

3. HAZARDOUS WASTE STATISTICS

3.1 Methodology

Section 26(2)(a) of the Act requires that information be assembled on:

- the type, quantity and origin of hazardous waste arising in the State;
- the movement of hazardous waste within, into or out of the State;
- facilities available for the collection, recovery or disposal of such waste in the State; and
- the likely position with respect to each of these matters for such period after the making of the plan as the Agency thinks appropriate.

A number of methodologies and sources of information were used in collating the statistical data. Some of the sources and methodologies are new while others are based on existing data.

The *National Waste Database (NWD) Report for 1995* provided an up to date picture of hazardous and non-hazardous waste arisings. Previous surveys were carried out by An Foras Forbartha and the Department of the Environment in 1986, 1988 and 1992. These surveys were based on definitions of toxic and dangerous waste which are markedly different to the definition of hazardous waste now in use (see chapter 1.5). The NWD (1995) was the first survey to use the hazardous waste list (HWL) classification in defining hazardous waste. This survey reported arisings of industrial hazardous waste as 167,406 tonnes and projected arisings of industrial hazardous waste of 243,754 tonnes. This projection was based on an extrapolation of reported quantities.

The base year used in compiling hazardous waste statistics for the *Proposed National Hazardous Waste Management Plan* is 1996 and all waste statistics therein are for the 1996 calendar year. The Strategy Study that generated data for the Proposed Plan commenced in 1997 and, in order that the most recent whole year's data would be available at that stage, 1996 was selected as the base year.

The *National Waste Database Report 1998* was published in 2000 and provides the most up to date database of hazardous waste arisings. This data has been incorporated into this chapter and presented alongside the data for 1996.

Two principal waste categories are used in this survey – reported and unreported waste. Reported hazardous waste is that for which there is a verifiable source and is dealt with in section 3.2 below. Unreported waste is that for which there is no defined source of information and estimates were made which are based on import and export data, extrapolations from known quantities and international experience. Unreported hazardous waste is dealt with in section 3.3. An overall analysis which combines data on reported and unreported hazardous waste is included from section 3.4 onwards.

The sources of information used in compiling hazardous waste statistics included returns from IPC and waste licence applications and licensed companies, local authorities, non-IPC licensed companies, the Central Statistics Office, waste contractors and data and experience from other countries.

3.2 Reported hazardous waste

Reported hazardous waste is that for which there is a defined source. Information sources used in compiling the dataset for 1996 include:

- *On-site treatment records.* A number of firms recover or dispose of their own hazardous waste on-site. Typical activities are solvent recovery, incineration and the landfill of solid waste. The majority of these firms are IPC licensed and information was readily available from records held by the Agency. For non-IPC licensed companies, an important source of information was the National Waste Database 1995 dataset.
- *Off-site treatment records.* The records of eight contract hazardous waste recovery and disposal facilities were used to quantify off-site treatment. A detailed review of the activities at six of these facilities was carried out.
- *Landfill of hazardous waste off-site.* The sources used in determining the quantities disposed of to landfill off-site in Ireland were local authorities, IPC licensed companies and the National Waste Database 1995 dataset.
- *Transfrontier shipment records.* All exports of waste are accompanied by TFS documentation,

the records of which are held by local authorities. A complete dataset relating to 1996 was compiled.

Wherever conflicting information was obtained, additional inquiries were made to the companies or to the authorities involved. On the basis of the four sub-sets of data obtained from these sources a hazardous waste database for 1996 was compiled. It contains information about hazardous waste in terms of the generator, the type of industry, whether IPC licensed, the waste type (European Waste Catalogue code and waste description), the quantity, the means of recovery or disposal and the place of treatment (on-site, off-site in Ireland or abroad).

In carrying out the survey for 1998, data on hazardous waste arisings was sought directly from industrial generators of hazardous waste. Data was also provided by hazardous waste brokerage firms and by merchant hazardous waste recovery and disposal facilities (see *National Waste Database Report 1998*).

3.2.1 Quantities of reported hazardous waste

It is estimated that 229,634 tonnes of reported hazardous waste were generated in 1996. By comparison, 296,017 tonnes of reported hazardous waste were generated in 1998, an increase of 29% in two years. Figure 3.1 illustrates the hazardous waste types reported for 1996 and 1998.

It should be noted in Figure 3.1 that the category “pharmaceutical waste” in the 1996 dataset is

virtually eliminated in the 1998 dataset (see Table 3.11 and Table 3.12 for more information). In 1996, the classification was made up of categories of waste “not otherwise specified”¹. In 1998, the category hardly featured and is therefore excluded from Figure 3.1.

In the 1998 dataset, a large proportion of reported hazardous waste arisings was made up of contaminated soil, a material which does not fit neatly within the definition of hazardous waste but which nonetheless presents risks of environmental pollution if managed in an inappropriate manner. Contaminated soil accounts for over two-thirds of the increase in reported quantities between 1996 and 1998.

A detailed breakdown of reported hazardous waste generation in 1996 and 1998 is given in Table 3.11 and Table 3.12 (section 3.5).

The destination of reported hazardous waste is summarised in Table 3.1. The table illustrates that the main changes (relative to the total for that year) relate to hazardous waste treated on-site. The proportion of hazardous waste treated on-site decreased from 61% of the total in 1996 to 44% in 1998. This is balanced somewhat by the increasing proportion of reported hazardous waste that is

¹ In terms of the European Waste Catalogue, these are “99” codes; wastes not otherwise specified. Such codes are generally used where a more accurate or appropriate code cannot be found.

Table 3.1 Destination of reported hazardous waste in 1996 and 1998

Category	1996		1998	
	Quantity (tonnes)	Percentage	Quantity (tonnes)	Percentage
To on-site recovery and disposal facilities	141,156	61.5	131,738	44.5
To off-site recovery and disposal facilities in Ireland	33,470	14.6	39,055	13.2
To landfill off-site in Ireland	2,964	1.3	3,430	1.2
Exported	51,727	22.5	99,598	33.6
To recovery and disposal at an unspecified location	317	0.1	22,196	7.5
Total	229,634	100	296,017	100

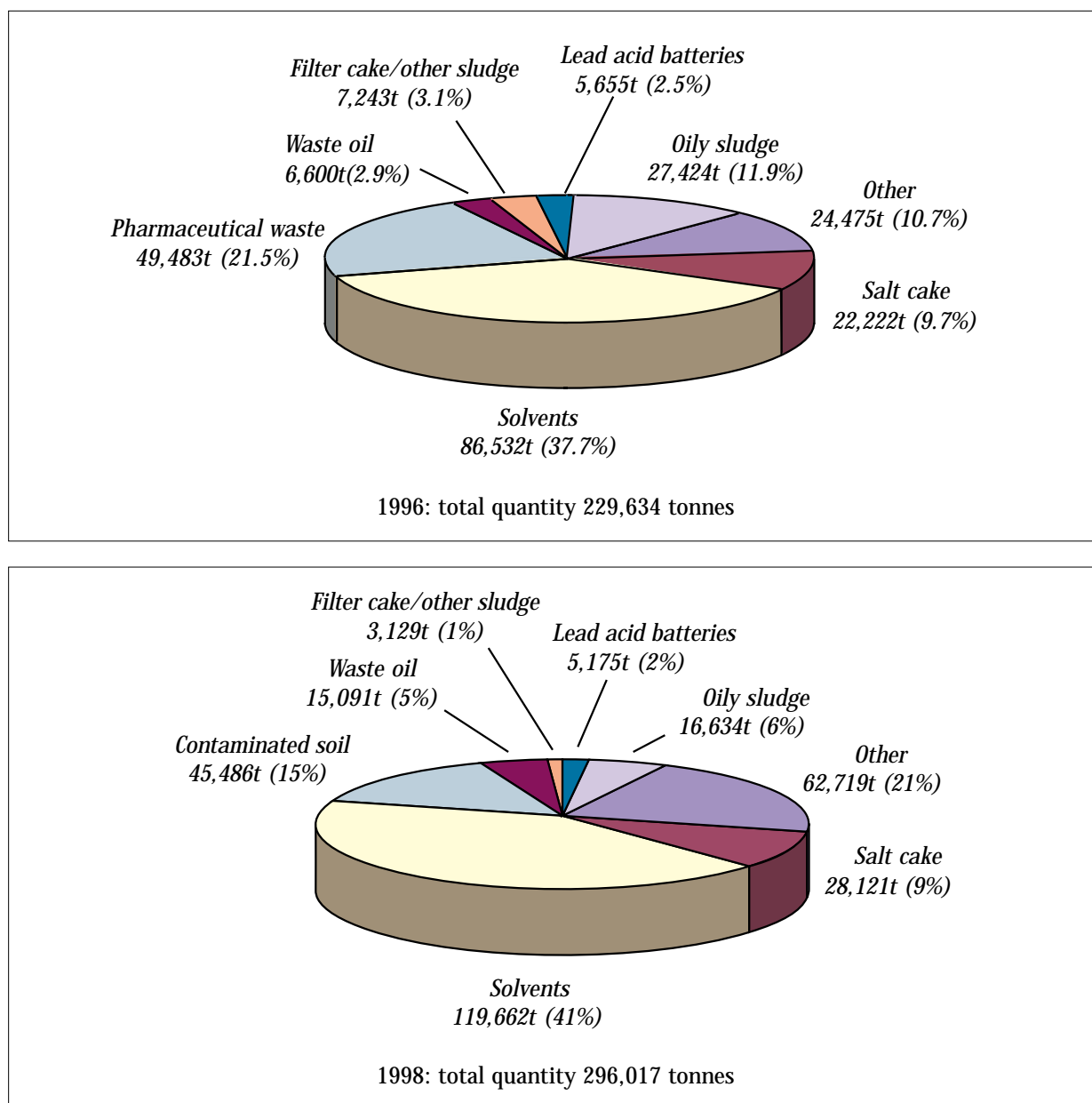


Figure 3.1 Hazardous waste types reported for 1996 and 1998

exported; up from 22% in 1996 to 34% in 1998. The quantity of 22,196 tonnes whose destination was unspecified in 1998 is composed mainly of contaminated soil (see Table 3.12).

Table 3.2 illustrates the geographical breakdown of hazardous waste arisings. This data is useful when making decisions on the location of facilities for the collection, recovery and disposal of waste. Due to its nature, the data as it was reported for 1996 shows a bias towards those local authority areas in which a recovery or disposal facility is located. Data was submitted directly by a number of

recovery and disposal facilities. The geographical origin of the waste was not always clear from the data and therefore the quantities were assigned to the local authority area in which the facility is located. The data for 1998 on the other hand derives more from generators' information and hence is more representative of the actual location of generation. There is no attempt made in the 1998 dataset to assign quantities of hazardous waste where the actual county of origin is unknown. Hence, the two datasets presented in Table 3.2 are not directly comparable.

