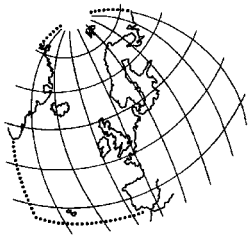
Hazardous Substances Series

Mercury Losses from the Chlor-Alkali Industry in 2001



OSPAR Commission

2003

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

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

After several years of more or less stable production capacities until 1998, mercury-cell based chlorine production capacities have further decreased in 2001. Capacity reductions in Belgium, France, Germany and Spain seem to be mainly responsible for this decrease. Mercury losses through product, waste water and air have decreased from 2000 to 2001 in all countries except Switzerland where there has been a slight increase.

Over the years, atmospheric emissions of mercury have been significantly reduced. For 2001 there was also a significant decrease of 730 kg per year mainly due to reductions reported from Belgium, France and Germany. For Switzerland and the UK a slight increase is indicated. The data show clearly that all plants comply with the limit value for air emissions in (established by PARCOM Decision 90/3) of 2 g mercury per tonne of chlorine produced; actual values range from 0,27 to 2,0 g per tonne. The extent to which these values are considered to reflect BAT in general or only for individual plants concerned is not clear. However, the EC Reference Document on Best Available Techniques in the Chlor-Alkali Industry (December 2001) identified best available techniques which can result in emissions that are much lower than the limit value of 2 g Hg/t Cl_2 specified in PARCOM Decision 90/3.

Between 2000 and 2001, the amount of mercury in safely deposited wastes has fallen from about 70 tonnes to about 60 tonnes. The data show a decrease in all countries except for France and Switzerland. There is now an explanation in the report what "safely deposited wastes" constitutes, as the range of values between countries is extremely large. It is sometimes unclear where this mercury has been deposited and whether it is "pure mercury" from decommissioned cells being returned to the market or used in other plants.

Reports on the intended future phasing-out of their national mercury-based chlor-alkali production capacities were received from Finland, France, Germany, Spain, Sweden, Switzerland and the UK. Germany, Spain and the UK provided updated information about conversion/shut down of their plants. Sweden, Finland and Switzerland confirmed the information provided in the report submitted last year. This is the last report where this information is provided on an annual basis. The 2003 meeting of OSPAR's Hazardous Substances Committee agreed on new reporting requirements for the implementation of PARCOM Decision 90/3. This reporting is scheduled for the intersessional period 2003/2004 and every four years thereafter. Publication of these reports are therefore foreseen in 2004, 2008 and 2012. 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.

RÉCAPITULATIF

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

Jusqu'en 1998, après plusieurs années pendant lesquelles les capacités de production sont restées plus ou moins stables, les capacités de production de chlore à base de cellules de mercure ont de nouveau baissé en 2001. La baisse des capacités de production en Belgique, en France, en Allemagne et en Espagne paraît être la principale responsable de cette diminution. Les pertes de mercure par le biais des produits, des eaux usées et de l'atmosphère ont baissé entre 2000 et 2001 dans tous les pays, à l'exception de la Suisse où l'on a constaté une légère augmentation.

Au fil des années, les émissions atmosphériques de mercure ont été réduites dans des proportions significatives. En 2001, on constate là encore une baisse significative, de 730 kg par an, diminution surtout due aux réductions signalées par la Belgique, la France et l'Allemagne. En Suisse et au Royaume-Uni, une légère augmentation est signalée. Les données prouvent que toutes les installations se conforment au plafond fixé (par la Décision PARCOM 90/3) pour les émissions atmosphériques, soit 2 g de mercure par tonne de chlore fabriqué ; les valeurs elles-mêmes se situent entre 0,27 et 2 g par tonne. L'on ne connaît pas en toute clarté la mesure dans laquelle ces valeurs sont considérées comme le résultat de la BAT en général ou uniquement pour telle ou telle installation. Toutefois, le Document de référence communautaire européen sur les meilleures techniques disponibles dans l'industrie des chlorures alcalins (de décembre 2001) fait état de meilleures techniques disponibles qui permettent d'obtenir des émissions nettement inférieures au plafond de 2 g Hg/t Cl_2 qui est stipulé dans la Décision PARCOM 90/3.

Entre 2000 et 2001, la quantité de mercure dans les déchets mis en décharges sûres a baissé, d'environ 70 tonnes à 60 tonnes à peu près. Les données mettent en évidence une diminution dans tous les pays excepté la France et la Suisse. Une explication de ce que sont les « déchets déposés dans des décharges sûres » est maintenant donnée dans le rapport car la fourchette des valeurs est extrêmement large. L'on ne sait parfois pas où ce mercure a été déposé ainsi que s'il s'agit de « mercure pur » provenant de cellules désaffectées et renvoyé sur le marché ou réutilisé dans d'autres installations.

La Finlande, la France, l'Allemagne, l'Espagne, la Suède, la Suisse et le Royaume-Uni ont remis des rapports sur l'abandon que ces pays prévoient dans l'avenir de leurs capacités de production des chlorures alcalins à base de mercure. L'Allemagne, l'Espagne et le Royaume-Uni ont communiqué des renseignements à jour sur la conversion/la fermeture de leurs installations. La Suède, la Finlande et la Suisse ont confirmé les renseignements qui figuraient dans les rapports qu'elles ont remis l'année dernière. Il s'agit là du dernier rapport dans lequel ces renseignements sont communiqués tous les ans. A sa réunion de 2003, le Comité substances dangereuses d'OSPAR s'est mis d'accord sur de nouvelles normes de notification de la mise en oeuvre de la Décision PARCOM 90/3. Cette notification est prévue pour l'intersession 2003/2004, puis tous les quatre ans. Il est donc prévu que ces rapports soient publiés en 2004, 2008 et 2012. Dans la Décision PARCOM 90/3, il est recommandé que l'exploitation des installations existantes d'électrolyse des chlorures alcalins à cellules de mercure de mercure cesse de plus rapidement possible. L'objectif est qu'elle cesse complètement d'ici 2010.

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 2001

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 2000 that the mercury-cell-based chlorine production capacities have decreased from 2000 to 2001. From the total reduction/decrease of about 227 kilo tonnes in 2001 Germany decreased 73%, Belgium 22% and Sweden 5%;

b. "Mercury Losses through Product, Waste Water and Air" have decreased from 2000 to 2001 in all countries except Switzerland where there has been a slight increase. For the total decrease of about 846 kg per year the following Contracting Parties were mainly responsible: Germany with 32%, France with 18%, Belgium with 17% and Spain with 15%.

The data show that there is still a wide range of specific Mercury Losses through Product, Waste Water and Air (from 0,29 to 2,89 g per tonne);

c. air emissions of mercury have been significantly reduced in 2001. Significant reductions from the total decrease of 730 kg per year are reported from Germany with 39%, France with 24% and Belgium with 20%. For the UK and Switzerland a slight increase is indicated. All plants comply with the limit value of 2 g Hg/t Cl_2 for air emissions in PARCOM Decision 90/3, and it is clear that in many plants, air emissions continue to fall. However, according to the date in Table 5 a wide range in actual values from 0,27 to 2,0 g Hg/t Cl_2 is shown The extent to which these values are considered to reflect BAT in general or only for individual plants concerned is not clear. However, the EC Reference Document on Best Available Techniques in the Chlor-Alkali Industry (December 2001) identified best available techniques which can result in emissions, discharges and losses that are much lower than the limit value of 2 g Hg/t Cl_2 specified in PARCOM Decision 90/3;

d. over the last year, the amount of mercury in safely deposited wastes has fallen from about 70 tonnes to about 60 tonnes. The data show a decrease in all countries except for France and Switzerland. There is an explanation in tables 6 and 7 what "safely deposited wastes" constitutes, as the range of values is extremely large. For example, Germany has a value of 30 tonnes and France a value of 10 tonnes, and it is sometimes unclear where this mercury has been deposited and whether it is "pure mercury" from decommissioned cells being returned to the market or used in other plants. An explantion for France is that there was no decrease in their amount of safely deposited waste is that plant F/2 stopped production of sodium hydroxide progressively between 1998 and 2000. This plant currently produces only potassium hydroxide which implies that the recycling of mercury is not possible anymore. The mercury resulting from the demercurisation unit is stabilised under sulphur form and sent to a Class 1 authorised technical landfill.

