EVALUATION OF DIRECTIVE 76/464/EEC REGARDING LIST II SUBSTANCES ON THE QUALITY OF THE MOST IMPORTANT SURFACE WATERS IN THE COMMUNITY

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Document

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Preface

The Framework Directive 76/464/EEC (4 May 1976; source: EC001[1]) and its daughter Directives are meant to control pollution caused by discharges of certain dangerous substances into the aquatic environment of the Community. The Directives have had to be transposed by the Member States into their national legislation within the time limits given by the Directives. The effect of implementation of the Directives on the quality of EC surface waters, however, had not yet been inventoried in a comprehensive way at Community level.

The purpose of this project is to provide an evaluation of the impact of Directive 76/464/EEC on the quality of the main surface waters within the Community for the years 1980-1993. An analysis of changes in discharges and water quality for List II substances accompanied by an evaluation of international, national and regional strategies for managing water quality has been conducted for the main EC surface waters. The three new countries to join the EC (Austria, Finland and Sweden) have not been included as part of this study.

The present study was commissioned by DGXI/E/1 in February 1994 to a Joint Venture comprising DELFT HYDRAULICS and the Institute for Inland Water Management and Waste Water Treatment (RIZA) the Netherlands (Contract B4-3040/94/000265/MAR/A3). The study was supervised by Mrs. J. Vennekens, Mrs. E. McDonnell and Mr. J.S. Hoornstra of the European Commission (DGXI-E.1). The data acquisition and the interpretation of the data have been carried out in association with the National Experts of the Member States. The cooperation of the National Experts and their colleagues in providing necessary information has been critical for conducting this study and is gratefully acknowledged.

[1] References throughout the text are given by a country/location code followed by a 3-4 digit number (e.g. EC001). This non-standard manner of giving references has been chosen in order to allow references to be easily incorporated within the water quality data tables (Appendix E, Volume II). Full references per country are given in Chapter 8.

Executive Summary

Introduction

The framework Directive 76/464/EEC (4 May 1976; source: EC001) on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (and its daughter Directives) have had to be incorporated by the Member States into their National legislation within the time limits given by the Directives. The effect of implementation of the Directives on the quality of EC surface waters, however, had not yet been inventoried in a comprehensive way at Community Level.

Objective of the study

The objective of this project is to provide an evaluation of the impact of Directive 76/464/EEC concerning List II substances on the quality of the main surface waters within the Community during the period 1980-1993. Directive 76/464/EEC comprises a number of key items with respect to the List I and List II substances:

- requirement for prior authorizations, including emission standards for List I/II substances;
- laying down limit values for discharges of List I substances and water quality objectives for List II substances at the National level;
- laying down quality objectives at the Community level as an alternative for limit values for List I substances;
- authorizations shall be reviewed at least every four years;
- requirement to establish programmes with quality objectives for List II substances;
- requirement for inventories of discharges of List I substances;
- monitoring of discharges and surface waters for List I/II substances;
- reporting obligation for Member States on request by the Commission concerning authorizations, inventories, monitoring data etc. (now incorporated in Directive 91/692/EEC);

An analysis has been made of changes in water quality and discharges for List II substances. This study is follow-up to the previous review of List I substances 'Impact of Directive 76/464/EEC and its "daughter" Directives on the most important surface waters in the Community'(EC023). The analysis is coupled with a compilation and review of transposition of the Directive in the National legislation of all Member States, and the manner of implementation of Article 7 (concerning List II substances) of the Directive, which includes an analysis of national and regional strategies. More specific objectives of this study are:

- to make an overview of the transposition and implementation of Directive 76/464/EEC with respect to List II substances in all Member States;
- to collect discharge and water quality data for the selected substances and surface waters, in as much detail as possible;
- to make an analysis on the basis of the gathered data, of the relationship between the transposition of Directive 76/464/EEC, the changes in industrial loads, and the water quality of the surface waters.

Selection of substances and main surface waters

During the inception phase of the project, a selection was made together with an EC representative for a limited number of substances and main surface waters. Various types of substances representing different types of pollutants were chosen, including nutrients, heavy metals, and organic micropollutants. For detailed analysis, the following List II substances were selected: arsenic and its mineral compounds, endosulfan, parathion, atrazine, 1,1,1-trichloro-ethane, chloronitrobenzenes (1-chloro-2-nitrobenzene, 1-chloro-3-nitrobenzene and 1-chloro-4-nitrobenzene), PAH (3,4-benzo(a)pyrene and 3,4-benzo(b)fluoranthene), zinc, copper, chromium, lead, total-nitrogen (Kjeldahl-N + nitrite-N + nitrate-N; alternative: ammonia-N + nitrite-N + nitrate-N) and total-phosphorous.

Dissolved oxygen and BOD as extra general parameters have been reported in the List I study (EC023).

To obtain a representative picture for the main surface waters in the community, the following 16 surface water systems were chosen:

national rivers:	UK	Thames, Mersey, Trent
	France	Seine, Loire, Rhone
	Italy	Po
	Greece	Axios
	Portugal	Sado
	Spain	Ebro
	Ireland	Slaney
	Luxembourg	Moselle (tributary of the Rhine)

international rivers: Rhine (covering parts of Germany, France, the Netherlands, Luxembourg)
Meuse and Scheldt (covering parts of France, Belgium and the Netherlands)
Tagus (covering parts of Spain and Portugal)

Collection of information

Once the set of substances and selected surface waters was chosen, all relevant information was collected, specifically:

- information on the transposition and implementation of Directive 76/464/EEC in all Member States;
- water quality data for the selected substances and surface waters (as yearly averaged concentrations);
- data on industrial dischargers and actual waste load discharges within each selected river basin;
- data on EQO's and EQS's

In general, the main sources for information have been the National Experts on the implementation of Directive 76/464/EEC, who provided the data as available at the central level in each Member State. In some cases this information was supplemented by data from international literature and personal contact of RIZA and DELFT HYDRAULICS with experts in the Member States. Additional water quality data was obtained from the international GEMS database.

Assessment of Directive 76/464/EEC

The scope of the project is to provide an evaluation of the impact entailed by the implementation of Directive 76/464/EEC for List II substances on the quality of the main surface waters in the Community in the period 1980 - 1993. In principle, the following main aspects were considered:

- how have countries implemented Article 7 of the directive?
- how far have they proceeded with their approach?
- how is a link between Water Quality Objectives (WQOs) and emissions made?
- are the programs having any result?

It was agreed with the European Commission to assess these general questions concerning the effectiveness of Directive 76/464/EEC by considering 4 components; a common methodology consisting of analysis of these four components has been carried out for each river basin:

1. transposition of Directive 76/464/EEC, based on:
   - actual transposition of the directive into national legislation,
   - existence of strategies and programmes, leading to the control of discharges of selected list II substances,
   - development of quality objectives (reflecting certain local, and/or national and/or international priorities),
   - requirement of authorization for the discharge of selected List II substances applied with enforcement of limit values (which are based either on BAT and/or EQS/EQO),
   - existence of monitoring of both discharge waters and the receiving aquatic system;
2. the trends in the water quality for selected List II substances in selected main surface waters in the Community;
3. the trends in discharges of List II substances by industrial point sources;
4. other driving forces (than Directive 76/464/EEC) also leading to water quality improvements in the Community.

The 4 components of the analysis are illustrated schematically in Figure 1.2.: Transposition of Directive 76/464/EEC → other driving forces → waste loads discharge (emissions) → water quality. It is important that all substances are evaluated in the perspective of all important related developments in the river basin (i.e. all relevant driving forces).

Thus, a comparison was made of monitoring data with developments (including the implementation of Directive 76/464/EEC) which may have had an impact on the waste loads and water quality. In this way, the effectiveness of Directive 76/464/EEC for the considered water systems and substances has been evaluated.

Conclusions

One general conclusion is that none of the Member States is completely in accordance with the requirements of Article 7 of Directive 76/464/EEC regarding pollution control and reduction measures of List II substances. Instead, Member States have each made their own interpretation of Article 7 of the Directive and developed what we describe as 'Alternative Measures' for control of List II substances. These Alternative Measures have been influenced by Article 7 as well as other (inter)national Driving Forces. Most Member States have followed an "emission approach" based on Best Available Techniques (BAT) and Best Environmental Practice (BEP) for List II substances rather than the required environmental quality objective approach. It is the 'Alternative Measures' which have had the most direct impact on the water quality of the surface waters concerning List II substances in the Member States (where there has been an impact). The Alternative Measures are in line with local, national and international requirements and do not necessarily consider individual List II substances specifically but rather consider them as part of a general policy and procedure for water pollution control.

Given the above conclusion, the Directive itself can not be evaluated regarding its impact on the quality of the surface waters in the Community (with respect to List II substances). Instead, the Alternative Measures can be assessed, based upon the available water quality and discharge data. There are a limited number (6) rivers for which sufficient information exists regarding water quality and discharges, on which to base an assessment of the effectiveness of the Alternative Measures,. These are the Rhine, UK Rivers (Mersey, Thames and Trent), Meuse and Scheldt Rivers. For other rivers, there is either:

- extensive water quality data and limited discharge information,
- limited water quality data and extensive discharge information, or
- limited water quality data and limited discharge information.

Overall conclusions for the Rhine:

- the water quality for all List II substances improved in the period 1980-1992;
- the industrial and municipal discharges of List II substances were strongly reduced in the period 1985-1992;
- Directive 76/464/EEC has not been completely implemented as specified in Article 7. However, all the Rhine countries have developed Alternative Measures for the control of List II substances. The Alternative Measures developed in the Rhine countries have resulted in a clear improvement of the quality of the Rhine River in the period 1980-1993.

Overall conclusions for the UK Rivers (Mersey, Thames and Trent):

- in the Mersey River, both concentrations and discharges of copper and lead decrease in the period 1980-1993;
- in the Thames River, both concentrations and discharges of lead decrease in the period 1980-1993;
- in the Trent River, both concentrations and discharges of zinc, copper, chromium and lead decrease in the period 1980-1993;
- the UK follows a water quality-based approach for control of water pollution of List II substances, which is in agreement with the principles of Directive 76/464/EEC. However, the Directive has not been completely implemented as specified in Article 7. The Alternative Measures as developed in the UK have lead to water quality improvements for some heavy metals in the selected UK rivers.

Overall conclusions for the Meuse and Scheldt:

- the water quality for Total P in the Scheldt improved in the period 1980-1992 (for other substances, no clear trend was visible);
- the water quality for arsenic, chromium, copper, lead and Total P in the Meuse improved in the period 1980-1992;
- considering estimated discharges to surface water for all of Belgium, there has been a strong reduction of Total P, as well as arsenic, chromium, copper, lead over the period 1985-1995.
- Directive 76/464/EEC has not been completely implemented as specified in Article 7. However, the Alternative Measures which were developed in part due to the Directive have lead to the measured quality improvement of the Meuse and Scheldt Rivers.

Overall conclusions for remaining rivers:

- the availability of water quality data is variable. In general, there are more data available for the heavy metals and nutrients than for the organic micropollutants. The trends in water quality is quite variable: sometimes improving, sometimes worsening, sometimes remaining constant, or fluctuating with no clear trend;
- the availability of information on industrial and municipal discharges also widely variable. The type of information available includes discharges from individual industries, aggregated discharges (groups of substances), and the sum of riverine plus direct inputs;
- in general, there is less information available for discharges than for water quality;
- Directive 76/464/EEC has not been completely implemented as specified in Article 7. Instead, the Member States have developed their own Alternative Measures for water quality management of List II substances. There is not enough data available to make an assessment of the Alternative Measures.

General Conclusions:

Directive 76/464/EEC has not been completely implemented as specified in Article 7 in any of the Member States. However, each of the Member States has developed its own 'Alternative Measures' for control of pollution to surface waters from List II substances. The Directive is one of the driving forces (together with other (inter)national legislations, treaties and conventions) influencing the development of the 'Alternative Measures' followed by the Member States.

For the Rhine River, the selected UK rivers (Mersey, Thames, and Trent) as well as the Scheldt and the Meuse Rivers, there is an observed decrease in both concentrations and discharges of (some of) the selected List II substances. For these rivers, it can be concluded that the developed Alternative Measures have lead to the water quality improvements.

For the other rivers, there is not enough data available to make an assessment of the Alternative Measures developed by the relevant Member States.

Uitgebreide samenvatting

Inleiding

Kaderrichtlijn 76/464/EEG van de Raad van 4 mei 1976 (bron EC001) betreffende de verontreiniging veroorzaakt door bepaalde gevaarlijke stoffen in het aquatisch milieu van de Gemeenschap (alsmede de dochter Richtlijnen), moeten door de lidstaten zijn opgenomen in de nationale wetgeving binnen de tijdlimieten van de Richtlijnen. Het effect van de implementatie van de Richtlijnen op de kwaliteit van het oppervlaktewater in de EG, is tot nu toe echter niet nauwkeurig in de Europese Gemeenschap onderzocht.

Doel van de studie

Het doel van dit project is om een evaluatie te geven van de invloed van Richtlijn 76/464/EEG met betrekking tot Lijst II stoffen op de kwaliteit van de belangrijkste oppervlaktewateren in de Europese Gemeenschap gedurende de periode 1980-1993. Richtlijn 76/464/EEG bevat een aantal belangrijke aspecten met betrekking tot zowel Lijst I als Lijst II stoffen:

- het vereiste van vergunningverlening vooraf, waaronder begrepen de opname in de vergunning van emissie-grenswaarden voor zowel Lijst I als Lijst II stoffen;
- het vastleggen van emissie-grenswaarden voor de lozing van Lijst I stoffen en waterkwaliteitsdoelstellingen voor Lijst II stoffen op nationaal niveau;
- het vastleggen van kwaliteitsdoelstellingen voor de Gemeenschap als alternatief voor emissie-grenswaarden voor Lijst I stoffen;
- vergunningen dienen ten minste elke vier jaar opnieuw te worden beschouwd;
- verplichting om programma's vast te stellen met kwaliteitsdoelstellingen voor Lijst II stoffen;
- verplichting om lozingsinventarisaties uit te voeren voor Lijst I stoffen;
- het monitoren van lozingen en oppervlaktewateren voor zowel Lijst I als Lijst II stoffen;
- rapportageverplichtingen voor Lidstaten op verzoek van de Commissie met betrekking tot vergunningen, inventarisaties, monitoring-gegevens etc. (momenteel opgenomen in Richtlijn 91/692/EEG).

Er is een analyse gemaakt van de veranderingen in de waterkwaliteit en lozingen voor Lijst II stoffen. Deze studie volgt op een eerdere studie met betrekking tot Lijst I stoffen getiteld "Impact of Directive 76/464/EEC and its "daughter" Directives on the most important surface waters in the Community" (bron EC023). De analyse gaat gepaard met een overzicht en beschrijving van de wettelijke implementatie van de Richtlijn in de nationale wetgeving van alle Lidstaten, en de manier van implementatie van artikel 7 (betreffende Lijst II stoffen) van de Richtlijn, hetgeen eveneens een analyse van nationale en internationale strategieën omvat.

Meer specifieke doelen van de studie zijn:

- het maken van een overzicht van de wettelijke en technische implementatie van Richtlijn 76/464/EEG met betrekking tot Lijst II stoffen in alle Lidstaten;
- het verzamelen van lozings- en waterkwaliteitsgegevens voor de geselecteerde stoffen en oppervlaktewateren, en wel zo gedetailleerd mogelijk;
- het maken van een analyse op basis van de verkregen informatie, de relatie tussen de wettelijke implementatie van Richtlijn 76/464/EEG, de veranderingen in de industriële lozingen alsmede de kwaliteit van de oppervlaktewateren.

Selectie van stoffen en belangrijkste oppervlaktewateren

Gedurende de inceptie fase van het project is een selectie gemaakt samen met een vertegenwoordiger van de Europese Commissie voor een beperkt aantal stoffen en belangrijke oppervlaktewateren. Diverse soorten stoffen zijn gekozen die representatief zijn voor verschillende typen verontreiniging, zoals nutriënten, zware metalen en organische microverontreinigingen. Voor een gedetailleerde analyse zijn de volgende Lijst II stoffen geselecteerd: arseen en anorganische verbindingen daarvan, endosulfan, parathion, atrazin, 1,1,1-trichloorethaan, chloornitrobenzenen (1-chloor-2-nitrobenzeen, 1-chloor-3-nitrobenzeen en 1-chloor-4-nitrobenzeen), PAK (3,4-benzo(a)pyrene en 3,4-benzo(b)fluorantheen), zink, koper, chroom, lood, totaal-stikstof (Kjeldahl-N + nitriet-N + nitraat-N; alternatief: ammonium-N + nitriet-N + nitraat-N) en totaal-fosfor.

Het opgeloste zuurstofgehalte en BZV als extra algemene parameters zijn in de Lijst I studie gerapporteerd (EC023).

Om een representatief beeld van de belangrijkste oppervlaktewateren in de Europese gemeenschap te krijgen, zijn de volgende 16 water systemen gekozen:

nationale rivieren:	Verenigd Koninkrijk	Theems, Mersey, Trent
	Frankrijk	Seine, Loire, Rhone
	Italië	Po
	Griekenland	Axios
	Portugal	Sado
	Spanje	Ebro
	Ierland	Slaney
	Luxemburg	Moezel (zijrivier van de Rijn)

internationale rivieren:

- Rijn (bestrijkt delen van Duitsland, Frankrijk, Nederland, Luxemburg)
- Maas en Schelde (bestrijkt delen van Frankrijk, België en Nederland)
- Taag (bestrijkt delen van Spanje en Portugal)

Verzameling van informatie

Na de selectie van stoffen en oppervlaktewateren werd alle relevante informatie verzameld, met name:

- informatie over de wettelijke en technische implementatie van Richtlijn 76/464/EEG in alle Lid staten;
- waterkwaliteitsgegevens van de geselecteerde stoffen voor de geselecteerde oppervlaktewateren (als jaargemiddelde concentraties);
- gegevens over industriële lozers en de lozingen in elk van de stroomgebieden;
- gegevens over waterkwaliteits-doelstellingen en waterkkwaliteitsnormen.

In zijn algemeenheid zijn de Nationale Experts voor de implementatie van Richtlijn 76/464/EEG de voornaamste bron geweest voor de verzamelde informatie zoals die beschikbaar is op centraal niveau in iedere Lidstaat.
In enkele gevallen is de informatie aangevuld met gegevens uit de internationale literatuur en persoonlijke contacten met experts in de Lidstaten van RIZA en het Waterloopkundig Laboratorium. Aanvullende waterkwaliteitsgegevens zijn gehaald uit de internationale GEMS gegevensbank.

Beoordeling van Richtlijn 76/464//EEG

De strekking van het project is het geven van een beoordeling van de invloed die het gevolg is van de implementatie van Richtlijn 76/464/EEG voor Lijst II stoffen op de kwaliteit van de belangrijkste oppervlaktewateren in de Gemeenschap in de periode 1980 - 1993. In principe zijn de volgende hoofdaspecten in beschouwing genomen:

- hoe hebben de Lidstaten artikel 7 van de Richtlijn geïmplementeerd?
- wat hebben zij bereikt met hun aanpak?
- hoe is de koppeling tussen water kwaliteitsdoelstellingen en emissies gemaakt?
- hebben de programma's resultaten opgeleverd?

Met de Europese Commissie is overeengekomen om deze algemene vragen op het gebied van de effectiviteit van Richtlijn 76/464/EEG te beoordelen door 4 elementen in beschouwing te nemen; voor ieder rivierstroomgebied is de zelfde analyse met genoemde 4 elementen uitgevoerd:

1. Wettelijke implementatie van Richtlijn 76/464/EEG, gebaseerd op:
   - de actuele opname van de Richtlijn in de nationale wetgeving,
   - de aanwezigheid van strategieën en programma's, die tot het reguleren van de lozing van Lijst II stoffen leidt,
   - de ontwikkeling van kwaliteitsdoelstellingen (als gevolg van bepaalde lokale, en/of nationale en/of internationale prioriteiten),
   - het vereiste van vergunningverlening voor de lozing van geselecteerde Lijst II stoffen inclusief de handhaving van emissie-grenswaarden (die gebaseerd zijn op de Beste Beschikbare Technieken en/of kwaliteitseisen-/kwaliteitsdoelstellingen),
   - de uitvoering van monitoring van zowel afvalwater als ontvangende oppervlaktewateren;

2. De trends van de waterkwaliteit voor geselecteerde Lijst II stoffen in de geselecteerde oppervlaktewateren in de Gemeenschap;
3. De trends van de lozing van Lijst II stoffen door industriële puntbronnen;
4. Andere drijvende krachten (dan Richtlijn 76/464/EEG) die mede leiden tot water kwaliteitsverbeteringen in de Gemeenschap.

De 4 elementen van de analyse zijn in Figuur 1.2 schematisch weergegeven: wettelijke implementatie van Richtlijn 76/464/EEG -> andere drijvende krachten -> lozingen via afvalwater (emissies) -> waterkwaliteit. Het is belangrijk dat alle stoffen worden geëvalueerd tegen het licht van alle belangrijke relevante ontwikkelingen in een rivier systeem (d.w.z. alle drijvende krachten).

Op deze manier is een vergelijking gemaakt van monitoring gegevens met ontwikkelingen (waaronder de implementatie van Richtlijn 76/464/EEG), die van invloed zouden kunnen zijn geweest op de omvang van de lozingen en op de waterkwaliteit. Op deze manier is de effectiviteit van Richtlijn 76/464/EEG geëvalueerd voor de in beschouwing genomen water systemen en stoffen.

Conclusies

Een algemene conclusie is, dat geen Lidstaat zich op het gebied van het reguleren van verontreinigingen en het maken van reductieprogramma's volledig gedraagt conform het vereiste in artikel 7 van Richtlijn 76/464/EEG. In plaats hiervan hebben Lidstaten een eigen interpretatie aan artikel 7 van de Richtlijn gegeven, en hebben "alternatieve maatregelen" ontwikkeld om de lozing van Lijst II stoffen te reguleren.
Deze alternatieve maatregelen zijn zowel door artikel 7 als ook andere (inter)nationale drijvende krachten beïnvloed. De meeste lidstaten hebben voor Lijst II stoffen een "emissie-aanpak" gevolgd gebaseerd op de Beste Beschikbare Technieken en Beste Milieu Praktijk in plaats van de vereiste water kwaliteitsaanpak. In de Lidstaten zijn het de alternatieve maatregelen voor Lijst II stoffen die de meest directe invloed hebben gehad op de kwaliteit van de oppervlaktewateren (voor zover er sprake is van een invloed). De alternatieve maatregelen voldoen aan de lokale, nationale en internationale verplichtingen, en nemen niet noodzakelijkerwijs individuele Lijst II stoffen in beschouwing, doch nemen ze mee als onderdeel van een algemeen beleid op het gebied van het waterbeheer.

Gezien de bovenstaande conclusie kan (op het gebied van Lijst II stoffen) niet de Richtlijn zelf worden geëvalueerd als het gaat om haar invloed op de kwaliteit van de oppervlaktewateren in de Gemeenschap. In plaats daarvan kan op grond van de beschikbare waterkwaliteits- en lozingsgegevens wel de alternatieve methode worden beoordeeld. Er is op het gebied van waterkwaliteit en lozingen voor een beperkt aantal rivieren (6) voldoende informatie beschikbaar om de effectiviteit van de alternatieve maatregelen te beoordelen. Dit zijn de Rijn, de rivieren in het Verenigd Koninkrijk (Mersey, Theems en Trent), Maas en Schelde. Voor de overige rivieren zijn:

- of veel waterkwaliteitsgegevens maar weinig lozingsgegevens,
- of weinig waterkwaliteitsgegevens maar veel lozingsgegevens,
- of weinig waterkwaliteitsgegevens en weinig lozingsgegevens beschikbaar.

Conclusies voor de Rijn:

- de waterkwaliteit voor alle Lijst II stoffen is in de periode 1985-1992 verbeterd;
- de industriële en communale lozing van Lijst II stoffen is in de periode 1985-1992 sterk verminderd;
- Richtlijn 76/464/EEG is niet volledig geïmplementeerd conform het gestelde in artikel 7. Alle Rijnoeverstaten hebben echter voor Lijst II stoffen alternatieve maatregelen ontwikkeld. De door de Rijnoeverstaten ontwikkelde alternatieve maatregelen resulteerden in een duidelijke verbetering van de waterkwaliteit van de Rijn in de periode 1980-1993.

Conclusies voor de rivieren in het Verenigd Koninkrijk (Mersey, Theems en Trent)

- zowel de concentraties als de lozingen van koper en lood in de Mersey nemen in de periode 1980-1993 af;
- zowel de concentratie als de lozing van lood in de Theems neemt af in de periode 1980-1993;
- zowel de concentraties als de lozing van zink, koper, chroom en lood in de Trent nemen af in de periode 1980-1993;
- het VK volgt een waterkwaliteitsaanpak voor de regulering van waterverontreiniging door Lijst II stoffen, hetgeen in overeenstemming is met de beginselen van Richtlijn 76/464/EEG.
  De Richtlijn is echter niet volledig geïmplementeerd conform het gestelde in artikel 7. De door het VK ontwikkelde alternatieve maatregelen hebben tot waterkwaliteitsverbeteringen geleid voor bepaalde zware metalen in de geselecteerde rivieren in het VK.

Conclusies voor de Maas en de Schelde

- de waterkwaliteit m.b.t. totaal-P is in de Schelde in de periode 1980-1992 verbeterd (voor de andere stoffen was geen duidelijke trend waarneembaar);
- de waterkwaliteit m.b.t. arseen, chroom, koper, lood en totaal-P in de Maas is in de periode 1980-1992 verbeterd;
- indien de geschatte lozingen naar oppervlaktewater voor geheel België in beschouwing worden genomen, is sprake van een grote lozingsvermindering voor totaal-P, arseen, chroom, koper en lood over de periode 1985-1995;
- Richtlijn 76/464/EEG is niet volledig geïmplementeerd conform het gestelde in artikel 7. Echter, de alternatieve maatregelen die ten dele ten gevolge van de Richtlijn zijn ontwikkeld, hebben tot de meetbare kwaliteitsverbetering van de Maas en de Schelde geleid.

Conclusies voor de andere rivieren

- de beschikbaarheid van waterkwaliteitsgegevens is wisselend. Over het algemeen zijn er meer gegevens beschikbaar voor zware metalen dan voor organische microverontreinigingen. De waterkwaliteitstrends zijn nogal wisselend; soms is er sprake van verbetering; soms van verslechtering, soms is het constant of is sprake van fluctuaties zonder dat er sprake is van een duidelijke trend;
- de beschikbaarheid van informatie m.b.t. industriële en communale lozers is ook sterk wisselend. Het type informatie dat beschikbaar is omvat lozingen door individuele industrieën, geaggregeerde lozingsgegevens (voor groepen van stoffen) en de som van de afvoer van stoffen via rivieren en de industriële lozingen in het betreffende deltagebied;
- in het algemeen is er minder informatie beschikbaar van lozingen dan van waterkwaliteit van oppervlaktewater;
- Richtlijn 76/464/EEG is niet volledig geïmplementeerd conform het gestelde in artikel 7. Daar staat tegenover, dat de Lidstaten hun eigen alternatieve maatregelen hebben ontwikkeld voor het waterkwaliteitsbeheer voor Lijst II stoffen. Er zijn onvoldoende gegevens beschikbaar om de alternatieve maatregelen te beoordelen.

Algemene conclusie

Richtlijn 76/464/EEG is in geen van de lidstaten geïmplementeerd conform het gestelde in artikel 7. Iedere Lidstaat heeft echter zijn eigen alternatieve maatregelen ontwikkeld voor de regulering van waterverontreiniging door Lijst II stoffen. De Richtlijn is één van de drijvende krachten (samen met andere (inter)nationale wetgevingen, verdragen en conventies), die van invloed is op ontwikkeling van alternatieve maatregelen zoals die door de Lidstaten wordt gevolgd.

Voor de rivieren Rijn, de geselecteerde rivieren in het VK (Mersey, Theems en Trent) en de Maas en de Schelde is er een waargenomen afname voor zowel concentraties als de lozing van (enige) geselecteerde Lijst II stoffen.
Voor deze rivieren kan worden geconcludeerd, dat de ontwikkelde alternatieve maatregelen hebben geleid tot de waterkwaliteitsverbeteringen.

Voor de andere rivieren zijn onvoldoende gegevens beschikbaar (gemaakt), teneinde een beoordeling van de door de relevante Lidstaten ontwikkelde alternatieve maatregelen uit te voeren.

Résumé

Introduction

La Directive Cadre 76/464/CEE de la Communauté Européenne sur la pollution des eaux par le déversement de certaines catégories de substances dangereuses (4 Mai 1976 ; source : EC001), ainsi que les Directives qui en sont issues, doivent en principe avoir été transposées dans les législations nationales dans la limite des délais fixés. Cependant, il n'existe pas encore d'inventaire complet des résultats de l'application des Directives sur la qualité des eaux de surface à l'échelle communautaire.

Objectifs de l'étude

Le but de la présente étude est de fournir une évaluation de l'impact de la Directive 76/464/-CEE relative aux substances de la Liste II sur la qualité des eaux de surface principales au sein de la Communauté pour la période 1980-1993. La Directive 76/464/CEE comprend un certain nombre d'éléments-clé concernant les substances de la Liste I et de la Liste II :

- conditions d'autorisation, comprenant entre autres des normes d'émission pour les substances des listes I et II ;
- valeurs limite pour les rejets de substances de Liste I, et objectifs de qualité de l'eau pour les substances de Liste II, à l'échelon national ;
- objectifs de qualité à l'échelon communautaire comme alternative aux valeurs limite pour les substances de Liste I ;
- révision obligatoire des autorisations au minimum tous les quatre ans ;
- nécessité d'établir des programmes comprenant des objectifs de qualité pour les substances de Liste II ;
- inventaires des rejets de substances de la Liste II ;
- surveillance des rejets et des eaux de surface pour les substances de Liste I et II ;
- obligation de rapportage pour les Etats Membres, sur requête de la Commission, concernant les autorisations, les inventaires, les mesures etc. (incorporée aujourd'hui dans la Directive 91/692/CEE) ;

Le présent document constitue une analyse de l'évolution de la qualité de l'eau et des rejets en ce qui concerne les substances de Liste II. Ce travail fait suite à l'étude réalisée pour les substances de Liste I et intitulée : "Impact de la Directive 76/464/CEE et des sous-directives sur les principales eaux de surface européennes". L'analyse concernant les substances de Liste II est présentée en parallèle avec une description détaillée de la transposition la Directive dans la législation nationale pour chacun des Etats Membres, ainsi que de l'application de l'Article 7 (relatif aux substances de Liste II), en prenant en considération à la fois les stratégies nationales et régionales. Plus précisément, les objectifs de l'étude sont les suivants :

- présenter la façon dont la Directive 76/464/CEE concernant les substances de Liste II a été transposée et appliquée dans chacun des Etats Membres ;
- collecter les mesures de rejets et de qualité de l'eau les plus détaillées possibles pour les substances concernées et les eaux de surface ;
- à partir des données rassemblées, analyser les relations existant entre la transposition de la Directive 76/464/CEE, l'évolution des rejets industriels, et la qualité des eaux de surface.

Sélection des substances et des principales eaux de surface

Il a été retenu un certain nombre de substances et d'eaux de surface au cours de la phase préparatoire de l'étude, en collaboration avec un représentant de l'Union Européenne. Les substances sélectionnées représentent différents types de polluants, incluant des nutriments, des métaux lourds, ainsi que des micropolluants organiques. L'analyse détaillée a porté sur les substances de Liste II suivantes : l'arsenic et ses composés minéraux, l'endosulfan, le parathion, l'atrazine, le 1,1,1-trichloroéthane, certains chloronitrobenzènes (1-chloro-2-nitrobenzène, 1-chloro-3-nitrobenzène et 1-chloro-4-nitrobenzène), les hydrocarbures aromatiques polycycliques (HAP) 3-4-benzo(a)pyrène et 3,4-benzo(b)fluoranthène, le zinc, le cuivre, le chrome, le plomb, l'azote total (azote Kjeldahl + nitrite + nitrate, ou à défaut ammonium + nitrite + nitrate), ainsi que le phosphore total.

Les paramètres globaux que sont l'oxygène dissous et la demande biochimique en sont traités dans l'étude concernant les substances de Liste I (EC023).

Les eaux suivantes ont été choisies afin d'obtenir une vision représentative des principales eaux de surfaces de l'Union :

rivières nationales :

Royaume-Uni	Tamise, Mersey, Trent
France	Seine, Loire, Rhône
Italie	Pô
Grèce	Axios
Portugal	Sado
Espagne	Ebre
Irlande	Slaney
Luxembourg	Moselle

rivières internationales : Rhin (Allemagne, France, Pays-Bas, Luxembourg)
Meuse et Escaut (France, Belgique, Pays-Bas)
Tage (Espagne, Portugal)

Sources d'informations

Une fois établies les listes des substances et des eaux de surface, les informations utiles ont été rassemblées, notamment :

- les informations concernant la transposition et l'application dans les Etats Membres de la Directive 76/464/CEE ;
- les données de qualité des eaux pour les substances et les eaux superficielles retenues (sous la forme de concentrations moyennes annuelles) ;
- des données sur la présence d'industries ainsi que les rejets effectifs d'eaux usées pour chacun des bassins versants sélectionnés ;
- les valeurs fixées pour les objectifs et les normes de qualité de l'environnement.

Les Experts Nationaux pour la mise en place de la Directive 76/464/CEE ont généralement fourni la plus grande part des informations sous la forme des données disponibles au niveau central dans chacun des Etats Membres. Dans certains cas, cette source d'information a été complétée par des données bibliographiques ou obtenues grâce aux contacts de RIZA et Delft Hydraulics avec différents experts dans les Etats Membres. Enfin, des données supplémentaires de qualité de l'eau sont issues des la base de données internationale GEMS (Global Environmental Monitoring System).

Evaluation de l'impact de la Directive 76/464/CEE

Le but du projet était de fournir une évaluation des effets atteints grâce à l'application de la Directive 76/464/CEE pour les substances de Liste II sur la qualité des principales eaux de surface de la Communauté au cours de la période 1980-1993. De façon générale, les aspects suivants ont été pris en considération :

- comment l'Article 7 a-t-il été appliqué dans les différents Etats ?
- quel niveau d'avancement cette mise en place a-t-elle atteint ?
- de quelle façon le lien entre les émissions et les objectifs de qualité de l'eau a-t-il été réalisé ?
- quels sont les résultats des différents programmes ?

En accord avec la Commission Européenne, il a été convenu d'évaluer l'efficacité de la Directive 76/464/CEE en mettant en place une méthodologie commune, fondée sur 4 éléments analysés de la même façon pour chacun des bassins versants :

1. Transposition de la Directive 76/464/CEE, en considérant :
   - la transposition effective de la Directive dans la législation nationale ;
   - l'existence de stratégies et de programmes ayant pour objectif la maîtrise des rejets des substances de Liste II retenues ;
   - le développement d'objectifs de qualité (reflétant certaines priorités locales, nationales et/ou internationales) ;
   - l'existence d'autorisations de rejet pour les substances de Liste II retenues incluant des normes de rejet établies soit d'après les Meilleures Techniques Disponibles (en Anglais BAT, Best Available Techniques), soit d'après les objectifs ou les normes de qualité de l'environnement ;
   - la présence de réseaux de mesure, à la fois pour les eaux usées et les systèmes aquatiques récepteurs ;
2. Les tendances observables dans l'évolution de la qualité de l'eau pour les substances de Liste II et les eaux sélectionnées ;
3. Les tendances observables dans l'évolution des rejets de substances de Liste II au niveau des sources ponctuelles de pollution industrielle ;
4. L'existence éventuelle de facteurs autres que l'application de la Directive 76/464/CEE pouvant expliquer une amélioration de la qualité de l'eau dans la Communauté.

Ces 4 éléments d'analyse sont repris schématiquement figure 1.2 : Transposition de la Directive 76/464/CEE -> autres facteurs -> rejet de polluants (émissions) -> qualité de l'eau. Il est important de noter que toutes les évaluations ont été réalisées en tenant compte des évolutions majeures pouvant influencer la qualité de l'eau dans le bassin versant.

De cette façon, l'efficacité de la Directive 76/464/CEE a pu être évaluée pour les substances et les eaux de surface considérées en étudiant les données de mesure rassemblées à la lumière de tous les développements, y compris l'application de la Directive, pouvant avoir eu un impact sur l'évolution des rejets et de la qualité de l'eau.

Conclusions

Une conclusion générale est qu'aucun des Etats Membres ne s'est entièrement conformé aux stipulations de l'Article 7 de la Directive 76/464/CEE sur les mesures de contrôle et de réduction de la pollution par les substances de Liste II. Au lieu de cela, les Etats Membres ont interprété l'Article 7 à leur façon et développé ce que nous appelons des "Mesures de Substitution" pour le contrôle des rejets de substances de Liste II. La mise en place de ces Mesures de Substitution a été influencées à la fois par l'Article 7 et par d'autres facteurs (inter)nationaux. La plupart des Etats Membres ont suivi une approche de réduction des émissions fondée sur les Meilleures Techniques Disponibles (BAT, Best Available Techniques en Anglais) et les Meilleures Pratiques Environnementales (BEP, Best Environmental Practice) pour les substances de Liste II, plutôt que de se conformer aux objectifs de qualité de l'environnement. Ce sont les Mesures de Substitution qui, dans les cas où il est possible de constater un effet positif sur la qualité des eaux de surface, ont eu l'impact le plus direct. Ces Mesures de Substitution s'alignent sur des exigences locales, nationales et internationales, et ne considèrent pas nécessairement de façon spécifique les substances de Liste II, mais les englobent dans une politique générale de réduction de la pollution des eaux.

Etant donné cette conclusion, il est difficile d'évaluer la Directive 76/464/CEE en elle-même quant à son impact sur la qualité des eaux de surface au sein de la Communauté pour les substances de Liste II. Par contre, il est possible d'évaluer l'impact des Mesures de Substitution, en se fondant sur les données de rejets et de qualité de l'eau disponibles. Pour un petit nombre de cours d'eau (6), l'information existe en quantité suffisante pour pouvoir assurer une évaluation de l'efficacité des Mesures de Substitution. Il s'agit du Rhin, des rivières britanniques (Merey, Tamise et Trent), de la Meuse et de l'Escaut. Pour les autres cours d'eau, il n'est jamais possible de réunir en quantité suffisante à la fois les données de qualité de l'eau et les mesures de rejets.

Conclusions générales pour le Rhin:

- la qualité de l'eau s'est améliorée pour toutes les substances de Liste II au cours de la période 1980-1992 ;
- les rejets aussi bien industriels que municipaux ont éte fortement réduits de 1985 à 1992 ;
- la Directive 76/464/CEE n'a pas été appliquée entièrement conformément à l'Article 7. Cependant, tous les pays riverains du Rhin ont développé des Mesures de Substitution pour le contrôle des substances de la Liste II. Ces mesures ont eu pour effet une amélioration très nette de la qualité des eaux du Rhin au cours de la période 1980-1993.

Conclusions générales pour les rivières britanniques (Mersey, Tamise et Trent) :

- dans la Mersey, aussi bien les concentrations que les rejets de cuivre et de plomb ont diminué au cours de la période 1980-1993 ;
- dans la Tamise, aussi bien les concentrations que les rejets de plomb diminuent pour cette même période ;
- dans la Trent, à la fois les concentrations et les rejets de cuivre, de plomb et de chrome diminuent au cours de la période 1980-1993 ;
- le Royaume-Uni suit une approche de type qualité de l'eau pour le contrôle de la pollution des eaux par les substances de Liste II en conformité avec les principes de la Directive 76/464/CEE. Cependant, la Directive n'a pas été appliquée entièrement comme spécifié dans l'Article 7. Les Mesures de Substitution développées au Royaume-Uni ont amené des amélioration de la qualité de l'eau pour certains métaux lourds dans les cours d'eau considérés.

Conclusions générales pour la Meuse et l'Escaut :

- la qualité de l'eau s'est améliorée en ce qui concerne le phosphore total dans l'Escaut entre 1980 et 1992 (aucune tendance nette n'a été décelée pour les autres substances) ;
- la qualité de l'eau s'est améliorée pour l'arsenic, le chrome, le plomb et le phosphore total pour la Meuse entre 1980 et 1992 ;
- si l'on comptabilise les rejets vers les eaux de surface pour l'ensemble de la Belgique, la réduction du phosphore total est importante, et il en est de même pour l'arsenic, le chrome, le cuivre et le plomb entre 1985 et 1995 ;
- la Directive 76/464/CEE n'a pas été appliquée entièrement comme spécifié dans l'Article 7. Cependant, les Mesures de Substitution développées en partie grâce à la Directive ont conduit à une amélioration notable de la qualité de la Meuse et de l'Escaut.

Conclusions pour les autres cours d'eau :

- la disponibilité de données de qualité de l'eau est très variable. En général, les données sont disponibles en plus grande quantité pour les métaux lourds et les nutriments que pour les micropolluants organiques. L'évolution de la qualité de l'eau varie également d'un cours d'eau à un autre : parfois positive, parfois négative, parfois nulle, ou encore sans tendance apparente ;
- la disponibilité de l'information sur les rejets municipaux et industriels est également largement variable. Il peut s'agir d'informations sur les rejets des industries individuelles, d'informations agrégées sur des groupes de substances, et de la somme des effluents direct et fluviaux ;
- en général, il existe moins d'informations sur les rejets que sur la qualité de l'eau;
- la Directive 76/464/CEE n'a pas été appliquée conformément à l'Article 7 dans sa totalité. Au lieu de cela, les Etats Membres ont développé leur propres Mesures de Substitution pour la gestion de la qualité de l'eau relativement aux substances de Liste II. Les données ne sont pas disponibles en quantité suffisante pour permettre une évaluation de l'effet de ces mesures.

