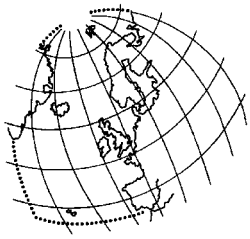
Hazardous Substances Series

Mercury Losses from the Chlor-Alkali Industry in 2002



OSPAR Commission
2004

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the "OSPAR Convention") was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.

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contents

Executive Summary

This report continues the series of reports on mercury discharges, emissions and losses of mercury by all routes from mercury-cell chlor-alkali plants.

After several years of more or less stable production capacities until 1998, mercury-cell based chlorine production capacities have in 2002 continued the decreases of the period 1998-2001 although to a smaller extent. Capacity reductions in Belgium, Germany and Portugal seem to be mainly responsible for the decrease in 2002. A small increase in mercury-cell production capacity in Finland has been reported. Mercury losses through product, waste water and air have decreased from 2001 to 2002 in all countries except Finland where there has been a slight increase.

Over the years, atmospheric emissions of mercury have been significantly reduced. For 2002 there was also a significant decrease of 668 kg mainly due to reductions reported from Belgium, Germany and United Kingdom. For Finland a slight increase is indicated due to the increased production. The data show clearly that all plants comply with the limit value for air emissions in (established by PARCOM Decision 90/3) of 2 g mercury per tonne of chlorine produced; actual values range from 0,12 to 1,88 g per tonne. The extent to which these values are considered to reflect BAT in general or only for individual plants concerned is not clear.

Between 2001 and 2002, the amount of mercury in safely deposited wastes has increased from about 60 tonnes to about 70 tonnes. Some countries report increases and others decreases but these changes do not necessarily correlate to the shutdown of cells or plants. An explanation has been provided in the report of what “safely deposited wastes” constitutes, as the range of values between countries is extremely large and OSPAR will in future seek more detailed information to explain year to year differences in the amount of mercury in safely deposited wastes.

Where relevant, convention-wide totals have been added to the data tables presented in this report in order to improve comparability of data on a convention-wide basis.

PARCOM Decision 90/3 contains a recommendation that existing mercury cell chlor-alkali plants be phased out as soon as practicable. The objective is that they should be phased out completely by 2010. Reports on the intended future phasing-out of national mercury-based chlor-alkali production capacities, previously included in this report, are now included in the “Overview Assessment of the Implementation of PARCOM Decision 90/3 on Reducing Atmospheric Emissions from Existing Chlor-Alkali Plants”.

Récapitulatif

Le présent rapport fait suite à la série de rapports sur les rejets, émissions et pertes de mercure des installations d'électrolyse des chlorures alcalins à cellules de mercure, par toutes les voies.

Jusqu'en 1998, après plusieurs années pendant lesquelles les capacités de production sont restées plus ou moins stables, les capacités de production de chlore à base de cellules de mercure ont de nouveau baissé en 2002, maintenant ainsi la tendance à la baisse qui s'est manifestée durant la période de 1998 à 2001 quoique les baisses se sont avérées moins importantes. La baisse des capacités de production en Belgique, en Allemagne et au Portugal paraît être la principale responsable de cette diminution en 2002. L'on a toutefois constaté une légère augmentation de la capacité de production de cellules de mercure en Finlande. Les pertes de mercure par le biais des produits, des eaux usées et de l'atmosphère ont baissé entre 2001 et 2002 dans tous les pays, à l'exception de la Finlande où l'on a noté une légère augmentation.

Au fil des années, les émissions atmosphériques de mercure ont été réduites dans des proportions significatives. En 2002, on constate là encore une baisse significative, de 668 kg par an, diminution surtout due aux réductions signalées par la Belgique, l'Allemagne et la Royaume-Uni. En Finlande, une légère hausse est signalée en raison d'une augmentation de la production. Les données prouvent que toutes les installations se conforment au plafond fixé (par la Décision PARCOM 90/3) pour les émissions atmosphériques, soit 2 g de mercure par tonne de chlore fabriqué ; les valeurs elles-mêmes se situent entre 0,12 et 1,88 g par tonne. L'on ne connaît pas en toute clarté la mesure dans laquelle ces valeurs sont considérées comme le résultat de la BAT en général ou uniquement pour telle ou telle installation.

Entre 2001 et 2002, la quantité de mercure présent dans les déchets mis dans des décharges sûres a augmenté, puisqu'elle est passée d'environ 60 tonnes à 70 tonnes à peu près. Bien que certains pays signalent une augmentation tandis que d'autres font état d'une diminution, ces évolutions ne sont pas nécessairement corrélées à la fermeture de cellules ou d'installations. Une explication de ce qui constitue des « déchets mis dans des décharges sûres » a été donnée dans le rapport, car la fourchette des valeurs est très différente selon les pays, et dans l'avenir, OSPAR s'efforcera d'obtenir des renseignements plus précis afin de pouvoir expliquer les fluctuations annuelles de la quantité de mercure dans les déchets mis dans des décharges sûres.

Lorsque pertinent, les totaux à l'échelon de la Convention ont été ajoutés dans les tableaux de données présentés dans ce rapport, ceci de manière à améliorer la comparabilité des données à l'échelle de la Convention.

Dans la décision PARCOM 90/3 figure une recommandation selon laquelle les installations actuelles d'électrolyse des chlorures alcalins devaient être abandonnées dès que possible. L'objectif est qu'elles le soient complètement d'ici 2010. Les rapports relatifs aux intentions d'abandon, dans l'avenir, des capacités nationales de production des chlorures alcalins à base de mercure, qui figuraient auparavant dans le présent rapport, sont désormais intégrés à la « Synthèse d'évaluation de la mise en œuvre de la décision PARCOM 90/3, sur la réduction des émissions atmosphériques des installations existantes d'électrolyse des chlorures alcalins ».

1. Introduction

Since the beginning of the 1980s, mercury discharges, emissions and losses from the chlor-alkali industry have been addressed under the former Paris Commission (PARCOM). The following Decisions and Recommendations are applicable under the OSPAR Convention:

- PARCOM Decision on Limit Values for Mercury Emissions in Water from Existing and New Brine Recirculation Chlor-alkali Plants (exit of the purification plant), 1980;
- PARCOM Decision on Limit Values for Existing Waste Brine Chlor-Alkali Plants, 1981;
- PARCOM Decision on Limit Values for Existing Brine Recirculation Chlor-Alkali Plants (exit of the factory site), 1981;
- PARCOM Decision on New Chlor-Alkali Plants Using Mercury Cells, 1982;
- PARCOM Recommendation on Limit Values for Mercury Emissions in Water from Existing Brine Recirculation Chlor-Alkali Plants (exit of factory site), 1985;
- PARCOM Decision 90/3 on Reducing Atmospheric Emissions from Existing Chlor-Alkali Plants.

In 1983, Contracting Parties to the former Paris Convention initiated an annual reporting of mercury discharges, emissions and losses from their national chlor-alkali industry. These data were compiled by the OSPAR Secretariat and, following examination by the relevant subsidiary bodies, published by the Commission in form of Annual Reports on Mercury Losses from the Chlor-alkali Industry, which comprised yearly data series from 1982 onwards.

Over time, reporting requirements and formats were regularly reviewed and up-dated in the light of the ongoing work under the Commission as regards the chlor-alkali industry. With a view to harmonising the way in which data and information are being established and reported, the Hazardous Substances Committee (HSC) of the OSPAR Commission adopted in 2003 the current reporting formats and procedures (see OSPAR agreement; reference number 2003-5) which set out the requirements for data and information to be provided via Euro Chlor. Annual data on discharges, emissions and losses of mercury from each plant operating within OSPAR Contracting Parties are reported to the OSPAR Secretariat, which, following a check and confirmation by Contracting Parties, compiles these technical data in form of a report.

OSPAR acknowledges the assistance of Euro Chlor in assembling the information and appreciates the efforts made by Euro Chlor to provide all requested information on a plant-by-plant basis and recommends continuing this procedure in future.