Reports on the intended future phasing-out of their national mercury-based chlor-alkali production capacities were received from Finland, France, Germany, Spain, Sweden, Switzerland and the UK. Germany, Spain and the UK provided updated information about conversion/shut down of their plants. Sweden, Finland and Switzerland confirmed the information provided in the report submitted last year. In order to have an overview of the plans submitted to date, a brief summary of the reports sent by Belgium, Netherlands, Portugal, Spain and France are included in indents f – j below:

a. Germany submitted a time-table which gives an overview of the anticipated phase-out scenario by the end of 2006. The data indicate an anticipated phase-out of about 60% of the mercury based chlorine capacity from 1991 until 2006. Two plants were converted in 2000 (D/1 and D/10) and two other plants (D/11 and D/12) were shut down in 2000/2001. In France plant F/2 stopped production of sodium hydroxide between 1998 and 2000.

b. Finland and Sweden have confirmed that the mercury-based production of chlorine will be ceased by 2010. The only plant producing mercury-based chlor-alkali in Finland, Eka Chemicals Oy in Oulu will stop mercury-based chlor-alkali production by 2010. The next evaluation of the situation in Finland will be in 2006 in connection with the permit procedure. Sweden will send a Swedish Ordinance on Chemicals for notification to the European Commission, which implies a ban on the use of mercury-cell-based chlor-alkali production from 2010 onwards;

c. Switzerland has confirmed that there are no specific phasing-out-plans but that the two mercury based plants signed the voluntary commitments by EuroChlor to reduce the emissions and closure the plants;

d. the United Kingdom has stated that the various factors associated with conversion or phase out of the three mercury-cell plants are currently being addressed but it is not yet possible to provide a time-table regarding phasing-out or conversion;

e. Spain reported further information on conversion one plant to membrane technology;

f. Belgium reported in 2001 that environmental legislation in one of their regions requires that mercury cell technology may not be used after 2010;

g. the Netherlands reported in 2001 about decommissioning of one plant in 2000 and the conversion of the remaining one plant NL/1 should take place before 2010;

h. Portugal reported that the conversion of the plant from mercury-based technology to membrane electrolysis took place in January 2002;

i. Spain has a voluntary agreement with its industry and will respect PARCOM Decision 90/3 and informed about one plant (E2), which is partly converted to membrane technology;

j. France reported in 2001 that there are no specific timetable for phasing out and informed about environmental assessment studies for the seven plants. The results will be prepared for further action.

In order to improve comparability of the data when assessing trends in discharges, emissions and losses of mercury, the following tables have been added to this annual report for the first time:

- Table 1: Chlorine Production Capacity with Hg-cells from all plants (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 tables add significant new data, and give more transparency, particularly on emissions, discharges and losses from individual plants.

Concerning “Decommissioned or converted plants” the new inclusion of basic information on “decommissioned or converted plants”at the bottom of the data tables on the plants of the Contracting Parties as additional information has been helpful, and increased transparency. However, when implementation reporting on PARCOM Decision 90/3 starts in 2003, such information might be best included in the implementation reports.

It was recommended in the previous annual report that Spain should report on the remarkable reduction of atmospheric emission at the plants E4, E7 and E9. Information was given in the national report and it is pointed out that important efforts during the last years were made. The main measures were conversion of the floor basements with resin, changing the heads of the cells and composers and improving the good housekeeping. These measures are in line with the recommended measures laid down in the BREF to reduce the mercury emissions.

3. EVOLUTION OF MERCURY LOSSES FROM THE CHLOR-ALKALI INDUSTRY (1982-2001)

The following figures give a rough indication of the evolution of mercury losses from the chlor-alkali industry in the period 1982-2001 as follows:

Figure 1: Chlorine Production Capacity with Mercury Cells;

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

Figure 3: Atmospheric Emissions of Mercury.

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

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

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

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

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

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

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

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

Until 2003, data has been published in Figures 1 to 3 as total figures for each Contracting Party. Since 1998, data has been made available on a plant-by-plant basis[1]. In order to improve comparibility 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 implementation reporting of PARCOM Decision 90/3.

[1] For plant codes in the tables see § 4.4.

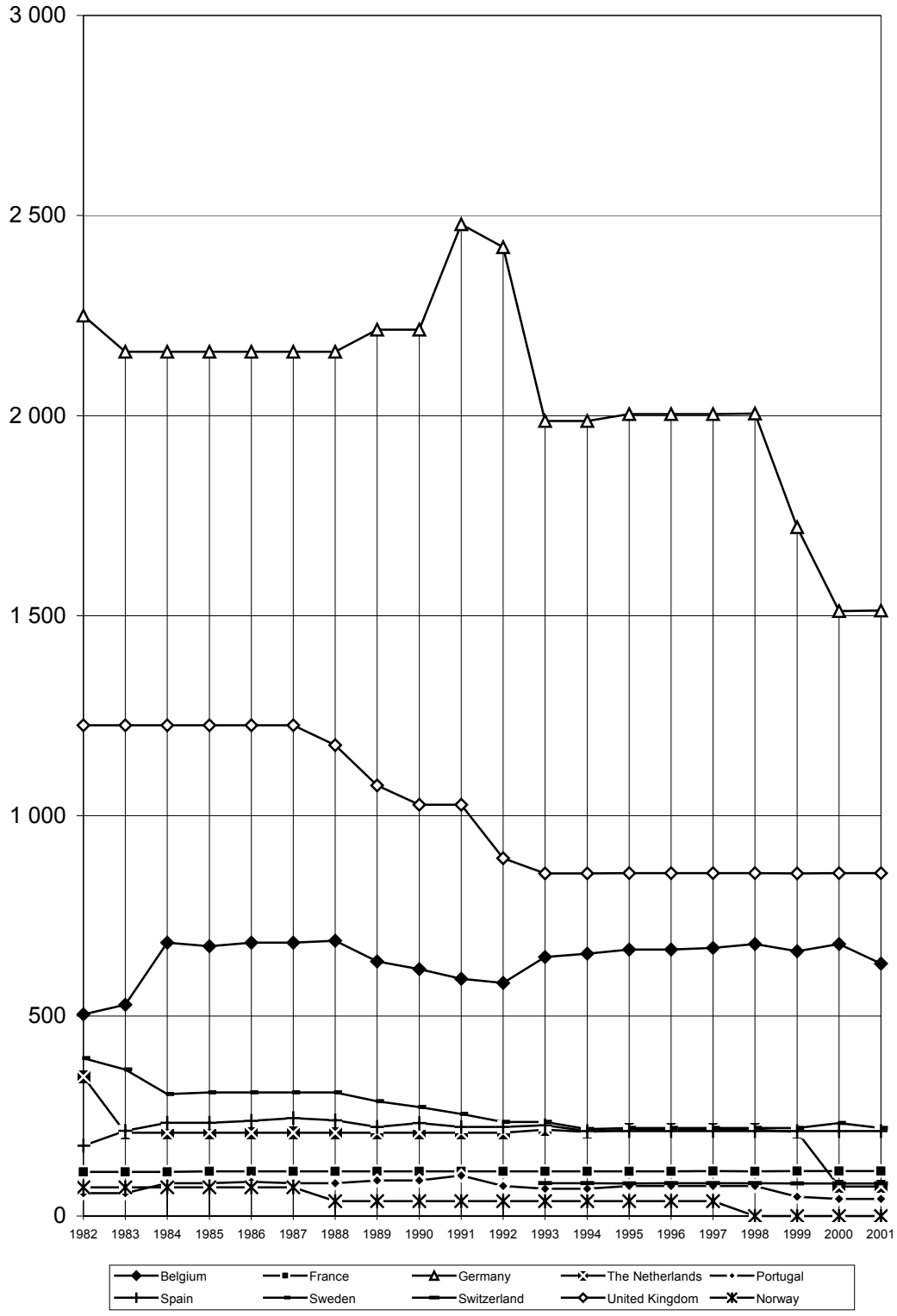


Figure 1: Chlorine Production Capacity with Mercury Cells of plants discharging into the OSPAR catchment area
(in kilotonnes per year)

