

Mercury Losses from the Chlor-Alkali Industry in 2003



**OSPAR Commission
2005**

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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Executive Summary/Récapitulatif

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

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

After several years of more or less stable production capacities, mercury-cell based chlorine production capacities have decreased in the period 1998-2002, with a further small decrease from 2002 to 2003. Capacity reductions in Germany are mainly responsible for the decrease in 2003.

Après plusieurs années pendant lesquelles les capacités de production sont restées plus ou moins stables, les capacités de production du chlore basée sur des cellules au mercure ont baissé pendant la période de 1998 à 2002, et une nouvelle diminution de faible ampleur s'est manifestée de 2002 à 2003. Ce sont les baisses de capacité survenues en Allemagne qui sont pour l'essentiel à l'origine de la diminution intervenue en 2003.

Mercury losses through product, waste water and air have in total decreased 5% from 2002 to 2003.

Les pertes de mercure par le biais des produits, de l'eau usée et de l'atmosphère ont au total baissé de 5% de 2002 à 2003.

Over the years, atmospheric emissions of mercury have been significantly reduced. In 2003, there was a further slight reduction relative to emissions reported in 2002. The data show that all plants comply with the limit value for air emissions of 2 g mercury per tonne of chlorine produced (established by PARCOM Decision 90/3), and it is clear that in many plants, air emissions continue to fall.

Au fil des années, les émissions atmosphériques de mercure ont été sensiblement réduites. En 2003, on constate une nouvelle et légère baisse par rapport aux émissions signalées en 2002. Les données prouvent que toutes les installations respectent le plafond d'émission atmosphérique de 2 g de mercure par tonne de chlore produit (plafond fixé par la Décision PARCOM 90/3), et il est clair que dans de nombreuses installations, les émissions atmosphériques continuent de diminuer.

Between 2002 and 2003, the amount of mercury in safely deposited wastes has increased from about 70 tonnes to about 75 tonnes. Some countries report increases and others decreases but these changes do not necessarily correlate to the shutdown of cells or plants. OSPAR will in future seek more detailed information to explain year-to-year differences in the amount of mercury in safely deposited wastes.

Entre 2002 et 2003, la quantité de mercure dans les déchets mis en décharges sécurisées a augmenté, puisqu'elle est passée d'environ 70 à 75 tonnes à peu près. Certains pays signalent des augmentations tandis que d'autres indiquent des baisses, ces changements n'étant cependant pas nécessairement corrélés à la fermeture de cellules ou d'installations. Dans l'avenir, OSPAR demandera des renseignements plus détaillés afin de pouvoir expliquer les différences dans les quantités de mercure se trouvant dans les déchets mis en décharges sécurisées.

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".

La Décision PARCOM 90/3 recommande que les installations existantes d'électrolyse des chlorures alcalins à cellules de mercure soient abandonnées le plus rapidement possible. L'objectif est qu'elles soient complètement abandonnées d'ici 2010. Les rapports relatifs aux projets d'abandon dans l'avenir des capacités nationales de production d'électrolyse des chlorures alcalins à cellules de mercure, qui étaient auparavant repris dans le présent rapport, figurent désormais dans 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 2003

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 2002, the mercury-cell-based chlorine production capacities have generally stayed the same with a small decrease from 2002 to 2003. The production capacity of all installations in the Convention area and for installations in the drainage area to maritime area decreased about 161 kilo tonnes. These reductions are based on the shut down of one plant in Germany (D/4) and of one plant in Spain (E/2), which was partly converted to membrane technology.
- b. "Mercury Losses through Product, Waste Water and Air" have decreased about 5% from 2002 to 2003. For the total decrease of about 255 kg from 2002 to 2003 the following Contracting Parties were mainly responsible: Germany with 192 kg and Spain with 38 kg. Some other countries had important increases e.g. France (116 kg), Belgium (34 kg) and UK (35 kg). The data show that there is still a wide range of specific Mercury Losses through Product, Waste Water and Air (from 0.22 to 1.68 g per tonne);
- c. air emissions of mercury have been slightly reduced in 2003. Significant reductions are reported from Germany (187 kg) and from UK and Switzerland of about 11 and 10 kg respectively. An increase of emission was reported by France, where one plant (F/7) increased its specific and total emissions up to 150 %. For further countries slight increases are indicated, e.g. Belgium and the Netherlands.

All plants comply with the limit value of 2 g Hg/t Cl₂ 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 0.14 to 1.57 g Hg/t Cl₂ 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 Cl₂ specified in PARCOM Decision 90/3;

- d. over the last year (see Table 6), the amount of mercury in safely deposited wastes has increased from about 70 tonnes to about 75 tonnes. The data are variable however, with some countries showing decreases and some showing increases. For example in 2003, Germany has a total value of about 35 tonnes and UK of about 21 tonnes. There is an explanation in Tables 6 and 7 what “safely deposited wastes” constitutes, 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 does not necessarily correlate to the shutdown of cells or plants all over the countries. The increasing figures of some plants e.g. in Germany plants D/5, D/8 or 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. So 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. The national plans on future phasing-out mercury-based chlor-alkali production capacities are now summarised in document “Overview Assessment of Implementation of PARCOM Decision 90/3 on Reducing Atmospheric Emissions from Existing Chlor-Alkali Plants” and readers are referred to this document which can be found at the OSPAR website under “hazardous substances/implementation reports and implementation reporting formats” (www.ospar.org) for further information.

Altogether the reported figures show clearly the results of the efforts, which have been achieved during the last five years. While the chlorine production capacity was reduced from 1998 to 2003 to about 78 % of the capacity in 1998, the parameter “mercury losses through product, waste water and air” and the parameter “atmospheric emissions of mercury” were reduced in a more forced rate to about 60 %.

3. Evolution of mercury losses from the chlor-alkali industry (1982-2003)

The following figures give a rough indication of the evolution of mercury losses from the chlor-alkali industry in the period 1982-2003 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 basis¹. 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 section 4.1.