2. Assessment of the Report on mercury losses from the Chlor-Alkali industry in 2002

On the basis of data provided by EuroChlor and all Contracting Parties, the following points are important to note:

a. as already stated for the year 2001, mercury-cell-based chlorine production capacities have generally stayed the same with some small decreases from 2001 to 2002. There was a small increase of 6% in Finland, due to the fact that the permitted discharges and emissions were increased on the basis of a revised authorisation in 2001 which is also reflected the categories examined in paragraphs b. c. and d. Out of the total reduction/decrease of approximately 266 kilo tonnes in 2002, there was a 67% decrease in Germany and a 16% decrease in both Belgium and in Portugal

b. "Mercury Losses through Product, Waste Water and Air" have decreased from 2001 to 2002 in all countries except Finland where there has been a slight increase of 7%. The total decrease of about 840 kg per year was due to a 28% reduction in the UK, 23% in Germany, 21% in Belgium and 12% both in France and Portugal. The data show that there is still a wide range of specific Mercury Losses through Product, Waste Water and Air (from 0,14 to 1,95 g per tonne);

c. air emissions of mercury have been significantly reduced in 2002. Out of the total decrease of 668 kg per year, significant reductions reported include a 30% reduction from the UK, 25% from Germany, 19% from Belgium and 13% from France. A slight increase of emissions was reported by Finland due to increase of production. All plants comply with the limit value of 2 g Hg/t Cl_2 for air emissions in PARCOM Decision 90/3, and it is clear that in many plants,

air emissions continue to fall. However, according to the data in Table 5, a wide range in actual values from 0,12 to 1,88 g Hg/t Cl_2 is shown. The extent to which these values are considered to reflect BAT in general or only for individual plants concerned is not clear. However, the EC Reference Document on Best Available Techniques in the Chlor-Alkali Industry (December 2001) identified techniques used in the best performing mercury-based chlor-alkali plants, which achieve losses to air, water and with products in the range of 0,2-0,5 g Hg/t C12 that are i.e. much lower than the limit value of 2 g Hg/t Cl_2 specified in PARCOM Decision 90/3;

d. over the last year, the amount of mercury in safely deposited wastes has increased from about 60 tonnes to about 70 tonnes. The data is variable however, with some countries showing decreases and others increases. For example in 2002, Germany has a value of about 35 tonnes, UK of about 11 tonnes and France of about 10 tonnes. The term "safely deposited wastes" is explained in tables 6 and 7, as the range of values is extremely large, because all deposits of mercury in whatever concentrations should be accounted for. For example, the increase or decrease do not necessarily correlate to the shutdown of cells or plants all over the countries. The tables show that in Germany the plant D/4 was shut down in 2002 and the amount for disposed waste increased from 1 259 to 3 437 kg/year, corresponding figures are shown e.g. for Spain plant E/2 but the figures of other plants e.g. for UK plant UK/3 do not correspond to any changes in capacity or conversion activities and it can not be explained by changes of capacity or conversion activities. In view of this it would be helpful in future to have more detailed information in this table to explain year to year differences, and whether these are due to pure mercury from decommissioned cells being returned to the market or used in other plants, or for other reasons.

Reports on the intended future phasing-out of their national mercury-based chlor-alkali production capacities have previously been included in this report. However, the national plans are now summarised in the Overview Assessment of Implementation of PARCOM Decision 90/3 on Reducing Atmospheric Emissions from Existing Chlor-Alkali Plants and readers are referred to this OSPAR publication for further information.

In order to improve comparability of the data on a Convention-wide basis, convention-wide totals are added to the tables 1, 2 and 4.

3. Evolution of mercury losses from the chlor-alkali industry (1982-2002)

The following figures give a rough indication of the evolution of mercury losses from the chlor-alkali industry in the period 1982-2002 as follows:

Figure 1: Chlorine Production Capacity with Mercury Cells;

Figure 2: Mercury Losses through Product, Waste Water and Air;

Figure 3: Atmospheric Emissions of Mercury.

It should be noted that these figures use data from previously published OSPAR Reports and that the way in which these data, in particular the pre-1999 data, were calculated and reported might differ:

- from Contracting Party to Contracting Party;
- within a time series of one Contracting Party.

Therefore, the interpretation of the figures is limited and any comparisons have to be carried out with extreme caution.

It should also be noted that Finland and Switzerland were not Contracting Parties to the former Paris Convention. Prior to the entry into force of the OSPAR Convention, the Contracting Parties supplied data on a voluntary basis as follows:

Finland: from 1996 onwards, atmospheric emissions from the only mercury-based chlor-alkali plant, which discharges into the Baltic Sea (i.e. outside the OSPAR maritime area);

Switzerland: from 1993 onwards, full data sets for the national mercury-based and mercury-free chlor-alkali industry.

Some information about changes in the reporting over time, as well as explanations of considerable increases or decreases in values, are given in footnotes to the OSPAR Report on Mercury Losses from the Chlor-alkali Industry (1982-1998), which was published in 2000.

A further source of information to be taken into account are the expert assessments, which were included in the publication of the Annual OSPAR Reports on Mercury Losses from the Chlor-alkali Industry from 1996 onwards.

Until 2003, data has been published in Figures 1 to 3 as total figures for each Contracting Party. Since 1998, data has been made available on a plant-by-plant basis[1]. In order to improve comparability of performance, plant-by-plant data are now published in:

Table 1: Chlorine Production Capacity with Hg-cells (tonnes)

Table 2: Mercury Losses through Product, Waste Water and Air (kg per year)

Table 3: Mercury Losses through Product, Waste Water and Air (g per tonne production capacity)

Table 4: Atmospheric Emissions of Mercury (kg per year)

Table 5: Atmospheric Emissions of Mercury (g per tonne production capacity)

Table 6: Mercury in Safely Deposited Wastes (kg per year)

Table 7: Mercury in Safely Deposited Wastes (g per tonne production capacity)

The presentation of these figures since 1998 will also assist in:

a. the review of progress to moving towards the OSPAR 2020 target of the cessation of discharges, emissions and losses of mercury;

b. the assessment of the effectiveness of the implementation of PARCOM Decision 90/3.

To this end, all locations of mercury-based chlor-alkali plants in operation in 1998 are described in Section 4.2 including when they have been decommissioned or converted.

[1] For plant codes in the tables see § 4.1.

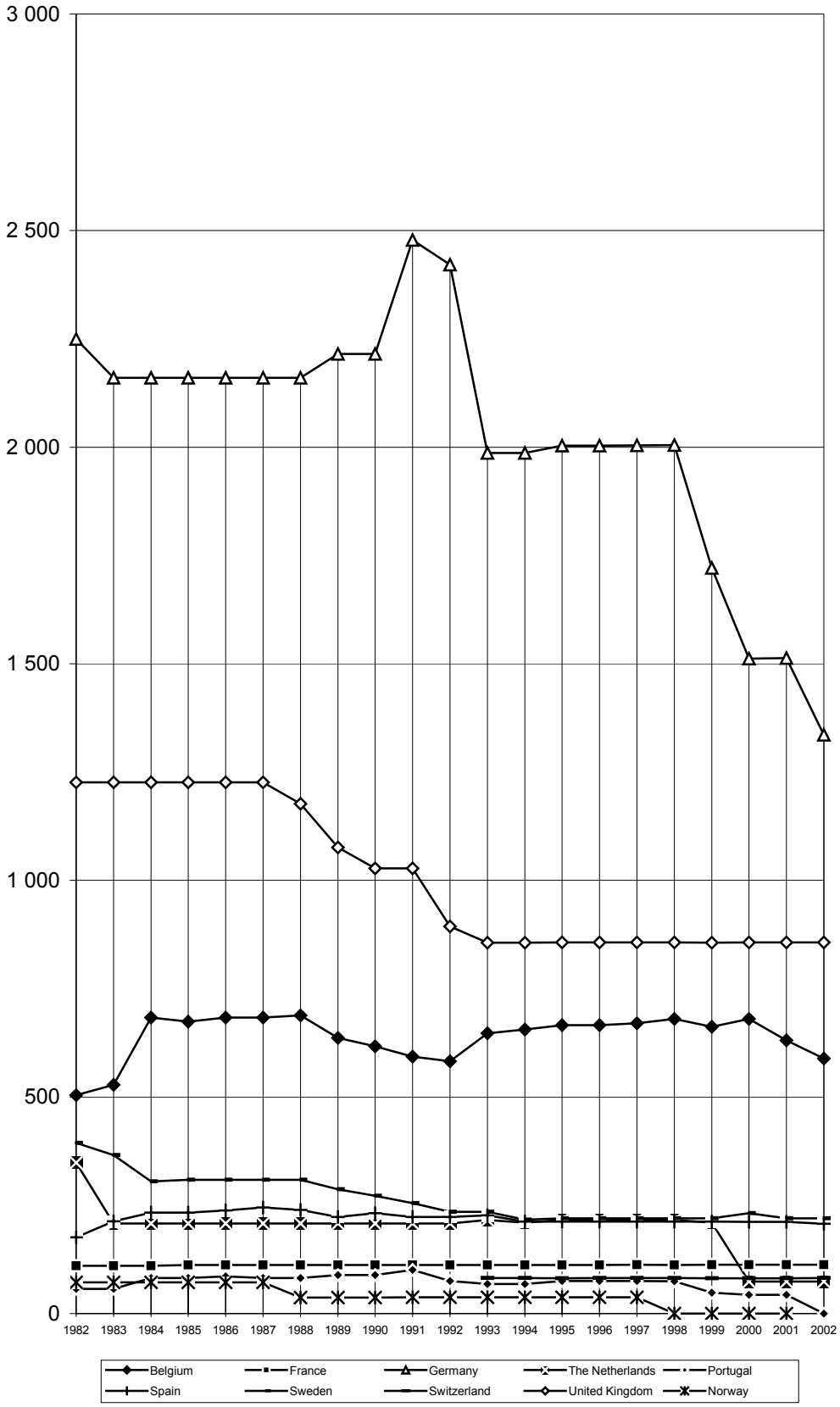


Figure 1: Chlorine Production Capacity with Mercury Cells of plants discharging into the OSPAR catchment area
(in kilotonnes per year)