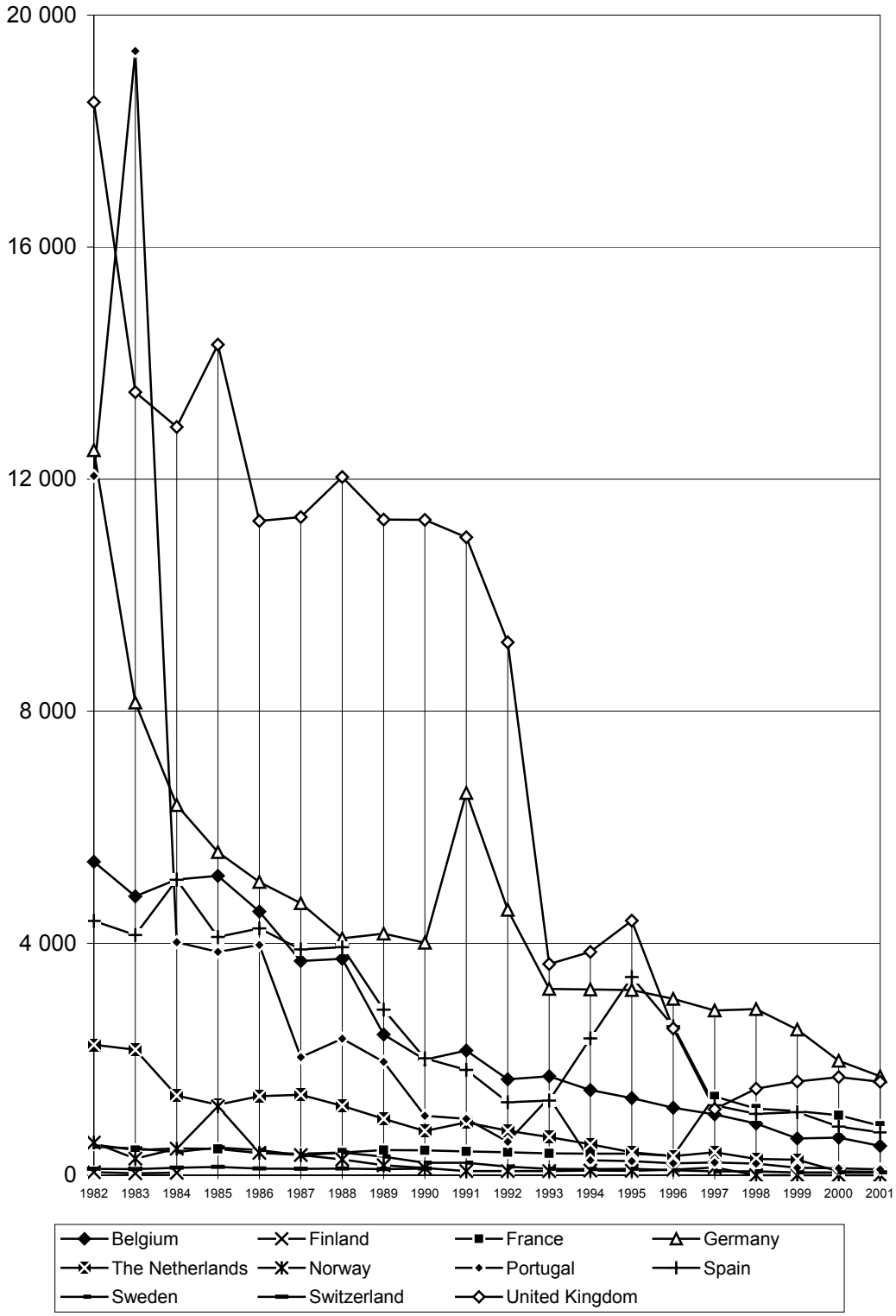


Figure 2: Mercury Losses through Product, Wastewater and Air
(in kilograms per year, sum of mercury losses to product and wastewater from national plants discharging into the OSPAR catchment area plus atmospheric emissions from all national plants)

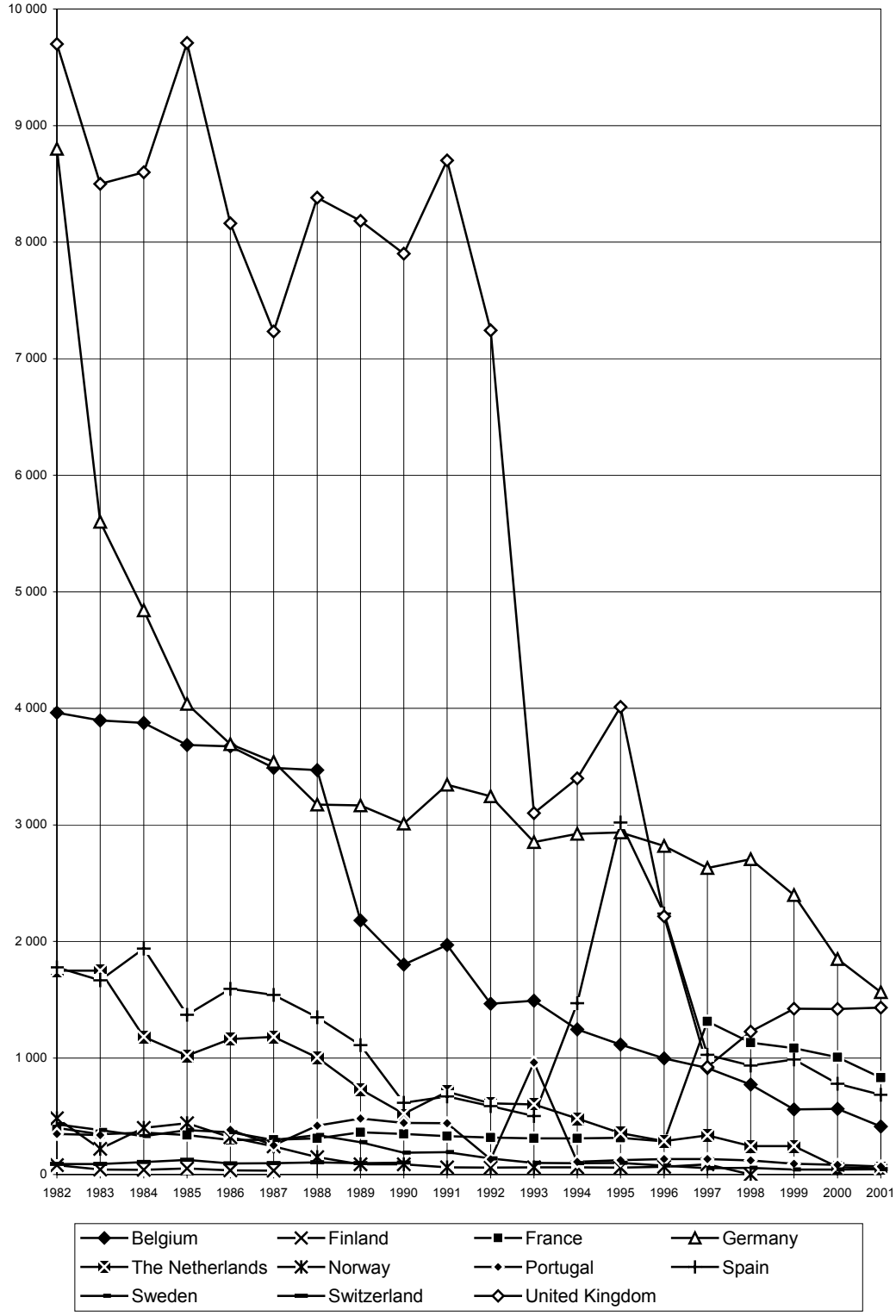


Figure 3: Atmospheric Emissions of Mercury from all plants of Contracting Parties
(in kilograms per year, all plants)