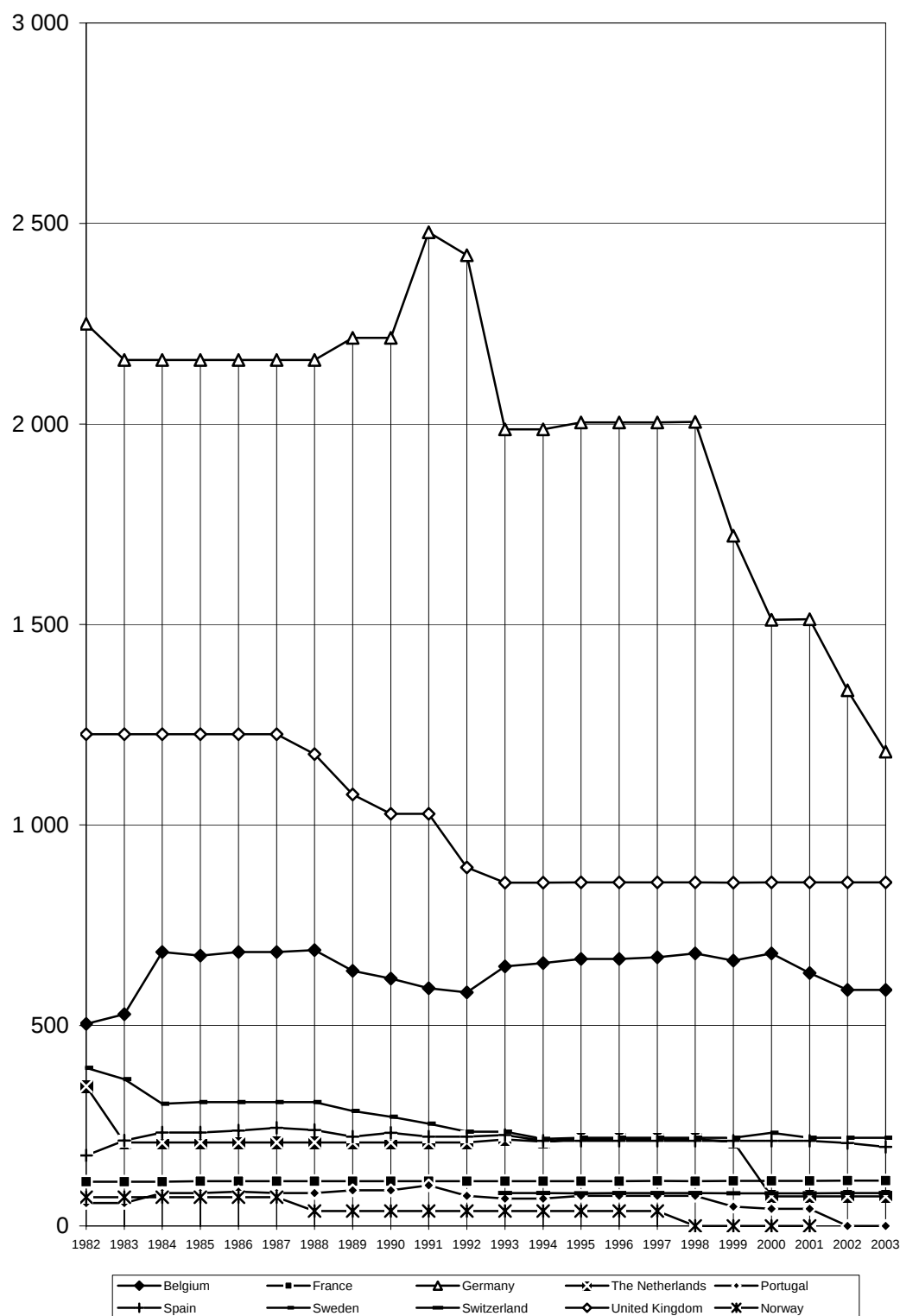


Figure 1: Chlorine Production Capacity with Mercury Cells of plants discharging into the OSPAR catchment area (in kilotonnes per year)

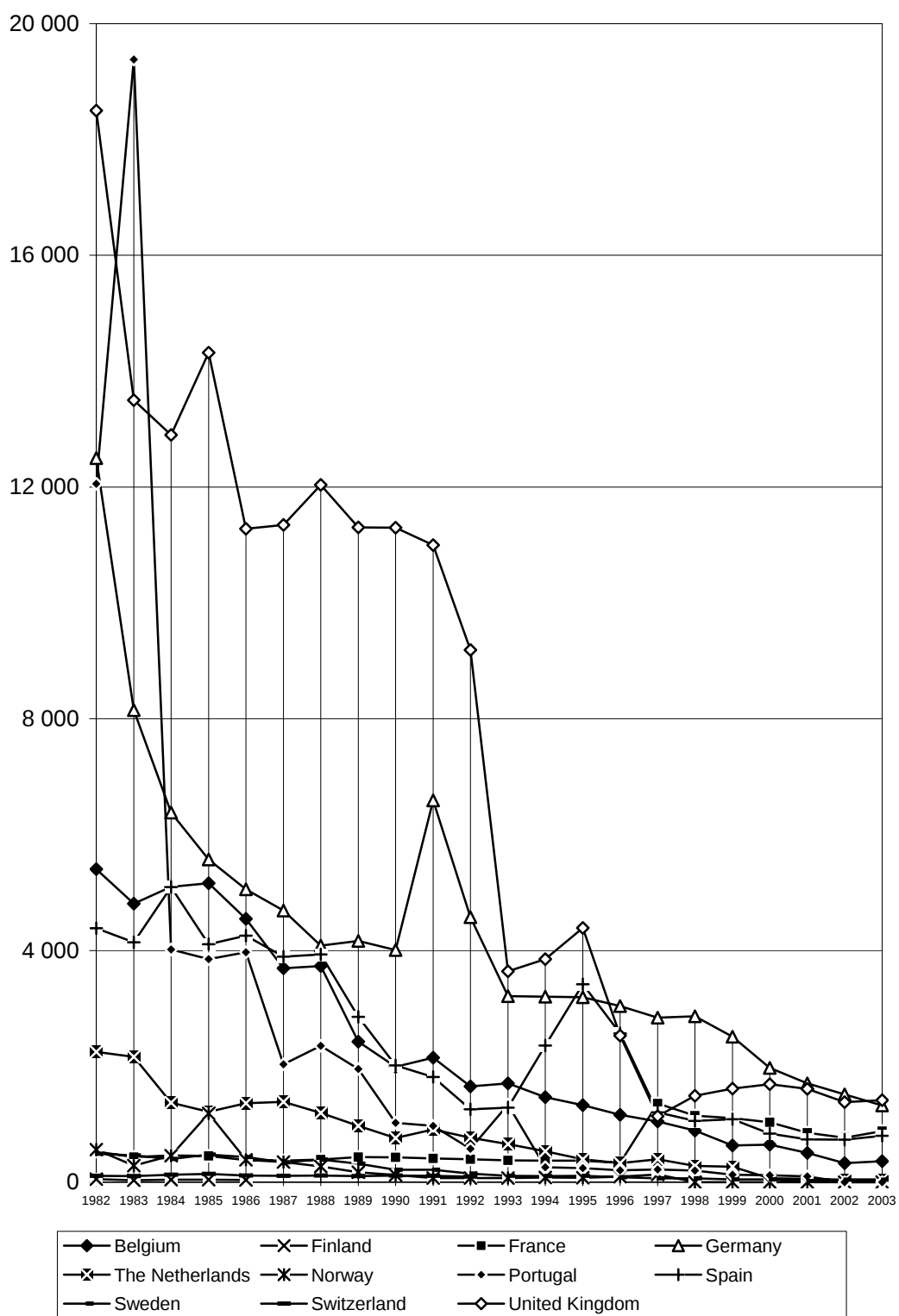


Figure 2: Mercury Losses through Product, Wastewater and Air
(in kilograms per year, sum of mercury losses to product and wastewater from national plants discharging into the OSPAR catchment area plus atmospheric emissions from all national plants)