Table 3.2 Geographical location of reported hazardous waste in 1996 and 1998

1996 – all reported hazardous waste, including industrial

1998 – industrial hazardous waste only; this table does not illustrate those hazardous waste arisings in 1998 for which no county of origin was specified.

<i>County</i>	<i>1996 Quantity (tonnes)</i>	<i>1998 Quantity (tonnes)</i>
Cork	132,084	137,102
Limerick	21,686	28,763
Dublin	–	18,536
Dublin Corporation	18,944	–
Fingal	6,063	–
South Dublin	4,709	–
Dun Laoghaire - Rathdown	24	–
Tipperary (NR and SR)	6,607	6,185
Wicklow	4,291	4,210
Kilkenny	416	4,109
Laois	9,709	3,399
Kildare	1,821	3,386
Clare	10,974	2,497
Kerry	234	2,338
Louth	6,693	1,756
Roscommon	25	1,490
Meath	160	1,412
Waterford	595	1,202
Galway	10	833
Mayo	180	754
Monaghan	18	322
Offaly	–	277
Leitrim	–	250
Cavan	792	221
Sligo	365	211
Westmeath	53	206
Longford	–	173
Wexford	–	159
Donegal	11	148
Carlow	0.18	36
Unknown or unspecified location	3,170	–
Total	229,634	219,974

3.2.2 Export of reported hazardous waste

In 1996, a total of 51,727 tonnes, or 23% of all reported hazardous waste, was exported for recovery or disposal. The largest percentage of hazardous waste exported (18,880 tonnes or 36% in 1996) was incinerated. Of the remainder, 11% was landfilled, 13% was reused as fuel, 19% was solvent sent for recovery and 14% was sent for metal recovery. The remaining 7% were subjected to other recovery and disposal processes. The ratio of recovery to disposal for 1996 is 1:1.14. Table 3.4 illustrates our dependency on recovery and disposal outlets in the UK to which 85% of all Irish hazardous waste exports went in 1996.

In 1998, 99,598 tonnes, or 33%, of all reported hazardous waste was exported for recovery or disposal. Again, thermal treatment was the main

reason for the export. The ratio of recovery to disposal for 1998 is 1:1.04. Contaminated soil accounted for 23,691 tonnes exported for recovery; excluding this quantity from the calculation alters the ratio of recovery to disposal for 1998 to 1:2.

Data for 1999 shows that 144,902 tonnes of waste were exported for recovery and disposal. Of this, 35,171 tonnes of contaminated soil was exported for recovery and 2,155 tonnes for disposal. The ratio of recovery to disposal for 1999 is 1:0.82. Excluding contaminated soil from the calculation alters the ratio of recovery to disposal for 1999 to 1:1.44.

Table 3.3 summarises the exports of waste between 1996 and 1999. Tables 3.4, 3.5 and 3.6 provide further detail on exports of hazardous waste in 1996, 1998 and 1999 respectively.

Table 3.3 Summary of exports of waste, 1996-1999

	Total (tonnes)	Recovery (tonnes)	Disposal (tonnes)	Unspecified (tonnes)
1996	51,727	24,051 ⁽¹⁾	27,369	307
1998	99,598	48,210 ⁽²⁾	50,180	1,208
1999	144,902	79,312 ⁽³⁾	65,590 ⁽⁴⁾	–

(1) including 400 tonnes of contaminated soil

(2) including 23,691 tonnes of contaminated soil

(3) including 35,171 tonnes of contaminated soil

(4) including 2,155 tonnes of contaminated soil

Table 3.4 Destination and fate of hazardous waste exported in 1996 (tonnes)

Country	Total exports	%	DISPOSAL				RECOVERY				
			Thermal treatment	Landfill	Other	Total	Solvent recovery	Metal recovery	Reuse as fuel	Other	Total
UK	43,895	84.9	13,799	5,350	2,480	21,629	9,546	5,680	6,527	473	22,226
Holland	862	1.7	331		350	681		180			180
Germany	387	0.7		280		280		87		20	107
Belgium	1,556	3.0	672		29	701		855			855
Denmark	1,555	3.0	1,270			1,270			285		285
Finland	2,925	5.6	2,808			2,808	117				117
USA	40	0.1						40			40
Norway	241	0.5						241			241
Other	266	0.5									
Totals	51,727	100	18,880	5,630	2,859	27,369	9,663	7,083	6,812	493	24,051

Table 3.5 Destination and fate of hazardous waste exported by brokers in 1998 (tonnes)

<i>Country</i>	<i>Total exports</i>	<i>%</i>	<i>DISPOSAL</i>				<i>RECOVERY</i>				
			<i>Thermal treatment</i>	<i>Landfill</i>	<i>Other</i>	<i>Total</i>	<i>Recovery of inorganic material</i>	<i>Solvent recovery</i>	<i>Metal recovery</i>	<i>Other</i>	<i>Total</i>
UK	34,188	34.3	9,773		392	10,165		15,875	2,404	5,744	24,023
Holland	30,162	30.3	6,367			6,367	23,795				23,795
Germany	13,192	13.2	11,154	2,037		13,192					
Belgium	10,554	10.6	10,381			10,381			72	100	173
Denmark	8,820	8.9	8,714			8,714				106	106
Finland	1,362	1.4	1,362			1,362					
USA	88	0.0								88	88
France	27	0.0								27	27
Other	1,208	1.2									
Totals	99,601	99.9	47,752	2,037	392	50,181	23,795	15,875	2,503	6,038	48,212

Table 3.6 Destination and fate of hazardous waste exported in 1999 (tonnes)

<i>Country</i>	<i>Total exports</i>	<i>%</i>	<i>DISPOSAL</i>				<i>RECOVERY</i>				
			<i>Thermal treatment</i>	<i>Landfill</i>	<i>Other</i>	<i>Total</i>	<i>Recovery of inorganic material</i>	<i>Solvent recovery</i>	<i>Metal recovery</i>	<i>Other</i>	<i>Total</i>
UK	45,945	31.7	11,992	8	646	12,646	64	17,015	9,223	6,997	33,299
Germany	41,051	28.3	36,100	3,405	71	39,576	151	345	240	739	1,475
Holland	35,712	24.6	393			393	35,119	127		73	35,319
Denmark	11,228	7.7	5,607			5,607				5,621	5,621
Belgium	8,578	5.9	5,099	89	61	5,249	44	766	1,978	541	3,329
Finland	2,075	1.4	2,075			2,075					
France	194	0.1			44	44			150		150
USA	119	0.1							119		119
	144,902	99.8	61,266	3,502	822	65,590	35,378	18,253	11,710	13,971	79,312

3.2.3 Recovery and disposal of reported hazardous waste

As described above, hazardous waste generated in Ireland is either recovered or disposed of on-site, off-site within Ireland or is exported. Table 3.7 and Table 3.8 below show the breakdown of reported quantities treated at each of these locations in 1996 and 1998, together with the recovery and disposal methods used.

Table 3.7 Destination, recovery and disposal of reported hazardous waste in 1996

(All numbers are in tonnes)					
<i>D/R Code*</i>	<i>Description</i>	<i>On-site</i>	<i>Off-site</i>	<i>Export</i>	<i>Total</i>
D1	Landfill	20,903	2,964	5,630	29,497
D2	Land treatment	3,670	0	0	3,670
D4	Surface impoundment	60	0	0	60
D5	Engineered landfill	1	0	0	1
D8	Biological pre-treatment	313	23	42	378
D9	Physico-chemical treatment	3,433	934	2,580	6,946
D10	Incineration on land	27,084	0	18,880	45,964
D13	Blending prior to disposal	0	0	227	227
D14	Packaging prior to disposal	0	0	10	10
D15	Storage prior to disposal	0.3	0	0	0.3
	Total for disposal	55,464	3,921	27,369	86,754
R0	Re-use in current form	10,215	0	0	10,215
R1	Re-use as fuel	205	0	6,812	7,017
R2	Solvent recovery	42,902	50	9,663	52,615
R3	Organic substance recovery	30,545	0	12	30,557
R4	Metal recovery	0	1,338	7,083	8,421
R5	Inorganic material recovery	1,300	0	420	1,720
R6	Acid/base regeneration	0	0	40	40
R8	Catalyst recovery	0	0	1	1
R9	Used oil re-refining	523	27,840	0	28,363
R13	Accumulation prior to recovery	0	0	20	20
	Total for recovery	85,690	29,228	24,051	138,969
U	Unspecified	2	3,285	307	3,594
	sub-totals	141,156	36,434	51,727	229,317
			plus unspecified location		317
		Total Reported Quantity			229,634

*Disposal and recovery codes are from Commission Decision 94/774/EC concerning the standard consignment note referred to in Council Regulation (EEC) No 259/93 on the supervision and control of shipments of waste within, into and out of the European Community; i.e. the transfrontier shipment form.

Table 3.8 Summary of disposal and recovery routes and locations for reported hazardous waste in 1998

(All numbers are in tonnes)						
<i>D/R Code *</i>	<i>Description</i>	<i>On-site</i>	<i>Off-site</i>	<i>Export</i>	<i>Unspecified</i>	<i>Total</i>
D1	Landfill	28,499	3,430	2,037	0	33,966
D2	Land treatment	100	7,151	0	0	7,251
D4	Surface impoundment	0	0	0	0	0
D5	Specially engineered landfill	0	0	0	0	0
D6	Biological treatment	8,304	1,141	0	335	9,780
D7	Physico chemical treatment	1,505	1,547	92	0	3,144
D8	Incineration	17,880	0	47,751	0	65,631
D9	Permanent storage	0	4	0	0	4
D10	Release to a water body	0	224	0	0	224
D11	Blending prior to disposal	0	35	0	0	35
D12	Repackaging prior to disposal	0	0	0	0	0
D13	Storage prior to disposal	10	9	0	0	19
DU	Unspecified disposal	0	0	300	0	300
	Total disposal	56,298	13,541	50,180	335	120,354
R0	Direct re-use	6,018	269	0	0	6,287
R1	Solvent recovery	65,988	148	15,875	24	82,035
R2	Recovery of organic substances	14	280	2,584	0	2,878
R3	Metal recovery	1	4,085	2,503	0	6,589
R4	Recovery of inorganic substances	0	0	23,795	0	23,795
R5	Acid and base regeneration	0	175	0	0	175
R6	Recovery of pollution abatement components	0	0	100	0	100
R7	Recovery of components from catalysts	0	0	0	0	0
R8	Oil Recovery	709	23,776	352	41	24,878
R9	Use as a fuel	2,708	127	1,947	0	4,782
R10	Landspreading	0	8	0	0	8
R13	Storage prior to recovery	2	0	84	0	86
RU	Unspecified recovery	0	0	970	0	970
	Total recovery	75,440	28,868	48,210	65	152,583
U	Unspecified	0	76	1,208	21,795	23,079
	TOTAL	131,738	42,485	99,598	22,196	296,017

*Disposal and recovery codes are from the Third and Fourth Schedules to the Waste Management Act, 1996, as amended.

