



Mercury losses from the chlor-alkali industry in 2007
including assessment of 2006 and 2007 data

OSPAR Convention

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.

Convention OSPAR

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.

Acknowledgement

This report has been prepared by the expert assessment panel, Ms Almut Reichart, Germany and Mr Richard Moxon, United Kingdom, with the support of Ms Corinne Michel, OSPAR Secretariat.

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Executive summary

This report presents the 2007 data on production capacities, atmospheric emissions of mercury, and the amount of mercury in safely deposited wastes as well as an assessment of both the 2006 and 2007 data and the trends.

The mercury-cell-based chlorine production capacities have decreased since 1998, with a marked decrease from 2005 to 2007, in particular in 2007, due to reductions of the mercury-cell-based chlorine production capacities in the United Kingdom and Germany and the shut down of one plant in the Netherlands.

Mercury losses through product, waste water and air have decreased about 21% from 2005 to 2007, following the decreasing trend over the last years, and reflecting the shut down of plants or reduction of production capacities.

Over the years, atmospheric emissions of mercury have been significantly reduced. Significant reductions are reported from all the relevant countries leading to a total of about 21 % reduction from 2005 to 2007. All but one plant comply with the limit value of 2 g Hg/t Cl₂ for air emissions in PARCOM Decision 90/3. This non-compliance is attributable to emissions during shut down processes due to partial conversion to membrane technique in 2007.

The amount of mercury in safely deposited wastes has increased. Some countries report increases and others decreases but these changes do not necessarily correlate to the shutdown of cells or plants. More detailed information to explain year-to-year differences in the amount of mercury in safely deposited wastes is needed.

Altogether the reported figures show clearly the results of the efforts, which have been achieved during the last nine years. Chlorine production capacity with mercury cells has been reduced by 39.4% from 1998 to 2007 in the Convention area. Over the same period, mercury losses through product, waste water and air and atmospheric emissions of mercury were more than halved.

Récapitulatif

Ce rapport présente les données 2007 sur les capacités de production, les émissions atmosphériques du mercure et la quantité de mercure dans les déchets mis en décharges sécurisées ainsi qu'une évaluation des données et des tendances pour 2006 et 2007.

Les capacités de production de chlore à base de cellules de mercure ont diminué depuis 1998, cette diminution étant notoire entre 2005 et 2007, en particulier en 2007, du fait des réductions des capacités de production de chlore à base de cellules de mercure au Royaume-Uni et en Allemagne et de la fermeture d'une usine aux Pays-Bas.

Les pertes de mercure dans les produits, l'eau usée et l'air ont diminué d'environ 21% entre 2005 et 2007, suivant la tendance à la baisse des dernières années et reflétant la fermeture d'usines ou la réduction de capacités de production.

Au cours des ans, les émissions atmosphériques de mercure ont diminué de manière significative. Tous les pays pertinents notifient des réductions significatives dont le cumul représente une réduction d'environ 21 % entre 2005 et 2007. Toutes les usines, à l'exception d'une, se conforment à la valeur limite de 2 g Hg/t Cl₂ pour les émissions atmosphériques de la Décision PARCOM 90/3. Ce manque de conformité est attribuable aux émissions qui se produisent au cours du processus de fermeture du fait de la conversion partielle à la technique à membrane en 2007.

La quantité de mercure dans les déchets mis en décharges sécurisées a augmenté. Certains pays notifient des augmentations et d'autres des diminutions mais ces modifications ne correspondent pas nécessairement à la fermeture de cellules ou d'usines. Il est nécessaire d'obtenir des informations plus détaillées permettant d'expliquer les différences que présente, d'une année à l'autre, la quantité de mercure dans les déchets mis en décharges sécurisées.

Dans l'ensemble les chiffres notifiés montrent clairement les résultats des efforts qui ont été réalisés au cours des neuf dernières années. La capacité de production de chlore à base des cellules de mercure a diminué de 39.4% entre 1998 et 2007 dans la zone de la Convention. Au cours de la même période, les pertes de mercure dans les produits, les eaux usées et l'air et les émissions atmosphériques de mercure ont diminué de plus de 50%.

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 80/2 on Limit Values for Mercury Emissions in Water from Existing and New Brine Recirculation Chlor-alkali Plants (exit of the purification plant);
- PARCOM Decision 81/1 on Limit Values for Existing Brine Recirculation Chlor-Alkali Plants (exit of the factory site);
- PARCOM Decision 81/2 on Limit Values for Existing Waste Brine Chlor-Alkali Plants;
- PARCOM Decision 82/1 on New Chlor-Alkali Plants Using Mercury Cells;
- PARCOM Recommendation 85/1 on Limit Values for Mercury Emissions in Water from Existing Brine Recirculation Chlor-Alkali Plants (exit of factory site);
- PARCOM Decision 90/3 on Reducing Atmospheric Emissions from Existing Chlor-Alkali Plants.

In 1983, Contracting Parties to the former Paris Convention initiated annual reporting of mercury discharges, emissions and losses from their national chlor-alkali industry. Over time, reporting requirements and formats have been 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 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 validation by Contracting Parties, compiles these technical data in form of this report.

Following examination by the HSC, the data are published by the Commission in form of Annual Reports on Mercury Losses from the Chlor-alkali Industry. This report series comprises yearly data series from 1982. The data are assessed by an expert assessment panel every two years.

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.

This report continues the series of annual reports on discharges, emissions and losses of mercury by all routes from mercury-cell chlor-alkali plants. The report presents the 2007 data on production capacities, atmospheric emissions of mercury, and the amount of mercury in safely deposited wastes as well as an assessment of both the 2006 and 2007 data and the trends. The presentation of these figures since 1998 will also assist in the assessment of the effectiveness of the implementation of PARCOM Decision 90/3.

2. Assessment of the reports on mercury losses from the chlor-alkali industry in 2006 and 2007

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

- a. Dissenting from the observations of the last years, **the mercury-cell-based chlorine production capacities** have considerably decreased from 2005 to 2007. The decrease was more significant in 2007 than in 2006 which is due to major changes in 2007 (-534 kt): reduction

of the mercury-cell-based chlorine production capacities of one big plant (UK/3) by 371 kt and a German plant by 103 kt, the shut down of one plant in the Netherlands (NL/1) with 37 kt, while during 2006 (-388 kt) there was a shut down in France with 184 kt, a shut down of a smaller plant in UK (UK/2) with 75 kt, a shut down of one plant in Sweden with another 74 kt and a decrease of production capacity in one plant of the Netherlands (NL/1) of 37 kt. Furthermore a Belgian plant decreased its production capacity about 23 kt in 2006 and 23 kt in 2007. One plant in Germany increased its production capacity by 4,5 kt in 2006.

- b. The summarised **“Mercury Losses through Product, Waste Water and Air”** from all plants have decreased about 21% from 2005 to 2007, which is following the general trend of approximately 6% decrease per year departing from the mercury losses in 1998. The most remarkable reduction of total mercury losses from 2005 to 2007 was observed in the UK (-312 kg) followed by France (-227 kg) and Germany (-200 kg). This was due to the shut down of plants or reduction of production capacities in those countries. The data shows, that there is still a wide range – one order of magnitude – of specific mercury losses through product, waste water and air from 0.17 (S/2) to 2.68 g per tonne (UK/3). In (UK/3) there was a substantial increase of specific emissions (increase about 0.7 g/tonne) from 2006 to 2007 which is attributable to emissions during shut down processes in the partial conversion of that plant to membrane technique in 2007.
- c. **Air emissions** have been significantly reduced since 2005 by about 21% in the Convention area. Significant reductions are reported from the following countries France (222 kg), Germany (190 kg), UK (190 kg), Spain (130 kg), Belgium (63 kg), Netherlands (42 kg), Finland (17 kg), Sweden (13 kg) and Switzerland (7 kg) respectively.

For most of the plants air emissions continue to fall. But the plant with the highest production capacity (UK/3) does not comply with the limit value of 2 g Hg/t Cl₂ for air emissions in PARCOM Decision 90/3, which is attributable to emissions during shut down processes due to partial conversion to membrane technique in 2007. However, according to the data in Table 5, besides the British plant also 7 other plants out of 30 still reported increased emissions in 2007. A wide range of the specific values from 0.15 g Hg/t Cl₂ to 2.39 g Hg/t Cl₂ is present. 7 plants (out of 30) achieved emission levels < 0.5 g Hg/t Cl₂ and 19 plants achieved emission levels ≥ 0.5 and < 1 g Hg/t Cl₂ (which latter is an internationally discussed limit value e. g. at UNECE) only 4 plants have still reported emissions ≥ 1 g Hg/t Cl₂. The EC Reference Document on Best Available Techniques in the Chlor-Alkali Industry (December 2001) identified the mercury-free membrane process as BAT. For reference purposes only, it also listed the then best performing mercury-based Chlor-Alkali plants, which achieved losses to air of 0.17-0.3 g Hg/t Cl₂ and overall losses to air, water and products in the range of 0.2-0.5 g Hg/t Cl₂, values which were undercut in recent years as shown by the present report (see Tables 5 and 3 respectively).

- d. Over the last years (see Table 6), the amount of **mercury in safely deposited wastes** (see definition in Tables 6 and 7) has increased. The data are variable however, with some countries showing decreases and some showing increases and the range of values is extremely large. The increases and decreases do not necessarily correlate to the shut down of cells or plants all over the countries. The increasing figures of some plants (for instance Germany/7) do not correspond to any changes of 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.

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 the 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 "programmes and measures/decisions"(www.ospar.org) for further information.

Altogether the report's figures show clearly the **results of the efforts**, which have been achieved during the last nine years. While the chlorine production capacity with mercury cells was reduced by 33.7% from 1998 to 2007 in the drainage area and by 39.4% in the overall Convention area. Over the same period, mercury losses through product, waste water and air in the drainage area were reduced by 57.2% and atmospheric emissions of mercury in the Convention area by 56.4%. The reductions of losses and emissions are thus more distinct than the reductions in production capacities.

3. Evolution of mercury losses from the chlor-alkali industry (1982 - 2007)

The following figures give a rough indication of the evolution of mercury losses from the chlor-alkali industry in the period 1982-2007 as follows:

- Figure 1a: Chlorine Production Capacity with Mercury Cells by Contracting Party;
- Figure 1b: Total Chlorine Production Capacity with Mercury Cells;
- Figure 2a: Mercury Losses through Product, Waste Water and Air by Contracting Party;
- Figure 2b: Total Mercury Losses through Product, Waste Water and Air;
- Figure 3a: Atmospheric Emissions of Mercury by Contracting Party;
- Figure 3b: Total 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.