Conclusion générales

La Directive 76/464/CEE n'a été appliquée conformément à l'Article 7 dans sa totalité dans aucun des Etats Membres. Cependant, chacun des Etats Membres a développé ses propres Mesures de Substitution pour le contrôle de la pollution des eaux de surface par les substances de Liste II. La Directive, en parallèle avec d'autres traités, lois et conventions (inter)nationales, est l'un des facteurs exerçant une influence sur les développement des Mesures de Substitution prises par les Etats Membres.

Pour le Rhin, les rivières britanniques considérées (Mersey, Tamise et Trent), ainsi que pour la Meuse et l'Escaut, une diminution des concentrations aussi bien que des rejets de certaines des substances de Liste II étudiées a pu être constatée. Pour ces cours d'eau, on peut affirmer que les Mesures de Substitution mises en place ont conduit à une amélioration de la qualité del'eau.

En ce qui concerne les autres cours d'eau, les données ne sont pas disponibles en quantité suffisante en général pour permettre une évaluation des Mesures de Substitution mises en place par les Etats Membres concernés.

1 Introduction

1.1 General Introduction

The EC Framework Directive 76/464/EEC (4 May 1976) and its "daughter" Directives are meant to control pollution caused by discharges of certain dangerous substances into the aquatic environment of the Community. Specifically, the Directive requires the Member States of the EC to take all adequate measures to eliminate water pollution by the black list substances (i.e. List I). The pollution of water by List II substances is addressed in Article 7 of the Directive. Here it is stated that all Member States must establish programs for the control of List II substances (paragraph 1). In the programs, water quality objectives for the receiving aquatic system are to be specified (paragraph 3). Further, the Directive lays down that all discharges containing List II substances require a licence, in which discharge standards are defined (paragraph 2) based on the water quality objectives.

Institutional arrangements for the enforcement of pollution include national and local authorities. The national authorities generally set policies, objectives, standards and basic procedures. Compliance monitoring is conducted by either national or local authorities. Enforcement is predominantly the role of the local authorities. The main surface water systems (i.e. river basins) are often used as the geographical unit for water management and pollution control. This system however is usually difficult to implement in international contexts. Differences in legal and governmental structures may mean that, for the same measures, different implementation incentive systems will be relevant in different countries.

The Framework Directive and daughter Directives have had to be transposed by the Member States into their national legislation within the time limits given by the Directives. The effect of implementation of the Directives on the quality of EC surface waters, however, has not yet been inventoried in a comprehensive way.

1.2 Scope and Objectives of the study

The purpose of this project is to provide an evaluation of the impact of Directive 76/464/EEC on the quality of the main surface waters in the Community during the period 1980-1993. An analysis of changes in discharges and water quality for List II substances accompanied by an in-depth analysis regarding national and regional strategies, international driving forces, and all available future plans and programmes, has been conducted for the main EC surface waters.

Directive 76/464/EEC primarily focuses on industrial waste loads, thus communal and diffuse loads are in principle not evaluated in this study. Exceptions are made when data are available and necessary for the analysis of the evolution of the industrial discharges.

Directive 76/464/EEC comprises a number of key items:

- requirement for prior authorizations, including emission standards for List I/II substances;
- laying down limit values for discharges of List I substances and water quality objectives for List II substances at National level;
- laying down quality objectives at Community level as an alternative for limit values for List I substances;
- authorizations shall be reviewed at least every four years;
- requirement to establish programmes with quality objectives for List II substances;
- requirement for inventories of discharges of List I substances;
- monitoring of discharges and surface waters for List I/II substances;
- reporting obligation for Member States on request by the Commission concerning authorizations, inventories, monitoring data etc. (now incorporated in Directive 91/692/EEC).

The scope of the project is to provide an evaluation of the impact entailed by the implementation of Directive 76/464/EEC for List II substances on the quality of the main surface waters in the Community in the period 1980 - 1993.

In principle, the following general questions should be taken into consideration:

- how have countries implemented Article 7 of the directive?
- how far have they proceeded with their approach?
- how is a link between Water Quality Objectives (WQOs) and emissions made?
- are the programs having any result?

The approach to assess these general questions is described in section 1.3.3.

1.3 Approach

1.3.1 Framework for analysis

The approach used in this study has been based on a Framework for Analysis, which is a structured sequence of steps to follow, in order to carry out the most optimal in-depth analysis. Within the Framework for Analysis three phases are identified:

phase 1: Inception phase: Establishing contacts with National Experts on the implementation of Directive 76/464/EEC, and selecting water systems for the study;

phase 2: Preparation phase: Data collection, preliminary analysis of all collected information and an identification of gaps in knowledge;

phase 3: Analysis phase: Final data collection and contact with National Experts on the implementation of Directive 76/464/EEC to fill gaps in knowledge; and in-depth analysis of water quality in the main EC surface waters integrated with knowledge of emissions and driving forces (legislation).

1.3.2 Selection of substances and surface waters

Before actual data collection began, there was a selection of river basins and List II substances for evaluation of the Directive 76/464/EEC (phase 1). The purpose of the selection was to limit the study to be manageable but meaningful in scope. The selection of substances and surface waters was made in consultation with representatives of the European Commission.

The following List II substances were selected: arsenic and its mineral compounds, endosulfan, parathion, atrazine, 1,1,1-trichloro-ethane, chloronitrobenzenes (1-chloro-2-nitrobenzene, 1-chloro-3-nitrobenzene and 1-chloro-4-nitrobenzene), PAH (3,4-benzo(a)pyrene and 3,4-benzo(b)fluoranthene), zinc, copper, chromium, lead, total-nitrogen (Kjeldahl-N + nitrite-N + nitrate-N; alternative: ammonia-N + nitrite-N + nitrate-N) and total-phosphorous (PO4-P). Dissolved oxygen and BOD as extra general parameters have been reported in 'Impact of Directive 76/464/EEC and its "daughter" Directives on the most important surface waters in the Community' (source EC023).

To obtain a representative picture for the main surface waters in the community, the following surface water systems were chosen (the same as those considered in the evaluation of List I substances; EC023):

national rivers:	UK	Thames, Mersey, Trent
	France	Seine, Loire, Rhone
	Italy	Po
	Greece	Axios
	Portugal	Sado
	Spain	Ebro
	Ireland	Slaney
	Luxembourg	Moselle (tributary of the Rhine)

international rivers:
- Rhine (covering parts of Germany, France, the Netherlands, Luxembourg)
- Meuse and Scheldt (covering parts of France, Belgium and the Netherlands)
- Tagus (covering parts of Spain and Portugal)

A summary of the selected substances and river basins included in this study is given in Table 1.1. A map showing the Member States and all the selected rivers in given in Figure 1.1.

The selection of monitoring points for water quality data in each river were chosen in consultation with the National Experts of each country. In general, one monitoring station per river is used. The selection in many cases was based on the availability of data. If data from more than one station were available, then typically the most downstream station was selected (i.e. representing a larger catchment area). An attempt was made to have only freshwater monitoring stations, though for some of the rivers (e.g. Scheldt) the monitoring stations are in an estuary (brackish water).
For the international rivers, data from more than one water quality monitoring station was collected (e.g. Rhine, Scheldt, Meuse, Tagus). These stations are from the different countries through which the river flows. Also for the Axios river in Greece, data from more than one station was collected.

For the international rivers (Rhine, Scheldt, Meuse, and Tagus), although water quality and loads data have been collected from different countries, the analysis of Directive 76/464/EEC is made for each river basin as a whole. No surface waters in Denmark were selected as water quality data from the National Expert on the implementation of Directive 76/464/EEC was not made available in time for inclusion. The new Member States of the Community (Austria, Finland and Sweden) were not included as part of this study. In the preparation phase (phase 2), most of the necessary information was collected via the National Experts from each country.

1.3.3 Analysis methodology

In the final or analysis phase (phase 3), an analysis has been made per river basin, of the impact of Directive 76/464/EEC regarding List II substances on the quality of the main rivers of the Community affected by the discharges of List II substances. This report is the final report corresponding to the completion of phase 3.

It was agreed with the European Commission to assess the general questions concerning the effectiveness of Directive 76/464/EEC by considering 4 points:

1. Transposition of Directive 76/464/EEC, based on:
   - actual transposition of the directive into national legislation,
   - existence of strategies and programmes, leading to the control of discharges of selected list II substances,
   - development of quality objectives (reflecting certain local, and/or national and/or international priorities),
   - requirement of authorization for the discharge of selected List II substances applied with enforcement of limit values (which are based wither on BAT and/or EEQS),
   - existence of monitoring of both discharge waters and the receiving aquatic system;
2. The trends in the water quality for selected List II substances in selected main surface waters in the Community;
3. The trends in discharges of List II substances by industrial point sources;
4. Other driving forces (than Directive 76/464/EEC) also leading to water quality improvements in the Community.

The 4 components of the analysis are illustrated schematically in Figure 1.2.: Transposition of Directive 76/464/EEC → other driving forces → waste loads discharge (emissions) → water quality. It is important that all substances are evaluated in the perspective of all important related developments in the river basin (i.e. all relevant driving forces). This methodology has been carried out for each river basin.

The water quality data are reported as yearly average concentrations. It was chosen to represent concentrations instead of riverine load values (i.e. Q x C), as the goal of the study is to review the change over the years in water quality, which can best be seen as concentrations. Furthermore, within daughter Directives of 76/464/EEC, water quality standards (e.g. water quality objectives) are given as receiving water concentrations. For List II substances, the programs within each country must also focus on established water quality objectives.

The water quality data were for the most part provided in the data by the National Experts on the implementation of Directive 76/464/EEC. The method used for calculating the yearly average was not always given. Several databases stated explicitly that for individual measurements below the detection limit, the yearly average values were calculated by setting the value to half the detection limit. In some cases, the National Experts provided only data of daily or monthly concentrations. In this event, the yearly average concentrations were calculated by setting values less than detection to half the detection limit. Flow weighting of concentrations was not used. It is clear that not all data collected by all institutes were made available for this study. Within the time limits of the project, by using only data controlled by the National Experts, a best effort has been made.

In all cases, (total) pollutant concentrations in water have been reported [μg/l]. It can be argued that concentrations of some pollutants (e.g. organic micropollutants) should be reported as particulate concentrations (e.g. [μg/kg], μg pollutant per kg suspended sediment). However, the majority of the data available consisted of water concentrations, and for the sake of consistency, only these values have been reported.

In the final analysis, the data described above have been analyzed for changes in discharges (emissions) and surface water quality over time (for the reasons given above, no statistical 'trend analysis' has been performed). The observable changes or trends have been compared with the required dates of compliance of Directive 76/464/EEC and its daughter Directives as well as other relevant driving forces for pollution control in the country and/or river basin. Furthermore, these comparisons have been discussed with the representatives of the Member States to put the trends in a historical perspective containing an overview of other developments that may have contributed to the character of the trends.

Thus, an evaluation of monitoring data is made in relation to developments (including the implementation of Directive 76/464/EEC) which may have had an impact on the waste loads and water quality. In this way, the effectiveness of Directive 76/464/EEC regarding List II substances for the considered water systems and substances is evaluated. The analysis is based on the selected substances only. As these were selected as being representative of the major groups of the List II substances, the conclusions can be extended to cover all List II substances.

Table 1.1 Selected surface waters and substances for impact Analysis of Directive 76/464/EEC

EC List II (grey list)	
substance	*unit*
flow	m3/s
Arsenic	ug/l
Endosulfan	ug/l
Parathion	ug/l
Atrazine	ug/l
1,1,1-Trichloro-ethane	ug/l
1-chloro-2-nitrobenzene	ug/l
1-chloro-3-nitrobenzene	ug/l
1-chloro-4-nitrobenzene	ug/l
Zinc	ug/l
Copper	ug/l
Chromium	ug/l
Lead	ug/l
Total N (Kj. N + NO3 + NO2)	mg/l
Total P	mg/l
3,4-benzo(a)pyrene (PAH)	ug/l
3,4-benzo(b)fluoranthene (PAH)	ug/l
PAH (total)	ug/l

River	Monitoring station	Country
Axios	*Axioupolis*	Greece
	Prochoma/Koufalia	Greece
	Chalastra	Greece
Ebro	*Asco*	Spain
Loire	*Ste Luce*	France
Mersey	*Howley Weir*	United Kingdom
Meuse	*Tailfer*	Belgium
	Eijsden	Netherland
	Keizersveer	Netherland
Moselle	*Palzem*	Luxembourg
	Grevenmacher	Luxembourg
Po	*Pontelaguscuro*	Italy
Rhine	*Koblenz*	Germany
	Bimmen-Lobith	Germany / Netherland
	Lobith	Netherland
	Maassluis	Netherland
Rhone	*Arles*	France
Sado	*Alvalade do Sado*	Portugal
Scheldt	*Doel*	Belgium
	Schaar van Ouden Doel	Netherland
Seine	*Paris*	France
Slaney	*Enniscorth*	Ireland
Tagus	*Talavera*	Spain
	Santerem	Portugal
Thames	*Teddington Weir*	United Kingdom
Trent	*Dunham*	United Kingdom
	Keadby	United Kingdom

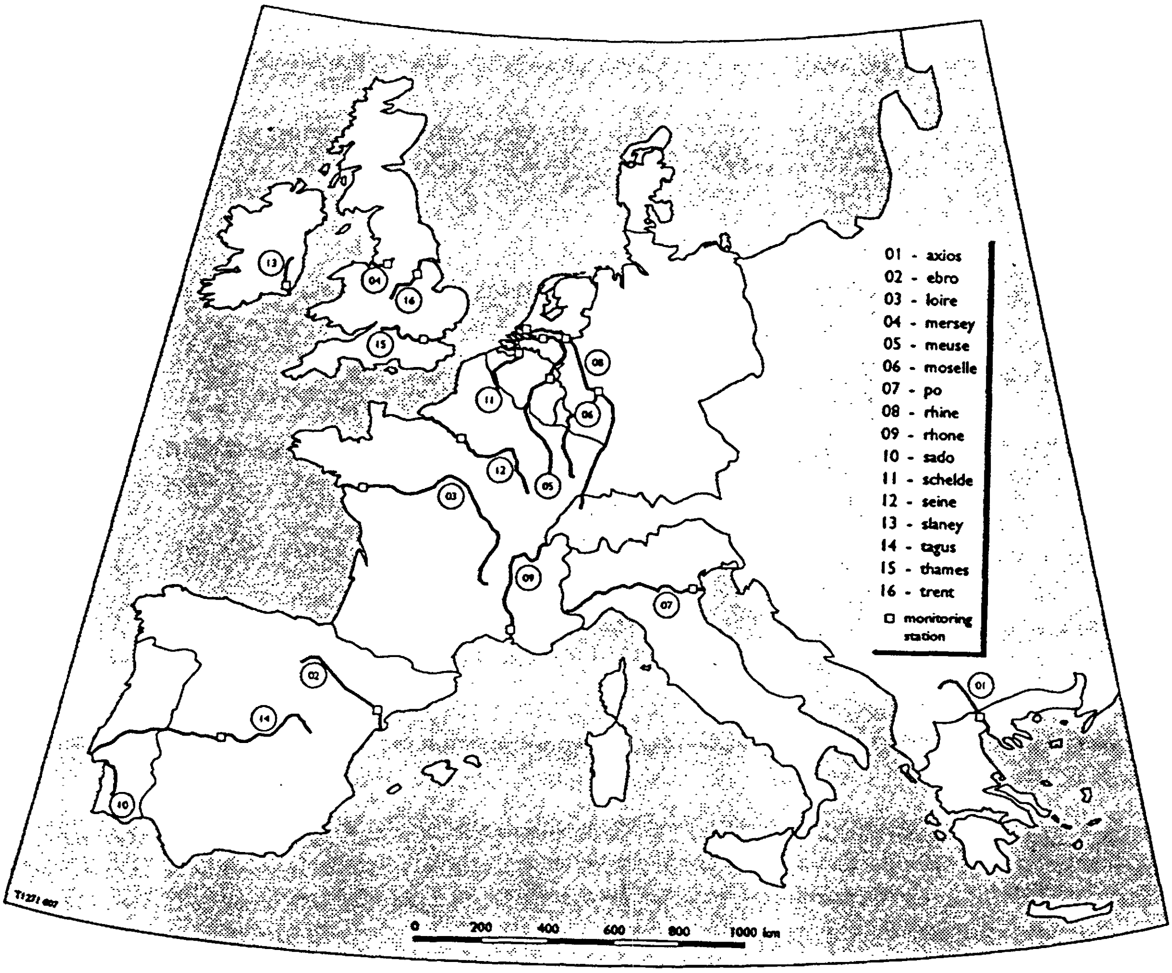

Figure 1.1 EC Member States and selected surface waters for analysis

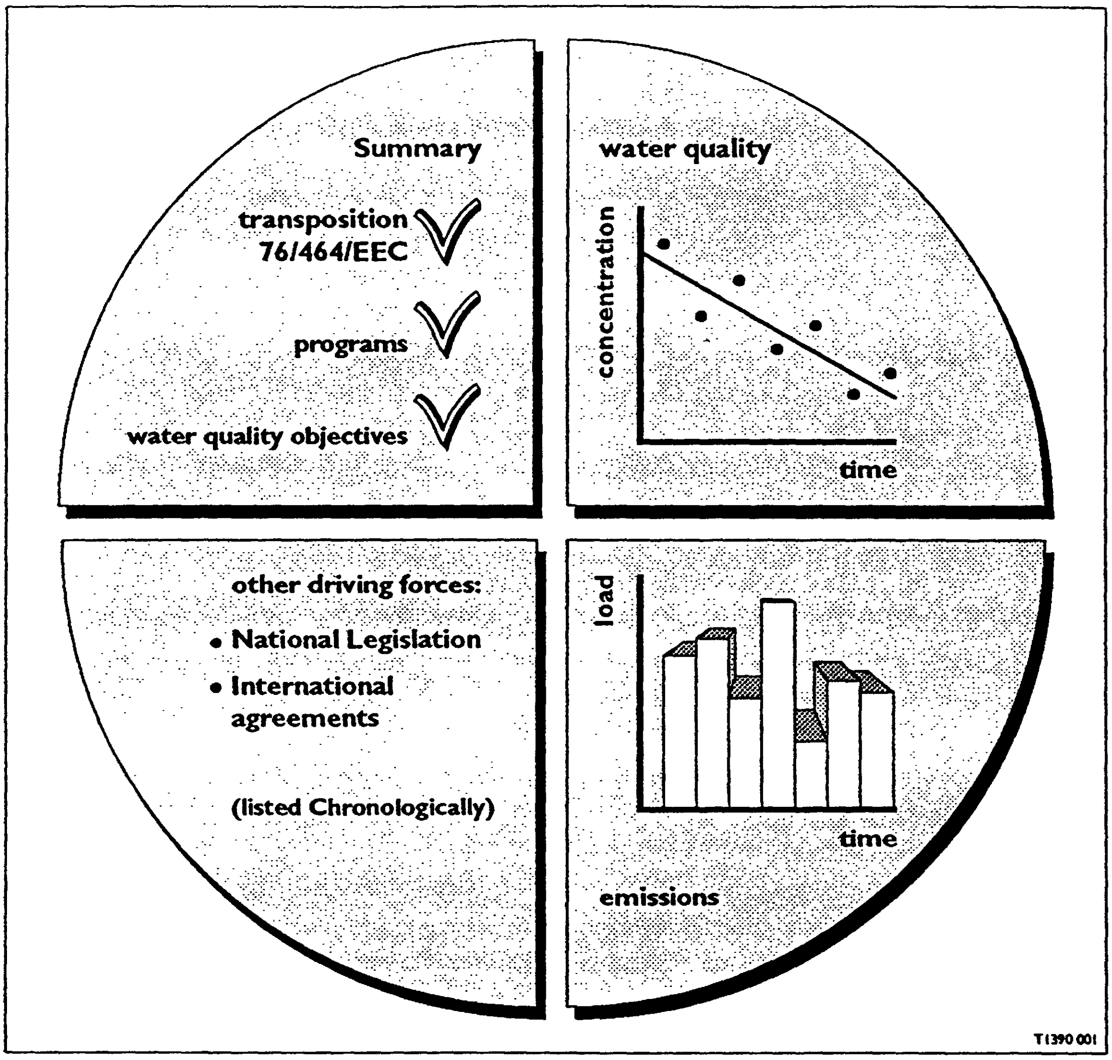

Figure 1.2 Impact of Directive 76/464/EEC regarding List II substances on the quality of a selected water system

1.4 Sources of Information

In general, the main sources for information were the Member States' National Experts on the implementation of Directive 76/464/EEC. In some cases this information was supplemented by data from international literature and personal direct contact of RIZA and DELFT HYDRAULICS with experts in the Member States. Full references are given in chapter 7 of this report. Additional water quality data was obtained from the international GEMS database (GEN003, GEN023).

1.5 Outline of the project report

This report is presented in two volumes as follows:

- Volume I: Main report plus Appendices A,B,C.
- Volume II: Supplementary Appendices (D,E,F,G)

The report gives an overview of:

- the List II substances including general chemical characteristics, important production processes and monitoring requirements;
- the data gathered for the selected substances and surface waters with respect to waste loads and water quality;
- the information gathered concerning the transposition and implementation of Directive 76/464/EEC regarding List II substances in the Member States.

A description of Framework Directive 76/464/EEC and daughter Directives is given in Chapter 2. An overview of the available discharge and water quality data is given in Chapter 3. Chapter 4 summarizes the different strategies in place by the Member States. Chapter 5 gives an analysis of the 16 selected surface waters in the Community. The conclusions over the impact of Directive 76/464/EEC on the surface waters of the Community are given in Chapter 6. Acknowledgements and Bibliography are in Chapters 7 and 8.

The text of Council Directive 76/464/EEC is given in Appendix A. Full details of the 'Water Management Profiles' for each Member State are given in Appendix B. Appendix C gives an extended analysis of the Rhine river as an illustration of the type of analysis that can be made if very complete information on waste loads, water quality and driving forces is known.

The full databases and supplementary information for discharges for the selected rivers are given in Appendices D-1 and D-2. The database for water quality is in Appendix E. The National and International water quality standards and objectives are given in Appendix F. Appendix G gives further details on the Phosphorous Quality objectives in Ireland.

1.6 Execution of the contracted research

The present study was commissioned by DGXI/E/1 in February 1994, to a Joint Venture comprising DELFT HYDRAULICS and the Institute for Inland Water Management and Waste Water Treatment (RIZA) the Netherlands. The data acquisition and the interpretation of the data are carried out in association with the National Experts involved in the implementation of Directive 76/464/EEC. The cooperation of the National Experts and their colleagues in providing necessary information has been critical for conducting this study and is gratefully acknowledged.

The study was carried out by a multi-disciplinary project team of the following persons:

Function	Name
Team leader DH	J-P.R.A. Sweerts (DH)
Project leader DH, Water Quality specialist	M.T. Villars (DH)
Project leader RIZA, emission specialist	G.H. Broseliske (RIZA)
Policy analysis and emission specialist	J.A.W. De Wit (RIZA)
Project assistant	F. de Graaf (DH)
Project assistant	R. Wunderink (RIZA)

The study was supervised by Mrs. J. Vennekens, Mrs. E. McDonnell, and Mr. S. Hoornstra of the European Commission (DG XI-E.1).

2 Directive 76/464/EEC and List II Substances

2.1 Framework Directive 76/464/EEC

During the summit in November 1972 of the heads of state of the European Community, the importance of having an environmental policy at Community level was stressed. Considering article 2 of the Treaty establishing the European Economic Community, promoting a continuous and well balanced development of economic activities within the whole of the Community, it was recognized that this aim could not be reached without an effective combat of pollution and nuisance, nor without an improvement of the quality of life and protection of the environment.

European institutions were invited to prepare a first environmental action programme to be completed by the end of July 1973. This first environmental action program, as adopted in July 1973, comprised a chapter on specific actions for certain industrial sectors including the production of energy. First of all, measures aiming at the reduction of emissions had to be developed by the European Commission for the paper and pulp industry, the iron and steel industry and the titanium dioxide industry.

The history of Directive 76/464/EEC actually goes back to the paper and pulp proposals of 1973-1975. It turned out that there was insufficient support to adopt measures for this industrial branch. Consequently, the paper and pulp proposals were blocked in 1975. However, the situation was such that there was an urgent need for general and simultaneous action by the Member States to protect the aquatic environment of the Community from pollution, particularly that caused by persistent, toxic an bioaccumulable substances.

Several conventions or draft conventions such as for the prevention of marine pollution from land-based sources and the draft convention for the protection of the Rhine against chemical pollution, were designed to protect international water courses and the marine environment from pollution. Within the European Community, it was considered to be important to ensure the coordinated implementation of these conventions. These aspects were major driving forces leading to the adoption of Council Directive 76/464/EEC as adopted on the 4th of May 1976. The full text of the Directive is given in Appendix A. This Directive aims at a general and simultaneous action by Member States of the European Union to protect the aquatic environment of the Community from pollution.

To ensure an effective protection of the aquatic environment of the Community, a first list (List I) of families and groups of substances was selected on the basis of their environmental toxicity, persistence and bioaccumulation, with the exception of those which are biologically harmless or which are rapidly converted into substances which are biologically harmless (see Annex to Directive 76/464/EEC, in Appendix A). In principle, the Directive states that pollution through the discharge of List I substances must be eliminated.

For this purpose, the Council has adopted specific discharge limit values and receiving water quality objectives and has implemented time limits based on proposals by the Commission. Requirements (emission standards) set by Member States in discharge authorizations, must at least meet the Directive's time limits and limit values except in cases where they employ the Directive's quality objectives.

Additionally, a second list of dangerous substances was established (List II). The List II (also known as the grey list) substances, are those which have a deleterious effect on the aquatic environment, which can, however, be confined to a given area and whose effects depend on the characteristics and location of the water into which they are discharged. Any discharge of these substances should be subject to prior authorization which specifies emission standards. These emission standards are required to be based on quality objectives.

The impact of Directive 76/464/EEC and its "daughter" Directives with regard to control of pollution by List I substances has been evaluated in a previous study 'Impact of Directive 76/464/EEC and its "daughter" directives on the most important surface waters in the Community', EC contract B4-3040/93/001169/LP/A3, (source EC 023).

For this project, only List II substances are evaluated.

2.2 List II substances

Article 7 of Directive 76/464/EEC requires Member States to establish 'programmes' to reduce pollution to the aquatic environment (inland surface water, territorial waters, internal coastal waters and ground water) in the Community by List II substances. All discharges into these Community waters which are liable to contain any of the substances within List II require prior authorization by the competent authority in the Member State. In these authorizations, emission standards must be laid down, and these emission standards must be based on quality objectives, which are to be part of the established 'programmes'. The quality objectives must be in accordance with Council Directives where they exist. The programmes may also include specific provisions governing the composition and use of substances or group of substances and products and shall take into account the latest economically feasible technical developments. The programmes shall set deadlines for their implementation.

Furthermore, Member States are required to inform the Commission in a summarized way about these programmes and the results of their implementation. The Commission, together with the Member States, shall arrange for regular comparison of the programmes in order to ensure sufficient coordination in their implementation. If necessary, the Commission can submit relevant proposals to the Council to this end.

In analyzing Article 7, we concluded that, in order to develop the programmes required by Directive 76/464/EEC, Member States need the answers to a number of questions, which we consider should be the following:

1. which specific List II substances should be taken into account, considering the type and functions of the receiving waters ?
2. which discharges (industrial, municipal and diffuse) take place into the receiving waters and which specific substances are or can be discharged ?
3. which quality objectives shall be applied for these substances (national and/or international quality objectives including quality objectives set in existing Council Directives) ?
4. what is the quantitative relation between (all) discharges on the one hand and the resulting quality of the aquatic environment on the other?
5. which measures shall be taken by (all) the dischargers?

It is inevitable that Member States have to answer these (or similar) questions in order to specify national programmes. In order to facilitate and to coordinate these programmes, the Commission conducted a number of activities:

- The Commission sent a communication in November 1976 to Member States, indicating the date by which the national programmes should be defined (15 September 1981) and setting a deadline of 15 September 1986 for their implementation.

- At a meeting of National Experts from the Member States on 27 January 1981, the Commission's study of the substances on List II was presented [Biokon report, EC025]. A list of priority substances was established for the purpose of providing a comparison of national programmes. This priority list included chromium, lead, zinc, copper and nickel.

- Subsequently, the Commission requested Member States in a letter dated 29 April 1981 to send their national programmes on chromium. As the Commission felt that the programmes received by the Commission failed to satisfy the requirements of article 7 of Directive 76/464/EEC, the Commission submitted a working document comprising water quality objectives for chromium. This working document was discussed at a meeting of national experts on 3 and 4 July 1984.

- Using this document as a basis and taking into consideration the discussion of the group of national experts, the Commission drafted a proposal for a Council Directive on water quality objectives for chromium (COM(85) 733 def. (85/C 351/11). This proposal, however, did not lead to a Council Directive on chromium due to insufficient support.

- In a letter of 21 August 1985, the Commission requested Member States to forward information by 30 November 1985 on programmes for the reduction of pollution by lead, zinc, copper and nickel, and on the results obtained from their implementation.

- Based on the results of a meeting of national experts on 31 January and 1 February 1989, a number of List II substances, for which Member States should report on programmes for reduction of pollution to the Commission, were selected. These List II substances, given in the Commission's letter of 26 September 1989, include:
  1. metals and metalloides (including their inorganic compounds): chromium, zinc, copper, nickel, lead, arsenic, silver, vanadium, tin, boron
  2. mono cyclic aromatics: benzene, xylene, toluene, monochlorobenzene, phenols
  3. non persistent mineral oils and hydrocarbons of petroleum origin
  4. cyanides
  5. ammonia, sulphides
  6. nutrients: nitrogen- and phosphoric compounds.

In a letter dated 4 April 1990, the Member States were informed by the Commission, that List I substances mentioned in the annex of Directive 76/464/EEC, for which no limit values have been set yet, are to be treated as List II substances. Considering the state of the art of 1990 this also implied that the priority List of 132 "potential List I substances" minus 33 substances for which "daughters" had either been adopted, or existed as draft Directives and proposals for a Directive were to be treated as List II substances (see Figure 2.1).

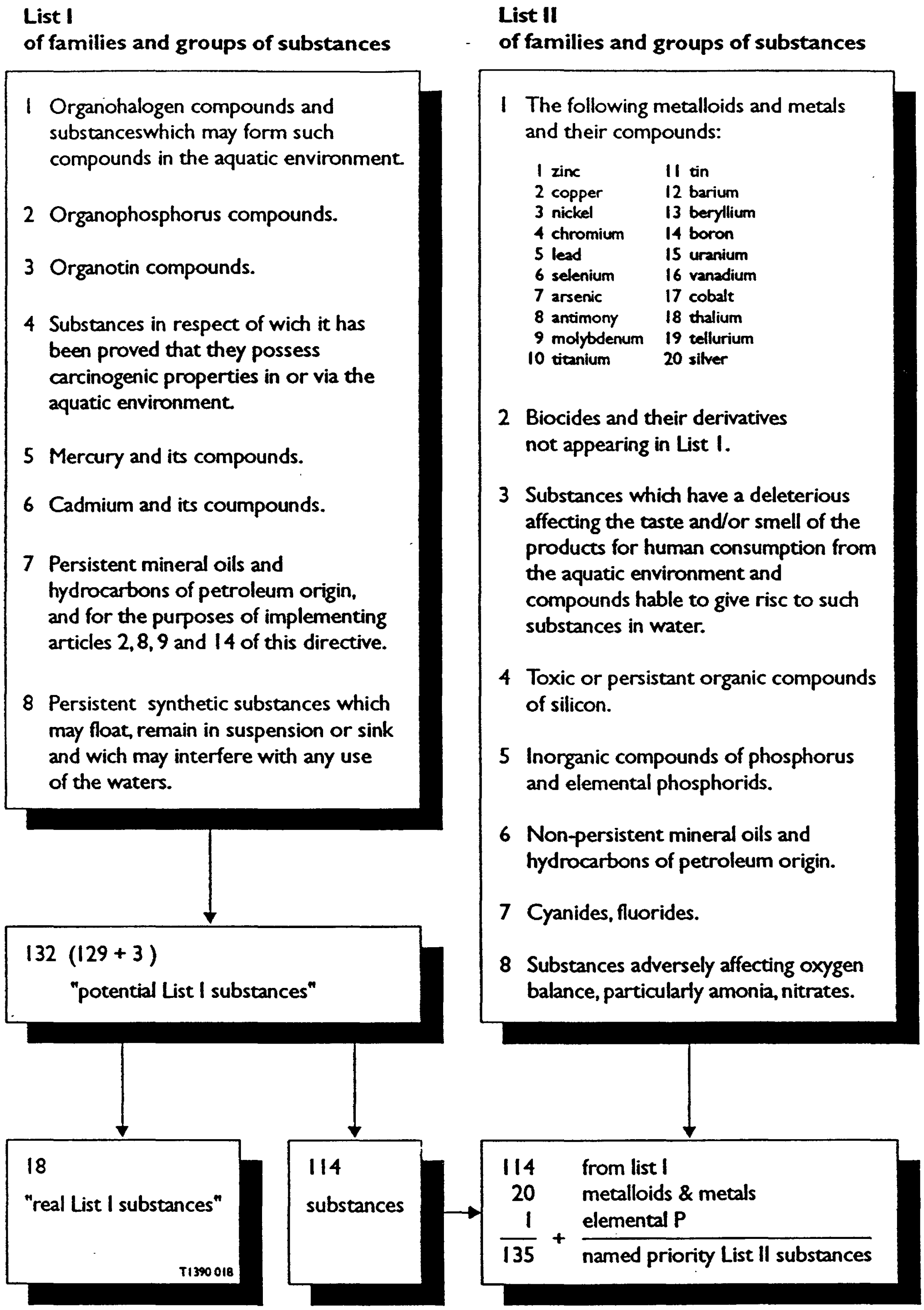

Figure 2.1 Overview of List I and List II substances

It has been explicitly stressed by the Commission that setting lists of priority List II substances does not reduce the responsibilities of Member states with respect to the requirements of the Directive concerning the remainder of List II substances.

Considering the terms of reference for this study, 114 substances of the priority list of 132 "potential List I substances" are considered to be part of the group of List II substances (132 substances minus 18 for which "daughters" have been adopted, thus 114). These substances plus all the 21 named substances in List II (20 metalloid or metals, elemental P, and ammonia, minus arsenic, which is counted in List I) brought the total number of named priority List II substances to 135.

In order to understand to what extent Member States have developed their strategies in implementing Article 7 of Directive 76/464/EEC, the Commission held a meeting of national experts on 14 and 15 July 1993. A comparison was made of the national programmes for the reduction of discharges of List II substances in the aquatic environment. Four Member States gave detailed presentations of the approach followed by their competent authorities in the last years in order to elaborate and implement their national programmes of reduction of water pollution in the light of Article 7 of Directive 76/464/EEC. The other delegations gave brief explanations of their strategies on List II substances.

As stated in chapter 1.2 (Scope and objectives of the study) the objective of this project is to provide an evaluation of the impact of Directive 76/464/EEC on the quality of the main surface waters within the Community during the period 1980-1993 with regard to List II substances. It is not the purpose of this study to check whether Member States meet all necessary legal obligations set in the Directive.

The analysis of the implementation by Member States of Article 7 of the Directive is therefore the opinion of the consultants and does not necessarily reflect the views of the Commission Services.

An important aspect of the analysis of the Directive is the evaluation of the transposition of the Directive. The term "transposition of Directive 76/464/EEC" as given in chapter 1.3.3 consists of the following 5 aspects:

- is Directive 76/464/EEC transposed in the national legislation (this assessment does not focus specifically on Article 7 but on the Directive as a whole);
- are strategies and/or programmes established for the control of discharge of selected List II substances (Article 7, paragraph 1);
- is prior authorization for the discharge of selected List II substances required and are emission limit values (either BAT based or/and EQS based) enforced (Article 7, paragraph 2);
- has the Member State adopted quality objectives (reflecting certain local, and/or national and/or international priorities), (Article 7, paragraph 3);
- does monitoring of both the discharge of waste waters and the quality of the receiving aquatic system take place.

Appendix B gives an overview of the water management structure and the implementation of Directive 76/464/EEC (sources are given in the text of Appendix B).

A general conclusion on water management (source: D110) is that the number of administrative tiers involved in the Member States ranges from 2 (State to local authority) to 5 (State, federal State, region, subregion and municipal), each having its characteristic transposition and implementation routes for Directives.

ERM (sources: EC002 and EC003) found that the transposition of the Directives (i.e. embedding Directives in acts and orders in Council) into Member State legislation is largely complete but the implementation (fixation of limit values in discharge permits and the technical realisation of abatement measures) of the Directives is in many cases still ongoing and in one or two cases either at a very early stage or is evolving due to changes in administrative responsibility.

ERM (sources: EC002 and EC003) concluded that a very wide range in the rate and level of implementation of the Directives exists in the EU. This reflects widely differing background conditions in Member States in terms of administrative and legal systems and resources.

Appendix D-1 (Volume II) gives a complete overview of (mostly industrial) dischargers (e.g. specific industries) of List II substances of Directive 76/464/EEC. Supplementary information regarding the discharge of List II substances is included in Appendix D-2.

2.3 Monitoring Requirements for List II substances

In general, monitoring takes place for several reasons. First of all it helps to identify the presence of certain substances in waste and surface waters. It also helps to control the discharge of waste water and it helps to control the quality of the receiving waters. Finally its an assisting tool to reveal developments and trends in both discharges and surface water quality. Water management (including the abstraction of surface water for the production of drinking water in the Member States) has given rise to a diversity of surface and waste water monitoring programmes.

For the surface waters in the European Community, several international monitoring programmes for waste waters have been developed (e.g. Rhine Action Program and North Sea Action Program). Priority pollutants and 76/464/EEC List II substances also play an important role in the choice of the parameters to be monitored.

Distinctions can be made between waste water monitoring and surface water monitoring. The formal basis for waste water monitoring (limit value approach) and surface water monitoring (quality objective approach) for List II substances is triggered by article 13 of Directive 76/464/EEC and article 6 of Directive 86/280/EEC. According to these articles, Member States shall supply the Commission, at its request, a variety of information including monitoring data of discharges and surface waters.

In addition to the monitoring requirements of Directive 76/464/EEC, other Directives and Decisions have surface water monitoring requirements, such as:

- required surface water quality for the abstraction of drinking water;
- bathing (surface) water quality;
- establishing a common procedure for the exchange of information on the quality of surface fresh water;
- the quality of fresh waters needing protection or improvement in order to support fish life;
- methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water;
- the required quality of shellfish (coastal and brackish) waters;
- the urban waste water treatment (UWWT) Directive.

Table 2.1 gives an overview of specific "surface water Directives" and related "76/464/EEC-List II" parameters that must be monitored by Member States.

It is worth while mentioning that a Commission Decision of 25 July 1995 (source EC022) concerning questionnaires for the water Directives gives a structured format for the information to be supplied regarding monitoring data. Monitoring data on bathing water quality and on quality of surface fresh waters are absorbed by the CORINE information system, maintained by the European Environment Agency Task Force within Directorate General XI of the European Commission. This is now the responsibility of the European Environment Agency (Council Regulation 90/1210/EEC of May 7, 1990 on the establishment of the EEA and the European Information and Observation Network QTL 120 11.5.90.p.l).

Table 2.1 Overview of specific "surface water Directives" (and Council Decisions) and related "76/464/EEC-List II parameters" that must be monitored by Member States for designated surface waters

Number and date of Council Directive / Council Decision	Scope of Council Directive / Council Decision	List II substances of Directive 76/464/EEC, that are included in the "surface water Directive/Decision", for which surface water monitoring must take place
Council Directive 75/440/EEC of 16 June 1975 (see also see 79/869/EEC)	required surface water quality for the abstraction of drinking water in the Member States	nitrates, fluorides, extractable total organochlorine, copper, zinc, boron, beryllium, cobalt, nickel, vanadium, arsenic, chromium (total), lead, selenium, barium, cyanide, tensides (reacting with methylene blue), phosphates, phenols, hydrocarbons (extractable with petroleum ether), polycyclic aromatic hydrocarbons, pesticides (sum of parathion, HCH and dieldrin; note: only parathion is a List II substance), Kjeldahl-nitrogen, ammonia, substances extractable with chloroform.
Council Directive 76/160/EEC of 8 December 1975	bathing (surface) water quality in the Community	mineral oils, tensides (reacting with laurylmethylene blue sulphate), phenol, ammonia, Kjeldahl-nitrogen, pesticides (sum of parathion, HCH and dieldrin; remark: only parathion is a List II substance), arsenic, chromium VI, lead, cyanides, nitrates and phosphates.
Council Decision 77/795/EEC of December 1977	establishing a common procedure for the exchange of information on the quality of surface fresh water in the Community. A list of sampling and measuring stations are included in the Directive.	nitrate, ammonium, total- phosphorous, tensides (reacting with methylene blue).
Council Directive 78/659/EEC of July 1978	the quality of fresh waters needing protection or improvement in order to support fish life. Member States must designate the waters to which they will apply the requirement of this Directive.	total-phosphate, nitrites, phenolic compounds, petroleum based hydrocarbons, non ionized ammonia, total ammonia, total residual chlorine, total zinc, total copper.
Council Directive 79/869/EEC of 9 October 1979 (also see 75/440/EEC)	methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water in the Member States.	nitrates, fluorides, extractable total organochlorine, copper, zinc, boron, beryllium, cobalt, nickel, vanadium, arsenic, chromium (total), lead, selenium, barium, cyanide, tensides (reacting with laurylmethylene blue sulphate), phosphates, phenols, hydrocarbons (extractable with petroleum ether), polycyclic aromatic hydrocarbons, pesticides (sum of parathion, HCH and dieldrin; note: only parathion is a List II substance), Kjeldahl-nitrogen, ammonia, substances extractable with chloroform.
Council Directive 79/923/EEC of 30 October 1979	the required quality of shellfish waters (coastal and brackish waters designated by Member States as needing protection or improvement in order to support shellfish)	petroleum based hydrocarbons, organohalogenated substances, silver, arsenic, chromium, copper, nickel, lead, zinc, substances tainting the taste of shellfish, saxitoxin (produced by dinoflagellates)

3 Overview of the available data

3.1 Summary of Data availability

Following the selection of representative rivers basins and List II substances (see Chapter 1), National Authorities were contacted and information on water quality management, industrial discharges, and water quality was requested. The National Authorities contacted are listed in Chapter 6. All information received was given a reference number, and is presented in the reference section (Chapter 7).