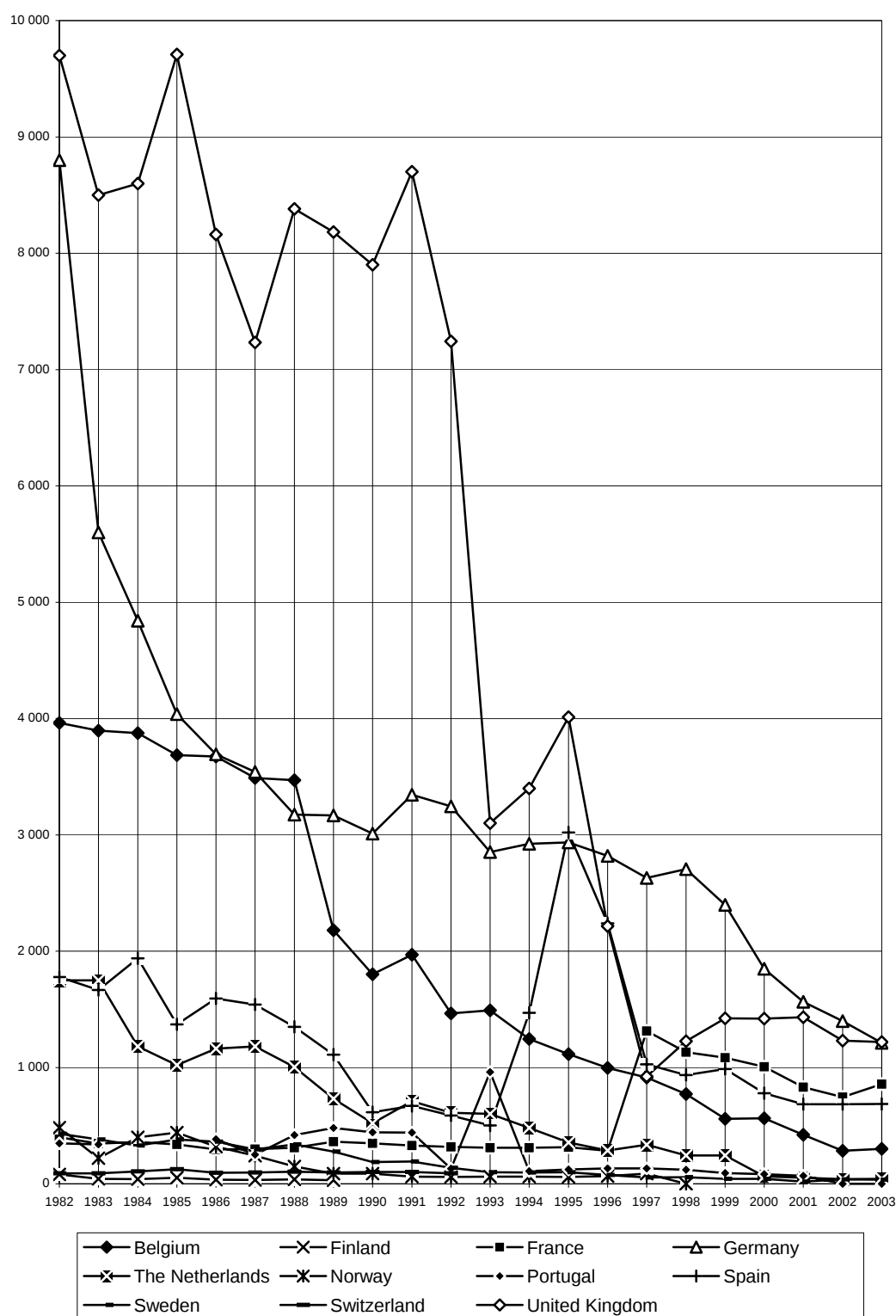


Figure 3: Atmospheric Emissions of Mercury from all plants of Contracting Parties
(in kilograms per year, all plants)

**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	2003
Belgium						
B/1*	219 000	230 000	219 000	219 000	219 000	219 000
B/2*	250 000	250 000	250 000	250 000	250 000	250 000
B/3*	120 000	100 000	120 000	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	589 000
Finland						
SF/1	40 000	40 000	40 000	40 000	42 485	42 485
Total	40 000	40 000	40 000	40 000	42 485	42 485
France						
F/1*	NI	18 040	18 040	18 040	18 040	18 040
F/2*	NI	72 000	72 000	72 000	72 000	72 000
F/3	NI	240 900	240 900	240 900	240 900	240 900
F/4	NI	170 070	170 070	170 070	170 070	170 070
F/5*	NI	22 500	22 500	22 500	22 500	22 500
F/6	NI	166 000	166 000	166 000	166 000	166 000
F/7	NI	184 300	184 300	184 300	184 300	184 300
Total	NI	873 810	873 810	873 810	873 810	873 810
Germany						
D/1	130 000	65 000	NA	NA	NA	NA
D/2*	130 000	130 000	140 000	140 000	110 000	110 000
D/3*	120 000	120 000	125 000	125 000	125 000	125 000
D/4*	150 000	300 000	300 000	300 000	153 000	NA
D/5*	180 000	150 000	160 000	160 000	160 000	160 000
D/6*	65 000	130 000	148 828	148 828	148 828	148 828
D/7*	160 000	180 000	182 000	176 000	176 000	176 000
D/8*	200 000	98 000	135 951	135 951	135 951	135 951
D/9*	150 000	150 000	160 000	167 000	167 000	167 000
D/10	300 000	248 000	NA	NA	NA	NA
D/11	50 000	60 000	9 804	NA	NA	NA
D/12	72 000	157 000	157 000	NA	NA	NA
D/13*	157 000	150 000	160 000	160 000	160 000	160 000
D/14	300 000	72 000	82 355	82 355	82 355	82 355
D/15	120 000	NA	NA	NA	NA	NA
Total	2 344 000	2 010 000	1 760 938	1 595 134	1 416 134	1 265 134
Netherlands						
NL/1*	70 000	70 000	74 294	74 294	74 294	74 294
NL/2*	140 000	140 000	NA	NA	NA	NA
Total	210 000	210 000	74 294	74 294	74 294	74 294
Portugal						
P/1*	48 600	48 000	43 302	43 302	NA	NA
P/2*	26 400	NA	NA	NA	NA	NA
Total	75 000	48 000	43 302	43 302	NA	NA
Spain						
E/1	31 920	30 000	31 373	31 373	31 373	31 373
E/2*	14 815	15 000	14 815	14 815	9 877	NI
E/3*	33 552	33 500	33 552	33 552	33 552	33 552
E/4	150 000	150 000	150 000	150 000	150 000	150 000
E/5*	62 745	63 000	62 747	62 747	62 747	62 747
E/6	209 200	209 000	217 871	217 871	217 871	217 871
E/7	25 000	25 000	25 000	25 000	25 000	25 000
E/8	135 000	135 000	135 004	135 004	135 004	135 004
E/9*	101 000	101 000	100 929	100 929	100 929	100 929
Total	763 232	761 500	771 291	771 291	766 353	756 476

Site	1998	1999	2000	2001	2002	2003
Sweden						
S/1*	100 000	100 000	100 000	100 000	100 000	100 000
S/2*	120 000	120 000	132 000	120 000	120 000	120 000
Total	220 000	220 000	232 000	220 000	220 000	220 000