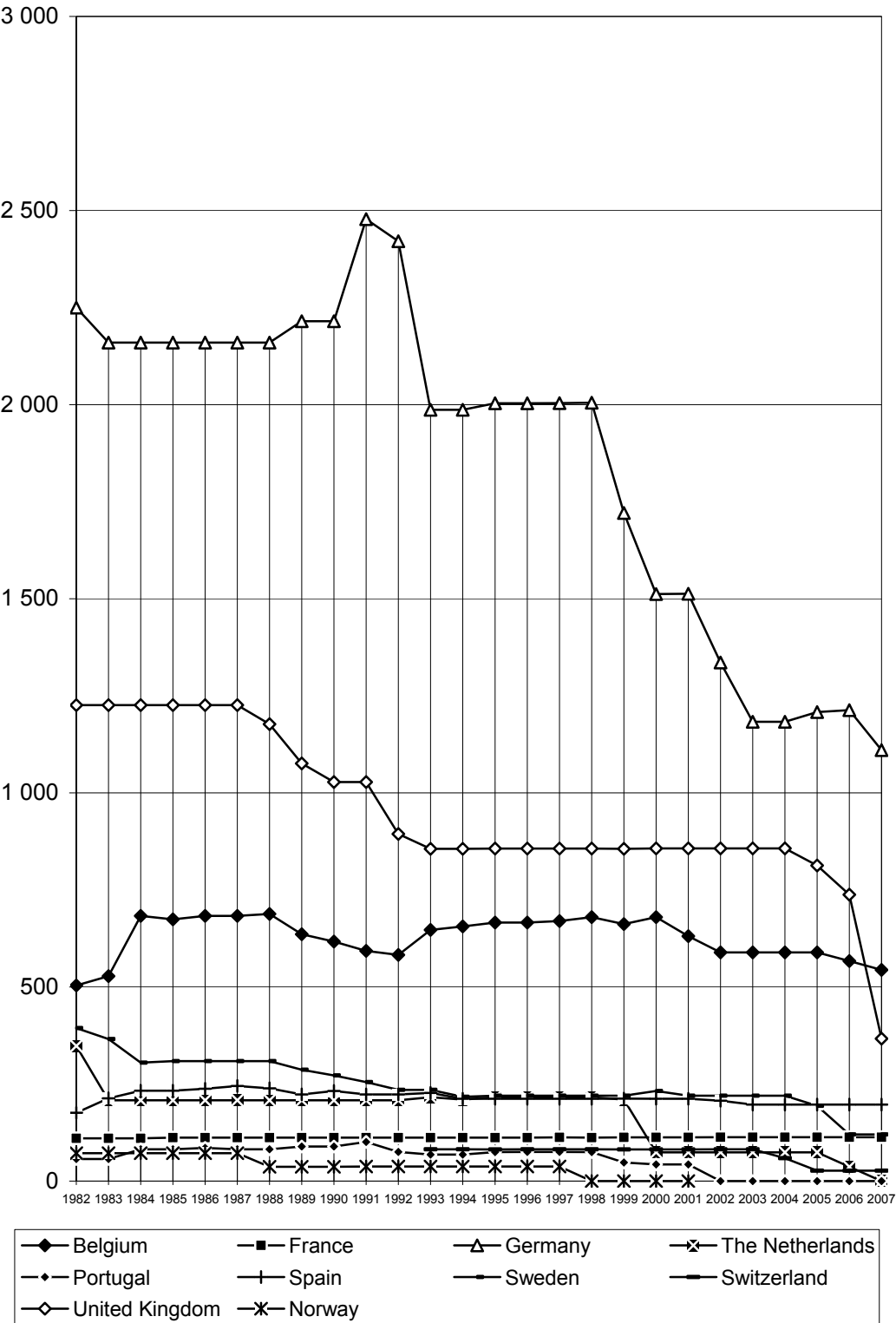


Figure 1a: Chlorine production capacity with mercury cells of plants discharging into the OSPAR catchment area by Contracting Party (in kilotonnes per year)

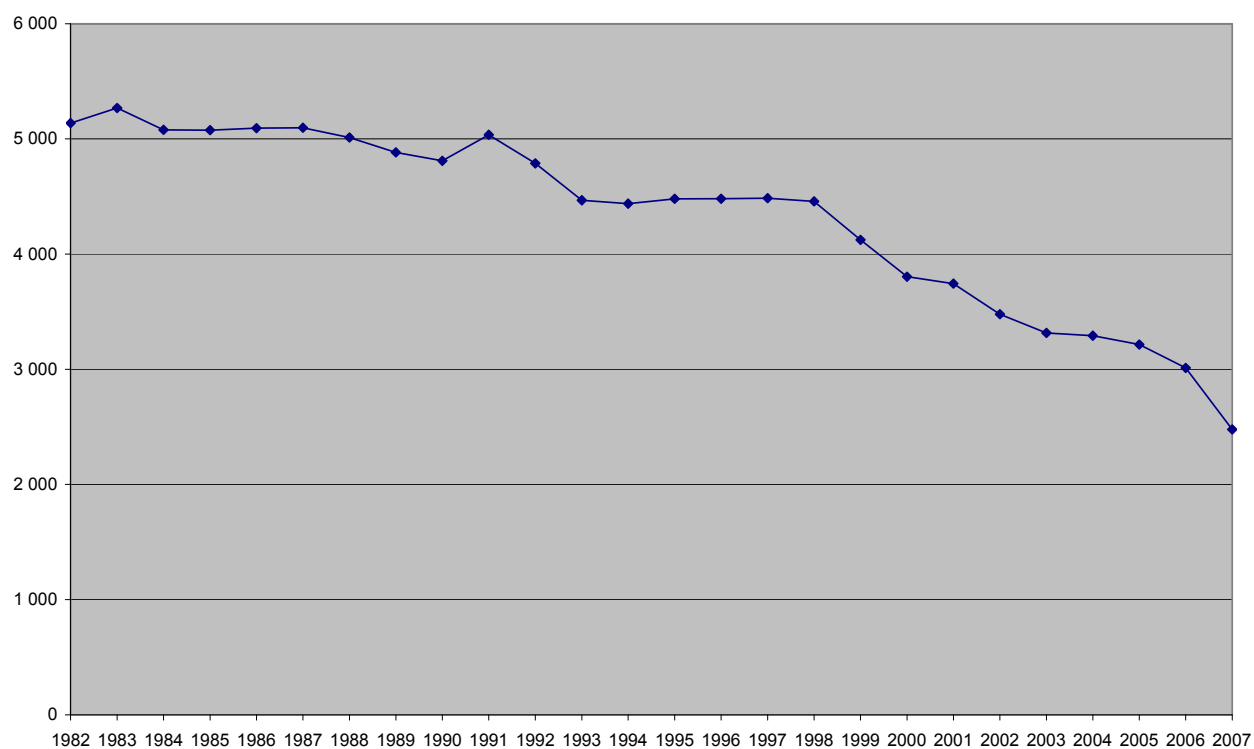


Figure 1b: Total chlorine production capacity with mercury cells of plants discharging into the OSPAR catchment area for all Contracting Parties (in kilotonnes per year)

Mercury losses from the chlor-alkali industry in 2006 and 2007

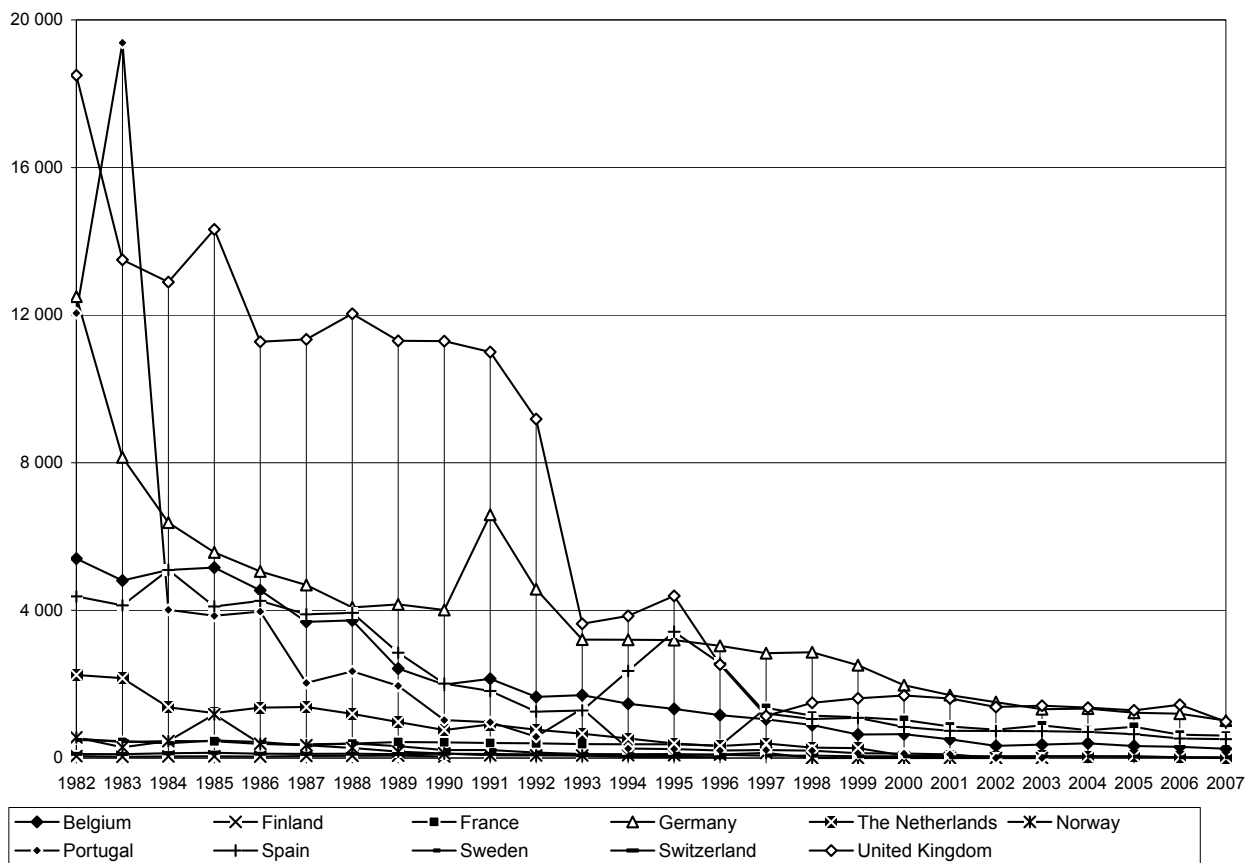


Figure 2a: Mercury losses through product, wastewater and air (in kilograms per year, sum of mercury losses to product and wastewater from national plants discharging into the OSPAR catchment area plus atmospheric emissions from all national plants)