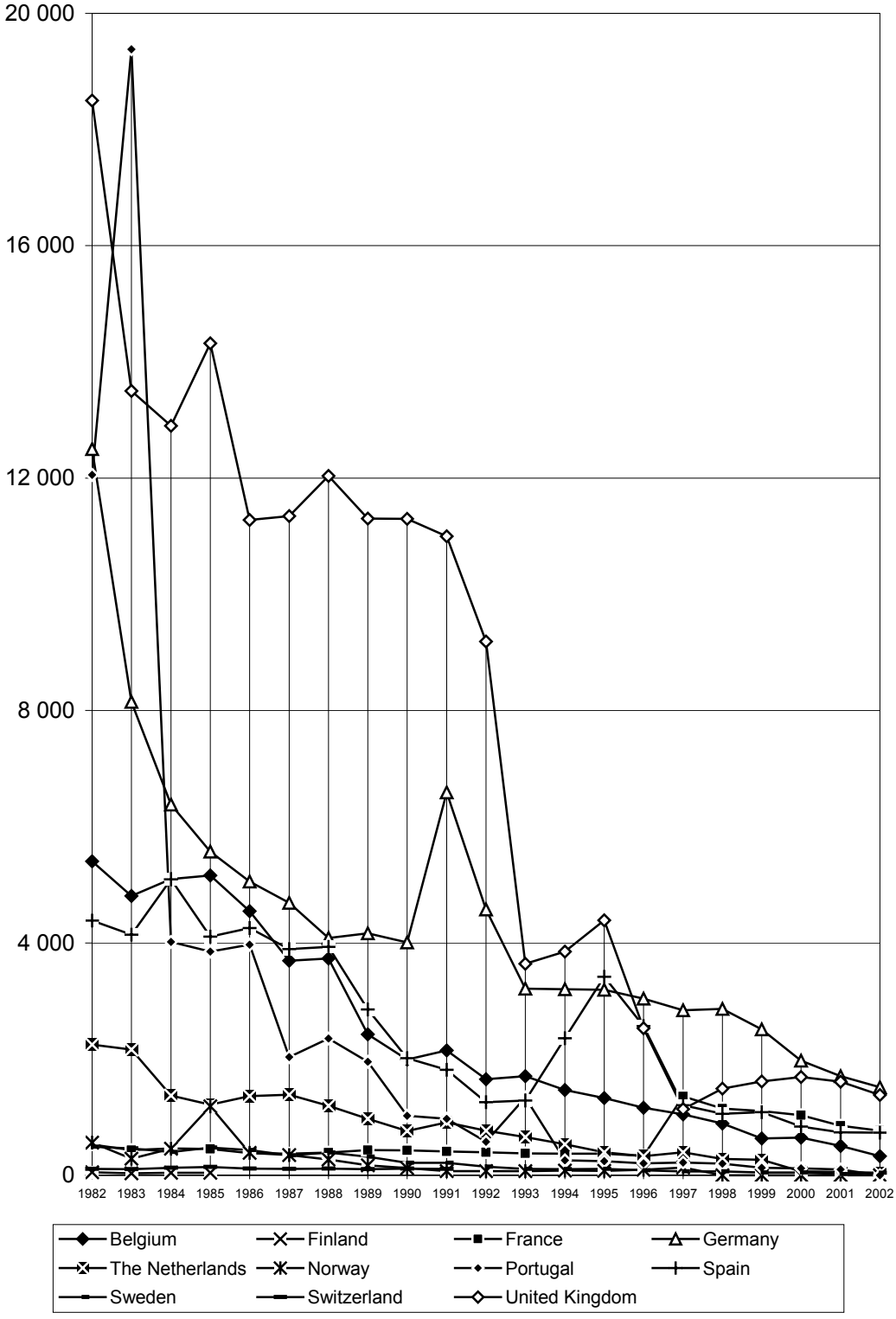


Figure 2: Mercury Losses through Product, Wastewater and Air
(in kilograms per year, sum of mercury losses to product and wastewater from national plants discharging into the OSPAR catchment area plus atmospheric emissions from all national plants)

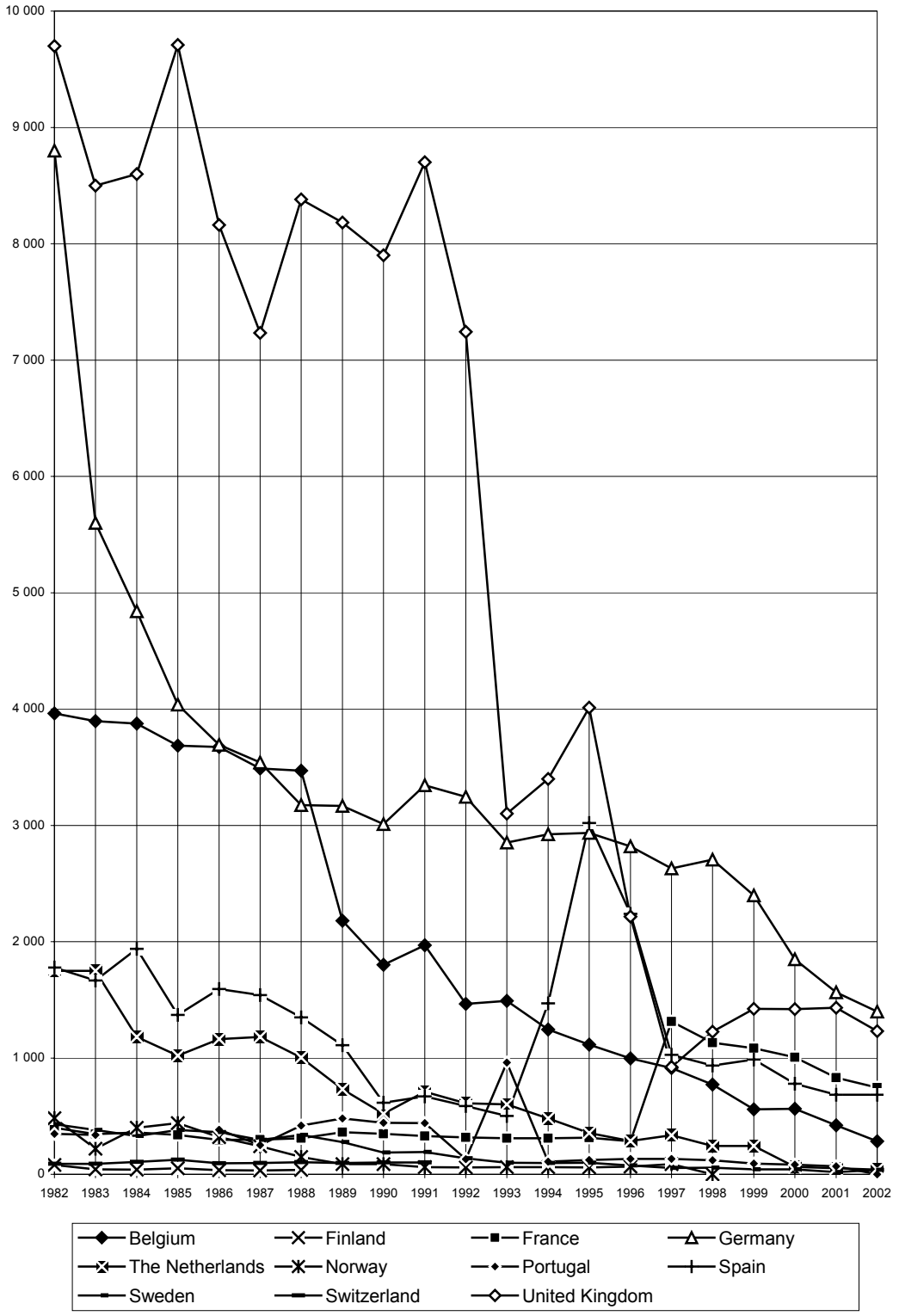


Figure 3: **Atmospheric Emissions of Mercury from all plants of Contracting Parties**
(in kilograms per year, all plants)

