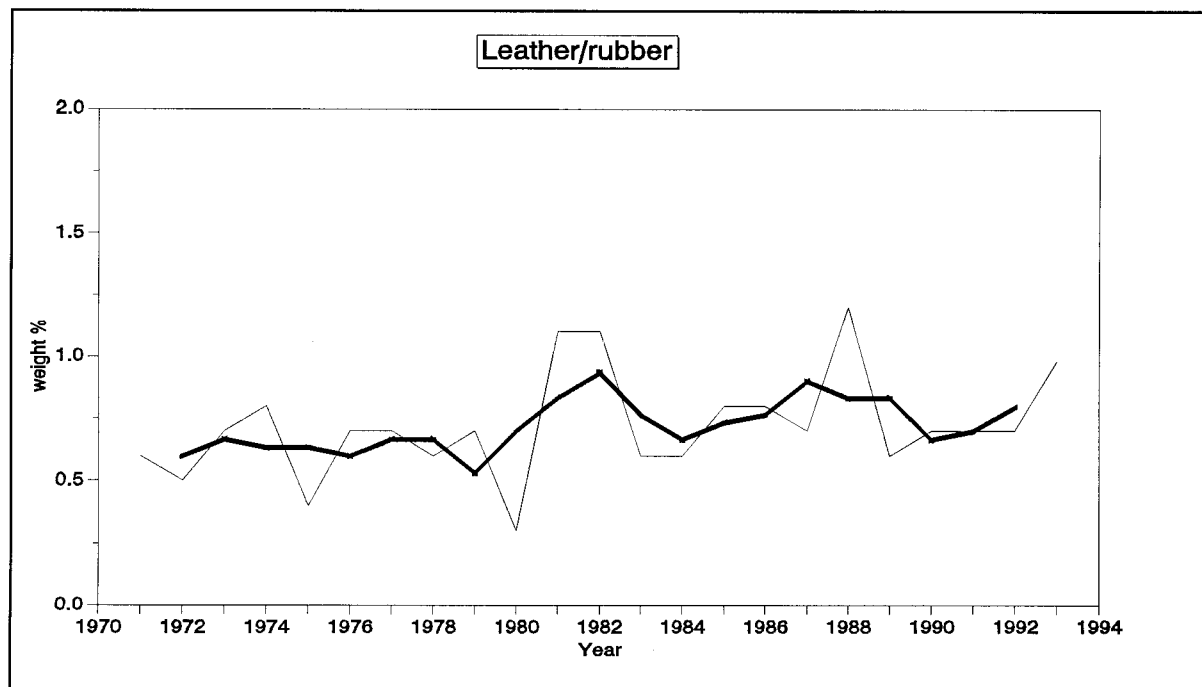
Graph 10: Ceramics in household waste (weight %).

4.1.11 Carpeting/mats



Graph 11: Carpeting/mats in household waste (weight %).

4.1.12 Leather/rubber

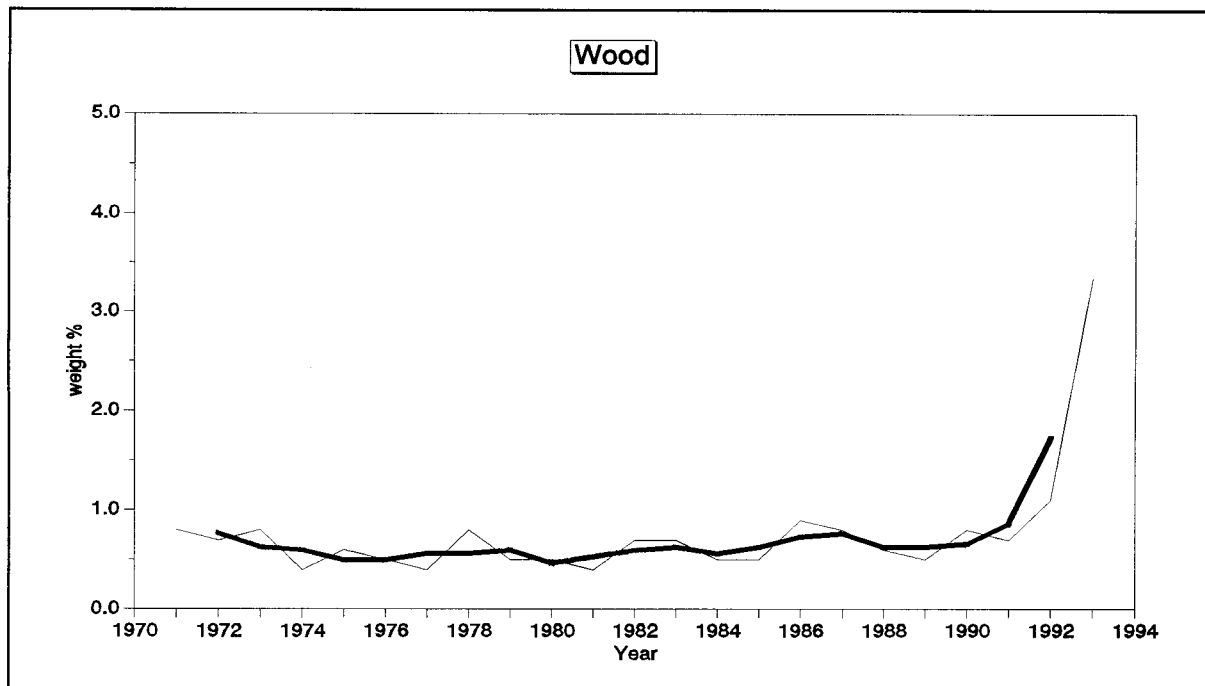


Graph 12: Leather/rubber in household waste (weight %).

TABLE 16: Results subanalysis leather/rubber

(Sub)component	<i>kg/connection/week</i>			<i>weight percentages</i>		
	<i>average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
Leather/rubber	0.12	0.07	0.18	0.98%	0.53%	1.44%
natural	0.016	0.007	0.025	0.13%	0.05%	0.20%
synthetic	0.005	0.003	0.006	0.04%	0.02%	0.05%
mixed	0.103	0.050	0.156	0.82%	0.40%	1.24%
clothing	0.069	0.03	0.113	0.55%	0.21%	0.90%
other products	0.054	0.02	0.084	0.43%	0.19%	0.67%

4.1.13 Wood



Graph13: Wood in household waste (weight %).

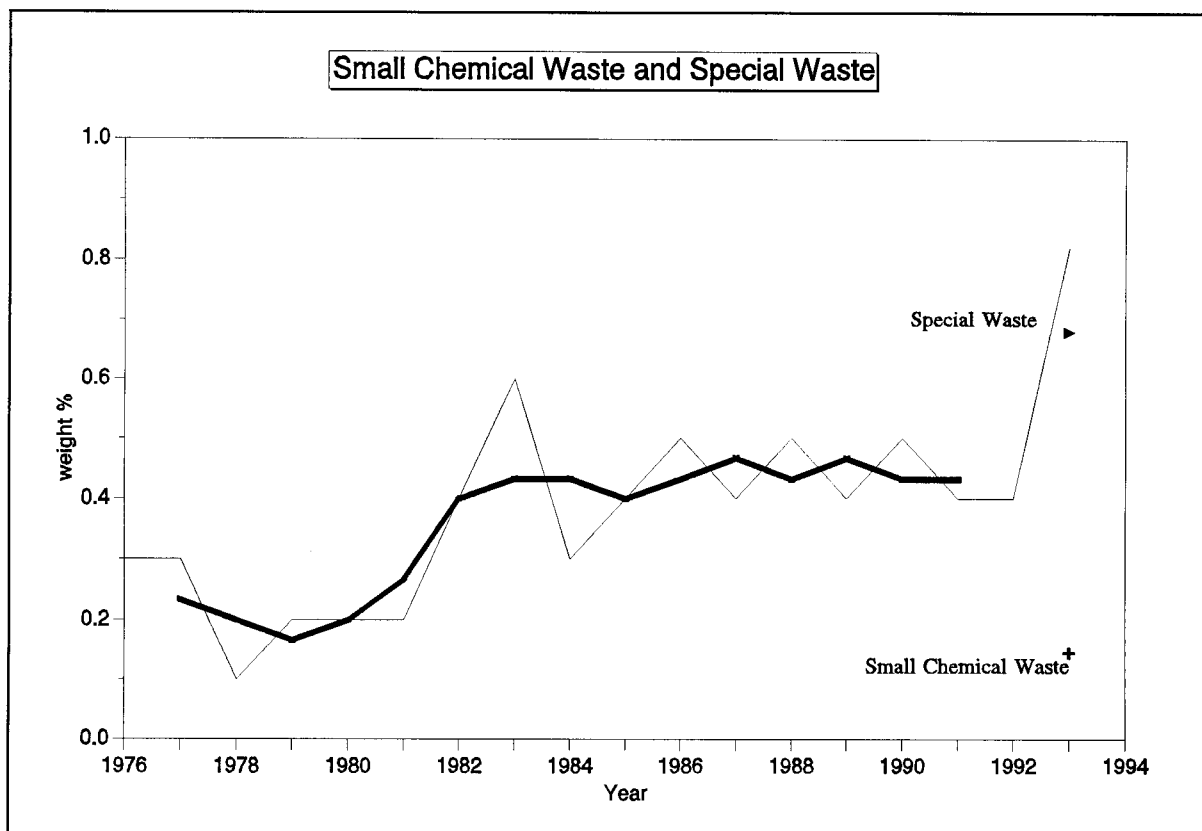
4.1.14 Special waste and small chemical waste

Until 1993 the Monitoring Section investigated the household waste for 14 main components as well as various other aspects. One of these components was the so-called 'special waste'. Substances and products which were expected to pose specific environmental problems, or substances which did not fit into any of the other thirteen categories were classified under this heading.

After the Dutch Ministry for the Environment published an official list of what constituted small chemical waste from households, in November 1992 (6), the Monitoring Section adapted its own selection criteria in the course of the following year. The component Special Waste was split up in *Small Chemical Waste* (SCR) and *Special Waste*. Only substances and materials listed in the official list would come under the first heading, whereas the component Special Waste remained reserved for those substances and/or products which would not fit in anywhere else.

Annex 7 includes the selection criteria on the basis of which certain substances and/or products are listed under the main components Small Chemical Waste or Special Waste.

This change was introduced in the course of 1993, which means that 6 samples from this investigation were analyzed for both the SCR-list and the (more limited) SR-list. The remaining 5 samples were sorted according to the selection criteria in use until 1993 (4).



Graph 14: Small Chemical Waste and Special waste in household waste (weight %).