3.3 Unreported hazardous waste

The information on reported hazardous waste relates almost exclusively to industrial waste. However, it cannot be assumed that all industrial hazardous waste transactions have been reported and this is particularly, though not exclusively, true for smaller businesses. In addition, hazardous waste generated by households, commercial activities (such as shops, offices and other services) and farms is not reported by any of the above mechanisms. Therefore, other mechanisms were used to estimate the quantity of hazardous waste that is unreported. These include:

- *Mass flow analysis.* There is a direct relationship between the use of certain products and the amount of hazardous waste that arises as a result of their use. Central Statistics Office data on imports and exports, combined with data on indigenous production, allowed estimates to be made of the sale of certain products and hence the likely waste generation. Examples are batteries and lubrication oil.
- *Extrapolations based on known quantities of hazardous waste and employee numbers* were used to estimate the quantity of industrial hazardous waste arising from non-IPC licensed companies. Known 'reported' quantities of hazardous waste generated by non-IPC licensed companies in a particular sector were used to extrapolate across that sector to estimate its total hazardous waste production.

The extrapolation procedure for non-IPC licensed industry in each sector is based on the following formula:

$$W = [(A / B) * C] - C$$

where: W is the quantity of unreported waste generated in each sector;

A is the total number of employees in that sector;

B is the number of employees in the non-IPC licensed companies of that sector which reported hazardous waste quantities; and

C is the quantity of waste reported by non-IPC licensed companies in that sector.

It has been assumed that all IPC-licensed companies report their hazardous waste generation. They were therefore not included in the extrapolation in order to avoid double counting. The extrapolation was completed for each sector. The sectors are categorised by NACE codes.

The extrapolation for the dataset published in the *National Waste Database Report 1998* is described in that report.

- *Examination of hazardous waste arisings in other countries.* For some sectors, namely the commercial sector and agriculture where no records exist in Ireland, quantities were estimated based on what is known to arise in the Netherlands and Denmark.

Table 3.9 shows the results of the estimation of unreported quantities of hazardous waste, based on the methodology described above.

3.4 Generators and sources of hazardous waste

IPC licensed industry

Approximately 79% of all reported hazardous waste was generated in 1996 at IPC licensed facilities. This portion of hazardous waste is considered to be relatively well managed. A feature of IPC licences is the focus on waste prevention and minimisation. This is achieved through a system of setting targets and objectives which are reviewed every year, thus ensuring that waste prevention is an ongoing process. In 1998, an estimated 85% of all reported hazardous waste was generated at IPC licensed facilities (this calculation excludes 45,486 tonnes of contaminated soil generated in 1998).

It is difficult to interpret current trends in the total quantity of hazardous waste generated at IPC sites due to a number of factors. IPC licensing has resulted in a significant reduction in hazardous waste generation and at several sites hazardous waste has been eliminated due to the use of cleaner technologies. Counter balancing these reductions is the increasing number of sites coming under the IPC system (21 sites were licensed at the end of 1995 while the total had risen to 328 at the end of 1998 and 500 by April 2001). This has resulted in a greater total of hazardous waste being

Table 3.9 Breakdown of unreported hazardous waste in 1996 and 1998

Description	Quantity 1996 (tonnes)	Quantity 1998 (tonnes)
Various product wastes		
Waste oils	17,500	2,255
Fluorescent lamps	399	524
Photochemical waste	642	1,572
Paint and paint packaging waste	6,524	–
Paint and ink packaging	–	7,764
Lead acid batteries	2,573	9,038
Other batteries	2,378	2,914
Waste oil filters	1,027	919
Perchloroethylene, trichloroethylene	119	68
Agricultural waste		
Sheep dip	28,000	19,000
Pesticides (agricultural)	342	340
Medicines (veterinary waste)	500	483
Agricultural oily sludges	2,500	2,429
Other agricultural	800	775
Other wastes		–
Household solvents and glues	1,945	–
Household medicines	1,575	–
Household pesticides	525	–
Other household hazardous waste	2,369	6,831*
Mercury waste from dentists	1	–
General office waste	681	152
Clinical waste	–	330
Extrapolation for non-IPC industry based on employee numbers		
Mining/quarrying	4	–
Food/beverage	479	–
Chemical/pharmaceutical	3,434	–
Rubber/plastics	201	–
Non-metals	6,516	–
Metals/metal products	15,408	–
Electrical/optical	1,718	–
Transport equipment	68	–
Extrapolation for industry based on employee numbers		
All sectors	–	18,918**
Total	98,228	74,311

* Figure for 1998 calculated from CSO population census data for 1996 by an estimated hazardous waste generation of 2.5kg per person per annum less household hazardous waste streams accounted for elsewhere (e.g. pesticides and fluorescent lamps).

** The data for 1998 was extrapolated for all industry (including IPC and non-IPC licensed industry) but was not broken down on a sectoral basis. This figure is not directly comparable with the extrapolation for non-IPC industry illustrated in the table for 1996.



Photo 2 Batteries collected from small scale generators.

reported. In addition, some industries have been rapidly expanding. In particular, the pharmaceutical and chemical sector has doubled production in the last five years and plans to double again in the next five years. This sector produces a significant proportion of the total hazardous waste arisings and even with the introduction of cleaner technologies and increased solvent recovery and reuse, the generation of hazardous waste in this sector is likely to increase. Given the overall quantity of hazardous waste generated by this sector, the use of cleaner technology must continue to be explored.

The data on IPC licensed industry includes on-site recovery and disposal of hazardous waste. In 1996, a relatively small number of companies (98% of whom were IPC licensed) recovered and disposed of their hazardous waste on site. The total quantity of hazardous waste recovered or disposed of on-site by

IPC licensed companies accounted for 60% of *all* reported hazardous waste in 1996 (138,847 tonnes). Of this quantity, 60% (83,405 tonnes) was recovered while 20% (27,084 tonnes) was disposed of by incineration and 15% (20,902 tonnes) was landfilled. The remainder was disposed of by land treatment, physico-chemical treatment or other means. See Table 3.7 and Table 3.8 for more information.

In 1996, of the 88,161 tonnes of hazardous waste reported as recovered or disposed of off-site in Ireland or abroad, 49% was generated by IPC licensed companies.

Non-IPC licensed industry

In 1996, a total of 48,473 tonnes of hazardous waste were estimated to have been generated at non-IPC licensed industry. Of this 16,255 tonnes were reported.

Commercial activities

The commercial sector produced an estimated 33,961 tonnes of hazardous waste in 1996 of which 28,273 tonnes were reported. The reported figure is largely made up of oil wastes arising in garages and shipping waste. Otherwise, the sector is characterised by individual generators of relatively small quantities of hazardous waste and the wastes arising are extremely varied and require very specific management solutions. This sector includes retail, service and commercial outlets and the type of hazardous waste generated includes waste oils, fluorescent lamps, dry-cleaning solvents, waste photochemicals and batteries. Commercial collection of these wastes depends on their being segregated at source.

Agriculture

In 1996, an estimated 34,742 tonnes of hazardous waste were generated by the agricultural sector. Hazardous waste arisings from this sector include waste oils (2,600 tonnes), pesticides (plus packaging, 342 tonnes), sheep dip (28,000 tonnes, mostly aqueous) oily sludges (2,500 tonnes), waste veterinary products (500 tonnes) and various other hazardous wastes (800 tonnes).

Waste sheep dip is the largest component and is generally land-spread. According to the Animal and Plant Health Association, an application rate of no more than 5,000 litres per hectare is specified and due care must be given to the prevention of pollution of ground and surface water. The use of a hazardous waste broker is recommended should no suitable land be available. Sheep dip residue is a waste for which there may be significant scope for improved management and control. Significantly, the *National Waste Database Report 1998* reports a decrease in the quantity of spent sheep dip being generated from 28,000 tonnes in 1996 to 19,000 tonnes in 1998. The decrease is largely attributed to the increased use of pour-on products which do not give rise to spent sheep dip. Any proposals for improved management of waste sheep dip should be based on a review of current management practices and the potential for waste sheep dip to impact detrimentally on water and soil quality.

Households

Quantities of household hazardous waste arising from individual households are generally small and

have generally been mixed in with other household waste. Some local authorities do provide periodic household hazardous waste drop off services in addition to, for example, waste oils and batteries receptacles at civic amenity sites. The segregation at source and separate collection of household hazardous waste is carried out in some countries and the proposed amendment to the hazardous waste directive (see chapter 2) is likely to require separate collection and treatment in Member States. The proper management of household hazardous waste is viewed as an important aspect of environmental protection in other European countries as it supports awareness of the environment amongst citizens generally and promotes a responsible attitude to waste management.

It is estimated that 8,750 tonnes of household hazardous waste were produced in Ireland in 1996. A report entitled *Household Hazardous Waste* (EPA, 1998) provides a breakdown of the waste stream and options for its management. The types of waste arising in this sector include fluorescent tubes, solvents, waste oils, pesticides, paint packaging waste and batteries. An estimate for 1998 indicates that 6,831 tonnes of household hazardous waste were generated. The apparent reduction may reflect increasing awareness of household hazardous waste or indicate the difficulty in obtaining accurate estimates for this waste stream.

Overview of the sources of hazardous waste

Figure 3.2 illustrates the relative proportions of reported and unreported hazardous waste in 1996 from the five principal sources. It is assumed that IPC licensed companies report all of their hazardous waste arisings.

Although IPC licensed industry is by far the largest producer of hazardous waste, this waste is reported and is generally well managed. For each of the remaining sources there is a significant lack of hazardous waste reporting. In Table 3.10, reported and unreported hazardous waste quantities for 1996 are presented based on the sector of origin. Codes used are based on the NACE classification of activities. There is no similar breakdown available for the 1998 dataset.

A further detailed breakdown of both reported and unreported hazardous waste is given in Table 3.11 and Table 3.12.