Table 1: Chlorine Production Capacity with Hg-cells (tonnes) from all plants (Asterisk indicates plants discharging into maritime area only)

Site	1998	1999	2000	2001	2002
Belgium					
B/1*	219 000	230 000	219 000	219 000	219 000
B/2*	250 000	250 000	250 000	250 000	250 000
B/3*	120 000	100 000	120 000	120 000	120 000
B/4*	90 900	82 000	90 900	41 663	
Total	**679 900**	**662 000**	**679 900**	**630 663**	**589 000**
Finland					
SF/1	40 000	40 000	40 000	40 000	42 485
Total	**40 000**	**40 000**	**40 000**	**40 000**	**42 485**
France					
F/1*	NI	18 040	18 040	18 040	18 040
F/2*	NI	72 000	72 000	72 000	72 000
F/3	NI	240 900	240 900	240 900	240 900
F/4	NI	170 070	170 070	170 070	170 070
F/5*	NI	22 500	22 500	22 500	22 500
F/6	NI	166 000	166 000	166 000	166 000
F/7	NI	184 300	184 300	184 300	184 300
Total	**NI**	**873 810**	**873 810**	**873 810**	**873 810**
Germany					
D/1	130 000	65 000	NA	NA	NA
D/2*	130 000	130 000	140 000	140 000	110 000
D/3*	120 000	120 000	125 000	125 000	125 000
D/4*	150 000	300 000	300 000	300 000	153 000
D/5*	180 000	150 000	160 000	160 000	160 000
D/6*	65 000	130 000	148 828	148 828	148 828
D/7*	160 000	180 000	182 000	176 000	176 000
D/8*	200 000	98 000	135 951	135 951	135 951
D/9*	150 000	150 000	160 000	167 000	167 000
D/10	300 000	248 000	NA	NA	NA
D/11	50 000	60 000	9 804	NA	NA
D/12	72 000	157 000	157 000	NA	NA
D/13*	157 000	150 000	160 000	160 000	160 000
D/14	300 000	72 000	82 355	82 355	82 355
D/15	120 000	NA	NA	NA	NA
Total	**2 344 000**	**2 010 000**	**1 760 938**	**1 595 134**	**1 416 134**
Netherlands					
NL/1*	70 000	70 000	74 294	74 294	74 294
NL/2*	140 000	140 000	NA	NA	NA
Total	**210 000**	**210 000**	**74 294**	**74 294**	**74 294**
Portugal					
P/1*	48 600	48 000	43 302	43 302	NA
P/2*	26 400	NA	NA	NA	NA
Total	**75 000**	**48 000**	**43 302**	**43 302**	**NA**
Spain					
E/1	31 920	30 000	31 373	31 373	31 373
E/2*	14 815	15 000	14 815	14 815	9 877
E/3*	33 552	33 500	33 552	33 552	33 552
E/4	150 000	150 000	150 000	150 000	150 000
E/5*	62 745	63 000	62 747	62 747	62 747
E/6	209 200	209 000	217 871	217 871	217 871
E/7	25 000	25 000	25 000	25 000	25 000
E/8	135 000	135 000	135 004	135 004	135 004
E/9*	101 000	101 000	100 929	100 929	100 929
Total	**763 232**	**761 500**	**771 291**	**771 291**	**766 353**

Site	1998	1999	2000	2001	2002
Sweden					
S/1*	100 000	100 000	100 000	100 000	100 000
S/2*	120 000	120 000	132 000	120 000	120 000
Total	**220 000**	**220 000**	**232 000**	**220 000**	**220 000**
Switzerland					
CH/1*	55 000	55 000	55 000	55 000	55 000
CH/2	26 500	22 000	26 500	26 500	26 500
CH/3*	27 000	26 500	27 000	27 000	27 000
Total	**108 500**	**103 500**	**108 500**	**108 500**	**108 500**
UK					
UK/1*	29 000	29 000	29 413	29 413	29 413
UK/2*	89 872	89 000	89 872	89 872	89 872
UK/3*	737 000	738 000	738 000	738 000	738 000
Total	**855 872**	**856 000**	**857 285**	**857 285**	**857 285**

Production capacity of all installations in the Convention area

	1998	1999	2000	2001	2002
tonnes	6 170 314	5 784 810	5 441 320	5 214 279	4 947 861
%	100	93,8	88,2	84,5	80,2

Production capacity of installations in the drainage area to the maritime area

	1998	1999	2000	2001	2002
tonnes	3 819 424	3 806 040	3 805 143	3 744 906	3 744 906
%	100	99,7	99,6	98,0	98,0

Table 2: Mercury Losses through Product, Waste Water and Air (kg per year)

Site	1998	1999	2000	2001	2002
Belgium					
B/1	NI	173	157	122	82
B/2	NI	178	180	175	169
B/3	NI	113	111	88	78
B/4	NI	173	201	120	
Total	**893**	**637**	**649**	**505**	**329**
Finland					
SF/1	NI	63	43	41	44
Total	**NI**	**63**	**43**	**41**	**44**
France					
F/1	NI	28	29	24	15
F/2	NI	129	119	121	92
F/3	NI	345	338	226	216
F/4	NI	192	220	203	152
F/5	NI	32	32	33	34
F/6	NI	190	152	139	175
F/7	NI	281	243	237	202
Total	**1 149**	**1 197**	**1 133**	**983**	**886**
Germany					
D/1	NI	111	NA	NA	NA
D/2	NI	147	247	159	127
D/3	NI	49	73	75	78
D/4	NI	367	367	358	285
D/5	NI	261	166	162	157
D/6	NI	70	62	52	49
D/7	NI	313	257	199	218
D/8	NI	193	209	228	174
D/9	NI	161	165	197	199
D/10	NI	391	NA	NA	NA
D/11	NI	104	18	NA	NA
D/12	NI	132	137	NA	NA
D/13	NI	137	171	201	163
D/14	285	100	112	80	67
D/15	NI	NA	NA	NA	NA
Total	**2 864**	**2 536**	**1 982**	**1 711**	**1 517**
Netherlands					
NL/1	NI	71	68	57	41
NL/2	NI	196	NA	NA	NA
Total	**282**	**267**	**68**	**57**	**41**
Portugal					
P/1	NI	130	121	100	NA
P/2	NI	NA	NA	NA	NA
Total	**202**	**130**	**121**	**100**	**NA**
Spain					
E/1	NI	61	63	58	48
E/2	NI	30	29	25	16
E/3	NI	66	57	52	38
E/4	NI	287	164	114	123
E/5	NI	142	102	101	86
E/6	NI	182	182	193	185
E/7	NI	53	49	32	36
E/8	NI	251	244	176	174
E/9	123	175	95	103	132
Total	**1 057**	**1 247**	**985**	**854**	**838**

Site	1998	1999	2000	2001	2002
Sweden					
S/1	NI	27	28	29	26
S/2	NI	18	19	18	17
Total	**65**	**45**	**47**	**47**	**43**
Switzerland					
CH/1	NI	82	70	64	73
CH/2	NI	19	20	28	19
CH/3	NI	15	19	25	17
Total	**111**	**116**	**109**	**117**	**109**
UK					
UK/1	NI	15	16	17	18
UK/2	NI	125	144	157	175
UK/3	NI	1 476	1 535	1 439	1 188
Total	**1 493**	**1 616**	**1 695**	**1 613**	**1 381**

Total mercury losses through product, waste water and air from all installations in the Convention area (waste water discharges from installations in the drainage area only)

	1998	1999	2000	2001	2002
kg/year	8 179	7 854	6 832	6 028	5 188
%	100	96,0	83,5	73,3	63,4

Table 3: Mercury Losses through Product, Waste Water and Air (g per tonne production capacity)