TABLE 17: Results subanalysis SCW and Special Waste

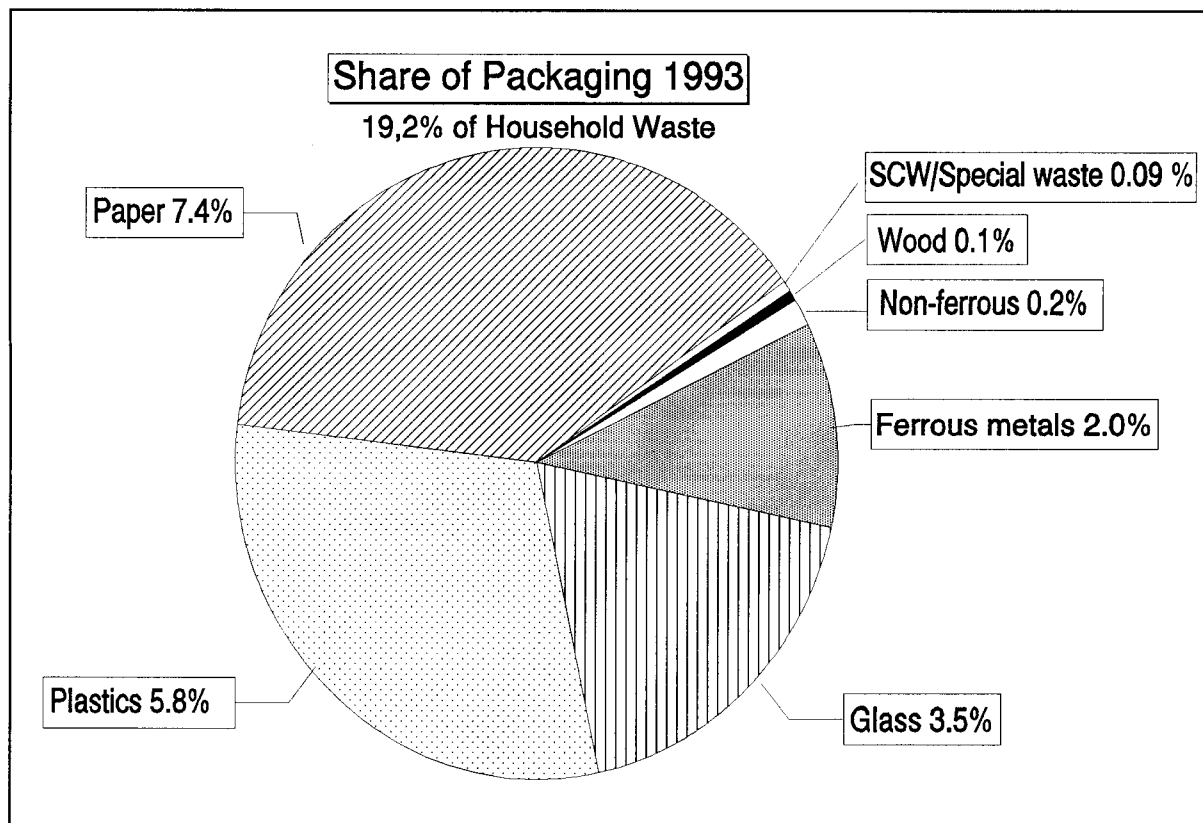
(Sub)component	<i>kg/connection/week</i>			<i>weight percentages</i>		
	<i>average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
<i>SCW/Special Waste</i>	0.103	0.043	0.163	0.82%	0.35%	1.30%
- packaging	0.011	0.004	0.019	0.09%	0.03%	0.15%
<i>Small Chemical Waste (SCW)</i>						
<i>(incl. packaging)</i>						
- batteries/ car batteries	0.004	0.001	0.007	0.034%	0.012%	0.056%
- paint/glue/kit	0.007	0.000	0.016	0.056%	0.000%	0.127%
- pharmaceuticals	0.004	0.000	0.008	0.031%	0.000%	0.065%
- other products	<u>0.003</u>	<u>0.000</u>	<u>0.009</u>	<u>0.024%</u>	<u>0.000%</u>	<u>0.073%</u>
subtotal SCW	0.018	0.004	0.032	0.145%	0.035%	0.255%

TABLE 17: Results subanalysis SCW and Special Waste

(Sub)component	<i>kg/connection/week</i>			<i>weight percentages</i>		
	<i>average</i>	<i>distribution</i>		<i>average</i>	<i>distribution</i>	
Packaging SCW:						
- batteries/ car batteries	0.000	0.000	0.000	0.000%	0.000%	0.000%
- paint/glue/kit	0.003	0.000	0.006	0.023%	0.000%	0.052%
- pharmaceuticals	0.002	0.000	0.005	0.018%	0.000%	0.037%
- other products	<u>0.001</u>	<u>0.000</u>	<u>0.006</u>	<u>0.009%</u>	<u>0.000%</u>	<u>0.048%</u>
subtotal packaging	0.006	0.000	0.012	0.050%	0.003%	0.097%
<i>Special Waste</i> <i>(incl. packaging)</i>						
- cleaning products	0.001	0.000	0.001	0.004%	0.000%	0.009%
- cosmetics	0.012	0.004	0.020	0.094%	0.031%	0.156%
- candles/wax/grease	0.005	0.002	0.008	0.041%	0.019%	0.063%
- other products	<u>0.068</u>	<u>0.003</u>	<u>0.133</u>	<u>0.539%</u>	<u>0.022%</u>	<u>1.057%</u>
subtotal	0.085	0.020	0.150	0.678%	0.161%	1.196%
Packaging Special Waste:						
- cleaning products	0.000	0.000	0.000	0.001%	0.000%	0.003%
- cosmetics	0.004	0.001	0.007	0.032%	0.011%	0.053%
- candles/wax/grease	0.001	0.000	0.001	0.005%	0.000%	0.012%
- other products	<u>0.000</u>	<u>0.000</u>	<u>0.001</u>	<u>0.002%</u>	<u>0.000%</u>	<u>0.004%</u>
subtotal packaging	0.005	0.002	0.008	0.040%	0.015%	0.065%

4.2 Subanalysis packaging material

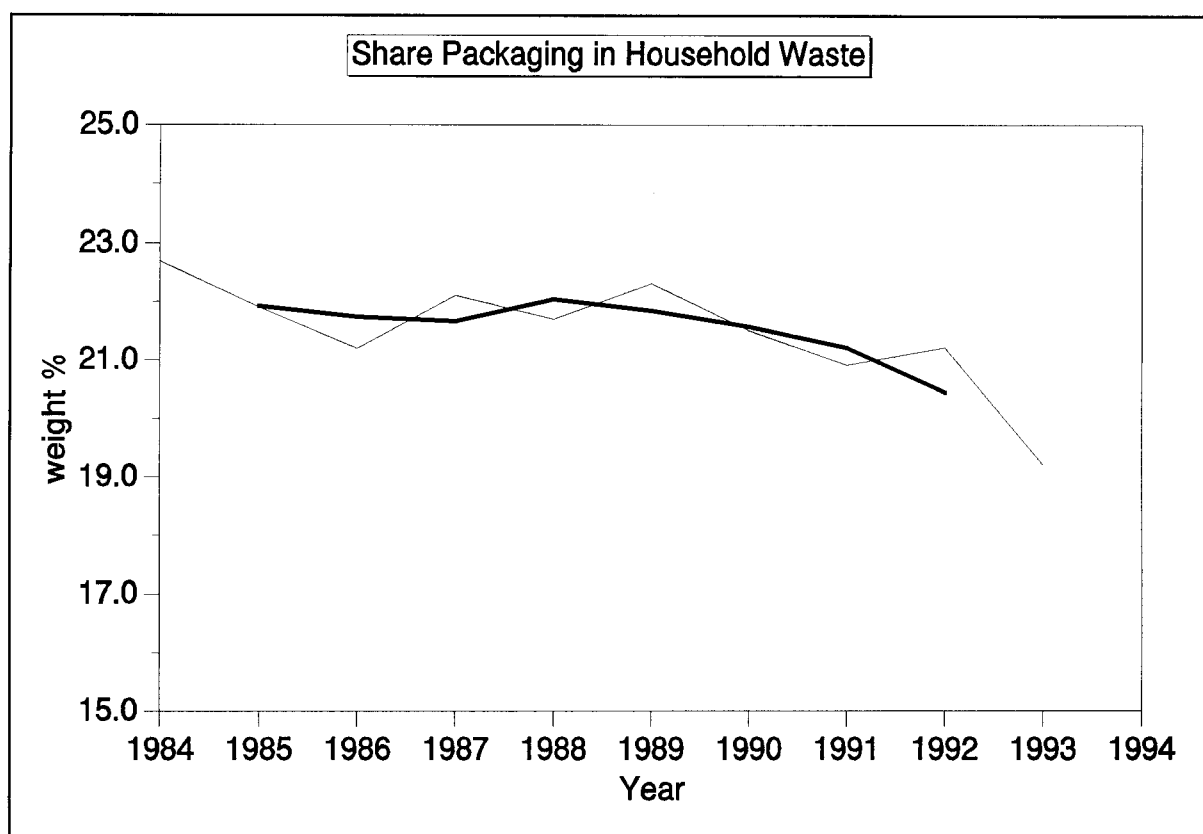
For the determination of Packaging Materials, the following main components were analyzed: paper/cardboard, plastics, ferrous metals, non-ferrous metals, wood and SCW/special waste. The packaging material was subdivided for each component according to use, i.e. foodstuffs, drinks and remaining packaging.



Graph 15: Composition Packaging by material, 1993.

TABLE 18: Share of Packaging by use and component (1993).