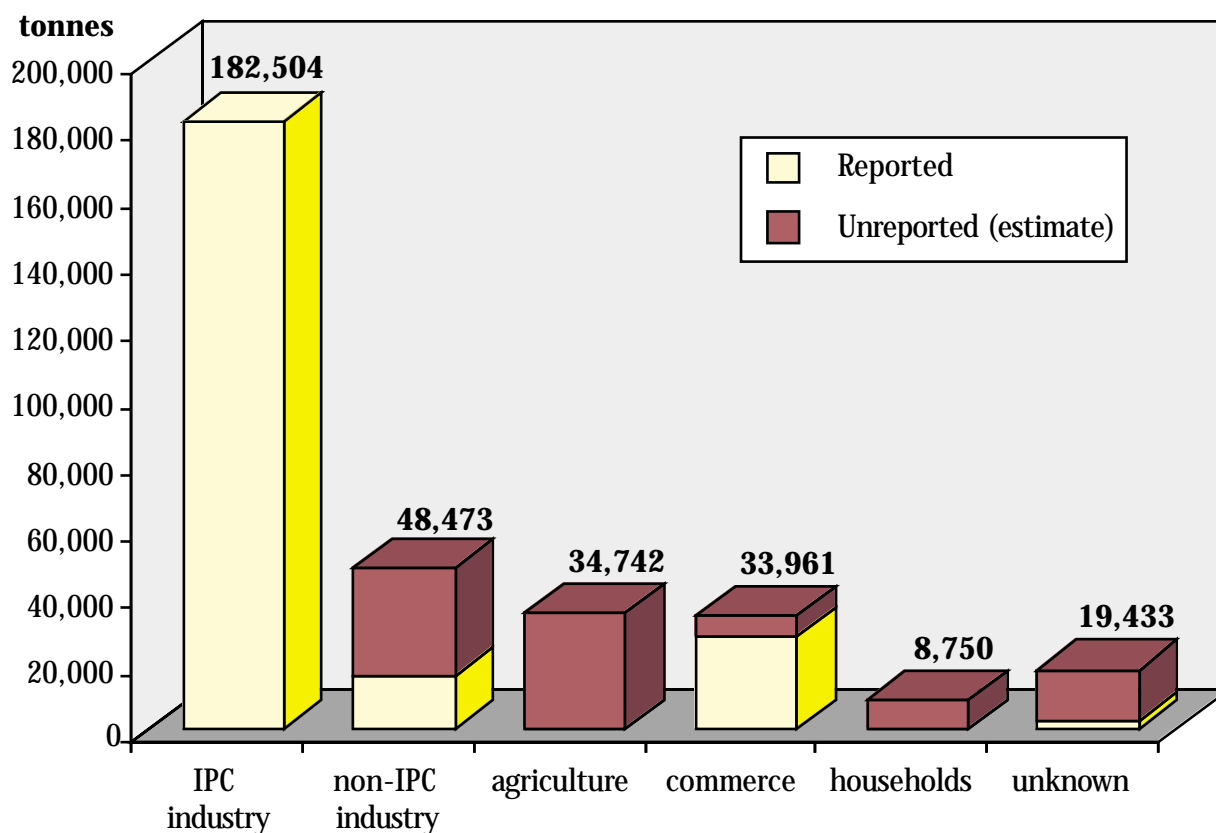


Figure 3.2 Breakdown of reported and unreported hazardous waste in 1996

3.5 Summary of hazardous waste generation

Figure 3.3 and Figure 3.4 summarise hazardous waste generation, recovery and disposal in 1996 and 1998 respectively. Although the proportion of hazardous waste recovered is high, significant quantities of hazardous waste are sent for disposal.

The unspecified quantities demonstrate incomplete reporting by waste generators and/or waste contractors. Figure 3.5 and Figure 3.6 are graphical illustrations of the destination of hazardous waste in 1996 and 1998 respectively.

Table 3.11 and Table 3.12 list, in order of magnitude, hazardous waste categorised by waste type, quantities and destination for 1996 and 1998 respectively. In generating the tables, a correlation was drawn between certain European Waste Catalogue (EWC) codes and certain general waste types. There are distinct advantages in using a

source or process based classification such as the European Waste Catalogue. There are also advantages from using a material based list such as that in the tables. Each method of classifying waste gives valuable information on the waste generated and it is considered that a combination of both source based and material based classifications as used in Table 3.11 and Table 3.12 provides most information.

Some amendments of the waste descriptions used in Table 3.11 were made in publishing the *National Waste Database Report 1998* (which is the source of Table 3.12). The category 'washing liquids' was amended to 'washing liquids and mother liquors' and a new category 'hazardous thermal treatment residues' was added. This waste stream gave rise to 828 tonnes in 1998. Other amendments include the amalgamation of 'lead bearing tin ashes' and 'lead dross' together with some other metallurgical wastes in the category 'dross from metallurgy'.

Table 3.10 Hazardous waste generation in 1996 by NACE sector

NACE Sector		Total generated (tonnes)	Reported (tonnes)	Unreported (tonnes)
A	Agriculture	34,742	0	34,742
	sub total	34,742	0	34,742
C	Mining and quarrying	13	8	4
DA	Food and beverages	643	164	479
DB	Textiles	338	6	332
DC	Leather	22	22	0
DD	Wood	34	34	0
DE	Paper, publishing & printing	2,955	2,250	705
DF	Coke, refined petroleum	6,642	6,642	0
DG	Chemical, pharmaceutical	177,473	174,039	3,434
DH	Rubber, plastics	1,769	1,568	201
DI	Non-metals	6,882	367	6,515
DJ	Metals, metal products	19,416	3,555	15,861
DL	Electrical, optical	3,695	1,977	1,718
DM	Transport equipment	1,082	1,014	68
DN	Manufacturing	482	482	0
E	Electricity, gas supply	661	661	0
F	Construction	3,089	159	2,930
I	Transport, communications	5,781	5,781	0
	sub total	230,977	198,729	32,248
G	Garages	22,745	18,180	4,565
I(61)	Shipping	6,906	6,906	0
N	Health	3,193	3,017	176
K	General commercial	792	110	682
L	Public administration	146	0	146
0(93.01)	Dry cleaners	179	60	119
	sub total	33,961	28,273	5,688
P	Households	8,750	0	8,750
U	Other	19,433	2,631	16,802
	Total	327,863	229,633	98,228