Switzerland						
CH/1*	55 000	55 000	55 000	55 000	55 000	55 000
CH/2	26 500	22 000	26 500	26 500	26 500	26 500
CH/3*	27 000	26 500	27 000	27 000	27 000	27 000
Total	108 500	103 500	108 500	108 500	108 500	108 500

UK						
UK/1*	29 000	29 000	29 413	29 413	29 413	29 413
UK/2*	89 872	89 000	89 872	89 872	89 872	89 872
UK/3*	737 000	738 000	738 000	738 000	738 000	738 000
Total	855 872	856 000	857 285	857 285	857 285	857 285

Production capacity of all installations in the Convention area

	1998	1999	2000	2001	2002	2003
tonnes	6 170 314	5 784 810	5 441 320	5 214 279	4 947 861	4 786 984
%	100	93,8	88,2	84,5	80,2	77,6

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

	1998	1999	2000	2001	2002	2003
tonnes	3 819 424	3 810 540	3 805 143	3 744 906	3 476 003	3 315 126
%	100	99,8	99,6	98,0	91,0	86,8

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

Site	1998	1999	2000	2001	2002	2003
Belgium						
B/1	NI	173	157	122	82	92
B/2	NI	178	180	175	169	186
B/3	NI	113	111	88	78	85
B/4	NI	173	201	120		
Total	893	637	649	505	329	363
Finland						
SF/1	NI	63	43	41	44	37
Total	NI	63	43	41	44	37
France						
F/1	NI	28	29	24	15	12
F/2	NI	129	119	121	92	118
F/3	NI	345	338	226	216	245
F/4	NI	192	220	203	152	127
F/5	NI	32	32	33	34	33
F/6	NI	190	152	139	175	185
F/7	NI	281	243	237	202	282
Total	1 149	1 197	1 133	983	886	1 002
Germany						
D/1	NI	111	NA	NA	NA	NA
D/2	NI	147	247	159	127	128
D/3	NI	49	73	75	78	80
D/4	NI	367	367	358	285	NA
D/5	NI	261	166	162	157	169
D/6	NI	70	62	52	49	77
D/7	NI	313	257	199	218	289
D/8	NI	193	209	228	174	159
D/9	NI	161	165	197	199	213
D/10	NI	391	NA	NA	NA	NA
D/11	NI	104	18	NA	NA	NA
D/12	NI	132	137	NA	NA	NA
D/13	NI	137	171	201	163	146
D/14	285	100	112	80	67	64
D/15	NI	NA	NA	NA	NA	NA
Total	2 864	2 536	1 982	1 711	1 517	1 325
Netherlands						
NL/1	NI	71	68	57	41	45
NL/2	NI	196	NA	NA	NA	NA
Total	282	267	68	57	41	45
Portugal						
P/1	NI	130	121	100	NA	NA
P/2	NI	NA	NA	NA	NA	NA
Total	202	130	121	100	NA	NA
Spain						
E/1	NI	61	63	58	48	45
E/2	NI	30	29	25	16	NI
E/3	NI	66	57	52	38	42
E/4	NI	287	164	114	123	137
E/5	NI	142	102	101	86	74
E/6	NI	182	182	193	185	199
E/7	NI	53	49	32	36	30
E/8	NI	251	244	176	174	174
E/9	123	175	95	103	132	99
Total	1 057	1 247	985	854	838	800

Site	1998	1999	2000	2001	2002	2003
Sweden						
S/1	NI	27	28	29	26	22
S/2	NI	18	19	18	17	19
Total	65	45	47	47	43	41
Switzerland						
CH/1	NI	82	70	64	73	67
CH/2	NI	19	20	28	19	19
CH/3	NI	15	19	25	17	12
Total	111	116	109	117	109	98
UK						
UK/1	NI	15	16	17	18	35
UK/2	NI	125	144	157	175	144
UK/3	NI	1 476	1 535	1 439	1 188	1237
Total	1 493	1 616	1 695	1 613	1 381	1 416

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	2003
kg/year	8 179	7 854	6 832	6 028	5 188	4 933
%	100	96,0	83,5	73,3	63,4	60,3

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

Site	1998	1999	2000	2001	2002	2003
Belgium						
B/1	NI	0,750	0,715	0,556	0,374	0,419
B/2	NI	0,710	0,720	0,699	0,676	0,744
B/3	NI	1,125	0,921	0,736	0,647	0,712
B/4	NI	2,110	2,212	2,890	NA	NA
Finland						
SF/1	NI	1,574	1,078	1,026	1,046	0,878
France						
F/1	NI	1,580	1,631	1,317	0,819	0,646
F/2	NI	1,792	1,646	1,680	1,277	1,644
F/3	NI	1,431	1,403	0,940	0,896	1,019
F/4	NI	1,131	1,292	1,197	0,896	0,746
F/5	NI	1,444	1,436	1,457	1,509	1,469
F/6	NI	1,144	0,917	0,836	1,054	1,117
F/7	NI	1,522	1,320	1,286	1,094	1,530
Germany						
D/1	NI	1,707	NA	NA	NA	NA
D/2	NI	1,128	1,766	1,132	1,153	1,163
D/3	NI	0,406	0,583	0,601	0,622	0,640
D/4	NI	1,223	1,223	1,193	1,862	NA
D/5	NI	1,740	1,040	1,010	0,980	1,060
D/6	NI	0,540	0,416	0,348	0,326	0,515
D/7	NI	1,740	1,410	1,130	1,240	1,640
D/8	NI	1,970	1,540	1,680	1,281	1,167
D/9	NI	1,070	1,032	1,182	1,189	1,279
D/10	NI	1,576	NA	NA	NA	NA
D/11	NI	1,740	1,864	NA	NA	NA
D/12	NI	0,843	0,871	NA	NA	NA
D/13	NI	0,910	1,069	1,259	1,019	0,911
D/14	NI	1,390	1,364	0,966	0,815	0,776
D/15	NI	NA	NA	NA	NA	NA
Netherlands						
NL/1	NI	1,008	0,909	0,765	0,551	0,610
NL/2	NI	1,400	NA	NA	NA	NA
Portugal						
P/1	NI	2,700	2,800	2,300	NA	NA
P/2	NI	NA	NA	NA	NA	NA
Spain						
E/1	NI	2,040	2,020	1,861	1,545	1,430
E/2	NI	2,020	1,948	1,667	1,626	NI
E/3	NI	1,970	1,699	1,563	1,123	1,264
E/4	NI	1,910	1,094	0,762	0,821	0,911
E/5	NI	2,259	1,632	1,608	1,368	1,172
E/6	NI	0,870	0,834	0,885	0,848	0,914
E/7	NI	2,100	1,940	1,265	1,428	1,220
E/8	NI	1,860	1,810	1,300	1,290	1,290
E/9	NI	1,730	0,938	1,021	1,309	0,976
Sweden						
S/1	NI	0,268	0,278	0,288	0,258	0,221
S/2	NI	0,154	0,144	0,154	0,143	0,161

Site	1998	1999	2000	2001	2002	2003
Switzerland						
CH/1	NI	1,490	1,271	1,162	1,336	1,227
CH/2	NI	0,877	0,743	1,054	0,699	0,712
CH/3	NI	0,560	0,692	0,917	0,638	0,434
UK						
UK/1	NI	0,525	0,538	0,574	0,606	1,180
UK/2	NI	1,410	1,600	1,744	1,950	1,600
UK/3	NI	2,000	2,080	1,950	1,610	1,677