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
Belgium				
B/1*	219 000	230 000	219 000	219 000
B/2*	250 000	250 000	250 000	250 000
B/3*	120 000	100 000	120 000	120 000
B/4*	90 900	82 000	90 900	41 663
Total	**679 900**	**662 000**	**679 900**	**630 663**
Finland				
SF/1	40 000	40 000	40 000	40 000
Total	**40 000**	**40 000**	**40 000**	**40 000**
France				
F/1*	NI	18 040	18 040	18 040
F/2*	NI	72 000	72 000	72 000
F/3	NI	240 900	240 900	240 900
F/4	NI	170 070	170 070	170 070
F/5*	NI	22 500	22 500	22 500
F/6	NI	166 000	166 000	166 000
F/7	NI	184 300	184 300	184 300
Total	**NI**	**873 810**	**873 810**	**873 810**
Germany				
D/1	130 000	65 000	NA	NA
D/2*	130 000	130 000	140 000	140 000
D/3*	120 000	120 000	125 000	125 000
D/4*	150 000	300 000	300 000	300 000
D/5*	180 000	150 000	160 000	160 000
D/6*	65 000	130 000	148 828	148 828
D/7*	160 000	180 000	182 000	176 000
D/8*	200 000	98 000	135 951	135 951
D/9*	150 000	150 000	160 000	167 000
D/10	300 000	248 000	NA	NA
D/11	50 000	60 000	9 804	NA
D/12	72 000	157 000	157 000	NA
D/13*	157 000	150 000	160 000	160 000
D/14	300 000	72 000	82 355	82 355
D/15	120 000	NA	NA	NA
Total	**2 344 000**	**2 010 000**	**1 760 938**	**159 5134**
Netherlands				
NL/1*	70 000	70 000	74 294	74 294
NL/2	140 000	140 000	NA	NA
Total	**210 000**	**210 000**	**74 294**	**74 294**
Portugal				
P/1*	48 600	48 000	43 302	43 302
P/2	26 400	NA	NA	**NA**
Total	**75 000**	**48 000**	**43 302**	**43 302**
Spain				
E/1	31 920	30 000	31 373	31 373
E/2*	14 815	15 000	14 815	14 815
E/3*	33 552	33 500	33 552	33 552
E/4	150 000	150 000	150 000	150 000
E/5*	62 745	63 000	62 747	62 747
E/6	209 200	209 000	217 871	217 871
E/7	25 000	25 000	25 000	25 000
E/8	135 000	135 000	135 004	135 004
E/9*	101 000	101 000	100 929	100 929
Total	**763 232**	**761 500**	**771 291**	**771 291**

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

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

Site	1998	1999	2000	2001
Belgium				
B/1	NI	173	157	122
B/2	NI	178	180	175
B/3	NI	113	111	88
B/4	NI	173	201	120
Total	**893**	**637**	**649**	**505**
Finland				
SF/1	NI	63	43	41
Total	**NI**	**63**	**43**	**41**
France				
F/1	NI	28	29	24
F/2	NI	129	119	121
F/3	NI	345	338	226
F/4	NI	192	220	203
F/5	NI	32	32	33
F/6	NI	190	152	139
F/7	NI	281	243	237
Total	**1149**	**1197**	**1133**	**983**
Germany				
D/1	NI	111	NA	NA
D/2	NI	147	247	159
D/3	NI	49	73	75
D/4	NI	367	367	358
D/5	NI	261	166	162
D/6	NI	70	62	52
D/7	NI	313	257	199
D/8	NI	193	209	228
D/9	NI	161	165	197
D/10	NI	391	NA	NA
D/11	NI	104	18	NA
D/12	NI	132	137	NA
D/13	NI	137	171	201
D/14	285	100	112	80
D/15	NI	NA	NA	NA
Total	**2864**	**2536**	**1982**	**1711**
Netherlands				
NL/1	NI	71	68	57
NL/2	NI	196	NA	NA
Total	**282**	**267**	**68**	**57**
Portugal				
P/1	NI	130	121	100
P/2	NI	NA	NA	NA
Total	**202**	**130**	**121**	**100**
Spain				
E/1	NI	61	63	58
E/2	NI	30	29	25
E/3	NI	66	57	52
E/4	NI	287	164	114
E/5	NI	142	102	101
E/6	NI	182	182	193
E/7	NI	53	49	32
E/8	NI	251	244	176
E/9	123	175	95	103
Total	**1057**	**1247**	**985**	**854**

Site	1998	1999	2000	2001
Sweden				
S/1	NI	27	28	29
S/2	NI	18	19	18
Total	**65**	**45**	**47**	**47**
Switzerland				
CH/1	NI	82	70	64
CH/2	NI	19	20	28
CH/3	NI	15	19	25
Total	**111**	**116**	**109**	**117**
UK				
UK/1	NI	15	16	17
UK/2	NI	125	144	157
UK/3	NI	1476	1535	1439
Total	**1493**	**1616**	**1695**	**1613**

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

Site	1998	1999	2000	2001
Belgium				
B/1	NI	0,750	0,715	0,556
B/2	NI	0,710	0,720	0,699
B/3	NI	1,125	0,921	0,736
B/4	NI	2,110	2,212	2,890
Finland				
SF/1	NI	1,574	1,078	1,026
France				
F/1	NI	1,580	1,631	1,317
F/2	NI	1,792	1,646	1,680
F/3	NI	1,431	1,403	0,940
F/4	NI	1,131	1,292	1,197
F/5	NI	1,444	1,436	1,457
F/6	NI	1,144	0,917	0,836
F/7	NI	1,522	1,320	1,286
Germany				
D/1	NI	1,707	NA	NA
D/2	NI	1,128	1,766	1,132
D/3	NI	0,406	0,583	0,601
D/4	NI	1,223	1,223	1,193
D/5	NI	1,740	1,040	1,010
D/6	NI	0,540	0,416	0,348
D/7	NI	1,740	1,410	1,130
D/8	NI	1,970	1,540	1,680
D/9	NI	1,070	1,032	1,182
D/10	NI	1,576	NA	NA
D/11	NI	1,740	1,864	NA
D/12	NI	0,843	0,871	NA
D/13	NI	0,910	1,069	1,259
D/14	NI	1,390	1,364	0,966
D/15	NI	NA	NA	NA
Netherlands				
NL/1	NI	1,008	0,909	0,765
NL/2	NI	1,400	NA	NA
Portugal				
P/1	NI	2,700	2,800	2,300
P/2	NI	NA	NA	NA
Spain				
E/1	NI	2,040	2,020	1,861
E/2	NI	2,020	1,948	1,667
E/3	NI	1,970	1,699	1,563
E/4	NI	1,910	1,094	0,762
E/5	NI	2,259	1,632	1,608
E/6	NI	0,870	0,834	0,885
E/7	NI	2,100	1,940	1,265
E/8	NI	1,860	1,810	1,300
E/9	NI	1,730	0,938	1,021
Sweden				
S/1	NI	0,268	0,278	0,288
S/2	NI	0,154	0,144	0,154
Switzerland				
CH/1	NI	1,490	1,271	1,162
CH/2	NI	0,877	0,743	1,054
CH/3	NI	0,560	0,692	0,917