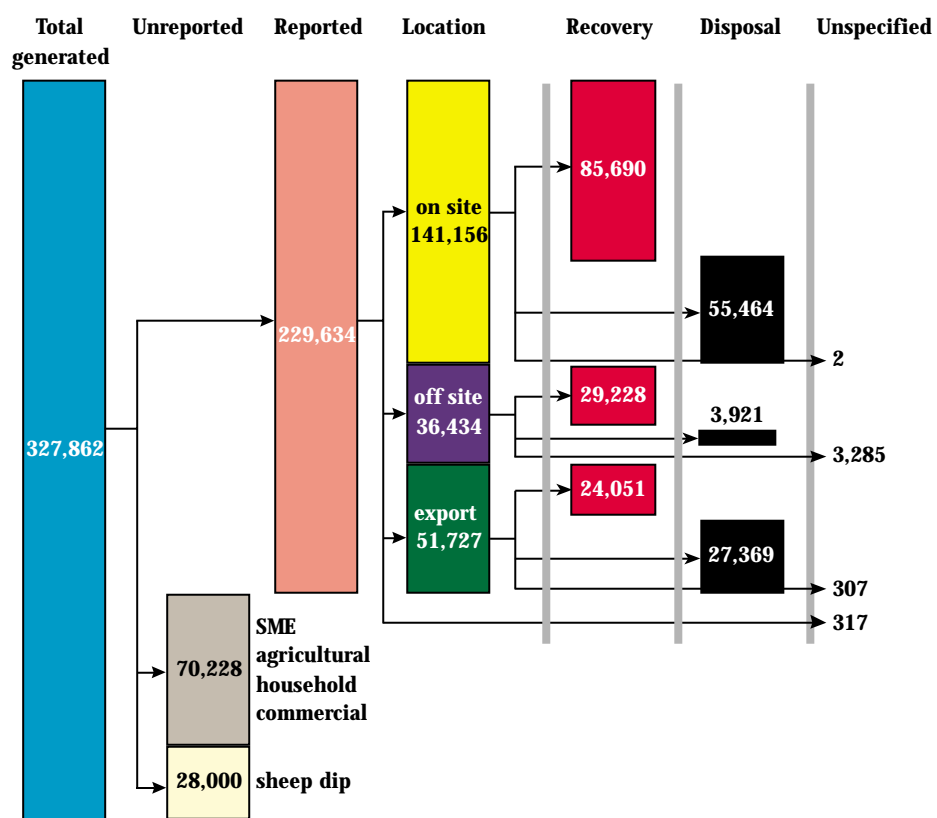


Figure 3.3 Hazardous waste generation, recovery and disposal in 1996

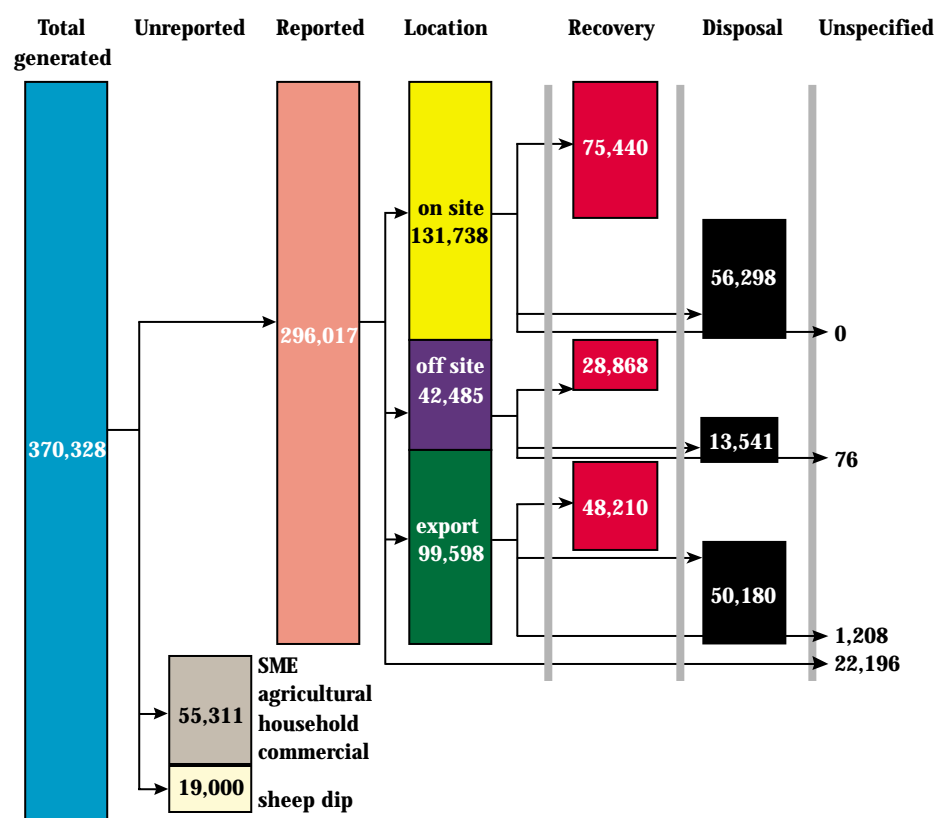


Figure 3.4 Hazardous waste generation, recovery and disposal in 1998

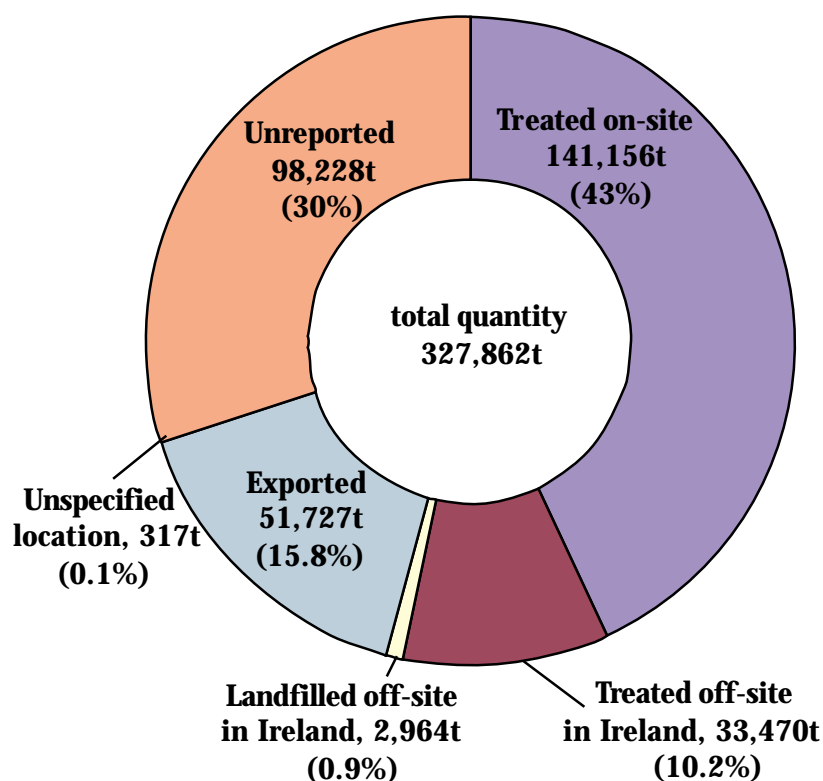


Figure 3.5 Destination of hazardous waste in 1996

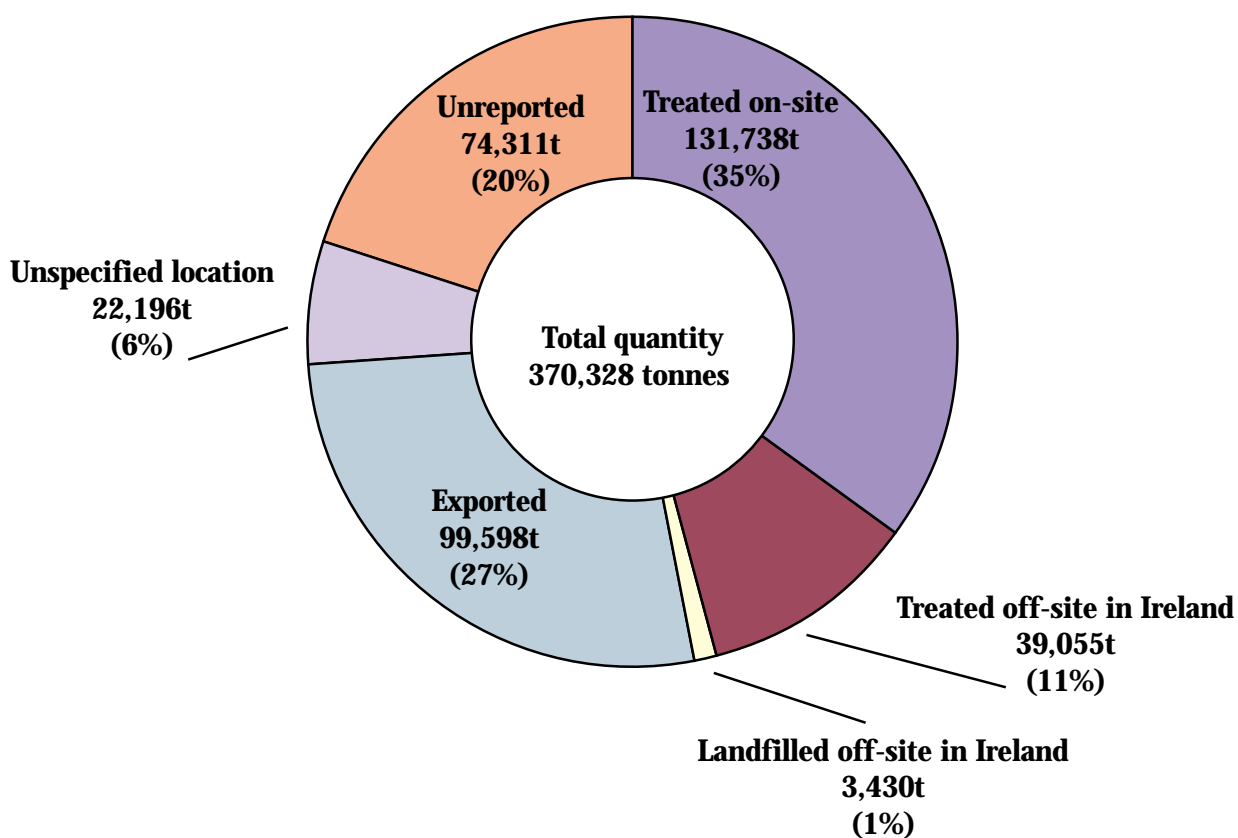


Figure 3.6 Destination of hazardous waste in 1998

Table 3.11 Hazardous wastes and destinations in 1996 categorised by waste type

Waste type	Total reported quantity - location of recovery or disposal (tonnes)					Total un-reported	Total quantity generated
	On-site	Off-site (Ireland)	Exported	Unspec-ified	Sub-total		
solvents:							
organic halogenated solvents	807.8	0	13,883.0	0	14,690.8	0	14,690.8
other organic solvents	60,242.4	9.2	10,948.0	0	71,199.6	0	71,199.6
unclassified organic solvents	0	53.4	588	0	641.4	119.0	760.4
other pharmaceutical waste (mixed)	44,783.0	0	4,700.0	0	49,483.0	0	49,483.0
oily sludges	6,145.3	21,241.1	38.0	0	27,424.4	2,500.0	29,924.4
sheep dip	0	0	0	0	0	28,000.0	28,000.0
waste oils	0	6,600.0	0	0	6,600.0	17,500.0	24,100.0
saltcake/metallic salts	22,200.0	0	22.0	0	22,222.0	0	22,222.0
lead acid batteries	0	1,020.0	4,635.0	0	5,655.0	2,573.0	8,228.0
filter cakes and metal bearing sludges	502.0	722.1	5,785.0	233.5	7,242.6	0	7,242.6
washing liquids	3,903.6	9.2	750.0	0	4,662.8	0	4,662.8
household medicine, pesticide and other waste	0	0	0	0	0	4,469.0	4,469.0
still bottoms and reaction residues	2,538.0	473.0	590.0	0	3,601.0	0	3,601.0
clinical waste	0	900.0	2,123.0	0	3,023.0	0	3,023.0
metal hydroxide sludges and ion exchange resins	22.0	296.2	2,324.0	0	2,642.2	0	2,642.2
small batteries	0	0	20.0	0	20.0	2,378.0	2,398.0
oil filters	0	300.0	0	0	300.0	1,027.0	1,327.0
paint, ink and varnish sludges	0	809.2	386.0	10.0	1205.2	0	1,205.2
household solvents	0	0	0	0	0	1,945.0	1,945.0
acid and alkali waste	7.7	332.2	618.0	0	957.9	0	957.9
paint, ink and varnish liquid waste	0	26.3	797.0	0	823.3	0	823.3
photographic waste	0	0	97.0	0	97.0	642.0	739.0
general office waste	0	0	0	0	0	681.0	681.0
lead dross	0	0	622.0	0	622.0	0	622.0
veterinary medicines	0	0	0	0	0	500.0	500.0
fluorescent lamps	3.0	23.2	0	0.02	26.2	399.0	425.2
contaminated soil	0	0	400.0	0	400.0	0	400.0
pesticide waste (agricultural)	0	0	0	0	0	342.0	342.0
asbestos waste	1.0	0	329.0	0	330.0	0	330.0
adhesive waste	0	0	205.0	0	205.0	0	205.0
mercury bearing wastes	0	0	180.0	0	180.0	1	181.0
lead bearing tin ashes	0	0	141.0	0	141.0	0	141.0
spent filters	0	0	97.0	0.1	97.1	0	97.1
zinc oxide	0	0	87.0	0	87.0	0	87.0
PCB waste	0.1	0	71.0	0	71.1	0	71.1
waxes and fats	0	19.0	0	0	19.0	0	19.0
gold solutions	0	0	9.0	0	9.0	0	9.0
waste catalysts	0	0	8.0	0	8.0	0	8.0
waste explosives	0	2.2	0	0	2.2	0	2.2
boiler dust	0	0.1	0	0	0.1	0	0.1
other (various)	0.1	3,597.5	1,274.0	73.3	4,944.9	7,324.0	12,268.9
extrapolated for non-IPC (unknown type)	0	0	0	0	0	27,828.0	27,828.0
TOTALS	141,156	36,434	51,727	317	229,634	98,228	327,862