The full data obtained for the study are presented in several Appendices, concerning:

- Water Management Profiles for EC Member States (Appendix B)
- Industrial Discharges of List II Substances (Appendix D-1)
- Water Quality of List II Substances in Selected Main Waters (Appendix E)

The availability of data is summarized in the following two tables for industrial discharges and water quality data.

Most water quality data are given as measured concentrations at specific monitoring locations in the river (Appendix E). In some cases, information on riverine and direct inputs to surface water (e.g. North Sea, Mediterranean Sea) are given (Appendix D-2).

Industrial Discharge Data

Table 3.1 Availability of industrial discharge data

substances/-rivers	1	2	3	4	5	6	7	8	9	10	11	12	13
Rhine	+	++	++	++	++	++	+)[2] +	++	++	++	++	+	++
Meuse								+		+			+
Scheldt	+							+	+	+	+	+	+
Tagus)[1]								+	+		+	+	+
Thames)[1]	+	+	+	+				+	+	+	++	++	++
Mersey)[1]								+	+		++	+	+
Trent	+	+	+	+				+	+	+	+		
Seine	+							+	+	+	+	+	+
Loire	+							+	+	+	+	+	+
Rhone	+							+	+	+	+	+	+
Po													
Ebro													
Axios													
Slaney)[3]								++	++		++	++	++
Moselle								+	+	+	+	+	+
Sado													

+
+ data available for statement on trends

+ data available, however insufficient for statement on trends

"blank" limited or no data available

)[1] riverine plus direct input data
)[2] in NL only
)[3] direct discharges

1 arsenic and its mineral compounds
2 endosulfan
3 parathion
4 atrazine
5 1,1,1-trichloro-ethane
6 chloronitrobenzenes
7 PAH
8 zinc
9 copper
10 chromium
11 lead
12 total-nitrogen
13 total-phosphorous

This table gives an overview of the available waste load data:

- Data are within the category '+ +' if there are data from different years such that a trend can be seen.
- Data are in the category '+' if data are available, but not enough for statements on trends.
- Data are in the category "blank" if there are limited or no data.

Water Quality Data

Table 3.2 Availability of water quality data

rivers/ substances	1	2	3	4	5	6	7	8	9	10	11	12	13
Rhine)[1] (Lobith)	++	+	+	++	++		++	++	++	++	++	++	++
Meuse)[2] (Eijsden)	++	+	+	+	++		++	++	++	++	++	++	++
Scheldt)[3] (Doel)	+	+					+	++	++	++	++	++	++
Tagus)[3] (Talavera)	+							++	++	++	++	++	++
Thames	++			+				++	++	++	++	++	+
Mersey								++	++	++	++	++	
Trent	++						+	++	++	++	++	++	
Seine	++							++	++	++	++		
Loire				+									
Rhone	+			+	+		+	+	+	+	+		
Po													
Ebro	++							++	++	++	++		
Axios)[4] (Axioupolis)													+
Slaney								+	+				
Moselle								++	++	++	++		++
Sado													

++ data available for statement on trends
\+ data available, however insufficient for statement on trends (at least 2 years of data)
"blank" limited or no data available

1 arsenic and its mineral compounds
2 endosulfan
3 parathion
4 atrazine
5 1,1,1-trichloro-ethane
6 chloronitrobenzenes
7 PAH
8 zinc
9 copper
10 chromium
11 lead
12 total-nitrogen
13 total-phosphorous

Notes:

)[1] Rhine river data includes 4 monitoring station: Koblenz (G), Bimmen-Lobith (NL/G), Lobith (NL), and Maasluis (NL). Station Lobith has the most water quality data.

)[2] Meuse river data includes 3 monitoring stations: Tailfer (B), Eijsden (NL), and Kaisersveer (NL). Station Eijsden has the most water quality data.

)[3] Tagus river data includes 2 monitoring stations: Talavara (SP) and Santerem (P). Station Talavara has the most water quality data.

)[4] Axios river data includes 3 monitoring stations in Greece: Axioupolis, 1020_02, and 1020_03. Station Axioupolis has the most data for List II substances.

3.2 Information on driving forces

In the beginning of the sixties, European industries were growing fast and the standard of living of the European society was improving. The dark side of these developments was an increased discharge of polluting substances, resulting in a deterioration of the quality of most European surface waters. The major issues of concern were the high concentrations of BOD, oxygen depletion and to a certain extent the presence of mercury and cadmium.

Later on, with increasing growth, urbanization, industrialization, and knowledge, the substances and effects of environmental concern expanded to include pesticides, nutrients, other heavy metals (in addition to mercury and cadmium) and specific organic substances. Part of these developments were also triggered by the fact that more analytical methods were made available to quantify the presence of these substances and their effects in surface water.

Counter measures, leading to the realization of municipal and industrial waste water treatment plants, were initiated, first of all at the national level, but also on an international level. A well known international framework for the conservation of surface water quality is the Convention for the protection of the Rhine against pollution (Bern, 1963). This convention was expanded in 1976 with the Rhine Chemical Treaty.

On a larger scale the EC adopted a number of Directives, having a positive impact on the surface water quality in the Community. Examples are the surface water Directives as mentioned in Table 2.1. Although these Directives did not primarily aim at water quality improvement, they had a positive impact on it.

An important EC Directive having a direct impact on the discharge of substances was adopted in 1976 (76/464/EEC). As well as the Rhine Chemical Treaty, Directive 76/464/EEC focused on the pollution caused by certain substances discharged to the aquatic environment. History showed that there was an intensive exchange of information between the International Rhine Commission (coordination of the execution of the Rhine Chemical Treaty) and the European Commission (coordination of the execution of Directive 76/464/EEC). In many cases, the International Rhine Commission took the lead in the technical specification of specific limit values for List I substances, giving a positive impact on specifying the limit values for the daughters of Directive 76/464/EEC.

Taking a look at "environmental history", one can see that actions against pollution or against unacceptable environmental impacts receive strong political support when the environmental situation, or an event affecting the environment is considered unacceptable by the general public. An example is the fire at an industrial site in Switzerland in 1986 which lead to massive pollution of the river Rhine. This accident lead to the adoption of the Rhine Action Programm by the riparian states of the Rhine aiming at an accelerated restoration of this river. Another example is the accident at Seveso in Italy, which resulted in a massive discharge of dioxin into the environment. This event initiated the adoption of EU-Directive 82/501/EEC of 1982, leading to safer situations for specific industrial operations.

Many environmental problems however, are not geographically restricted to individual Member States. Transboundary surface waters allow pollution to be transported from one country to another. Special sea areas are polluted by riparian countries via national and international rivers.

In the beginning of the seventies, the situation in Europe was ready for international cooperation in the field of combatting water pollution. Furthermore, there was a need to harmonize countermeasures in order to minimize "unintended" competition among industries, caused by a high diversity of environmental demands.

Beginning in 1963 and continuing to the present, many international treaties, conventions, and other forms of international cooperation concerning the protection of the aquatic environment have been signed. Table 3.3 gives an overview, including the participating Member States. This table shows that all EC Member States are involved in one or more international agreements. The EC is represented in these agreements through its Commission.

The term 'driving forces' is used for all major developments which have been and/or still are of influence on industrial discharges. Directive 76/464/EEC is an important driving force for the control of industrial discharges. Thus, complete information on the transposition and implementation of the directive in each of the Member States has been collected. This includes the names and dates of specific national legislation which transpose the intent of the Directives, as well as the national organization regarding water management including issuing of permits, and monitoring of effluents and ambient water. This information is presented in full in Appendix B "Water Management Profiles".

Other driving forces can be important for pollution control, such as international commitments and treaties. Examples are the Paris Commission (PARCOM) for control of discharges to the North Sea from land based sources, International Rhine Commission (IRC) for improvement of the water quality of the Rhine River, Barcelona Convention for protection of the Mediterranean Sea, etc. Correspondence with the National Experts have helped to identify the relevant driving forces in each Member State. The information on relevant driving forces is presented with the river summaries in Chapter 5.

Table 3.3 Treaty/convention-matrix for EC Member States

Member State	EU	PARCOM	RHINE	NSMC's	HELCOM	BARCELONA
Austria	▦					
Belgium	▦	▦		▦		
Denmark	▦	▦		▦	▦	
Finland	▦				▦	
France	▦	▦	▦	▦		▦
Germany	▦	▦	▦	▦	▦	
Greece	▦					▦
Ireland	▦	▦				
Italy	▦					▦
Luxembourg	▦		▦			
Netherlands	▦	▦	▦	▦		
Portugal	▦	▦				
Spain	▦	▦				▦
Sweden	▦	▦		▦	▦	
United Kingdom	▦	▦		▦		
European Community		▦	▦	▦	▦	▦

Key for Table 3.3:

PARCOM Convention for the prevention of marine pollution from land-based sources (1974)
This so called Paris Convention is merged with the Oslo Convention giving the OSPAR Convention (Convention for the protection of the marine environment in the north east part of the Atlantic Ocean; Paris, 1992)

RHINE Convention for the protection of the Rhine against pollution (1963); Rhine Chemical Treaty (1976); Rhine Action Programme (1987)

NSMC's Ministerial Declarations on the protection the North Sea against pollution (1984, 1987, 1990, 1995)

HELCOM Baltic Sea Convention to protect the Baltic Sea against pollution (1974)

BARCELONA Convention for the protection of the Mediterranean against pollution (1976) and its Protocols

4 Analysis of Member State Strategies

4.1 General approaches for water quality management

In general, two different approaches to pollution control for surface waters can be recognized (Source GEN 031):

- the emission-based approach
- the water quality-based approach

In a pure emission-based (also called "technology based") approach, it is essential that the discharge limits do not depend on the change in quality of the receiving water [source GEN 031]. This requirement is generally referred to as necessitating BAT (Best Available Techniques). The pollution reduction required is based on general (toxic) properties of the chemicals and properties like persistence and bioaccumulation potential (i.e. the approach adopted by the majority of Member States to control emissions of List I substances).

In a pure water quality based approach, the resulting site-specific water quality (or ecological functioning of the receiving water body) is the focal point for the setting of discharge licenses. Prevention of pollution does not necessarily require BAT if integrity of the water quality and/or ecological functioning of the receiving water body can be warranted by other means. However, in some cases more stringent requirements than provided by BAT may be needed for this purpose. In Table 4.1 the most important differences between both approaches are presented.

The approach required from Article 7 of Directive 76/464/EEC is the water quality approach. In the complete implementation of Article 7, Member States would need to quantify loads from industrial, municipal and diffuse sources, and have a system to "derive" a balanced consented emission for these types of discharges as a function of the quality objective of the receiving aquatic environment. The influence of natural background concentrations where relevant would also need to be included. All of the List II substances would have to be accounted for.

Table 4.1 Differences in the emission-based and the water-quality based approach (from GEN 031)

	Emission-based	Water quality-based
Effluent limits	No site-specific load	Site-specific concentrations
Required treatment techniques	Based on intrinsic (toxic) properties of chemicals in effluent; or technology based	Based on water quality criteria or preventing toxic effects in the effluent receiving water
Data requirements	Basic chemical and ecotoxicological data	Basic chemical and ecotoxicological data. Physical, chemical and biological characteristics for the receiving water and the fate of discharged chemicals
Monitoring	Effluent	Receiving water
Competition	Equality for the law	Inequality
Practice	May tend to worst case approach in general, but may underestimate effects of discharges in specific situations	May tend to dilution as a solution in general, but stricter standards are possible when effects are intolerable in specific situations

4.2 Analysis of Member State strategies

Considering the results of the meeting of national experts on 14 and 15 July 1993, but also taking into consideration the results of communication with national experts in the frame of this study, a number of trends can be given and a number of conclusions can be drawn:

1 Next to the "substance by substance approach" (as required under Directive 76/464/-EEC), the "sector by sector approach" (resulting in Best Available Techniques (BAT) for industrial sectors) has gained in importance as a complementary approach to control pollution of the aquatic environment. In addition, the latest trend comprises the application of biological testing in both waste waters and surface waters to identify specific deleterious substances e.g. to be included in programmes.

2 Many Member States followed an "emission-based approach" for List II substances rather than the required environmental quality objective approach (although after application of BAT additional measures exceeding BAT can become compulsory when environmental quality objectives are not met).

3 In many cases attention was not specifically given to individual (List II) substances. In discharge licences composite parameters can partly cover the lack of knowledge on the possible presence of "unrecognized" (List II) substances. Examples of composite parameters are: summative parameters such as AOX or EOX "summing" the organohalogen portion of many different halogenated organic substances; or group parameters such as COD "adding" together the comparable properties such as "chemical oxygen consumption" of the majority of substances.

4 International agreements prompted further action on pollution reduction programmes which supported considerably the goals expressed in Directive 76/464/EEC. (International agreements referred to are e.g. the Convention for the prevention of marine pollution from land-based sources, Convention for the protection of the Rhine against pollution, the Rhine chemical treaty, the Rhine Action Programme, ministerial declarations on the protection of the North Sea against pollution, the Convention to protect the Baltic Sea against pollution and the Convention for the protection of the Mediterranean against pollution).

5 From a historic point of view it can be concluded that controlling pollution of the aquatic environment started with abatement measures by industry. In so doing, the discharge of municipal waste water was recognized at a later stage. The recognition of the relevance of diffuse sources is relatively young. Moreover, point source discharges (industry and municipality) can easily be controlled e.g. with prior authorization. The discharger (e.g. industry) is directly responsible for his discharge; the municipality can influence the municipal discharge to a large extent.

6 The control of municipal discharges has improved with time. At the community level the urban waste water Directive plays an important role in harmonizing the control of the discharge via this "sector".

7 Diffuse discharges are more difficult to control than point source discharges. They require a set of measures to be taken by a diverse group of "sources". Furthermore diffuse discharges can not be as easily or directly measured as industrial and municipal discharges. Model calculations, often asking a vast amount of input data, are required. In many cases, these models are under development or simply do not exist.

8 With the increased recognition of the importance of diffuse sources, specific programmes have been developed e.g. for the control of nutrients (nitrates Directive 91/676/EEC) and pesticides (pesticides Directive 91/414/EEC).

9 Most Member States have adopted water quality objectives set in several Community Directives. In addition, national water quality objectives have been and/or are (being) developed by Member States, taking into account the local needs and situations of the aquatic environment. In the framework of the Rhine Action Programme, indicative water quality objectives for priority substances (known as 'reference values') have been developed for the international catchment area of the Rhine. For further substances considered to pose a risk for the Rhine, indicative water quality objectives are being developed.

10 Full pollution control of the aquatic environment for <u>all</u> List II substances (about 50,000 are used for technical purposes in the Community (Source: EC 028)) cannot be achieved on an individual substance approach as the technical ability to analyze all the substances does not exist.

11 A complete implementation of Article 7 would comprise control of industrial, municipal and diffuse sources, including knowledge on how to "derive" a balanced consented emission (for industrial, municipal and diffuse discharges) as a function of the quality objective of the receiving aquatic environment. The influence of natural background concentrations where relevant must also be included. Considering that the means of quantifying diffuse discharges are still limited, a coherent procedure of quantifying all discharges into a aquatic system and deriving the consented discharge for point and diffuse discharges into the aquatic system is not (yet) feasible from a technical point of view. Despite these limitations, for international rivers, Member States must often work together in order to derive a balanced consented emission which is valid for the whole catchment.

12 In cases where the "emission approach" is followed, practice shows that BAT for point sources are applied and Best Environmental Practice (BEP) for diffuse sources are being developed. If the receiving waters do not meet the environmental quality objectives after completion of BAT and BEP, measures exceeding BAT and BEP are considered. The check whether environmental quality objectives are met is based on the results of monitoring programmes of the aquatic systems. Substances are monitored which are considered relevant for the aquatic system, taking into account the availability of analytical methods having sufficient low detection limits and the costs for monitoring. In cases where the environmental quality objectives approach is followed, consented values are directly derived from operational environmental quality standards.

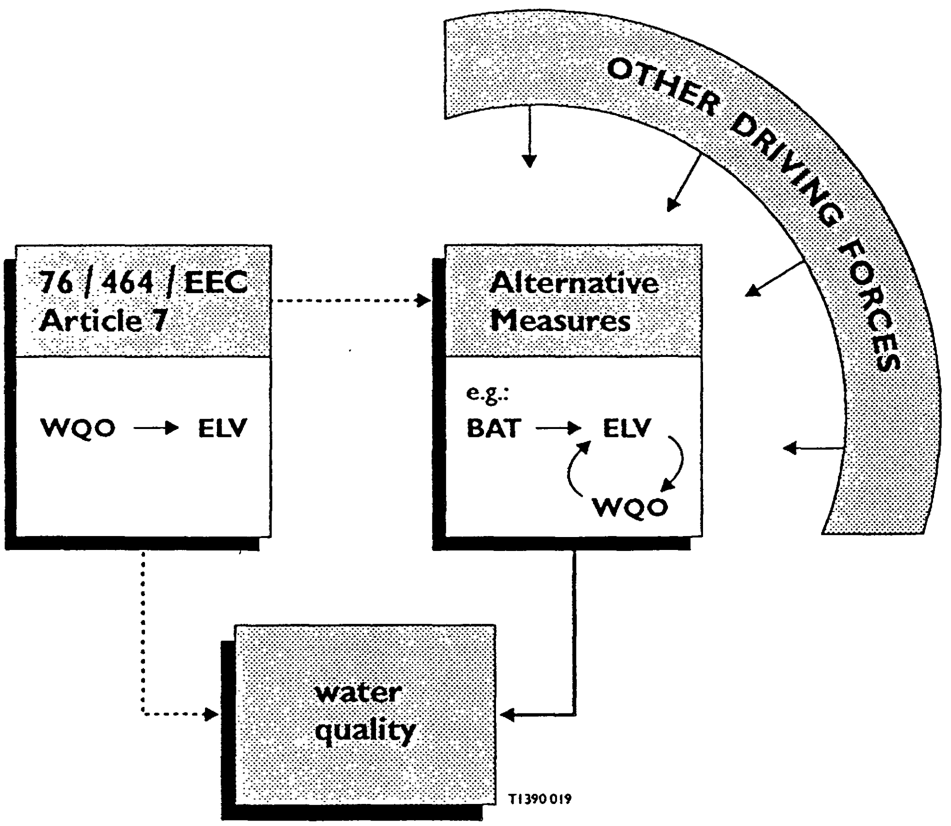

Figure 4.1 Relationship between Directive 76/464/EEC (Article 7), Alternative Measures, and surface water quality

These above items point to the overall conclusion that none of the Member States is completely in accordance with the requirements of Article 7 of Directive 76/464/EEC regarding pollution control and reduction measures of List II substances. The United Kingdom follows the principles of a water quality approach as specified in Article 7. However, the UK, as well as the other Member States, have technical difficulties in complete implementation, namely:

- ELV's are not defined for all List II substances on an individual substance basis. This in fact is not realistic to do, since the technical ability to analyze all the substances does not exist.
- It is not feasible to quantify all industrial, municipal and diffuse loads as necessary to derive a balanced consented emission (for all types of discharges) as a function of the quality objective of the receiving aquatic environment. The means of quantifying diffuse discharges are especially limited.

Faced with these issues among others, Member States have instead made their own interpretation of Article 7 of the Directive and developed what we now refer to as 'Alternative Measures' for control of List II substances. These Alternative Measures have been influenced by Article 7 and Article 3 and 5 governing control of List I substances emissions, as well as other (inter)national Driving Forces (e.g. PARCOM, OSPAR, HELCOM, Barcelona Convention, North Sea Ministers Conferences, International Rhine Commission, etc.). In most cases, it is the 'Alternative Measures' which have had the most direct impact on the water quality of the surface waters concerning List II substances in the Member States. The Alternative Measures are in line with local, national and international requirements and do not necessarily consider individual List II substances specifically but rather consider them as part of a general policy and procedure for water pollution control. This can be illustrated schematically, as shown in Figure 4.1.

In the following chapter, an analysis of the selected surface waters in the Community is made against the developed 'Alternative Measures'.

5 Analysis of the selected surface waters in the Community

A summary analysis of each of the selected surface waters in the Community is made. The analysis focuses on the following collected information:

- Summary of Transposition of the Directive by the relevant Member State(s);
- Working Practices in the Member State(s);
- discharges of the selected substances within the selected river basin;
- water quality of the river (annual average concentrations) over the period 1980-1993;
- other driving forces for changes in emissions and water quality (e.g. national and international policies). Driving forces are listed chronologically. For multiple driving forces in the same year, international directives are listed first.

Each analysis ends with a conclusion as to the impact of the developed Alternative Measures concerning the water quality and the discharges. Each analysis also includes a figure summarizing all available information regarding the substances chromium(tot) and Phosphorous(tot). These two substances have been selected based on data availability, and representativeness of two important categories of List II substances (namely, heavy metals and nutrients). The selection of these two substances was made in consultation with the representative of the European Commission.

The figures for each river summarize the 4 components of the study:
'Summary' regarding Directive 76/464/EEC → other driving forces → waste load discharges → water quality.

The 'Summary' regarding Directive 76/464/EEC, for the purpose of this study comprises the following aspects:

- Summary of Transposition:
  1) Is the Directive incorporated into national legislation?

- Working Practice:
  1) Is there a Programme for List II substances; where 'program' is defined as:
     - having a general (national) policy document and/or adopting an international program (e.g. Rhine Action Program); and
     - having an authorization instrument for discharges
  2) Are there water quality objectives (EQOs) defined for general or specific functions surface water (relative to the 17 substances that have been chosen for this study). Note: Other objectives may be available but were not evaluated in this study. Also, Water Quality Objectives in some cases are based on other EC Directives for specific water uses (e.g. fisheries, drinking water, water abstraction), and are not necessarily EQOs/EQSs as meant in Article 7, where all waters should have a quality objective.

The three aspects of transposition, programmes, and WQOs are assessed separately for each River basin, and are summarized in the River Basin 'circles' with either a check (V) or a minus (-) indicating whether they do/do not exist. These three aspects are all important components of Article 7 of Directive 76/464/EEC.

The rivers are presented in alphabetical order in the following sections. The complete data bases for each river are given in Appendix D-1 and D-2 (dischargers) and Appendix E (water quality data), both in Volume II.

It has been already concluded (in Chapter 4) that none of the Member States are in complete accordance (have completely implemented) Directive 76/464/EEC with respect to List II substances. Instead, all of the Member States have made their own interpretations of the Directive, and developed 'Alternative Measures' for water pollution management of List II substances. Directive 76/464/EEC, together with other (inter)national Driving Forces has in all cases influenced the 'Alternative Measures'. In this chapter, all available information about each of the river basins is summarized, and a conclusion regarding the effectiveness of the Alternative Measures on the quality of the surface waters is made.

5.1 Axios River

Country: Greece

Water Quality Data: Some water quality data for TotP have been provided by the National Expert for the years 1980-1992, for the monitoring stations 1020_01 (Axiopolous), 1020_02 (Prochama) and 1020_03 (Chalastra). These data show a similar trend of increasing TotP concentrations at all 3 stations. Data for Total(inorganic) N also show constant or increasing concentrations. There were no data found or made available for the other List II substances.

Loads: No information on loads from individual dischargers, or other aggregated loads of List II substances was made available.

Summary of Transposition:

1) Transposition of 76/464/EEC has been carried out by the following legislative instruments:
   - Presidential Decree No 1180 of 1981
   - Health Decree Elb/221/1965 (remains in force until full implementation of Law N 1650 of 1986)
   - Act on the Protection of the Environment No. 1650 of 1986
   - Ministerial Decision No 144 of 1987
   - Ministerial Decision No 18186/271 of 1988

Working Practice:

1) Greece laid down specific conditions applicable to the discharge of List II substances. To implement there provisions, administrative approaches are being followed by all prefectures in Greece. A substantial number of prefectorial decisions have been adopted comprising emission limit values for List II substances. Many decisions also lay down quality standards for receiving waters.
2) Water quality objectives have been set in Greece, and are available for TotP, arsenic, chromium, copper, lead and zinc as given in Appendix F.

Driving Forces:

- 76/464/EEC (Brussels, 1976)
- Barcelona Convention (Barcelona, 1976) and its protocols
- National Legislation (Basic Law on the Environment N 1650 of 1986)

Overall Summary:

The available information on water quality (N and P) shows increasing nutrient concentrations, and there are no data available on discharges. The 'Alternative Measures' to Directive 76/464/EEC have not lead to a quality improvement of the Axios River.

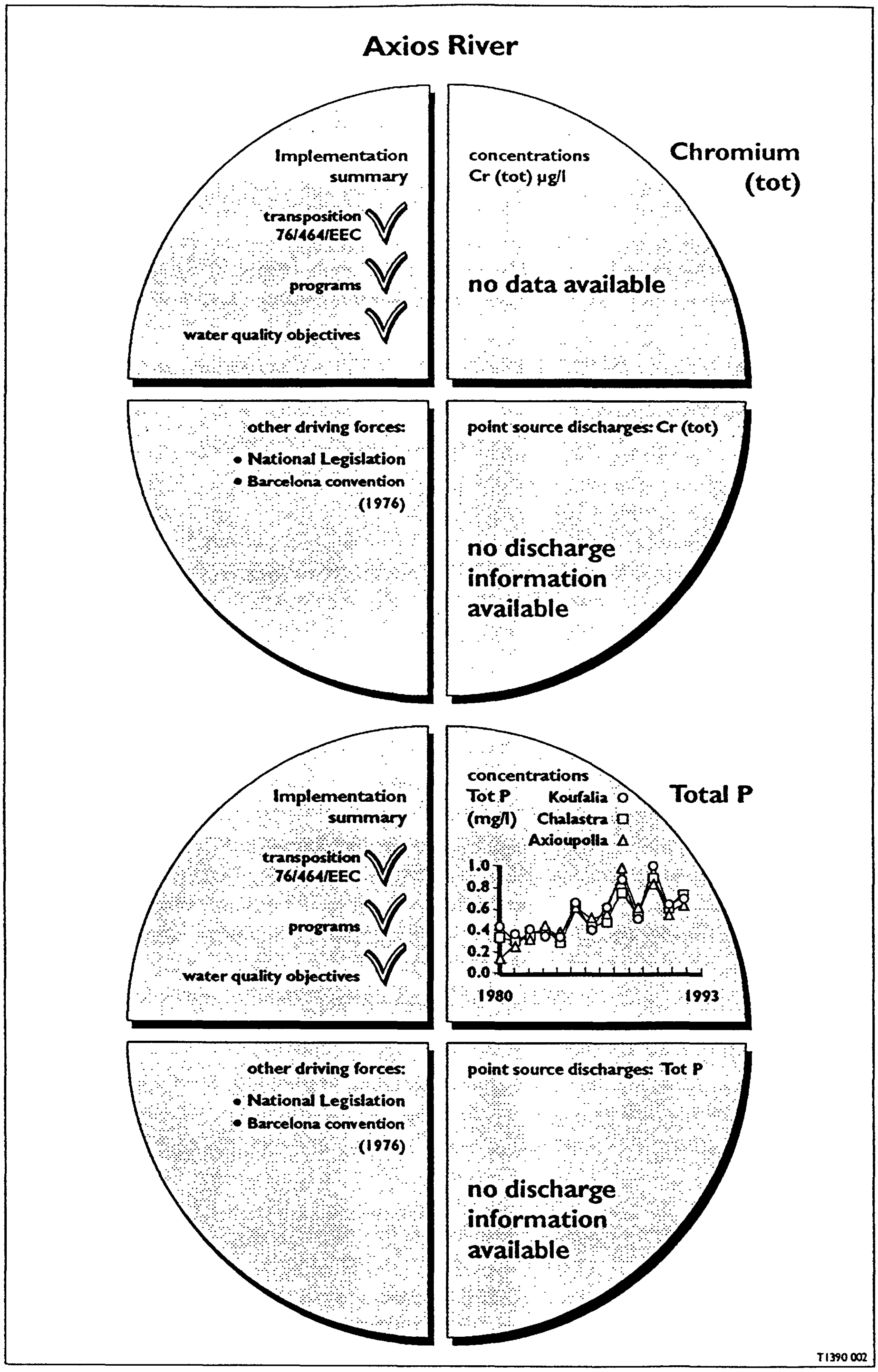

Figure 5.1 Summary of impact analysis of Directive 76/464/EEC for the Axios River

5.2 Ebro River

Country: Spain

Water Quality Data: Data concerning Arsenic and the heavy metals Zn, Cu, Cr, Pb and arsenic are available for the Ebro (monitoring station Asco) for the period 1981-1993. Most of these data are below detection level. For zinc, copper and lead, data for the last 3 years are fairly constant. It is not possible to determine a trend.
Data for TotN are available for 1980-1982; an increasing trend is noticed over these three years.

Loads: No information on industrial loads from individual dischargers of List II substances is available.

Summary of Transposition:

1) Transposition of 76/464/EEC has been carried out by the following legislative instruments:
   - Royal Decree No 849 of 1986 (Articles 245 to 274)
   - Order of 12-11-1987
   - Order of 28-6-1991

Working Practice:

1) Implementation of the legislation is still in progress with major programmes of work still being developed or being carried out. Discharge consents will be issued by the Drainage Basins on a case by case basis, taking into account planned reduction programmes.
2) No information was made available on water quality objectives or standards.

Driving Forces:

- 76/464/EEC (Brussels, 1976)
- Barcelona Convention (Barcelona, 1976) and its protocols
- National Legislation (Water Act of 1985)

Overall Summary:

The available information shows no clear trends for the measured water quality parameters, except for TotN, where concentrations are increasing. No data on discharges are available. It is not possible to make a conclusion as to the impact of the Alternative Measures on the quality of the Ebro River.

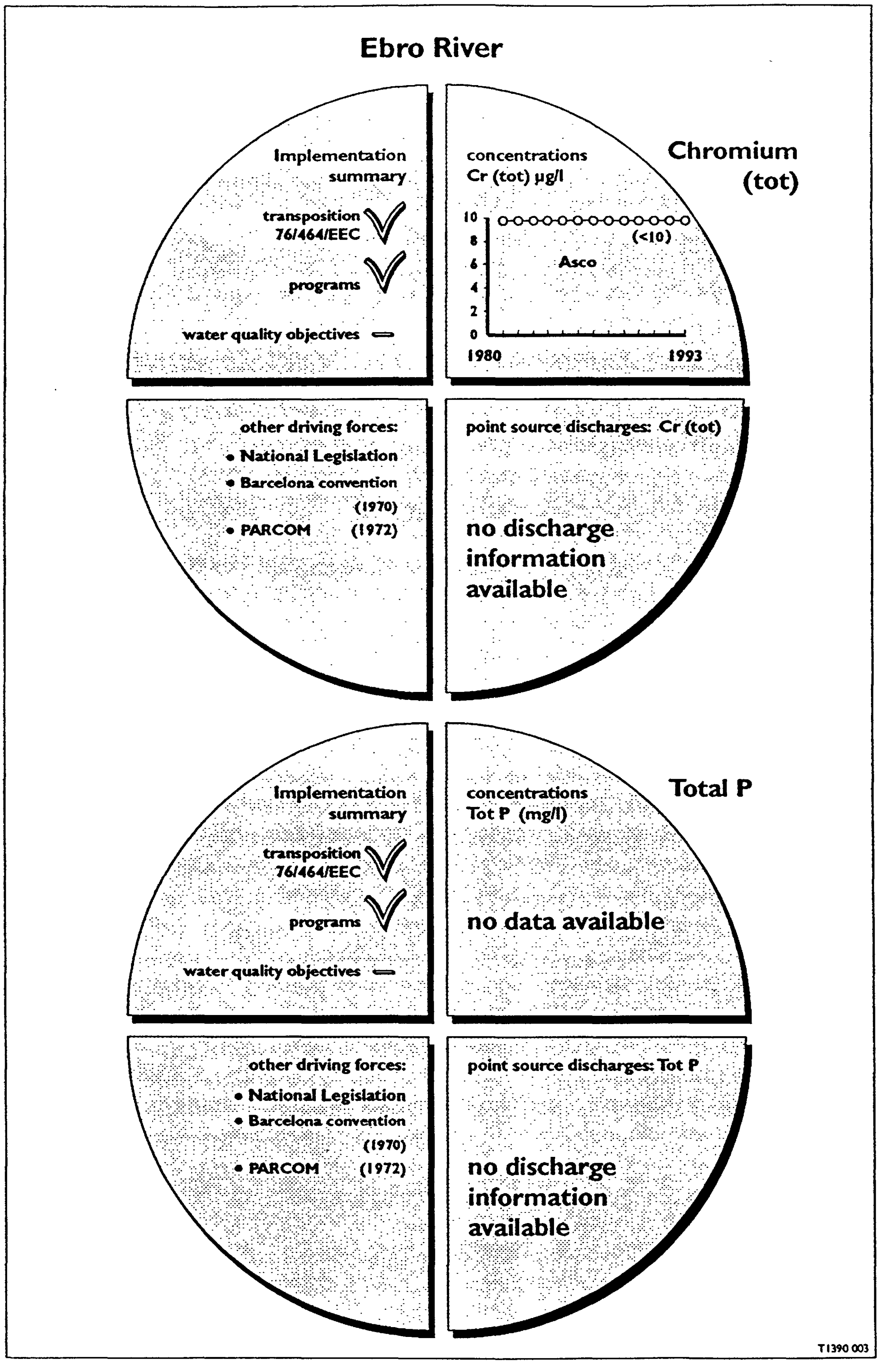

Figure 5.2 Summary of impact analysis of Directive 76/464/EEC for the Ebro River

5.3 Loire River

Country: France

Water Quality Data: Water quality data for the Loire River are available for atrazine (1991-1993), chromium (1980-1987, excluding 1985) and TotalP (1982-1992).

The three years of data for atrazine show a slight increase in the concentrations. Data for chromium show a decrease in concentration, and data for TotP show an increase in concentration, namely in the last years (1989-92).

Loads: There is a lot of information made available concerning industrial discharges of List II substances in the Loire River catchment.

15 different dischargers of chromium are identified; data are available primarily for the years 1988-1992, though not all years are reported for all dischargers. The available data do not show any clear trend in chromium discharges in the Loire River basin. In some cases discharges seem to decrease, though in other the amount discharged actually increase over the reported time period.

6 different dischargers of totP are identified. For most of these dischargers only 1-2 years of data are available. For one discharger, 3 years of data are available. Based on the available data, it is not possible to see any clear trend in totP discharges in the Loire River basin.

For other substances for which data are available, there is no overall trend in the changes in discharges over the period 1980-1992 which can be seen. For some dischargers, a clear decrease over the years may be seen, while in a number of cases, the loads increase). For most of the reported discharges, no conclusions on trends can be made based on the limited number of years reported. For many of the selected substances, there are no data on discharges.

Summary of Transposition:

1) Directive 76/464/EEC has been transposed into French legislation by a number of ministerial decrees and circulars adopted in the framework of the law of 19 July 1976 on classified installations.

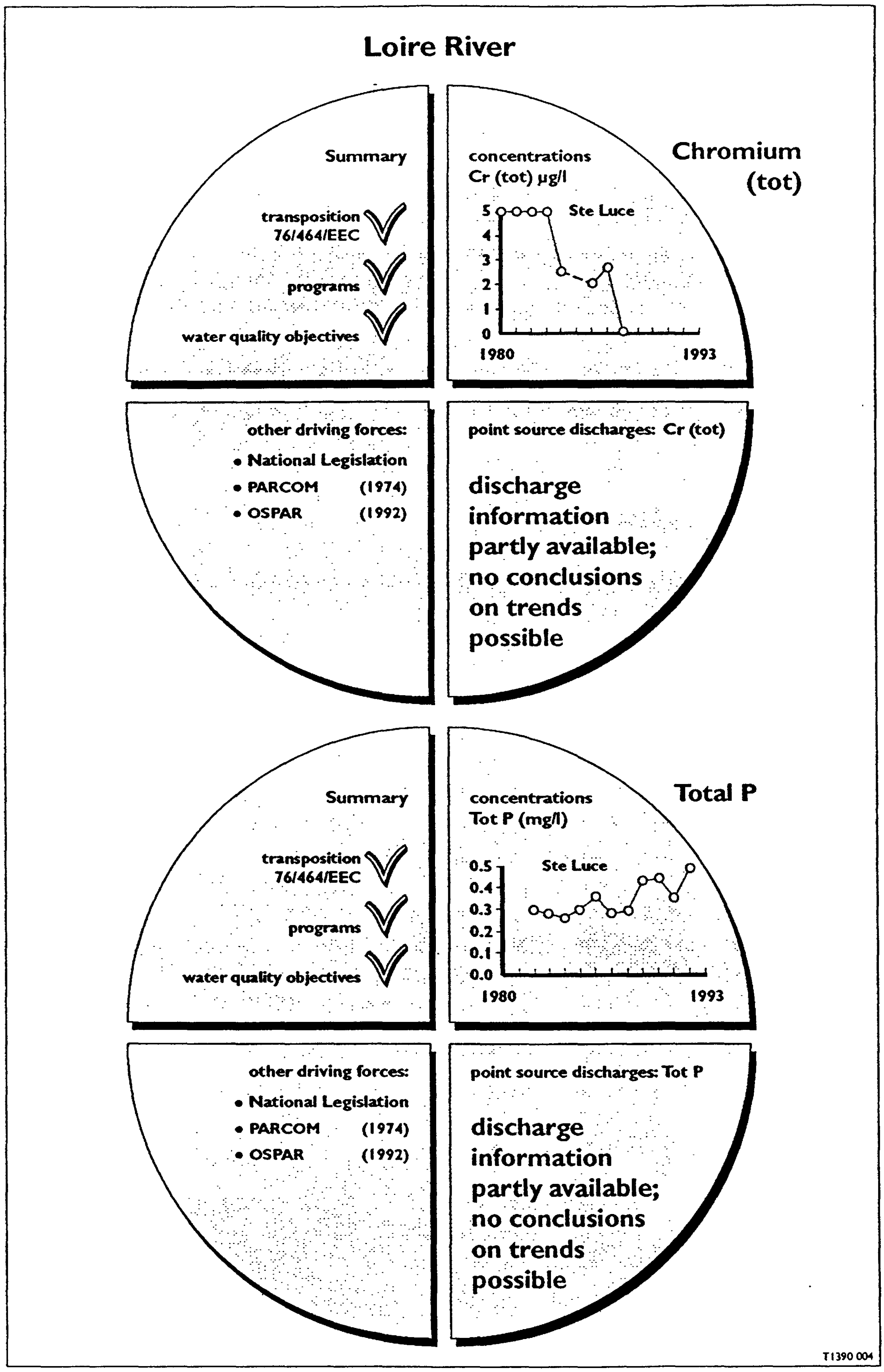

Figure 5.3 Summary of impact analysis of Directive 76/464/EEC for the Loire River

Working Practice:

1) In 1993, France adopted a general decree applicable to class A installations (see Appendix B for further description). This general decree also incorporates some limit values for list II substances.
Article 22 of the general decree stipulates that quality objectives of receiving water courses must be considered when setting limit values for discharges.

2) France has developed a set of quality objectives, for most of the selected List II substances, as given in Appendix F. For each receiving water, quality objectives are set by prefectorial decree, taking into account the functions and targets of the local receiving water.

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National Legislation (Act of July 1976 on classified installations).
- OSPAR (1992)

Overall Summary:

Systematic monitoring of discharges of List II substances started only recently (1991). Thus, discharge information is partly available, but no conclusion on trends is possible. For surface water monitoring, some data are available in the 1980's (chromium, TotP), though no consistent trends are seen.

At present, it is not possible to make a conclusion as to the impact of the Alternative Measures on the quality of the Loire River. With continuation of the present monitoring system, there will be sufficient data to make a better analysis in several years time.

5.4 Mersey River

Country: UK

Water Quality Data: Data concerning the heavy metals Zn, Cu, Cr, and Pb as well as Total N are available for the Mersey (monitoring station Howley Weir) for the period 1981-1993.

Information from the National Authorities (source UK813) indicates that Total P has not been analyzed on a regular basis, due to perceived difficulties in analyzing for true TotalP, and the fact that the soluble ortho-Phosphate is the dominant form (thus O-PO4 is the form reported by the National Authority).

Data for all the heavy metals show a decreasing concentration over the years. Data for Total N show a fairly constant concentration for 1980-1984, with higher levels from 1985-1993.

Loads: Information on industrial loads from individual discharges of List II substances is available on the Public Register held in Regional Offices, but has not been compiled nationally (and thus is not present here). Only one individual discharger (of 1,1,1-trichloroethane) is identified for the river basin.
In addition, the direct plus riverine inputs to Paris Convention waters by UK rivers (including the Mersey) are available over the years 1987-1992 for copper, lead, zinc, TotP and TotN (table D.5 in Appendix D-2). Inputs of copper and lead decrease over the four years. No clear trend is visible for the other substances. Information from the National Authority (source UK813) also confirms that no clear concentration trends are visible for nutrients, nor would they be expected from knowledge of changes in inputs to the catchment. (Note: inputs of TotP are not consistent with information on PO4-P given in the same reference.)