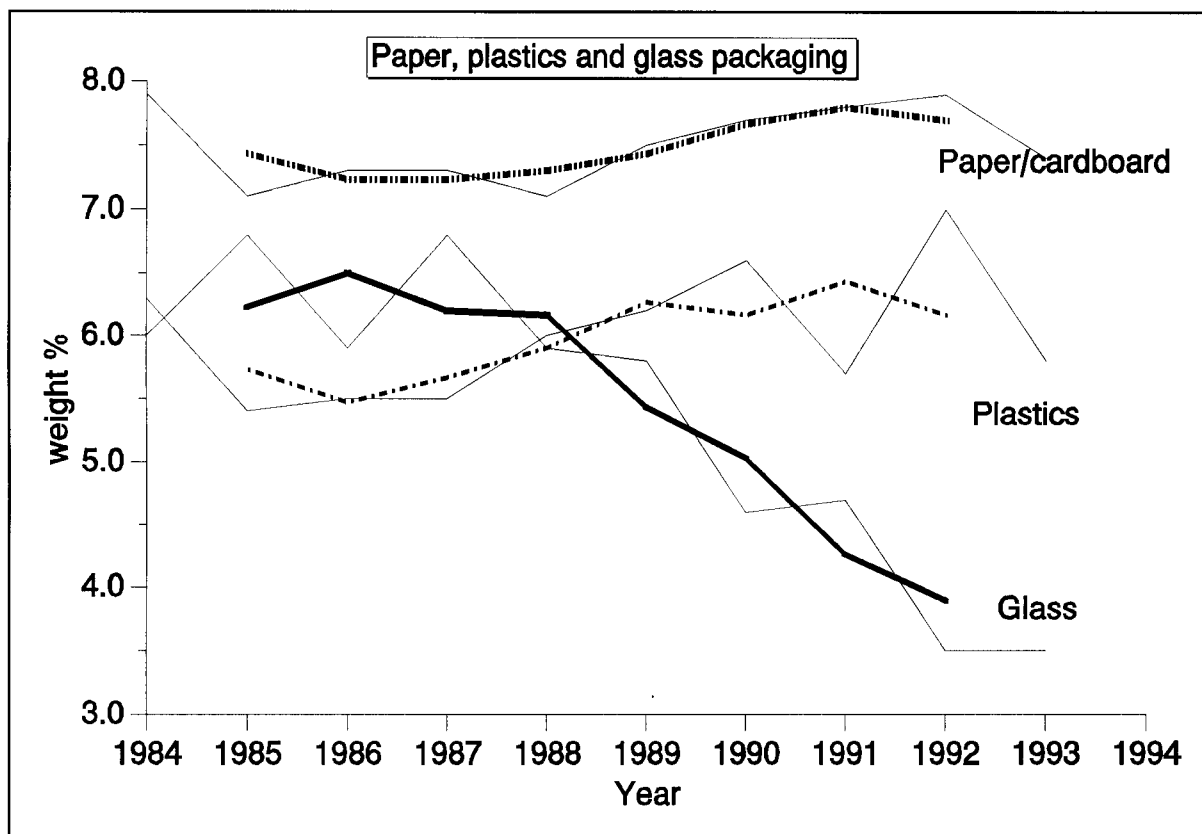
Component	Total house- hold waste %	Share of packaging (%)			
		foodstuff	drinks	other	Total
Paper/cardboard	27.1	3.6	1.4	2.4	7.4
Plastics	8.9	2.7	0.2	3.0	5.8
Glass	4.2	2.1	1.2	0.2	3.5
Ferrous metals	4.1	1.6	0.3	0.1	2.0
Non-ferrous metals	0.64	0.1	0.01	0.13	0.25
Wood	3.3	-	-	0.12	0.12
SCW/Special Waste	0.82	-	-	0.09	0.09
Total Packaging		10.1	3.1	6.0	19.2



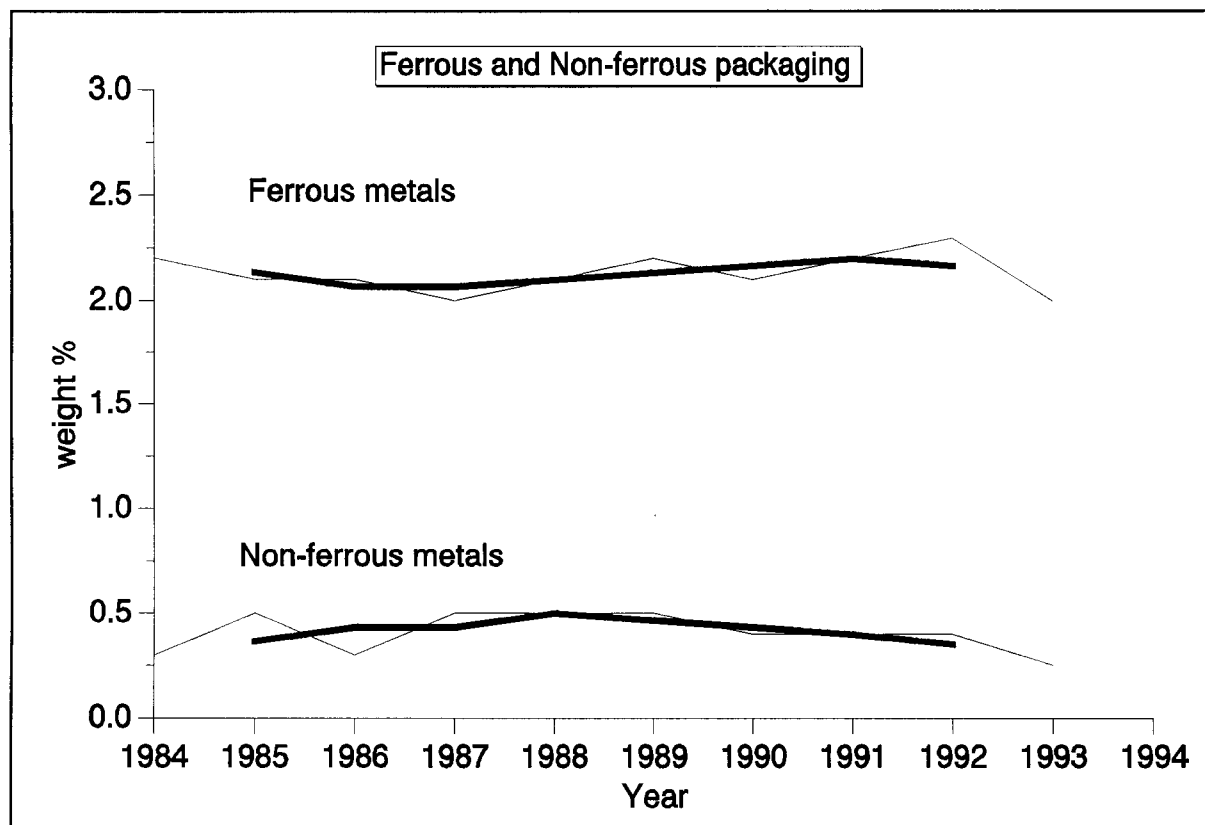
Graph 16: Review paper, plastic and glass packaging, 1984-1993

TABLE 19. Review packaging materials in household waste 1984-1993 (weight %)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
By use:										
foodstuffs	10.2	10.4	10.4	10.3	10.2	10.4	10.7	10.1	10.1	10.1
drinks	4.9	5.2	4.6	5.5	4.5	4.7	3.7	4.3	3.7	3.1
other products	7.6	6.3	6.2	6.3	7.0	7.2	7.1	6.5	7.4	6.0
By component:										
Paper/cardb.	7.9	7.1	7.3	7.3	7.1	7.5	7.7	7.8	7.9	7.4
Plastics	6.3	5.4	5.5	5.5	6.0	6.2	6.6	5.7	7.0	5.8
Glass	6.0	6.8	5.9	6.8	5.9	5.8	4.6	4.7	3.5	3.5
Ferrous metals	2.2	2.1	2.1	2.0	2.1	2.2	2.1	2.2	2.3	2.0
Non-ferrous metals	0.3	0.5	0.3	0.5	0.5	0.5	0.4	0.4	0.4	0.3
Wood								0.03	0.05	0.1
SCW/Special Waste	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.04	0.1
Total	22.7	21.9	21.2	22.1	21.7	22.3	21.5	20.9	21.2	19.2



Graph 17: Review paper, plastic and glass packaging, 1984-1993.

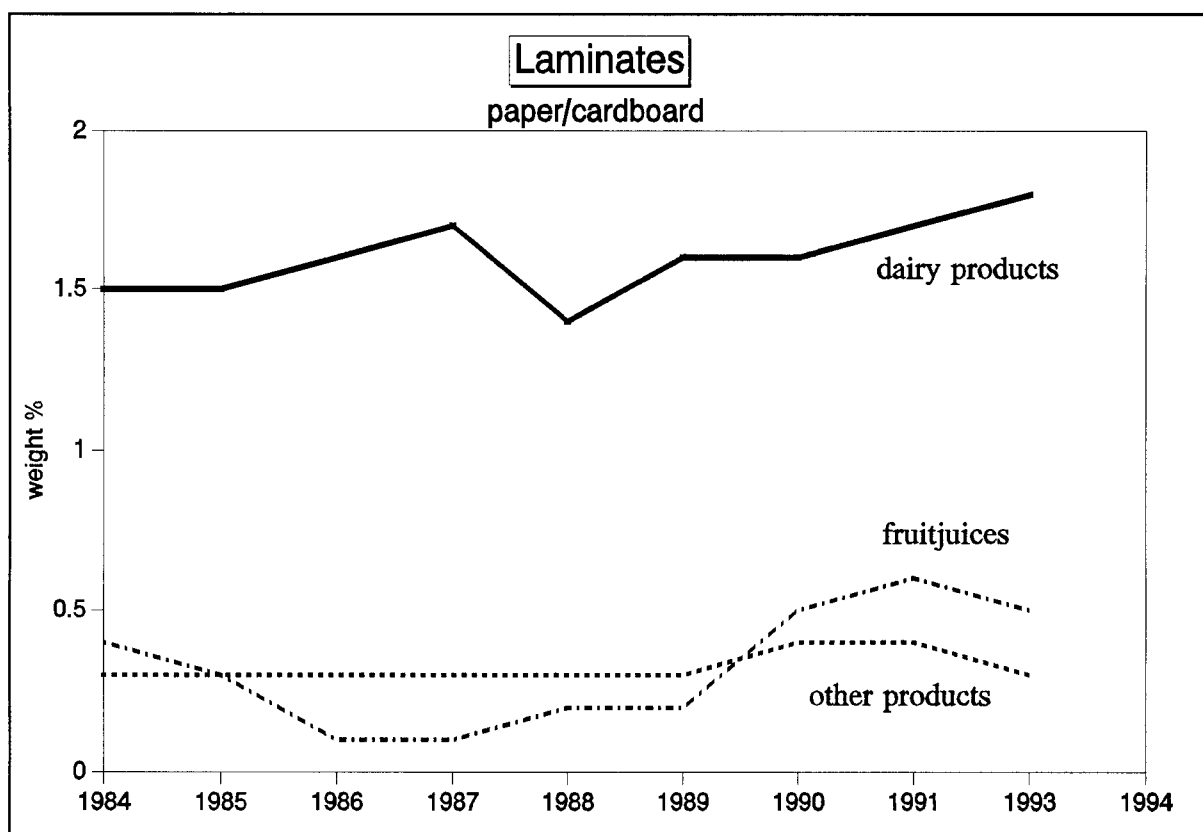


Graph 18: Review ferrous metal en non-ferrous metal packaging, 1984-1993.

4.3 Laminates

Laminated packaging was sorted from the component Packaging Material and subdivided according to destination, i.e. dairy products, fruit juices and remaining laminates. Laminates may be coated with plastic, aluminium, paraffin, or otherwise. They were consigned to the component of which they include the largest weight (often paper/cardboard).

Reviews of the component Laminates in household waste since 1984 may be found in Table 20 and Graph 19.