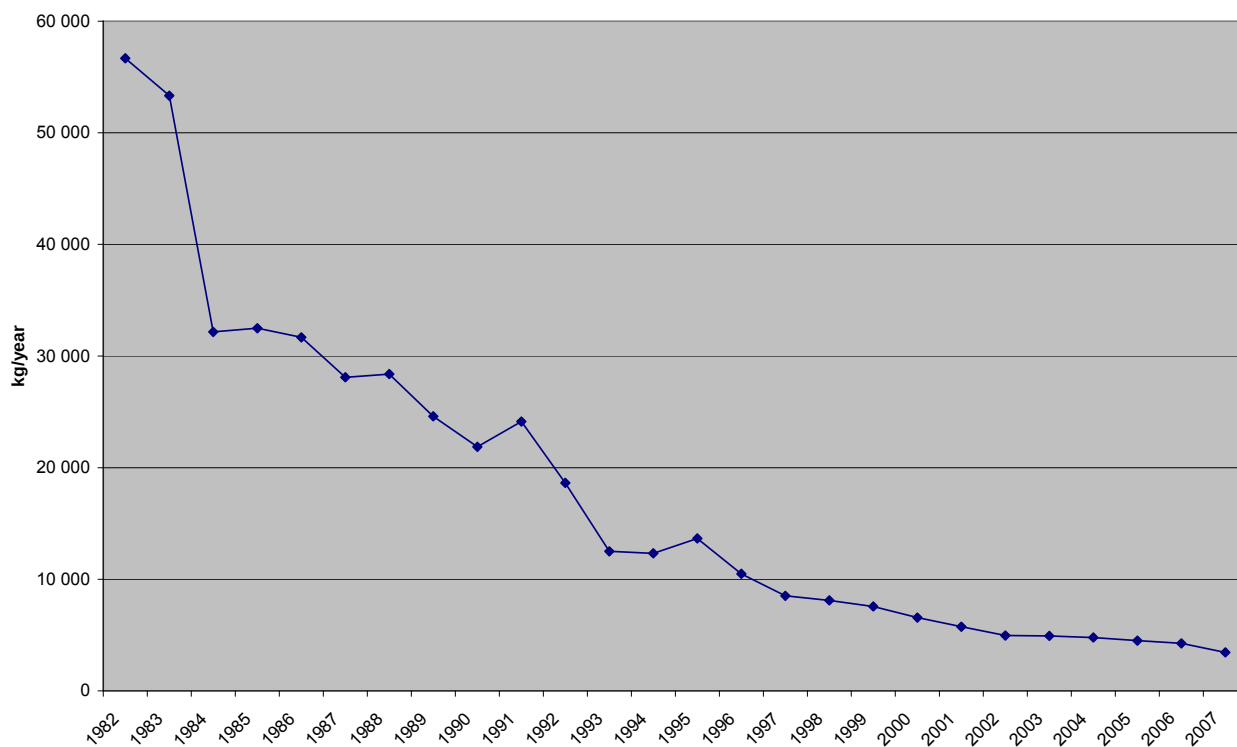


Figure 2b: Total mercury losses through product, wastewater and air for all Contracting Parties (in kilograms per year, sum of mercury losses to product and wastewater from national plants discharging into the OSPAR catchment area plus atmospheric emissions from all national plants)

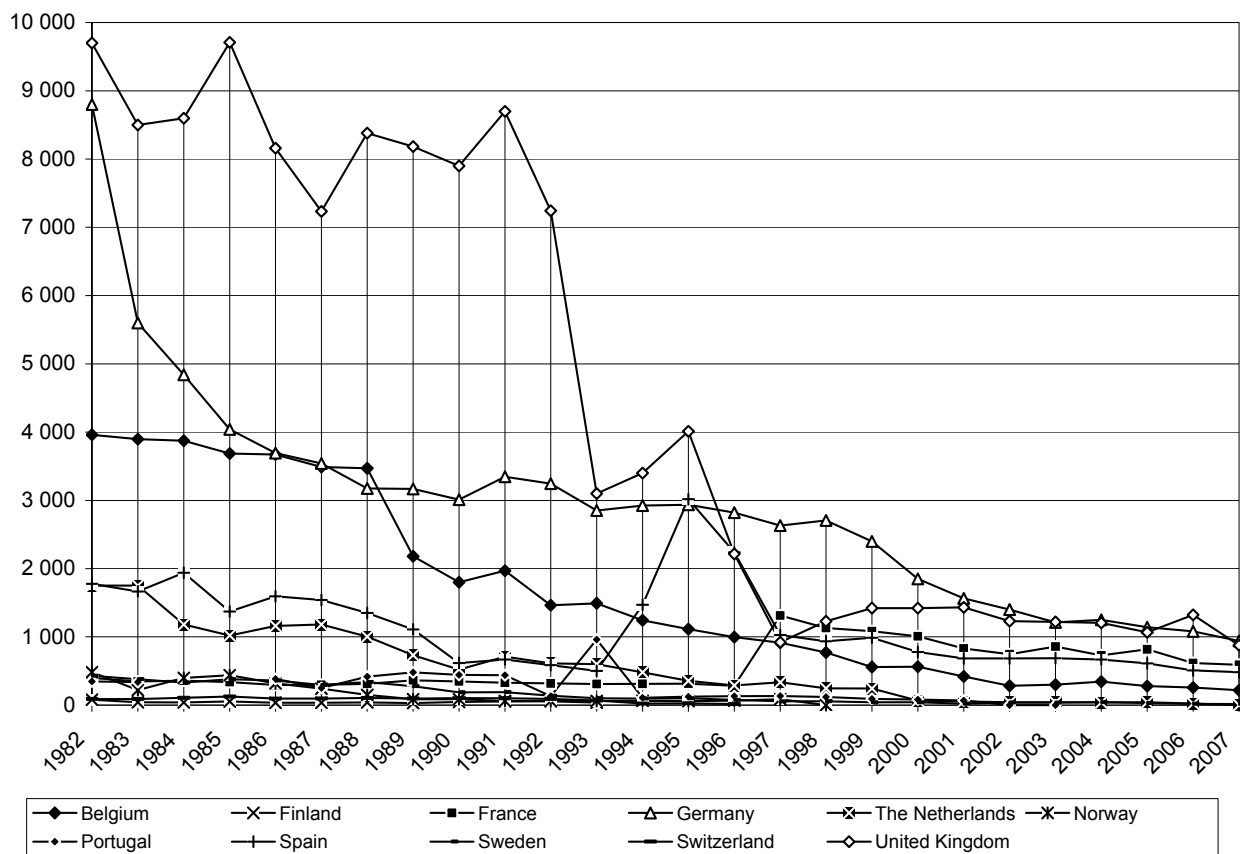


Figure 3a: Atmospheric emissions of mercury from all plants from Contracting Parties (in kilograms per year, all plants)

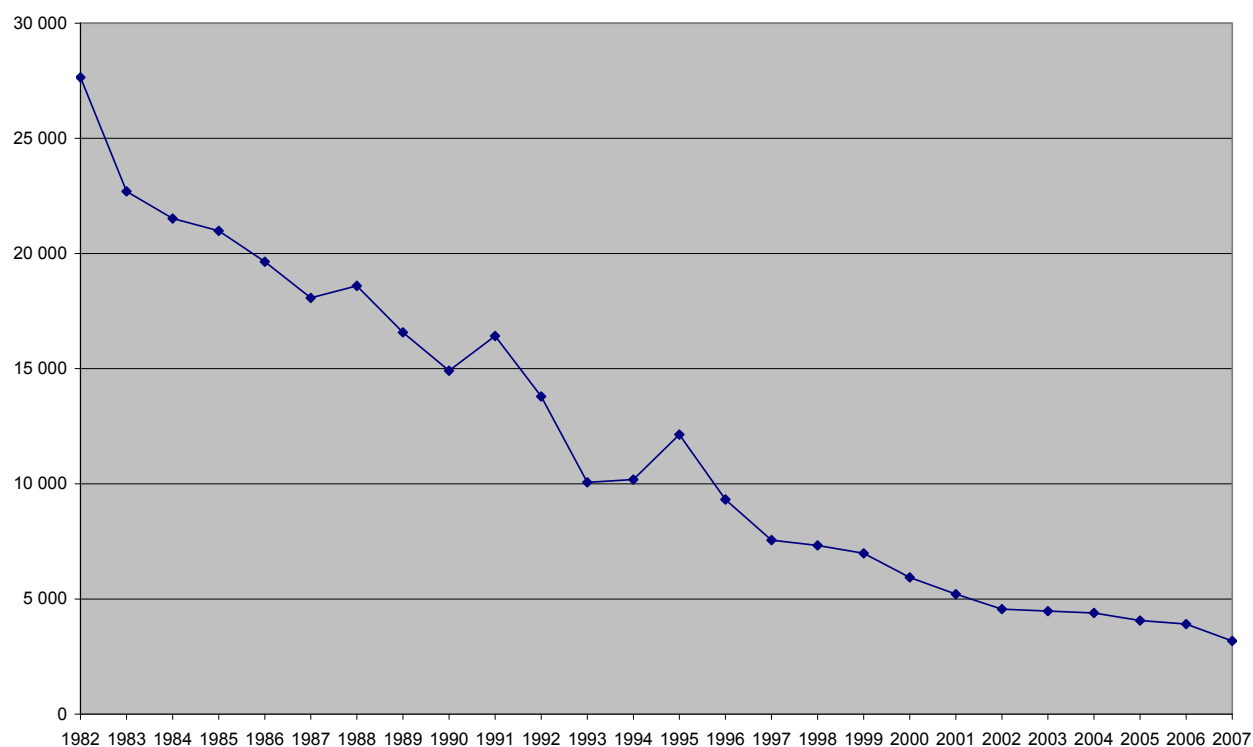


Figure 3b: Total atmospheric emissions of mercury from all plants for all Contracting Parties (in kilograms per year, all plants)