Site	1998	1999	2000	2001
UK				
UK/1	NI	0,525	0,538	0,574
UK/2	NI	1,410	1,600	1,744
UK/3	NI	2,000	2,080	1,950

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

Site	1998	1999	2000	2001
Belgium				
B/1	290	156	137	106
B/2	176	154	157	153
B/3	146	101	98	74
B/4	160	146	172	80
Total	**772**	**558**	**564**	**413**
Finland				
SF/1	40	53	35	34
Total	**40**	**53**	**35**	**34**
France				
F/1	26	25	26	21
F/2	111	115	103	108
F/3	301	320	313	210
F/4	179	182	188	171
F/5	330	25	25	26
F/6	24	161	129	109
F/7	160	255	223	186
Total	**1131**	**1083**	**1007**	**831**
Germany				
D/1	173	105	NA	NA
D/2	92	135	235	146
D/3	84	39	63	68
D/4	255	353	353	345
D/5	256	255	160	155
D/6	105	66	58	48
D/7	128	301	244	187
D/8	280	175	171	179
D/9	150	149	151	185
D/10	354	382	NA	NA
D/11	105	100	18	NA
D/12	103	119	128	NA
D/13	97	124	158	177
D/14	285	96	110	74
D/15	238	NA	NA	NA
Total	**2705**	**2399**	**1849**	**1564**
Netherlands				
NL/1	65	65	65	53
NL/2	180	178	NA	NA
Total	**245**	**243**	**65**	**53**
Portugal				
P/1	92	91	82	69
P/2	28	NA	NA	NA
Total	**120**	**91**	**82**	**69**
Spain				
E/1	31	38	45	36
E/2	21	20	19	17
E/3	66	51	43	32
E/4	210	218	118	69
E/5	109	91	85	91
E/6	126	157	165	178
E/7	48	35	27	22
E/8	203	227	204	155
E/9	123	152	74	84
Total	**937**	**989**	**780**	**684**

Site	1998	1999	2000	2001
Sweden				
S/1	37	25	25	27
S/2	21	17	17	17
Total	**58**	**42**	**42**	**44**
Switzerland				
CH/1	57	75	63	58
CH/2	18	19	19	27
CH/3	21	10	14	17
Total	**96**	**104**	**96**	**102**
UK				
UK/1	14	14	14	13
UK/2	106	117	137	149
UK/3	1107	1292	1269	1270
Total	**1227**	**1423**	**1420**	**1432**

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

Site	1998	1999	2000	2001
Belgium				
B/1	1,320	0,680	0,627	0,484
B/2	0,705	0,617	0,627	0,615
B/3	1,213	1,013	0,813	0,615
B/4	1,770	1,780	1,888	1,930
Finland				
SF/1	1,000	1,322	0,885	0,856
France				
F/1	1,390	1,380	1,442	1,154
F/2	1,540	1,600	1,424	1,498
F/3	1,250	1,330	1,300	0,871
F/4	1,050	1,068	1,108	1,004
F/5	1,790	1,123	1,132	1,159
F/6	1,080	0,971	0,776	0,660
F/7	0,960	1,381	1,210	1,011
Germany				
D/1	1,330	1,610	NA	NA
D/2	0,710	1,040	1,680	1,040
D/3	0,700	0,322	0,507	0,546
D/4	1,700	1,175	1,175	1,150
D/5	1,420	1,700	1,000	0,970
D/6	1,609	0,510	0,390	0,322
D/7	0,800	1,670	1,340	1,060
D/8	1,400	1,790	1,260	1,320
D/9	1,000	0,995	0,942	1,106
D/10	1,180	1,540	NA	NA
D/11	2,100	1,660	1,846	NA
D/12	1,431	0,760	0,815	NA
D/13	0,620	0,829	0,989	1,108
D/14	0,950	1,330	1,330	0,900
D/15	1,980	NA	NA	NA
Netherlands				
NL/1	0,920	0,927	0,873	0,716
NL/2	1,230	1,270	NA	NA
Portugal				
P/1	1,893	1,900	1,900	1,600
P/2	1,061	NA	NA	NA
Spain				
E/1	0,960	1,260	1,420	1,141
E/2	1,430	1,330	1,272	1,153
E/3	1,960	1,510	1,280	0,959
E/4	1,400	1,450	0,784	0,462
E/5	1,735	1,442	1,347	1,455
E/6	0,603	0,750	0,758	0,818
E/7	1,900	1,400	1,060	0,880
E/8	1,500	1,680	1,510	1,140
E/9	1,220	1,500	0,735	0,831
Sweden				
S/1	0,370	0,250	0,250	0,270
S/2	0,171	0,139	0,131	0,140
Switzerland				
CH/1	1,030	1,370	1,146	1,065
CH/2	0,680	0,848	0,710	1,019
CH/3	0,780	0,370	0,517	0,625

Site	1998	1999	2000	2001
UK				
UK/1	0,483	0,470	0,461	0,452
UK/2	1,179	1,310	1,520	1,660
UK/3	1,501	1,750	1,720	1,720

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

Site	1998	1999	2000	2001
Belgium				
B/1	NI	837	6823	260
B/2	NI	5733	3566	4646
B/3	NI	3	5	6
B/4	NI	0	2	1242
Total	**8529**	**6573**	**10396**	**6154**
Finland				
SF/1	0	0	0,16	0
Total	**0**	**0**	**0,16**	**0**
France				
F/1	NI	0	0	0
F/2	NI	68	2632	9644
F/3	NI	1257	1296	1078
F/4	NI	54	37	43
F/5	NI	0	70	6
F/6	NI	33	16	64
F/7	NI	24	35	8
Total	**344**	**1436**	**4086**	**10843**
Germany				
D/1	NI	31	NA	NA
D/2	NI	4	0	NI
D/3	NI	2	3	2
D/4	NI	3054	3054	1259
D/5	NI	66	576	766
D/6	NI	1314	3764	1034
D/7	NI	37260	20602	13200
D/8	NI	1646	2311	NI
D/9	NI	2270	4570	4230
D/10	NI	304	NA	NA
D/11	NI	19	NI	NA
D/12	NI	176	176	NA
D/13	NI	2692	5659	9209
D/14	NI	1656	754	833
D/15	NI	NA	NA	NA
Total	**26200**	**50494**	**41469**	**30533**
Netherlands				
NL/1	NI	6	2	28
NL/2	NI	0	NA	NA
Total	**38**	**6**	**2**	**28**
Portugal				
P/1	NI	0	0	0
P/2	NI	NA	NA	NA
Total	**689**	**0**	**0**	**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
Spain				
E/1	NI	1265	4276	495
E/2	NI	27	8	9
E/3	NI	384	599	359
E/4	NI	2694	6279	4868
E/5	NI	1013	412	59
E/6	NI	604	770	1088
E/7	NI	20	10	3
E/8	NI	498	432	459
E/9	NI	500	401	279
Total	**657**	**7005**	**13187**	**7619**
Sweden				
S/1	NI	6	6	850
S/2	NI	1	1	1
Total	**42**	**7**	**7**	**851**
Switzerland				
CH/1	NI	165	178	215
CH/2	NI	0	3	32
CH/3	NI	1084	0	1933
Total	**1905**	**1249**	**181**	**2180**
UK				
UK/1	NI	161	268	263
UK/2	NI	37	48	147
UK/3	NI	3911	3092	2842
Total	**3187**	**4109**	**3408**	**3252**

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

Site	1998	1999	2000	2001
Belgium				
B/1	NI	3,640	31,155	1,188
B/2	NI	22,930	14,264	18,585
B/3	NI	0,025	0,039	0,046
B/4	NI	0	0,0260	29,819
Finland				
SF/1	NI	0,003	0,004	0,006
France				
F/1	NI	0	0	0
F/2	NI	0,950	36,560	133,941
F/3	NI	5,220	5,380	4,474
F/4	NI	0,320	0,215	0,255
F/5	NI	0	3,100	0,280
F/6	NI	0,196	0,094	0,386
F/7	NI	0,131	0,190	0,044
Germany				
D/1	NI	0,480	NA	NA
D/2	NI	0,030	0	0
D/3	NI	0,014	0,021	0,014
D/4	NI	10,180	10,180	4,197
D/5	NI	0,440	3,600	4,788
D/6	NI	10,104	25,290	6,950
D/7	NI	207,000	113,200	75,000
D/8	NI	16,800	17,000	0
D/9	NI	15,134	28,560	25,329
D/10	NI	1,225	NA	NA
D/11	NI	0,310	0	NA
D/12	NI	1,120	1,120	NA
D/13	NI	17,949	35,371	57,555
D/14	NI	23,000	9,150	10,110
D/15	NI	NA	NA	NA
Netherlands				
NL/1	NI	0,082	0,027	0,382
NL/2	NI	0	NA	NA
Portugal				
P/1	NI	0	0	0
P/2	NI	NA	NA	NA
Spain				
E/1	NI	42,150	136,300	15,759
E/2	NI	1,800	0,556	0,607
E/3	NI	11,460	17,850	10,703
E/4	NI	17,960	41,860	32,450
E/5	NI	16,085	6,564	0,943
E/6	NI	2,890	3,533	4,994
E/7	NI	0,800	0,380	0,120
E/8	NI	3,690	3,200	3,400
E/9	NI	4,950	3,970	2,767

[*] 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
Sweden				
S/1	NI	0,064	0,064	8,500
S/2	NI	0,011	0,010	0,010
Switzerland				
CH/1	NI	3,000	3,230	3,900
CH/2	NI	0	0,104	1,216
CH/3	NI	40,910	0	71,602
UK				
UK/1	NI	5,540	9,115	8,938
UK/2	NI	0,420	0,530	1,640
UK/3	NI	5,300	4,190	3,850

4. 2001 DATA AND INFORMATION

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);

   (iii) information about the intended future phasing out of the mercury-based chlor-alkali industry (provided by Contracting Parties directly);

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.