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

Site	1998	1999	2000	2001	2002	2003
Belgium						
B/1	290	156	137	106	68	74
B/2	176	154	157	153	153	164
B/3	146	101	98	74	63	62
B/4	160	146	172	80	NA	NA
Total	772	558	564	413	284	300
Finland						
SF/1	40	53	35	34	39	31
Total	40	53	35	34	39	31
France						
F/1	26	25	26	21	12	7
F/2	111	115	103	108	80	103
F/3	301	320	313	210	202	235
F/4	179	182	188	171	109	88
F/5	330	25	25	26	27	27
F/6	24	161	129	109	147	142
F/7	160	255	223	186	170	255
Total	1 131	1 083	1 007	831	747	857
Germany						
D/1	173	105	NA	NA	NA	NA
D/2	92	135	235	146	114	113
D/3	84	39	63	68	71	74
D/4	255	353	353	345	274	NA
D/5	256	255	160	155	150	163
D/6	105	66	58	48	45	72
D/7	128	301	244	187	206	276
D/8	280	175	171	179	141	113
D/9	150	149	151	185	188	203
D/10	354	382	NA	NA	NA	NA
D/11	105	100	18	NA	NA	NA
D/12	103	119	128	NA	NA	NA
D/13	97	124	158	177	144	135
D/14	285	96	110	74	65	62
D/15	238	NA	NA	NA	NA	NA
Total	2 705	2 399	1 849	1 564	1 398	1 211
Netherlands						
NL/1	65	65	65	53	37	42
NL/2	180	178	NA	NA	NA	NA
Total	245	243	65	53	37	42
Portugal						
P/1	92	91	82	69	NA	NA
P/2	28	NA	NA	NA	NA	NA
Total	120	91	82	69	NA	NA
Spain						
E/1	31	38	45	36	33	38
E/2	21	20	19	17	12	NI
E/3	66	51	43	32	23	31
E/4	210	218	118	69	80	114
E/5	109	91	85	91	77	63
E/6	126	157	165	178	171	182
E/7	48	35	27	22	28	26
E/8	203	227	204	155	148	151
E/9	123	152	74	84	112	81
Total	937	989	780	684	684	686

Site	1998	1999	2000	2001	2002	2003
Sweden						
S/1	37	25	25	27	23	20
S/2	21	17	17	17	15	16
Total	58	42	42	44	38	36
Switzerland						
CH/1	57	75	63	58	69	65
CH/2	18	19	19	27	18	18
CH/3	21	10	14	17	14	8
Total	96	104	96	102	101	91
UK						
UK/1	14	14	14	13	13	29
UK/2	106	117	137	149	169	137
UK/3	1 107	1 292	1 269	1 270	1 048	1053
Total	1 227	1 423	1 420	1 432	1 230	1 219

Total atmospheric emissions of mercury from all installations in the Convention area¹

	1998	1999	2000	2001	2002	2003
kg/year	7 331	6 985	5 940	5 226	4 558	4 475
%	100	95,3	81,0	71,3	62,2	61

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

Site	1998	1999	2000	2001	2002	2003
Belgium						
B/1	1,320	0,680	0,627	0,484	0,310	0,338
B/2	0,705	0,617	0,627	0,615	0,611	0,657
B/3	1,213	1,013	0,813	0,615	0,524	0,516
B/4	1,770	1,780	1,888	1,930	NA	NA
Finland						
SF/1	1,000	1,322	0,885	0,856	0,916	0,738
France						
F/1	1,390	1,380	1,442	1,154	0,651	0,416
F/2	1,540	1,600	1,424	1,498	1,111	1,433
F/3	1,250	1,330	1,300	0,871	0,838	0,976
F/4	1,050	1,068	1,108	1,004	0,641	0,518
F/5	1,790	1,123	1,132	1,159	1,199	1,186
F/6	1,080	0,971	0,776	0,660	0,886	0,853
F/7	0,960	1,381	1,210	1,011	0,921	1,384
Germany						
D/1	1,330	1,610	NA	NA	NA	NA
D/2	0,710	1,040	1,680	1,040	1,040	1,030
D/3	0,700	0,322	0,507	0,546	0,571	0,592
D/4	1,700	1,175	1,175	1,150	1,792	NA
D/5	1,420	1,700	1,000	0,970	0,940	1,020
D/6	1,609	0,510	0,390	0,322	0,303	0,481
D/7	0,800	1,670	1,340	1,060	1,170	1,570
D/8	1,400	1,790	1,260	1,320	1,039	0,834
D/9	1,000	0,995	0,942	1,106	1,125	1,215
D/10	1,180	1,540	NA	NA	NA	NA
D/11	2,100	1,660	1,846	NA	NA	NA
D/12	1,431	0,760	0,815	NA	NA	NA
D/13	0,620	0,829	0,989	1,108	0,898	0,841
D/14	0,950	1,330	1,330	0,900	0,787	0,756
D/15	1,980	NA	NA	NA	NA	NA
Netherlands						
NL/1	0,920	0,927	0,873	0,716	0,501	0,560
NL/2	1,230	1,270	NA	NA	NA	NA
Portugal						
P/1	1,893	1,900	1,900	1,600	NA	NA
P/2	1,061	NA	NA	NA	NA	NA
Spain						
E/1	0,960	1,260	1,420	1,141	1,041	1,220
E/2	1,430	1,330	1,272	1,153	1,166	NI
E/3	1,960	1,510	1,280	0,959	0,685	0,927
E/4	1,400	1,450	0,784	0,462	0,537	0,760
E/5	1,735	1,442	1,347	1,455	1,226	1,001
E/6	0,603	0,750	0,758	0,818	0,784	0,836
E/7	1,900	1,400	1,060	0,880	1,120	1,040
E/8	1,500	1,680	1,510	1,140	1,100	1,120
E/9	1,220	1,500	0,735	0,831	1,110	0,800
Sweden						
S/1	0,370	0,250	0,250	0,270	0,234	0,204
S/2	0,171	0,139	0,131	0,140	0,121	0,135

Site	1998	1999	2000	2001	2002	2003
Switzerland						
CH/1	1,030	1,370	1,146	1,065	1,258	1,176
CH/2	0,680	0,848	0,710	1,019	0,670	0,689
CH/3	0,780	0,370	0,517	0,625	0,515	0,315
UK						
UK/1	0,483	0,470	0,461	0,452	0,438	1,004
UK/2	1,179	1,310	1,520	1,660	1,880	1,520
UK/3	1,501	1,750	1,720	1,720	1,420	1,427