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

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium										
BE/1*	219 000	230 000	219 000	219 000	219 000	219 000	219 000	219 000	219 000	219 000
BE/2*	250 000	250 000	250 000	250 000	250 000	250 000	250 000	250 000	227 500	205 000
BE/3*	120 000	100 000	120 000	120 000	120 000	120 000	120 000	120 000	120 000	120 000
BE/4*	90 900	82 000	90 900	41 663	N/A	N/A	N/A	N/A	N/A	N/A
Total	679 900	662 000	679 900	630 663	589 000	589 000	589 000	589 000	566 500	544 000
Finland										
SFR/1	40 000	40 000	40 000	40 000	42 485	42 485	42 485	42 485	42 485	42 485
Total	40 000	40 000	40 000	40 000	42 485	42 485	42 485	42 485	42 485	42 485
France										
FR/1*	NI	18 040	18 040	18 040	18 040	18 040	18 040	18 040	18 040	18 040
FR/2*	NI	72 000	72 000	72 000	72 000	72 000	72 000	72 000	72 000	72 000
FR/3	NI	240 900	240 900	240 900	240 900	240 900	240 900	240 900	240 900	240 900
FR/4	NI	170 070	170 070	170 070	170 070	170 070	170 070	170 070	170 070	170 070
FR/5*	NI	22 500	22 500	22 500	22 500	22 500	22 500	22 500	22 500	22 500
FR/6	NI	166 000	166 000	166 000	166 000	166 000	166 000	166 000	166 000	166 000
FR/7	NI	184 300	184 300	184 300	184 300	184 300	184 300	184 300	Shutdown	Shutdown
Total	NI	873 810	873 810	873 810	873 810	873 810	873 810	873 810	689 509	689 509
Germany										
DE/1	130 000	65 000	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/2*	130 000	130 000	140 000	140 000	110 000	110 000	110 000	130 000	130 000	130 000
DE/3*	120 000	120 000	125 000	125 000	125 000	125 000	125 000	125 000	125 276	125 276
DE/4*	150 000	300 000	300 000	300 000	153 000	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/5*	180 000	150 000	160 000	160 000	160 000	160 000	160 000	165 500	170 000	170 000
DE/6*	65 000	130 000	148 828	148 828	148 828	148 828	148 828	148 828	148 828	148 828
DE/7*	160 000	180 000	182 000	176 000	176 000	176 000	176 000	176 000	176 000	72 811
DE/8*	200 000	98 000	135 951	135 951	135 951	135 951	135 951	135 951	135 951	135 951
DE/9*	150 000	150 000	160 000	167 000	167 000	167 000	167 000	167 000	167 000	167 376
DE/10	300 000	248 000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DE/11	50 000	60 000	9 804	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/12	72 000	157 000	157 000	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/13*	157 000	150 000	160 000	160 000	160 000	160 000	160 000	160 000	160 000	160 000
DE/14	300 000	72 000	82 355	82 355	82 355	82 355	82 355	82 355	82 355	82 355
DE/15	120 000	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
Total	2 344 000	2 010 000	1 760 938	1 595 134	1 416 134	1 265 134	1 265 134	1 290 634	1 295 411	1 192 597
Netherlands										
NL/1*	70 000	70 000	74 294	74 294	74 294	74 294	74 294	74 294	37 452	Shutdown
NL/2*	140 000	140 000	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
Total	210 000	210 000	74 294	74 294	74 294	74 294	74 294	74 294	37 452	0
Portugal										
P/1*	48 600	48 000	43 302	43 302	N/A	N/A	N/A	N/A	N/A	N/A
P/2*	26 400	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
Total	75 000	48 000	43 302	43 302						
Spain										
ES/1	31 920	30 000	31 373	31 373	31 373	31 373	31 373	31 373	31 373	31 373
ES/2*	14 815	15 000	14 815	14 815	9 877	PC	PC	PC	PC	PC

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ES/3*	33 552	33 500	33 552	33 552	33 552	33 552	33 552	33 552	33 552	33 552
ES/4	150 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000	150 000
ES/5*	62 745	63 000	62 747	62 747	62 747	62 747	62 747	62 747	62 747	62 747
ES/6	209 200	209 000	217 871	217 871	217 871	217 871	217 871	217 871	217 871	217 871
ES/7	25 000	25 000	25 000	25 000	25 000	25 000	25 000	25 000	25 000	25 000
ES/8	135 000	135 000	135 004	135 004	135 004	135 004	135 004	135 004	135 004	135 004
ES/9*	101 000	101 000	100 929	100 929	100 929	100 929	100 929	100 929	100 929	100 929
Total	763 232	761 500	771 291	771 291	766 353	756 476	756 476	756 476	756 475	756 475

Sweden										
SE/1*	100 000	100 000	100 000	100 000	100 000	100 000	100 000	74 355	Shutdown	Shutdown
SE/2*	120 000	120 000	132 000	120 000	120 000	120 000	120 000	120 000	120 000	120 000
Total	220 000	220 000	232 000	220 000	220 000	220 000	220 000	194 355	120 000	120 000
Switzerland										
CH/1*	55 000	55 000	55 000	55 000	55 000	55 000	32 083	Shut down	Shut down	Shutdown
CH/2	26 500	22 000	26 500	26 500	26 500	26 500	26 500	Shut down	Shut down	Shutdown
CH/3*	27 000	26 500	27 000	27 000	27 000	27 000	27 000	27 000	27 000	27 000
Total	108 500	103 500	108 500	108 500	108 500	108 500	85 583²	27 000	27 000	27 000

UK										
UK/1*	29 000	29 000	29 413	29 413	29 413	29 413	29 413	Shut down	Shut down	Shutdown
UK/2*	89 872	89 000	89 872	89 872	89 872	89 872	89 872	74 855	Shut down	Shutdown
UK/3* ³	737 000	738 000	738 000	738 000	738 000	738 000	738 000	738 000	738 000	367 000
Total	855 872	856 000	857 285	857 285	857 285	857 285	857 285	812 855	738 000	367 000

Production capacity of all installations in the Convention area

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
tonnes	6 170 314	5 784 810	5 441 320	5 214 279	4 947 861	4 786 984	4 764 067	4 660 910	4 272 833	3 739 066
%	100	93,8	88,2	84,5	80,2	77,6	77,2	75,5	62,2	60,6

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

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
tonnes	3 819 424	3 810 540	3 805 143	3 744 906	3 476 003	3 315 126	3 292 209	3 215 551	3 011 775	2 478 009
%	100	99,8	99,6	98,0	91,0	86,8	86,2	84,2	78,8	64,9

NI: No information

N/A: Not applicable

PC: Partly converted to membrane technology

² The Solvay chlorine production unit located in Zurzach (CH/1) was shut down at the beginning of August 2004 and, in agreement with the Euro Chlor rules, a yearly production capacity "pro rata temporis" was considered (i.e. 55 000 t/y * 7 /12 = 32 083 t/y).

³ This plant is undergoing conversion to membrane technology and if the mercury losses are calculated only on the effective mercury capacity, then the value would be 1.58g/te. In agreement with the Euro Chlor rules, a yearly production capacity "pro rata temporis" was considered before the definitive shut down.

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

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium										
BE/1	NI	173	157	122	82	92	142	88	98	56
BE/2	NI	178	180	175	169	186	178	179	142	131
BE/3	NI	113	111	88	78	85	82	60	64	67
BE/4	NI	173	201	120	N/A	N/A	N/A	N/A	N/A	N/A
Total	893	637	649	505	329	363	402	327	304	254
Finland										
SFR/1	NI	63	43	41	44	37	56	59	63	42
Total	NI	63	43	41	44	37	56	59	63	42
France										
FR/1	NI	28	29	24	15	12	25	21	13	26
FR/2	NI	129	119	121	92	118	116	125	119	122
FR/3	NI	345	338	226	216	245	189	202	224	244
FR/4	NI	192	220	203	152	127	96	106	119	111
FR/5	NI	32	32	33	34	33	32	29	29	24
FR/6	NI	190	152	139	175	185	147	168	195	188
FR/7	NI	281	243	237	202	282	242	290	Shutdown	Shutdown
Total	1149	1197	1133	983	886	1002	847	941	699	714
Germany										
DE/1	NI	111	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/2	NI	147	247	159	127	128	103	94	97	85
DE/3	NI	49	73	75	78	80	92	86	91	104
DE/4	NI	367	367	358	285	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/5	NI	261	166	162	157	169	173	169	160	151
DE/6	NI	70	62	52	49	77	116	64	97	74
DE/7	NI	313	257	199	218	289	260	194	179	84
DE/8	NI	193	209	228	174	159	151	170	162	150
DE/9	NI	161	165	197	199	213	244	243	207	170
DE/10	NI	391	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DE/11	NI	104	18	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/12	NI	132	137	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
DE/13	NI	137	171	201	163	146	141	153	158	159
DE/14	285	100	112	80	67	64	62	56	55	52
DE/15	NI	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
Total	285	2536	1982	1711	1517	1325	1343	1229	1206	1029
Netherlands										
NL/1	NI	71	68	57	41	45	42	46	22	Shutdown
NL/2	NI	196	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
Total	282	267	68	57	41	45	42	46	22	
Portugal										
P/1	NI	130	121	100	N/A	N/A	N/A	N/A	N/A	N/A
P/2	NI	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
Total	202	130	121	100						
Spain										
ES/1	NI	61	63	58	48	45	46	38	35	30
ES/2	NI	30	29	25	16	PC	PC	PC	PC	PC
ES/3	NI	66	57	52	38	42	32	30	27	23
ES/4	NI	287	164	114	123	137	121	121	110	102

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ES/5	NI	142	102	101	86	74	92	47	29	34
ES/6	NI	182	182	193	185	199	205	203	154	156
ES/7	NI	53	49	32	36	30	26	25	25	24
ES/8	NI	251	244	176	174	174	154	139	137	120
ES/9	123	175	95	103	132	99	94	109	68	70
Total	1057	1247	985	854	838	800	770	713	585	560

Sweden										
SE/1	NI	27	28	29	26	22	25	14	Shutdown	Shutdown
SE/2	NI	18	19	18	17	19	22	20	20	20
Total	65	45	47	47	43	41	47	34	20	20

Switzerland										
CH/1	NI	82	70	64	73	67	39	Shut down	Shut down	Shut down
CH/2	NI	19	20	28	19	19	11	Shut down	Shut down	Shut down
CH/3	NI	15	19	25	17	12	22	30	32	20
Total	111	116	109	117	109	98	72	30	32	20

UK										
UK/1	NI	15	16	17	18	35	54	Shut down	Shut down	Shut down
UK/2	NI	125	144	157	175	144	154	112	Shut down	Shut down
UK/3	NI	1 476	1 535	1 439	1 188	1 237	1 155	1 183	1 444	983
Total	1493	1616	1695	1613	1381	1416	1363	1295	1444	983