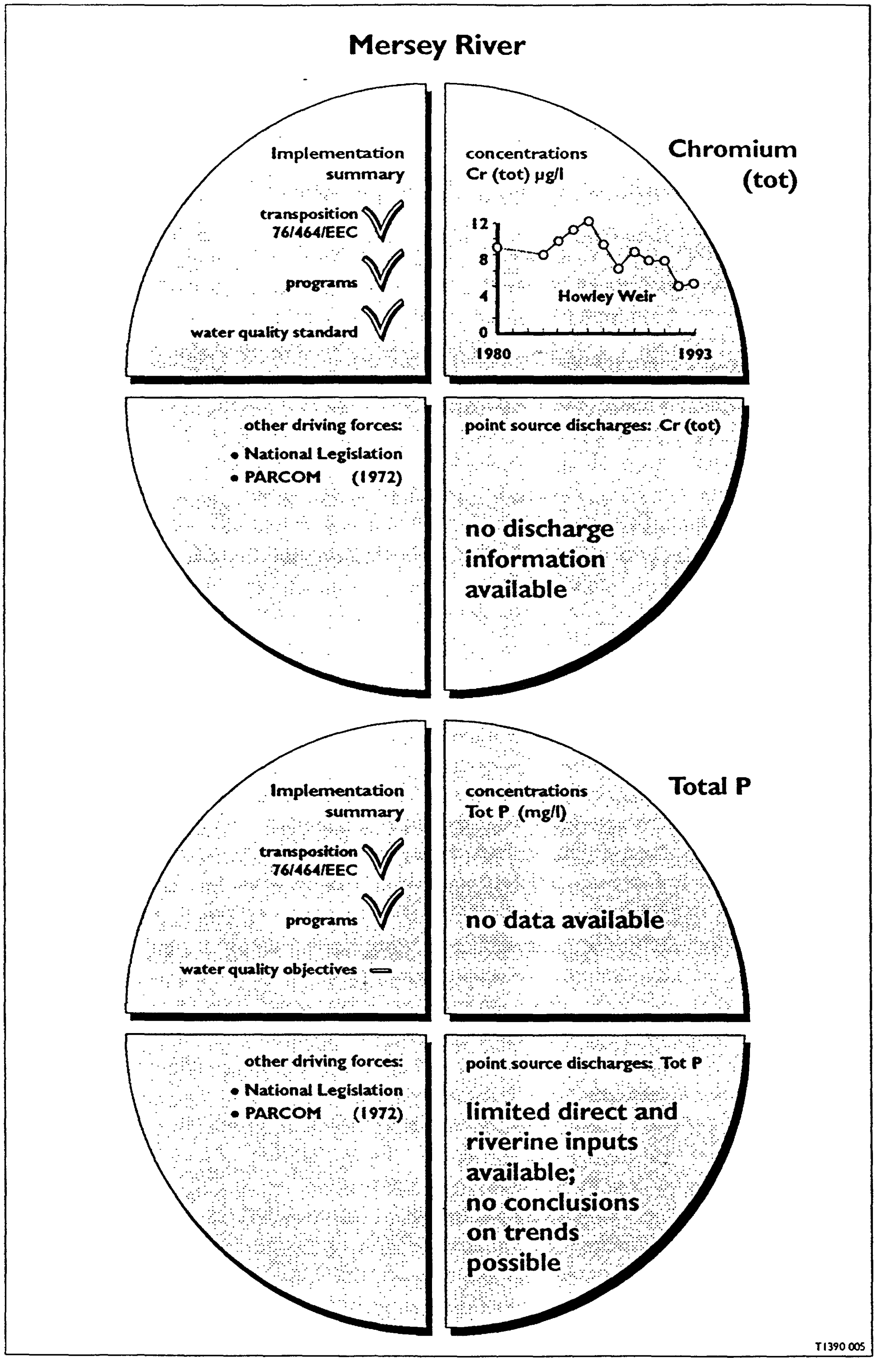

Figure 5.4 Summary of impact analysis of Directive 76/464/EEC for the Mersey River

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out by the following legislative instruments:
- Surface Water (Dangerous Substances) (Classification) Regulations 1989 SI 1989/2286 discharges to water
- Surface waters (Dangerous Substances) (Classification) Regulations 1992 SI 1992-337 discharges to water
- Trade effluents (Prescribed Processes and Substances) Regulations 1989 SI 1989/1156 discharges to sewer
- Trade effluents (Prescribed Processes and Substances) Regulations 1992 SI 1992/339 discharges to sewer
- Environmental Protection (Prescribed Processes and Substances) Regulations 1991 SI 1991/472 IPC processes and substances
- Environmental Protection (Prescribed Processes and Substances) (Amendment) Regulations:
  SI 836 (1991), SI 614 (1992), SI 1749 (1993), SI 2405 (1993), SI 1271 (1994), SI 1329 (1994), SI 3247 (1995)

Working Practice:

1) Programs: The discharge of dangerous substances into surface waters is prohibited except when authorised by a consent under the Water Resources Act 1991, an authorization under the Environmental Protection Act 1990. Limits are set in the consents and authorizations for the discharge of List II substances. In the UK, discharge limits are determined by Environmental Quality Standards (EQS) which apply to the receiving water. Water quality objectives are assigned to the receiving water depending on the use of the water. EQS are then applied to the water to meet those objectives. Discharge limits are set at a level so that the EQS can be achieved in the receiving water. Prescribed processes and prescribed substances are controlled under the Environmental Protection Act, and the discharger may be required to adopt Best Available Techniques Not Entailing Excessive Costs (BATNEEC) and, in the case of release to more than one environmental medium, Best Practical Environmental Option (BPEO). All other processes and substances are controlled by consents issued under the Water Resources Act of 1991. The consents and authorizations are valid indefinitely, but are reviewed periodically.

2) Water quality standards have been adopted for several list II substances (arsenic, chromium, copper, lead and zinc). In addition, there are proposed water quality standards for endosulfan and atrazine (see Appendix F).

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National Legislation (Environmental Protection Act, 1990; Water Resources Act, 1991; Water Industry Act, 1991).
- OSPAR (1992)

Overall Summary:

The water quality at the chosen station shows a trend of decreasing concentrations for the selected List II heavy metals: copper, lead, zinc and chromium. However, concentrations of TotN have increased.

The information available on direct and riverine inputs suggests that discharges for copper and lead have decreased. No clear trends can be seen for zinc, TotN and TotP.

Thus, an improvement in the quality of the Mersey River regarding certain substances can be seen, as both concentrations and discharges of copper and lead have decreased. One can conclude that the Alternative Measures adopted in the UK have contributed to this trend.

5.5 Meuse River

Countries: France, Belgium, The Netherlands

Water Quality Data: Water quality data from three monitoring stations are presented: Tailfer (Belgium), Eijsden (NL at the NL/Belgium border), and Keisersveer (NL). For all three stations, data are available for Total N and Total P, as well as heavy metals, arsenic, and PAHs for most years.

The data show a clear decreasing trend in concentration for chromium as well as for the other heavy metals, arsenic and PAH. TotP concentrations show a decreasing trend at Keizersveer, and a constant or slightly increasing trend at Tailfer and Eijsden. Total N concentrations are constant to slightly increasing.

Loads: No detailed information on actual industrial loads from individual dischargers is available. Only 3 individual dischargers (one of chromium and two of zinc) are identified for the river basin. For two of the discharges, only one year (1992) of discharge data is reported. For the third discharger, 3 years of data are reported, and the discharge amounts are constant. No conclusion on discharge trends in the Meuse River is possible.

In addition, the discharge of PAH in the Netherlands is summarized for 1985, and 1989-95 (table D.9 in Appendix D-2). The discharge is lower in 1995 compared to 1985.

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out by the following legislative instruments:
France: Act of July 1976 on classified installations, 1976.
Belgium: legislation for the protection of surface water, 1971;
Flemish region: decree of 28 June 1985 concerning environmental licensing, modified by decrees of 07 February 1990, 02 December 1990 and 21 December 1990; decree of 05 April 1995 giving general requirements concerning environmental policy, expanded by decree of 19 April 1995 concerning environmental auditing
Netherlands: Pollution of Surface Waters Act. 1970.

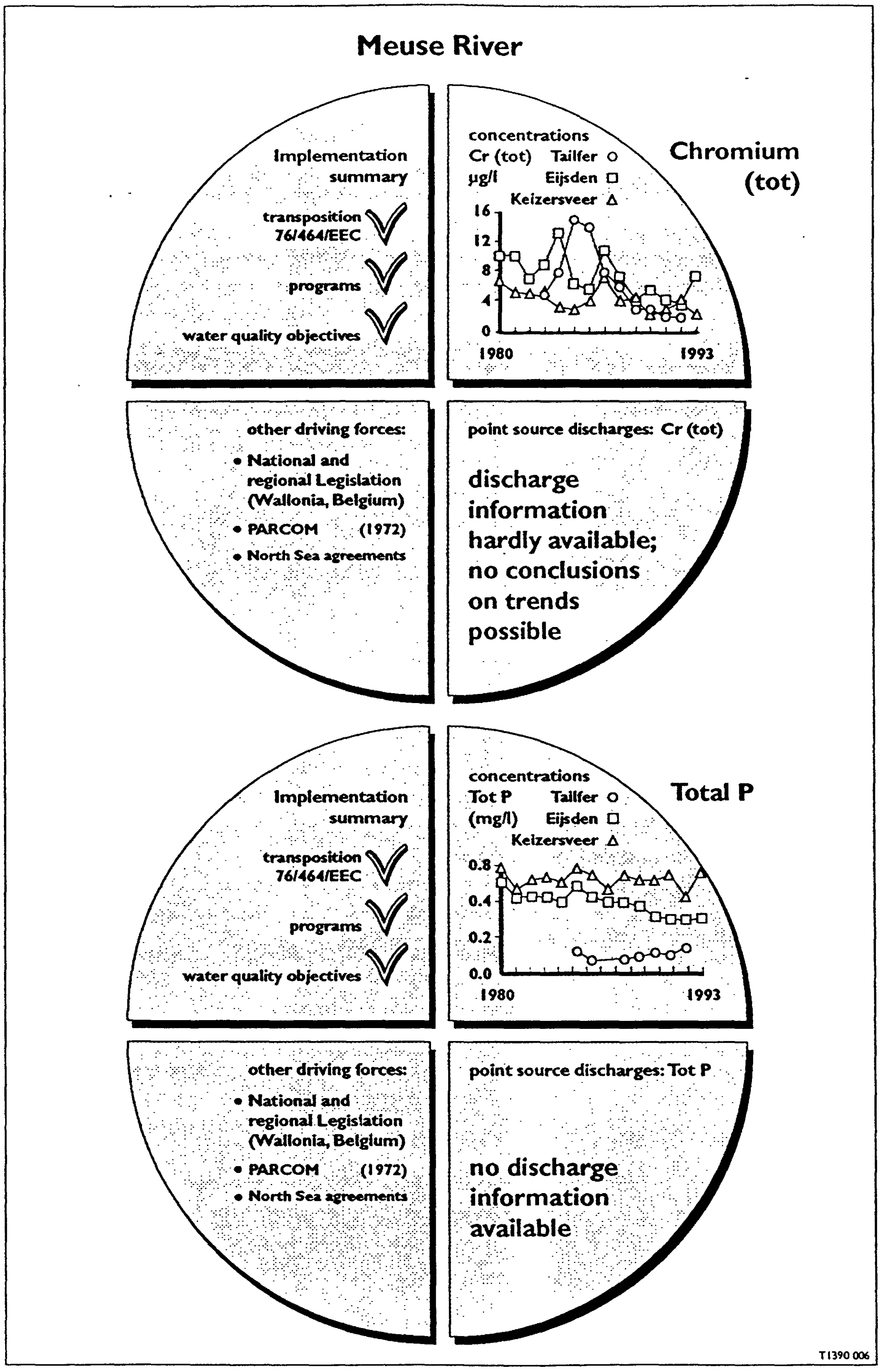

Figure 5.5 Summary of impact analysis of Directive 76/464/EEC for the Meuse River

Working Practice:

1) Non specific programmes regarding List II substances exists for France, Belgium (Walloon Region) and the Netherlands. In addition, the Netherlands adopted a policy on water management (laid down in an official policy document). Finally, all 3 member states committed themselves to all actions listed in the Ministerial North Sea Agreements (chromium and TotP are specially addressed).

2) Water quality objectives are adopted in France, Belgium and the Netherlands: France has developed a set of quality objectives for most of the selected List II substances; Belgium has water quality objectives for nutrients, arsenic, heavy metals, and Total PAH; The Netherlands has water quality targets and standards for nutrients (TotN and TotP), arsenic, heavy metals (Cr, Cu, Pb, and Zn), parathion, atrazine and 3,4-benzo(a)pyrene (see Appendix F).

Driving Forces:

- National legislation
  (France: Act of July 1976 on classified installations, 1976;
  Belgium: legislation for the protection of surface waters, 1971;
  Flemish region: decree of 28 June 1985 concerning environmental licensing, amended by decrees of 07 February 1990, 02 December 1990 and 21 December 1990; decree of 05 April 1995 giving general requirements concerning environmental policy, expanded by decree of 19 April 1995 concerning environmental auditing
  Netherlands: Pollution of Surface Waters Act, 1970;
- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- Ministerial Declarations on the protection of the North Sea (1984, 1987, 1990, 1995)
- OSPAR (1992)

Overall Summary:

Fairly complete water quality data are available at the three stations selected for water quality measurements. There is a visible trend of improving water quality (decreasing concentrations) for many substances, such as heavy metals, arsenic, trichloroethane, and PAHs. The concentrations of TotN and Total P show a constant or slightly increasing trend (though concentrations of TotP are decreasing in the Netherlands).

From the information available on individual industrial loads, no conclusions on trends are possible. Additional information indicates that the discharges of As, Cr, Cu, Pb, TotP, TotN, and TCA to all surface waters in Belgium have decreased. Also, the discharge of PAHs has decreased in the Netherlands.

Thus, concentrations of arsenic, chromium, copper, lead and TotP decrease, while the discharge of these substances (to all surface waters in Belgium) also decreases. If it is assumed that these are linked, one can conclude that a the developed Alternative Measures have contributed to this trend.

5.6 Moselle River

Country: Luxembourg (Note: The Moselle is a tributary of the Rhine River, which is discussed in Section 5.8).

Water Quality Data: Water quality data for chromium and other heavy metals are available for the years 1982-1991. In addition, data for TotP are available for the period 1982-1992. Data on some organic substances are available for the year 1992 (from station Palzem).

Data for the heavy metals do not show a clear trend over the years, though it seems that concentrations may be decreasing. Some high concentrations are measured in individual years (zinc in 1991, copper 1988, lead in 1989). TotP shows a constant or increasing concentration trend.

Loads: No information on industrial loads from individual dischargers of List II substances is available.

However, discharge information of certain List II substances (Zn, Cu, Cr, Pb, TotN and TotP) in Luxembourg is summarized for the year 1985 in Table D.10, Appendix D-2; As there is only one year of data, no conclusion on trends is possible.

Summary of Transposition:

1) Transposition implies that regulations adopting and implementing Directive 76/464/EEC are subject to the 1971 framework legislation.

Working Practice:

1) Luxembourg is committed to the Rhine Action Programme. This implies i.a. the application of Best Available Techniques for industrial sectors.
2) In the framework of the Rhine Action Program indicative quality objectives are set including those for a number of List II substances (TotN, TotP, chromium, copper, lead and zinc - see Appendix F). In case the indicative quality objectives are not met, additional measures exceeding BAT should be taken.

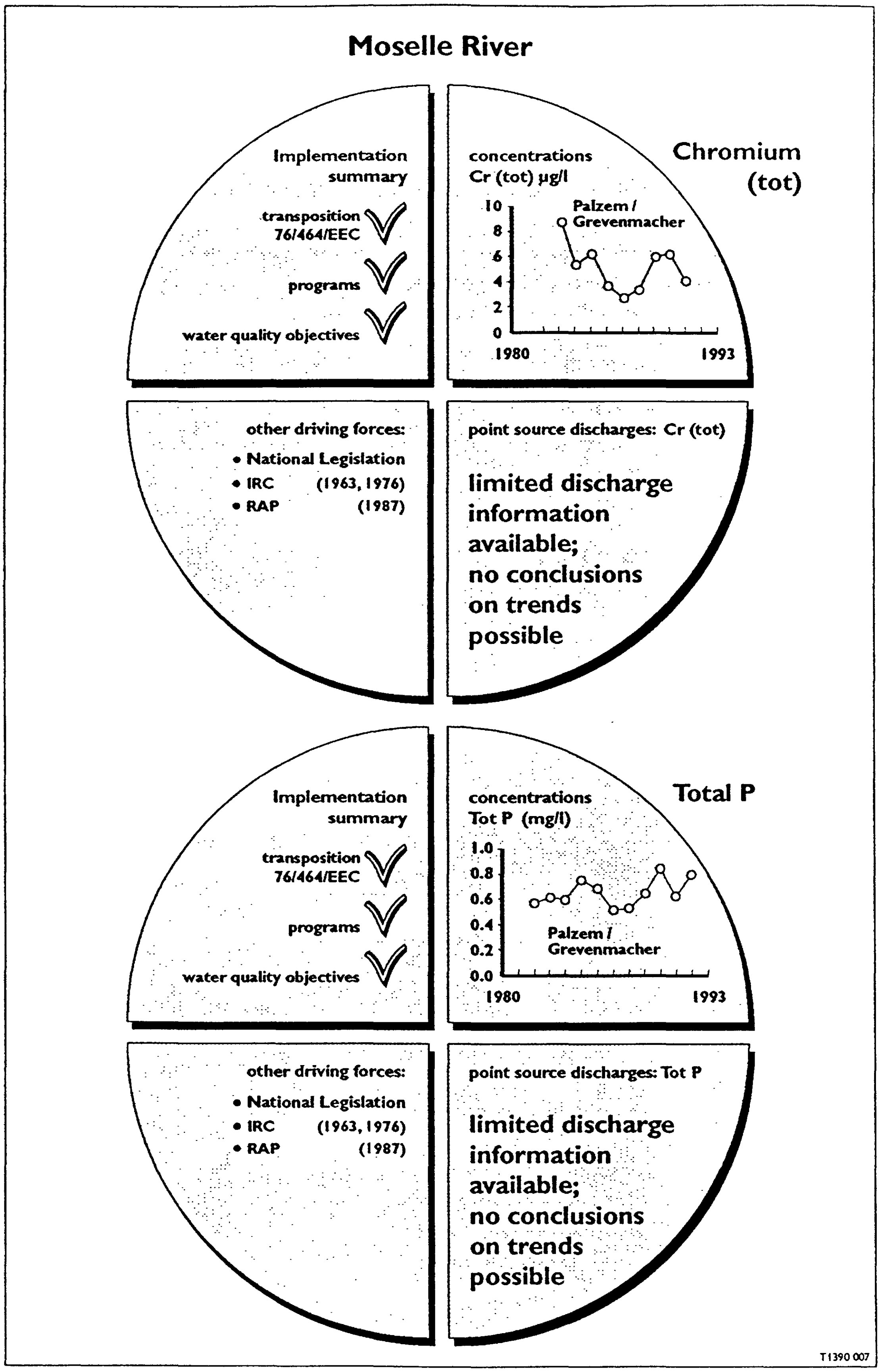

Figure 5.6 Summary of impact analysis of Directive 76/464/EEC for the Moselle River

Driving Forces:

- IRC (Bern, 1963)
- National legislation (frame work regulation of 1971)
- 76/464/EEC (Brussels, 1976)
- IRC (Rhine Chemical Treaty; Bonn, 1976)
- RAP (Strassbourg, 1987)

Overall Summary:

Most of the available water quality data (i.e. heavy metals) do not show a clear trend, though concentrations seem to be decreasing over the years. Concentrations of TotP have increased. Discharge data is only available for 1985, thus it is not possible to see any trends. It is not possible to make a conclusion as to the impact of the developed Alternative Measures on the quality of the Moselle River.

5.7 Po River

Country:	Italy
Selected River Catchment:	Po
Water Quality Data:	Only limited water quality data are available (8 substances for the year 1990 only). No conclusion on water quality trends in the Po River is possible.
Loads:	No detailed information on actual industrial loads from individual dischargers is available. Only 1 dischargers is identified for the river basin (discharging chloro-nitrobenzene compounds). No conclusion on discharge trends in the Po River is possible.
Summary of Transposition:	1) Legislative Decree No 133 of 27 January 1992 transposed Directive 76/464 into national law. This decree represents an attempt to resolve a number problems on transposition of the Directive. List II substances are still subject to the old limit values of the national legislation.
Working Practice:	1) A non specific program regarding List II substances exits for Italy via the permitting system. 2) No information was made available on water quality objectives or standards.
Driving Forces:	• National legislation (Law no 319 of 1976) • 76/464/EEC (Brussels, 1976) • Barcelona Convention (Barcelona, 1976) and its protocols

Overall Summary:

Given the available information, a conclusion as to the impact of the developed Alternative Measures on the quality of the Po River cannot be made.

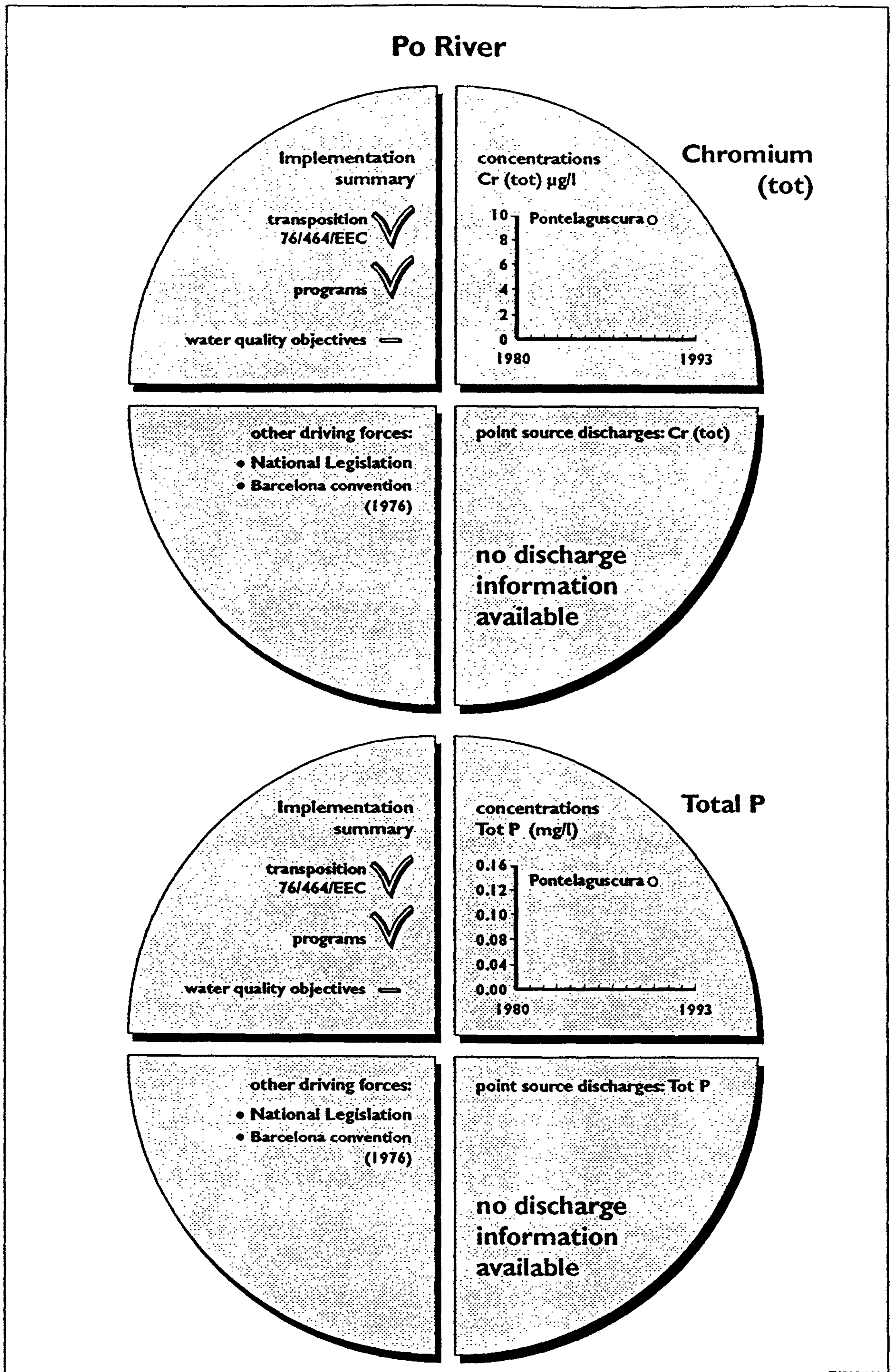

Figure 5.8 Summary of impact analysis of Directive 76/464/EEC for the Po River

5.8 Rhine River

Countries:

Germany, Netherlands, Luxembourg (Moselle), France (Moselle). Note 1: the Moselle River is also presented separately in section 5.6. Note 2: Switzerland is a riparian state of the Rhine, but not an EU Member State.

Water Quality Data:

A great deal of data for many substances over the entire time period (1980-93) are available from 3 monitoring stations. The most data are available at station Lobith.

Data for chromium and the other heavy metals as well as arsenic show decreasing concentrations. The nutrients TotN and TotP also show decreasing concentrations. Trends for the organic substances endosulfan, parathion, cannot be determined with few years of data. Data for atrazine, 1,1,1-TCA, and PAHs show no clear trend.

Loads:

A great deal of data covering most substances are available.

Chromium data are available for 19 individual dischargers from 3 countries (FRA, FRG, and NL). For most dischargers, there are 1-2 years of data (not necessarily consecutive); for a few dischargers, data are available for 3 or more years. The biggest dischargers in each country as well as many other dischargers show a clear decrease in discharge amounts. At the same time, some dischargers show an increase, variable trend, or constant discharge. Overall, given the large decreases from many, including some of the main dischargers, the trend is one of decreasing discharges.

Phosphorous data are available for 16 individual dischargers from 3 countries (FRA, FRG, and NL). For most of the dischargers only 1 or 2 years of data are available. Two of the biggest dischargers have significantly cut discharges between 1985 and 1992. For all other individual industries with more than one year of data, the trend shows decreasing discharges. It is concluded that the overall trend in the river basin is of decreasing discharges.

In addition, the discharge of PAH in the Netherlands is summarized for 1985, and 1989-95 (table D.9 in Appendix D-2). The discharge is lower in 1995 compared to 1985.

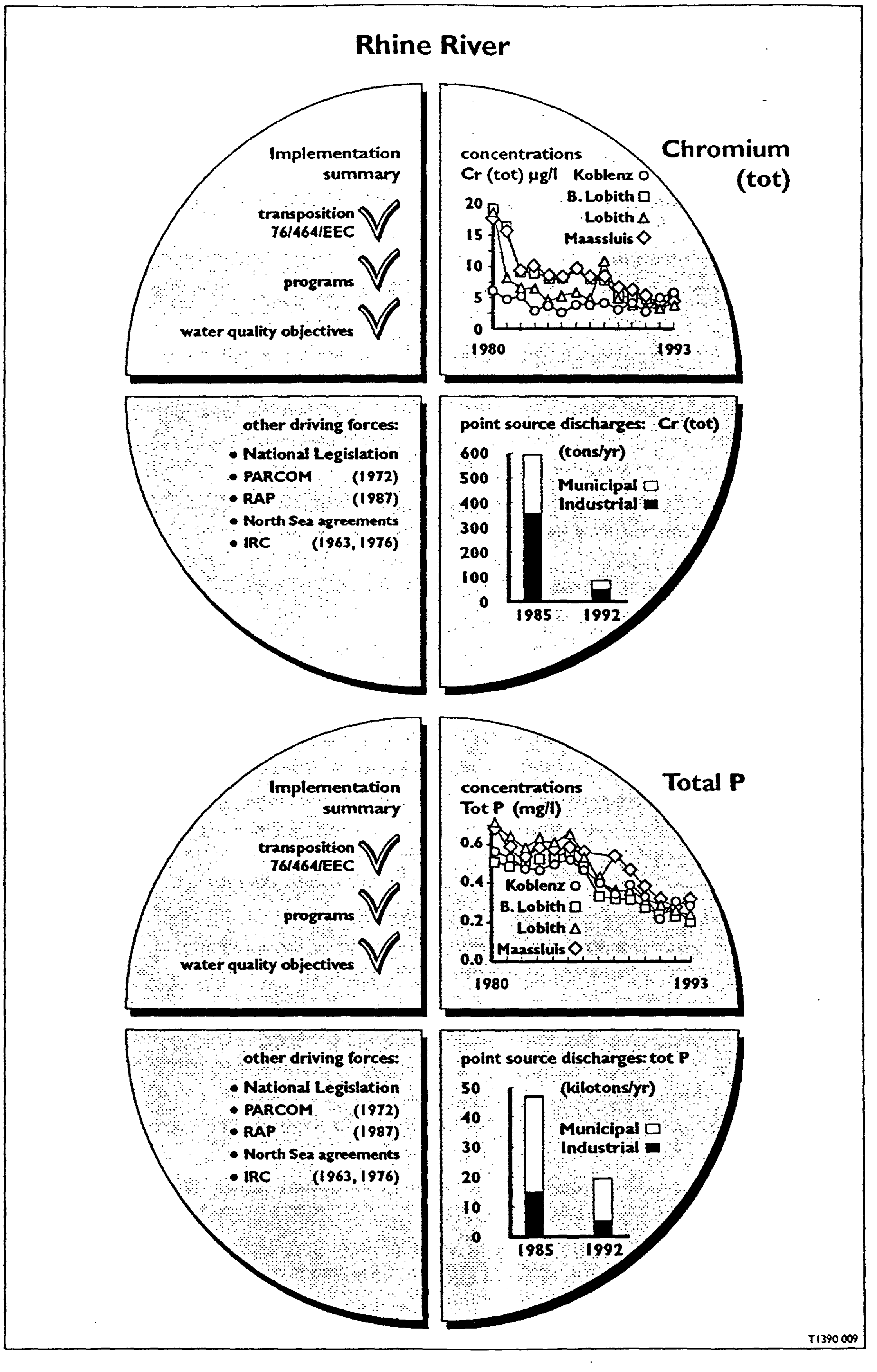

Figure 5.9 Summary of impact analysis of Directive 76/464/EEC for the Rhine River

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out by the following legislative instruments:
France: Act of July 1976 on classified installation, 1976;
Germany:
- Federal Water Management Law of 23-9-1986 (amended 27-6-1994)
- Ordinance on Water origins of 3-7-1987 (amended 27-5-1991)
- General Administrative Rules on Water Polluting Substances 9-3-1990
- General Administrative Ordinance on Minimal Requirements relating to Waste Water Discharges of 29-10-1992
- Waste Water Charge Act of 6-11-1990 (amended 5-7-1994)

Luxembourg: Transposition implies that regulations adopting and implementing Directive 76/464/EEC are subject to the 1971 legislation.
Netherlands: Pollution of Surface Waters Act. 1970.

Working Practice:

1) Non specific programmes regarding List II substances exist for France, Germany, Luxembourg and the Netherlands. In addition, the Netherlands adopted a policy on water management (laid down in an official policy document). Finally, all 4 member states committed themselves to all actions listed in the Ministerial North Sea Agreements (chromium and TotP are specially addressed in both international programmes).

2) Water quality objectives are adopted in France, Germany and the Netherlands: France has developed a set of quality objectives, for most of the selected List II substances; Germany has general water quality standards, as well as 'Zeilvorgabe' covering the substances TotN, TotP, arsenic, chromium, copper, lead, zinc, endosulfan, parathion, 1,1,1,-trichloroethane, chloro-nitrobenzenes, and 3,4-benzo(b)fluoranthene; The Netherlands has water quality targets and standards for nutrients (TotN and TotP), arsenic, heavy metals (Cr, Cu, Pb, and Zn), parathion, atrazine and 3,4-benzo(a)pyrene (see Appendix F). In the framework of the Rhine Action Program indicative quality objectives are set including those for a number of List II substances. In case the indicative quality objectives are not met, additional measures exceeding BAT should be taken.

Driving Forces:

- IRC (Bern, 1963)
- National Legislation:
  (France: Act of July 1976 on classified installations, 1976;
  Germany: Federal Water Management Law (1986)
- Luxembourg: frame work regulation of 1971
  Netherlands: Pollution of Surface Waters Act, 1970;
- PARCOM (Paris, 1974); OSPAR (1992)
- 76/464/EEC (Brussels, 1976)
- IRC (Rhine Chemical Treaty; Bonn, 1976)
- RAP (Strassbourg, 1987)
- Ministerial Declarations on the protection of the North Sea (1984, 1987, 1990, 1995)

Overall Summary:

A review of the available information on industrial loads shows a general decrease in discharges.

A review of water quality shows an improvement in water quality for heavy metals and nutrients. The Alternative Measures developed in the relevant Member States have contributed to the improvement of water quality. An extensive review of the Rhine River is given in Appendix C, which illustrates the type of analysis that can be made when complete information is available.

5.9 Rhône River

Country:	France
Water Quality Data:	Water quality data for the Rhone comprises 2 years of data (1991-92) for several substances (arsenic, atrazine, 1,1,1-TCA, heavy metals, and PAHs); most of these measurements are below detection limit. Data for TotP show a decreasing trend, however, it is not possible to make a general statement on trends.
Loads:	In general, there are a lot of data available concerning manufacturing and discharging industries in France, including the Rhone. Eleven individual dischargers of chromium are identified. For most of these, only one year of data is available, and thus no conclusion on trends is possible. Eight individual dischargers of phosphorous are identified. For most of these, only one year of data is available. For the largest industrial discharger, 6 years of data are available, and a clear decrease in discharge is visible. Overall, however, no conclusion on trends for TotP is possible. For other substances, data for some individual industries includes 6 years of effluent monitoring (1986-1992), and it is possible to see some decreasing trends. This is not enough however, to make a general statement on discharge trends.
Summary of Transposition:	1) Directive 76/464/EEC has been transposed into French legislation by a number of ministerial decrees and circulars adopted in the framework of the law of 19 July 1976 on classified installations.

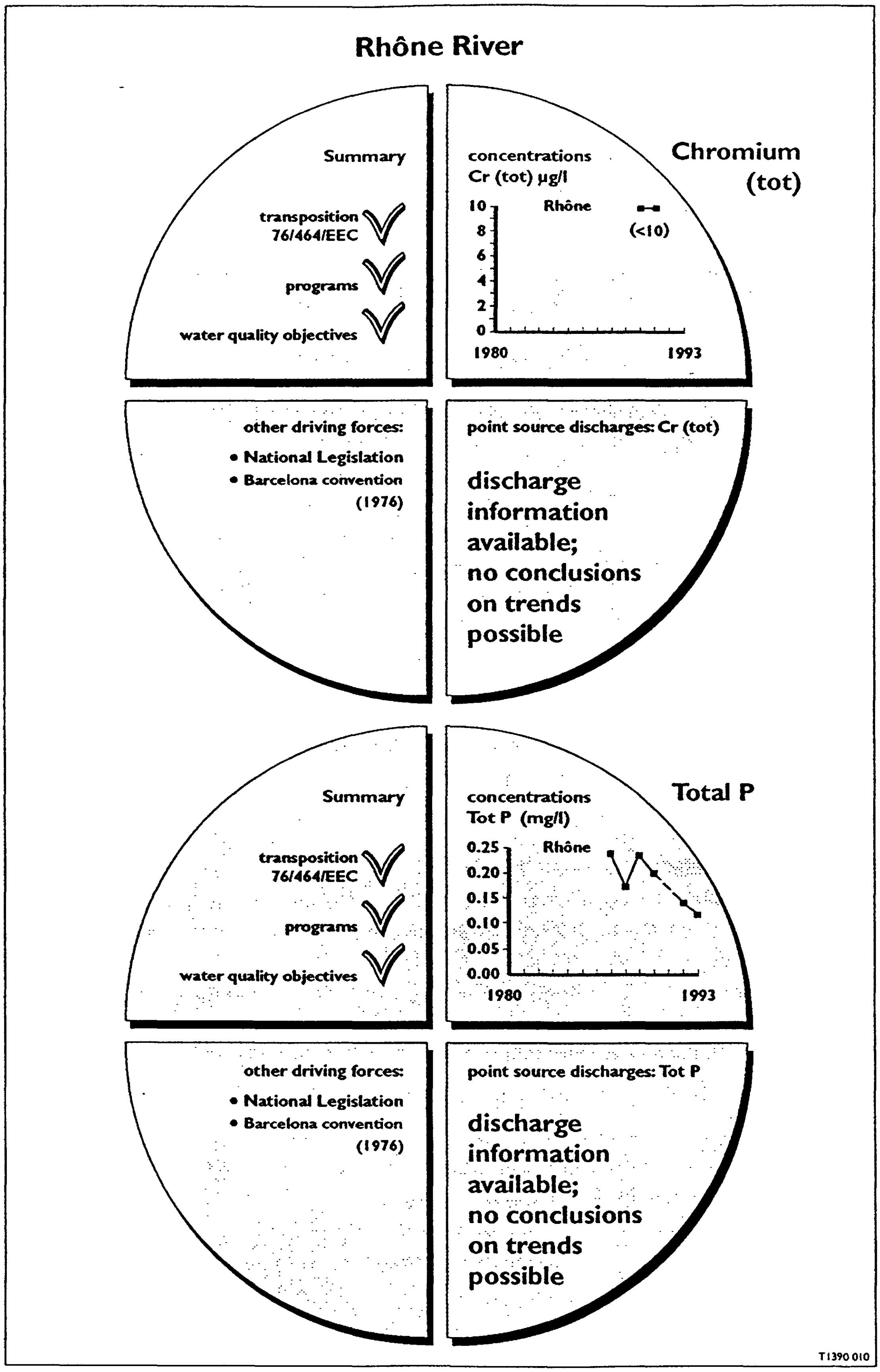

Figure 5.9 Summary of impact analysis of Directive 76/464/EEC for the Rhône River

Working Practice:

1) In 1993, France adopted a general decree applicable to class A installations (see Appendix B for further description). This general decree also incorporates some limit values for list II substances.
Article 22 of the general decree stipulates that quality objectives of receiving water courses must be considered when setting limit values for discharges.

2) France has developed a set of quality objectives, for most of the selected List II substances, as given in Appendix F. For each receiving water, quality objectives are set by prefectorial decree, taking into account the functions and targets of the local receiving water.

Driving Forces:

- 76/464/EEC (Brussels, 1976)
- National Legislation (Act of 19 July 1976 on classified installations)
- Barcelona convention (Barcelona, 1976) and its protocols

Overall Summary:

Systematic monitoring of French surface water concerning most List II substances started only recently (1991). Thus, there is not enough historical water quality data with which to see any clear trends (however, for TotP, more data were available and concentrations have decreased).

Historical data is also limited for the monitoring of discharges. For some individual industries, where, effluent monitoring includes 6 years (1986-1992), it is possible to see a decrease in trends. This is not enough however, to make a general statement on discharge trends.

Thus, it is not currently possible to make a conclusion as to the impact of the developed Alternative Measures on the quality of the Rhone River. With continuation of the present monitoring system, there will be sufficient data to make a better analysis in several years time.

5.10 Sado River

Country: Portugal

Water Quality Data: Water quality data comprises 4 years (1989-1993, excluding 1992) for chromium and the other heavy metals (zinc, copper, and lead) and 5 years (1989-1993) for nutrients (TotP and TotN).

Concentrations of zinc seem to indicate a decreasing trend, as do those for TotN and TotP. For the other substances, no trends can be determined.

Loads: No information on industrial loads from individual dischargers of List II substances is available.

Summary of Transposition:

1) Directive 76/464/EEC has been transposed into Portuguese legislation via legislative Decree No 74 of 1990.

Working Practice:

1) Programmes are initiated via the national policy document on the environment, resulting in more detailed water management policies. In addition there are non- specific programs regarding List II substances for Portugal via the permitting system, or via specific actions on problem areas such as tanning, surface treatment and textile industries.
2) Quality objectives for Portugal are given in Appendix F. In Portugal, water quality standards are established in the legislation (Decree-law 74/90) for heavy metals and a few other List II substances (arsenic, chromium, copper, lead, zinc, and Total PAH) according to water use or as a minimum water quality level. In the same legislation, maximum allowable concentrations for discharges either to water bodies or to sewers are also included.

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National legislation (The Environmental Law of 1987)
- OSPAR (1992)

Overall Summary:

The available water quality data show decreasing concentrations for zinc, TotN and TotP. Data for copper, chromium and lead show now clear trend. No discharge data is available. Given the available information, a conclusion as to the impact of the developed Alternative Measures on the quality of the Sado River cannot be made.