Table 3.12 Hazardous wastes and destinations in 1998 categorised by waste type

<i>Hazardous waste type</i>	<i>Total reported quantity - location of recovery or disposal (tonnes)</i>					<i>Total un-reported</i>	<i>Total quantity generated</i>
	<i>On-site</i>	<i>Off-site</i>	<i>Exported</i>	<i>Unspec-ified</i>	<i>Sub-total</i>		
Organic halogenated solvents	3,669	12	3,248	0	6,929	68	6,997
Non halogenated organic solvents	67,060	27	44,434	0	111,520	0	111,520
Other organic solvents	576	65	571	0	1,213	0	1,213
Other pharmaceutical waste (mixed)	103	14	1,557	0	1,675	0	1,675
Oily sludges	6,444	9,960	230	0	16,634	2,429	19,063
Spent sheep dip	0	0	0	0	0	19,000	19,000
Waste oils	747	14,187	131	26	15,091	2,255	17,346
Saltcake/salts	28,111	0	10	0	28,121	0	28,121
Lead acid batteries	7	3,350	1,818	0	5,175	9,038	14,213
Filter cakes and metal containing sludges	42	542	2,545	0	3,129	0	3,129
Washing liquids and mother liquors	19,044	3,860	10,391	335	33,630	0	33,630
Household hazardous waste	0	0	0	0	0	6,831	6,831
Still bottoms and reaction residues	4,126	346	324	0	4,795	0	4,795
Clinical waste	0	3	3,326	0	3,329	330	3,659
Metal hydroxide sludges/ion exchange resins	46	1,755	86	0	1,887	0	1,887
Small batteries	0	18	0	0	18	2,914	2,932
Oil filters	6	349	13	40	408	919	1,327
Paint/ink/varnish sludges	12	246	271	0	529	0	529
Acid/alkali waste	6	5,282	623	0	5,911	0	5,911
Paint/ink/varnish liquid waste	1,657	167	570	0	2,393	0	2,393
Photographic waste	0	3	34	0	37	1,572	1,609
General office waste	0	0	0	0	0	152	152
Dross from lead metallurgy	0	48	1,304	0	1,352	0	1,352
Veterinary medicine	0	0	0	0	0	483	483
Fluorescent tubes	0	27	3	0	30	524	554
Contaminated soil	0	0	23,691	21,795	45,486	0	45,486
Pesticides (agricultural)	0	0	0	0	0	340	340
Asbestos waste	1	0	1,334	0	1,335	0	1,335
Spent filters	0	0	56	0	56	0	56
Adhesive waste	29	127	162	0	318	0	318
Zinc oxide	0	20	225	0	245	0	245
Mercury containing wastes	0	0	535	0	536	0	536
PCB waste	0	0	190	0	190	0	190
Waxes/fats	0	114	141	0	255	0	255
Gold solutions	0	0	4	0	4	0	4
Waste catalysts	0	0	245	0	245	0	245
Paint and ink packaging	0	0	0	0	0	7,764	7,764
Hazardous thermal treatment residues	11	496	320	0	828	0	828
Other hazardous wastes	43	1,465	1,205	0	2,713	19,693	22,406
TOTALS	131,738	42,485	99,598	22,196	296,017	74,311	370,328

3.6 Projection of hazardous waste to 2006

The National Hazardous Waste Management Plan must take into account anticipated future developments with regard to hazardous waste generation in Ireland. International experience has shown that projections have a significant margin of error but nevertheless projections provide an indication of the future challenge to those involved in hazardous waste management in Ireland. The following projection of waste quantities to 2006 is based solely on the 1996 dataset for hazardous waste. A simple projection of hazardous waste disposal quantities to 2008, based on the 1998 dataset, is illustrated on page 44.

The following methodology is based on one used in the Nordrhein-Westfalen region of Germany and in the Netherlands. It has also been used in the preparation of the Municipal Solid Waste Strategy Study for the Cork region.

In making projections, the following factors were taken into account:

- the growth in hazardous waste quantities due to the provision of additional outlets and improved collection rates (all unreported hazardous waste), [I];
- the growth in hazardous waste quantities based on the economic growth index, [A];
- the impact of emission reduction measures or other structural changes to, for example, industry or the Irish economy, quantified by the index [S]; and
- targets and expectations for waste prevention, [P].

With these elements, a future waste arising (F) can be calculated on the basis of the waste arising in the base year (B) according to the formulae given below. First, the potential *total* waste arising in the base year 1996 is calculated (F_{1996}). This quantity is made up of reported and unreported hazardous waste. Thus,

$$F_{1996} = B_{1996} + I$$

The increased arisings over 10 years, as a result of autonomous economic growth only, can be estimated by multiplying the index for economic growth (ieg) for 2006 (1996 = 100%) with the potential waste arisings in 1996. A complication is

that a certain level of economic growth does not necessarily lead to an identical growth in waste production (even ignoring all other factors). This phenomenon is known as dematerialisation. The ESRI indicated in the Medium Term Review that an average economic growth rate of 5.5% corresponds to a growth in energy use of about 4%. It has been assumed that the growth in material use mirrors this growth and thus a modification factor (mf) of 0.72 (4/5.5) has been applied to industrial sectors, giving a modified index for economic growth. This modification factor seems realistic as similar dematerialisation has been experienced in the Netherlands (RIVM, 1997). Ten year growth is therefore equal to $[1 + (ieg)(mf)]^{10}$.

Taking hazardous waste prevention (P) into account, a standstill scenario was calculated as illustrated below.

Structural changes (S) can occur as a result of changes in economic and industrial structures. Such changes may be brought about by new practices such as the implementation of new emission reduction technologies or emission limit values. This factor may be influenced by the adoption of new waste management technologies, for example as a result of waste prevention initiatives or the construction of municipal thermal treatment plants which would generate large amounts of fly ash and flue gas cleaning residues. Changes in practice are difficult to predict and the factor S is taken to be equal to zero in the absence of reliable information on its influences and effects.

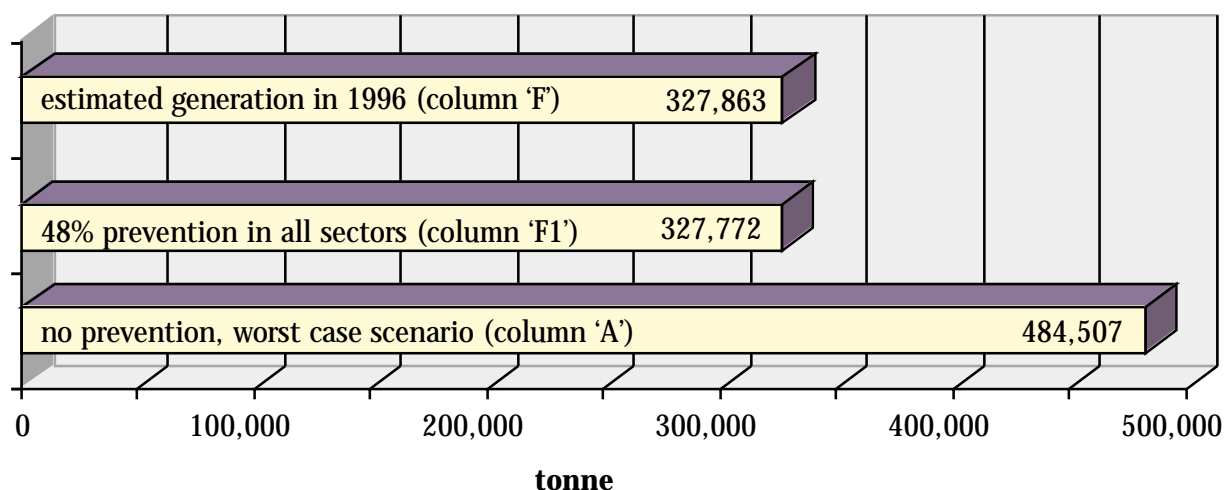
In summary, therefore, future waste arisings can be estimated by the following formula:

$$F_{2006} = (F_{1996} \cdot [1 + (ieg)(mf)]^{10} \cdot [1 - P]) + S$$

The calculations making up the projections are shown in Table 3.13. Key projections are shown in Figure 3.7 and are listed below:

- a 48% prevention target (column 'F1') across all sectors by 2006; and
- no hazardous waste prevention (column 'A') – i.e. the projected total quantity of hazardous waste in 2006.

The worst case scenario depicted in the figure of 484,507 tonnes represents a 48% increase in hazardous waste quantities over 1996. Figure 3.7 shows that to stabilise hazardous waste quantities



References in the figure are to Table 3.13.

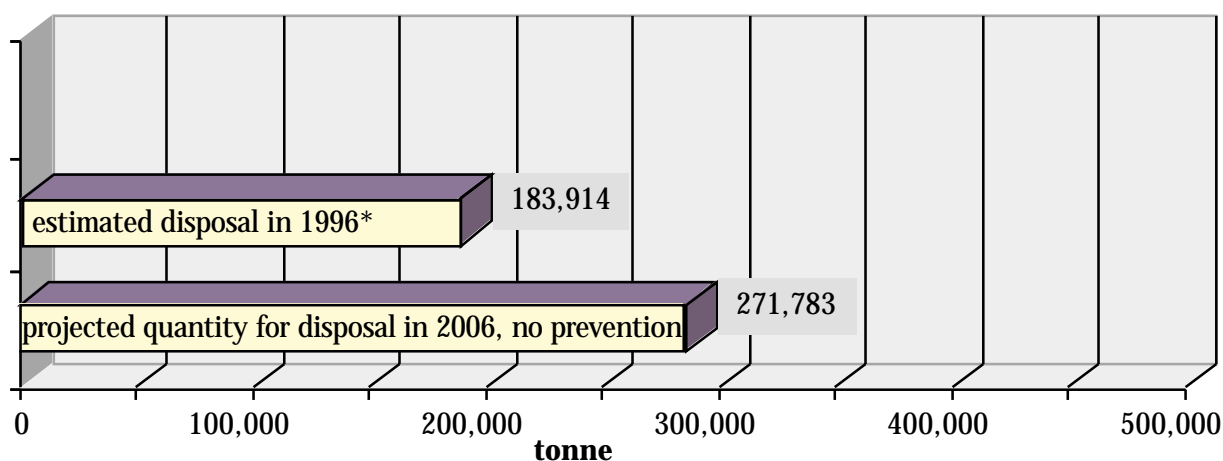
Figure 3.7 Projections of hazardous waste quantities to 2006

at 1996 levels, an average of 48% prevention across all sectors would have to be achieved by 2006. To achieve any reduction on 1996 levels, more than 48% hazardous waste prevention, based on 1996 quantities, is required.

The Plan (section 4.4) recommends setting prevention targets which are based on the quantity

of hazardous waste disposed of in 1996.

The recommendation, detailed in chapter 4, is for a “standstill scenario” whereby the quantity of hazardous waste disposed of does not exceed the quantity disposed of in 1996 (see Figure 3.8).