Graph 19: Laminates in Packaging Waste, 1984-1993.

TABLE 20: Review laminates in household waste 1984-1993 (weight %)*

Laminates	1984	1985	1986	1987	1988	1989	1990	1991	1993
fruitjuices	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3
dairy products	1.5	1.5	1.6	1.7	1.4	1.6	1.6	1.7	1.8
other products **)	0.4	0.3	0.1	0.1	0.2	0.2	0.5	0.6	0.5
Total	2.2	2.1	2.0	2.1	1.9	2.1	2.5	2.7	2.5

*) The component laminates was not monitored in 1992

**) Other products - packaging of coffee, powdered foodstuffs (soups, flour etcetera)

4.4 Batteries

(Author: P.J. Meijer)

4.4.1 Introduction

From 1993 onward, all household waste available for sorting at the RIVM Monitoring Section was further analyzed for the occurrence of batteries. In previous years this was only done with the household waste from the 'Basic Research' programme, which was supplemented by the neighbourhoods in Almere-Haven (1985) and Amersfoort (1992).

As mentioned in Chapter 1.2, from the middle of 1993 the composition of the household waste was determined after sampling according to the MOSAIC-postal code segmenting system. Apart from this, sorting tests were also carried out on behalf of other projects. The combined activities resulted in an increase of the quantity of sorted waste which was analyzed for batteries. This increase in turn led to a better performance and a more reliable transposition to national levels.

The changes introduced in the course of 1993 meant that the various fractions of household waste were quite different. Some municipalities still collected 'mixed' household waste, while other ones had already introduced the separate collection of bio-waste. In the latter cases, RIVM-samples only contained residual waste for sorting and analysis. This should be kept in mind with the interpretation of the results in this report (see also Chapters 1.2 and 4.1).

Could 1993 still be labeled a year of transition, in 1994 all municipalities in the Netherlands were statutorily obliged to introduce separate collections of bio-waste and residual waste. It is likely that the analysis results over 1994 will be more open to interpretation and upgrading to a national level.

4.4.2 Results

36 sorting tests for batteries were executed in 1993: 31 analyses of various types of household waste and 5 analyses of waste from offices, shops and services (OSS).

These tests are presented in the following table.

TABLE 21: Batteries in all sorting tests executed in 1993.

Sorted waste fraction/type	-----Total-----		-----Batteries-----							
	household waste		zinc pyrolusite		alkaline		cell batteries		remaining	
	kg	(*)	nr	gr	nr	gr	nr	gr	nr	gr
Mixed	5219	(8)	45	1353	20	659	14	13	4(**)	103
Bio-waste	3416	(5)	3	25	1	24	-	-	-	-
Res.fraction	3513	(6)	24	713	27	797	1	2	-	-
Spec.fraction	7417	(12)	32	1003	29	642	3	3	-	-
OSS	4437	(5)	3	206	7	279	1	2	-	-
Total	24002	(36)	107	3300	84	2398	26	25	4	103

(*) number of analyzed samples

(**) 4 nickel-cadmium batteries

Explanation 'Sorted waste'

Mixed: non-separated household waste

Bio-waste: fruit, vegetable and garden waste

Residual fraction: household waste without bio-waste

Special fractions: this concerns sorting tests such as those carried out for the Breda project, where only specific fractions were collected (only waste paper, or only plastic/metal/drinks packaging)

OSS: waste from offices, shops and services

The above table shows that batteries were found in all analysed fractions. Only one of the five samples of bio-waste analyzed appeared to contain batteries, the other four did not.

It is true that, according to the test results, the largest number of batteries not collected separately occur in 'mixed' household waste, 'residual fractions' and 'special fractions', but they have also turned up in bio-waste and even more so in OSS waste.

Most of the batteries found were zinc pyrolusite batteries, followed by alkaline batteries. There were few cell batteries. A few sortings of mixed household waste appeared to contain ni-cad batteries (4 in all).

4.4.3 Comparison of the results of 1993 to those of the preceding years.

The results of 1993 can only be compared with those of the preceding years (1984-1992) with regard to 'mixed' household waste, i.e. the waste from neighbourhoods where the separate collection of bio-waste had not yet started.

- *Cell batteries*

The number of cell batteries included in the mixed household waste (total studied quantities rounded off to 5 tonnes) in 1993 amounted to 14, whereas in 1992 this number was 19 (for a total rounded off to 10 tonnes). Relatively speaking this yielded a larger amount in 1993 than in 1992, but in view of the small quantities involved no conclusions could be drawn.

- *Torch batteries*

Table 22 includes the results as well as the data from 1984 onward. For 1993, this table indicates a proportional share of batteries (0.04% of the total of household waste) similar to the previous years since 1989, although the quantity of 'mixed' household waste collected and made available for sorting in 1993 was only half of that in the previous years.

TABLE 22: Review sorting analyses batteries 1984 t/m 1992.

	Quantities analyzed	Weight batteries	Proportional share	Amount of batteries	Share of spec.waste
Year	(kg)	(kg)	(%)	(number)	(%)
1984*	10,404	8.56	0.08	164	27
1985	11,979	6.83	0.06	167	17
1986	11,515	7.52	0.07	172	14
1987	10,313	7.87	0.08	183	15
1988	10,530	6.00	0.06	161	13
1989	10,280	4.21	0.04	133	10
1990	10,252	4.40	0.04	152	9
1991	10,475	3.15	0.03	115	8
1992	10,163	3.76	0.04	177	6
1993	5,219**	2.13	0.04	83	4***

* The 1984 battery study was based on the samples of household waste collected in the four neighbourhoods of the basic study. From 1985 on, household waste from other studies, too, was analyzed for batteries.

** The batteries were found by the Monitoring Section in household waste and other waste streams (such as OSS and Waste substances Dry Components -ADC- projects)

*** Expressed as proportional share in SCW plus Special Waste

The 1993 analyses with regard to the proportional weights of zinc pyrolusite and alkaline batteries showed a slight increase of the former type of battery (see Table 23).

4.4.4 Equipment with built-in ni-cad batteries

Devices such as dustbusters, electric shavers and handheld phones are increasingly fitted with built-in ni-cad batteries. The 1993 sorting analyses also focused on the occurrence of such equipment, but none was found.

TABLE 23: Battery types

Year	Zinc-pyrolusite		Alkaline		Other *		
	Weight	% batteries	Weight	%	Weight	%	
1984	7.86	92	0.68	8	0.02	< 1	
1985	5.87	86	0.84	12	0.11	2	(1)
1986	6.16	82	1.36	18	-	-	
1987	6.29	80	1.29	17	0.29	4	(2)
1988	4.92	82	0.90	15	0.18	3	(3)
1989	2.74	65	1.44	34	0.03	1	(4)
1990	2.59	59	1.79	41	0.03	< 1	(5)
1991	2.23	71	0.88	28	0.04	1	(6)
1992	2.28	61	1.36	36	0.12	3	(7)
1993	1.35	64	0.66	31	0.12	5	(8)

- * Remaining batteries: all sorted batteries excl. of zinc-pyrolusite and alkaline torch batteries
- (1) Includ. 1 nickel-cadmium battery
- (2) 5 ni-cad batteries in all, no other types of battery.
- (3) Includ. 1 ni-cad battery and 3 batteries of non-definable types.
- (4) Cell batteries only.
- (5) 2 batteries in all, of non-definable types
- (6) Cell batteries
- (7) 25 batteries in all, includ. 6 torch batteries (4 ni-cad, 2 non-definable types, and 19 cell batteries (3 silicon-batteries and 16 of other types).

4.4.5 National situation

- *Separate collection batteries*

The separate collection of batteries as small chemical waste (SCW) is a well-known phenomenon. Gathered through municipal SCW-depots and collectors of (industrial) SCW, the larger part is temporarily stored with the AVR Waste Treatment Plant in Botlek.

The quantity of batteries collected in 1993 amounted to 1782 tonnes (19). Apart from that, 775 tonnes, most of which came from the quantities already stored with AVR, was exported by Ecotechnique to the American company RRI in Pecos, Texas for re-use (19). Also, specific types of cell batteries were collected separately. This concerned mostly silver-oxide cell batteries from jewellers, for the recovery of silver. The total amount of these batteries gathered in the Netherlands amounted to about 1 tonne (19).

- *Batteries not collected separately*

As could be concluded from the sorting analyses, part of the batteries was not collected separately, but was removed with the household waste, the mixed household waste as well as the bio-waste and residual fractions. The OSS-waste also contained batteries.

The quantities of batteries not collected separately in 1993 cannot be upgraded to cover the whole country, as no national data of the quantities collected per component are available. But the results from the analyses of the mixed household waste can provide some indication with regard to batteries.

If such an indication would be assumed to be valid countrywide, it could be concluded that the situation in 1993 was more or less comparable to 1992. Calculations set the quantity of batteries in the mixed household waste in 1992 at 1880 tonnes (4). In view of the above it is likely that in 1993 the same amount of batteries was not offered for separate collection.

This would bring the total amount of batteries discarded in 1993 at $1880 + 1782 = 3662$ tonnes. The profitability of battery collection can thus be estimated at 50%.


4.4.6 Discussion

Until now, the annual sale of batteries has always been estimated at 4000 tonnes (20 and 21).

According to the Dutch Association of Manufacturers and Importers of Batteries (NEFIBAT), sales have currently dropped to a considerably lower level. For 1992 they were said to be only 2780 tonnes (22). Let us assume that this quantity was also sold in 1993 (no data are available as yet), and all of it ended up in the waste collecting process. On the basis of the amount of household refuse collected in 1993 and on the battery analyses conducted, it can be calculated that an estimated 65% of the discarded batteries were collected in 1993.

The Ministry for the Environment and Nefibat have agreed that, as of 1st January 1996, a collecting percentage of 80% should be reached, and by 1st January 1998 as much as 90% - without introducing a system of deposit money (23). This involves RIVM in the framework of its monitoring programme.