Site	1998	1999	2000	2001	2002
Belgium					
B/1	NI	0,750	0,715	0,556	0,374
B/2	NI	0,710	0,720	0,699	0,676
B/3	NI	1,125	0,921	0,736	0,647
B/4	NI	2,110	2,212	2,890	NA
Finland					
SF/1	NI	1,574	1,078	1,026	1,046
France					
F/1	NI	1,580	1,631	1,317	0,819
F/2	NI	1,792	1,646	1,680	1,277
F/3	NI	1,431	1,403	0,940	0,896
F/4	NI	1,131	1,292	1,197	0,896
F/5	NI	1,444	1,436	1,457	1,509
F/6	NI	1,144	0,917	0,836	1,054
F/7	NI	1,522	1,320	1,286	1,094
Germany					
D/1	NI	1,707	NA	NA	NA
D/2	NI	1,128	1,766	1,132	1,153
D/3	NI	0,406	0,583	0,601	0,622
D/4	NI	1,223	1,223	1,193	1,862
D/5	NI	1,740	1,040	1,010	0.980
D/6	NI	0,540	0,416	0,348	0,326
D/7	NI	1,740	1,410	1,130	1,240
D/8	NI	1,970	1,540	1,680	1,281
D/9	NI	1,070	1,032	1,182	1,189
D/10	NI	1,576	NA	NA	NA
D/11	NI	1,740	1,864	NA	NA
D/12	NI	0,843	0,871	NA	NA
D/13	NI	0,910	1,069	1,259	1,019
D/14	NI	1,390	1,364	0,966	0,815
D/15	NI	NA	NA	NA	NA
Netherlands					
NL/1	NI	1,008	0,909	0,765	0,551
NL/2	NI	1,400	NA	NA	NA
Portugal					
P/1	NI	2,700	2,800	2,300	NA
P/2	NI	NA	NA	NA	NA
Spain					
E/1	NI	2,040	2,020	1,861	1,545
E/2	NI	2,020	1,948	1,667	1,626
E/3	NI	1,970	1,699	1,563	1,123
E/4	NI	1,910	1,094	0,762	0,821
E/5	NI	2,259	1,632	1,608	1,368
E/6	NI	0,870	0,834	0,885	0,848
E/7	NI	2,100	1,940	1,265	1,428
E/8	NI	1,860	1,810	1,300	1,290
E/9	NI	1,730	0,938	1,021	1,309
Sweden					
S/1	NI	0,268	0,278	0,288	0,258
S/2	NI	0,154	0,144	0,154	0,143

Site	1998	1999	2000	2001	2002
Switzerland					
CH/1	NI	1,490	1,271	1,162	1,336
CH/2	NI	0,877	0,743	1,054	0,699
CH/3	NI	0,560	0,692	0,917	0,638
UK					
UK/1	NI	0,525	0,538	0,574	0,606
UK/2	NI	1,410	1,600	1,744	1,950
UK/3	NI	2,000	2,080	1,950	1,610

Table 4: Atmospheric Emissions of Mercury (kg per year)

Site	1998	1999	2000	2001	2002
Belgium					
B/1	290	156	137	106	68
B/2	176	154	157	153	153
B/3	146	101	98	74	63
B/4	160	146	172	80	NA
Total	**772**	**558**	**564**	**413**	**284**
Finland					
SF/1	40	53	35	34	39
Total	**40**	**53**	**35**	**34**	**39**
France					
F/1	26	25	26	21	12
F/2	111	115	103	108	80
F/3	301	320	313	210	202
F/4	179	182	188	171	109
F/5	330	25	25	26	27
F/6	24	161	129	109	147
F/7	160	255	223	186	170
Total	**1 131**	**1 083**	**1 007**	**831**	**747**
Germany					
D/1	173	105	NA	NA	NA
D/2	92	135	235	146	114
D/3	84	39	63	68	71
D/4	255	353	353	345	274
D/5	256	255	160	155	150
D/6	105	66	58	48	45
D/7	128	301	244	187	206
D/8	280	175	171	179	141
D/9	150	149	151	185	188
D/10	354	382	NA	NA	NA
D/11	105	100	18	NA	NA
D/12	103	119	128	NA	NA
D/13	97	124	158	177	144
D/14	285	96	110	74	65
D/15	238	NA	NA	NA	NA
Total	**2 705**	**2 399**	**1 849**	**1 564**	**1 398**
Netherlands					
NL/1	65	65	65	53	37
NL/2	180	178	NA	NA	NA
Total	**245**	**243**	**65**	**53**	**37**
Portugal					
P/1	92	91	82	69	NA
P/2	28	NA	NA	NA	NA
Total	**120**	**91**	**82**	**69**	**NA**
Spain					
E/1	31	38	45	36	33
E/2	21	20	19	17	12
E/3	66	51	43	32	23
E/4	210	218	118	69	80
E/5	109	91	85	91	77
E/6	126	157	165	178	171
E/7	48	35	27	22	28
E/8	203	227	204	155	148
E/9	123	152	74	84	112
Total	**937**	**989**	**780**	**684**	**684**

Site	1998	1999	2000	2001	2002
Sweden					
S/1	37	25	25	27	23
S/2	21	17	17	17	15
Total	**58**	**42**	**42**	**44**	**38**
Switzerland					
CH/1	57	75	63	58	69
CH/2	18	19	19	27	18
CH/3	21	10	14	17	14
Total	**96**	**104**	**96**	**102**	**101**
UK					
UK/1	14	14	14	13	13
UK/2	106	117	137	149	169
UK/3	1 107	1 292	1 269	1 270	1 048
Total	**1 227**	**1 423**	**1 420**	**1 432**	**1 230**

Total atmospheric emissions of mercury from all installations in the Convention area[1]

	1998	1999	2000	2001	2002
kg/year	7 331	6 985	5 940	5 226	4 558
%	100	95,3	81,0	71,3	62,2

Table 5: Atmospheric Emissions of Mercury (g per tonne production capacity)

Site	1998	1999	2000	2001	2002
Belgium					
B/1	1,320	0,680	0,627	0,484	0,310
B/2	0,705	0,617	0,627	0,615	0,611
B/3	1,213	1,013	0,813	0,615	0,524
B/4	1,770	1,780	1,888	1,930	NA
Finland					
SF/1	1,000	1,322	0,885	0,856	0,916
France					
F/1	1,390	1,380	1,442	1,154	0,651
F/2	1,540	1,600	1,424	1,498	1,111
F/3	1,250	1,330	1,300	0,871	0,838
F/4	1,050	1,068	1,108	1,004	0,641
F/5	1,790	1,123	1,132	1,159	1,199
F/6	1,080	0,971	0,776	0,660	0,886
F/7	0,960	1,381	1,210	1,011	0,921
Germany					
D/1	1,330	1,610	NA	NA	NA
D/2	0,710	1,040	1,680	1,040	1,040
D/3	0,700	0,322	0,507	0,546	0,571
D/4	1,700	1,175	1,175	1,150	1,792
D/5	1,420	1,700	1,000	0,970	0,940
D/6	1,609	0,510	0,390	0,322	0,303
D/7	0,800	1,670	1,340	1,060	1,170
D/8	1,400	1,790	1,260	1,320	1,039
D/9	1,000	0,995	0,942	1,106	1,125
D/10	1,180	1,540	NA	NA	NA
D/11	2,100	1,660	1,846	NA	NA
D/12	1,431	0,760	0,815	NA	NA
D/13	0,620	0,829	0,989	1,108	0,898
D/14	0,950	1,330	1,330	0,900	0,787
D/15	1,980	NA	NA	NA	NA
Netherlands					
NL/1	0,920	0,927	0,873	0,716	0,501
NL/2	1,230	1,270	NA	NA	NA
Portugal					
P/1	1,893	1,900	1,900	1,600	NA
P/2	1,061	NA	NA	NA	NA
Spain					
E/1	0,960	1,260	1,420	1,141	1,041
E/2	1,430	1,330	1,272	1,153	1,166
E/3	1,960	1,510	1,280	0,959	0,685
E/4	1,400	1,450	0,784	0,462	0,537
E/5	1,735	1,442	1,347	1,455	1,226
E/6	0,603	0,750	0,758	0,818	0,784
E/7	1,900	1,400	1,060	0,880	1,120
E/8	1,500	1,680	1,510	1,140	1,100
E/9	1,220	1,500	0,735	0,831	1,110
Sweden					
S/1	0,370	0,250	0,250	0,270	0,234
S/2	0,171	0,139	0,131	0,140	0,121

Site	1998	1999	2000	2001	2002
Switzerland					
CH/1	1,030	1,370	1,146	1,065	1,258
CH/2	0,680	0,848	0,710	1,019	0,670
CH/3	0,780	0,370	0,517	0,625	0,515
UK					
UK/1	0,483	0,470	0,461	0,452	0,438
UK/2	1,179	1,310	1,520	1,660	1,880
UK/3	1,501	1,750	1,720	1,720	1,420