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

Site	1998	1999	2000	2001	2002	2003
Belgium						
B/1	NI	837	6 823	260	2 889	2 293
B/2	NI	5 733	3 566	4 646	358	NI
B/3	NI	3	5	6	67	6
B/4	NI	0	2	1 242	NA	NA
Total	8 529	6 573	10 396	6 154	3 254	2 299
Finland						
SF/1	0	0	0,16	0	0	0
Total	0	0	0,16	0	0	0
France						
F/1	NI	0	0	0	18	33
F/2	NI	68	2 632	9 644	8 896	6 230
F/3	NI	1 257	1 296	1 078	922	1 323
F/4	NI	54	37	43	41	34
F/5	NI	0	70	6	238	13
F/6	NI	33	16	64	48	25
F/7	NI	24	35	8	25	24
Total	344	1 436	4 086	10 843	10 188	7 682
Germany						
D/1	NI	31	NA	NA	NA	NA
D/2	NI	4	0	NI	NI	NI
D/3	NI	2	3	2	1	NI
D/4	NI	3 054	3 054	1 259	3 437	NA
D/5	NI	66	576	766	5 799	10 555
D/6	NI	1 314	3 764	1034	472	1 591
D/7	NI	37 260	20 602	13 200	13 390	12 260
D/8	NI	1 646	2 311	NI	674	2 282
D/9	NI	2 270	4 570	4 230	6 366	5 340
D/10	NI	304	NA	NA	NA	NA
D/11	NI	19	NI	NA	NA	NA
D/12	NI	176	176	NA	NA	NA
D/13	NI	2 692	5 659	9 209	4 378	2 745
D/14	NI	1 656	754	833	406	85
D/15	NI	NA	NA	NA	NA	NA
Total	26 200	50 494	41 469	30 533	34 923	34 858
Netherlands						
NL/1	NI	6	2	28	7	3
NL/2	NI	0	NA	NA	NA	NA
Total	38	6	2	28	7	3
Portugal						
P/1	NI	0	0	0	NA	NA
P/2	NI	NA	NA	NA	NA	NA
Total	689	0	0	0	0	0
Spain						
E/1	NI	1 265	4 276	495	2 027	846
E/2	NI	27	8	9	141	NI
E/3	NI	384	599	359	472	679
E/4	NI	2 694	6 279	4 868	2 343	2 020
E/5	NI	1 013	412	59	0	440
E/6	NI	604	770	1 088	2 339	2 625
E/7	NI	20	10	3	13	14
E/8	NI	498	432	459	552	328

* 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	2003
E/9	NI	500	401	279	169	349
Total	657	7 005	13 187	7 619	8 056	7 301
Sweden						
S/1	NI	6	6	850	5	NI
S/2	NI	1	1	1	NI	NI
Total	42	7	7	851	5	NI
Switzerland						
CH/1	NI	165	178	215	207	239
CH/2	NI	0	3	32	1	2
CH/3	NI	1 084	0	1 933	NI	1 891
Total	1 905	1 249	181	2 180	208	2 132
UK						
UK/1	NI	161	268	263	136	118
UK/2	NI	37	48	147	113	119
UK/3	NI	3 911	3 092	2 842	10 745	21 247
Total	3 187	4 109	3 408	3 252	10 994	21 484

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

Site	1998	1999	2000	2001	2002	2003
Belgium						
B/1	NI	3,640	31,155	1,188	13,192	10,472
B/2	NI	22,930	14,264	18,585	1,432	NI
B/3	NI	0,025	0,039	0,046	0,055	0,047
B/4	NI	0	0,0260	29,819	NA	NA
Finland						
SF/1	NI	0,003	0,004	0,006	0,003	NI
France						
F/1	NI	0	0	0	1,024	1,810
F/2	NI	0,950	36,560	133,941	123,555	86,528
F/3	NI	5,220	5,380	4,474	3,828	5,491
F/4	NI	0,320	0,215	0,255	0,240	0,200
F/5	NI	0	3,100	0,280	10,580	0,600
F/6	NI	0,196	0,094	0,386	0,292	0,148
F/7	NI	0,131	0,190	0,044	0,134	0,131
Germany						
D/1	NI	0,480	NA	NA	NA	NA
D/2	NI	0,030	0	0	NI	NI
D/3	NI	0,014	0,021	0,014	0,007	NI
D/4	NI	10,180	10,180	4,197	22,464	NA
D/5	NI	0,440	3,600	4,788	36,242	66
D/6	NI	10,104	25,290	6,950	3,171	11
D/7	NI	207,000	113,200	75,000	76,080	70
D/8	NI	16,800	17,000	0	4,959	17
D/9	NI	15,134	28,560	25,329	38,119	32
D/10	NI	1,225	NA	NA	NA	NA
D/11	NI	0,310	0	NA	NA	NA
D/12	NI	1,120	1,120	NA	NA	NA
D/13	NI	17,949	35,371	57,555	27,362	17
D/14	NI	23,000	9,150	10,110	4,937	1
D/15	NI	NA	NA	NA	NA	NA
Netherlands						
NL/1	NI	0,082	0,027	0,382	0,100	0,043
NL/2	NI	0	NA	NA	NA	NA
Portugal						
P/1	NI	0	0	0	NA	NA
P/2	NI	NA	NA	NA	NA	NA
Spain						
E/1	NI	42,150	136,300	15,759	64,604	27
E/2	NI	1,800	0,556	0,607	14,300	NI
E/3	NI	11,460	17,850	10,703	14,056	20
E/4	NI	17,960	41,860	32,450	15,620	13
E/5	NI	16,085	6,564	0,943	0,005	7
E/6	NI	2,890	3,533	4,994	10,737	12
E/7	NI	0,800	0,380	0,120	0,528	1
E/8	NI	3,690	3,200	3,400	4,090	2
E/9	NI	4,950	3,970	2,767	1,673	3
Sweden						
S/1	NI	0,064	0,064	8,500	0,052	NI
S/2	NI	0,011	0,010	0,010	NI	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	2003
Switzerland						
CH/1	NI	3,000	3,230	3,900	3,774	4,350
CH/2	NI	0	0,104	1,216	0,021	0,061
CH/3	NI	40,910	0	71,602	NI	70,048
UK						
UK/1	NI	5,540	9,115	8,938	4,631	4,001
UK/2	NI	0,420	0,530	1,640	1,260	1,330
UK/3	NI	5,300	4,190	3,850	14,560	28,790

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	
Germany²			
D/1	ECI	Bitterfeld	Ceased operation in 1999
D/2	Bayer	Uerdingen	Converted to membrane
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

² Germany advised that 7 plants have been converted. 5 more plants are to be converted.