4.1 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
Belgium		
B/1	Solvay	Lillo
B/2	Tessenderlo	Tessenderlo
B/3	Solvin	Antwerpen
B/4	Solvay	Jemeppe
Finland		
SF/1	Eka Chemicals	Oulu
France		
F/1	PC de Loos	Loos
F/2	Albemarle PPC	Thann
F/3	Solvay	Tavaux
F/4	Atofina	Jarrie
F/5	SPC Harbonnières	Harbonnières
F/6	Atofina	Lavera
F/7	Atofina	St Auban
Germany		
D/2	Bayer	Uerdingen
D/3	ECI	Ibbenbüren
D/4	Bayer	Leverkusen
D/5	BASF	Ludwigshafen
D/6	Ineos	Wilhelmshafen
D/7	Vestolit	Marl
D/8	Degussa - Hüls	Lülsdorf
D/9	LII	Frankfurt
D/13	Vintron	Knapsack
D/14	Vinnolit	Gendorf
The Netherlands		
NL/1	Akzo Nobel	Hengelo
Portugal		
P/1	Uniteca	Estarreja
Spain		
E/1	Quimica del Cinca	Monzon
E/2	Hernani	Hernani
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

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

4.2 Other OSPAR Contracting Parties

Denmark

Denmark has no chlor-alkali plants.

Luxembourg

Luxembourg has no chlor-alkali plants.

Iceland

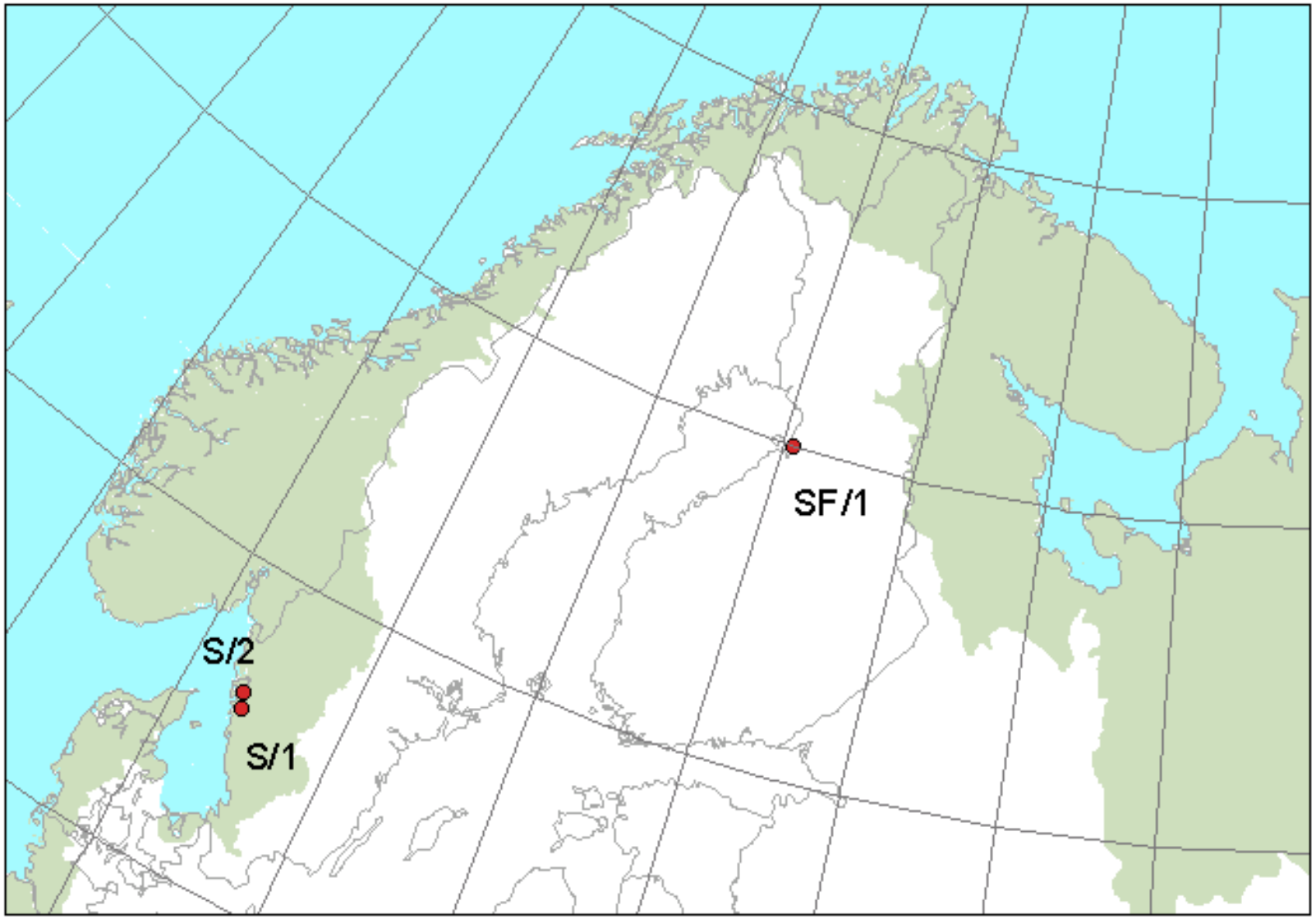
Iceland has no chlor-alkali plants.