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	2004	2005	2006	2007
kg/year	8179	7854	6832	6028	5188	4933	4730	4450	4192	3499
%	100	96,0	83,5	73,3	63,4	60,3	57,8	54,4	51,3	42,8

NI: No information

N/A: Not applicable

PC: Partly converted to membrane technology

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

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium										
BE/1	NI	0,750	0,715	0,556	0,374	0,419	0,649	0,400	0,446	0,258
BE/2	NI	0,710	0,720	0,699	0,676	0,744	0,712	0,718	0,624	0,639
BE/3	NI	1,125	0,921	0,736	0,647	0,712	0,684	0,503	0,539	0,558
BE/4	NI	2,110	2,212	2,890	N/A	N/A	N/A	N/A	N/A	N/A
Finland										
SFR/1	NI	1,574	1,078	1,026	1,046	0,878	1,324	1,380	1,478	0,994
France										
FR/1	NI	1,580	1,631	1,317	0,819	0,646	1,400	1,149	0,720	1,416
FR/2	NI	1,792	1,646	1,680	1,277	1,644	1,615	1,732	1,658	1,689
FR/3	NI	1,431	1,403	0,940	0,896	1,019	0,785	0,838	0,932	1,011
FR/4	NI	1,131	1,292	1,197	0,896	0,746	0,567	0,621	0,699	0,650
FR/5	NI	1,444	1,436	1,457	1,509	1,469	1,402	1,308	1,277	1,086
FR/6	NI	1,144	0,917	0,836	1,054	1,117	0,883	1,015	1,173	1,135
FR/7	NI	1,522	1,320	1,286	1,094	1,530	1,312	1,574	Shutdown	Shutdown
Germany										
DE/1	NI	1,707	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/2	NI	1,128	1,766	1,132	1,153	1,163	0,934	0,724	0,743	0,651
DE/3	NI	0,406	0,583	0,601	0,622	0,640	0,733	0,689	0,730	0,830
DE/4	NI	1,223	1,223	1,193	1,862	Shut down	Shut down	Shut down	Shut down	Shut down
DE/5	NI	1,740	1,040	1,010	0,980	1,060	1,083	1,020	0,940	0,890
DE/6	NI	0,540	0,416	0,348	0,326	0,515	0,777	0,428	0,655	0,496
DE/7	NI	1,740	1,410	1,130	1,240	1,640	1,479	1,101	1,018	1,156
DE/8	NI	1,970	1,540	1,680	1,281	1,167	1,111	1,254	1,193	1,102
DE/9	NI	1,070	1,032	1,182	1,189	1,279	1,464	1,455	1,238	1,014
DE/10	NI	1,576	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/11	NI	1,740	1,864	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/12	NI	0,843	0,871	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/13	NI	0,910	1,069	1,259	1,019	0,911	0,884	0,956	0,985	0,994
DE/14	NI	1,390	1,364	0,966	0,815	0,776	0,757	0,680	0,669	0,630
DE/15	NI	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Netherlands										
NL/1	NI	1,008	0,909	0,765	0,551	0,610	0,571	0,615	0,587	Shutdown
NL/2	NI	1,400	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shutdown
Portugal										
P/1	NI	2,700	2,800	2,300	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
P/2	NI	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Spain										
ES/1	NI	2,040	2,020	1,861	1,545	1,430	1,461	1,204	1,122	0,971
ES/2	NI	2,020	1,948	1,667	1,626	PC	PC	PC	PC	PC

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ES/3	NI	1,970	1,699	1,563	1,123	1,264	0,945	0,884	0,810	0,682
ES/4	NI	1,910	1,094	0,762	0,821	0,911	0,811	0,806	0,730	0,683
ES/5	NI	2,259	1,632	1,608	1,368	1,172	1,461	0,756	0,458	0,548
ES/6	NI	0,870	0,834	0,885	0,848	0,914	0,944	0,933	0,708	0,715
ES/7	NI	2,100	1,940	1,265	1,428	1,220	1,030	1,017	1,020	0,969
ES/8	NI	1,860	1,810	1,300	1,290	1,290	1,140	1,030	1,014	0,890
ES/9	NI	1,730	0,938	1,021	1,309	0,976	0,933	1,081	0,676	0,693

Sweden										
SE/1	NI	0,268	0,278	0,288	0,258	0,221	0,248	0,186	Shutdown	Shutdown
SE/2	NI	0,154	0,144	0,154	0,143	0,161	0,188	0,167	0,165	0,166

Switzerland										
CH/1	NI	1,490	1,271	1,162	1,336	1,227	1,227	Shut down	Shut down	Shut down
CH/2	NI	0,877	0,743	1,054	0,699	0,712	0,429	Shut down	Shut down	Shut down
CH/3	NI	0,560	0,692	0,917	0,638	0,434	0,802	1,110	1,170	0,727

UK										
UK/1	NI	0,525	0,538	0,574	0,606	1,180	1,852	Shut down	Shut down	Shut down
UK/2	NI	1,410	1,600	1,744	1,950	1,600	1,710	1,494	Shut down	Shut down
UK/3 ⁴	NI	2,000	2,080	1,950	1,610	1,677	1,565	1,603	1,957	2,679

NI: No information

N/A: Not applicable

PC: Partly converted to membrane technology

⁴ This plant is undergoing conversion to membrane technology and if the mercury losses are calculated only on the effective mercury capacity, then the value would be 1,58g/te.

Mercury losses from the chlor-alkali industry in 2006 and 2007

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

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium										
BE/1	290	156	137	106	68	74	120	67	79	43
BE/2	176	154	157	153	153	164	160	164	129	122
BE/3	146	101	98	74	63	62	64	49	49	52
BE/4	160	146	172	80	N/A	N/A	N/A	N/A	N/A	N/A
Total	772	558	564	413	284	300	344	280	257	217
Finland										
SFR/1	40	53	35	34	39	31	46	54	57	37
Total	40	53	35	34	39	31	46	54	57	37
France										
FR/1	26	25	26	21	12	7	14	11	11	12
FR/2	111	115	103	108	80	103	106	113	109	96
FR/3	301	320	313	210	202	235	181	191	212	226
FR/4	179	182	188	171	109	88	67	64	89	84
FR/5	330	25	25	26	27	27	26	24	24	19
FR/6	24	161	129	109	147	142	118	139	172	159
FR/7	160	255	223	186	170	255	217	275	Shutdown	Shut down
Total	1131	1083	1007	831	747	857	729	818	617	596
Germany										
DE/1	173	105	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/2	92	135	235	146	114	113	98	88	88	78
DE/3	84	39	63	68	71	74	86	80	84	82
DE/4	255	353	353	345	274	Shut down	Shut down	Shut down	Shut down	Shut down
DE/5	256	255	160	155	150	163	167	162	153	144
DE/6	105	66	58	48	45	72	111	59	48	70
DE/7	128	301	244	187	206	276	247	181	166	80
DE/8	280	175	171	179	141	113	114	142	141	139
DE/9	150	149	151	185	188	203	233	232	195	158
DE/10	354	382	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DE/11	105	100	18	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/12	103	119	128	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/13	97	124	158	177	144	135	131	142	148	148
DE/14	285	96	110	74	65	62	60	54	53	51
DE/15	238	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Total	2705	2399	1849	1564	1398	1211	1248	1140	1079	950
Netherlands										
NL/1	65	65	65	53	37	42	40	42	20	Shut down
NL/2	180	178	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Total	245	243	65	53	37	42	40	42	20	

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
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Portugal										
P/1	92	91	82	69	N/A	N/A	N/A	N/A	N/A	N/A
P/2	28	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Total	120	91	82	69						

Spain										
ES/1	31	38	45	36	33	38	40	32	30	26
ES/2	21	20	19	17	12	PC	PC	PC	PC	PC
ES/3	66	51	43	32	23	31	23	21	21	17
ES/4	210	218	118	69	80	114	105	101	92	92
ES/5	109	91	85	91	77	63	74	38	20	20
ES/6	126	157	165	178	171	182	193	188	146	144
ES/7	48	35	27	22	28	26	22	22	22	21
ES/8	203	227	204	155	148	151	128	117	117	101
ES/9	123	152	74	84	112	81	85	93	59	62
Total	937	989	780	684	684	686	670	613	509	483

Sweden										
SE/1	37	25	25	27	23	20	23	13	Shut down	Shut down
SE/2	21	17	17	17	15	16	20	18	19	18
Total	58	42	42	44	38	36	43	31	19	18

Switzerland										
CH/1	57	75	63	58	69	65	38	Shut down	Shut down	Shut down
CH/2	18	19	19	27	18	18	11	Shut down	Shut down	Shut down
CH/3	21	10	14	17	14	8	17	22	27	15
Total	96	104	96	102	101	91	66	22	27	15

UK										
UK/1	14	14	14	13	13	29	49	Shut down	Shut down	Shut down
UK/2	106	117	137	149	169	137	147	108	Shut down	Shut down
UK/3	1107	1292	1269	1270	1048	1053	1010	958	1322	876
Total	1227	1423	1420	1432	1230	1219	1206	1066	1322	876

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

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
kg/year	7331	6985	5940	5226	4558	4475	4392	4066	3906	3197
%	100	95,3	81,0	71,3	62,2	61	59,9	55,5	53,3	43,6