Table 6: Mercury in Safely Deposited Wastes* (kg per year)

Site	1998	1999	2000	2001	2002
Belgium					
B/1	NI	837	6 823	260	2 889
B/2	NI	5 733	3 566	4 646	358
B/3	NI	3	5	6	67
B/4	NI	0	2	1 242	NA
Total	**8 529**	**6 573**	**10 396**	**6 154**	**3 254**
Finland					
SF/1	0	0	0,16	0	0
Total	**0**	**0**	**0,16**	**0**	**0**
France					
F/1	NI	0	0	0	18
F/2	NI	68	2 632	9 644	8 896
F/3	NI	1 257	1 296	1 078	922
F/4	NI	54	37	43	41
F/5	NI	0	70	6	238
F/6	NI	33	16	64	48
F/7	NI	24	35	8	25
Total	**344**	**1 436**	**4 086**	**10 843**	**10 188**
Germany					
D/1	NI	31	NA	NA	NA
D/2	NI	4	0	NI	NI
D/3	NI	2	3	2	1
D/4	NI	3 054	3 054	1 259	3 437
D/5	NI	66	576	766	5 799
D/6	NI	1 314	3 764	1034	472
D/7	NI	37 260	20 602	13 200	13 390
D/8	NI	1 646	2 311	NI	674
D/9	NI	2 270	4 570	4 230	6 366
D/10	NI	304	NA	NA	NA
D/11	NI	19	NI	NA	NA
D/12	NI	176	176	NA	NA
D/13	NI	2 692	5 659	9 209	4 378
D/14	NI	1 656	754	833	406
D/15	NI	NA	NA	NA	NA
Total	**26 200**	**50 494**	**41 469**	**30 533**	**34 923**
Netherlands					
NL/1	NI	6	2	28	7
NL/2	NI	0	NA	NA	NA
Total	**38**	**6**	**2**	**28**	**7**
Portugal					
P/1	NI	0	0	0	NA
P/2	NI	NA	NA	NA	NA
Total	**689**	**0**	**0**	**0**	**0**
Spain					
E/1	NI	1 265	4 276	495	2 027
E/2	NI	27	8	9	141
E/3	NI	384	599	359	472
E/4	NI	2 694	6 279	4 868	2 343
E/5	NI	1 013	412	59	0
E/6	NI	604	770	1 088	2 339
E/7	NI	20	10	3	13
E/8	NI	498	432	459	552

* All mercury-contaminated materials, such as cell components, process equipment, solid wastes from sumps, pits, demercurisation units and the brine purification process, which have been sent to authorised and properly controlled toxic waste disposal sites, are to be included in the category "safely deposited waste". For the purpose of the balance, all deposits of mercury in whatever concentrations should be accounted for.

Site	1998	1999	2000	2001	2002
E/9	NI	500	401	279	169
Total	**657**	**7 005**	**13 187**	**7 619**	**8 056**

Sweden					
S/1	NI	6	6	850	5
S/2	NI	1	1	1	NI
Total	**42**	**7**	**7**	**851**	**5**

Switzerland					
CH/1	NI	165	178	215	207
CH/2	NI	0	3	32	1
CH/3	NI	1 084	0	1 933	NI
Total	**1 905**	**1 249**	**181**	**2 180**	**208**

UK					
UK/1	NI	161	268	263	136
UK/2	NI	37	48	147	113
UK/3	NI	3 911	3 092	2 842	10 745
Total	**3 187**	**4 109**	**3 408**	**3 252**	**10 994**

Table 7: Mercury in Safely Deposited Wastes* (g per tonne production capacity)

Site	1998	1999	2000	2001	2002
Belgium					
B/1	NI	3,640	31,155	1,188	13,192
B/2	NI	22,930	14,264	18,585	1,432
B/3	NI	0,025	0,039	0,046	0,055
B/4	NI	0	0,0260	29,819	NA
Finland					
SF/1	NI	0,003	0,004	0,006	0,003
France					
F/1	NI	0	0	0	1,024
F/2	NI	0,950	36,560	133,941	123,555
F/3	NI	5,220	5,380	4,474	3,828
F/4	NI	0,320	0,215	0,255	0,240
F/5	NI	0	3,100	0,280	10,580
F/6	NI	0,196	0,094	0,386	0,292
F/7	NI	0,131	0,190	0,044	0,134
Germany					
D/1	NI	0,480	NA	NA	NA
D/2	NI	0,030	0	0	NI
D/3	NI	0,014	0,021	0,014	0,007
D/4	NI	10,180	10,180	4,197	22,464
D/5	NI	0,440	3,600	4,788	36,242
D/6	NI	10,104	25,290	6,950	3,171
D/7	NI	207,000	113,200	75,000	76,080
D/8	NI	16,800	17,000	0	4,959
D/9	NI	15,134	28,560	25,329	38,119
D/10	NI	1,225	NA	NA	NA
D/11	NI	0,310	0	NA	NA
D/12	NI	1,120	1,120	NA	NA
D/13	NI	17,949	35,371	57,555	27,362
D/14	NI	23,000	9,150	10,110	4,937
D/15	NI	NA	NA	NA	NA
Netherlands					
NL/1	NI	0,082	0,027	0,382	0,100
NL/2	NI	0	NA	NA	NA
Portugal					
P/1	NI	0	0	0	NA
P/2	NI	NA	NA	NA	NA
Spain					
E/1	NI	42,150	136,300	15,759	64,604
E/2	NI	1,800	0,556	0,607	14,300
E/3	NI	11,460	17,850	10,703	14,056
E/4	NI	17,960	41,860	32,450	15,620
E/5	NI	16,085	6,564	0,943	0,005
E/6	NI	2,890	3,533	4,994	10,737
E/7	NI	0,800	0,380	0,120	0,528
E/8	NI	3,690	3,200	3,400	4,090
E/9	NI	4,950	3,970	2,767	1,673
Sweden					
S/1	NI	0,064	0,064	8,500	0,052
S/2	NI	0,011	0,010	0,010	NI

* All mercury-contaminated materials, such as cell components, process equipment, solid wastes from sumps, pits, demercurisation units and the brine purification process, which have been sent to authorised and properly controlled toxic waste disposal sites, are to be included in the category "safely deposited waste". For the purpose of the balance, all deposits of mercury in whatever concentrations should be accounted for.

Site	1998	1999	2000	2001	2002
Switzerland					
CH/1	NI	3,000	3,230	3,900	3,774
CH/2	NI	0	0,104	1,216	0,021
CH/3	NI	40,910	0	71,602	NI
UK					
UK/1	NI	5,540	9,115	8,938	4,631
UK/2	NI	0,420	0,530	1,640	1,260
UK/3	NI	5,300	4,190	3,850	14,560

4. 2002 data and information

4.1 Introduction

In this part of the report, data and information about the national chlor-alkali industry of each OSPAR Contracting Party is given as follows:

a. Contracting Parties with mercury-based chlor-alkali plants:
   (i) two overview maps showing the locations, the names and the operators of the sites;
   (ii) tables with technical data on the annual discharges, emissions and losses, including wastes, from plants of each Contracting Party (provided via Euro Chlor);
b. Contracting Parties with mercury-free plants or without chlor-alkali industry.

The column headings and abbreviations (e.g. C, E1, E2 etc) used in the tables correspond to the reporting requirements set out in the current formats:

Sea Area - Sea area in which liquid wastes from the plant is discharged, or is likely to be discharged

OSPAR maritime area
A - Atlantic

Areas not covered by the OSPAR Convention
Baltic - Baltic Sea
Bl Sea - Black Sea
M - Mediterranean Sea

Brine
W - waste brine plant
R - brine-recirculation plant

Values are expressed in continental notation.