Ireland

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

Norway

The last Norwegian plant with mercury cells ceased its mercury-based operations in September 1997.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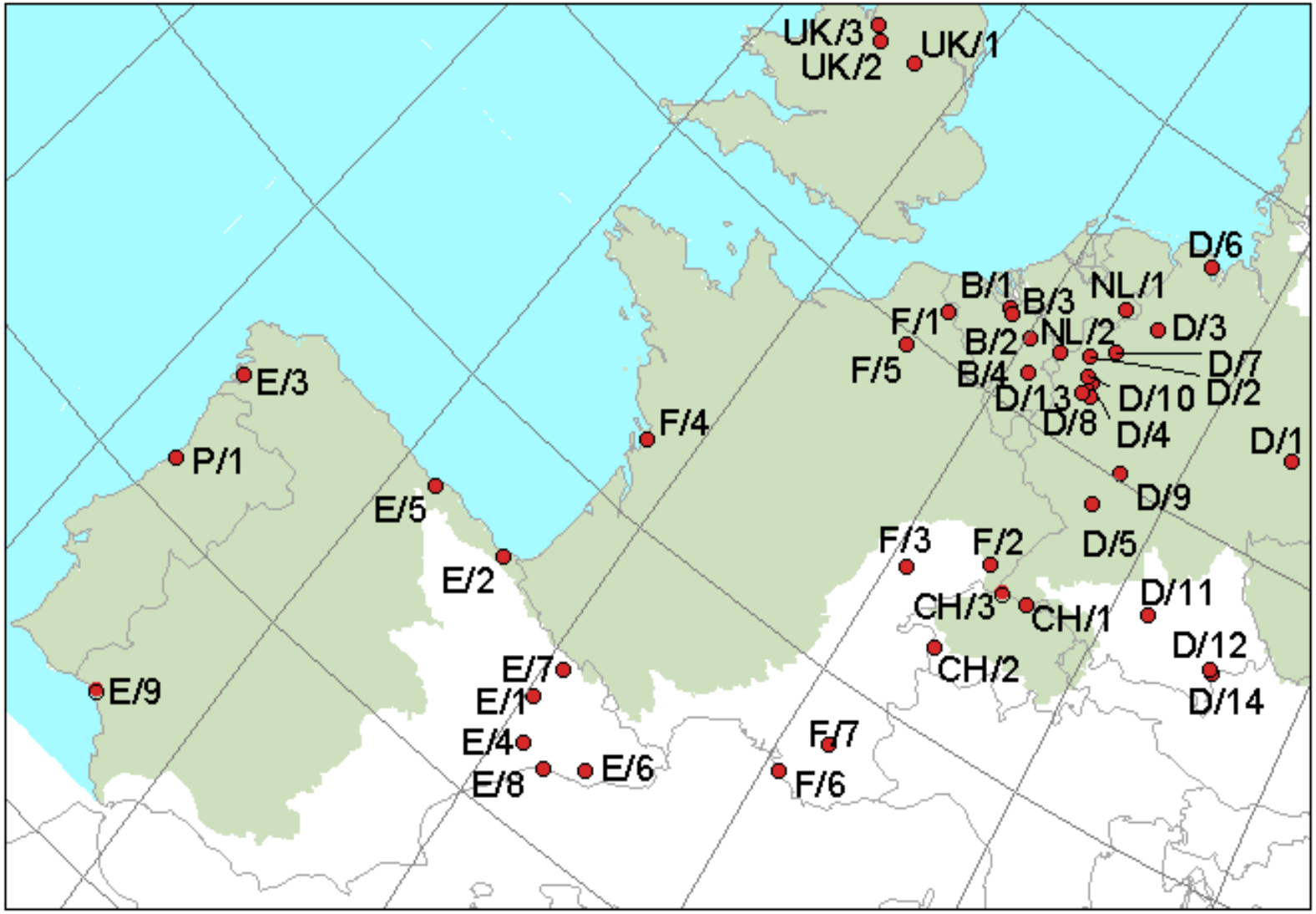
S/2
S/1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Belgium

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
B/1	219000	A	R	22,872	0,055	0,017	0,195	0,289	0,484	0,556	1,188	0,919	-0,280		2,920	18,208
B/2	250000	A	R	12,852	0,073	0,011	0,001	0,614	0,615	0,699	18,585	-1,308	-0,300		-6,432	0,000
B/3	120000	A	R	14,217	0,074	0,047	0,015	0,600	0,615	0,736	0,046	0,600			5,000	8,435
B/4	41663	A	R	62,814	0,060	0,720	0,150	1,780	1,930	2,710	29,819	1,140	0,036		28,227	1,878
Total	**630663**															

Additional information:

The plants located in the Flemish region (all but one plant) are subject to the Flemish environmental legislation that states that the mercury-cell technique may not be used anymore after the year 2010 (Ref: VLAREM II, section 5.7.5.1 paragraph 3).

The plant B/4 located in the Wallonian region has replaced its mercury technology in 2001.

Finland

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
SF/1	40000	Baltic	R	62,375	0,050	0,120		0,856	0,856	1,026	0,006	-0,105			-2,615	63,958
Total	40000															

Additional information:

The only plant producing mercury-based chlor-alkali in Finland, Eka Chemicals Oy in Oulu will stop mercury-based chlor-alkali production by 2010.
The next evaluation of the situation in Finland will be in 2006 in connection with the permit procedure.

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 I (tonnes)	Temporarily stored F (g/t)	
F/1	18040	A	R	52,716	0,087	0,076	0,078	1,076	1,154	1,317		0,112	0,276		21,508	29,891
F/2	72000	A	R	142,375	0,130	0,052	0,028	1,470	1,498	1,680	133,941	0,125	-0,010	0,115	3,194	3,560
F/3	240900	M	R	9,651	0,067	0,002	0,015	0,856	0,871	0,940	4,474			0,583	2,420	1,817
F/4	170070	M	R	7,826	0,049	0,144	0,249	0,755	1,004	1,197	0,255	0,056	0,084		0,823	5,551
F/5	22500	A	R	16,889	0,297	0,001	0,029	1,130	1,159	1,457	0,280		0,238		10,578	4,574
F/6	166000	M	R	10,012	0,059	0,117		0,660	0,660	0,836	0,386					8,790
F/7	184300	M	R	18,988	0,022	0,253	0,001	1,010	1,011	1,286	0,044	0,587			3,185	14,472
Total	**873810**															

Additional information:

France does not have a timetable yet for achieving the recommendation as set out in PARCOM Decision 90/3. However, operators in France have finalised their environmental assessment studies for 7 individual plants. These studies are currently being assessed by the authorities and a synthesis will be prepared for future action.

Plant F/2 stopped production of sodium hydroxide progressively between 1998 and 2000. This plant currently produces only potassium hydroxide which implies that the recycling of mercury is not possible anymore. The mercury resulting from the demercurisation unit is stabilised under sulphur form and sent to a Class 1 authorised technical landfill.

Germany

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere: Process Exhaust 2.3.1 (g/t)	Emissions to the Atmosphere: Cellroom 2.3.2 (g/t)	Emissions to the Atmosphere: Total E3 (g/t)	Total Emissions Discharges Losses (g/t)	Mercury in Wastes: Disposed off D (g/t)	Mercury in Wastes: Awaiting recovery c (tonnes)	Mercury in Wastes: Awaiting disposal f (tonnes)	Mercury in Wastes: Awaiting decision I (tonnes)	Mercury in Wastes: Temporarily stored F (g/t)	Difference to Balance DB (g/t)
D/2	140000	A	R	15,000	0,090	0,002	0,030	1,010	1,040	1,132			0,030		0,214	13,654
D/3	125000	A	R		0,052	0,003	0,007	0,539	0,546	0,601	0,014	0,175		0,004	1,429	-2,044
D/4	300000	A	R	5,317	0,026	0,017	0,030	1,120	1,150	1,193	4,197					-0,073
D/5	160000	A	R	13,125	0,030	0,010		0,970	0,970	1,010	4,788					7,327
D/6	148828	A	R	-11,045	0,021	0,005		0,322	0,322	0,348	6,950		0,052	-3,030	-20,010	1,666
D/7	176000	A	R	101,136	0,060	0,010	0,020	1,040	1,060	1,130	75,000		0,020		0,114	24,893
D/8	135951	A	R	-3,516	0,350	0,010	0,030	1,290	1,320	1,680			-0,800		-5,884	0,689
D/9	167000	A	R	23,988	0,066	0,010	0,085	1,021	1,106	1,182	25,329			-0,750	-4,491	1,968
D/13	160000	A	R	64,194	0,099	0,052	0,018	1,090	1,108	1,259	57,555	1,312	-0,373		5,869	-0,489
D/14	82355	Bl Sea	R	-68,788	0,065	0,001	0,120	0,780	0,900	0,966	10,110	-1,320	-0,341		-20,169	-59,694
Total	**1595134**															

Additional information:

The plants D/1 (Elektro Chemie, Bitterfeld, 75 000 t/a) and D/10 (Bayer, Dormagen, 370 000 t/a) as reported in the previous annual reports have been converted to membrane technology. D/7: shut down of some of the cells in 2001. D/9: The permit was enlarged by authorities. D/11 and D/12 shut down in 2000.