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

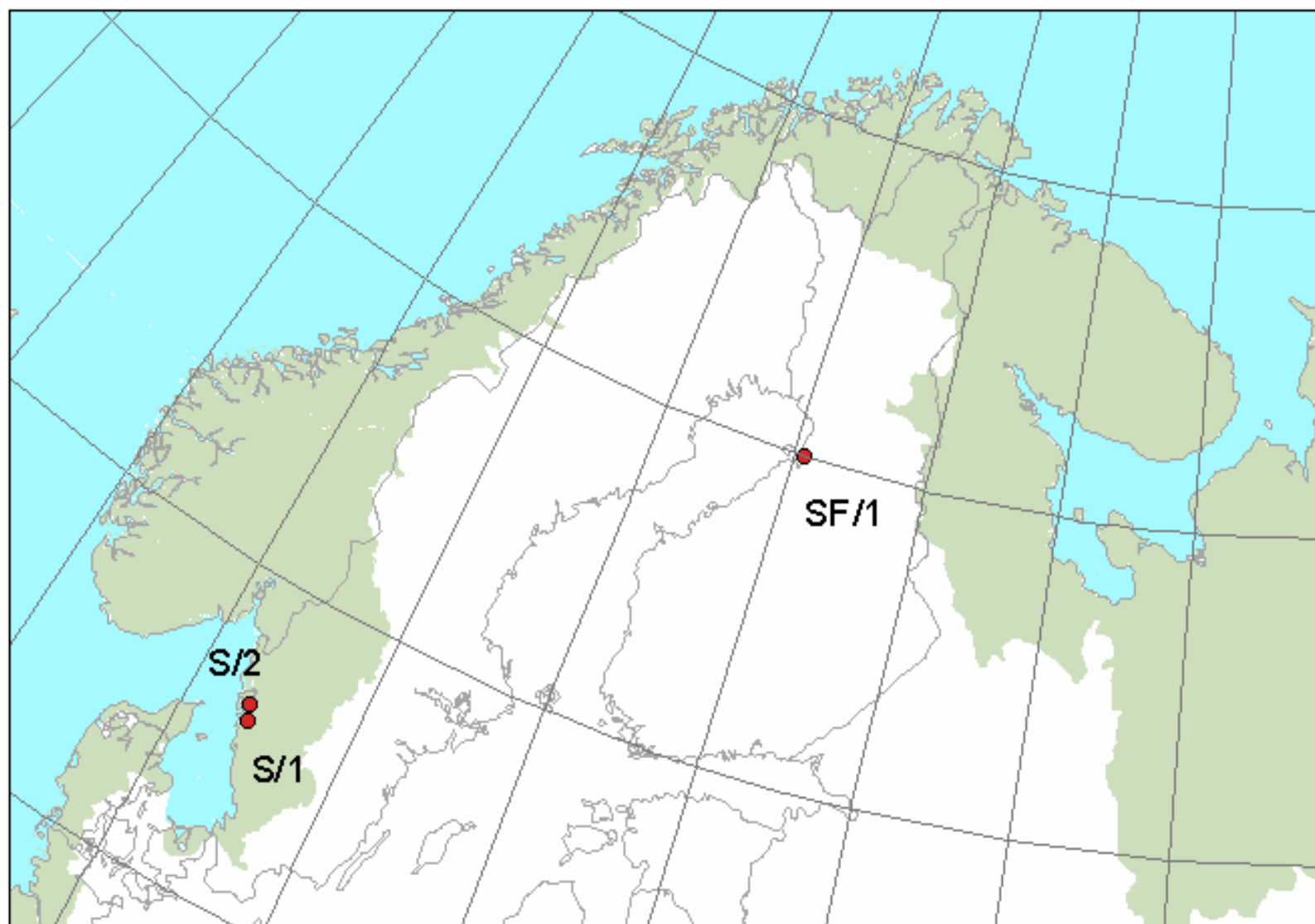
Iceland has no chlor-alkali plants.

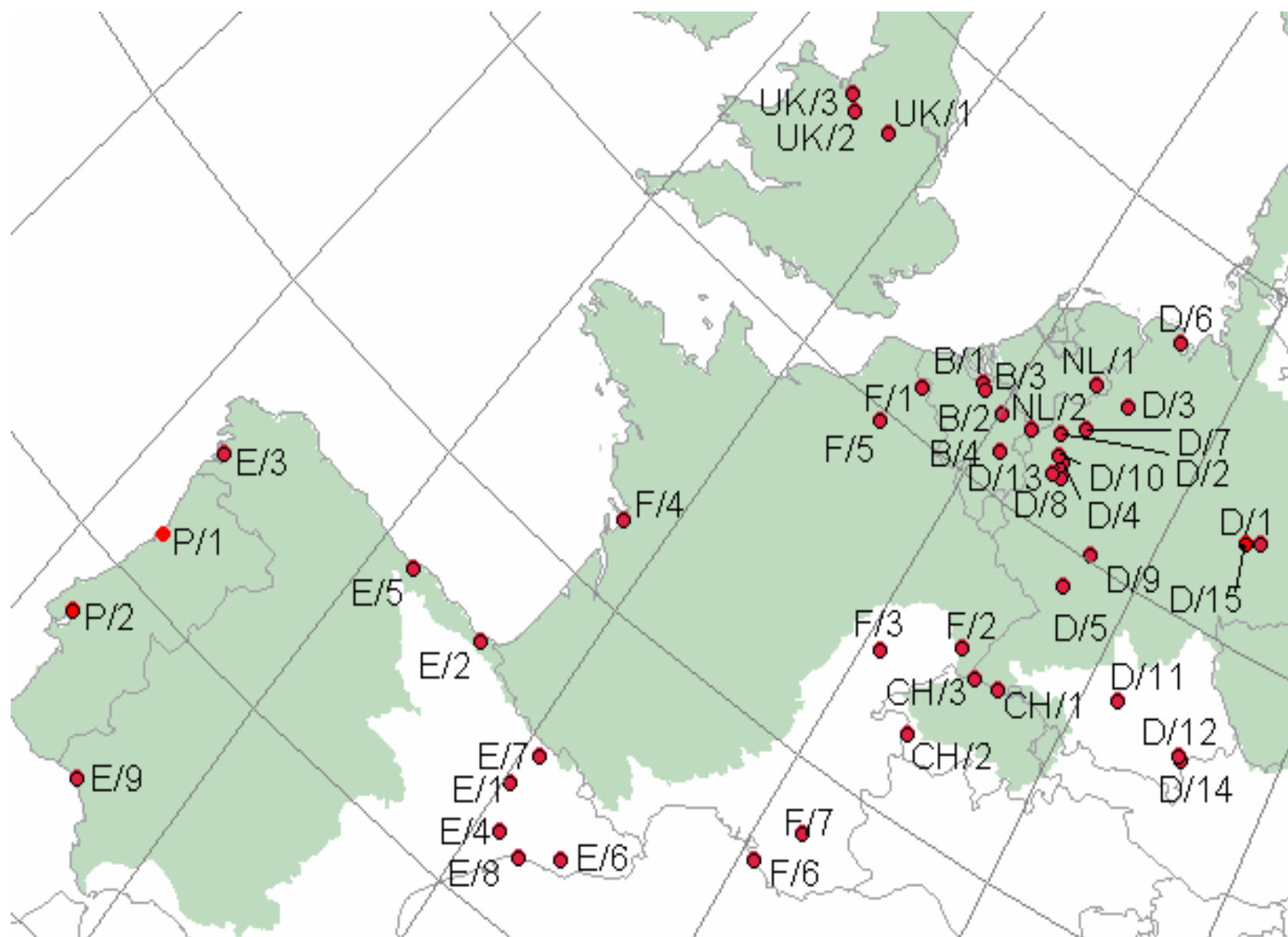
Ireland

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.