NI: No information

N/A: Not applicable

PC: Partly converted to membrane technology

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

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium										
BE/1	1,320	0,680	0,627	0,484	0,310	0,338	0,547	0,307	0,360	0,196
BE/2	0,705	0,617	0,627	0,615	0,611	0,657	0,641	0,654	0,565	0,598
BE/3	1,213	1,013	0,813	0,615	0,524	0,516	0,531	0,411	0,412	0,432
BE/4	1,770	1,780	1,888	1,930	N/A	N/A	N/A	N/A		N/A
Finland										
SFR/1	1,000	1,322	0,885	0,856	0,916	0,738	1,084	1,27	1,335	0,870
France										
FR/1	1,390	1,380	1,442	1,154	0,651	0,416	0,763	0,618	0,600	0,648
FR/2	1,540	1,600	1,424	1,498	1,111	1,433	1,469	1,570	1,510	1,333
FR/3	1,250	1,330	1,300	0,871	0,838	0,976	0,752	0,792	0,880	0,938
FR/4	1,050	1,068	1,108	1,004	0,641	0,518	0,396	0,375	0,525	0,493
FR/5	1,790	1,123	1,132	1,159	1,199	1,186	1,153	1,087	1,075	0,849
FR/6	1,080	0,971	0,776	0,660	0,886	0,853	0,712	0,840	1,035	0,958
FR/7	0,960	1,381	1,210	1,011	0,921	1,384	1,176	1,494	Shut down	Shut down
Germany										
DE/1	1,330	1,610	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/2	0,710	1,040	1,680	1,040	1,040	1,030	0,890	0,680	0,680	0,600
DE/3	0,700	0,322	0,507	0,546	0,571	0,592	0,687	0,639	0,673	0,653
DE/4	1,700	1,175	1,175	1,150	1,792	NA	NA	NA	NA	NA
DE/5	1,420	1,700	1,000	0,970	0,940	1,020	1,043	0,980	0,900	0,850
DE/6	1,609	0,510	0,390	0,322	0,303	0,481	0,745	0,396	0,324	0,471
DE/7	0,800	1,670	1,340	1,060	1,170	1,570	1,405	1,030	0,952	1,093
DE/8	1,400	1,790	1,260	1,320	1,039	0,834	0,842	1,042	1,038	1,020
DE/9	1,000	0,995	0,942	1,106	1,125	1,215	1,396	1,387	1,170	0,946
DE/10	1,180	1,540	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DE/11	2,100	1,660	1,846	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/12	1,431	0,760	0,815	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/13	0,620	0,829	0,989	1,108	0,898	0,841	0,820	0,890	0,924	0,924
DE/14	0,950	1,330	1,330	0,900	0,787	0,756	0,734	0,653	0,645	0,616
DE/15	1,980	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Netherlands										
NL/1	0,920	0,927	0,873	0,716	0,501	0,560	0,542	0,559	0,546	Shut down
NL/2	1,230	1,270	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Portugal										
P/1	1,893	1,900	1,900	1,600	NA	NA	NA	NA	NA	NA
P/2	1,061	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Spain										
ES/1	0,960	1,260	1,420	1,141	1,041	1,220	1,265	1,030	0,970	0,818
ES/2	1,430	1,330	1,272	1,153	1,166	PC	PC	PC	PC	PC
ES/3	1,960	1,510	1,280	0,959	0,685	0,927	0,690	0,627	0,641	0,496

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ES/4	1,400	1,450	0,784	0,462	0,537	0,760	0,699	0,674	0,616	0,614
ES/5	1,735	1,442	1,347	1,455	1,226	1,001	1,178	0,603	0,328	0,314
ES/6	0,603	0,750	0,758	0,818	0,784	0,836	0,885	0,863	0,670	0,661
ES/7	1,900	1,400	1,060	0,880	1,120	1,040	0,880	0,890	0,880	0,860
ES/8	1,500	1,680	1,510	1,140	1,100	1,120	0,950	0,870	0,864	0,750
ES/9	1,220	1,500	0,735	0,831	1,110	0,800	0,843	0,925	0,589	0,616

Sweden										
SE/1	0,370	0,250	0,250	0,270	0,234	0,204	0,231	0,173	Shut down	Shut down
SE/2	0,171	0,139	0,131	0,140	0,121	0,135	0,167	0,151	0,155	0,147

Switzerland										
CH/1	1,030	1,370	1,146	1,065	1,258	1,176	1,176	Shut down	Shut down	Shut down
CH/2	0,680	0,848	0,710	1,019	0,670	0,689	0,408	Shut down	Shut down	Shut down
CH/3	0,780	0,370	0,517	0,625	0,515	0,315	0,647	0,820	0,985	0,548

UK										
UK/1	0,483	0,470	0,461	0,452	0,438	1,004	1,669	Shut down	Shut down	Shut down
UK/2	1,179	1,310	1,520	1,660	1,880	1,520	1,640	1,446	Shut down	Shut down
UK/3	1,501	1,750	1,720	1,720	1,420	1,427	1,368	1,298	1,791	2,387

NI: No information

N/A: Not applicable

PC: Partly converted to membrane technology

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

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium										
BE/1	NI	837	6823	260	2889	2293	4608	5405	304	1928
BE/2	NI	5733	3566	4646	358	NI	250	5 949	1 139	3802
BE/3	NI	3	5	6	67	6	5	3	6	3
BE/4	NI	0	2	1 242	N/A	N/A	N/A	N/A	N/A	
Total	8529	6573	10 396	6154	3254	2299	4863	11357	1449	5733
Finland										
SFR/1	0	0	0,16	0	0	0	0	0	0,2	0,3
Total	0	0	0,16	0	0	0	0	0	0,2	0,3
France										
FR/1	NI	0	0	0	18	33	75	17	0	0
FR/2	NI	68	2632	9644	8896	6230	7268	7309	10 428	4858
FR/3	NI	1257	1296	1078	922	1323	1143	1423	2106	1066
FR/4	NI	54	37	43	41	34	26	34	0	20
FR/5	NI	0	70	6	238	13	3	NI	2,5	3
FR/6	NI	33	16	64	48	25	15	9	18	18
FR/7	NI	24	35	8	25	24	44	32	Shutdown	Shutdown
Total	344	1436	4086	10 843	10 188	7682	8574	8824	12 555	5965
Germany										
DE/1	NI	31	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/2	NI	4	0	NI	NI	NI	138	182	120	85
DE/3	NI	2	3	2	1	NI	NI	NI	3	207
DE/4	NI	3054	3054	1259	3437	Shut down	Shut down	Shut down	Shut down	Shut down
DE/5	NI	66	576	766	5799	10 555	10 027	4958	1762	2514
DE/6	NI	1314	3764	1034	472	1591	1551	496	1386	5602
DE/7	NI	37 260	20 602	13 200	13 390	12 260	16 490	15 330	59 991	55 830
DE/8	NI	1646	2311	NI	674	2282	1536	356	358	553
DE/9	NI	2270	4570	4230	6366	5340	4355	3239	3241	0
DE/10	NI	304	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DE/11	NI	19	NI	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/12	NI	176	176	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/13	NI	2692	5659	9209	4378	2745	2500	2780	2309	1888
DE/14	NI	1656	754	833	406	85	212	71	96	72
DE/15	NI	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Total	26 200	50 494	41 469	30 533	34 923	34 858	36 808	27 412	63 266	66 751
Netherlands										
NL/1	NI	6	2	28	7	3	2	1	0	Shut down
NL/2	NI	0	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Total	38	6	2	28	7	3	2	1	0	

* 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	2004	2005	2006	2007
------	------	------	------	------	------	------	------	------	------	------

Portugal										
P/1	NI	0	0	0	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
P/2	NI	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Total	689	0	0	0	0	0	0			

Spain										
ES/1	NI	1265	4276	495	2027	846	408	1297	807	1107
ES/2	NI	27	8	9	141	PC	PC	PC	PC	PC
ES/3	NI	384	599	359	472	679	402	323	370	376
ES/4	NI	2694	6279	4868	2343	2020	2837	3549	3938	2899
ES/5	NI	1013	412	59	0	440	1544	1880	208	161
ES/6	NI	604	770	1088	2339	2625	622	900	1043	3776
ES/7	NI	20	10	3	13	14	NI	315	9	11
ES/8	NI	498	432	459	552	328	506	633	551	1035
ES/9	NI	500	401	279	169	349	185	217	156	1105
Total	657	7005	13 187	7619	8056	7301	6503	9114	7082	10 470
Sweden										
SE/1	NI	6	6	850	5	NI	55	NI	NI	Shut down
SE/2	NI	1	1	1	NI	NI	NI	NI	NI	Shut down
Total	42	7	7	851	5	NI	55	NI	0	

Switzerland										
CH/1	NI	165	178	215	207	239	139	Shut down	Shut down	Shut down
CH/2	NI	0	3	32	1	2	1	Shut down	Shut down	Shut down
CH/3	NI	1084	0	1933	NI	1891	NI	1859	0	1948
Total	1 905	1249	181	2180	208	2132	140	1859	0	1948

UK										
UK/1	NI	161	268	263	136	118	246	Shut down	Shut down	Shut down
UK/2	NI	37	48	147	113	119	134	43	Shut down	Shut down
UK/3	NI	3 911	3 092	2 842	10 745	21 247	6 208	6 446	15 905	11 703
Total	3 187	4 109	3 408	3 252	10 994	21 484	6 588	6 489	15 905	11 703

NI: No information

N/A: Not applicable

PC: Partly converted to membrane technology

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

Site	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Belgium										
BE/1	NI	3,640	31,155	1,188	13,192	10,472	21,041	24,680	1,389	8,803
BE/2	NI	22,930	14,264	18,585	1,432	NI	1,000	23,794	5,007	18,548
BE/3	NI	0,025	0,039	0,046	0,055	0,047	0,038	0,029	0,050	0,023
BE/4	NI	0	0,0260	29,819	N/A	N/A	N/A	N/A	N/A	N/A
Finland										
SFR/1	NI	0,003	0,004	0,006	0,003	NI	NI	NI	NI	0,006
France										
FR/1	NI	0	0	0	1,024	1,810	4,130	0,953	0,000	0,000
FR/2	NI	0,950	36,560	133,941	123,555	86,528	100,950	101,514	144,833	67,472
FR/3	NI	5,220	5,380	4,474	3,828	5,491	4,746	5,907	8,744	4,424
FR/4	NI	0,320	0,215	0,255	0,240	0,200	0,155	0,202	0,000	0,115
FR/5	NI	0	3,100	0,280	10,580	0,600	0,140	NI	0,110	0,159
FR/6	NI	0,196	0,094	0,386	0,292	0,148	0,092	0,052	0,110	0,112
FR/7	NI	0,131	0,190	0,044	0,134	0,131	0,237	0,172	Shutdown	Shutdown
Germany										
DE/1	NI	0,480	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/2	NI	0,030	0	0	NI	NI	1,250	1,400	0,920	0,650
DE/3	NI	0,014	0,021	0,014	0,007	NI	NI	NI	0,023	1,653
DE/4	NI	10,180	10,180	4,197	22,464	Shut down	Shut down	Shut down	Shut down	Shut down
DE/5	NI	0,440	3,600	4,788	36,242	66	62,670	29,960	10,365	14,790
DE/6	NI	10,104	25,290	6,950	3,171	11	10,422	3,330	9,315	37,643
DE/7	NI	207,000	113,200	75,000	76,080	70	93,693	87,102	306,767	766,780
DE/8	NI	16,800	17,000	0	4,959	17	11,295	2,621	2,632	4,064
DE/9	NI	15,134	28,560	25,329	38,119	32	26,077	19,398	19,408	0,000
DE/10	NI	1,225	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DE/11	NI	0,310	0	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/12	NI	1,120	1,120	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
DE/13	NI	17,949	35,371	57,555	27,362	17	15,628	17,378	14,434	11,800
DE/14	NI	23,000	9,150	10,110	4,937	1	2,571	0,857	1,160	0,877
DE/15	NI	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Netherlands										
NL/1	NI	0,082	0,027	0,382	0,100	0,043	0,029	0,008	0	Shut down
NL/2	NI	0	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down
Portugal										
P/1	NI	0	0	0	N/A	N/A	N/A	N/A	N/A	Shut down
P/2	NI	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down	Shut down