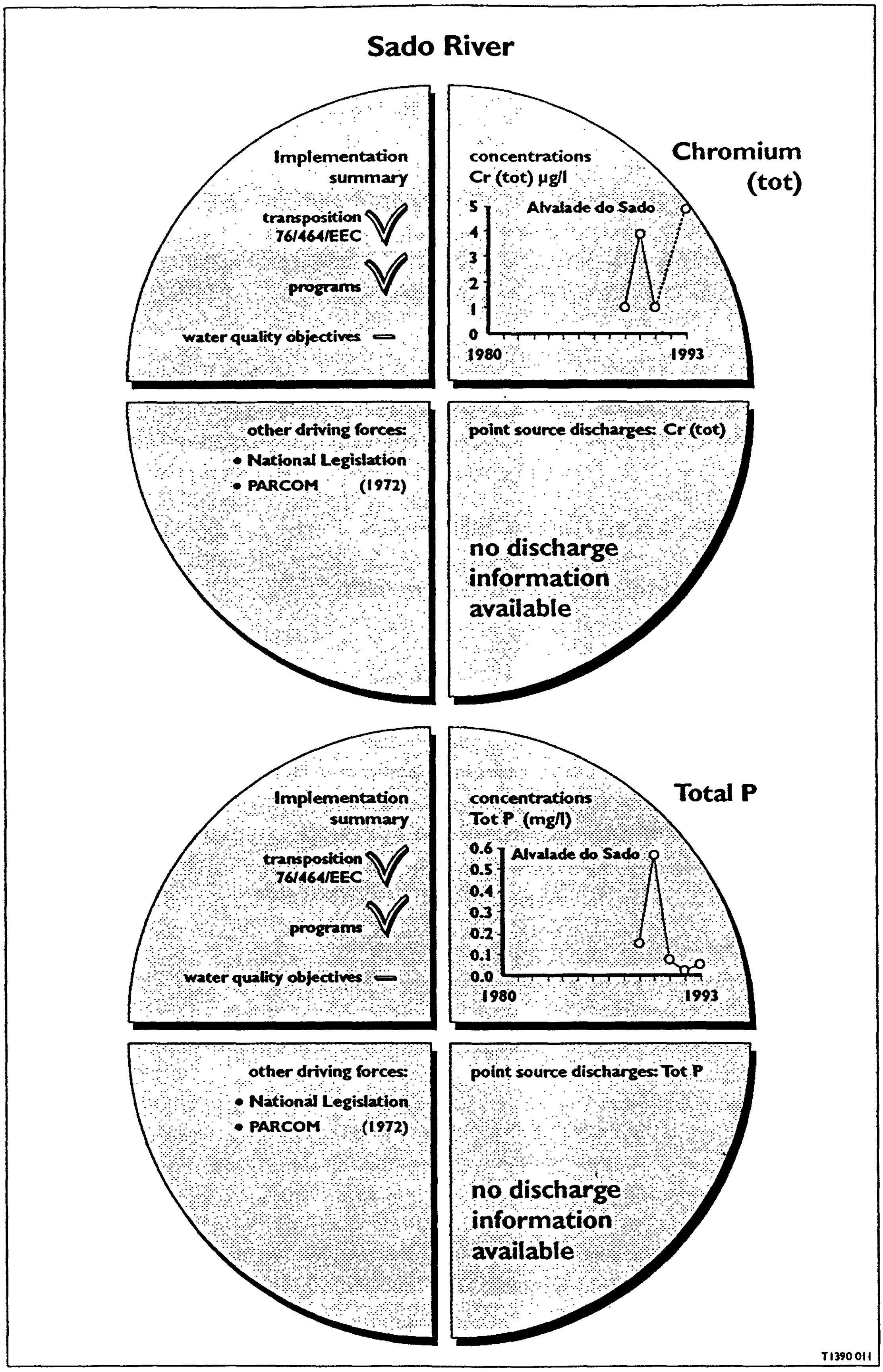

Figure 5.10 Summary of impact analysis of Directive 76/464/EEC for the Sado River

5.11 Scheldt River

Countries:

France, Belgium, The Netherlands

Water Quality Data:

Water quality data are available for the station Doel (Belgium, near the Netherlands border). Substantial data for heavy metals and nutrients are available over a long time period (~ 10 years). Concentrations for some other substances (arsenic, endosulfan, and PAHs are available for 5 or less years).

Concentrations of chromium as well as the other heavy metals show a great deal of variability over the years, and no clear trend is visible (though lead concentrations seem to have decreased since 1984).

Concentrations of TotP clearly decrease over the period 1982-1993. Concentrations of TotN remain roughly constant. No trends in concentration can be seen with the other data.

Loads:

Sufficient data for a number of substances over a long time period are available.

21 individual dischargers of chromium are identified in France and Belgium. For most of these, only one year of data is available. For the 3 dischargers where several years of data are available, 2 show decreasing trends and one shows a fairly constant (slightly increasing) trend. No overall statement on trends is possible.

A total of 8 individual dischargers of Phosphorous are identified (in France and Belgium). For most of these, only one year of data is available. No statement on trends is possible.

For other substances, it is also difficult to make a conclusion on trends. For dischargers in France, for which there are sometimes more than one year of data, there is often a decreasing trend.

Also, Table D.4 of Appendix D-2 gives aggregated information on estimated discharges to surface waters in Belgium. This aggregated information shows a decrease in discharges between 1985 and 1995 for several substances.

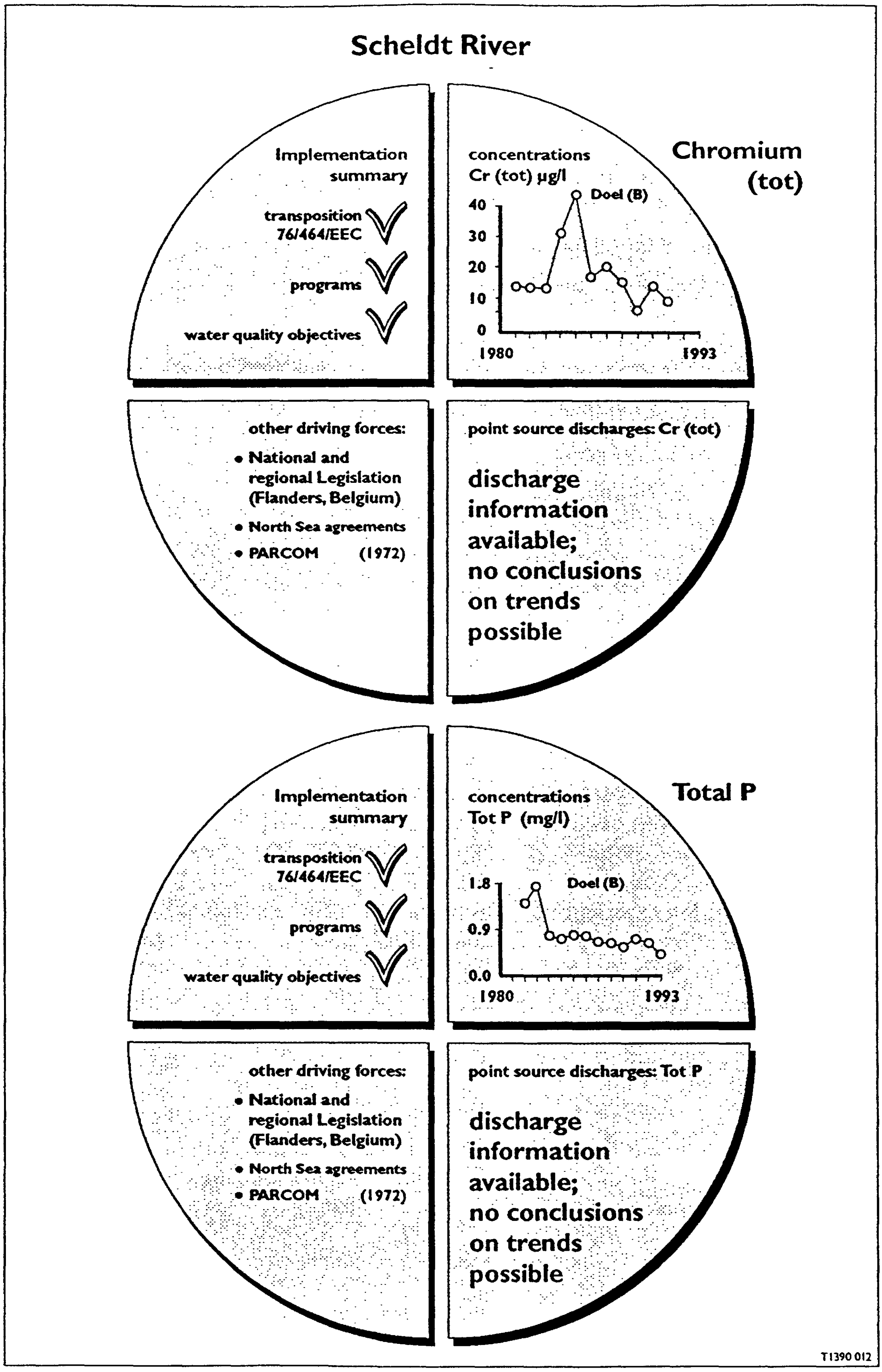

Figure 5.11 Summary of impact analysis of Directive 76/464/EEC for the Scheldt River

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out by the following legislative instruments:
France: Act of July 1976 on classified installations, 1976.
Belgium: legislation for the protection of surface water, 1971
Flemish region: decree of 28 June 1985 concerning environmental licensing, amended by decrees of 07 February 1990, 02 December 1990 and 21 December 1990; decree of 05 April 1995 giving general requirements concerning environmental policy, expanded by decree of 19 April 1995 concerning environmental auditing
Netherlands: Pollution of Surface Waters Act. 1970.

Working Practice:

1) Non specific programmes regarding List II substances exists for France, Belgium (Brussels and Flemish Region) and the Netherlands. In addition, the Netherlands adopted a policy on water management (laid down in an official policy document). Finally, all 3 member states committed themselves to all actions listed in the Ministerial North Sea Agreements (chromium and TotP are specially addressed).

2) Water quality objectives are adopted in France, Belgium and the Netherlands: France has developed a set of quality objectives for most of the selected List II substances; Belgium has water quality objectives for nutrients(TotN and TotP), arsenic, heavy metals (Cr, Cu, Pb, and Zn), and Total PAH; The Netherlands has water quality targets and standards for nutrients (TotN and TotP), arsenic, heavy metals (Cr, Cu, Pb, and Zn), parathion, atrazine and 3,4-benzo(a)pyrene (see Appendix F).

Driving Forces:

- National legislation
  France: Act of July 1976 on classified installations, 1976;
  Belgium: legislation for the protection of surface waters, 1971;
  Flemish region: decree of 28 June 1985 concerning environmental licensing, amended by decrees of 07 February 1990, 02 December 1990 and 21 December 1990; decree of 05 April 1995 giving general requirements concerning environmental policy, expanded by decree of 19 April 1995 concerning environmental auditing
  Netherlands: Pollution of Surface Waters Act, 1970;
- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- Ministerial Declarations on the protection of the North Sea (1984, 1987, 1990, 1995)
- OSPAR (1992)

Overall Summary:

For the Scheldt, concentrations of TotP clearly decrease over the period 1982-1993. For other substances, no conclusions about the change in water quality can be made.

Also for individual industrial loads, no overall statement on trends is possible. Additional information indicates that the discharges of As, Cr, Cu, Pb, TotP, TotN, and TCA to all surface waters in Belgium have decreased. Also, the discharge of PAHs has decreased in the Netherlands.

Thus, concentrations TotP decrease, while the discharge of this substance (to all surface waters in Belgium) also decreases. If it is assumed that these are linked, one can conclude that the developed Alternative Measures have contributed to this trend.

5.12 Seine River

Country: France

Water Quality Data: Water quality data for the Seine are available at the monitoring station 'Paris' for heavy metals and arsenic for the years 1980-1991, excluding 1988. In addition, concentration of TotP are available at the monitoring station 'Poissy' for 1980-1993).

Concentrations of chromium show a clear decreasing trend, especially since 1984. Other heavy metals show a similar trend, though not so sharply. The available concentrations of arsenic show an increasing trend. Concentrations of TotP show variability, and no clear trend.

Loads: There are a lot of data available for industrial discharges in France; for the Seine river catchment, there is a lot of information on manufacturing and discharging industries.

A total of 15 individual dischargers of chromium are identified. For those where more than one year of data is available, decrease in discharges can be seen. Overall, however, no conclusion on trends for chromium is possible.

A total of 36 dischargers of Phosphorus are identified. For most of these where more than one year of data is available, there is a decrease in discharges. For a few of the dischargers, the discharge levels are constant or slightly increasing.

Overall, there is no clear trend in the changes in loads over the period 1980-1992. In many cases, the loads decrease, but there are also examples where loads increase, or remain constant.

Summary of Transposition:

1) Directive 76/464/EEC has been transposed into French legislation by a number of ministerial decrees and circulars adopted in the framework of the law of 19 July 1976 on classified installations.

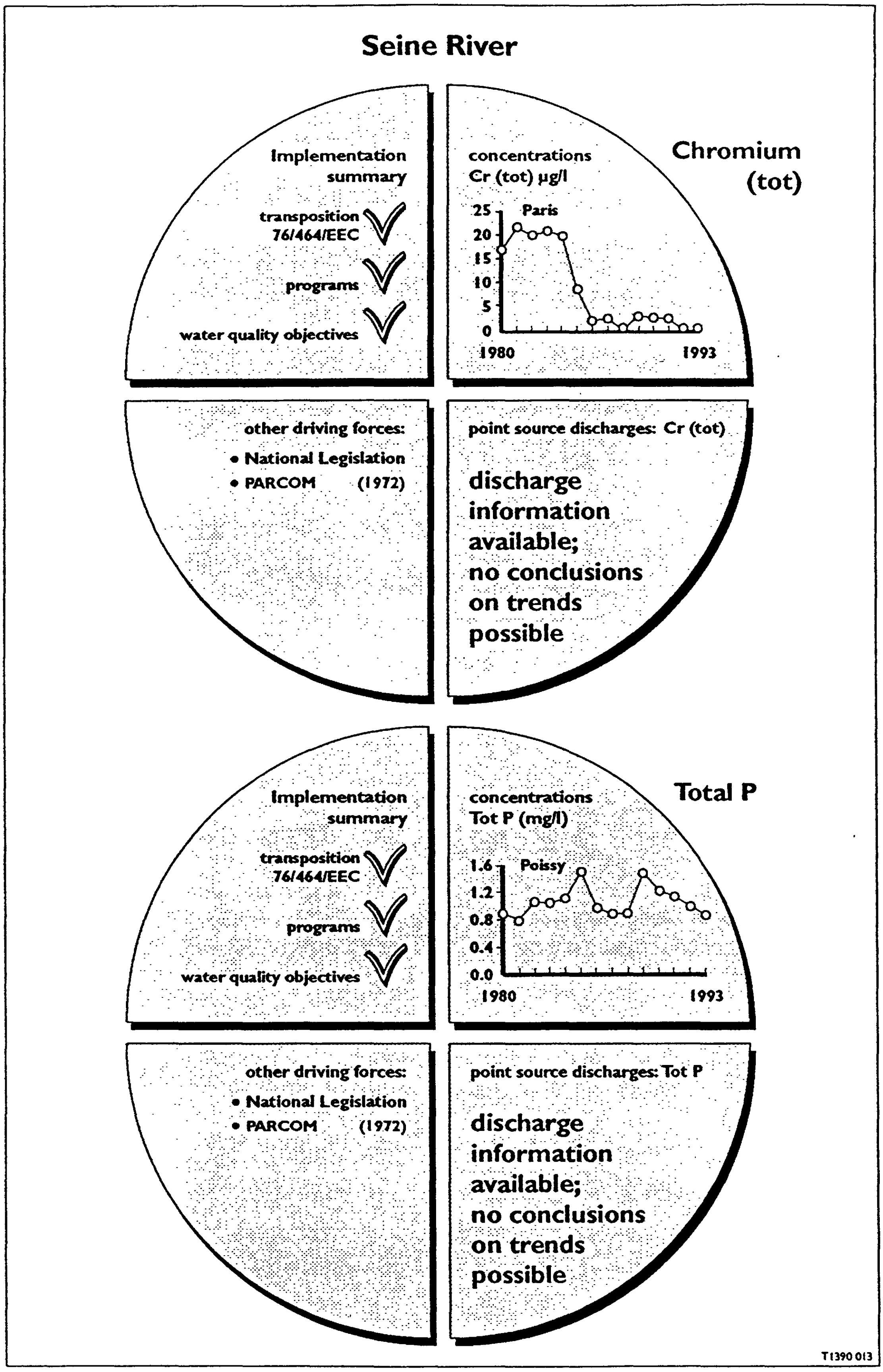

Figure 5.12 Summary of impact analysis of Directive 76/464/EEC for the Seine River

Working Practice:

1) In 1993, France adopted a general decree applicable to class A installations (see Appendix B for further description). This general decree also incorporates some limit values for list II substances.
Article 22 of the general decree stipulates that quality objectives of receiving water courses must be considered when setting limit values for discharges.

2) France has developed a set of quality objectives, for most of the selected List II substances, as given in Appendix F. For each receiving water, quality objectives are set by prefectorial decree, taking into account the functions and targets of the local receiving water.

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National Legislation (Act of July 1976 on classified installations).
- OSPAR (1992)

Overall Summary:

Measured water quality shows decreasing concentrations for heavy metals, increasing concentrations for arsenic, and no trend for the nutrient TotP.

For industrial loads, there is no clear overall trend in the changes in loads over the period 1980-1992. In many cases, the loads decrease, but there are also examples where loads increase, or remain constant.

Given the available information, a conclusion as to the impact of developed Alternative Measures on the quality of the Seine River cannot be made.

5.13 Slaney River

Country: Ireland

Water Quality Data: Water quality data for List II substances in the Slaney River comprise zinc and copper (1989-1993), and chromium and lead (1993 only). TotN and TotP data are available for 1994 only. With the available data no assessment of trends is possible.

Loads: No information on industrial loads from individual dischargers of List II substances is available.

Some additional information on annual loads (inputs) is available from PARCOM summaries (table D.1 in Appendix D-2), for TotN, TotP, copper, lead, and zinc. No conclusions on trends is possible.

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out by permitting through Local Government (Water Pollution) Acts 1977 and 1990 and the Environmental Protection Agency Act, 1992.

Working Practice:

1) In general, programmes for List II substances are non- specific though quality objectives are used as the basis for setting limits as conditions of licenses for List II substances. Some specific programmes have been developed, such as the targeting of phosphorus from diffuse sources and in sewage, and industrial discharges to sensitive areas.
2) Ireland has developed a range of water quality objectives (arsenic, chromium, copper, lead and zinc) contained in Memorandum No. 1, Water Quality Guidelines by the Technical Committee on Effluent and Water Quality Standards (see Appendix F). These are presently being reviewed with priority being given to phosphorus (see Appendix G) and heavy metals.

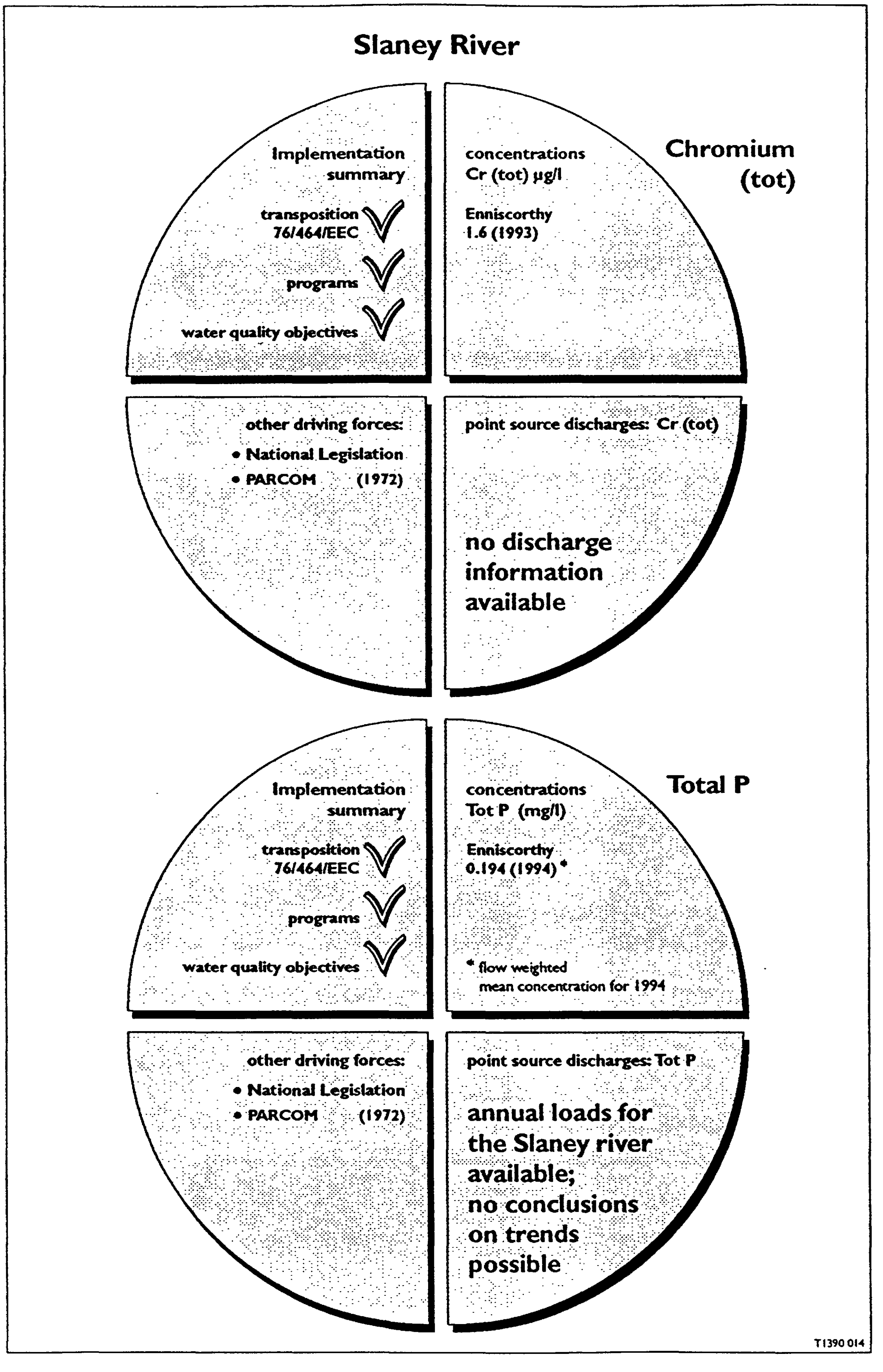

Figure 5.13 Summary of impact analysis of Directive 76/464/EEC for the Slaney River

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National Legislation (Local Government (Water Pollution) Act, 1977)
- OSPAR (1992)

Overall Summary:

A considerable amount of information from the national representative of Ireland has been supplied. The water quality data show no clear trend for the available substances.

Also from the information provided, it seems that there are little or no industrial discharges of dangerous substances. The discharge data from PARCOM show no clear trends. Thus, it is not possible to make an assessment of the effectiveness of the developed Alternative Measures on the quality of surface waters in Ireland. From personal communications, it became clear that other EC Directives have had an impact on industrial waste production in Ireland.

5.14 Tagus River

Countries: Spain and Portugal

Water Quality Data: For the Tagus river in Spain, water quality data are available for heavy metals (1983-1993, with various missing years), and arsenic (1985 and 1988-93). No data on organic substances are available.

In Portugal, water quality data for heavy metals are available for the years 1989-92, plus some other years. For arsenic, data are available for 1989-1992, and for TotP, from 1980-92. Data for (inorganic) Nitrogen are from 1980-85 and 1989-92.

In Spain, most of the measured concentrations are reported as below detection limit. No analysis of trends is possible.

In Portugal, chromium data from 1989-92 are significantly lower than those from 1980-84. For zinc and copper, recent data are lower than the concentrations measured in 1980. These data suggest a decreasing trend. No clear trend is visible in the data for lead. Data for arsenic show an increasing trend over 4 years. For nutrients, the data show a lot of variation; a decreasing trend in TotP can be seen.

Loads: No information on industrial loads from individual dischargers of List II substances is available.

Additional information on direct and riverine inputs for 1991-1994 is available (table D.3, appendix D-2); no conclusion on trends is possible.

Summary of Transposition:

1) Transposition of 76/464/EEC has been carried out by the following legislative instruments:
   Spain:
   - Royal Decree No 849 of 1986 (Articles 245 to 274)
   - Order of 12-11-1987
   - Order of 28-6-1991

   Portugal: via legislation via legislative Decree No 74 of 1990.

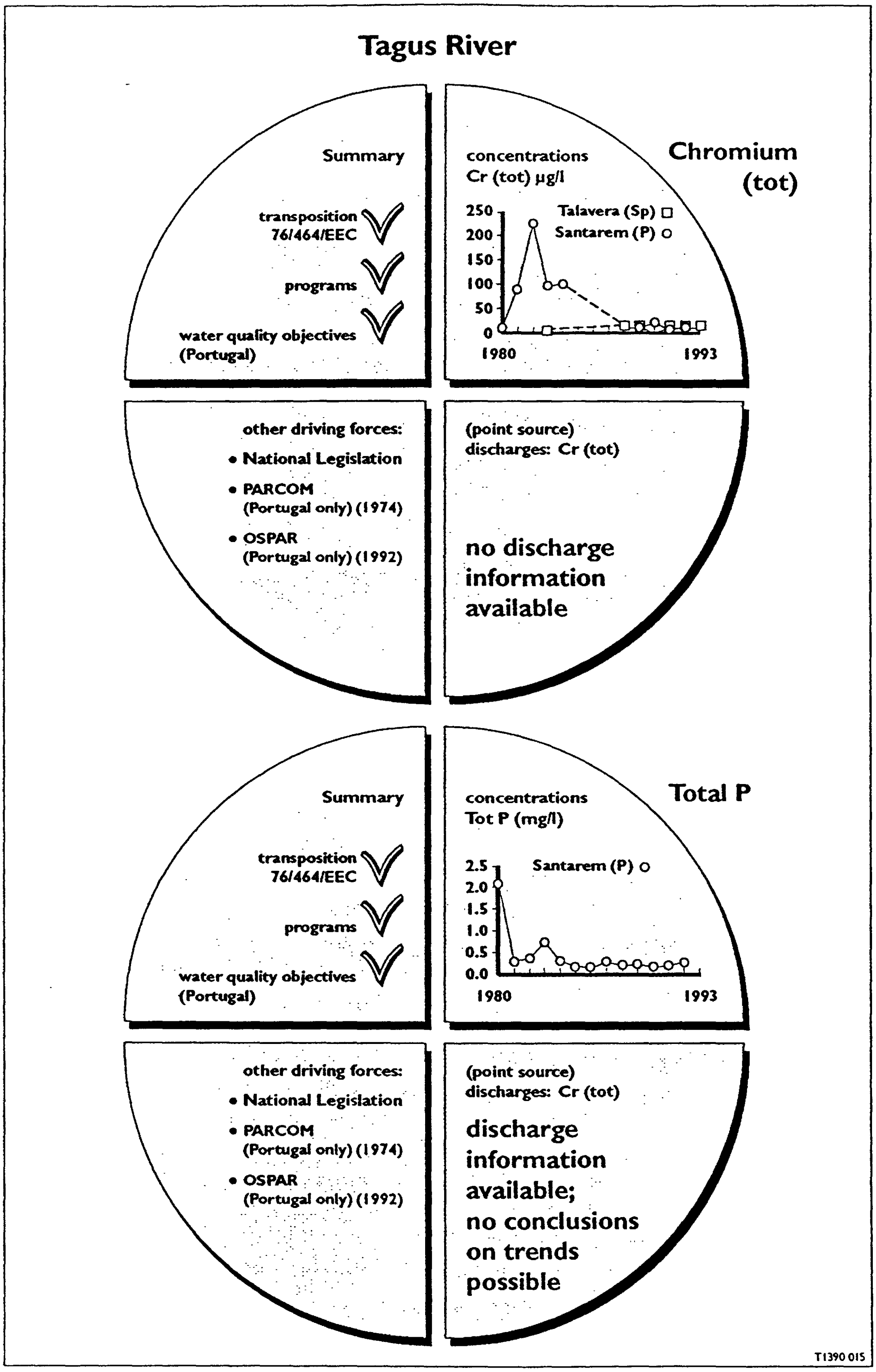

Figure 5.14 Summary of impact analysis of Directive 76/464/EEC for the Tagus River

Working Practice:

1) Implementation of the legislation in Spain is still in progress with major programmes of work still being developed or being carried out. Discharge consents will be issued by the Drainage Basins on a case by case basis, taking into account planned reduction programmes.
In Portugal programmes are initiated via the national policy document on the environment, resulting in more detailed water management policies. In addition there are non specific program regarding List II substances for Portugal via the permitting system, or via specific actions on problem areas, such as tanning, surface treatment, and textile industries.

2) No information was made available on water quality objectives or standards for Spain. Quality objectives for Portugal are given in Appendix F. In Portugal, water quality standards are established in the legislation (Decree-law 74/90) for heavy metals and a few other List II substances (arsenic, chromium, copper, lead, zinc, and Total PAH) according to water use or as a minimum water quality level. In the same legislation, maximum allowable concentrations for discharges either to water bodies or to sewers are also included.

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National legislation:
  (Spain: Water Act of 1985
  Portugal: The Environmental Law of 1987)
- OSPAR (1992)

Overall Summary:

The available water quality data in Spain show no clear trends. The available water quality data in Portugal suggest a trend of decreasing concentrations for zinc, copper, chromium and TotP, increasing concentrations for arsenic, and no clear trend for TotN.

No discharge information is available from Spain. Data on riverine and direct discharges in Portugal show no clear trends for zinc, copper, chromium and TotN, and an increasing trend for TotP.

Given the available information, a conclusion as to the impact of Alternative Measures developed in Spain and Portugal on the quality of the Tagus River cannot be made.

5.15 Thames River

Country:	UK
Water Quality Data:	Data are mostly available for heavy metals and TotN (1980-1993). Some additional data are available for arsenic (1980-81 and 1986-93), atrazine (1988-92) and TotP (1989, 90, and 92). Data for chromium show some variation, but no clear trend. This is also true for the other heavy metals zinc and copper. For lead, concentrations since 1987 are lower compared to the beginning of the 1980's. Concentrations of TotN show some variability but no clear trend. For TotP, as well as arsenic and atrazine, no trend can be determined with the available data.
Loads:	Information on industrial loads from individual discharges of List II substances is available on the public register held in Regional Offices, but has not been compiled nationally (and thus is not presented here). Information on riverine and direct inputs (Table 6 of Appendix D-2) show decreased inputs to the North Sea for the heavy metals and arsenic from 1985-90-95 (rivers Thames and Trent included). Also, riverine plus direct inputs of nitrogen and phosphorous for the Thames for 1985 and 1990-93 are available (table 8 in Appendix D-2); no conclusion is possible for nitrogen; inputs show a decreasing trend for phosphorous. Communication from the National Expert (source UK813) states that there are very few direct industrial discharges of List II substances in the Thames River catchment. However, about 30 trade effluents containing heavy metals have been identified which are consented and monitored as are the receiving water-courses. Also, most of the industry in the Thames basin is served by a public sewerage system where the trade wastes mix with domestic sewage before receiving treatment at a sewage treatment works. This information is held by the Water companies. Sewage treatment works which receive significant inputs of List II substances are consented and monitored for those substances.

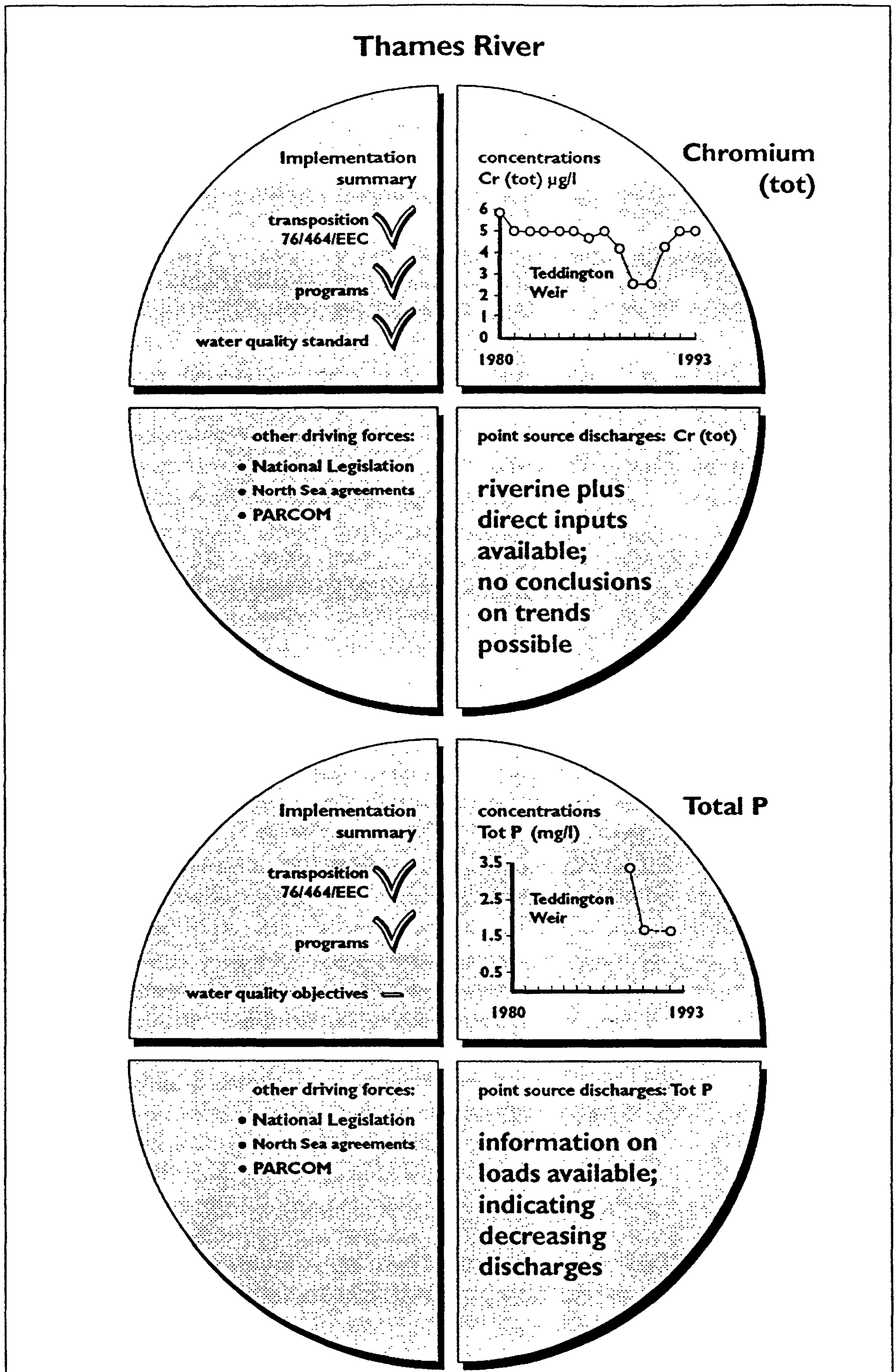

Figure 5.15 Summary of impact analysis of Directive 76/464/EEC for the Thames River

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out by the following legislative instruments:
   - Surface Water (Dangerous Substances) (Classification) Regulations 1989 SI 1989/2286 discharges to water
   - Surface waters (Dangerous Substances) (Classification) Regulations 1992 SI 1992-337 discharges to water
   - Trade effluents (Prescribed Processes and Substances) Regulations 1989 SI 1989/1156 discharges to sewer
   - Trade effluents (Prescribed Processes and Substances) Regulations 1992 SI 1992/339 discharges to sewer
   - Environmental Protection (Prescribed Processes and Substances) Regulations 1991 SI 1991/472 IPC processes and substances
   - Environmental Protection (Prescribed Processes and Substances) (Amendment) Regulations:
     SI 836 (1991), SI 614 (1992), SI 1749 (1993),
     SI 2405 (1993), SI 1271 (1994), SI 1329 (1994),
     SI 3247 (1995)

Working Practice:

1) Programs: The discharge of dangerous substances into surface waters is prohibited except when authorised by a consent under the Water Resources Act 1991, an authorization under the Environmental Protection Act 1990. Limits are set in the consents and authorizations for the discharge of List II substances. In the UK, discharge limits are determined by Environmental Quality Standards (EQS) which apply to the receiving water. Water quality objectives are assigned to the receiving water depending on the use of the water. EQS are then applied to the water to meet those objectives. Discharge limits are set at a level so that the EQS can be achieved in the receiving water. Prescribed processes and prescribed substances are controlled under the Environmental Protection Act, and the discharger may be required to adopt Best Available Techniques Not Entailing Excessive Costs (BATNEEC) and, in the case of release to more than one environmental medium, Best Practical Environmental Option (BPEO). All other processes and substances are controlled by consents issued under the Water Resources Act of 1991. The consents and authorizations are valid indefinitely, but are reviewed periodically. Finally, the UK committed herself to all actions listed in the Ministerial North Sea Agreements (Cr and TotP are specially addressed).

2) Water quality standards have been adopted for several list II substances (arsenic, chromium, copper, lead and zinc). In addition, there are proposed water quality standards for endosulfan and atrazine (see Appendix F).

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National legislation (Environmental Protection Act, 1990; Water Resources Act, 1991; Water Industry Act, 1991)
- Ministerial Declarations on the protection of the North Sea (1984, 1987, 1990, 1995)
- OSPAR (1992)

Overall Summary:

The available water quality data at the chosen station show variations in concentration of heavy metals, atrazine, TotN, and TotP over the years, but no clear trend except for lead (decreasing concentrations).

The information on direct and riverine inputs reported to the Oslo and Paris Commissions for the catchment of the North Sea (which includes the Thames) shows a decrease in inputs for the years 1985-1995 for the substances copper, zinc, arsenic, chromium and lead.

Thus, both concentrations and discharges of lead decrease. It can be concluded that the developed Alternative Measures have contributed to the improved quality of the Thames River with respect to this substance.

5.16 Trent River

Country: UK

Water Quality Data: Water quality data comprise heavy metals, TotN and arsenic for the years 1980-1993. Data for 1-3 years are available for TotP and PAHs.

Data for chromium show a clear decrease in concentrations, as do those for the other heavy metals. Data for TotN show variability of the years, but no clear trend. No trend can be determined based on the data for arsenic and PAHs.

Loads: Information on industrial loads from individual discharges of List II substances is available on the public register held in Regional Offices, but has not been compiled nationally (and thus is not presented here).

Information on riverine and direct inputs (Table D.6 of Appendix D-2) show decreased inputs to the North Sea for the heavy metals and arsenic from 1985-90-95 (rivers Thames and Trent included).

Estimated inputs of pesticides show a percent reduction of >50% from 1985 to 1995 for atrazine and parathion (Table 7, in Appendix D-2).

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out by the following legislative instruments:
   - Surface Water (Dangerous Substances) (Classification) Regulations 1989 SI 1989/2286 discharges to water
   - Surface waters (Dangerous Substances) (Classification) Regulations 1992 SI 1992-337 discharges to water
   - Trade effluents (Prescribed Processes and Substances) Regulations 1989 SI 1989/1156 discharges to sewer
   - Trade effluents (Prescribed Processes and Substances) Regulations 1992 SI 1992/339 discharges to sewer
   - Environmental Protection (Prescribed Processes and Substances) Regulations 1991 SI 1991/472 IPC processes and substances
   - Environmental Protection (Prescribed Processes and Substances) (Amendment) Regulations:
     SI 836 (1991), SI 614 (1992), SI 1749 (1993),
     SI 2405 (1993), SI 1271 (1994), SI 1329 (1994),
     SI 3247 (1995)

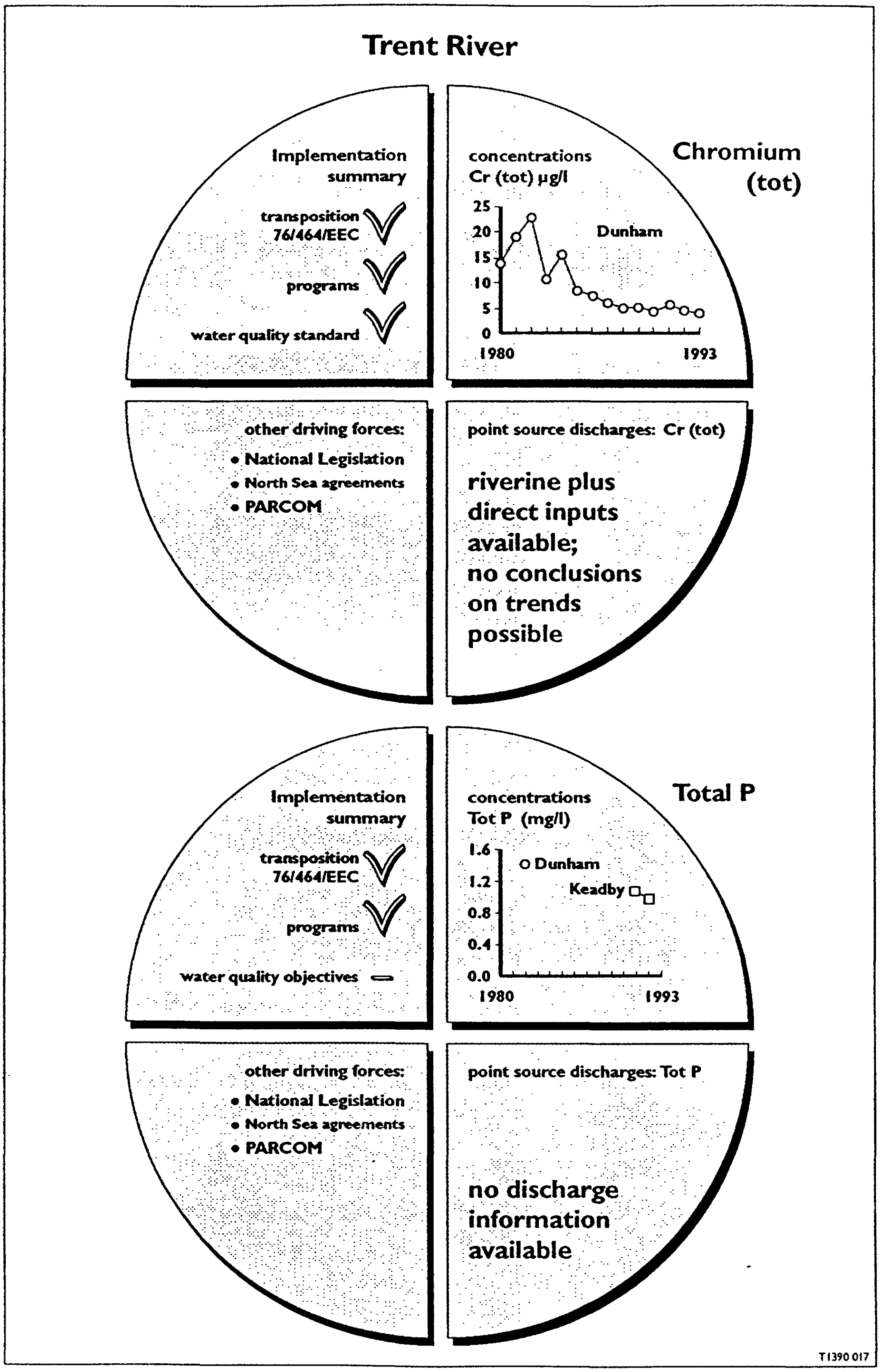

Figure 5.16 Summary of impact analysis of Directive 76/464/EEC for the Trent River

Working Practice:

1) Programs: The discharge of dangerous substances into surface waters is prohibited except when authorised by a consent under the Water Resources Act 1991, an authorization under the Environmental Protection Act 1990. Limits are set in the consents and authorizations for the discharge of List II substances. In the UK, discharge limits are determined by Environmental Quality Standards (EQS) which apply to the receiving water. Water quality objectives are assigned to the receiving water depending on the use of the water. EQS are then applied to the water to meet those objectives. Discharge limits are set at a level so that the EQS can be achieved in the receiving water. Prescribed processes and prescribed substances are controlled under the Environmental Protection Act, and the discharger may be required to adopt Best Available Techniques Not Entailing Excessive Costs (BATNEEC) and, in the case of release to more than one environmental medium, Best Practical Environmental Option (BPEO). All other processes and substances are controlled by consents issued under the Water Resources Act of 1991. The consents and authorizations are valid indefinitely, but are reviewed periodically.
Finally, the UK committed herself to all actions listed in the Ministerial North Sea Agreements (chromium and TotP are specially addressed).