5 REFERENCES

 *NOTE. None of these publications are available in English.*

1. Beek, A.I.M. van de; Cornelissen, A.A.J.; Aalbers, Th. G.
Physical and chemical investigation of household waste in 1986. Bilthoven/Amersfoort, June 1988.
2. Beek, A.I.M. van de; Cornelissen, A.A.J.; Aalbers Th. G.
Physical and chemical investigation of household waste in 1986, including batteries. Bilthoven/Amersfoort, February 1989.
3. Cornelissen, A.A.J.
Physical investigation of the composition of household waste in the Netherlands. Results 1991. RIVM-file nr 736201020. Amersfoort, July 1993.
4. Cornelissen, A.A.J.
Physical investigation of the composition of household waste in the Netherlands. Results 1992. RIVM-file nr 776201003. Amersfoort, July 1993.
5. Groot, J.L.B. de
Sorting tests of the fraction plastics from household waste 1992. KRI/TNO-file nr 4148/'93 (Dutch Organization for Applied Scientific Research). Delft, March 1993.
6. Meer, L. van de; Meijer, P.J.; Lohuizen, Z.I. van
Determination Small Chemical Waste from households. VROM-file nr 1992/20 (Ministry for the Environment). Bilthoven, November 1992.
7. Nagelhout, D.; Lohuizen, Z.I. van
Waste Removal 1990-2010. Background information to the National Environmental Reconnaissance 2. RIVM-file nr 736201010. Bilthoven, January 1992.
8. Oh, K.M.M.
Composition of household waste from Almere. Results sorting analyses 1985-1991. RIVM-file nr 73201009. Amersfoort, October 1992.
9. Oh, K.M.M.
Sorting analyses from separately collected household waste from Hoogeveen, 1992. RIVM-file nr 736201025. Amersfoort, February 1993.
10. Oh, K.M.M.
Composition of separately collected household waste from Breda, RIVM-file nr 776201008. Amersfoort, March 1994.

11. Oh, K.M.M.
Sorting analyses from separately collected household waste from Lemsterland. RIVM-file nr 736201023. Amersfoort, June 1993.
12. Oh, K.M.M.
Investigation of the composition of residual household waste after separate collection in West-Friesland, 1993. RIVM-file nr 776201009. Amersfoort, March 1994.
13. Otte, P.F.
Investigation of the composition of used glass collected separately in bottle banks. RIVM-file nr 776201002. Amersfoort, June 1993.
14. Otte, P.F.
Investigation of the component Packaging in used paper/cardboard collected separately from households in the Netherlands. RIVM-file nr 776201001, Amersfoort, June 1993.
15. Otte, P.F.
Analysis of metals and calorific value of components derived from household waste. RIVM-file nr 776201012. Amersfoort, December 1994.
16. Population of the municipalities in the Netherlands on 1st January 1993. Central Statistical Office. Main Department Population Statistics. Voorburg/Heerlen, 1993.
17. Waste collected by municipalities, 1991. Central Statistical Office, Department State of the Environment/ Department Finances Environment. Voorburg/heerlen, 1993.
18. Data available in the MOSAIC database. CCN Marketing Systemen BV. De Meern, October 1992.
19. RIVM Project Monitoring waste substances: Batteries
20. Documentation Batteries. RIVM Report file nr 738902014, February 1991.
21. Plan of Implementation Batteries. Series of Publications on waste substances, file nr. 1992/9, Ministry for the Environment.
22. Annex VI of Nefibat Comments with regard to the Ministerial Order Removal Batteries.
23. Report of an oral discussion, agenda item nr. 3: Preliminary Order Removal Batteries; Dutch Parliament, parliamentary year 1993-1994, 23 400 XI, nr 60, established March 9th, 1994.

ANNEX 1

List of abbreviations and concepts used in this report

LAE

Laboratory for Waste Materials and Emissions

RIVM

National Institute of Public Health and Environmental Protection (the Netherlands)

HHW (Household Waste)

Waste from private households which may be offered for collection in a storage device prescribed by the municipal authorities. Unless mentioned otherwise, the sorting analyses have been based on the total amount of waste collected in waste bags, mini-containers or collective containers. Excluded are separately collected waste streams such as bio-waste, glass from glass containers, used paper (collected by associations/schools), clothing (collected by charities), small chemical waste and bulk (household/garden) waste.

Bio-waste and u.r.

Fruit, vegetable and garden waste, and undefined residual waste

SCW (Small Chemical Waste)

The report *List of Small Chemical Waste from households* (6) describes the results of an investigation of waste substances from households and other comparable sources, which can be considered 'small chemical waste' on the basis of a number of criteria. This report defines SCW as 'Waste substances which are released in small quantities per source (households) and could be categorized as chemical waste on the basis of the *Ministerial Order Registration Chemical Waste Substances* (BACA) if their origin and the objects excluded by said Order were disregarded, and which cannot be removed collectively with the household waste in view of the environmental risk.'

OSS-waste

Waste from Offices, Shops and Services, subjected to separate sorting tests.

Laminates

Product composed of multiple materials (paper, plastic, aluminium). Laminated packaging cardboard, for example (which includes milk or fruitjuice cartons), consists of cardboard with a coating of plastic or aluminium, or a combination of both. In the sorting analyses such packaging is allotted to the component taking up the largest proportional weight, which in this case is paper/cardboard.

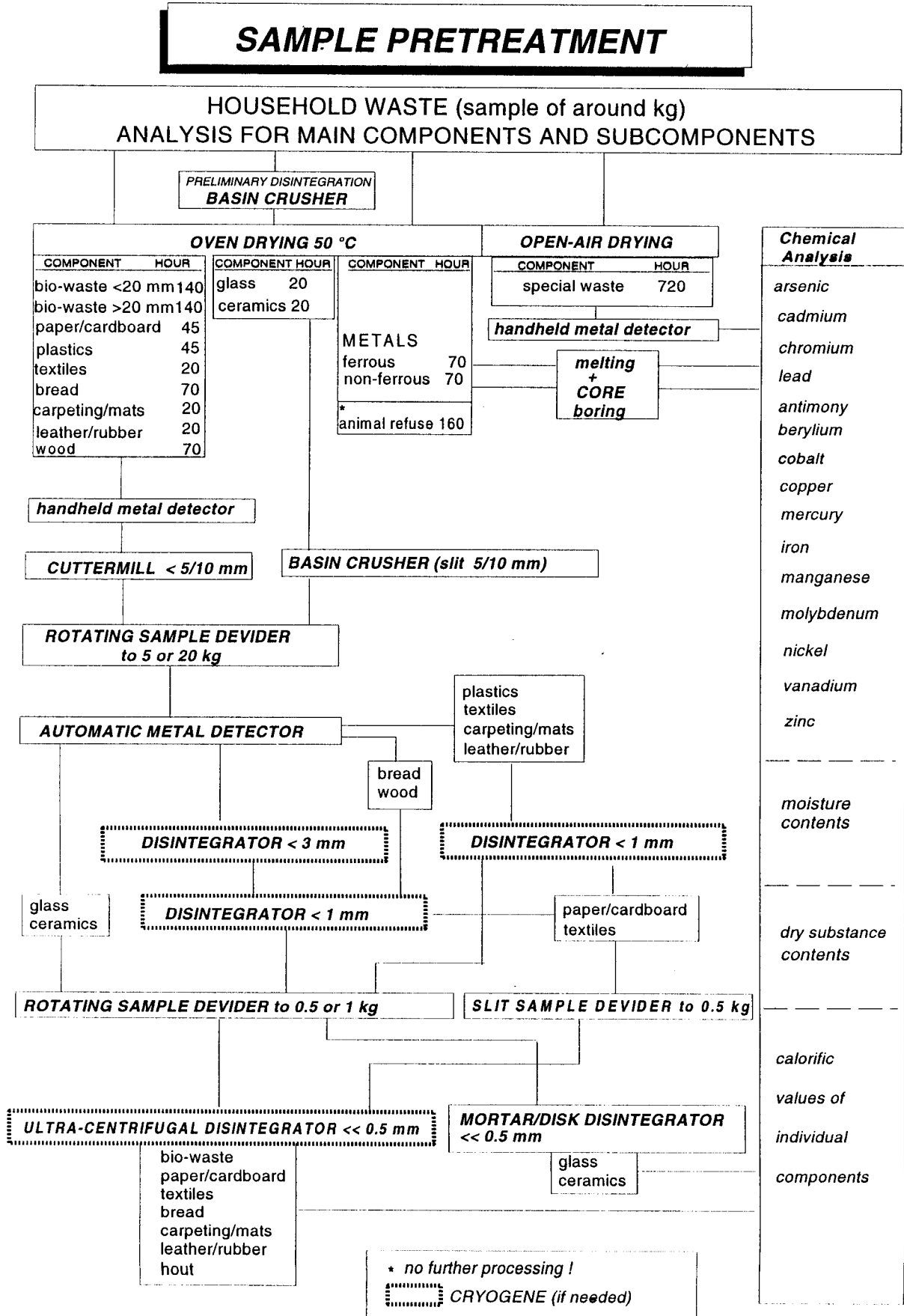
ANNEX 2: Analysis diagram 1993

MAIN COMPONENT	1st Subanalysis	2nd Subanalysis (packaging)
Bio waste and u.r.	u.r. < 3 mm u.r. 3 - 8 mm u.r. 8 - 20 mm u.r. > 20 mm	
Paper/ Cardboard	cardboard other paper newspapers printed matter/magazine sanitary paper	Packaging foodstuffs Packaging drinks Other packaging
Plastics	PE + PP PET PS PVC Other plastics	Packaging foodstuffs Packaging drinks Other packaging
Glass	Clear Green Brown Other glass	Packaging foodstuffs Packaging drinks Other packaging Non- packaging
Ferrous metals		Foodstuffs Drinks Other products Non-packaging
Non-Ferro metals	aluminium foil other aluminium copper lead other non-ferro metals	Foodstuffs Drinks Other products Non-packaging
Textiles	natural/synthetic/mixed	
Bread		
Animal refuse		
Ceramics		
Carpeting/mats	natural/synthetic/mixed	
Leather/rubber	natural/synthetic/mixed	
Wood		Packaging wood
Special Waste	Cleaning products Cosmetics Candles/wax/lubricants Other SW	Packaging cleaning products Packaging cosmetics Packaging candles/wax/lubricants Other packaging
Small Chemical Waste	Batteries/car batteries Paint/glue/kit Pharmaceuticals Other SCW	Packaging batteries/car batteries packaging paint/glue/kit Pharmaceutical packaging Other packaging

ANNEX 2: Analysis diagram 1993 (contin.)