* All mercury-contaminated materials, such as cell components, process equipment, solid wastes from sumps, pits, demercuration 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	2004	2005	2006	2007
------	------	------	------	------	------	------	------	------	------	------

Spain										
ES/1	NI	42,150	136,300	15,759	64,604	27	12,995	41,354	25,733	35,286
ES/2	NI	1,800	0,556	0,607	14,300	PC	PC	PC	PC	PC
ES/3	NI	11,460	17,850	10,703	14,056	20	11,977	9,624	11,034	11,212
ES/4	NI	17,960	41,860	32,450	15,620	13	18,910	23,662	26,255	19,325
ES/5	NI	16,085	6,564	0,943	0,005	7	24,606	29,962	3,315	2,566
ES/6	NI	2,890	3,533	4,994	10,737	12	2,857	4,129	4,785	17,331
ES/7	NI	0,800	0,380	0,120	0,528	1	NI	12,600	0,362	0,443
ES/8	NI	3,690	3,200	3,400	4,090	2	3,750	4,690	4,080	7,670
ES/9	NI	4,950	3,970	2,767	1,673	3	1,830	2,150	1,546	10,946

Sweden										
SE/1	NI	0,064	0,064	8,500	0,052	NI	0,553	NI	Shut down	Shut down
SE/2	NI	0,011	0,010	0,010	NI	NI	NI	NI	0	0

Switzerland										
CH/1	NI	3,000	3,230	3,900	3,774	4,350	4,350	Shut down	Shut down	Shut down
CH/2	NI	0	0,104	1,216	0,021	0,061	0,030	Shut down	Shut down	Shut down
CH/3	NI	40,910	0	71,602	NI	70,048	NI	68,835	0	72,163

UK										
UK/1	NI	5,540	9,115	8,938	4,631	4,001	8,359	Shut down	Shut down	Shut down
UK/2	NI	0,420	0,530	1,640	1,260	1,330	1,490	0,573	Shut down	Shut down
UK/3	NI	5,300	4,190	3,850	14,560	28,790	8,412	8,734	21,552	31,887

NI: No information

N/A: Not applicable

PC: Partly converted to membrane technology

4. 2007 National 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 Agreement 2003/5.

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

BI 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 following tables give an overview of the locations of the mercury-based chlor-alkali plants and their operators:

Country/Code	Company	Location	Status
Belgium			
BE/1	Solvin	Lillo	
BE/2	Tessenderlo	Tessenderlo	Only the period of time in production before the definitive shut down considered
BE/3	Solvin	Antwerpen	
BE/4	Solvay	Jemeppe	Replaced its mercury technology in 2001
Finland			
SFR/1	Eka Chemicals	Oulu	The permitted discharges and emissions have been increased on the basis of a revised authorisation in 2002
France			
FR/1	PC de Loos	Loos	
FR/2	Albemarle PPC	Thann	
FR/3	Solvay	Tavaux	
FR/4	Arkema	Jarrie	
FR/5	SPC Harbonnières	Harbonnières	
FR/6	Arkema	Lavera	
FR/7	Arkema	St Auban	Closed down
Germany⁵			
DE/1	ECI	Bitterfeld	Ceased operation in 1999
DE/2	Bayer	Uerdingen	Converted to membrane
DE/3	Akzo Nobel	Ibbenbüren	
DE/4	Bayer	Leverkusen	Shut down in 2002
DE/5	BASF	Ludwigshafen	
DE/6	Ineos	Wilhelmshafen	
DE/7	Vestolit	Marl	Shut down of some cells in 2001. Only the period of time in production before the definitive shut down considered.
DE/8	Degussa - Hüls	Lülsdorf	
DE/9	Lil	Frankfurt	The permitted discharges and emissions have been increased on the basis of a revised authorisation in 2001
DE/10	Bayer	Dormagen	Ceased operation in 1999
DE/11	Clariant	Gersthofen	Shut down in 2000
DE/12	Wacker Chemie	Burghausen	Shut down in 2000
DE/13	Vinnolit	Knapsack	
DE/14	Vinnolit	Gendorf	
DE/15	BSL Olefinverbund	Schkopau	Shut down in 1998
The Netherlands			
NL/1	Akzo Nobel	Hengelo	Shut down in 2007
NL/2	Solvay	Linne-Herten	Decommissioned in 1999

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

Country/Code	Company	Location	Status
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
Spain			
ES/1	Quimica del Cinca	Monzon	
ES/2	Electroquimica de Hernani	Hernani	Partly converted to membrane technology
ES/3	Elnosa	Lourizan	
ES/4	Ercros	Flix	
ES/5	Solvay	Torrelavega	
ES/6	Solvin	Martorell	
ES/7	Ercros	Sabinanigo	
ES/8	Ercros	Vilaseca	
ES/9	Ercros	Huelva/Palos	
Sweden			
SE/1	Akzo Nobel	Bohus	This plant was shut down
SE/2	Ineos	Stenungsund	Verified value
Switzerland			
CH/1	Solvay	Zurzach	This plant was shut down in 2004
CH/2	Syngenia	Monthey	This plant was shut down in 2005
CH/3	SF-Chem	Pratteln	
United Kingdom			
UK/1	Rhodia	Staveley	This plant was shut down in 2005
UK/2	Albion Chemicals	Sandbach	This plant was shut down
UK/3	Ineos	Runcorn	This plant is undergoing conversion to membrane technology. Only the period of time in production before the definitive shut down considered.

4.2.1 Other OSPAR Contracting Parties

This section presents the status of the chlor-alkali industry within other OSPAR Contracting Parties.

Denmark

Denmark has no chlor-alkali plants.

Iceland

Iceland has no chlor-alkali plants.

Ireland

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

Luxembourg

Luxembourg has no chlor-alkali plants.

Norway

The last Norwegian plant with mercury cells ceased its mercury-based operations in September 1997.

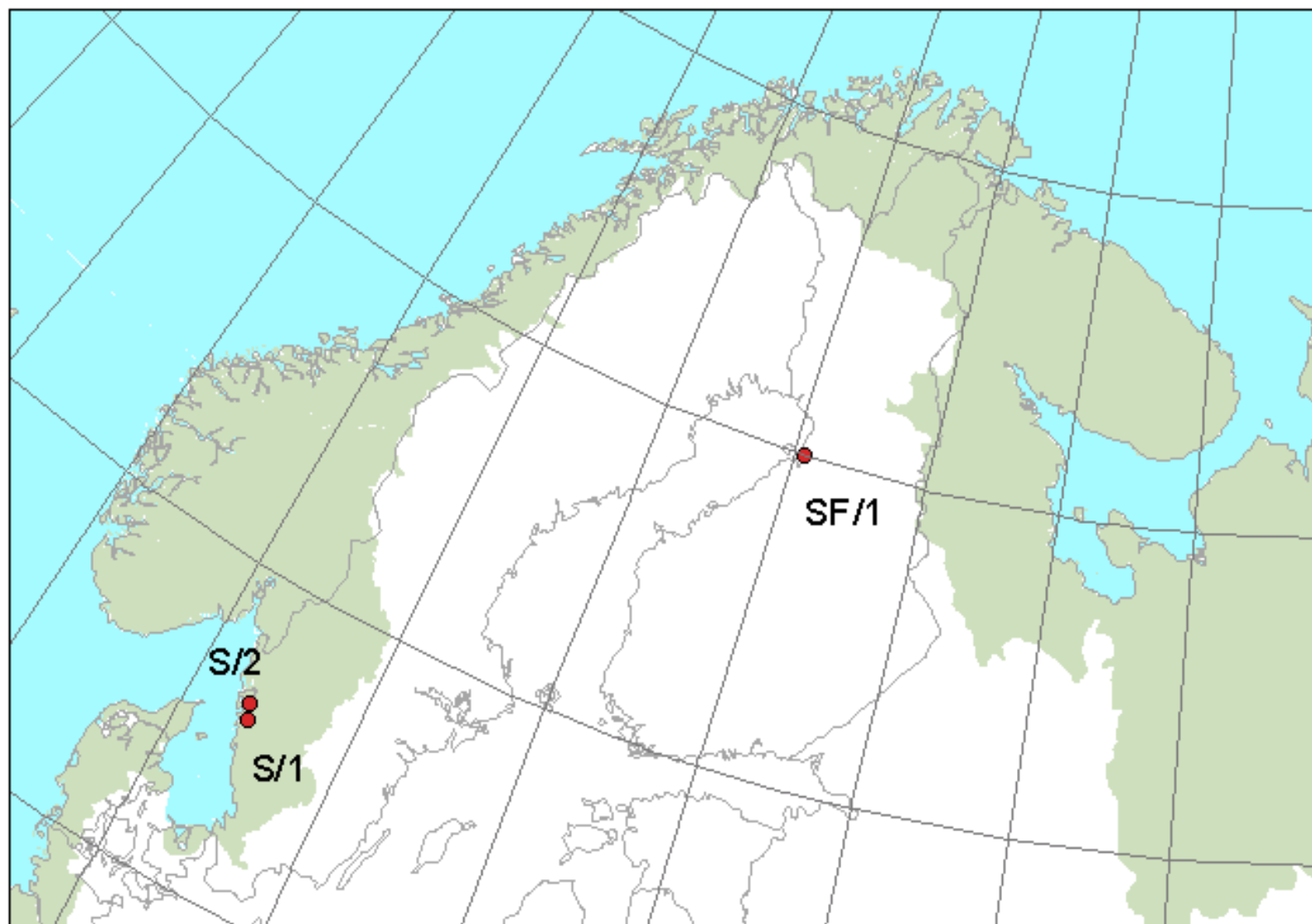


Figure 4a: Maps showing the location of the mercury-based chlor-alkali plants (Sweden)