Belgium

Site	Chlorine Production Capacity with Hg- cells (tonnes)	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
				C (g/t)	E1 (g/t)	E2 (g/t)	Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)	(g/t)	Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision l (tonnes)	Temporarily stored F (g/t)	DB (g/t)
B/1	219 000	A	R	25,023	0,061	0,020	0,110	0,228	0,338	0,419	10,472	-0,709			-3,237	17,369
B/2	250 000	A	R	14,656	0,079	0,008	0,003	0,654	0,657	0,744		-0,040	3,518		13,912	0,000
B/3	120 000	A	R	-20,933	0,057	0,139	0,016	0,500	0,516	0,712	0,047	-0,633			-5,275	-16,417
Total	589 000															

Finland

Site	Chlorine Production Capacity with Hg- cells (tonnes)	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
				C	E1	E2	Process Exhaust	Cellroom	Total		Disposed off	Awaiting recovery	Awaiting disposal	Awaiting decision	Temporarily stored	
				(g/t)	(g/t)	(g/t)	2.3.1 (g/t)	2.3.2 (g/t)	E3 (g/t)		D (g/t)	c (tonnes)	f (tonnes)	l (tonnes)	F (g/t)	
SF/1	42 485	Baltic	R	19,466	0,020	0,120	0,002	0,736	0,738	0,878		1,706			40,155	-21,568
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 (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)	
F/1	18 040	A	R	88,858	0,142	0,088	0,010	0,406	0,416	0,646	1,810	1,017	0,005		56,652	29,750
F/2	72 000	A	R	64,125	0,151	0,060	0,072	1,361	1,433	1,644	86,528	0,720	-2,667		-27,042	2,995
F/3	240 900	M	R	8,601	0,041	0,002	0,114	0,862	0,976	1,019	5,491	0,166			0,689	1,402
F/4	170 070	M	R	5,939	0,042	0,186	0,073	0,445	0,518	0,746	0,200	0,025	0,051		0,443	4,549
F/5	22 500	A	R	16,800	0,282	0,001	0,006	1,180	1,186	1,469	0,600	-0,046			-2,044	16,775
F/6	166 000	M	R	10,054	0,035	0,229		0,853	0,853	1,117	0,148					8,789
F/7	184 300	M	R	14,700	0,018	0,128	0,004	1,380	1,384	1,530	0,131	0,571			3,098	9,941
Total	873 810															

Germany

Site	Chlorine Production Capacity with Hg- cells (tonnes)	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
				C	E1	E2	Process Exhaust	Cellroom	Total		Disposed off	Awaiting recovery	Awaiting disposal	Awaiting decision	Temporarily stored	
				(g/t)	(g/t)	(g/t)	2.3.1 (g/t)	2.3.2 (g/t)	E3 (g/t)		D (g/t)	c (tonnes)	f (tonnes)	l (tonnes)	F (g/t)	
D/2	110 000	A	R	16,300	0,130	0,003	0,030	1,000	1,030	1,163			0,030		0,273	14,864
D/3	125 000	A	R		0,047	0,001	0,010	0,583	0,592	0,640		0,057	0,036	-0,002	0,724	-1,364
D/5	160 000	A	R	74,250	0,030	0,010		1,020	1,020	1,060	65,969	-10,330			-64,563	71,783
D/6	148 828	A	R	23,242	0,027	0,007		0,481	0,481	0,515	10,694	0,185	-0,667		-3,239	15,271
D/7	176 000	A	R	39,773	0,060	0,010	0,020	1,550	1,570	1,640	69,660		3,420		19,432	-50,959
D/8	135 951	A	R		0,286	0,047	0,007	0,827	0,834	1,167	16,783		1,468		10,798	-28,748
D/9	167 000	A	R		0,057	0,007	0,086	1,129	1,215	1,279	31,976		-3,752		-22,467	-10,788
D/13	160 000	A	R	91,531	0,060	0,010	0,018	0,823	0,841	0,911	17,156	16,510	-6,006		65,650	7,814
D/14	82 355	Bl Sea	R	16,113	0,019	0,001	0,082	0,674	0,756	0,776	1,033	0,666			8,087	6,217
Total	1 265 134															

The Netherlands

Site	Chlorine Production Capacity with Hg- cells (tonnes)	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
				C (g/t)	E1 (g/t)	E2 (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)	
NL/1	74 294	A	R	-28,239	0,029	0,021	0,141	0,419	0,560	0,610	0,043	-2,145	0,001		-28,858	-0,034
Total	74 294															

Spain

Site	Chlorine Production Capacity with Hg- cells (tonnes)	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
				C (g/t)	E1 (g/t)	E2 (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	30,057	0,200	0,010	0,011	1,209	1,220	1,430	26,980	-0,138	-1,138		-8,797	10,445
E/3	33 552	A	R	23,218	0,322	0,015	0,263	0,664	0,927	1,264	20,224		0,025		0,745	0,985
E/4	150 000	M	R	18,087	0,106	0,045	0,005	0,755	0,760	0,911	13,469	-0,037	-0,003		-0,267	3,973
E/5	62 747	A	W	17,037	0,101	0,070	0,015	0,986	1,001	1,172	7,007	0,084	0,002		1,371	7,487
E/6	217 871	M	R	21,797	0,073	0,005	0,200	0,636	0,836	0,914	12,047			0,430	1,974	6,863
E/7	25 000	M	R	13,000	0,170	0,010	0,010	1,030	1,040	1,220	0,549	0,120	0,012		5,280	5,951
E/8	135 004	M	R	17,955	0,110	0,060	0,020	1,100	1,120	1,290	2,430	1,357			10,052	4,183
E/9	100 929	A	R	11,394	0,120	0,056	0,080	0,720	0,800	0,976	3,460	0,019			0,188	6,770
Total	756 476															

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 l (tonnes)	Temporarily stored F (g/t)	
S/1	100 000	A	R	6,870	0,014	0,003	0,001	0,203	0,204	0,221		0,567	0,005		5,720	0,929
S/2	120 000	A	R	21,458	0,022	0,004		0,135	0,135	0,161		1,791			14,925	6,372
Total	220 000															

Switzerland

Site	Chlorine Production Capacity with Hg- cells (tonnes)	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
				C (g/t)	E1 (g/t)	E2 (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	-11,455	0,028	0,023	0,046	1,130	1,176	1,227	4,350					-17,032
CH/2	26 500	M	R		0,017	0,006	0,020	0,669	0,689	0,712	0,061					-0,773
CH/3	27 000	A	R	35,556	0,100	0,019		0,315	0,315	0,434	70,048		-0,943		-34,926	-0,001
Total	108 500															

United Kingdom

Site	Chlorine Production Capacity with Hg- cells (tonnes)	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
				C	E1	E2	Process Exhaust	Cellroom	Total		Disposed off	Awaiting recovery	Awaiting disposal	Awaiting decision	Temporarily stored	
				(g/t)	(g/t)	(g/t)	2.3.1 (g/t)	2.3.2 (g/t)	E3 (g/t)		D (g/t)	c (tonnes)	f (tonnes)	l (tonnes)	F (g/t)	
UK/1	29 413	A	R	27,641	0,171	0,005	0,015	0,989	1,004	1,180	4,001					22,460
UK/2	89 872	A	R	82,273	0,030	0,050	0,030	1,490	1,520	1,600	1,330	7,138			79,424	-0,081
UK/3	738 000	A	W	2,275	0,040	0,210	0,245	1,182	1,427	1,677	28,790	4,320			5,854	-34,046
Total	857 285															