*includes reported and unreported hazardous waste

Figure 3.8 Projections for hazardous waste disposal to 2006

Table 3.13 Projection of hazardous waste quantities to 2006

The percentage prevention target (P1) is expressed on the basis of the projections to 2006.													
NACE	Description	B (1996)	I	F (1996)	ieg	basis	mf	material growth	10 year growth	A: 10 year growth x F (1996)	S	P1	F1 (2006)
C	Mining/quarrying	8	5	13	0.06	general industry	0.72	0.0432	1.5264	20	0.0	0.3235	14
DA	Food + beverages	164	480	643	0.06	general industry	0.72	0.0432	1.5264	982	0.0	0.3235	664
DB	Textiles	7	332	339	0.06	general industry	0.72	0.0432	1.5264	517	0.0	0.3235	350
DC	Leather	22	0	22	0.06	general industry	0.72	0.0432	1.5264	34	0.0	0.3235	23
DD	Wood	34	0	34	0.06	general industry	0.72	0.0432	1.5264	52	0.0	0.3235	35
DE	Paper, publishing/printing	2250	705	2955	0.06	general industry	0.72	0.0432	1.5264	4511	0.0	0.3235	3052
DF	Coke, refined petroleum	6642	0	6642	0.049	growth in oil use	1	0.0490	1.6134	10717	0.0	0.3235	7250
DG	Chemical/pharma1	174039	3434	177473	0.06	general industry	0.72	0.0432	1.5264	270900	0.0	0.3235	183264
DH	Rubber, plastics	1568	201	1769	0.06	general industry	0.72	0.0432	1.5264	2701	0.0	0.3235	1827
DI	Non-metals	367	6516	6882	0.06	general industry	0.72	0.0432	1.5264	10505	0.0	0.3235	7107
DJ	Metals, Metal products	3555	15861	19416	0.06	general industry	0.72	0.0432	1.5264	29637	0.0	0.3235	20049
DL	Electrical, optical	1977	1718	3695	0.063	manufacturing	0.72	0.0454	1.5583	5757	0.0	0.3235	3895
DM	Transport equipment	1014	68	1081	0.063	manufacturing	0.72	0.0454	1.5583	1685	0.0	0.3235	1140
DN	Manufacturing nec.	482	0	482	0.063	manufacturing	0.72	0.0454	1.5583	751	0.0	0.3235	508
E	Electricity, gas supply	661	0	661	0.0575	growth in electricity use	1	0.0575	1.7491	1155	0.0	0.3235	781
F	Construction	159	2930	3089	0.035	construction growth	0.72	0.0252	1.2826	3962	0.0	0.3235	2680
G	Garages	18180	4565	22745	0.064	transport growth	0.72	0.0461	1.5691	35689	0.0	0.3235	24144
I	Transport, communications	5781	0	5781	0.064	transport growth	0.72	0.0461	1.5691	9071	0.0	0.3235	6137
I(61)	Shipping	6906	0	6906	0.064	transport growth	0.72	0.0461	1.5691	10836	0.0	0.3235	7331
N	Health	3017	176	3193	0.0044	population	1	0.0044	1.0449	3336	0.0	0.3235	2257
K	Business	110	682	793	0.059	services growth	0.72	0.0425	1.5159	1202	0.0	0.3235	813
A	Agriculture	0	6742	6742	0.024	agri growth	0.72	0.0173	1.1869	8002	0.0	0.3235	5413
A	Sheep dip	0	28000	28000	0.024	agri growth	0.72	0.0173	1.1869	33233	0.0	0.3235	22482
L	Public administration	0	146	146	0.027	public admin growth	0.72	0.0194	1.2123	177	0.0	0.3235	120
M	Education	5	0	5	0.025	education growth	0.72	0.0180	1.1953	6	0.0	0.3235	4
P	Households	0	8747	8747	0.0044	population	1	0.0044	1.0449	9140	0.0	0.3235	6183
U	Other	2687	16922	19609	0.06	general industry	0.72	0.0432	1.5264	29932	0.0	0.3235	20249
		229634	98228	327863						484,507			327,772

3.7 Future sources of data

In future, the following sources of information will be available as a result of waste management regulations having been made under the Waste Management Act 1996 (see Box 2.2):

- *Waste generators records.* Section 18 of the Act empowers the Minister, the Agency and local authorities to obtain waste related information from waste holders, contractors, brokers and facility operators. Sub-section 3 empowers the Minister to make regulations in relation to the recording and reporting of specific waste types and waste related activities. Provision has been made in the Waste Management (Hazardous Waste) Regulations, 1998, S.I. No. 163 of 1998, in relation to waste holders as follows:
 - article 21 of the Regulations requires hazardous waste generators to maintain records of the generation of hazardous waste which are to be submitted, upon service of a notice, to the Agency or a local authority;
 - article 20 sets additional requirements for generators of waste oils;
 - article 15 requires holders of polychlorinated biphenyls to give notice to the Agency of quantities held and decontamination schedules.

Data on waste generators will be available from IPC records and Annual Environmental Reports in particular. In relation to article 15, two organisations have to date notified the Agency of quantities of PCB contaminated equipment held at facilities under their control.

- *Local authority hazardous waste consignment notes.* The Waste Management (Movement of Hazardous Waste) Regulations, S.I. No. 147 of 1998 require all movements of hazardous waste within Ireland to be accompanied by a consignment note issued by the local authority of origin of the waste. Article 12 of the regulations provides for the submission of consignment note records by local authorities to the Agency.
- *Local authority transfrontier shipment consignment notes.* Local authorities are the competent authorities of dispatch in respect of the export of waste from Ireland. Article 11 of

the Waste Management (Transfrontier Shipment of Waste) Regulations, S.I. No. 149 of 1998, requires that local authorities furnish information relating to all shipments for which they were the competent authorities of dispatch in the preceding calendar year to the Agency not later than 28 February each year. Not all local authorities responded to a questionnaire issued by the EPA in respect of data for 1998. The majority of data returned was of poor quality. It was clear that for the most part the data was not being compiled by local authorities on an ongoing basis throughout the year. A spreadsheet was issued to local authorities in 2000 to facilitate the recording of information required by the Agency.

- *EPA transfrontier shipment consignment notes.* The EPA is the competent authority of destination and the competent authority of transit in respect of the import of waste into, or the passage of waste in transit through Ireland. No notifications were received in the period 1996 to 1999. Three notifications for the import of waste railway sleepers were received in 2000. To date in 2001, two notifications for the transit of waste through Ireland have been received.
- *Waste licensing and permitting records.* Waste licensing by the Agency, waste permitting by local authorities and the issue of certificates of registration by both authorities will place recording and reporting obligations on licence and permit holders. All waste facilities will be covered by the licensing, permitting and registration systems and detailed information will be available. This will close the circle between generation, transport and recovery and disposal.

In summary, all generators are required to record details of the hazardous waste they generate; all movements within, into and from Ireland will be recorded; and all licensed or permitted facilities' records will be readily accessible.

3.8 Trends – 1996 to 1998

3.8.1 Reported hazardous waste arisings

Overall, hazardous waste arisings are estimated to have increased from 327,862 tonnes in 1996 to

370,328 tonnes in 1998, an increase of 12.9% or about 6.4% per annum. Of perhaps greater significance is the increase in reported hazardous waste arisings from 229,634 tonnes in 1996 to 296,017 tonnes (including 45,486 tonnes of contaminated soil) in 1998, and the corresponding decrease in 'unreported' hazardous waste from 98,228 tonnes in 1996 to 74,311 tonnes in 1998. Figure 3.9 illustrates the trends in hazardous waste generation and disposal between 1996 and 1998 and in hazardous waste exports between 1996 and 1999.

3.8.2 Disposal and recovery routes for reported hazardous waste

There have been some significant changes in the management of hazardous wastes between 1996 and 1998, with some key trends illustrated in Figure 3.10. The most notable changes are the increase in export of hazardous waste from 51,727 tonnes in 1996 to 99,598 tonnes in 1998, and shifts in the final destination of these wastes. In 1996, 84.9% of Ireland's exported hazardous waste was exported to the United Kingdom compared with 34.3% in 1998. This is mirrored by an increase in export to mainland Europe with Holland, Germany and Belgium, collectively, receiving 54.1% of Ireland's exported hazardous waste in 1998, compared with 5.4% in 1996. This increase in export means that the domestic treatment rate,

being the percentage of total reported arisings managed in Ireland, has fallen from 77% in 1996 to 59% in 1998. There has also been a decrease of about 6.6% (9,418 tonnes) over the two years in reported on-site treatment and an increase of 16.6% (6,051 tonnes) during the same period in reported domestic off-site treatment.

Disposal trends are illustrated in Figure 3.11. As can be seen, the total quantity of reported hazardous waste disposed of has increased from 86,754 tonnes in 1996 to 120,354 tonnes in 1998, an increase of 38.7% in two years.² There has been an increase of 83.3% in the quantity of waste disposed of abroad, with reported quantities disposed of through thermal treatment abroad increasing from 18,880 tonnes in 1996 to 47,751 tonnes in 1998. Domestic disposal has increased from 59,385 tonnes in 1996 to 69,839 tonnes in 1998, an increase of 17.6%.

This trend illustrates the challenges ahead in relation to hazardous waste and the

² This includes an increase in total incineration (i.e. domestic and abroad) from 45,964 tonnes in 1996 to 65,631 tonnes in 1998. It is not clear how much of this waste is being incinerated at facilities that are equipped for energy recovery. More complete information on the final destinations of these wastes may lead to a revision of this figure.

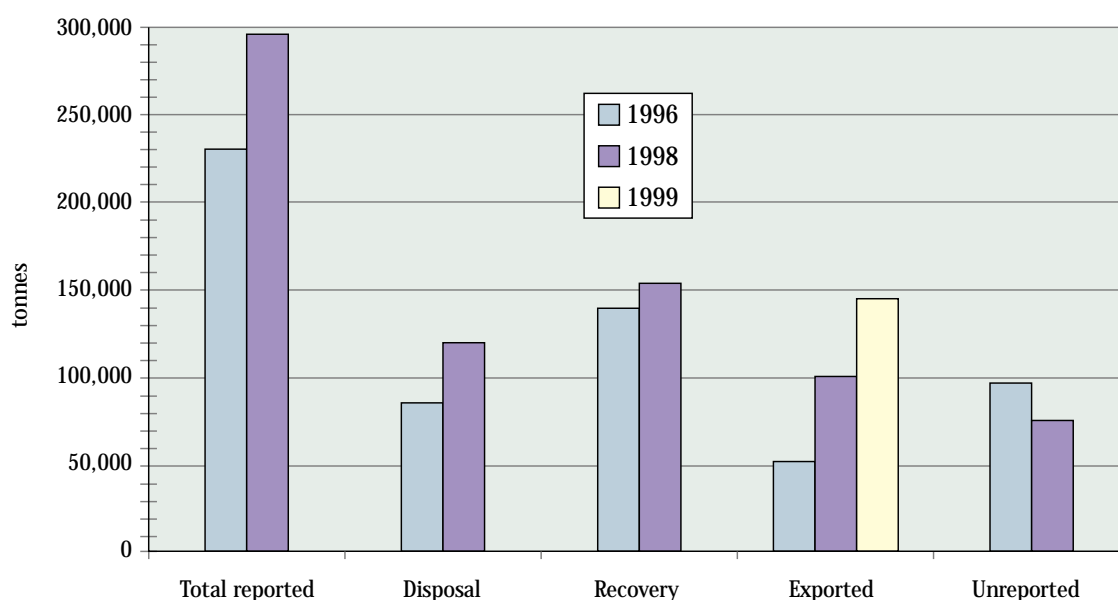


Figure 3.9 Illustration of reported hazardous waste data 1996-1999



Figure 3.10 Trends in the management of hazardous waste, 1996 and 1998

implementation of the prevention programme set out in Chapter 4.