MAINCOMPONENT	3rd Subanalysis	4th Subanalysis
Bio waste and u.r.	Garden Waste Resid. food Other bio-waste and UR	Leftovers Peels/cuttings Grease/oil/dairy Other food
Paper/ Cardboard	Laminates fruit juices Laminates solid dairy prod. Laminates liquid dairy prod. Other laminates paper/plastics Other laminates paper/aluminium Other non-laminates	
Plastics	Foils Utensils Returnable bottles Non-returnable bottles Clothing Other products	Waste bags Carrying bags Plastics/aluminium Min. water bottles Soda bottles Dairy bottles Bottles toiletries Bottles detergents Bottles cleaning products Other bottles
Glass	Fruit/veg. sandwich.fill. sauces fish pres. baby food pickles herbs mushrooms instant coffee solid dairy other products wine distilled beer sodas min.water other products fr.juices/drinks tinned milk cream other products Pharmaceuticals Cosmetics Other products Lamps Utensils Other products	Returnable bottles Non-returnable bottles Returnable jars Non-returnable jars
Ferrous metals	Iron containers	Aerosol sprays (iron)
Non-Ferrous metals	Non-ferrous containers	Aerosol sprays (non-ferrous)
Textiles	Clothing/other products	sanitary textiles
Bread		
Animal refuse		
Ceramics		
Carpeting/mats		
Leather/rubber	Clothing/other products	
Wood		
Special Waste		Aerosol sprays (special waste)
Small Chemical Waste		Aerosol sprays (SCW)

ANNEX 3: Diagram pre-treatment samples



ANNEX 4: Method for the chemical analysis of household waste

Component	Method of decomposition
Bio-waste, paper/cardboard, textiles, wood	NEN 6465 (Dutch Standard) nitrohydrochloric acid
plastic, carpets/mats, leather/rubber	sulphuric acid/hydrogenperoxide
glass, ceramics	hydrogen fluoride (closed)

Element	Method/technique
Arsenic (As), Antimony (Sb)	hydrid technique
Beryllium (Be), Cadmium (Cd), Cobalt (Co), Chromium (Cr), Copper (Cu), Iron (Fe), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Lead (Pb), Titanium (Ti), Vanadium (V), Zinc (Zn), Tin (Sn)	ICP
Mercury (Hg)	cold vapour technique
Silver (Ag)	flame AAS
Calorific Value	ASTM D240

ANNEX 5: Analysis results household waste per area (contin.)

Main group (for description: table 2) Municipality	1	2	3	4	5	6	7	8	9	10	11	weighted average %
	Malden* %	Waddinxv.* %	Hengelo %	Almere %	Arnhem %	Veendam %	Venlo %	Amersf. %	Amersf. %	Heerenv.* %	Rijsbergen %	
Bio-waste and u.r.	33.19%	40.75%	45.19%	43.40%	41.27%	48.41%	31.40%	30.80%	38.72%	34.87%	40.06%	39.78%
Sievefraction:												
< 3 mm	5.71%	4.89%	9.18%	4.32%	4.34%	3.88%	0.79%	2.98%	5.43%	3.77%	5.77%	4.63%
3 - 8 mm	4.53%	7.70%	6.54%	7.08%	5.42%	5.43%	2.93%	7.02%	4.60%	5.42%	3.42%	5.67%
8 - 20 mm	2.82%	4.41%	6.56%	3.80%	4.13%	5.16%	5.68%	4.19%	5.56%	2.93%	4.98%	4.64%
> 20 mm	20.13%	23.75%	22.91%	28.20%	27.37%	33.93%	22.00%	16.60%	23.13%	22.76%	25.89%	24.84%
Sievefraction > 20mm:												
Garden waste	6.79%	3.15%	8.52%	9.04%	1.98%	9.21%	0.55%	1.94%	6.47%	10.67%	5.07%	6.63%
Resid. food	11.40%	18.60%	12.46%	17.91%	23.04%	23.21%	21.17%	11.97%	15.27%	8.96%	19.00%	16.27%
Other Bio-waste and u.r	1.95%	1.99%	1.93%	1.25%	2.35%	1.52%	0.29%	2.70%	1.38%	3.13%	1.82%	1.94%
subanalysis foodstuffs												
mealstuffs	2.75%	4.70%	1.17%	2.05%	1.57%	3.96%	2.71%	1.45%	0.77%	1.58%	1.65%	2.35%
peels/cuttings	5.76%	10.90%	9.82%	13.26%	19.04%	16.99%	17.10%	9.48%	12.62%	6.24%	15.16%	12.05%
grease/oil/dairy	1.98%	2.36%	1.05%	1.55%	1.55%	1.40%	0.85%	0.60%	1.54%	0.62%	1.55%	1.21%
other food	0.91%	0.64%	0.43%	1.06%	0.89%	0.86%	0.51%	0.44%	0.35%	0.53%	0.65%	0.65%
Paper/cardboard	36.36%	31.63%	21.46%	29.93%	32.45%	24.16%	28.14%	32.59%	33.41%	24.55%	21.20%	27.09%
cardboard	9.10%	11.07%	5.61%	6.35%	5.89%	5.34%	7.46%	7.57%	7.27%	5.43%	6.72%	6.63%
newspaper	1.85%	4.58%	4.60%	5.10%	10.57%	2.66%	2.94%	6.55%	4.77%	4.23%	2.54%	4.27%
printed matter/magaz.	1.67%	4.08%	4.22%	5.37%	7.82%	3.64%	5.51%	7.79%	7.16%	1.36%	3.49%	4.30%
sanitary paper	18.25%	7.00%	4.22%	8.56%	2.54%	9.23%	9.58%	7.50%	10.68%	10.99%	4.65%	8.40%
other paper	5.49%	4.91%	2.82%	4.55%	5.64%	3.29%	2.64%	3.18%	3.53%	2.54%	3.82%	3.49%
subanalysis packaging												
packaging foodstuffs	5.38%	5.40%	3.21%	3.28%	3.23%	3.00%	4.48%	3.39%	2.76%	3.53%	3.91%	3.64%
packaging drinks	2.90%	3.56%	0.98%	1.27%	1.01%	1.11%	0.62%	1.32%	1.15%	1.17%	0.93%	1.35%
packaging other	2.54%	3.07%	2.43%	2.89%	3.79%	0.93%	2.62%	3.61%	2.45%	1.91%	3.40%	2.41%
total packaging	10.83%	12.03%	6.62%	7.45%	8.03%	5.05%	7.73%	8.32%	6.36%	6.61%	8.24%	7.40%

ANNEX 5: Analysis results household waste per area (contin.)

Main group (see for description table)	Municipality											weighted average %
	1	2	3	4	5	6	7	8	9	10	11	
Bottles/flacons	Maiden* 1.22%	Waddinxv.* 1.33%	Hengelo 0.64%	Almere 0.57%	Arnhem 0.45%	Veendam 0.96%	Venlo 0.72%	Amersf. 0.55%	Amersf. 0.44%	Heerenv.* 0.82%	Rijsbergen 0.77%	0.79%
mineralwater	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
sodas	0.05%	0.02%	0.02%	0.00%	0.01%	0.04%	0.04%	0.05%	0.00%	0.02%	0.02%	0.03%
dairy	0.08%	0.02%	0.05%	0.12%	0.04%	0.22%	0.17%	0.07%	0.00%	0.21%	0.09%	0.13%
cosmetics	0.38%	0.37%	0.19%	0.12%	0.11%	0.17%	0.16%	0.14%	0.09%	0.21%	0.20%	0.19%
washproducts	0.12%	0.25%	0.15%	0.15%	0.11%	0.16%	0.12%	0.04%	0.06%	0.07%	0.11%	0.12%
cleaningproducts	0.41%	0.40%	0.07%	0.11%	0.15%	0.21%	0.05%	0.12%	0.11%	0.13%	0.18%	0.16%
other bottles	0.17%	0.26%	0.16%	0.07%	0.04%	0.16%	0.17%	0.13%	0.11%	0.18%	0.17%	0.16%
total bottles	1.22%	1.33%	0.64%	0.57%	0.45%	0.96%	0.72%	0.55%	0.44%	0.82%	0.77%	0.79%
*)whereof with returnable:												
	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.04%	0.01%	0.00%	0.02%	0.02%	0.01%
laminates plastics/aluminium	0.48%	0.44%	0.15%	0.20%	0.94%	0.22%	0.07%	0.51%	0.14%	0.23%	0.24%	0.29%
Glass	1.29%	2.98%	3.96%	3.85%	4.39%	4.57%	7.04%	4.62%	3.46%	3.74%	4.81%	4.21%
on color:												
clear	1.06%	2.14%	2.36%	3.17%	2.99%	3.28%	3.26%	3.10%	2.34%	2.29%	3.54%	2.76%
green	0.01%	0.23%	1.05%	0.26%	1.02%	0.56%	0.29%	0.97%	0.71%	0.41%	0.53%	0.58%
brown	0.12%	0.27%	0.39%	0.35%	0.31%	0.63%	0.46%	0.45%	0.13%	0.74%	0.21%	0.46%
other glass	0.11%	0.34%	0.16%	0.07%	0.07%	0.09%	3.02%	0.11%	0.29%	0.30%	0.53%	0.41%
subanalysis packagingglass												
packaging food	0.62%	1.84%	1.78%	2.45%	2.07%	2.78%	2.40%	2.54%	1.69%	1.57%	2.52%	2.12%
packaging drinks	0.11%	0.46%	1.57%	0.78%	1.79%	1.25%	1.05%	1.65%	1.44%	1.50%	1.27%	1.24%
packaging other	0.28%	0.46%	0.13%	0.13%	0.40%	0.08%	0.14%	0.10%	0.08%	0.10%	0.39%	0.17%
Total packaging	1.02%	2.76%	3.48%	3.36%	4.26%	4.11%	3.59%	4.29%	3.21%	3.17%	4.17%	3.54%
productsgroep foodstuffspackaging												
vegetables/fruit	0.28%	0.40%	0.90%	0.62%	0.64%	1.29%	1.03%	1.35%	0.73%	0.55%	0.86%	0.88%
sandwichfill.	0.05%	0.48%	0.25%	0.60%	0.90%	0.27%	0.60%	0.22%	0.21%	0.41%	0.25%	0.35%
saucers	0.07%	0.25%	0.23%	0.48%	0.09%	0.39%	0.06%	0.28%	0.41%	0.16%	0.78%	0.28%
fish preserves	0.00%	0.00%	0.00%	0.07%	0.17%	0.04%	0.00%	0.04%	0.00%	0.04%	0.03%	0.03%
babyfood	0.08%	0.12%	0.05%	0.06%	0.00%	0.02%	0.03%	0.10%	0.16%	0.22%	0.04%	0.08%
pickles	0.08%	0.18%	0.11%	0.26%	0.15%	0.18%	0.12%	0.27%	0.00%	0.05%	0.04%	0.14%
east food	0.02%	0.12%	0.06%	0.02%	0.00%	0.12%	0.00%	0.15%	0.18%	0.02%	0.05%	0.07%
mushrooms	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.00%	0.00%	0.00%	0.00%	0.01%
instant coffee	0.00%	0.00%	0.02%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.02%	0.06%	0.02%
solid dairy	0.00%	0.00%	0.08%	0.07%	0.00%	0.33%	0.17%	0.10%	0.00%	0.00%	0.00%	0.11%
other food	0.05%	0.30%	0.10%	0.26%	0.13%	0.11%	0.32%	0.03%	0.00%	0.10%	0.40%	0.15%

ANNEX 5: Analysis results household waste per area (contin.)