2) Water quality standards have been adopted for several list II substances (arsenic, chromium, copper, lead and zinc). In addition, there are proposed water quality standards for endosulfan and atrazine (see Appendix F).

Driving Forces:

- PARCOM (Paris, 1974)
- 76/464/EEC (Brussels, 1976)
- National legislation (Environmental Protection Act, 1990; Water Resources Act, 1991; Water Industry Act, 1991)
- Ministerial Declaration on the protection of the North Sea (1984, 1987, 1990, 1995)
- OSPAR (1992)

Overall Summary:

The water quality at the chosen station shows decreasing concentrations for the heavy metals zinc, copper, chromium and lead. Trends for arsenic, TotN and PAH are not clear.

The information on direct and riverine inputs reported to the Oslo and Paris Commissions for the catchment of the North Sea (which includes the Thames) shows a decrease in inputs for the years 1985-1995 for the same heavy metals (zinc, copper, chromium and lead, as well as arsenic, atrazine and parathion.

Thus, both concentrations and discharges of the selected List II heavy metals decrease. It can be concluded that the developed Alternative Measures have contributed to the improved quality of the Trent River with respect to these substances.

5.17 Denmark

Country: Denmark

Selected River Catchment: None selected

Water quality data: No water quality information has been sent from the national representative. Time series for several years of water quality data for List II substances apparently are not available at the Danish EPA (J.B. Jensen, Danish EPA, personal communication).

However, data reports are produced by the Danish EPA: Since 1989, reports for the whole country are produced about general water quality parameters, oxygen and nutrients [source: DK1006]. It is expected that in the future further monitoring of an expanded list of substances will take place. At present, all the waterboards produce reports themselves and the information is not assembled for the whole country.

Loads: No information on industrial loads from individual dischargers of List II substances is available. Summary data (table D.2 in Appendix D-2) show decreases in heavy metals, nutrients (TotP and TotN), and organic compounds since 1985.

Summary of Transposition:

1) Transposition of Directive 76/464/EEC has been carried out via the Environmental Protection Act, last revision 1995.

Working Practice:

1) A non specific program regarding List II substances exits for Denmark via the permitting system. Finally, Denmark committed herself to all actions listed in the Ministerial North Sea Agreements (chromium and TotP are specially addressed)
2) Denmark adopted water quality objectives for a number of List II substances but not for nutrients.

Driving Forces:

- PARCOM (Paris, 1974)
- Baltic Sea Convention (Helsinki 1974)
- 76/464/EEC (Brussels, 1976)
- Ministerial Declaration on the protection of the North Sea (1984, 1987, 1990, 1995)
- National Legislation (1991 = last revision)
- OSPAR (1992)

The description of the driving forces and the order of impact of the driving forces were discussed at the Danish EPA with the National Expert.

Overall Summary:

Aggregated information on loads shows a clear decreasing trend, but it is not possible to distinguish trends for individual substances. Also, without any water quality data, it is not possible to evaluate the impact of the developed Alternative Measures on the quality of surface waters in Denmark.

6 Overall analysis of Directive 76/464/EEC

Summary of Member State Strategies

Next to the "substance by substance approach" (as required under Directive 76/464/EEC) the "sector by sector approach" (resulting in Best Available Techniques (BAT) for industrial sectors) has gained in importance as a complementary approach to control pollution of the aquatic environment. In addition, the latest trend comprises the application of biological testing in both waste waters and surface waters to identify specific deleterious substances e.g. to be included in programmes.

Many Member States have followed an "emission approach" for List II substances rather than the required environmental quality objective approach. In cases where the "emission approach" is followed, practice shows that BAT for point sources are applied and Best Environmental Practice (BEP) for diffuse sources are being developed. If the receiving waters do not meet the environmental quality objectives after completion of BAT and BEP, additional measures exceeding BAT and BEP can become compulsory. The check whether environmental quality objectives are met is based on the results of monitoring programmes of the aquatic systems. Substances are monitored which are considered relevant for the aquatic system, taking into account the availability of analytical methods having sufficiently low detection limits and the costs for monitoring. In cases where the environmental quality objectives approach is followed, consented values are directly derived from operational environmental quality standards.

As required by Article 7 of Directive 76/464/EEC, most Member States have set water quality objectives. Many Member States have simply adopted water quality objectives set in several Community Directives. In addition, national water quality objectives have been and/or are (being) developed by Member States, taking into account the local needs and situations of the aquatic environment. Within the framework of the Rhine Action Programme, indicative water quality objectives for priority substances (known as 'reference values') for approximately 50 substances have been developed for the international catchment area of the Rhine. For further substances considered to pose a risk for the Rhine, indicative water quality objectives are being developed (currently for about 8 substances).

The overall conclusion is that none of the Member States is completely in accordance with the requirements of Article 7 of Directive 76/464/EEC regarding pollution control and reduction measures of List II substances. Instead, Member States have made their own interpretation of Article 7 of the Directive and developed what we have referred to as 'Alternative Measures' for control of List II substances. These Alternative Measures have been influenced by Article 7 as well as the articles relating to control of List I substances and other (inter)national Driving Forces. In most cases, it is the 'Alternative Measures' which have had the most direct impact on the water quality of the surface waters concerning List II substances in the Member States. The Alternative Measures are in line with local, national and international requirements and do not necessarily consider individual List II substances specifically but rather consider them as part of a general policy and procedure for water pollution control.

Driving Forces

Many international agreements which considerably support the goals expressed in Directive 76/464/EEC have prompted action on pollution reduction programmes. Such international agreements include several EC Directives as well as international agreements such as: the Convention for the prevention of marine pollution from land-based sources, Convention for the protection of the Rhine against pollution, the Rhine chemical treaty, the Rhine Action Programme, ministerial declarations on the protection of the North Sea against pollution, the Convention to protect the Baltic Sea against pollution and the Convention for the protection of the Mediterranean against pollution. Also, economic developments and developments in industrial activities and production processes have influenced pollution control measures. Quantification of the relative contributions of these development to the improvement of water quality is not possible to make. However, it can be concluded, that the sum of all of these Driving Forces have served to cause Member States to develop their own strategies (Alternative Measures) for pollution control.

Industrial and Municipal Loads

For the Rhine River, a comprehensive survey of all industrial and municipal discharges for the years 1985 and 1992 is available. This survey shows that for most of the selected List II substances, discharges have decreased significantly in this period.

For the river Scheldt, a great deal of discharge information for individual industries was made available, especially for chromium and phosphorus. Additional discharge information for all of Belgium suggests that discharges have decreased noticeably between 1985 and 1995. This discharge trend is also be relevant for the Meuse. There were few data on individual dischargers available for the Meuse.

For the rivers in France (Loire, Rhône and Seine), a great deal of data on individual discharges are available. In a some cases, a decreasing trend can be seen, but in most cases, no clear trend is observed.

For several rivers, including those in the UK (Mersey, Thames and Trent), as well as the Slaney and Tagus, discharge information in the form of riverine plus direct input data was available for some substances. In many cases, a decreasing trend can be seen for the data that is available.

For the Axios, Ebro, Moselle, Po and Sado Rivers, no data on industrial and municipal loads were available.

Water Quality

Yearly average water quality data have been collected for 16 rivers in the European Union. In general, historical data for most of the List II substances were available only for a few rivers. In general, water quality data are more available for the heavy metals and nutrients than for the organic substances.

For three of the rivers (Meuse, Scheldt and Rhine), an extensive amount of data for List II substances, including heavy metals and arsenic, organic pollutants, and nutrients were collected from the National Experts. In general, where such complete data are available, a trend of improving water quality (i.e. decreasing concentrations) can be seen, though this trend is often not so clear for the nutrients or organic micropollutants.

For the rivers Mersey, Thames, Trent, Moselle, Ebro, Seine and Tagus, data were available for many years for heavy metals and nutrients. For the Sado River, data for these same substances were available for the last five years. For the Slaney River, data for a few heavy metals are available for the last five years. No data for the List II organic substances were available for these rivers.

For the Axios River, only data on nutrients were made available.

For Loire River, limited data for several List II substances including heavy metals and organic pollutants were available from recent years.

For the Po River, little or no water quality data were made available.

A summary of the discharge and water quality data available in each river basin is given in Table 6.1. From this information, a further conclusion about the impact of Directive 76/464/EEC can (in some cases) be made.

Monitoring

Considering the monitoring of water flows and water quality data in the Community, some general conclusions can be drawn:

- monitoring of surface waters is performed by the competent authorities at different levels in different countries (e.g. national, provincial or local). In a number of cases, surface water monitoring is also carried out by non-governmental organisations, such as drinking water production companies;
- at the beginning of the 1980's, it was common practice to monitor surface waters for the water flow and general water quality parameters such as dissolved oxygen. In many rivers, the List II heavy metals were also routinely monitored;
- In only a few rivers was the monitoring expanded with the analysis of some List II organic substances. In the river catchments of the Rhine, Meuse, and Scheldt, an extended group of the above mentioned parameters has been analyzed over a longer period of time;
- for a number of substances, the concentrations are below the limit of detection. Furthermore, this detection limit may be changing with time;
- for several rivers, annual average concentrations are calculated and reported by setting any values below the detection limit to half the detection value. This calculation method was also used in cases where only daily concentration data were reported. For other rivers, annual average concentrations are reported with no indication of how any data below the detection limit were handled.

Considering the monitoring of waste water discharge, the following conclusions can be drawn:

- in the majority of the Member States, self monitoring of waste water discharges seems to be common practice; enforcement of the terms and standards set in the permits (on spot check basis) is carried out by the competent authorities;
- a number of Member States made actual discharge information available for individual industries (i.e. this information came from the central level). In a number of Member States, the information on industry discharges is decentralized. This decentralized information could not be made available by the National Expert. All discharge data used in this report are from publicly available literature (see References);
- some Member States aggregated discharge information at a central level; this information is sometimes aggregated per river catchment (e.g. direct and indirect riverine input data, as reported by PARCOM);
- the procedures for discharge monitoring and reporting of discharges data at a central level seem to be less developed than for surface water monitoring.

Table 6.1 Summary of trends in water quality and discharges to surface water and conclusions on the impact of Directive 76/464/EEC

River	Summary WQ	Summary Discharges	Conclusion on impact 76/464/EEC
Axios	TotP ↑ Tot(in)N ↑	ND	No influence
Ebro	Zn,Cu,Cr,Pb ? TotN ↑	ND	No conclusion possible
Loire	TotP, atrazine ↑ Cr ↓	? (As, Cr, Cu, Pb, TotN, TotP, Zn)	No conclusion possible
Mersey	Cu, Pb ↓ Zn, Cr ↓ TotN ↑	Cu, Pb ↓ Zn ? TotN, TotP ? (Riv. + Dir. inputs)	Both concentrations and discharges of Cu and Pb decrease.
Meuse	Zn, Cu, Cr, Pb ↓ As, PAH, TCA ↓ TotN ↑, TotP ↓ atrazine, parathion, endosul. ?	?)[1,2] (Cr, Zn, PAH)	Concentrations of As, Cr, Cu, Pb, and Total P decreased, as did discharge to all surface waters in Belgium
Moselle	Zn, Cu, Cr, Pb ? ↓ TotP ↑	? (Zn, Cu, Cr, Pb, TotN, TotP)	No conclusion possible
Po	Zn, Cu, Cr, Pb ? As, TotP, TotN ? atrazine? (one yr. data only)	ND	No conclusion possible
Rhine	↓ (see App. C)	↓ (see App. C)	Both concentrations and discharges of the selected List II substances have decreased.
Rhone	Zn, Cu, Cr, Pb ? TotP ↓ As, PAH, TCA ? atrazine ?	? (TCA, As, Cr, Cu, Pb, TotN, TotP)	No conclusion possible
Sado	Zn,TotN,TotP ↓ Cu, Cr, Pb ?	ND	No conclusion possible
Scheldt	Zn, Cu, Cr, Pb ? TotN ?, TotP ↓ PAH, As ? endosulfan ?	?)[1,2] (Zn, Cu, Pb, TotN, TotP)	Concentrations of Total P decreased, as did discharge to all surface waters in Belgium
Seine	Zn, Cu, Cr, Pb ↓ TotP ? As ↑	? (As, Cr, Cu, Pb, TotN, TotP, Zn)	No conclusion possible
Slaney	Zn, Cu, Cr, Pb? TotN , TotP ?	? (Zn, Cu, Pb, TotN, TotP) (PARCOM annual loads)	No conclusion possible

Tagus)3	Zn, Cu ?/↓ Cr ?/↓ Pb ?/? As ?/↑ TotP ND/↓ TotN ND/?	Zn, Cu, Pb ? TotP-↑, TotN ? (Riv. + Dir. inputs)	No conclusion possible
Thames	Pb ↓ Zn, Cu, Cr ? TotN ? TotP ? atrazine ?	Pb ↓ Zn, Cu, Cr ↓ TotN ? TotP↓ atraz., parath. ↓ (Riv. + Dir. inputs)	Both concentrations and discharges of lead decrease.
Trent	Zn, Cu, Cr, Pb ↓ As ? TotN ? PAH ?	Zn, Cu, Cr, Pb ↓ As ↓ atraz., parath. ↓ (Riv. + Dir. inputs)	Both concentrations and discharges of Zn, Cu, Cr, and Pb decrease.

Notes:

)1 As, Cr, Cu, Pb, TotP, TotN, and TCA discharges to all Belgian surface waters were lower in 1995 compared to 1985 (estimated values for 1995)
)2 Industrial discharges of PAH decrease from 1985 to 1995 in The Netherlands
)3 Summary given for both Spain and Portugal (S/P), due to differences in data availability and observed trends. For other international rivers, the trends were consistent in the different countries.

↑ = concentration/discharges increasing for the listed substances
↓ = concentration/discharges decreasing for the listed substances
? = no clear trend in concentrations or discharges
ND= No Data

Overall

The available data on water quality and discharges have been used to make an assessment of the Alternative Measures developed by the Member States regarding the improved quality of the selected surface waters.

There are several (six) rivers for which extensive information exists regarding water quality and discharges on which to base a conclusion about the impact of Directive 76/464/EEC regarding List II substances. These are the Rhine, UK Rivers (Mersey, Thames, and Trent) Meuse, and Scheldt Rivers. For other rivers, there is either:

- extensive water quality data and limited discharge information;
- limited water quality data and extensive discharge information;
- limited water quality data and limited discharge information.

Overall conclusions for the Rhine (see also Appendix C)

- the water quality for all List II substances improved in the period 1980-1992;
- the industrial and municipal discharges of List II substances were strongly reduced in the period 1985-1992;
- Directive 76/464/EEC has not been completely implemented as specified in Article 7. However, all the Rhine countries have developed Alternative Measures for the control of List II substances. The Alternative Measures have resulted in a clear improvement of the quality of the Rhine River in the period 1980-1993. The Directive together with other Driving Forces is one of the factors that lead to the development of the Alternative Measures. In turn, the Directive was partly based on the Chemical Treaty for the Rhine of 1976.

Overall conclusions for the UK Rivers (Mersey, Thames and Trent):

- In the Mersey River, both concentrations and discharges of copper and lead decrease in the period 1980-1993;
- In the Thames River, both concentrations and discharges of lead decrease in the period 1980-1993;
- In the Trent River, both concentrations and discharges of zinc, copper, chromium and lead decrease in the period 1980-1993;
- The UK follows a water quality-based approach for control of water pollution of List II substances, which is in agreement with the principles of Directive 76/464/EEC. However, the Directive has not been completely implemented as specified in Article 7. The Alternative Measures as developed in the UK have lead to water quality improvements for heavy metals in the UK rivers.

Overall conclusions for the Meuse and Scheldt:

- the water quality for Total P in the Scheldt improved in the period 1980-1992 (for other substances, no clear trend was visible);
- the water quality for arsenic, chromium, copper, lead and Total P in the Meuse improved in the period 1980-1992;
- considering estimated discharges to surface water for all of Belgium, there has been a strong reduction of Total P, as well as arsenic, chromium, copper, lead over the period 1985-1995.
- Directive 76/464/EEC has not been completely implemented as specified in Article 7. However, the Alternative Measures which were developed in part due to the Directive have lead to the measured quality improvement of the Meuse and Scheldt Rivers.

Overall conclusions for remaining rivers:

- the availability of water quality data is variable. In general, there are more data available for the heavy metals and nutrients than for the organic micropollutants. The trends in water quality is quite variable: sometimes improving, sometimes worsening, sometimes remaining constant, or fluctuating with no clear trend;
- the availability of information on industrial and municipal discharges also widely variable. The type of information available includes discharges from individual industries, aggregated discharges (groups of substances), and the sum of riverine plus industrial discharges (river discharges to sea);
- in general, there is less information available for discharges than for water quality.
- Directive 76/464/EEC has not been completely implemented as specified in Article 7. Instead, the Member States have developed their own Alternative Measures for water quality management of List II substances. However, the Directive is probably one of the driving forces for the 'Alternative Measures' followed by the relevant Member States. There is not enough data available to make an assessment of the Alternative Measures.

General Conclusions:

Directive 76/464/EEC has not been completely implemented as specified in Article 7 in any of the Member States. However, each of the Member States has developed its own 'Alternative Measures' for control of pollution to surface waters from List II substances. The Directive is one of the driving forces (together with other (inter)national legislations, treaties and conventions) influencing the development of the 'Alternative Measures' followed by the Member States. Most Member States have followed an "emission approach" based on BAT and BEP for List II substances rather than the required environmental quality objective approach. If the receiving waters do not meet the environmental quality objectives after completion of BAT and BEP, additional measures exceeding BAT and BEP can become compulsory.

For the Rhine River, the selected UK rivers (Mersey, Thames, and Trent) as well as the Scheldt and the Meuse Rivers, there is an observed decrease in both concentrations and discharges of (some of) the selected List II substances. For these rivers, it can be concluded that the developed Alternative Measures lead to the water quality improvements.

For the other rivers, there is not enough data available to make an assessment of the Alternative Measures developed by the relevant Member States.

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8 References

EC	= European Community
GEN	= General information ; not received from EC
B	= Belgium
DK	= Denmark
F	= France
D	= Germany
GR	= Greece
IRL	= Ireland
I	= Italy
L	= Luxembourg
NL	= Netherlands
P	= Portugal
E	= Spain
UK	= United Kingdom

Note: References throughout the text are given by a country/location code followed by a 3-4 digit number (e.g. EC001). This non-standard manner of giving references has been chosen in order to allow references to be easily incorporated within the water quality data tables (Appendix E, Volume II).

EC = European Community

EC001: Council directive of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community. OJL 129, 18.5.1976, p.23.
: European Community, May 1976.

EC002: Administrative Structures and Implementation of the Community Directives on the Dangerous Substances Discharged into the Aquatic Environment.
Ref. No. B4-3040/015406/92
: Environmental Resources Management, Final Report, Sept. 1994.

EC003: Administrative Structures and Implementation of the Community Directives on the Dangerous Substances Discharged into the Aquatic Environment: Country Annexes.
Ref. No. B4-3040/015406/92
: Environmental Resources Management, Final Report, Sept. 1994.

EC004: Kwaliteit van zoet oppervlaktewater. Gemeenschappelijke procedure voor de uitwisseling van informatie: 1982-1986. Samenvattend verslag Comm. v/d Europese Gemeensch.
: Dir. Gen. Milieubescherming, Nucleaire Veiligheid en Burgerbescherming.

EC005: Identification and brief description of the emissions (water, air & wastes) from the different sectors of the Organic Chemical Industry. Final Report January 1992.
: Comm. of the European Communities. Dir. General for the environment.

EC006: Study Contract B 6612-90-007819. Application of directive 76/464/EEC
Dangerous substances in the aquatic environment. Final Report. XI/15/92-EN
: EXCOSER

EC007: The economic effects of pollution control. Measures on defined industrial sectors. Mercury discharging industries. Draft report.
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EC008: Technical data sheets on substances, candidates for List I, Directive 76/464/EEC. Final Report, 1990. EURECO.
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EC009: Identification and brief description of emissions (water, air, wastes) from different sectors of the manufacture of basic inorganic chemicals and non-metallic mineral products.
: Environmental Resources Management, Final Report.

EC010: The importance of diffuse pollution sources and their consequences to the aquatic environment of the community. Final Report.
: WRc Environment Medmenham Laboratory, Medmenham, UK.

EC011: Council Directive of 12 June 1986 on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464/EEC. OJL 181, 4.7.1986, p.16.
: European Community, June 1986.

EC012: National reports of Member States concerning implementation of Directive 76/464/EEC

EC013: European Rivers and Lakes. Assessment of their Environmental State
Prepared by Danish Ministry of Environment and Energy
: European Environment Agency

EC014 Techno-economic Aspects of Measures to Reduce Water Pollution in Small and Medium Sized Enterprises on the Basis of an Industry and Market Driven Approach.
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Appendix A: Council Directive 76/464/EEC

COUNCIL DIRECTIVE

of 4 May 1976

on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community

(76/464/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Articles 100 and 235 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament [1],

Having regard to the opinion of the Economic and Social Committee [2],

Whereas there is an urgent need for general and simultaneous action by the Member States to protect the aquatic environment of the Community from pollution, particularly that caused by certain persistent, toxic and bioaccumulable substances;

Whereas several conventions or draft conventions, including the Convention for the prevention of marine pollution from land-based sources, the draft Convention for the protection of the Rhine against chemical pollution and the draft European Convention for the protection of international watercourses against pollution, are designed to protect international watercourses and the marine environment from pollution; whereas it is important to ensure the coordinated implementation of these conventions;

Whereas any disparity between the provisions on the discharge of certain dangerous substances into the aquatic environment already applicable or in preparation in the various Member States may create unequal conditions of competition and thus directly affect the functioning of the common market; whereas it is therefore necessary to approximate laws in this field, as provided for in Article 100 of the Treaty;

Whereas it seems necessary for this approximation of laws to be accompanied by Community action so that one of the aims of the Community in the sphere of protection of the environment and improvement of the quality of life can be achieved by more extensive rules; whereas certain specific provisions to this effect should therefore be laid down; whereas Article 235 of the Treaty should be invoked as the powers required for this purpose have not been provided for by the Treaty;

Whereas the programme of action of the Europea Communities on the environment [3], provides for number of measures to protect fresh water and se water from certain pollutants;

Whereas in order to ensure effective protection of th aquatic environment of the Community, it is necessary to establish a first list, called List I, of certain individual substances selected mainly on the basis of their toxicity, persistence, and bioaccumulation, with the exception of those which are biologically harmless or

(1) OJ No C 5, 8. 1. 1975, p. 62.
(2) OJ No C 108, 15. 5. 1975, p. 76.

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which are rapidly converted into substances which are biologically harmless, and a second list, called List II, containing substances which have a deleterious effect on the aquatic environment, which can, however, be confined to a given area and which depend on the characteristics and location of the water into which they are discharged; whereas any discharge of these substances should be subject to prior authorization which specifies emission standards;

Whereas pollution through the discharge of the various dangerous substances within List I must be eliminated; whereas the Council should, within specific time limits and on a proposal from the Commission, adopt limit values which the emission standards should not exceed, methods of measurement, and the time limits with which existing dischargers should comply;

Whereas the Member States should apply these limit values, except where a Member State can prove to the Commission, in accordance with a monitoring procedure set up by the Council, that the quality objectives established by the Council, on a proposal from the Commission, are being met and continuously maintained throughout the area which might be affected by the discharges because of the action taken, among others, by that Member State;

Whereas it is necessary to reduce water pollution caused by the substances within List II; whereas to this end the Member States should establish programmes which incorporate quality objectives for water drawn up in compliance with Council Directives where they exist; whereas the emission standards applicable to such substances should be calculated in terms of these quality objectives;

Whereas, subject to certain exceptions and modifications, this Directive should be applied to discharges into ground water pending the adoption of specific Community rules in the matter;

Whereas one or more Member States may be able, individually or jointly, to take more stringent measures than those provided for under this Directive;

Whereas an inventory of discharges of certain particularly dangerous substances into the aquatic environment of the Community should be drawn up in order to know where they originated;

Whereas it may be necessary to revise and, where required, supplement Lists I and II on the basis of experience, if appropriate, by transferring certain substances from List II to List I.

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. Subject to Article 8, this Directive shall apply to:

— inland surface water,

— territorial waters,

— internal coastal waters,

— ground water.

2. For the purposes of this Directive:

(a) 'inland surface water' means all static or flowing fresh surface water situated in the territory of one or more Member States;

(b) 'internal coastal waters' means waters on the land-ward side of the base line from which the breadth of territorial waters is measured, extending, in the case of watercourses, up to the fresh-water limit;

(c) 'fresh-water limit' means the place in the water-course where, at low tide and in a period of low fresh-water flow, there is an appreciable increase in salinity due to the presence of sea-water;

(d) 'discharge' means the introduction into the waters referred to in paragraph 1 of any substances in List I or List II of the Annex, with the exception of:

— discharges of dredgings,

— operational discharges from ships in territorial waters,

— dumping from ships in territorial waters;

(e) 'pollution' means the discharge by man, directly or indirectly, of substances or energy into the aquatic environment, the results of which are such as to cause hazards to human health, harm to living resources and to aquatic ecosystems, damage to amenities or interference with other legitimate uses of water.

Article 2

Member States shall take the appropriate steps to eliminate pollution of the waters referred to in Article 1 by the dangerous substances in the families and groups of substances in List I of the Annex and to reduce pollution of the said waters by the dangerous substances in the families and groups of substances in List II of the Annex, in accordance with this Directive, the provisions of which represent only a first step towards this goal.

Article 3

With regard to the substances belonging to the families and groups of substances in List I, hereinafter called 'substances within List I':

1. all discharges into the waters referred to in Article 1 which are liable to contain any such substance shall require prior authorization by the competent authority of the Member State concerned;
2. the authorization shall lay down emission standards with regard to discharges of any such substance into the waters referred to in Article 1 and, where this is necessary for the implementation of this Directive, to discharges of any such substance into sewers;
3. in the case of existing discharges of any such substance into the waters referred to in Article 1, the dischargers must comply with the conditions laid down in the authorization within the period stipulated therein. This period may not exceed the limits laid down in accordance with Article 6 (4);
4. authorizations may be granted for a limited period only. They may be renewed, taking into account any charges in the limit values referred to in Article 6.

Article 4

1. Member States shall apply a system of zero-emission to discharges into ground water of substances within List I.

2. Member States shall apply to ground water the provisions of this Directive relating to the substances belonging to the families and groups of substances in List II, hereinafter called 'substances within List II'.

3. Paragraphs 1 and 2 shall apply neither to domestic effluents nor to discharges injected into deep, saline and unusable strata.

4. The provisions of this Directive relating to ground water shall no longer apply upon the implementation of a separate Directive on ground water.

Article 5

1. The emission standards laid down in the authorizations granted pursuant to Article 3 shall determine:

(a) the maximum concentration of a substance permissible in a discharge. In the case of dilution the limit value provided for in Article 6 (1) (a) shall be divided by the dilution factor;

(b) the maximum quantity of a substance permissible in a discharge during one or more specified periods of time. This quantity may, if necessary, also be expressed as a unit of weight of the pollutant per unit of the characteristic element of the polluting activity (e.g. unit of weight per unit of raw material or per product unit).

2. For each authorization, the competent authority of the Member State concerned may, if necessary, impose more stringent emission standards than those resulting from the application of the limit values laid down by the Council pursuant to Article 6, taking into account in particular the toxicity, persistence, and bioaccumulation of the substance concerned in the environment into which it is discharged.

3. If the discharger states that he is unable to comply with the required emission standards, or if this situation is evident to the competent authority in the Member State concerned, authorization shall be refused.

4. Should the emission standards not be complied with, the competent authority in the Member State concerned shall take all appropriate steps to ensure that the conditions of authorization are fulfilled and, if necessary, that the discharge is prohibited.

Article 6

1. The Council, acting on a proposal from the Commission, shall lay down the limit values which the emission standards must not exceed for the various dangerous substances included in the families and groups of substances within List I. These limit values shall be determined by:

(a) the maximum concentration of a substance permissible in a discharge, and

(b) where appropriate, the maximum quantity of such a substance expressed as a unit of weight of the pollutant per unit of the characteristic element of the polluting activity (e.g. unit of weight per unit of raw material or per product unit).

Where appropriate, limit values applicable to industrial effluents shall be established according to sector and type of product.

The limit values applicable to the substances within List I shall be laid down mainly on the basis of:

— toxicity,
— persistence,
— bioaccumulation,

taking into account the best technical means available.

2. The Council, acting on a proposal from the Commission, shall lay down quality objectives for the substances within List I.

These objectives shall be laid down principally on the basis of the toxicity, persistence and accumulation of the said substances in living organisms and in sediment, as indicated by the latest conclusive scientific data, taking into account the difference in characteristics between salt-water and fresh water.

3. The limit values established in accordance with paragraph 1 shall apply except in the cases where a Member State can prove to the Commission, in accor-dance with a monitoring procedure set up by the ouncil on a proposal from the Commission, that the ality objectives established in accordance with para-ph 2. or more severe Community quality objec-es, are being met and continuously maintained oughout the area which might be affected by the charges because of the action taken, among others, that Member State.

he Commission shall report to the Council the nstances where it has had recourse to the quality objectives method. Every five years the Council shall review, on the basis of a Commission proposal and in accordance with Article 148 of the Treaty, the instances where the said method has been applied.

4. For those substances included in the families and groups of substances referred to in paragraph 1, the deadlines referred to in point 3 of Article 3 shall be laid down by the Council in accordance with Article 12, taking into account the features of the industrial sectors concerned and, where appropriate, the types of products.

Article 7

1. In order to reduce pollution of the waters referred to in Article 1 by the substances within List II, Member States shall establish programmes in the implementation of which they shall apply in particular the methods referred to in paragraphs 2 and 3.

2. All discharges into the waters referred to in Article 1 which are liable to contain any of the substances within List II shall require prior authorization by the competent authority in the Member State concerned, in which emission standards shall be laid down. Such standards shall be based on the quality objectives, which shall be fixed as provided for in paragraph 3.

3. The programmes referred to in paragraph 1 shall include quality objectives for water; these shall be laid down in accordance with Council Directives, where they exist.

4. The programmes may also include specific provisions governing the composition and use of substances or groups of substances and products and shall take into account the latest economically feasible technical developments.

5. The programmes shall set deadlines for their implementation.

6. Summaries of the programmes and the results of their implementation shall be communicated to the Commission.

7. The Commission, together with the Member States, shall arrange for regular comparisons of the programmes in order to ensure sufficient coordination in their implementation. If it sees fit, it shall submit relevant proposals to the Council to this end.

Article 8

Member States shall take all appropriate steps to implement measures adopted by them pursuant to this Directive in such a way as not to increase the pollution of waters to which Article 1 does not apply. They shall in addition prohibit all acts which intentionally or unintentionally circumvent the provisions of this Directive.

Article 9

The application of the measures taken pursuant to this Directive may on no account lead, either directly or indirectly, to increased pollution of the waters referred to in Article 1.

Article 10

Where appropriate, one or more Member States may individually or jointly take more stringent measures than those provided for under this Directive.

Article 11

The competent authority shall draw up an inventory of the discharges into the waters referred to in Article 1 which may contain substances within List I to which emission standards are applicable.

Article 12

1. The Council, acting unanimously, shall take a decision within nine months on any Commission proposal made pursuant to Article 6 and on the proposals concerning the methods of measurement applicable.

Proposals concerning an initial series of substances as well as the methods of measurement applicable and the deadlines referred to in Article 6 (4) shall be submitted by the Commission within a maximum period of two years following notification of this Directive.

2. The Commission shall, where possible within 27 months following notification of this Directive, forward the first proposals made pursuant to Article 7 (7). The Council, acting unanimously, shall take a decision within nine months.

Article 13

1. For the purposes of this Directive, Member States shall supply the Commission, at its request to be submitted in each case, with all the necessary information, and in particular:

— details of authorizations granted pursuant to Article 3 and Article 7 (2),

— the results of the inventory provided for in Article 11,

— the results of monitoring by the national network,

— additional information on the programmes referred to in Article 7.

2. Information acquired as a result of the application of this Article shall be used only for the purpose for which it was requested.

3. The Commission and the competent authorities of the Member States, their officials and other servants shall not disclose information acquired by them pursuant to this Directive and of a kind covered by the obligation of professional secrecy.

4. The provisions of paragraphs 2 and 3 shall not prevent publication of general information or surveys which do not contain information relating to particular undertakings or associations of undertakings.

Article 14

The Council, acting on a proposal from the Commission, which shall act on its own initiative or at the request of a Member State, shall revise and, where necessary, supplement Lists I and II on the basis of experience, if appropriate, by transferring certain substances from List II to List I.

Article 15

This Directive is addressed to the Member States.

Done at Brusssels, 4 May 1976.

For the Council

The President

G. THORN

ANNEX

List I of families and groups of substances

List I contains certain individual substances which belong to the following families and groups of substances, selected mainly on the basis of their toxicity, persistence and bioaccumulation, with the exception of those which are biologically harmless or which are rapidly converted into substances which are biologically harmless:

1. organohalogen compounds and substances which may form such compounds in the aquatic environment,
2. organophosphorus compounds,
3. organotin compounds,
4. substances in respect of which it has been proved that they possess carcinogenic properties in or via the aquatic environment (1),
5. mercury and its compounds,
6. cadmium and its compounds,
7. persistent mineral oils and hydrocarbons of petroleum origin,

and for the purposes of implementing Articles 2, 8, 9 and 14 of this Directive:

8. persistent synthetic substances which may float, remain in suspension or sink and which may interfere with any use of the waters.

List II of families and groups of substances

List II contains:

— substances belonging to the families and groups of substances in List I for which the limit values referred to in Article 6 of the Directive have not been determined,

— certain individual substances and categories of substances belonging to the families and groups of substances listed below,

and which have a deleterious effect on the aquatic environment, which can, however, be confined to a given area and which depend on the characteristics and location of the water into which they are discharged.

Families and groups of substances referred to in the second indent

1. The following metalloids and metals and their compounds:

1. zinc	6. selenium	11. tin	16. vanadium
2. copper	7. arsenic	12. barium	17. cobalt
3. nickel	8. antimony	13. beryllium	18. thalium
4. chromium	9. molybdenum	14. boron	19. tellurium
5. lead	10. titanium	15. uranium	20. silver

2. Biocides and their derivatives not appearing in List I.

3. Substances which have a deleterious effect on the taste and/or smell of the products for human consumption derived from the aquatic environment,

and compounds liable to give rise to such substances in water.

4. Toxic or persistent organic compounds of silicon, and substances which may give rise to such compounds in water, excluding those which are biologically harmless or are rapidly converted in water into harmless substances.

(1) Where certain substances in List II are carcinogens, they are included in category 4 of this list.

5. Inorganic compounds of phosphorus and elemental phosphorus.

6. Non persistent mineral oils and hydrocarbons of petroleum origin.

7. Cyanides, fluorides.

8. Substances which have an adverse effect on the oxygen balance, particularly: ammonia, nitrites.

Statement on Article 8

With regard to the discharge of waste water into the open sea by means of pipelines, Member States undertake to lay down requirements which shall be not less stringent than those imposed by this Directive.

Appendix B: Water Management Profiles for EC Member States)[1]

(Comprising key issues of organisation, legislation, transposition of Directive 76/464/EEC (for List II substances), permitting, enforcement and monitoring)

)[1] New Member States (Sweden, Finland and Austria) are not included, since the project was required to assess the effectiveness of the Directive since its adoption.

BELGIUM

Brussels region

(sources: EC002, EC003, EC012, D110, B110, B330, B331)

1 Organization

The competent authority in Brussels is the Brussels Institute for Environmental Management (IBGE-BIM). IBGE publishes reports on the state of the environment in Brussels based on data, primarily collected by the national authorities.

2 Framework legislation

The framework legislation for protection of surface water was adopted in 1971 (Loi du 26 mars 1971 portant sur la protection des eaux de surface contre la pollution). Directive 76/464/EEC is applicable in the Brussels region through a mix of royal decrees (national level) and regional.

3 Transposition

Directive 76/464/EEC is transposed via a Royal Decree of 03-08-1976.

Some List II substances are covered by regional regulations subsequent to a royal decree of 1987 (Arrêté Royal du 4 novembre 1987 fixant des normes de qualité de base pour les eaux du réseau hydrographique public).
There is no programme for List II substances, except that their discharge is forbidden unless it is specially authorised in the discharge permit.

4 Permitting and enforcement

Currently the industrial waste water emissions are covered by a separate permit system. A new permit system will be adopted soon. New permits will be valid for 10 years, renewable twice during this period of 10 years.

5 Monitoring

a. Waste water monitoring
Monitoring of waste water discharges is carried out by the Environmental Inspectorate. There are currently no specific provisions at regional level for self-monitoring.

b. Surface water monitoring
The monitoring of the quality of surface waters is carried out by the authorities.

Flemish region

(sources: EC002, EC003, EC012, D110, B110, B117 B119, B320, B325, B330, B331)

1 Organization

The Administration for Environment, Nature, Land and Water Management called AMINAL (Administratie Milieu, Natuur-, Land en Waterbeheer), is a subdivision of the Department of the Environment and Infrastructure (Departement Leefmilieu en Infrastructuur) belonging to the Administration of the Flemish Government. The Flemish Environmental Agency (VMM = Vlaamse Milieu Maatschappij) is an official organisation responsible for planning (sewage infrastructure and sewage treatment plants and environmental policy), monitoring, control and collecting levies on waste water discharges.

2 Framework legislation

Regulation of (point source) discharges in Flanders is primarily based on the Act of 26 March 1971 concerning the protection of surface waters against pollution (Wet van 26 maart 1971 op de bescherming van de oppervlaktewateren tegen verontreiniging). This Act has been regularly amended and supplemented (10 times in the period 1979 - 1992). The Decree of 28 June 1985 concerning environmental licensing has been ammended by decrees of 07 February 1990, 02 December 1990 and 21 December 1990; The Decree of 05 April 1995 giving general requirements concerning environmental policy has been expanded by the Decree of 19 April 1995 concerning environmental auditing.

3 Transposition

The directive has been transposed into national and regional law. Directive 76/464/EEC was first transposed into a Royal Decree of 03. August 1976 (Koninklijk Besluit van 03 augustus 1976 houdende algemeen regelement voor het lozen van afvalwater in de gewone oppervlakte-wateren). One has to keep in mind that environmental legislation became progressively a regional matter from 01 January 1989 onwards; product norms are still a federal matter).

Two major pieces of legislation have recently been adopted:

VLAREM 1 :
General rules and permit procedures (Besluit van de Vlaamse Executieve van 6 februari 1991 houdende vaststelling van het Vlaams Regelement betreffende de Milieuvergunning, gewijzigd bij besluiten van de Vlaamse Executieve van 27 februari 1992, van 28 oktober 1992, en van 01 juni 1995).

VLAREM 2 :
VLAREM 2 of 01 June 1995 replaces VLAREM 2 of 1992 for juridical reasons. Specific rules for the different environmental compartments (air, water, soil, noise) and industrial sectors (nuisance causing installations). The new VLAREM 2 imposes VMM to work out discharge reduction programmes and other "76/464 obligations".

As a base line, next to general conditions, discharge standards for specific industrial sectors were set (based on BAT). Priority sectors have been allocated also based on the agreements of the North Sea Conferences. Inventories of emissions and water qualities of List II substances guide the authorities when taking further measures as reflected in the 20-25 quality objectives (as of 01-07-1995) for surface waters in Flanders (concerning nutrients, heavy metals, organic substances such as pesticides and inorganic substances). Special or supplementary conditions can relate to the quality of receiving waters. For diffuse pollution, fertilizer and manure policies are executed (e.g. the manure action programme).