4.2 Locations of mercury-based chlor-alkali plants

The two following maps give an overview of the locations of the mercury-based chlor-alkali plants indicated below and their operators:

Country/Code	Company	Location	Status
Belgium			
B/1	Solvin	Lillo	
B/2	Tessenderlo	Tessenderlo	
B/3	Solvin	Antwerpen	
B/4	Solvay	Jemeppe	Replaced its mercury technology in 2001
Finland			
SF/1	Eka Chemicals	Oulu	The permitted discharges and emissions have been increased on the basis of a revised authorisation in 2002
France			
F/1	PC de Loos	Loos	
F/2	Albemarle PPC	Thann	
F/3	Solvay	Tavaux	
F/4	Atofina	Jarrie	
F/5	SPC Harbonnières	Harbonnières	
F/6	Atofina	Lavera	
F/7	Atofina	St Auban	
Germany			
D/1	ECI	Bitterfeld	Ceased operation in 1999
D/2	Bayer	Uerdingen	Shut down in 2002
D/3	ECI	Ibbenbüren	
D/4	Bayer	Leverkusen	Shut down in 2002
D/5	BASF	Ludwigshafen	
D/6	Ineos	Wilhelmshafen	
D/7	Vestolit	Marl	Shut down of some cells in 2001
D/8	Degussa - Hüls	Lülsdorf	
D/9	Lil	Frankfurt	The permitted discharges and emissions have been increased on the basis of a revised authorisation in 2001
D/10	Bayer	Dormagen	Ceased operation in 1999
D/11	Clariant	Gersthofen	Shut down in 2000
D/12	Wacker Chemie	Burghausen	Shut down in 2000
D/13	Vintron	Knapsack	
D/14	Vinnolit	Gendorf	
D/15	BSL Olefinverbund	Schkopau	Shut down in 1998
The Netherlands			
NL/1	Akzo Nobel	Hengelo	
NL/2	Solvay	Linne-Herten	Decommissioned in 1999
Portugal			
P/1	Uniteca	Estarreja	Has been replaced by membrane cells in January 2002
P/2	Solvay Portugal	Póvoa de Santa Iria	Shut down in 1998

Country/Code	Company	Location	Status
Spain			
E/1	Quimica del Cinca	Monzon	
E/2	Electroquimica de Hernani	Hernani	Partly converted to membrane technology
E/3	Elnosa	Lourizan	
E/4	Ercros	Flix	
E/5	Solvay	Torrelavega	
E/6	Solvay	Martorell	
E/7	Aragonesas	Sabinanigo	
E/8	Aragonesas	Vilaseca	
E/9	Aragonesas	Huelva/Palos	
Sweden			
S/1	Akzo Nobel	Bohus	
S/2	Hydro Polymers	Stenungsund	Verified value
Switzerland			
CH/1	Solvay	Zurzach	
CH/2	Syngenia	Monthey	
CH/3	SF-Chem	Pratteln	
United Kingdom			
UK/1	Rhodia	Staveley	
UK/2	Albion Chemicals	Sandbach	
UK/3	Ineos	Runcorn	

4.3 Other OSPAR Contracting Parties

Denmark

Denmark has no chlor-alkali plants.

Luxembourg

Luxembourg has no chlor-alkali plants.

Iceland

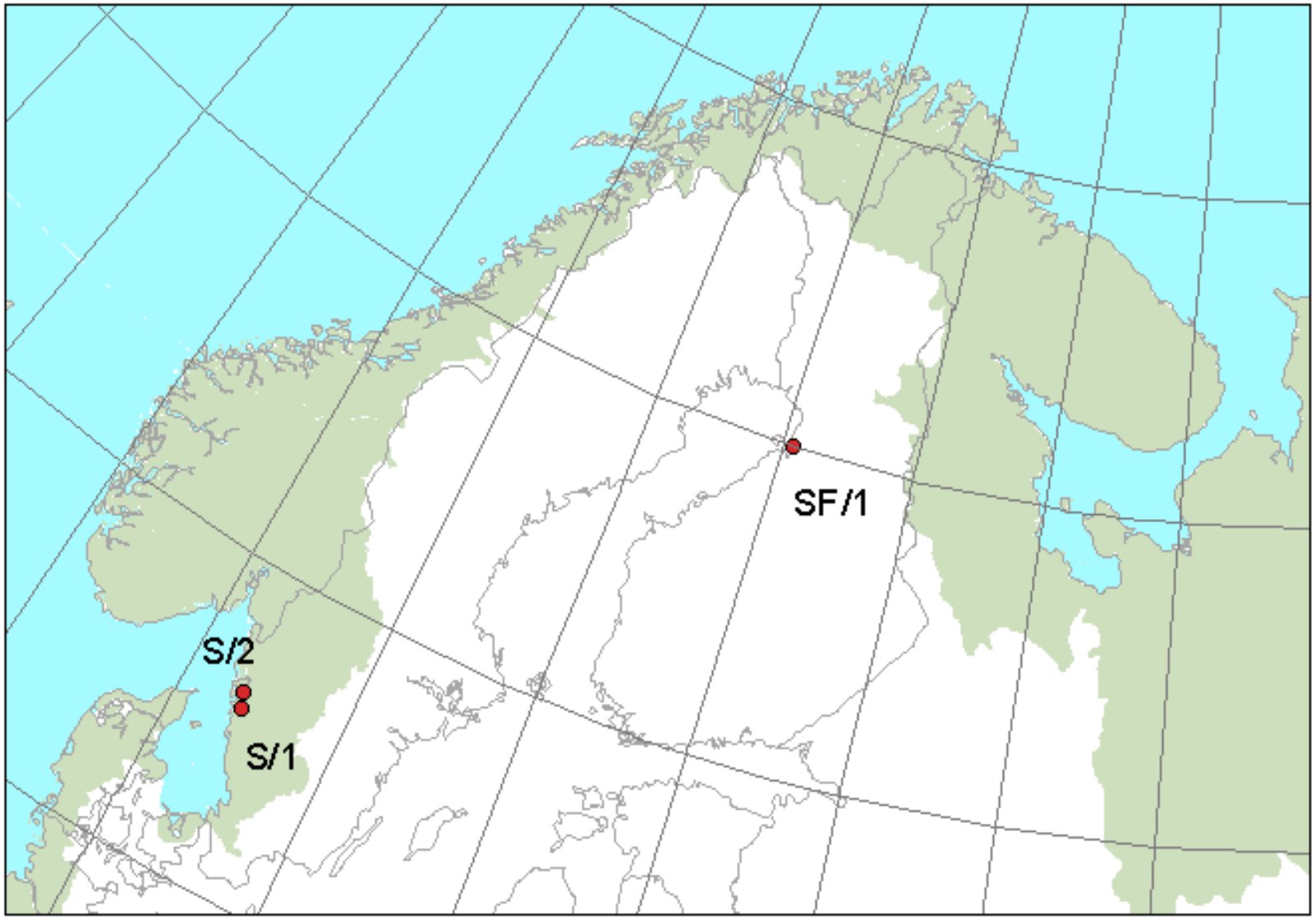
Iceland has no chlor-alkali plants.

Ireland

Ireland has only one chlor-alkali plant, which operates mercury-free.

Norway

The last Norwegian plant with mercury cells ceased its mercury-based operations in September 1997.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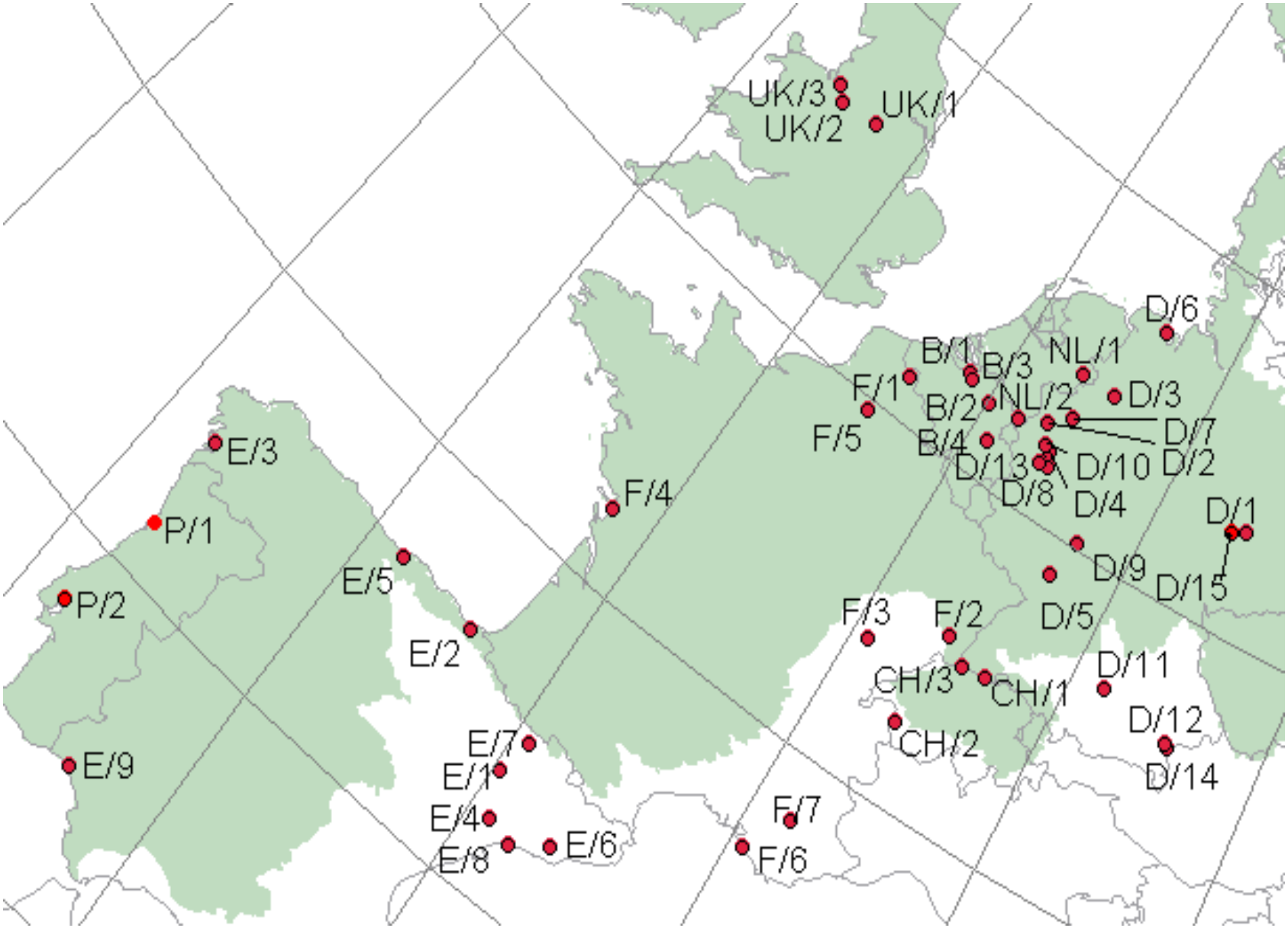
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E/8
F/6