Main group (see for description table)	1	2	3	4	5	6	7	8	9	10	11	weighted average %
Municipality	Maiden* %	Waddinxv.* %	Hengelo %	Almere %	Arnhem %	Veendam %	Venlo %	Amersf. %	Amersf. %	Heerenv.* %	Rijsbergen %	
productsgroup drinkspackaging												
wine	0.00%	0.22%	0.30%	0.00%	1.37%	0.50%	0.66%	0.69%	0.72%	0.62%	0.43%	0.48%
distilled	0.00%	0.23%	0.90%	0.55%	0.39%	0.39%	0.02%	0.09%	0.45%	0.44%	0.40%	0.39%
beer	0.00%	0.00%	0.17%	0.16%	0.00%	0.14%	0.17%	0.62%	0.09%	0.28%	0.05%	0.20%
sodas	0.03%	0.00%	0.03%	0.00%	0.00%	0.19%	0.00%	0.19%	0.11%	0.00%	0.08%	0.07%
mineralwater	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
fruitjuices/drinks	0.00%	0.00%	0.18%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%	0.14%	0.12%	0.07%
cons. melk/melkprod.	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
coffeemilk	0.08%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%	0.02%	0.00%	0.01%	0.17%	0.02%
other drinks	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
productgroup other packaging												
pharmaceuticals	0.04%	0.17%	0.03%	0.04%	0.09%	0.05%	0.05%	0.02%	0.06%	0.00%	0.25%	0.05%
cosmetics	0.24%	0.29%	0.11%	0.09%	0.12%	0.02%	0.08%	0.05%	0.02%	0.08%	0.13%	0.10%
other	0.00%	0.00%	0.00%	0.00%	0.19%	0.01%	0.00%	0.03%	0.00%	0.03%	0.00%	0.02%
non-packagingglass												
lamps	0.08%	0.06%	0.13%	0.04%	0.01%	0.05%	0.01%	0.02%	0.01%	0.08%	0.02%	0.06%
untills/glass	0.20%	0.12%	0.34%	0.31%	0.12%	0.38%	0.37%	0.32%	0.22%	0.34%	0.08%	0.30%
other glass	0.00%	0.05%	0.00%	0.14%	0.00%	0.03%	3.07%	0.00%	0.02%	0.15%	0.54%	0.32%
Bottles												
-returnable bottles	0.35%	0.97%	1.90%	1.18%	2.05%	1.67%	1.08%	1.98%	1.51%	1.65%	1.89%	1.56%
-non-returnable bottles	0.00%	0.10%	0.09%	0.00%	0.00%	0.09%	0.12%	0.17%	0.00%	0.00%	0.13%	0.07%
Jars												
-returnable jars	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.07%	0.06%	0.00%	0.05%	0.00%	0.02%
-non-returnable jars	0.67%	1.84%	1.57%	2.13%	2.20%	2.43%	2.46%	2.24%	1.66%	0.94%	2.31%	1.88%
Ferrous	3.78%	3.87%	2.63%	3.81%	2.97%	3.41%	6.54%	4.02%	3.27%	6.30%	3.13%	4.09%
subanalysis packaging												
packaging foodstuffs	2.32%	2.73%	1.07%	1.76%	1.73%	2.25%	0.78%	1.09%	0.69%	1.32%	1.09%	1.57%
packaging drinks	0.39%	0.28%	0.34%	0.22%	0.67%	0.32%	0.18%	0.58%	0.60%	0.22%	0.22%	0.33%
packaging other	0.15%	0.16%	0.22%	0.19%	0.04%	0.15%	0.09%	0.10%	0.16%	0.07%	0.15%	0.14%
Total packaging	2.85%	3.17%	1.63%	2.17%	2.44%	2.72%	1.05%	1.76%	1.45%	1.61%	1.46%	2.04%
ferrous jars	2.42%	2.78%	1.38%	1.93%	2.15%	2.50%	0.90%	1.47%	1.26%	1.34%	1.14%	1.77%
sprayjars ferrous	0.12%	0.11%	0.14%	0.05%	0.00%	0.15%	0.10%	0.05%	0.07%	0.02%	0.12%	0.09%

ANNEX 5: Analysis results household waste per area (contin.)

Main group (see for description table)	1	2	3	4	5	6	7	8	9	10	11	weighted average
Municipality	Malden*	Waddinxv.*	Hengelo	Almere	Arnhem	Veendam	Venlo	Amersf.	Amersf.	Heerenv.*	Rijsbergen	%
Non-ferrous	0.50%	0.54%	0.28%	0.38%	0.66%	0.45%	2.79%	0.43%	0.42%	0.62%	0.40%	0.64%
Materialsort												
aluminium foils	0.08%	0.15%	0.07%	0.08%	0.06%	0.07%	0.07%	0.10%	0.03%	0.05%	0.04%	0.08%
other aluminium	0.36%	0.36%	0.15%	0.29%	0.28%	0.20%	1.87%	0.17%	0.20%	0.29%	0.27%	0.37%
copper	0.04%	0.01%	0.01%	0.00%	0.05%	0.02%	0.08%	0.09%	0.00%	0.04%	0.06%	0.04%
lead	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
other non-ferrous	0.02%	0.02%	0.03%	0.02%	0.28%	0.16%	0.76%	0.07%	0.18%	0.23%	0.03%	0.16%
subanalysis packaging:												
packaging foodstuffs	0.24%	0.23%	0.06%	0.09%	0.13%	0.09%	0.07%	0.08%	0.03%	0.10%	0.10%	0.10%
packaging drinks	0.01%	0.01%	0.01%	0.01%	0.06%	0.01%	0.02%	0.01%	0.01%	0.01%	0.01%	0.01%
packaging other	0.15%	0.24%	0.13%	0.11%	0.14%	0.11%	0.09%	0.12%	0.06%	0.12%	0.18%	0.13%
Total packaging	0.40%	0.48%	0.21%	0.22%	0.33%	0.21%	0.18%	0.21%	0.10%	0.23%	0.30%	0.25%
non-ferrous jars	0.13%	0.09%	0.06%	0.04%	0.14%	0.04%	0.02%	0.03%	0.02%	0.07%	0.18%	0.07%
sprayjars non-ferrous	0.04%	0.04%	0.04%	0.01%	0.04%	0.04%	0.00%	0.01%	0.00%	0.03%	0.13%	0.03%
Textiles	2.89%	2.99%	1.78%	1.19%	1.49%	1.67%	1.75%	2.81%	2.39%	3.47%	2.23%	2.26%
natural textiles	0.62%	1.00%	0.01%	0.54%	0.57%	0.23%	0.31%	0.18%	0.01%	1.12%	0.15%	0.43%
synthetic textiles	0.10%	0.29%	0.08%	0.05%	0.06%	0.09%	0.24%	0.01%	0.14%	0.06%	0.05%	0.10%
mixed textiles	2.17%	1.70%	1.69%	0.60%	0.85%	1.35%	1.19%	2.62%	2.24%	2.29%	2.03%	1.73%
clothing textiles	1.88%	1.59%	1.03%	0.73%	0.82%	1.02%	0.33%	1.40%	1.28%	1.48%	0.67%	1.12%
other textiles	1.01%	1.39%	0.75%	0.46%	0.67%	0.65%	1.42%	1.41%	1.12%	2.00%	1.57%	1.14%
subtotal:	2.89%	2.99%	1.78%	1.19%	1.49%	1.67%	1.75%	2.81%	2.39%	3.47%	2.23%	2.26%
sanitary textiles	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Carpeting/mats	0.00%	0.01%	0.03%	0.31%	0.00%	0.12%	0.09%	0.70%	0.08%	2.76%	0.01%	0.55%
natural	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
synthetic	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%
mixed	0.00%	0.01%	0.03%	0.31%	0.00%	0.12%	0.09%	0.70%	0.05%	2.76%	0.01%	0.55%
Leather/rubber	0.53%	0.37%	1.28%	1.58%	0.35%	0.80%	0.21%	1.28%	0.57%	1.61%	0.68%	0.98%
natural	0.04%	0.18%	0.06%	0.04%	0.00%	0.10%	0.07%	0.34%	0.00%	0.15%	0.20%	0.13%
synthetic	0.03%	0.05%	0.03%	0.06%	0.04%	0.04%	0.01%	0.04%	0.02%	0.05%	0.02%	0.04%
mixed	0.47%	0.14%	1.19%	1.48%	0.31%	0.66%	0.13%	0.90%	0.55%	1.41%	0.47%	0.82%
clothing leather/rubber	0.42%	0.09%	1.18%	1.15%	0.29%	0.39%	0.07%	0.59%	0.50%	0.52%	0.32%	0.55%
other leather/rubber	0.11%	0.28%	0.10%	0.44%	0.06%	0.41%	0.14%	0.69%	0.07%	1.09%	0.36%	0.43%
Wood	2.00%	1.45%	1.93%	2.65%	0.91%	1.47%	8.36%	6.55%	2.45%	5.34%	0.69%	3.34%
packaging	0.07%	0.04%	0.09%	0.08%	0.04%	0.01%	0.62%	0.19%	0.40%	0.03%	0.02%	0.12%

ANNEX 5: Analysis results household waste per area (contin.)