Figure 3.12 illustrates corresponding trends in relation to recovery of reported hazardous waste. The total quantity reported to be recovered has increased from 138,969 tonnes in 1996 to 152,583 tonnes in 1998, an increase of 9.8%. The slight decrease in waste recovered on-site is off-set by the increase in waste recovered abroad. Note however that the 1998 quantity for recovery includes 23,691 tonnes of contaminated soil; as compared to 400 tonnes in 1996. If this 23,691 tonnes of recovered

waste are excluded from the calculation, there is a net decrease to 128,892 tonnes of reported hazardous waste being recovered in 1998.

3.8.3 Key trends

The key trends in relation to hazardous waste are:

Overall

- A continuing increase in the quantities being generated, with an overall increase from 327,862 tonnes in 1996 to 370,328 tonnes in 1998, an increase of 12.9% in two years;

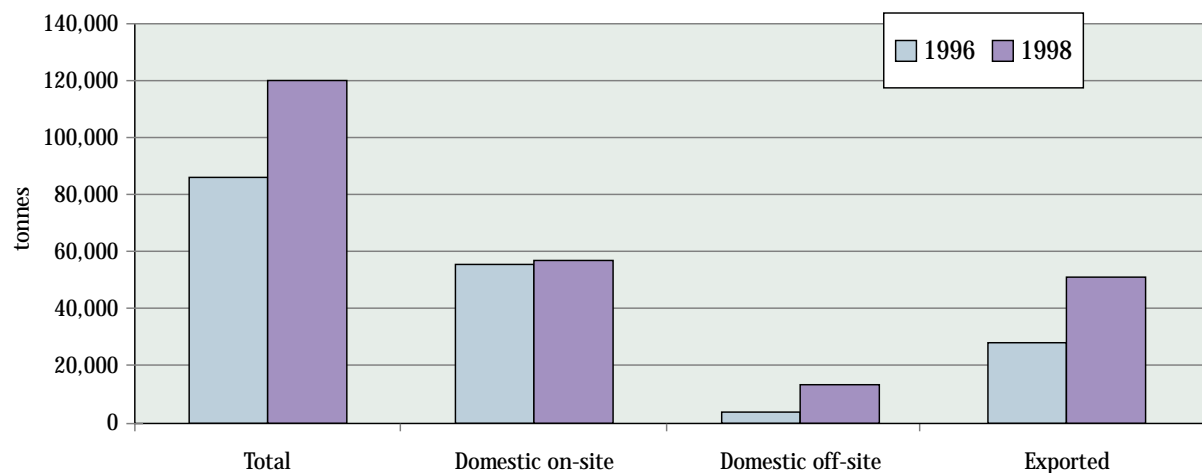


Figure 3.11 Disposal rates for reported hazardous waste arising in Ireland: 1996 and 1998

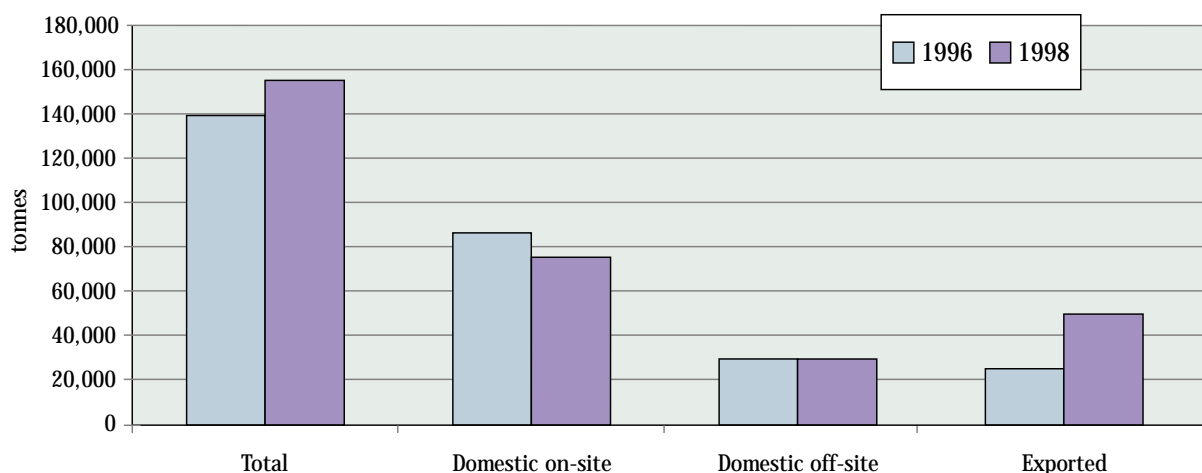


Figure 3.12 Recovery rates for reported hazardous waste arising in Ireland: 1996 and 1998

Reported hazardous waste

- An upward trend in the quantities of reported hazardous waste with an overall increase from 229,634 tonnes in 1996 to 296,017 tonnes in 1998, an increase of 29%; excluding contaminated soil arisings of 45,486 tonnes reported for 1998 (compared to 400 tonnes for 1996), an increase in reported hazardous waste arisings of 9% is observed between 1996 and 1998;
- An upward trend in quantities of hazardous waste exported with an overall increase from 51,727 tonnes in 1996 to 99,598 tonnes in 1998, an increase of 92.5%. Data for 1999 indicates that 144,902 tonnes of hazardous waste were exported in 1999. It should be noted that of these totals, 23,691 tonnes of contaminated soil were exported in 1998 and 37,327 tonnes in 1999. If we exclude contaminated soil, exports of hazardous waste have increased from 51,327 tonnes in 1996 to 75,907 tonnes in 1998 to 107,575 tonnes in 1999;
- An upward trend in the overall quantities of reported hazardous waste disposed of, with an overall increase from 86,754 tonnes in 1996 to 120,354 tonnes in 1998, an increase of 38.7%;
- An upward trend in the quantities of reported hazardous waste disposed of in Ireland, with an overall increase from 59,385 tonnes in 1996 to 69,839 tonnes in 1998, an increase of 17.6%;
- An upward trend on the overall quantities of reported hazardous waste recovered, with an overall increase from 138,969 tonnes in 1996 to 152,583 tonnes in 1998, an increase of 9.8%;

- A downward trend on the quantities of reported hazardous waste recovered in Ireland, with an overall decrease from 114,918 tonnes in 1996 to 104,308 tonnes in 1998, a decrease of 9.2%;
- Excluding contaminated soil arisings in 1998, a downward trend in the quantities of reported hazardous waste recovered is observed, with an overall decrease from 138,969 tonnes in 1996 to 129,892 tonnes³ in 1998, a decrease of 6.5%.

Unreported hazardous waste

- Decreasing quantities of unreported hazardous waste with a decrease from 98,228 tonnes in 1996 to 74,311 tonnes in 1998.

3.9 Indicators

In order to track progress of the management of hazardous waste in Ireland, it will be necessary to develop environmental indicators. The State of the Environment in Ireland Report published in 1996 sets out how indicators should be used. The indicators proposed for hazardous waste (and further developed in the *National Waste Database Report 1998*) are illustrated in Box 3.1. As reporting mechanisms improve, the quality of the data and the usefulness of indicators will improve. The data in the box illustrates the changes that have occurred between 1996 and 1998.

³ 152,583 tonnes overall reported recovery in 1998 minus 23,691 tonnes of contaminated soil exported for recovery = 128,892 tonnes.

Box 3.1 Indicators for hazardous waste management, 1996 to 1998

Indicator	Value, 1996	Value, 1998
1) Quantity of reported hazardous waste	229,634 tonnes	296,017 tonnes
2) Estimated quantity of unreported hazardous waste	98,228 tonnes	74,311 tonnes
3) Quantity of hazardous waste moved under local authority consignment note	not quantified	not quantified
4) Quantity of hazardous waste exported under TFS notification ^{note 4}	51,727 tonnes 24,051 tonnes recovery 27,369 tonnes disposal 307 tonnes unspecified	99,598 tonnes ^{note 5} 48,210 tonnes recovery 50,180 tonnes disposal 1,208 tonnes unspecified
5) Quantity of hazardous waste imported under TFS notification	0 tonnes	0 tonnes
6) Number of authorised hazardous waste recovery and disposal facilities	at least 8 see note 1	1 waste licence issued by EPA, 9 EPA waste licence applications being processed see note 2
7) Quantity of hazardous waste accepted at authorised recovery and disposal facilities	36,434 tonnes see note 1	– see note 3
8) Quantity of reported hazardous waste recovered in Ireland	114,918 tonnes	104,308 tonnes
9) Quantity of reported hazardous waste recovered (including export)	138,969 tonnes	152,583 tonnes
10) Quantity of reported hazardous waste disposed of in Ireland	59,385 tonnes	69,839 tonnes
11) Quantity of reported hazardous waste disposed of (including export)	86,754 tonnes	120,354 tonnes
12) Domestic treatment rate (percentage of total reported hazardous waste treated in Ireland)	77.3%	58.9%

Note 1: The recovery and disposal facilities reviewed held, in 1996, a variety of permits issued under the now revoked *waste regulations* and/or *toxic and dangerous waste regulations*.

Note 2: Situation as at end 1998 in respect of waste and IPC licensing. Represents solely facilities for the recovery and disposal of hazardous waste. Licence issued to Southern Health Board (38-1). Nine EPA applications (as at end 1998) are licence register numbers 35-1, 40-1, 36-1, 41-1, 50-1, 54-1, 55-1, 83-1, 472 plus Kildare County Council permit reference number TDW54 (Irish Lamp Recycling).

Note 3: The situation in 1998 represented a transition period between the now revoked *waste regulations* and *toxic and dangerous waste regulations* permit systems and the new waste licensing systems. It is not appropriate that assumptions about the “authorised” status of facilities be made. By end 1999, all hazardous waste recovery and disposal facilities are required to have made a waste licence, IPC licence or local authority permit application.

Note 4: Data for 1999 indicates that 144,902 tonnes of hazardous waste were exported (79,312 tonnes for recovery and 65,590 tonnes for disposal) of which 37,327 tonnes were contaminated soil.

Note 5: Of this total, 23,691 tonnes was contaminated soil exported for recovery.