4 Permitting and enforcement

Since 1992 all issued discharge permits are based on VLAREM I and II. These regulations were established in order to integrate all previous fragmentary environmental legislation into one up-dated coordinated Flemish environmental legislation. All EC Directives are put into force in VLAREM.

Discharges from installations classified as first or second class need a discharge permit. An application for a permit has to be made at the provincial level for nuisance causing installations in the private sector (industry) and at the regional level for installations under control of official bodies. The applications are judged by provincial and regional commissions. AMINAL/Division of permits (AMINAL/AMV of Afdeling Milieuvergunningen) coordinates the permit procedure and exercises, together with VMM in an advisory role, on water discharges and emissions into air.

Permits delivered or requested before September 1991 are valid for a maximum period of 20 years or the period as mentioned in the permit if less.

Permits for discharges containing List II substances have to be evaluated at least every four years and renewed or adapted considering progress in best available techniques and water quality objectives.

Enforcement of the terms and standards set in the permits is carried out by AMINAL/Division of environmental Inspection (AMINAL/AMI = Afdeling Milieu Inspectie)

5 Monitoring

a. Waste water monitoring
Monitoring of waste water discharges is conducted by (i) the plant operator, (ii) the Flemish Environmental Agency (VMM), and (iii) the Inspection Division of the Flemish Ministry of the Environment.

Monitoring of waste water by the plant operator (parameters, sampling, frequency, methodology of analyses) to control ELVs is required by VLAREM. The monitoring can be conducted by the plant operator or by an independent officially authorised laboratory. If monitoring is conducted by the plant operator, the whole monitoring procedure must be approved by an authorised environmental expert.

b. Surface water monitoring
The Flemish Environmental Agency (VMM) runs the measuring network for the control of the physico-chemical and biological (biological index) quality of surface waters. VMM also publishes various annual reports on waste water emissions.

Walloon region

(sources: EC002, EC003, EC012, EC014, D110, B330, B331)

1 Organization

The competent body in the Walloon region is the General Directorate for Natural Resources and the Environment (DGNRE). Two divisions of the DGNRE are involved in areas covered by the directives:

- Division of Surface Waters (Divisions des eaux de surface), whose competencies include waste water discharge permits.

- Division of industrial Pollution (Divisions de pollutions industrielles, DPI). This division is in charge of monitoring all industrial emissions and immissions.

2 Framework legislation

The framework legislation (at national level) for protection of surface water was adopted in 1971 (Loi du 26 mars 1971 portant sur la protection des eaux de surface contre la pollution). Decree of 07 October 1985 sets a framework legislation on the protection of surface water in the Walloon region.

3 Transposition

Directive 76/464/EEC is transposed via the Royal Decree of 03-08-1983

There is at the moment no programme covering List II substances. As a base line, next to general conditions, discharge standards for specific industrial sectors were set (BAT). Priority sectors have been allocated also based on the agreements of the North Sea Conferences. Inventories of emissions and water qualities of List II substances guide the authorities for taking further measures while reflecting upon 20-25 quality objectives for surface waters (01-07-1995) in Wallonia (concerning nutrients, heavy metals, organic substances such as pesticides). Special or supplementary conditions can relate to quality of receiving waters. For diffuse pollution, fertilizer and manure policies are executed.

4 Permitting and enforcement

A system of permits for industrial waste water is organized by Regional Decrees of 1985 and 1989. Discharge permits must be renewed every four years. Permits set limit values based on continuous measurements or daily averages.

The enforcement of waste water discharges does not systematically take place.

5 Monitoring

a. Waste water monitoring
Monitoring in the framework of maintenance and compliance with permit conditions is a responsibility of the Division of Surface Water.

Results from discharge monitoring are not published but can be obtained from the authorities upon request.

Wallonia adopted a general decree in February 1993 for the discharge of List II hazardous substances to surface water and sewers. This decree includes a number of requirements applicable to self-monitoring, sampling, measurements and reporting. Self-monitoring requirements are also laid down in permits on a case-by-case basis.

b. Surface water monitoring
Surface water quality is monitored systematically by the authorities.

The Walloon Region publishes an annual report on surface water quality.

DENMARK

(sources: EC002, EC003, EC012, DK1003, DK1007)

1 Organization

In Denmark, the county and municipal authorities are in principle responsible for the control of waste water discharges. This control is part of their overall environmental responsibility.

2 Framework legislation

The Environmental Protection Act (Lov om Miljφbeskyttelse, 1974) introduced comprehensive environmental legislation and was enacted before Denmark became a member of the EC.

3 Transposition

Directive 76/464/EEC is transposed via the Environmental Protection Act, last revision 1995. The Ministerial Decree of January 1995 (Bekendtgφrelse om kvalitetsgrænsevaedier for vandområder og krav til udledning af visse farlige stoffer til vandlφb, sφer eller havet), specifies the constraints for the discharge of both List I and List II substances. The discharge of List II substances requires a permit containing limit values, issued on the basis of a combination of the principle of best available techniques (sector by sector) and the principle of compliance with fixed environmental quality objectives for the receiving waters. (For List I substances at least the limit values set in the "Daughters" of Directive 76/464/EEC are to be met).

The Decree contains water quality objectives for List I and List II substances. Quality objectives are set for the following List II substances:

* the "132 Substances")[1] minus the 17 List I substances for which limit values and environmental quality objectives are set at Community level;
* a number of heavy metals;
* a number of substances having a carcinogenic effect on man or having a negative impact on water for man as far as taste and bad smell are concerned.

)[1] Resolution of the Council adopted on the 7th of February 1983, containing a list of 129 priority pollutants (later on this list was expanded to 132 substances).

In addition, a regional approach is followed, whereby prioritization for environmental quality objectives for List II substances is taking place. A very important part of Danish policy is a nutrient reduction program for point and diffuse sources.

4 Permitting and enforcement

In Denmark the county (for direct discharges) and municipal authorities (for indirect discharges) are in principle responsible for the control of waste water discharges.
County and municipal authorities each have officials with authority to check compliance with permits which have been granted by them.

The Environmental Protection Agency (Miljφ Styrelsen) is generally not involved in compliance checking and enforcement, but where the local authority fails to act, it can initiate legal action against an operator.

5 Monitoring

a. Waste water monitoring
Self-monitoring is required for all installations that need a permit to operate. Monitoring methods and frequencies are specified in the permits, in accordance with national guidelines.

The national authorities have published data on site-specific industrial waste water discharges. Of particular interest in this respect was the Environment Project, that covered eight industry sectors, focusing primarily on large installations discharging hazardous substances.
In addition annual inventories are made of the effluents from industrial activity to lakes, rivers and the sea.

b. Surface water monitoring
The Danish government carried out research projects concerning surface water quality in particular "hot spots" areas.

FRANCE

(sources: EC002, EC003, EC012, F213, F214, F217, F218, D110, NL537; GEN018)

1 Organization

The key organisations in charge of water management in France include the Ministry of Environment, Regional Directorates and Water Agencies. The Ministry of Environment is competent for regulatory aspects. The quality of the aquatic environment is the responsibility of 22 Regional Directorates of Environment (Directions Régionales de l'Environnement; DIREN). These Regional Directorates are managed by the Ministry of Environment.

The Classified Installations Inspectorate is responsible for coordinating permitting and monitoring activities of classified installations. The Inspectorate is organized at regional level, located within 22 Directorates of Industry, Research and Environment (Directions Régionales de l'Índustries, de la Recherche et de l'Environnement; DRIRE). These DRIRE-organizations are managed by both the Ministry of Environment and the Ministry of Industry.

The 6 Water Agencies (Agences de l'Eau) collect data on water consumption and waste water discharges for taxation purposes. The Water Agencies are mainly planning and fund-raising agencies. The raised money will be reallocated to the dischargers as financial support in order to encourage discharge reductions. Construction of sewer systems or sewage treatment plants for example is carried out by the municipalities.

Under the auspices of the Minister of the Environment, the prefects of the 100 departments have a key role in water control. National river quality and the setting of river quality objectives is the responsibility of the prefect. Moreover the prefect has to assure compliance with the standards via inspection and prosecution. For this purpose the Service for technical Assistance to Treatment Plants (Service d'Assistance Technique aux Stations d'Epurations; SATESE) operates under the supervision of the departments.

2 Framework legislation

In France the Act of 19 July 1976 on classified installations (Loi 76-663 du 19 juillet relative aux installations classées pour la protection de l'environnement) is the framework legislation.

3 Transposition

Directive 76/464 has been transposed into French legislation by a number of ministerial decrees (MD) and circulars (CI) adopted in the framework of the law of 19 July 1976 on classified installations:

In 1993 France adopted a general decree applicable to class A installations (where 'A' refers to Authorization and does not imply a level of importance). Numerous installations in France are submitted to authorization (about 6000) and thus this represents a large part of industrial plants. This general decree contains limit values for List I substances of the Directives. It also incorporates some limit values for List II substances.

Article 22 of the general decree stipulates that quality objectives of receiving watercourses must be considered when setting limit values for discharges. France has developed a set of quality objectives. For each receiving water, quality objectives are set by prefectorial decree, taking into account the functions and targets of the local receiving water. It was reported that concentration values have generally not been transposed into departmental objectives (sources: EC002, EC003).

4 Permitting and enforcement

Industrial waste water discharges are covered by environmental permits coordinated at regional level by the Inspectorate of Classified Installations (Class A installations) and issued by the prefectorial authorities. Permit conditions are granted on the basis of circulars and ministerial decrees covering specific aspects of industrial activities.

The prefect has to assure compliance with the standards via inspection and prosecution. For this purpose the Service for Technical Assistance to Treatment Plants (Service d'Assistance Technique a l'exploitation des Stations d'Epurations; SATESE) operates under the supervision of the departments.

5 Monitoring

a. Waste water monitoring
The General Decree of 01. March 1993 requires classified installations to (self)monitor emissions of List I and II substances on a daily basis when discharged quantities exceed certain limits. Classified installations are those needing an authorizations (referred to as "Class A installations" above) and mainly comprise industrial installations.

SATESE executes the monitoring of discharges mainly originating from municipal waste water treatment plants.

b. Surface water monitoring
The General Decree of 01. March 1993 also stipulates discharge rates of COD, hydrocarbons and heavy metals beyond which classified installations must monitor the quality of the receiving watercourses.

In general, the quality of the aquatic environment is monitored by the DIREN and the 6 Water Agencies.

At national level results are centralised by the Ministry of Environment; at regional level monitoring data is centralised and published by the DIREN and the 6 Water Agencies.

GERMANY

(sources: EC002, EC003, EC012, D109, D110, D115, D119, GEN018)

1 Organization

The federal government passes framework acts which contain the basic provisions on water management measures. Implementation of the water legislation is the responsibility of the "Länder" and the municipal authorities which both implement the permitting procedures and grant permits.

Specific provisions such as discharge standards are provided by the Administrative Framework Ordinance (Rahmen-Abwasserverwaltungsvorschrift). The Länder are required to incorporate these requirements and are entitled to be more stringent if necessary. The ordinance covers direct discharges into surface waters.

The Ministry of Environment, Nature Conservation and Nuclear Safety (Bundesministerium für Umweltschutz, Naturschutz und Reaktorsicherheit) and other ministries are responsible for the preparation of legislation rather than the implementation.
The implementation of the legislation is the responsibility of the "Länder". Generally there are three levels of authority involved in surface water management:

- The competent "Länder" ministry, p.e. in Rheinland-Pfalz the Ministry of Environment and Forestry (Ministerium für Umwelt und Forsten).
- Regional authorities, generally responsible for permitting and monitoring.
- Local authorities, generally responsible for permitting and monitoring.

2 Framework legislation

The Federal Water Act (Gesetz zur Ordnung des Wasserhaushalts, WHG) of 23 September 1986 represents the legislative framework for the control of hazardous discharges. Most of its general provisions are interdependent with Länder legislation.

All the Länder have implemented federal water legislation by establishing their own water statutes.

3 Transposition

Directive 76/464/EEC (and its daughter directives) have been transposed into German law by the following legislation:

- Federal Water Act (Gesetz zur Ordnung des Wasserhaushalts - WHG) of 23-9-1986 (amended 27-6-1994);
- Ordinance on Waste Water origins (Abwasserherkunftsverordnung - AbwHerkV) of 3-7-1987 (amended 27-5 1991);
- General Administrative Rules on Water Polluting Substances (Katalog Wassergefährdender Stoffe) of 9-3-1990;

- General Administrative Ordinance on Minimal Requirements relating to Waste Water Discharges (Rahmen-Abwasser Verwaltungsvorschrift - Rahmen Abwasser VwV) of 29-10-1992;
- Waste Water Charges Act (Abwasserabgabengesetz - AbwAG) of 6-11-1990 (amended 5-7-1994).

These general administrative rules on water polluting substances are "Verwaltungsvorschriften des Bundes" (administration regulations at federal level). There are also administrative regulations at "Länder-level" which implement parts of the Directives. In March 1995, the Bundesrat decided upon an amendment of the WHG. This amendment should give the federal government the legal basis to implement EC-directives by ordinances instead of administrative regulations. The Bundesstag has now to decide about the amendment that is forced by a decision of the European court. The Länders will amend their legislation in the same way.

Difficulties arise in translating EC Directives into national law both because of the federal structure of Germany in which enforcement of water laws is the responsibility of the Länder and because of different interpretations of the requirements set in the EC Directives. The principal difference between the German approach of controlling hazardous discharges and that in Directive 76/464/EEC is that German legislation is applied to industrial sectors rather than individual substances. In federal "Verwaltungsvorschriften" a Best Available Techniques (BAT) is defined for about 60 industrial sectors. Among these there are sectors discharging hazardous substances (such as heavy metals and AOX substances) to surface waters. German legislation is based on emission limits rather than quality objectives.

In the absence of general environmental quality criteria, the Federal Government and the Federal States reached agreement in 1993 on a "Concept for the derivation of quality guide values for the protection of inland surface waters against pollution". Based on current scientific knowledge it lays down, on a trial basis, separate, legally non-binding quality objectives (quality guide values) for various water uses meriting protection (e.g. aquatic communities, drinking water supply, professional and sports fishing). Quality guide values are also given for suspended particulate matter and sediments, to ensure that a hazard to the respective uses worthy of protection need not be feared.

The quality guide values set are concentration values for hazardous substances in the water compartment which should not be exceeded, if at all possible (orientation values rather than normative limit values). In using the quality guide values, the enforcement authorities are free to decide in each case which uses worthy of protection to take into account, whether to set intermediate values and, if so, what time targets to allocate to the various intermediate values. Initially, compliance with the quality guide values will be monitored on the basis of water quality data. A second step envisaged is to search for the causes of pollution in cases where water pollution exceeds the quality guide values.

On that basis, sources of pollution and the effectiveness of cleanup measures can be better determined, and measures designed to reduce water pollution, e.g. drawing up of effective cleanup programmes can be proposed. The concept (which follows the environmental pollution control ('immission') approach) therefore constitutes an ideal complement to the well-tried emission approach (reduction or prevention of pollutant inputs at source).

In addition to improving the quality of water, the water system as a whole, including banks and their respective environment must be so conserved or reshaped that a sound species variety can develop in an ecological system. This must be as close to nature as possible.

The limit values of the Directives are "Anforderungen" in German legislation. In these "Anforderungen" the limit values are implemented as loads and/or concentrations. The EC-limit values correspond with the "Anforderungen" according to Best Available Techniques set in the "Verwaltungsvorschriften". In many cases, the German "Verwaltungsvorschriften" contain just loads, although the Directives contain loads as well as concentrations (source: D110, EURECO, pag. 74).

In the Chemicals Act, there is a possibility to forbid or to decrease the production, the application or putting on the market of certain hazardous substances with reference to human and environmental conditions.

Germany has a ministerial decree to control the application of PCB and PCB-substitutes. By 1999, the application of PCB and its hazardous substitutes must be put to an end by applying a step by step programme, and the substances have to be destroyed in an environmentally correct way.

German legislation does not distinguish between List I and II substances. It is sector-specific. Hazardous discharges must be treated according to the "state of art" and less hazardous discharges must comply with the less stringent "generally acknowledged rules of techniques".

4 Permitting and enforcement

The requirements for the discharge of waste water into surface waters are defined in the WHG. In principle, every discharge of water and every waste water treatment installation requires a permit from the competent authority.

The implementation of water resources management regulations is exclusively a matter of the Federal States and the municipalities. The water management administrations of the Federal States are predominantly integrated in the respective general Federal State administrations; in the new states, partly special environmental administrations have been introduced.

In most Federal States, water resources management is carried out on three levels just as general administration . However, the assignment of tasks differs from state to state:

<u>Supreme authority:</u>
(Ministry with a water resources department; predominantly ministry for the environment).
Functions: water management control and superior administrative procedures.

<u>Intermediate-level authority:</u>
District government, offices of the presidents of the governments, Federal State authorities.
Functions: regional water resources management planning, important procedures under the water acts, administrative procedures.

Lower Authority:
Lower water authorities (districts or towns not belonging to a country) as well as technical authorities (e.g. water resources authorities).
Functions: procedures under the water acts as well as technical advice, monitoring of waters and waste water discharges.

Some smaller states have a two-level administration (i.e. no intermediate-level authority) while city states have only one level of water resources management.

For the comprehensive technical functions of water resources management, most Federal States consist of (apart from water resources authorities) central state authorities having different designations (Federal State authorities of environmental protection, for water resources management, for water waste etc.). The technical function of these Federal State authorities in the sectors water science, water resources management planning, official technical advice, preparation of technical guidelines, and education and training, differ from state to state. The said authorities are responsible to the supreme authorities. In part, the Federal State authorities are also in charge of enforcement functions (e.g. flood warning services, monitoring of waters and discharges, waste water charges).

For the purposes of coordinating common problems and handling legislative instruments under the water acts, the supreme Federal State authorities working in the field of water resources management have pooled together to form the Joint Water Commission of the Federal States (LAWA).

Waste waster containing hazardous (groups of) substances must meet the discharge standards laid down in accordance with the state of techniques (Stand der Technik; also referred to as Best Available Techniques)

As far as permit granting is concerned, the competent authority can restrict the period of validity of a permit. (source: D110, EURECO 2.1.4). A four yearly evaluation of the permit is neither set in the national legislation nor is it a permit condition. Competent authorities however, have the right to evaluate and to actualise permits at any time (source: D110, EURECO pg. 77, 2.1.4).

Enforcing compliance of terms as set in permits is in particular a responsibility of the Länder and the lower environmental administrations.

5 Monitoring

a. Waste water monitoring

In principle, the enforcement by the competent authority is regulated in the water statutes of the Länder. Supplementary to this kind of enforcement on these statutes (water acts, ordinances, administrative regulations) a system of so-called self-enforcement by the dischargers is also regulated. This system includes the control of the quality of the waste water by the discharger himself.

In the WHG, it is determined that users of water who are permitted to discharge more than 750 m^3 of waste water on one day shall appoint one or more water pollution control officers. In case the waste water discharge does not exceed 750 m^3/day, the competent authority may direct the discharger to appoint pollution control officers.

Analysis methods are specified in the Administrative Framework Ordinance (Rahmen-Abwasser Verwaltungsvorschrift) and in the individual plant operation permits (self-monitoring).

The national authorities draw up inventories for the EC as part of their general reporting duties. These inventories are compiled by the Länder authorities.

b. Surface water monitoring
Surface waters in Germany are subject to regular monitoring. Water quality monitoring is to safeguard natural waters as ecological systems, and also for their many diverse uses. Water quality monitoring goals include:
- documenting the long-term developments and present state of water pollution,
- assessing the impacts of anthropogenic substances on aquatic ecosystems,
- preventing potential danger to human health (especially by early recording of short-term changes)
- showing the effectiveness of water protection measures (limitation of emissions) and the needs for further action by means of water quality (immission) values.

As written in section 4, surface water monitoring is also a matter of the Federal States. According to the three levels of administration, different agencies realize surface water monitoring on the basis of state water laws and supplementary regulations. Generally the agency at the highest administration levels is responsible for data collection and reporting. Data reports to the EC are coordinates by the LAWA and/or the Federal Environmental Agency.

GREECE

(sources: EC002, EC003, EC012, EC014, GR902, GR904)

1 Organization

At central level, waste water discharges are (primarily) the responsibility of both the Ministry of Environment and the Ministry of Health. However, day to day control lies with the prefectural authorities.
The role of the prefectures is very important as far as discharge permitting is concerned. In the case of major or Class A installations the central ministries will also be involved in reviewing the permit. Compliance with waste water permits is supervised by the Ministry of Health.

2 Framework legislation

The permitting of industrial installations and hence of their discharges is controlled under the terms of the Basic Law on the Environment N 1650 of 1986. Health Decree Elb/221/1965 however, remains in force until full implementation of Law N 1650 of 1986.

3 Transposition

The process of transposition is essentially complete, but full-scale implementation of the Directive and its requirements is still in progress.
Transposition of the Directive has been carried out by following legislative instruments:

- Presidential Decree No 1180 of 1981
- Health Decree Elb/221/1965 (remains in force until full implementation of Law N 1650 of 1986)
- Act on the Protection of the Environment No 1650 of 1986
- Ministerial Decision No 144 of 1987
- Ministerial Decision No 18186/271 of 1988

Implementation of specific programmes to reduce the levels of List II substances comprise institutional and implementational measures, projects and various studies.

Prefectures are entitled to issue measures for the protection of the aquatic environment in their region, laying down general and specific conditions applicable both to the discharge of List I and List II substances. To implement these provisions, identical administrative approaches (submission of studies, approval of studies, execution of projects, authorization) are being followed by all prefectures in Greece. Thus, on the recommendations of the competent central ministries, approval, publication and implementation of prefectorial decisions started, covering receiving surface waters liable to water pollution. At the moment, a substantial number of prefectorial decisions have been adopted, covering almost the entire aquatic environment (both sea and inland waters) of Greece. Most of these decisions lay down limit values for List I and List II substances. Many decisions also lay down quality standards for the receiving waters.

4 Permitting and enforcement

The permitting of industrial installations and hence of their discharges is controlled under the terms of the Basic Law on the Environment of 1986. Standards to be used in permits are drawn up by the Ministry of Health, advised by the Ministry of Environment. These standards reflect the limit values and quality objectives of the Directives. Permits tend to be renewed every 3 - 5 years and are changed when standards or processes change.

For List II substances, the prefectorial decisions as mentioned under 'Transposition' must be regarded. Enforcement of the terms and standards set in the permits is mainly the responsibility of the Ministry of Health and the Prefectures (source: GR902).

5 Monitoring

a. Waste water monitoring
Most discharges are subject to self-monitoring by operators. Otherwise monitoring tends to be on the basis of complaints or incidents.

Environmental Resources Management (sources: EC002 and EC003) reports that the official reporting of monitoring or discharge surveys does not appear to be well developed in Greece at the present.

b. Surface water monitoring
Sources EC002 and EC003 report that no specific programmes on the monitoring of List I and II substances in Greece exist. Source GR902 however, reports that the Water Department of the Ministry of the Environment has planned the start of a surface water monitoring program for toxic substances of both List I and List II substances of Directive 76/464/EEC.

IRELAND

(sources: EC002, EC003, IRL603, IRL604, IRL605, IRL606, IRL607, IRL613)

1 Organization

The development and implementation of policy and legislation related to the protection of the aquatic environment is the responsibility of the Department of the Environment, while implementation is the responsibility of local/sanitary authorities and the Environmental Protection Agency. The Department is responsible for the transposition of Directive 76/464 and its daughter Directives and has a supervisory role in relation to their implementation. Specific aspects of the Directives are implemented by the following:

- The Environmental Protection Agency (EPA);
- The 33 local authorities are responsible for licensing discharges of trade and sewage effluent to waters, and for monitoring of compliance with discharge conditions;
- The 87 sanitary authorities are responsible for licensing discharges to sewers and for monitoring of compliance with discharge conditions.

2 Framework legislation

The framework legislation for water pollution control is the Local Government (Water Pollution) Act of 1977, the Local Government (Water Pollution) (Amendment) Act of 1990 and the Environmental Protection Agency Act of 1992.

3 Transposition

Transposition of Directive 76/464/EEC is carried out by permitting through Local Government (Water Pollution) Acts 1977 and 1990. It has been stated that due to the general absence of import, production and use of most List I and II substances and the very limited use of a few, that water quality has been largely unaffected by such substances with the exception of nutrients, particularly from agriculture. Ireland has made regulations to adopt water quality objectives for water uses - bathing, fresh water fish, surface water abstraction, etc. Most of the State's fresh waters would be regarded by local authorities as having to meet fresh water fish quality objectives and this has been reflected in Water Quality Management Plans prepared by Local Authorities.

4 Permitting and enforcement

The entry of polluting matter into surface waters is prohibited and the discharge of trade or sewage effluent to waters and the discharge of trade effluent to sewer must be licensed. Licenses are issued by the local/sanitary authority or the EPA as appropriate. Licenses are reviewable at least every 3 years but may be reviewed earlier where circumstances warrant.

A distinction between scheduled and non-scheduled industries has to be made. The Environmental Protection Agency (EPA) licenses the discharges of all scheduled industries to both surface waters and to sewerage through an integrated pollution control system based on BATNEEC. Potentially less polluting industries (i.e non-scheduled industries) are licensed by sanitary and local authorities for discharges to sewers and waters respectively.

Statutory emission standards are imposed as conditions in licenses only for List I substances whereas quality objectives are used as a basis for setting limits as conditions of licenses for List II substances.

Compliance checking with regard to discharge licenses is undertaken by licensing authorities.

5 Monitoring

a. Waste water monitoring
Monitoring of discharges is carried out by the operator (based on terms in the discharge permit).

In addition, licensing authorities exercise compliance checking by spot check discharge monitoring.

b. Surface water monitoring
Monitoring of surface waters is conducted by EPA and local authorities. Quality control and data reporting is coordinated by the EPA.

ITALY

(sources: EC002, EC003)

1 Organization

One of the major concerns of the national authorities in implementing directive 76/464/EEC and it daughters was the need to overhaul the existing administrative system. The responsibilities of all tiers of government in Italy are currently in a state of flux. In general there is a move towards devolving authority to lower tiers of government.
The national authorities are responsible for policy development on the control of industrial discharges, overseeing the implementation of the decree, developing technical standards for sampling of discharges and receiving waters. They are also responsible for setting limit values for List I and II substances.
The regional authorities are responsible for the production of water quality plans and for data collecting relating to discharges and water quality within their regions.
The provincial authorities retain overall competence for the administration of the authorization and inspection system. In practice these activities are normally carried out by the municipal authorities (especially in case of discharges into the municipal sewer) and the local health authority respectively.

2 Framework legislation

Law no 319 of 1976 is the Italian framework legislation.

3 Transposition

Legislative Decree No 133 of 27 January 1992 transposed Directive 76/464 into national law. This decree represents an attempt to resolve a number of problems on transposition of the Directive.

List II substances are still subject to the old limit values of the national legislation.

Italy prefers the Emission Limit Value approach for monitoring compliance, taking into account all listed substances. National and local priorities will be set for programmes which include Environmental Quality Standards and Emission Limit Values

4 Permitting and enforcement

Provincial and municipal authorities are the main agents involved in permitting. All permits are granted for four years with the request for renewal being presented one year before expiry of an existing permit. In the case of discharges containing List II, but not List I substances the duration of the permit is decided on the basis of regional water quality programmes.

Enforcement of the terms and standards set in the permits is carried out by the competent authority

5 Monitoring

a. Waste water monitoring
The frequency of monitoring and analysis to be carried out is fixed in the discharge permit and both activities are the responsibility of the operator.

b. Surface water monitoring
The monitoring to be carried out under the terms of decree 133 should produce useful data for both List I and II substances. Environmental Resources Management (sources: EC002, EC003) reports that at present no specific programmes of monitoring of discharges exist at a national level.

At present reporting and data availability varies widely between regions, premises and local health authorities. The investigation of pollution is largely based on complaints.

LUXEMBOURG

(sources: EC002, EC003)

1 Organization

The Ministry of Environment (Administration de l'Environnement) is competent for regulatory aspects and discharge permits, whereas its administration is in charge of monitoring industrial waste water and water quality.

2 Framework legislation

In 1971 a framework regulation was adopted for the transposition of EC Directives concerning e.g. agriculture. By extension this law has also been used for transposing EC Directives related to the environment but will be completed shortly by a framework law for the transposition of environmental Directives.

3 Transposition

Regulations adopting and implementing Directive 76/464 are subject to the 1971 framework legislation. In most cases the Directives have been transposed as such. List II substances have generally not been addressed by regulation. Luxembourg opts for self-control rather than regulating action.

4 Permitting and enforcement

A permit is always required for the discharge of industrial waste water. Permits delivered before 1990 are valid for a period of 30 years. The validity of new permits is not limited but they can be revised at any time by the authorities. New permits refer to discharge limits included in the regulation, except for certain substances.

Enforcement of the terms and standards set in the permits is carried out by the competent authority.

5 Monitoring

a. Waste water monitoring
The administration conducts an average of four to six checks per company per year down to three checks for industries with minor discharges. The administration centralises monitoring data for industrial discharges.

Measurements are also conducted by industries themselves, but the results collected have no legal status. The authorities are trying to define legal conditions that will apply to self-assessment.

b. Surface water monitoring

The Water Department of the Ministry of the Environment is responsible for the monitoring of surface and ground waters.

The quality of surface waters is assessed indirectly by measuring the concentration of heavy metals in algae after immersion in watercourses for a certain period of time.

The administration centralises monitoring data for surface water quality.

NETHERLANDS

(sources: EC002, EC003, EC012, D110, GEN018, NL535, NL538, NL539, NL540, NL541, NL545)

1 Organization

The Ministry of Transport, Public Works and Water Management (Ministerie van Verkeer en Waterstaat) is the competent authority for waste water discharge permitting in the case of discharges into state managed waters (in general the major surface waters having an interregional importance). The (twelve) provinces are the competent authority for the non-state managed waters (waters having more a regional importance). In practice, however, most provinces (the exceptions being Utrecht and Groningen), delegated their authority to (± thirty) local water boards ("Waterschappen").

"National Policy Documents on Water Management" are frequently prepared presenting an integrated approach to water management, including aspects such as:

- pollution reduction
- hydraulic design
- use
- institutional arrangement
- international waters

The National Policy Document contains a list of environmental quality objectives, including most of the 76/464/EEC List I substances and a number of List II substances. Quality objectives are given for general parameters, nutrients, salts, radio-active parameters, biological parameters, metals, EOX/AOX, PAH's, volatile halogenated hydrocarbons, chlorobenzenes, PCB's, organo chlorinated pesticides, chlorinated phenols, organo phosphorous pesticides, organo tin compounds, phenol herbicides, carbonates, dithio carbamates, chlorophenoxy carboxylic acids, halogenated nitro aromatics, pyrethroid pesticides, anilides, aromatic chlorinated amines and carboximides.

The provinces are required to make their own policy plans both to meet the targets specified in the National Policy Document and aspects which are of provincial interest. Orders in council specify some elements that must be included in provincial plans. These include requirements of EC Directives. The final level of planning is at water board level. The water boards are responsible for drawing up concrete management plans to implement the provincial plans.

2 Framework legislation

Regulation of (point source) discharges in the Netherlands is primarily based on the Pollution of Surface Waters Act (Wet verontreiniging oppervlaktewateren, Wvo; adopted in 1969; last revision 1994). The Wvo is a framework act. Water management planning is based on the Water Management Act.

3 Transposition

Directive 76/464/EEC has fully been transposed into Dutch legislation.

In the Netherlands List I substances, candidate List I substances and some List II substances are dealt with by means of emission limit values. In the case of some List II substances a quality objectives approach is pursued (e.g. for chloride, sulphate, heat). Table 1 gives an overview of the application of concepts and technologies in relation to the substances to be emitted.

Table 1: concepts and technologies to be used in relation to substances to be emitted.

type of substance	black-listed substance	other pollutants	
example	specific organohalogen substances, dioxins, mercury, cadmium etc.	heavy metals, oxygen consuming substances, nutrients (P & N)	chloride, sulphate, heat
always	restriction of pollution		
clean-up primarily on the basis of	emission reduction approach		water quality objectives approach
treatment method	best technical means	best practicable means	acceptability of discharges and steps to be taken depending on the water quality objectives aimed at
any further requirements based on	unacceptable concentrations in the aquatic environment	water quality objectives	

This concept is applied by competent authorities to set specific limit values in discharge permits.

It is also important to mention the international Rhine Action Program (RAP) adopted in 1987 and the North Sea Conference Declarations of 1987 (London), 1990 (The Hague) and 1995 ((Esbjerg). These plans for the protection of European waters also contain specific obligations for the reduction of discharges to the catchment area of the Rhine and inputs to the North Sea of priority substances also containing List II substances. The combined list of Rhine and North Sea priority substances ("RAP/NAP-list") is being used in the Netherlands as a basis for accelerated pollution reduction.

4 Permitting and enforcement

Discharge permits may contain technical terms which the operator is required to meet (also see table 1). These conditions are based on best technical means (List I and List I candidate substances) and best practicable means (most of the List II substances), and on legal standards. The entity of best technical means and best practicable means are referred to as Best Available Techniques.

Enforcement of the terms and standards set in the permits is carried out by the competent authority (the Ministry of Transport, Public Works and Water Management for the state managed waters and the provinces and local water boards for the non-state managed waters).

5 Monitoring

a. Waste water monitoring
Monitoring of discharges is carried out by the discharger (a self monitoring obligation laid down in articles in the discharge permits) and (with a lower frequency) by the competent authorities as a reflection of their water management task (including enforcement).
Water monitoring data are applied for regular national (and international) reporting on discharges.

b. Surface water monitoring
Surface water monitoring of the state managed waters is carried out and reported by RIZA (inland waters including part of the brackish waters) and RIKZ for remaining brackish waters and the (North) Sea). RIZA and RIKZ are technical institutes of the directorate "Rijkswaterstaat" of the Ministry of Transport, Public Works and Water Management. Non state managed waters are monitored by the provinces and local water boards. RIZA is responsible for reporting monitoring data (of both state and non-state managed waters) to the European Commission.

In this context it is worth while mentioning that water production companies are also monitoring surface waters (even in international cooperation frame works). The results are also periodically reported.

PORTUGAL

(sources EC002, EC003, EC012, P1204)

1 Organization

At central level, the Ministry of Environment and Natural Resources (Ministériodo Ambiente e Recursos Naturais, MARN) is the competent authority for water policy and water management in Portugal. The Directorate of the Environment of this Ministry (Direccao-General do Ambiente, DGA) is responsible for developing policies, legislations and programmes at national level.
Within the MARN, the Water Institute (Instituto da Agua) has the overall responsibility for water management but the Regional Directorates of the Environment and Natural Resources (Direccoes Regionais do Ambiente e Recursos Naturais, DRARN) are the executive and operational bodies. The Directorate of the Environment's role derives from its responsibilities concerning environmental policy (not just water), implementation and enforcement.

2 Framework legislation

The Environmental Law of 1987 (Lei de Bases do Ambiente) is a framework legislation demanding and permitting specific legislation and regulations. Regarding water management specific legislation on some important aspects has been published. The more important are:

- Decree-law 74/90, March 7 - Water quality standards and generic waste water discharge standards.
- Decree-law 45/94, February 22 - Planning of water resources management.
- Decree-law 46/94, February 22 - Permitting system for uses of water public domain.
- Decree-law 47/94, February 22 - Economical and financial regime of the use of water public domain.

3 Transposition

Environmental Resources Management (ERM) reports that the transposition of Directive 76/464/EEC into national legislation is essentially complete. It has been carried out by legislative Decree No 74 of 1990, though permitting requirements are established under Decree-law 46/94.

4 Permitting and enforcement

Permitting and enforcement is carried out under the provisions of Decree-law 46/94 of 22 February, of Decree-law 74/90 of 7 March and of regulations concerning specific activities. The competent authorities are the Regional Directorates for Environment and Natural Resources (there are 5 such Directorates). The Water Institute has a coordinating role, establishing criteria and issuing guidelines to guarantee an harmonized approach and the Directorate of the Environment has a decisive role in the permitting where large and highly polluting industries or large urban waste water treatment plants are concerned. Permits for waste water discharges may be granted for 10 years and the terms and the standards laid down in the permit may be altered under "good reason" or may be renewed.

Enforcement of the terms and standards set in the discharge permits is carried out primarily by the competent authority for the permitting, but the Directorate of the Environment may also carry out enforcement actions (and participate in the permitting) whenever it is considered necessary on a policy basis. Enforcement actions should be carried out regarding each discharge, every six months.

5 Monitoring

a. Waste water monitoring
Self-monitoring of discharges is requested within the permitting system. Dischargers (industries or municipalities) are required to collect and analyze samples of their effluents according to what is set out in the permit. It may be required that results of this self-monitoring activities are periodically sent to the permitting competent authority. The data regarding discharge monitoring gathered either by the authorities or by the discharger are not widely reported at present.

b. Surface water monitoring
Monitoring of surface water quality is carried out at both national and regional level. A Water Quality Network is established nationwide coordinated by the Water Institute with the participation (sampling and analysis) of the Regional Directorates and DGA. The results of such monitoring have been published. All the concerned authorities carry out surface and groundwater quality studies (monitoring or other types of studies) which may or may not be published. The objectives of the Water Quality Network are to collect data to assess water quality on a national basis to provide support to decision-making regarding planning and water management. In addition, monitoring of water with specific uses is carried out to comply with EU legislation. Since 1993 monthly publication of data (and its assessment) from selected sampling stations of the Water Quality Network is being done by the Water Institute in connection with the Regional Directorates and the DGA.

SPAIN

(sources: EC002, EC003, EC012, E1104, E1105, E1107, E1108)

1 Organization

The administrative hierarchy in Spain consists of a central government, regional authorities (Comunidas Autónomas), provinces and municipalities. Surface water quality management is the responsibility of the central government (Ministry of Public Works, Transport and Environment; Ministerio de Obras Públicas, Transportes y Medio Ambiente) except in the case of water basins which fall entirely within one administrative region. In that case water quality is controlled by the regional environmental agencies.

In addition to this administrative structure, Spain is split up into 10 continental regions based on hydrographical principals. The Canary Islands are considered separately. Each of these river basins have a Drainage Basin Authority (Organismo de Cuenca hidrográfica) which reports to the Directorate General for Water Quality (Direccion General de Calidad de las Aquas of Ministry of Public Works, Transport and Environment) but has considerable independence as far as day to day planning and management are concerned.

2 Framework legislation

Regulation of the water management in Spain is primarily based on the Water Act of 1985; Ley de Aguas 1985.

3 Transposition

ERM (EC002, EC003) reports that the transposition of Directive 76/464 into Spanish legislation is essentially complete. The relevant items of legislations are:
- Royal Decree No 849 of 1986 (Articles 245 to 274)
- Order of 12-11-1987
- Order of 28-6-1991

Implementation of the legislation is still in progress with major programmes of work still being developed or being carried out.

An ambitious national program has started to be implemented by the Drainage Basin Agencies. Discharge consents will be issued on a case by case basis, taking into account planned reduction programmes. Studies of industrial sectors will allow prioritization and identification of principle problem areas. International commitments (OSPAR, Barcelona Convention) will act as a guidance.

4 Permitting and enforcement

Permitting is the responsibility of the 10 Drainage Basin Agencies. Discharge permits are normally valid for 4 to 5 years unless there is a significant variation in either the process being operated or characteristics of the discharge. Permits for discharges to the sewer system are issued by municipalities. Enforcement of the terms and standards set in the permits is carried out by the Drainage Basin Agencies.

5 Monitoring

a. Waste water monitoring
Monitoring of discharges is carried out by the discharger (a self monitoring obligation laid down in articles in the discharge permits) and by or on behalf of the Drainage Basin Agencies.

Water monitoring data are applied on an ad hoc basis for national (and international) reporting on discharges. At this moment Spain is preparing a national data system on discharges of List I substances, containing potential dischargers of List I substances; in the near future it is expected to include actual discharges of these substances in a systematic way.

b. Surface water monitoring
Surface water quality monitoring in Spain is controlled by the Ministry of Public Works, Transport and Environment through the water basin authorities. Monitoring is carried out for List I substances. There is a national monitoring network which has been operating for ten years. Monitoring data used to be published annually (until 1991). All data however, are put in a water quality data system, from which these data can easily be obtained.

UNITED KINGDOM

(sources: EC002, EC003, EC012, GEN028, D110, UK800, UK803, UK806, UK808, UK812, NL536)

Although practical arrangement for the control of discharges of dangerous substances to water are similar in all parts of the United Kingdom, there are differences in legislation and organisations responsible for the control. This water management profile for the United Kingdom focuses on England and Wales. Key differences are indicated regarding Scotland and Northern Ireland.

1 Organization

Overall responsibility for protection of the aquatic environment from discharges of dangerous substances lies with the Department of Environment. Regulatory functions in England and Wales including the issuing of authorizations and consents, and compliance checking are undertaken by the following:

- Non-IPC discharge to water - National Rivers Authority (NRA)
- IPC discharge to water and sewer - Her Majesty's Inspectorate of Pollution (HMIP)
- Non-IPC discharge to sewer - water companies and NRA

In Scotland, the Water Purification Boards carry out equivalent functions to the NRA; The IPC regulation is the responsibility of Her Majesty's Industrial Pollution Inspectorate (HMIPI). Discharge to sewers is controlled by local authorities. In Northern Ireland, discharge to water and sewer is controlled by the Department of the Environment for Northern Ireland.