Overview of the anticipated phase-out scenario by the end of 2006:

Year	Existing or projected chlorine capacity [kt]	Base year 1991 [%]
1991	2478	100
1/1/2001	1595	64
1/1/2003	1295	52
1/1/2005	1128	46
1/1/2007	988	40

The Netherlands

Site	Chlorine Production Capacity with Hg-cells	Sea Area	Brine W or R	Mercury consumption	Losses via Products	Discharges via Waste Water	Emissions to the Atmosphere			Total Emissions Discharges Losses	Mercury in Wastes					Difference to Balance
							Process Exhaust	Cellroom	Total		Disposed off	Awaiting recovery	Awaiting disposal	Awaiting decision	Temporarily stored	
				C	E1	E2	2.3.1	2.3.2	E3		D	c	f	I	F	DB
	(tonnes)			(g/t)	(g/t)	(g/t)	(g/t)	(g/t)	(g/t)	(g/t)	(g/t)	(tonnes)	(tonnes)	(tonnes)	(g/t)	(g/t)
NL/1	74294	A	R	25,937	0,027	0,022	0,139	0,577	0,716	0,765	0,382	2,855	-0,023		38,119	-13,328
Total	74294															

Additional information:

The plant NL/2 (Solvay, Linne-Herten, 140 000 t/a) as reported in the previous annual reports has been decommissioned.

On the national level the IPPC BREF for the chlor-alkali industry and OSPAR Decision 90/3 is being considered to give the guiding principles for the BAT on chlorine production. Briefly, this means that membrane technology and electrolyses using asbestos free diaphragms are considered as BAT and conversion of mercury-cell technology should take place. These guiding principles have been laid down in the Netherlands' emission regulation systems (CIW and NER). With regard to the conversion to membrane technology, the regulations states that this shall take place before 2010.

Portugal

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
P/1	43302	A	R	26,973	0,400	0,300	0,200	1,400	1,600	2,300		0,100	0,550		15,011	9,662
Total	43302															

Additional information:

The only existing mercury-based plant in Portugal has replaced the mercury cells by membrane cells. The chlorine production with mercury cells ceased operation in January 2002. Decommissioning of the mercury cells at the plant started and until 31 October 2002, 70 tonnes of mercury has been recovered and sent to Euro Chlor Associates. It is estimated that within a year another 10 tonnes will be recovered.

Spain

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere: Process Exhaust 2.3.1 (g/t)	Emissions to the Atmosphere: Cellroom 2.3.2 (g/t)	Emissions to the Atmosphere: Total E3 (g/t)	Total Emissions Discharges Losses (g/t)	Mercury in Wastes: Disposed off D (g/t)	Mercury in Wastes: Awaiting recovery c (tonnes)	Mercury in Wastes: Awaiting disposal f (tonnes)	Mercury in Wastes: Awaiting decision I (tonnes)	Mercury in Wastes: Temporarily stored F (g/t)	Difference to Balance DB (g/t)
E/1	31373	M	R	25,372	0,427	0,293	0,035	1,106	1,141	1,861	15,759	0,138	0,307		14,184	-6,432
E/2	14815	A	R	23,625	0,166	0,348	0,002	1,151	1,153	1,667	0,607	0,086			5,805	15,546
E/3	33552	A	R	20,267	0,598	0,006	0,189	0,770	0,959	1,563	10,703	-0,003	0,048		1,341	6,660
E/4	150000	M	R	18,607	0,210	0,090	0,005	0,457	0,462	0,762	32,450	0,341	-2,712		-15,807	1,201
E/5	62747	A	W	5,498	0,102	0,051	0,047	1,408	1,455	1,608	0,943	-0,099			-1,578	4,525
E/6	217871	M	R	6,178	0,059	0,008	0,169	0,649	0,818	0,885	4,994					0,299
E/7	25000	M	R	11,520	0,360	0,025	0,010	0,870	0,880	1,265	0,120	0,219			8,760	1,375
E/8	135004	M	R	11,948	0,100	0,060	0,040	1,100	1,140	1,300	3,400	0,005			0,037	7,211
E/9	100929	A	R	7,223	0,120	0,070	0,050	0,781	0,831	1,021	2,767	-0,302			-2,992	6,427
Total	**771291**															

Additional information:

Spain has a voluntary agreement with its industry and will respect PARCOM Decision 90/3. Plant E/2 is partly converted to membrane technology.

Sweden

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
S/1	100000	A	R	19,240	0,010	0,006	0,002	0,270	0,270	0,288	8,500	1,324	0,004		13,280	5,672
S/2	120000	A	R	25,567	0,010	0,004	0,002	0,138	0,140	0,154	0,010	1,459			12,158	13,244
Total	220000															

Additional information:

S/2: Verified value.

The Swedish Government has proposed a ban on the use of mercury in the chlor-alkali industry from the year 2010. The intention is that the ban will be in place well in advance of, and implemented by 2010.

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 I (tonnes)	Temporarily stored F (g/t)	
CH/1	55000	A	R	82,273	0,044	0,053	0,038	1,027	1,065	1,162	3,900					77,211
CH/2	26500	M	R	-38,038	0,030	0,005	0,001	1,018	1,019	1,054	1,216					-40,308
CH/3	27000	A	R	37,667	0,237	0,055		0,625	0,625	0,917	71,602		-0,941		-34,852	0,000
Total	**108500**															

Additional information on the intended future phasing out of mercury-based chlor-alkali industry or conversion to mercury free capacities:

There are no specific plans for the phasing out or conversion for the two mercury-based plants operating in the OSPAR catchment area in Switzerland. However, both companies are signatures to the voluntary commitments (see Summary Record WOCAI 99/7/1, Annex 5 or Document POINT 99/10/Info.4) presented to POINT 1999 (POINT 99/10/7) by Euro Chlor and are willing to adhere to the fixed proposals, inter alia, to the timetable for emission reductions and plant closures.

United Kingdom

Site	Chlorine Production Capacity with Hg-cells (tonnes)	Sea Area	Brine W or R	Mercury consumption C (g/t)	Losses via Products E1 (g/t)	Discharges via Waste Water E2 (g/t)	Emissions to the Atmosphere			Total Emissions Discharges Losses (g/t)	Mercury in Wastes					Difference to Balance DB (g/t)
							Process Exhaust 2.3.1 (g/t)	Cellroom 2.3.2 (g/t)	Total E3 (g/t)		Disposed off D (g/t)	Awaiting recovery c (tonnes)	Awaiting disposal f (tonnes)	Awaiting decision I (tonnes)	Temporarily stored F (g/t)	
UK/1	29413	A	R	26,349	0,112	0,010	0,024	0,428	0,452	0,574	8,938					16,837
UK/2	89872	A	R	172,168	0,052	0,032	0,030	1,630	1,660	1,744	1,640			15,550	173,024	-4,241
UK/3	738000	A	W	14,939	0,050	0,180	0,300	1,420	1,720	1,950	3,850	-1,190			-1,612	10,751
Total	**857285**															

There are 3 UK plants currently using mercury-cell technology. The various factors associated with conversion or phase out of mercury-cell plants are currently being addressed but it is not yet possible to provide a timetable regarding phasing out or conversion. Regarding the plans for the future phasing out of UK national mercury-based chlor-alkali production capacities (or their conversion to mercury free capacities), this will be determined in connection, inter alia, with the implementation of the IPPC Directive and PARCOM Decision 90/3 and information will be provided when it becomes available.

The level of releases to air from UK/3 has not decreased as expected in relation to the level of releases in 1999. The main reason behind the level of release to atmosphere in 1999 was the effect of phosphate addition to the water used for cooling purposes by the water supplier, and the consequential effect on cooling capacity. As was predicted at the time, this effect was progressively less pronounced in 2000 as the agreed solutions took effect. However, the expected improvement in releases to air was not realised, the gains from the cooling water work being offset by increased releases due to maintenance activities. In 2000 it became necessary to repair and refurbish parts of the plants which were found to be contaminated with mercury, and despite best endeavours, this undoubtedly made a contribution to the UK/3 release level. This maintenance work is an essential part of the strategy for reducing the levels of release to atmosphere. Maintenance activities were also the main reason for the deterioration in the level of releases to water. Large projects to improve the reliability and availability of the waste brine treatment unit meant that the unit was not fully operational at all times. Again, the purpose of the work is to improve the longer-term environmental performance of the plant complex. It should be noted that the plant has operated within the limits and conditions set in its IPC permit, and continues to do so.