Main group (see for description table)	1	2	3	4	5	6	7	8	9	10	11	weighted average %
Municipality	Malden *	Waddinxv. *	Hengelo	Almere	Arnhem	Veendam	Venlo	Amersf.	Amersf.	Heerenv. *	Rijsbergen	
Chemical waste/special waste packaging	1.23%	0.35%	1.38%	0.56%	1.10%	0.27%	0.51%	0.13%	0.89%	2.05%	0.31%	0.82%
	0.02%	0.05%	0.17%	0.18%	0.38%	0.05%	0.10%	0.03%	0.46%	0.10%	0.04%	0.09%
<i>small chemical waste</i>												
<i>incl. packaging</i>												
batteries/car batteries	0.00%	0.05%	0.05%	0.05%	0.18%	0.06%	0.00%	0.03%	0.02%	0.02%	0.00%	0.034%
paint/glue/kit	0.02%	0.00%	0.17%	0.29%	0.12%	0.03%	0.03%	0.00%	0.04%	0.03%	0.00%	0.056%
pharmaceuticals	0.00%	0.02%	0.11%	0.04%	0.15%	0.02%	0.05%	0.00%	0.00%	0.00%	0.01%	0.031%
other	<u>0.03%</u>			<u>0.07%</u>	<u>0.00%</u>			<u>0.00%</u>	<u>0.37%</u>	<u>0.01%</u>		<u>0.024%</u>
subtotal	0.05%			0.46%	0.45%			0.03%	0.43%	0.05%		0.145%
<i>packaging chemical waste</i>												
batteries/car batteries	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.000%
paint/glue/kit	0.00%	0.00%	0.06%	0.12%	0.09%	0.02%	0.01%	0.00%	0.02%	0.00%	0.00%	0.023%
pharmaceuticals	0.00%	0.02%	0.07%	0.02%	0.08%	0.01%	0.03%	0.00%	0.00%	0.00%	0.00%	0.018%
other	<u>0.00%</u>			<u>0.00%</u>	<u>0.00%</u>			<u>0.00%</u>	<u>0.28%</u>	<u>0.00%</u>		<u>0.009%</u>
subtotal	0.01%			0.14%	0.18%			0.00%	0.30%	0.00%		0.050%
sprays/jars in chemical waste	0.00%			0.00%	0.00%			0.00%	0.00%	0.00%		0.000%
<i>Special waste</i>												
<i>incl. packaging</i>												
cleaning products	0.00%	0.04%	0.08%	0.02%	0.00%	0.02%	0.40%	0.00%	0.00%	0.01%	0.01%	0.004%
cosmetics	0.04%			0.05%	0.54%			0.07%	0.26%	0.10%		0.094%
candleless/wax/lubr.	0.11%			0.03%	0.11%			0.01%	0.17%	0.05%		0.041%
other	<u>1.04%</u>			<u>0.00%</u>	<u>0.00%</u>			<u>0.01%</u>	<u>0.02%</u>	<u>1.83%</u>		<u>0.539%</u>
subtotal	1.18%			0.10%	0.65%			0.09%	0.46%	2.00%		0.678%
<i>Packaging special waste:</i>												
packaging cleaning products	0.00%			0.01%	0.00%			0.00%	0.00%	0.00%		0.001%
packaging cosmetics	0.01%	0.01%	0.03%	0.02%	0.20%	0.01%	0.06%	0.02%	0.14%	0.07%	0.01%	0.032%
packaging lubr.	0.00%			0.00%	0.00%			0.00%	0.00%	0.02%		0.005%
other packaging	<u>0.00%</u>			<u>0.00%</u>	<u>0.00%</u>			<u>0.00%</u>	<u>0.00%</u>	<u>0.00%</u>		<u>0.002%</u>
subtotal	0.01%			0.03%	0.20%			0.03%	0.16%	0.09%		0.040%
sprays/jars in special waste	0.00%			0.00%	0.03%			0.00%	0.01%	0.00%		0.003%

ANNEX 6: Review household waste 1971-1993

Composition household waste in weight percentage (separate collected waste streams are not included)

Component	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Bio-waste and u.r.	49.6	45.0	45.5	48.2	48.7	48.1	47.9	48.2	48.1	50.3	51.7	50.3	48.4	49.0	50.5	48.9	48.0	47.2	45.3	46.8	46.4	46.3	39.8
Paper/cardboard	25.5	26.1	25.6	22.6	23.0	22.3	22.6	22.2	21.3	21.0	22.3	24.0	24.6	24.5	22.8	23.8	24.2	24.3	26.5	24.7	26.8	26.2	27.1
Plastics	4.7	5.2	5.1	5.3	5.6	5.8	6.0	6.2	6.0	6.5	6.8	6.5	7.5	7.5	6.8	7.1	7.1	7.5	7.8	8.1	7.9	8.6	8.9
Glass	10.0	11.7	11.9	13.0	12.0	12.7	12.7	11.9	13.8	11.9	8.1	6.7	6.7	6.7	7.2	6.2	7.2	6.3	6.2	5.0	5.2	4.1	4.2
Ferrous metals	3.1	3.3	3.2	3.1	3.0	2.6	2.9	2.8	2.6	2.6	2.5	2.2	2.5	2.6	2.8	2.7	2.6	2.7	3.1	3.0	2.9	3.5	4.1
Non-ferrous metals	0.0	0.2	0.2	0.1	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.5	0.6	0.6	0.6	0.7	0.8	0.7	0.5	0.6	0.6
Textiles	1.9	2.3	2.2	1.8	1.7	1.9	1.8	2.2	1.5	1.7	2.2	2.2	2.4	2.2	2.1	2.3	2.1	2.4	1.9	2.4	2.2	2.3	2.3
Bread	1.9	2.1	2.1	2.3	1.7	1.9	2.0	1.8	1.7	1.8	1.9	1.6	2.0	1.8	1.8	2.0	2.3	2.2	2.5	2.5	2.5	2.2	1.9
Animal refuse	0.4	0.5	0.9	0.8	0.9	0.9	1.0	1.3	1.0	1.3	1.1	1.3	1.7	2.1	1.7	2.4	2.1	2.3	2.7	2.6	2.2	1.9	1.7
Ceramics	1.3	2.4	1.8	1.4	1.9	1.6	1.3	1.3	1.6	1.3	1.0	2.1	1.2	1.3	1.5	1.5	1.3	1.5	1.5	1.4	1.4	1.3	3.7
Carpets/mats	0.2	0.3	0.3	0.3	0.2	0.4	0.2	0.2	0.6	0.1	0.2	0.3	0.5	0.4	0.5	0.3	0.7	0.6	0.3	0.8	0.3	0.9	0.6
Leather/rubber	0.6	0.5	0.7	0.8	0.4	0.7	0.7	0.6	0.7	0.3	1.1	1.1	0.6	0.6	0.8	0.8	0.7	1.2	0.6	0.7	0.7	1.0	1.0
Wood	0.8	0.7	0.8	0.4	0.6	0.5	0.4	0.8	0.5	0.5	0.4	0.7	0.7	0.5	0.5	0.9	0.8	0.6	0.5	0.8	0.7	1.1	3.3
Special waste/SCW	-	-	-	-	-	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.4	0.6	0.3	0.4	0.5	0.4	0.5	0.4	0.5	0.4	0.8

source:RIVM

Composition household waste in kg/household/year (separate collected waste streams are not included)

Component	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Bio-waste and u.r.	118	111	111	113	117	122	128	135	141	145	146	140	133	136	140	137	141	140	139	145	145	145	108
Paper/cardboard	60	64	62	53	55	56	61	62	62	60	63	67	67	68	63	67	71	72	81	76	84	82	73
Plastics	11	13	12	12	13	15	16	17	18	19	19	18	21	21	19	20	21	22	24	25	25	27	24
Glass	24	29	29	31	29	32	34	33	40	34	23	19	18	19	20	17	21	19	19	15	16	13	11
Ferrous metals	7.3	8.2	7.8	7.3	7.2	6.6	7.8	7.8	7.6	7.5	7.1	6.1	6.9	7.2	7.8	7.6	7.7	8.0	9.5	9.3	9.1	11	11
Non-ferrous metals	0.0	0.5	0.5	0.2	0.7	0.8	0.8	1.1	1.2	1.4	1.4	1.7	1.6	1.4	1.7	1.7	1.8	2.1	2.5	2.2	1.6	1.9	1.7
Textiles	4.5	5.7	5.4	4.2	4.1	4.8	4.8	6.2	4.4	4.9	6.2	6.1	6.6	6.1	5.8	6.5	6.2	7.1	5.8	7.4	6.9	7.2	6.1
Bread	4.5	5.2	5.1	5.4	4.1	4.8	5.4	5.0	5.0	5.2	5.4	4.5	5.5	5.0	5.0	5.6	6.8	6.5	7.7	7.7	7.8	6.9	5.2
Animal refuse	0.9	1.2	2.2	1.9	2.2	2.3	2.7	3.6	2.9	3.7	3.1	3.6	4.7	5.8	4.7	6.7	6.2	6.8	8.3	8.0	6.9	6.0	4.7
Ceramics	3.1	5.9	4.4	3.3	4.6	4.0	3.5	3.6	4.7	3.7	2.8	5.9	3.3	3.6	4.2	4.2	3.8	4.5	4.6	4.3	4.4	4.1	10
Carpets/mats	0.5	0.7	0.7	0.7	0.5	1.0	0.5	0.6	1.8	0.3	0.6	0.8	1.4	1.1	1.4	0.8	2.1	1.8	0.9	2.5	0.9	2.8	1.5
Leather/rubber	1.4	1.2	1.7	1.9	1.0	1.8	1.9	1.7	2.1	0.9	3.1	3.1	1.6	1.7	2.2	2.2	2.1	3.6	1.8	2.2	2.2	2.2	2.7
Wood	1.9	1.7	2.0	0.9	1.4	1.3	1.1	2.2	1.5	1.4	1.1	2.0	1.9	1.4	1.4	2.5	2.4	1.8	1.5	2.5	2.2	3.4	9.1
Special waste/SCW	-	-	-	-	-	0.8	0.8	0.3	0.6	0.6	0.6	1.1	1.6	0.8	1.1	1.4	1.2	1.5	1.2	1.5	1.3	1.3	2.2

Total (kg/household/year)**	237	247	244	235	240	253	268	280	293	288	283	279	274	278	277	281	294	297	307	309	314	313	311
million tonne/year**	3.1	3.3	3.3	3.2	3.3	3.5	3.7	3.9	4.1	4.1	4.0	4.0	3.9	4.0	4.0	4.1	4.3	4.4	4.6	4.6	4.7	4.8	4.8
million habitants (31/12)	13.1	13.2	13.3	13.4	13.5	13.7	13.8	13.8	13.9	14.2	14.2	14.3	14.3	14.5	14.5	14.6	14.7	14.8	14.9	15.0	15.1	15.2	15.4

source:RIVM, Central Statistical Office

*) from 1993, excluding separated collected bio-waste

**) including separated collected bio-waste

ANNEX 7: Selection criteria small chemical waste and special wasteSpecial Waste**(household) cleaning agents:**

Ammonia, bleaching water, lyes to unclog sinks and toilets, soap, detergents, stain removers, carpet cleaner (water based), brass/silver polish.

Cosmetics (exclusive of nail polish and remover):

Deodorants, lip stick, eye shadow, mascara, creams, powders, pastes, soap.

Candles, wax and polishing products:

Floor wax/polish, candles and shoe polish.

Remainder:

Lighters (filled), ink tapes for typewriters/printers, printers, cartridges/toners, fireworks and ammunition, leather roofing, ant killers (box traps).

Small Chemical Waste**Batteries, car batteries****Paint, glue, (stencil) ink and cement/kit**

Paint, varnish and stain/pickle, wood preservatives, (stencil) ink, brush softening/cleaning agents, glues, filler/primer, paint thinner, cement/kit.

Pharmaceuticals:

powders, pills/capsules, creams, mixtures.

Other products:

Energy-saving light bulbs, asbestos products, fire extinguishers.

Pesticides (weeds, mildew, moss, insects, rats, mice, flea collars).

Aggressive chemicals (hydrochloric acid, battery acid, photography chemicals, rust preventing agents).

Solvents (acetone, furniture oil, degreasants, mineral spirits, turpentine spirits, thinner, stain removers (non-water based).

Dry-cleaning naphta, nail polish remover, nail polish, correcting fluid.

Oil products (petrol, lamp oil, oil filters, brake-fluid, lubricating oil, lubricating grease, petroleum).

Mercury and lead.