Belgium

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision l (tonnes)	Temporarily stored F (g/t)	
B/1	219 000	A	R	12,050	0,045	0,019	0,106	0,204	0,310	0,374	13,192	1,100			5,023	-6,539
B/2	250 000	A	R	13,352	0,056	0,009	0,002	0,609	0,611	0,676	1,432	0,477	2,334		11,244	0,000
B/3	120 000	A	R	8,008	0,040	0,083	0,024	0,500	0,524	0,647	0,055	0,900			7,500	-0,194
Total	**589 000**															

Finland

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
SF/1	42 485	Baltic	R	77,957	0,050	0,080	0,003	0,913	0,916	1,046	0,003	0,019			0,447	76,461
Total	**42 485**															

The permitted discharges and emissions have been increased on the basis of a revised authorisation in 2002.

France

Site	Chlorine Production Capacity with Hg-cells	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses	Mercury in Wastes					Difference to Balance
							Process Exhaust	Cellroom	Total		Disposed off	Awaiting recovery	Awaiting disposal	Awaiting decision	Temporarily stored	
	(tonnes)			C (g/t)	E1 (g/t)	E2 (g/t)	2.3.1 (g/t)	2.3.2 (g/t)	E3 (g/t)	(g/t)	D (g/t)	c (tonnes)	f (tonnes)	I (tonnes)	F (g/t)	DB (g/t)
F/1	18 040	A	R	93,237	0,082	0,086	0,017	0,634	0,651	0,819	1,024	1,066	0,016		59,978	31,416
F/2	72 000	A	R	190,514	0,134	0,032	0,041	1,070	1,111	1,277	123,555	-0,281	4,915	-0,115	62,764	2,918
F/3	240 900	M	R	9,651	0,046	0,012	0,021	0,817	0,838	0,896	3,828		0,366		1,519	3,408
F/4	170 070	M	R	7,288	0,046	0,209	0,231	0,410	0,641	0,896	0,240	0,023	0,080		0,602	5,551
F/5	22 500	A	R	16,844	0,308	0,002	0,014	1,185	1,199	1,509	10,580		0,027		1,200	3,555
F/6	166 000	M	R	10,133	0,070	0,098		0,886	0,886	1,054	0,292					8,787
F/7	184 300	M	R	15,217	0,021	0,152	0,001	0,920	0,921	1,094	0,134	-0,089			-0,483	14,472
Total	**873 810**															

Germany

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
D/2	110 000	A	R	15,391	0,110	0,003	0,030	1,010	1,040	1,153			0,030		0,273	13,965
D/3	125 000	A	R		0,050	0,001	0,006	0,565	0,571	0,622	0,007	0,681		0,002	5,464	-6,093
D/4	153 000	A	R	24,327	0,040	0,030	0,060	1,732	1,792	1,862	22,464					0,001
D/5	160 000	A	R	13,125	0,030	0,010		0,940	0,940	0,980	36,242	10,300			64,375	-88,472
D/6	148 828	A	R	23,047	0,019	0,005		0,303	0,303	0,326	3,171	-2,404	0,719		-11,324	30,874
D/7	176 000	A	R	39,773	0,060	0,010	0,020	1,150	1,170	1,240	76,080		-0,800		-4,545	-33,002
D/8	135 951	A	R	2,523	0,211	0,031	0,007	1,032	1,039	1,281	4,959		8,227		60,514	-64,231
D/9	167 000	A	R	10,503	0,051	0,013	0,086	1,039	1,125	1,189	38,119			-4,410	-26,407	-2,398
D/13	160 000	A	R	69,462	0,087	0,034	0,018	0,880	0,898	1,019	27,362	7,320	0,395		48,219	-7,137
D/14	82 355	Bl Sea	R	28,486	0,028		0,091	0,696	0,787	0,815	4,937	0,048	-0,078		-0,364	23,099
Total	**1 418 134**															

The Netherlands

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
NL/1	74 294	A	R	0,619	0,030	0,020	0,143	0,358	0,501	0,551	0,100	-1,522	-0,004		-20,540	20,508
Total	**74 294**															

Spain

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision l (tonnes)	Temporarily stored F (g/t)	
E/1	31 373	M	R	18,774	0,221	0,283	0,023	1,018	1,041	1,545	64,604		-1,401		-44,656	-2,719
E/2	9 877	A	R	48,726	0,160	0,300	0,066	1,100	1,166	1,626	14,300	-0,172	-0,006		-18,022	50,822
E/3	33 552	A	R	20,804	0,421	0,017	0,010	0,675	0,685	1,123	14,056		0,011		0,328	5,297
E/4	150 000	M	R	21,480	0,225	0,059	0,005	0,532	0,537	0,821	15,620	0,523	0,013		3,573	1,466
E/5	62 747	A	W	3,411	0,108	0,034	0,011	1,215	1,226	1,368	0,005	-0,059	0,023		-0,574	2,611
E/6	217 871	M	R	15,202	0,058	0,006	0,187	0,597	0,784	0,848	10,737					3,617
E/7	25 000	M	R	12,400	0,281	0,027	0,010	1,110	1,120	1,428	0,528	0,129			5,160	5,284
E/8	135 004	M	R	11,140	0,130	0,060	0,050	1,050	1,100	1,290	4,090	0,061			0,452	5,308
E/9	100 929	A	R	12,187	0,148	0,051	0,115	0,995	1,110	1,309	1,673	0,250			2,477	6,728
Total	**766 353**															

Sweden

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
S/1	100 000	A	R	7,460	0,011	0,013	0,001	0,233	0,234	0,258	0,052	0,593		-0,002	5,913	1,237
S/2	120 000	A	R	31,508	0,019	0,003	0,002	0,119	0,121	0,143		1,620			13,500	17,865
Total	**220 000**															

Switzerland

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision l (tonnes)	Temporarily stored F (g/t)	
CH/1	55 000	A	R	-2,909	0,037	0,041	0,015	1,243	1,258	1,336	3,774					-8,019
CH/2	26 500	M	R		0,024	0,005	0,001	0,669	0,670	0,699	0,021					-0,720
CH/3	27 000	A	R	35,556	0,079	0,044		0,515	0,515	0,638			0,943		34,926	-0,008
Total	**108 500**															

United Kingdom

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
UK/1	29 413	A	R	47,598	0,127	0,041	0,010	0,428	0,438	0,606	4,631					42,361
UK/2	89 872	A	R	40,168	0,050	0,020	0,100	1,780	1,880	1,950	1,260	2,470			27,484	9,475
UK/3	**738 000**	A	W	19,751	0,050	0,140	0,220	1,200	1,420	1,610	14,560	3,130			4,241	-0,661
Total	**857 285**															