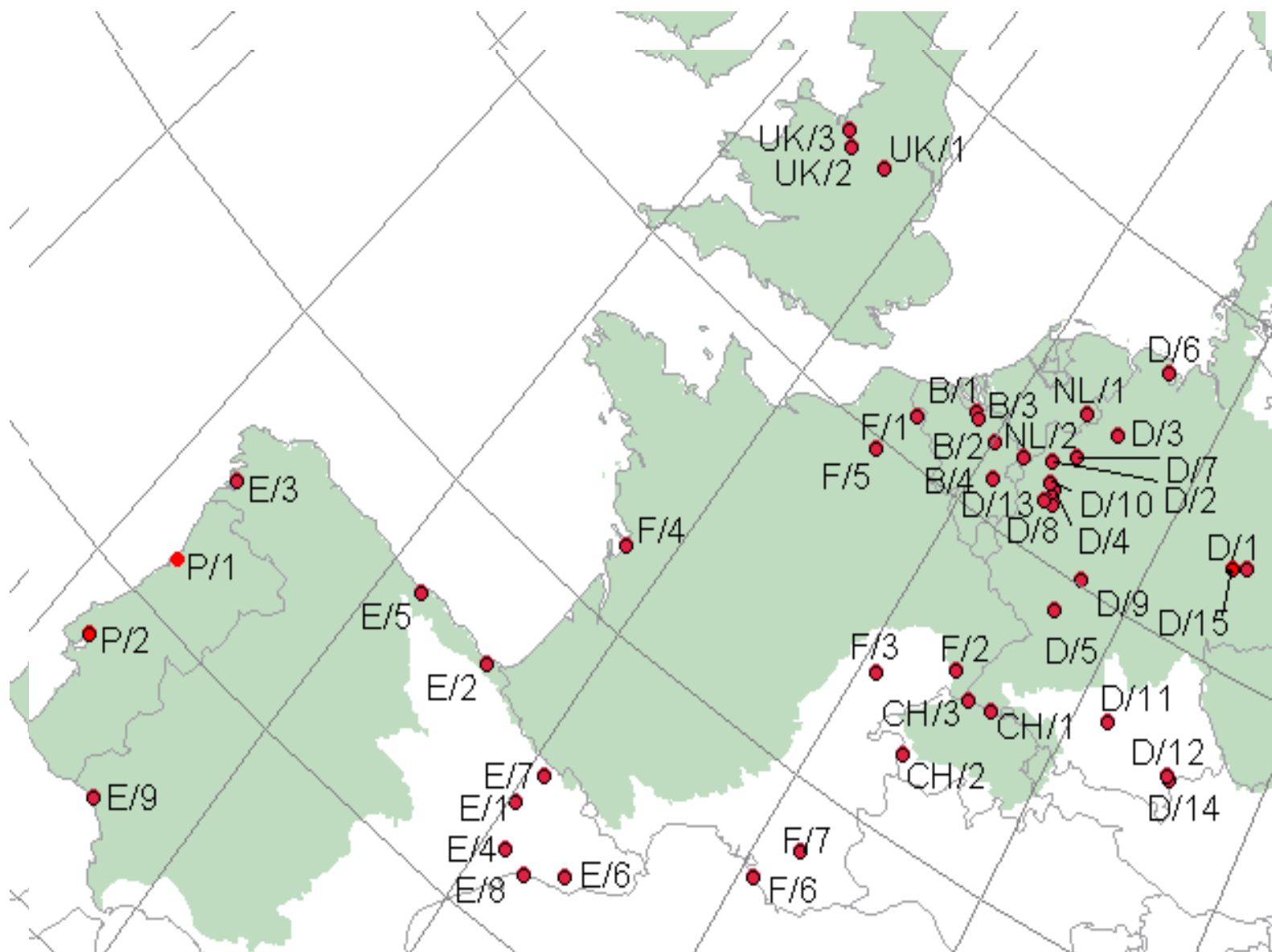


Figure 4b: Maps showing the location of the mercury-based chlor-alkali plants (Rest of Contracting Parties)

Mercury losses data per Contracting Party on a plant-by-plant basis

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	Mercury in Wastes					Difference to balance
				C	E1	E2	Process exhaust	Cellroom	Total	Discharges losses	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)	(g/t)	D (g/t)	c (tonnes)	f (tonnes)	l (tonnes)	F (g/t)	DB (g/t)
BE/1	219 000	A	R	40,909	0,050	0,012	0,014	0,182	0,196	0,258	8,803	-0,806	0,000	0,000	-3,680	35,528
BE/2	205 000	A	R	17,981	0,030	0,011	0,002	0,596	0,598	0,639	18,548	2,571	-2,818	0,000	-1,207	0,000
BE/3	120 000	A	R	12,208	0,029	0,097	0,065	0,367	0,432	0,558	0,023	0,050	0,000	0,000	0,417	11,211
Total	544 500															

Mercury losses from the chlor-alkali industry in 2006 and 2007

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 l (tonnes)	Temporarily stored F (g/t)	
SFR/1	42 485	Baltic	R	16,684	0,033	0,091	0,002	0,868	0,870	0,994	0,006	-0,541	0,000	0,000	-12,738	28,422
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)	
FR/1	18 040	A	R	18,127	0,020	0,748	0,093	0,555	0,648	1,416	0,000	0,038	-0,005	0,000	1,829	15,542
FR/2	72 000	A	R	88,542	0,108	0,247	0,000	1,337	1,333	1,689	67,472	-1,711	2,976	0,000	17,569	2,023
FR/3	240 900	M	R	8,165	0,044	0,029	0,012	0,909	0,938	1,011	4,424	0,000	0,217	0,000	0,901	1,874
FR/4	170 070	M	R	10,443	0,022	0,135	0,007	0,494	0,493	0,650	0,115	0,026	0,000	0,000	0,151	9,515
FR/5	22 500	A	R	16,844	0,235	0,002	0,005	0,842	0,849	1,086	0,159	0,297	0,000	0,000	13,200	2,401
FR/6	166 000	M	R	10,464	0,057	0,120	0,000	0,944	0,958	1,135	0,112	0,000	0,000	0,000	0,000	9,219
Total	689509															

Mercury losses from the chlor-alkali industry in 2006 and 2007

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	Mercury in Wastes					Difference to balance
				C	E1	E2	Process exhaust	Cellroom	Total	Discharges losses	Disposed off	Awaiting recovery	Awaiting disposal	Awaiting decision	Temporarily stored	DB
				(g/t)	(g/t)	(g/t)	2.3.1 (g/t)	2.3.2 (g/t)	E3 (g/t)	(g/t)	D (g/t)	c (tonnes)	f (tonnes)	l (tonnes)	F (g/t)	
DE/2	130 000	A	R	13,546	0,050	0,001	0,030	0,570	0,600	0,651	0,650	0,300	0,000	0,000	2,308	9,937
DE/3	125 276	A	R	2,305	0,157	0,020	0,000	0,653	0,653	0,830	1,653	0,047	-0,067	0,000	-0,161	-0,016
DE/5	170 000	A	R	-0,765	0,030	0,010	0,000	0,850	0,850	0,890	14,790	-0,300	0,000	0,000	-1,765	-14,680
DE/6	148 828	A	R	74,717	0,019	0,006	0,000	0,471	0,471	0,496	37,643	0,755	0,533	4,159	36,599	-0,021
DE/7	72 811	A	R	343,356	0,060	0,003	0,024	1,069	1,093	1,156	766,780	0,000	-9,262	0,000	-127,206	-297,374
DE/8	135 951	A	R	5,502	0,070	0,012	0,021	0,999	1,020	1,102	4,064	0,541	-0,027	0,000	3,781	-3,445
DE/9	167 376	A	R	9,904	0,053	0,015	0,086	0,860	0,946	1,014	0,000	0,000	0,000	4,000	23,952	-15,006
DE/13	160 000	A	R	296,019	0,056	0,014	0,018	0,906	0,924	0,994	11,800	40,700	3,389	0,000	275,000	8,225
DE/14	82 355	Bl Sea	R	-51,970	0,014	0,000	0,035	0,581	0,616	0,630	0,877	-4,244	0,094	0,000	-50,391	-3,086
Total	1 192 222															

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	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)		
ES/1	31 373	M	R	17,180	0,138	0,015	0,002	0,816	0,818	0,971	35,286	0,000	0,117	0,000	3,729	-22,806
ES/3	33 552	A	R	13,531	0,174	0,012	0,001	0,495	0,496	0,682	11,212	0,000	0,001	0,000	0,030	1,607
ES/4	150 000	M	R	18,000	0,044	0,025	0,005	0,609	0,614	0,683	19,325	0,000	-0,022	0,000	-0,147	-1,861
ES/5	62 747	A	W	11,172	0,191	0,043	0,008	0,306	0,314	0,548	2,566	0,294	0,000	0,000	4,685	3,372
ES/6	217 871	M	R	17,891	0,043	0,011	0,147	0,514	0,661	0,715	17,331	0,251	-2,611	0,276	-9,565	9,411
ES/7	25 000	M	R	-60,601	0,101	0,008	0,010	0,850	0,860	0,969	0,443	-1,783	0,000	0,000	-71,321	9,309
ES/8	135 004	M	R	21,511	0,080	0,060	0,010	0,740	0,750	0,890	7,670	0,486	0,000	0,000	3,600	9,351
ES/9	100 929	A	R	7,124	0,063	0,014	0,009	0,608	0,616	0,693	10,946	-1,564	0,000	0,365	-11,880	7,364
Total	756 475															

Mercury losses from the chlor-alkali industry in 2006 and 2007

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)	
SE/2	120 000	A	R	46,600	0,014	0,004	0,000	0,147	0,147	0,166	0,000	-5,905	0,000	0,000	-49,208	95,643
Total	120 000															

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/3	27 000	A	R	38,519	0,140	0,039	0,000	0,548	0,548	0,727	72,163	0,000	-0,928	0,000	-34,371	0,000
Total	27 000															

Mercury losses from the chlor-alkali industry in 2006 and 2007

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	Mercury in Wastes					Difference to balance
				C	E1	E2	Process exhaust	Cellroom	Total	Discharges losses	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)	(g/t)	D (g/t)	c (tonnes)	f (tonnes)	l (tonnes)	F (g/t)	DB (g/t)
UK/3	367 000	A	W	109,300	0,099	0,193	0,140	2,247	2,387	2,679	31,887	32,782	0,000	0,000	89,324	-14,591
Total	367 000															

This plant is undergoing conversion to membrane technology and if the mercury losses are calculated only on the effective mercury capacity, then the value would be 1.58g/te.



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