2 Framework legislation

The framework legislation for the control of water pollution is as follows:

- Discharges to water:	Water Resources Act 1991
- Discharges to sewer:	Water Industry Act 1991
- Discharges to sewer and water from processes subject to Integrated Pollution Control (IPC):	Environmental Protection Act 1990

In Scotland, the frame work legislation controlling water pollution by dangerous substances is the Control of Pollution Act 1974. In Northern Ireland, discharges are controlled under The Water Act (Northern Ireland) 1972. Integrated Pollution Control under the Environment Protection Act 1990 applies in Scotland but has yet to be introduced in Northern Ireland (source: EC003).

3 Transposition

The framework acts are implemented in relation to discharges of List I substances by a number of regulations (listed below). There are currently no regulations to implement the Directive with respect to discharges of List II substances.

- Surface Waters (Dangerous Substances) (Classification) Regulations 1989 SI 1989/2286 - discharges to water
- Surface Waters (Dangerous Substances) (Classification) Regulations 1992 SI 1992/337 - discharges to water
- Trade Effluents (Prescribed Processes and Substances) Regulations 1989 SI 1989/1156 - discharges to sewer
- Trade Effluents (Prescribed Processes and Substances) Regulations 1992 SI 1992/339 - discharges to sewer
- Environmental Protection (Prescribed Processes and Substances) Regulations 1991 SI 1991/472 - IPC processes and substances
- Environmental Protection (Prescribed Processes and Substances) (Amendment) Regulations:
  - SI 836 (1991)
  - SI 614 (1992)
  - SI 1749 (1993)
  - SI 2405 (1993)
  - SI 1271 (1994)
  - SI 1329 (1994)
  - SI 3247 (1995) - IPC processes and substances.

Environmental Quality Standards (statutory requirements) are set for:

EC List I substances:	mercury, cadmium, HCH(total), DDT (total), drins (total), carbontetrachloride, pentachlorophenol, hexachlorobenzene, hexachlorobutadiene, chloroform, 1,2-Dichloroethane, trichloroethylene, tetrachloroethylene and trichlorobenzene;
EC List II substances:	lead, chromium, zinc, copper, nickel, arsenic, boron, iron, pH, vanadium, tributyltin, triphenyltin and five mothproofing agents (PCSD's, cyfluthrin, sulcofuron, flucofuron and permethrin);
EQS in preparation for:	benzene, toluene, xylene, inorganic tin, and all remaining Red List Substances (atrazine, simazine, trifluralin, malathion, azinphos-methyl, dichlorvos, endosulphan, fenitrothion), ammonia, and sulphide.

4 Permitting and enforcement

The discharge of dangerous substances into surface waters is prohibited except when authorised by a consent under the Water Resources Act 1991, an authorization under the Environmental Protection Act 1990. Limits are set in the consents and authorizations for the discharge of List II substances. In the UK, discharge limits are determined by Environmental Quality Standards (EQS) which apply to the receiving water. Water quality objectives are assigned to the receiving water depending on the use of the water. EQS are then applied to the water to meet those objectives. Discharge limits are set at a level so that the EQS can be achieved in the receiving water.

Prescribed processes and prescribed substances are controlled under the Environmental Protection Act, and the discharger may be required to adopt Best Available Techniques Not Entailing Excessive Costs (BATNEEC) and, in the case of release to more than one environmental medium, Best Practical Environmental Option (BPEO). All other processes and substances are controlled by consents issued under the Water Resources Act of 1991. The consents and authorizations are valid indefinitely, but are reviewed periodically.

Enforcement of the terms and standards set in the discharge permits is carried out by the National Rivers Authority (source: UK800) in England and Wales and the Water Purification Boards in Scotland.

5 Monitoring

a. Waste water monitoring
Discharges into surface water from non-IPC processes are monitored by the licensing authority (National Rivers Authority, NRA in England and Wales and the Water Purification Boards in Scotland).

The monitoring of discharges is carried out by the operator for IPC processes and non-IPC discharges to sewer.

b. Surface water monitoring
Surface water monitoring is undertaken by the National Rivers Authority in England and Wales and the Water Purification Boards in Scotland.

Data from environmental monitoring are reported to the EC.

Appendix C Analysis of the Rhine River with respect to Directive 76/464/EEC for List II substances

Introduction

The entire catchment area of the Rhine is located in 9 mid and western European countries. The major part of the catchment area is located in Switzerland, France, Germany, Luxembourg and the Netherlands and comprises approximately 185,000 km^2. The length of the river is more than 1000 km, measured from its major origin (Swiss Alps) to the Rhine estuary in the Netherlands, where it flows into the North Sea. More than 40 million people live within its catchment area. The river flow ranges from 1000 m^3/sec at the Swiss-German border to 2200 m^3/sec at the Dutch-German border. The catchment area is highly industrialised. In addition, the Rhine is one of the most intensively used rivers in the world for shipping, connecting the world's largest sea harbour (Rotterdam) with the world's largest inland harbour (Duisburg) in the heart of the Ruhr area.

The riparian states of the Rhine, (i.e. Switzerland, France, Germany, Luxembourg, and the Netherlands) and the European Community have signed several treaties in order to protect the river Rhine against pollution. Also, the riparian states and the EU are working together within the framework of the Rhine Action Program (RAP). This program aims both at the intensified protection of the Rhine against pollution, and at the ecological and morphological restoration of the Rhine.

Finally, it is worthwhile mentioning that recently the IRC adopted guidelines for discharge-monitoring by point source dischargers (i.e. substance or group of substances to monitor, and frequency of monitoring). Guidelines are also given for the enforcement intensity to be employed by the competent authority.

The major part of the information presented in this appendix is based on information brought together by the riparian states of the Rhine within the framework of the Rhine treaties and the Rhine Action Program (results of monitoring data on both surface water, including suspended solids, and on industrial, municipal and diffuse discharges). Table C.1 gives an overview of monitoring activities in the riparian states of the Rhine (source: International Rhine Commission, GEN027).

Transposition of Directive 76/464/EEC in river basin legislation

Appendix B gives an overview of the implementation of Directive 76/464/EEC in the riparian Rhine states of France, Luxembourg, Germany and the Netherlands. In general it can be concluded, that transposition of Directive 76/464/EEC into national legislation is completed.

Waste loads (selected List II substances for the purpose of this study)

Within the framework of the Rhine Action Program, the International Rhine Commission adopted a number of reports giving a clear view of the discharge trends of priority pollutants in the catchment area of the Rhine for the period 1985 -1992. The majority of the List II substances selected for the purpose of this study are included in this list of priority substances (exempt poly cyclic aromatic hydrocarbons and total-nitrogen, although for the latter information is gathered by the International Rhine Commission comparable to priority substances).

The results as given in Table C.2, should be assessed considering the trends in the Rhine water quality as given in chapter 4. To obtain a good balance between discharge trends and water quality trends, the Swiss discharge data are included, in spite of the fact that Switzerland is not a EU-Member State. Discharge data for Luxembourg for 1992 (although of relatively minor importance) are not available.

For all substances which are considered within the framework of the Rhine Action Programme, the IRC adopted indicative water quality objectives (so called "Zielvorgaben"). Except for polycyclic aromatic hydrocarbons and total-nitrogen, all List II substances selected for the purpose of this study are included in this list of priority pollutants. Based on the monitored concentrations of the priority substances in the Rhine River at its international monitoring locations compared with the "Zielvorgaben", it was concluded that additional abatement measures should be considered (exceeding BAT and BEP) for a number of priority substances. Among these, three selected 76/464/EEC List II substances are included (zinc, copper, lead). At the moment, the International Rhine Commission has decided to develop indicative water quality objectives for polycyclic aromatic hydrocarbons. The necessity to develop indicative water quality objectives for total-nitrogen is under scrutiny.

It is important to keep in mind that significant discharge reductions in industrial and municipal sources took place in the past 15 - 20 years. For this reason, the relative contribution of diffuse discharges of many priority substances is increasing, and in a number of cases they are even exceeding the discharge contribution of the point sources.

The IRC concluded that additional abatement measures for the priority substances not reaching the "Zielvorgaben" should be considered only after integral pathway studies and assessments were conducted, including diffuse sources in the catchment area of the Rhine. This work started in 1995.

Considering the results as listed in table C.2, a number of conclusions can be drawn considering the data for 1992. The discharge of chloronitrobenzenes via municipal waste water is absent. For other substances (copper and arsenic) discharges via industrial and municipal waste water are of the same order of magnitude. Finally there are a number of substances which are either primarily discharged via municipal waste water (e.g. total-nitrogen and total-phosphorus) or via industrial waste water (e.g. chloronitrobenzenes).

It is important to realise that municipal waste water consists of waste water from households, contaminated rainwater (as far as it is collected via the municipal sewerage system) and smaller industries connected to the municipal sewerage system. It is in general not correct to presume that connected industries (i.e. the smaller industries connected to municipal sewerage systems) are primarily responsible for the discharge of selected List I substances via municipal waste water. Rain water and households also contribute significantly to sewage treatment plants.

The reduction in total point-source discharges in the period 1985 - 1992 ranges in the order of 40 % to 100 %, as shown in Figure C.2. Changes in discharges from individual industrial dischargers of selected List II substances (as given in Appendix D) vary widely in the same period of time, ranging from an increase of the discharge to an almost complete elimination of the discharge. One must bear in mind, that discharge reductions of selected substances such as e.g. endosulfan and parathion via industrial and municipal discharges only have a relative significance compared to their total discharge to the environment. The diffuse discharge of these crop protection products arising from their agricultural use is of an order of magnitude greater than the point source discharge of these substances.

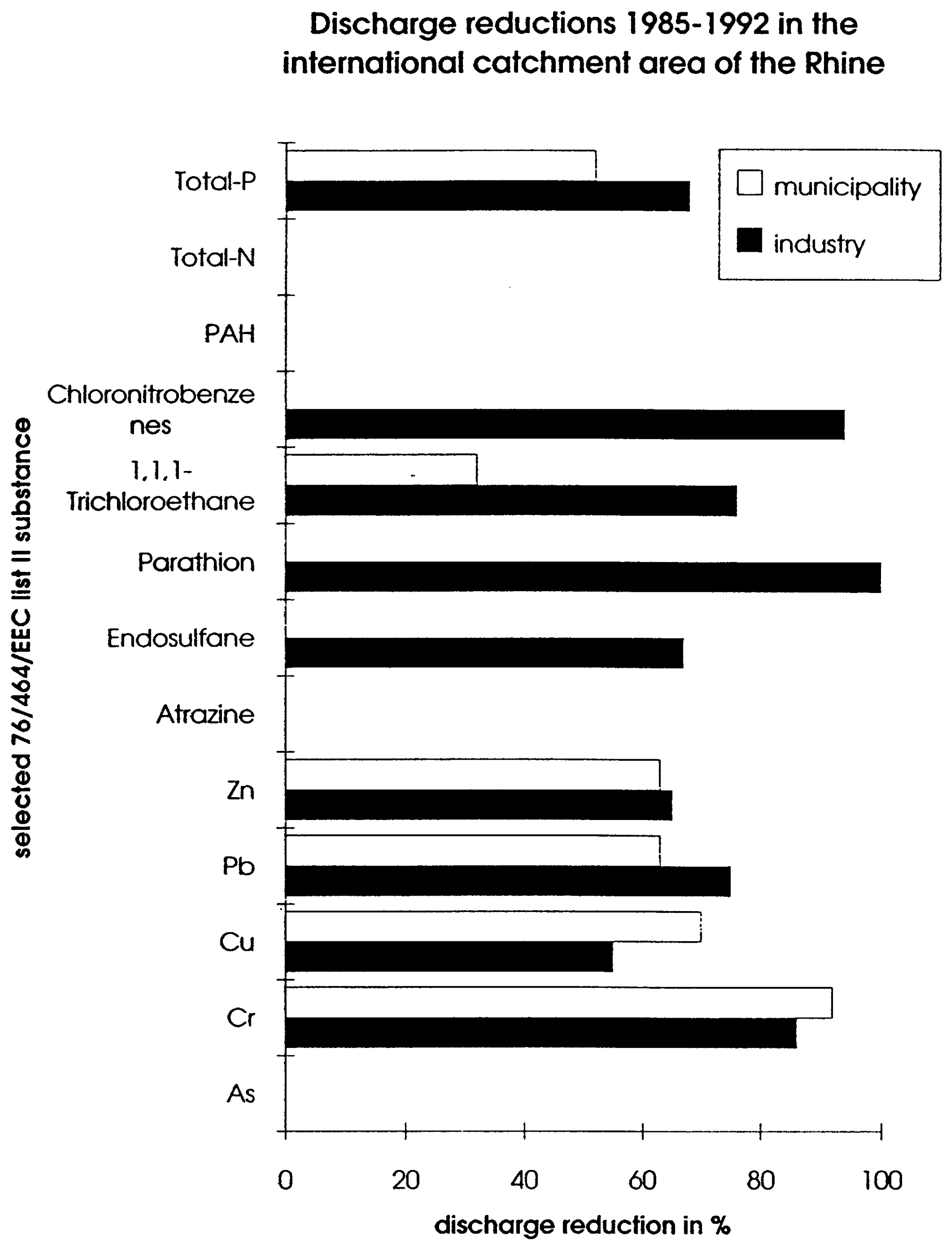

Figure C.1 Reduction in point source discharges to the Rhine river, 1985-1992

Table C.1 Overview of discharge and surface water monitoring activities in the riparian states of the Rhine (source: International Rhine Commission)

monitoring profile	monitoring within the limits of industrial or municipal site (i.e. battery limits)				monitoring in receiving surface water	
country	monitoring by discharger ("self-enforcement"))[1]	monitoring (enforcement) by or on behalf of competent authorities)[2]			surface water monitoring network	abstraction of surface water for the production of drinking water
		regular	periodically	unexpected		
France	I,V	L,O	A,L,O	A	A,L	A,L,D
Germany	I,V	A,O,L	A,O	A	A,O	A,D
Switzerland	I	A	A	A	A	A
Netherlands	V,I	O	A	A,O	A	D
Luxembourg	V, (I)	A,O,L	A	A	A	-

)[1] key: V = voluntary
I = imperative

)[2] key: A = competent authority
O = on behalf of a competent authority (governmental institutes etc.)
L = a certified and approved laboratory
D = drinking water production company

Table C.2 Point source discharges of selected 76/464/EEC List II substances in the catchment area of the Rhine
Discharges are given in Kg/year (IRC, source GEN017)

substance	industrial discharge in 1985	industrial discharge in 1992	municipal discharge in 1985	municipal discharge in 1992	relevance of diffuse discharge)[1]	industrial discharge reduction in 1985-1992 in %	municipal discharge reduction in 1985-1992 in %	overall discharge reduction in 1985-1992 in %
Arsenic (as As)		1,456		1,200				
Chromium (as Cr)	362,355	< 50,785	235,910	< 19,412	-	86	92	88
Copper (as Cu)	180,595	< 81,378	293,720	< 88,258	-	55	70	64
Lead (as Pb)	112,730	< 27,707	167,940	< 62,705	-	75	63	67
Zinc (as Zn)	705,850	< 246,750	1,460,920	< 545,943	-	65	63	63
Atrazine	< (year 1990)	0	< (year 1990)	<	+			
Endosulfan	< 3	< 1	2	2	+	67	0	40
Parathion	< 21	<	<	<	+	100		100
1,1,1-Trichloroethane	3,568	< 850	2,470	< 1,677	=	76	32	58
Chloronitrobenzenes	39,550	2350	<	<	-	94		94
Polycyclic aromatic hydro-carbons (3,4 benzo(a)py-rene and 3,4 benzopyrene)								
Total-nitrogen (as N)		< 38,063,119		< 158,381,050				
Total-phosphorus (as P)	16,433,000	< 5,195,577	30,669,000	< 14,571,225	=	68	52	58

)[1] - -> the known diffuse discharge is of minor importance in comparison to the point source discharges (sum of industrial and municipal wastewater)
= -> the known diffuse discharge is of the same order as the discharge via point source discharges
\+ -> the known diffuse discharge is more important than the discharge via point source discharges

< -> "no discharge" based on waste water analysis results below analytical detection limit

Driving forces behind the observed changes in industrial waste loads

For the international catchment area of the Rhine there are a number of international driving forces leading to the reduction of discharges by industries and municipalities. The Rhine Convention (Bern 1963), The Rhine Chemical Treaty (Bonn, 1976), Directive 76/464/EEC and to a lesser extend the Rhine Chloride Treaty (Bonn 1976) play an important role as far as the quality improvement of the river Rhine via discharge reductions is concerned. Since 1987, the Ministers of the riparian states of the Rhine and the European Community adopted the Rhine Action Programme, giving a political incentive to expedite the clean-up and ecological restoration of the river Rhine.

The Paris Convention, recently merged with the Oslo Convention giving the OSPAR Convention (protection of the marine environment in the north east part of the Atlantic Ocean) and the North Sea Ministers Conferences should be mentioned as well, because these also formulate Best Available Techniques and limit values for substances representative of specific industrial branches.

In addition, there are several surface water bound EC-Directives (including Directive 76/464/EEC) demanding a certain minimum water quality regarding specific functions of the surface waters (see Table 3.1 giving a specific overview of surface water Directives in the Community).

It is worth while mentioning, that there was an intensive exchange of information between the International Rhine Commission (coordinating the execution of the Rhine Chemical Treaty) and the European Commission (coordinating the execution of Directive 76/464/EEC), considering the technical specification of limit values for List II substances.

It can be concluded that no one single convention, treaty or Directive is responsible for quality improvement of the river Rhine. Rather, it is a combination of conventions, treaties, Directives and action programmes applied in a coherent way that lead to successful restoration and protection of the water quality of the Rhine.

Besides formal (legal) incentives and political commitments, there are economic incentives. Charge schemes for discharges to the sewerage are in force in all countries (N544). Revenues from this charge are mainly used for the financing of communal waste water treatment. In Germany, France and the Netherlands charge schemes are also in force for discharges direct to surface waters. In France and the Netherlands the main objective of the charge scheme is the financing of water quality management (e.g. communal waste water treatment). The German waste water scheme is primarily meant to have an incentive effect on direct discharges. Due to the relative high charge rates an incentive effect on direct discharges is also established in the Netherlands.

SUPPLEMENTARY APPENDICES

Inhoud

Appendices:

Volume II:

Appendix D1 Discharges of List II substances to Surface Waters in the EU

Industrial Discharges

List 2 substances.

The data are sorted as follows:

1. first on catchment area
   (the catchment areas are selected as described in the study contract)
2. second on country
   (every country (per catchment area) starts on a fresh page)
3. third on substance
   (list 2)
4. fourth on industry-name
5. fifth on site of the industry
6. sixth on year of discharge

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Loire.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Soc. des Mines du Bourneix		St Yrieix la Perche	Loire		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
109,0	kg/y	in	1991	N	
102,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Acieries Imphy S.A.	d	Imphy	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
912,0	kg/y	in	1988	N	
1503,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Aerospatiale	d	Nantes	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
584,0	kg/y	in	1990	N	
620,0	kg/y	in	1991	N	
609,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Cie Forges Fonderiess	d	Firminy	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
584,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Compagnie Europeenne de Tannage CET	d	Chateauneuf sur Sarthe	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
3905,0	kg/y	in	1988	N	
3394,0	kg/y	in	1990	N	
3467,0	kg/y	in	1991	N	
3650,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Loire.**

FRA	Lyotard	d	Sury le Comtal	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
401,0	kg/y	in	1989	N	

FRA	Marzet	d	Chatellerault	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1314,0	kg/y	in	1986	N	

FRA	Megisseries	d	Levroux	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
13140,0	kg/y	in	1986	N	
13140,0	kg/y	in	1988	N	
13140,0	kg/y	in	1989	N	
1277,0	kg/y	in	1990	N	
1277,0	kg/y	in	1991	N	

FRA	Sarel	d	Marolles les Braults	?		N	dep 72.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
693,0	kg/y	in	1989	N	

FRA	Soc. Imphy	d	Imphy	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
912,0	kg/y	in	1986	N	
1606,0	kg/y	in	1989	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Loire**.

FRA	Sollac	d	Basse Indre	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
219,0	kg/y	in	1986	N	
55,0	kg/y	in	1988	N	
365,0	kg/y	in	1990	N	
584,0	kg/y	in	1992	N	

FRA	Souriau	d	La Ferte Bernard (n-w France)	Sarthe		N,D	electroplating

Chromium

Discharge	Unit		Year	Refer.	Other remarks
474,0	kg/y	in	1986	N	
511,0	kg/y	in	1989	N	
1825,0	kg/y	in	1990	N	

FRA	Sueur	d	Chateauneuf sur Sarthe	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
4964,0	kg/y	in	1989	N	

FRA	Tanneries du Puy	d	Le Puy	Loire		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
511,0	kg/y	in	1991	N	

FRA	Ugine Gueugnon Bois Morey	d	Gueugnon	Loire		N	dep 71.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
511,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Loire.**

FRA	Ugine Gueugnon SA (ACG)	d	Gueugnon	Loire		N	dep 71.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
6716,0	kg/y	in	1986	N	
6716,0	kg/y	in	1988	N	
7738,0	kg/y	in	1989	N	
17885,0	kg/y	in	1990	N	
25696,0	kg/y	in	1991	N	
18323,0	kg/y	in	1992	N	

FRA	Cie Gle D Electrolyse	d	Le Palais sur Vienne	Loire		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
1460,0	kg/y	in	1986	N	
919,0	kg/y	in	1992	N	

FRA	Epi	d	Champagnac la Riviere	Loire		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
730,0	kg/y	in	1988	N	
730,0	kg/y	in	1989	N	
876,0	kg/y	in	1990	N	
474,0	kg/y	in	1991	N	
547,0	kg/y	in	1992	N	

FRA	GIPM	d	St Amand Montrond	?		N	dep 18.

Copper

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Loire**.

FRA Sarel | d | Marolles les Braults | ? | | N | dep 72.

Copper

Discharge	Unit		Year	Refer.	Other remarks
474,0	kg/y	in	1986	N	

FRA CEAC | | Vierzon | | | N

Lead

Discharge	Unit		Year	Refer.	Other remarks
153,0	kg/y	in	1992	N	

FRA Cie Gle D Electrolyse | | Le Palais sur Vienne | Loire | | N

Lead

Discharge	Unit		Year	Refer.	Other remarks
7,0	kg/y	in	1986	N	
7,0	kg/y	in	1988	N	
160,0	kg/y	in	1990	N	
146,0	kg/y	in	1992	N	

FRA Octel France (Kuhlmann) | | Paimboeuf | | | N | dep 44.

Lead

Discharge	Unit		Year	Refer.	Other remarks
16352,0	kg/y	in	1986	N	
15804,0	kg/y	in	1988	N	
26280,0	kg/y	in	1989	N	
14636,0	kg/y	in	1990	N	
19527,0	kg/y	in	1991	N	
8322,0	kg/y	in	1992	N	

FRA Elf Antar | d | Montoir de Bretagne | Loire | | N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
154395,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Loire.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Hydro Agri France	d	Montoir de Bretagne	Loire		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
206590,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	RPNA		Commentry			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
256595,0	kg/y	in	1988	N	
267545,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Cana		Ancenis			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
7300,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Celia		St Florent le Vieil			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
73000,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Citroen	d	Chartres de Bretagne	Loire		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
41610,0	kg/y	in	1986	N	
8212,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	RPNA	d	Commentry			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
5110,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Loire.**

FRA	Roussel Uclaf	d	Vertolaye			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
31755,0	kg/y	in	1986	N	

FRA	Socegap	d	St Saturnin du limet			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
47450,0	kg/y	in	1986	N	
54750,0	kg/y	in	1989	N	
54750,0	kg/y	in	1990	N	

FRA	Bundy S.N.C.	d	Nazelles Negron	Loire		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1642,0	kg/y	in	1992	N	

FRA	Chopin	d	Nevers	Loire		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
912,0	kg/y	in	1990	N	
2299,0	kg/y	in	1991	N	
2190,0	kg/y	in	1992	N	

FRA	Ciba Geigy	d	St Fons	Loire		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
317,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Loire.**

FRA Citroen — d — Chartres de Bretagne — Loire — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
3394,0	kg/y	in	1986	N	

FRA Gouillard — d — Nantes — Loire — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
3650,0	kg/y	in	1991	N	
3650,0	kg/y	in	1992	N	

FRA Herrly — d — Dijon — Loire — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1193,0	kg/y	in	1992	N	

FRA Manhurin — d — Cusset — Loire — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
693,0	kg/y	in	1986	N	
500,0	kg/y	in	1988	N	
594,0	kg/y	in	1990	N	
350,0	kg/y	in	1992	N	

FRA Marzet — d — Chatellerault — Loire — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2555,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Loire.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Mazinox	d	Naintre	Loire		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2555,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Ondaine service depollution	d	Firmimy	Loire		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
223,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Safil	d	Bonny sur Loire	Loire		N	dep 45.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
73,0	kg/y	in	1986	N	
109,0	kg/y	in	1988	N	
175,0	kg/y	in	1990	N	
401,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Saunier Duval	d	Nantes	Loire		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
985,0	kg/y	in	1991	N	
511,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Valeo (ex Chausson)	d	Laval	Loire		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2555,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Mersey.**

UK	ICI Mond division	m	Runcorn (s-e of Liverpool)	Mersey		W,E,N	Cheshire.

1,1,1-Trichloroethane

Discharge	Unit	Year	Refer.	Other remarks
0,0	No Info. in			

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Meuse.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Ralux	d	Dilsen	Meuse		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
751,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	K.N.P. Belgie	d	Lanaken	Meuse		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
712,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Meuse.**

FRA	Cellatex	d	Givet	Meuse		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
12410,0	kg/y	in	1990	N	
12410,0	kg/y	in	1991	N	
12410,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Po.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
ITA	ACNA Chimica Organica	m	Cengio	Bormida di Mill.		W,E	

1-Chloro-2-nitrobenzene

Discharge	Unit	Year	Refer.	Other remarks
0,0	No Info. in			

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
ITA	ACNA Chimica Organica	m	Cengio	Bormida di Mill.		W,E	

1-Chloro-3-nitrobenzene

Discharge	Unit	Year	Refer.	Other remarks
0,0	No Info. in			

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
ITA	ACNA Chimica Organica	m	Cengio	Bormida di Mill.		W,E	

1-Chloro-4-nitrobenzene

Discharge	Unit	Year	Refer.	Other remarks
0,0	No Info. in			

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	ICMD	m	Mulhouse	Rhine		W,E	

1-Chloro-2-nitrobenzene

Discharge	Unit		Year	Refer.	Other remarks
0,0	No Info.	in			See Chloronitrobenzenes.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	ICMD	m	Mulhouse	Rhine		W,E	

1-Chloro-3-nitrobenzene

Discharge	Unit		Year	Refer.	Other remarks
0,0	No Info.	in			

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	ICMD	m	Mulhouse	Rhine		W,E	

1-Chloro-4-nitrobenzene

Discharge	Unit		Year	Refer.	Other remarks
0,0	No Info.	in			

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Mines de Potasse d'Alsace (MDPA)	d	Mulhouse (n-e France)	Rhine	via ...	N	dep 68.

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
255,0	kg/y	in	1988	N	
182,0	kg/y	in	1989	N	
219,0	kg/y	in	1990	N	
146,0	kg/y	in	1991	N	
113,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Papeteries de Golbey	d	Golbey	Rhine		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
83,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References
FRA	Thann et Mulhouse	d	Alsace Lorraine area	Rhine	via ...	R,N

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1988	N	
73,0	kg/y	in	1990	N	
66,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References
FRA	ICID	d	Elsac Lorraine (area)	Rhine	Indirect discharge into the Rhine	R

Chloronitrobenzenes

Discharge	Unit		Year	Refer.	Other remarks
17000,0	kg/y	in	1985	R	Sum of 1-chloro-2-nitrobenzene, 1-chloro-3-nitrobenzene and 1-chloro-4-nitrobenzene.
2000,0	kg/y	in	1992	R	See remarks for 1985.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References
FRA	Cegedur Pechiney	d	Biesheim	Rhine		?

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2372,0	kg/y	in	1986	N	
255,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References
FRA	Ciba Geigy	d	Huningue	Rhine		N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
547,0	kg/y	in	1990	N	
3566,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References
FRA	Elf ATOCHEM	d	Carling	Rhine		N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1496,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine.**

Discharge	Unit		Year	Refer.	Other remarks
1496,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	MDPA (Mines de Potasse d'Alsace?)	d	Elsac Lorraine area	Rhine	via ...	R	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
4000,0	kg/y	in	1985	R	
3000,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Reynolds Aluminium France	d	Merxheim	Rhine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
474,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhenalu	d	Biesheim	Rhine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2372,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	Chalampe	Rhine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1898,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sandoz	d	Huningue	Rhine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1715,0	kg/y	in	1990	N	
15257,0	kg/y	in	1991	N	
8687,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine**.

FRA Sollac | d | Florange/ Ste Agathe | Rhine | | N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
18943,0	kg/y	in	1986	N	
1569,0	kg/y	in	1989	N	
803,0	kg/y	in	1990	N	
839,0	kg/y	in	1991	N	

FRA Sollac TAF | d | Alsac Lorraine | Rhine | Indirect discharge into the Rhine | R

Chromium

Discharge	Unit		Year	Refer.	Other remarks
35000,0	kg/y	in	1985	R	
800,0	kg/y	in	1992	R	

FRA Tanneries Grosjean et Fils | d | Le Thillot | Rhine | | N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2117,0	kg/y	in	1986	N	
1569,0	kg/y	in	1988	N	
1496,0	kg/y	in	1989	N	
3044,0	kg/y	in	1992	N	

FRA Ciba Geigy | d | Huningue | Rhine | | N

Copper

Discharge	Unit		Year	Refer.	Other remarks
566,0	kg/y	in	1992	N	

FRA MDPA (Mines de Potasse d'Alsace?) | d | Elsac Lorraine area | Rhine | via ... | R

Copper

Discharge	Unit		Year	Refer.	Other remarks
12500,0	kg/y	in	1985	R	
8600,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Mines de Potasse d'Alsace (MDPA)	d	Mulhouse (n-e France)	Rhine	via ...	N	dep 68.

Copper

Discharge	Unit		Year	Refer.	Other remarks
985,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	Chalampe	Rhine		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
9672,0	kg/y	in	1990	N	
7373,0	kg/y	in	1991	N	
3504,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	Elsac Lorraine	Rhine	Indirect discharge into the Rhine	R	

Copper

Discharge	Unit		Year	Refer.	Other remarks
30000,0	kg/y	in	1985	R	
3500,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sandoz	d	Huningue	Rhine		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
803,0	kg/y	in	1990	N	
3650,0	kg/y	in	1991	N	
2519,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Stracel	d	Strasbourg	Rhine	via ..	R	

Copper

Discharge	Unit		Year	Refer.	Other remarks
5500,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine**.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	VTF	d	Troisfontaines			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
4380,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Delco Remy		Sarreguemines			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
22,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	MDPA (Mines de Potasse d'Alsace?)	d	Elsac Lorraine area	Rhine	via ...	R	

Lead

Discharge	Unit		Year	Refer.	Other remarks
2680,0	kg/y	in	1985	R	
1800,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Mines de Potasse d'Alsace (MDPA)	d	Mulhouse (n-e France)	Rhine	via ...	N	dep 68.

Lead

Discharge	Unit		Year	Refer.	Other remarks
182,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Papeteries de Golbey		Golbey	Rhine		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
226,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sola Industrie Optique		Goetzenbruck			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
146,0	kg/y	in	1990	N	
193,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine.**

FRA	Stracel	d	Strasbourg	Rhine	via ..	R	

Lead

Discharge	Unit		Year	Refer.	Other remarks
2900,0	kg/y	in	1992	R	

FRA	Elf ATOCHEM		Carling	Rhine		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
672695,0	kg/y	in	1990	N	
339085,0	kg/y	in	1991	N	

FRA	Norscolor	d	Carling			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
885125,0	kg/y	in	1989	N	

FRA	Bongrain-Gerard		Le Tholy			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
6935,0	kg/y	in	1992	N	

FRA	Lorfonte		Seremange			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
9490,0	kg/y	in	1991	N	

FRA	Papeteries de Golbey		Golbey	Rhine		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
29565,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Rhine**.

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Pec Rhin		Ottmarsheim			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
26645,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	SGEMV	d	Vittel			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
49275,0	kg/y	in	1986	N	
3650,0	kg/y	in	1989	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Strasbourg	d	Strasbourg	Rhine	Indirect discharge into the Rhine	R	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
600000,0	kg/y	in	1985	R	
260000,0	kg/y	in	1992	R	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Lorfonte	d	Hayange	Rhine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
876,0	kg/y	in	1991	N	
1591,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Lorfonte	d	Rombas	Rhine		N	dep 57.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
3139,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine**.

FRA Lorfonte | d | Uckange | Rhine | | N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
4635,0	kg/y	in	1991	N	

FRA Ludman | d | Niderviller | Rhine | | N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
223,0	kg/y	in	1992	N	

FRA MDPA (Mines de Potasse d'Alsace?) | d | Elsac Lorraine area | Rhine | via ... | R

Zinc

Discharge	Unit		Year	Refer.	Other remarks
48000,0	kg/y	in	1985	R	
33000,0	kg/y	in	1992	R	

FRA Mines de Potasse d'Alsace (MDPA) | d | Mulhouse (n-e France) | Rhine | via ... | N | dep 68.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
4270,0	kg/y	in	1988	N	
5840,0	kg/y	in	1989	N	
3233,0	kg/y	in	1992	N	

FRA Papeteries de Golbey | d | Golbey | Rhine | | N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2204,0	kg/y	in	1992	N	

FRA Sollac | d | Florange/ Ste Agathe | Rhine | | N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
29857,0	kg/y	in	1986	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Rhine**.

29857,0	kg/y	in	1988	N
5949,0	kg/y	in	1989	N
657,0	kg/y	in	1990	N
3431,0	kg/y	in	1991	N
1766,0	kg/y	in	1992	N

FRA	Stracel	d	Strasbourg	Rhine	via ..	R	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
14600,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine**.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bayer AG Leverkusen	m	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments '

Substance	Discharge	Unit	Year	Refer.	Other remarks
1-Chloro-2-nitrobenzene	0,0	No Info. in			See Chloronitrobenzenes.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Hoechst AG	m	Frankfurt	Rhine	via Main	W,E,N,D	

Substance	Discharge	Unit	Year	Refer.	Other remarks
1-Chloro-2-nitrobenzene	0,0	No Info. in			See Chloronitrobenzenes.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bayer AG Leverkusen	m	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Substance	Discharge	Unit	Year	Refer.	Other remarks
1-Chloro-3-nitrobenzene	0,0	No Info. in			See Chloronitrobenzenes.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Hoechst AG	m	Frankfurt	Rhine	via Main	W,E,N,D	

Substance	Discharge	Unit	Year	Refer.	Other remarks
1-Chloro-3-nitrobenzene	0,0	in		N	For discharge of chloronitrobenzenes see FRG Hoechst AG Griesheim

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bayer AG Leverkusen	m	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Substance	Discharge	Unit	Year	Refer.	Other remarks
1-Chloro-4-nitrobenzene	0,0	in		N	See Chloronitrobenzenes.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Hoechst AG	m	Frankfurt	Rhine	via Main	W,E,N,D	

Substance	Discharge	Unit	Year	Refer.	Other remarks
1-Chloro-4-nitrobenzene	0,0	No Info. in		N	For discharge of chloronitrobenzenes see FRG Hoechst AG Griesheim

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Kernforschungszentrum Karlsruhe	d	Karlsruhe	Rhine		R,N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
6,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Bayer AG Leverkusen	d	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Chloronitrobenzenes

Discharge	Unit		Year	Refer.	Other remarks
12000,0	kg/y	in	1985	N	Sum of 1-chloro-2-nitrobenzene, 1-chloro-3-nitrobenzene and 1-chloro-4-nitrobenzene.
24,0	kg/y	in	1992	R	<< 24 kg\y; + see remarks for 1985.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Hoechst AG, Griesheim	m	Frankfurt Griesheim	Main		N,R	

Chloronitrobenzenes

Discharge	Unit		Year	Refer.	Other remarks
2150,0	kg/y	in	1985	R/N	Sum of 1-chloro-2-nitrobenzene, 1-chloro-3-nitrobenzene and 1-chloro-4-nitrobenzene; production of organic intermediates.
250,0	kg/y	in	1992	R/N	see before

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	BASF AG	d	Ludwigshafen	Rhine		D,R,N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
9000,0	kg/y	in	1985	R	
4000,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Bayer AG	d	Uerdingen	Rhine		R	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
122000,0	kg/y	in	1985	R	
16000,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Bayer AG Leverkusen	d	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Chromium

Discharge	Unit		Year	Refer.	Other remarks
45000,0	kg/y	in	1985	R	
4500,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Ciba-Geigy	d	Grenzach	Rhine		R,N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2000,0	kg/y	in	1985	R	
1200,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Fa. Rasselstein	d	Andernach	Rhine		R	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
3000,0	kg/y	in	1985	R	
1800,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Sachtleben	d	Duisburg	Rhine		D,N,R	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
3600,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	BASF AG	d	Ludwigshafen	Rhine		D,R,N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
23000,0	kg/y	in	1985	R	
6300,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bad. Stahlwerke	d	Kehl	Rhine		R	

Copper

Discharge	Unit		Year	Refer.	Other remarks
3300,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bayer AG	d	Uerdingen	Rhine		R	

Copper

Discharge	Unit		Year	Refer.	Other remarks
8000,0	kg/y	in	1985	R	
5100,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bayer AG Leverkusen	d	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Copper

Discharge	Unit		Year	Refer.	Other remarks
24000,0	kg/y	in	1985	R	
4200,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Deutsche Solvay Werke	d	Rheinberg (near Duisburg?)	Rhine (?)		D,R (N)	not the Rheinberg near Regensburg (Donau catchment area).

Copper

Discharge	Unit		Year	Refer.	Other remarks
3000,0	kg/y	in	1985	R	
1900,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Matthes und Weber	d	Duisburg	Rhine		D,R,N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
6000,0	kg/y	in	1985	N	
1700,0	kg/y	in	1992	R,N	<< 1700 kg/y, see note.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine**.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRG	Sachtleben	d	Duisburg	Rhine	D,N,R	

Copper

Discharge	Unit		Year	Refer.	Other remarks
3600,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRG	Stadtwerke Duisburg	d	Duisburg	Rhine	R	

Copper

Discharge	Unit		Year	Refer.	Other remarks
1800,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRG	Hoechst AG, Griesheim	m	Frankfurt Griesheim	Main	N,R	

Endosulfane

Discharge	Unit		Year	Refer.	Other remarks
2,0	kg/y	in	1985	N	< 2 kg/y
1,0	kg/y	in	1992	N	< 1 kg/y

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRG	Bayer AG	d	Uerdingen	Rhine	R	

Lead

Discharge	Unit		Year	Refer.	Other remarks
2600,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRG	Berzelius Metallhütte	d	Duisburg	Rhine	D,R (N)	non ferrous metal industry

Lead

Discharge	Unit		Year	Refer.	Other remarks
3000,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRG	Deutsche Solvay Werke	d	Rheinberg (near Duisburg?)	Rhine (?)	D,R (N)	not the Rheinberg near Regensburg (Donau catchment area).

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Lead

Discharge	Unit		Year	Refer.	Other remarks
4300,0	kg/y	in	1992	R	

FRG	Bayer AG	d	Dormagen (n. of Colone)	Rhine		N (R)	

Parathion

Discharge	Unit		Year	Refer.	Other remarks
20,0	kg/y	in	1985	N	< 20 kg\y, see note.
0,0	kg/y	in	1992	R,N	No discharge in 1992

FRG	Bayer AG Leverkusen	m	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Parathion

Discharge	Unit		Year	Refer.	Other remarks
0,0	No Info.	in		D	Parathion production is abandoned

FRG	BASF AG	d	Ludwigshafen	Rhine		D,R,N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
11831600,0	kg/y	in	1992	R	

FRG	Bayer AG	d	Dormagen (n. of Colone)	Rhine		N (R)	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
2600000,0	kg/y	in	1992	R	

FRG	Bayer AG Leverkusen	d	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
4200000,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine.**

FRG	Klåranlage Nürnberg 1	d	Nürnberg	Rhine		R	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
2048255,0	kg/y	in	1992	R	

FRG	Köln-Stammheim	d	Köln	Rhine		R	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
2100000,0	kg/y	in	1992	R	

FRG	BASF AG	d	Ludwigshafen	Rhine		D,R,N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
190000,0	kg/y	in	1985	N	

FRG	Bayer AG	d	Dormagen (n. of Colone)	Rhine		N (R)	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
480000,0	kg/y	in	1985	N	

FRG	Bayer AG	d	Elberfeld	Rhine		R	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
180000,0	kg/y	in	1985	N	

FRG	Bayer AG Leverkusen	d	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
290000,0	kg/y	in	1985	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Benkisher	d	Ladenburg	Rhine		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
100000,0	kg/y	in	1985	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Hoechst AG, Werk Knapsack	d	Hürth	Rhine	via Düffelsbach	E1,D	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
65000,0	kg/y	in	1985	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Hoffmann La Roche	d	Grenzach	Rhine		R (N) E1	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
30000,0	kg/y	in	1985	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	BASF AG	d	Ludwigshafen	Rhine		D,R,N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
107000,0	kg/y	in	1985	R	
41600,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bayer AG	d	Uerdingen	Rhine		R	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
49000,0	kg/y	in	1985	R	
11000,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRG	Bayer AG Leverkusen	d	Leverkusen (n. of Colone)	Rhine		D,N	manufacture of pigments

Zinc

Discharge	Unit		Year	Refer.	Other remarks
62000,0	kg/y	in	1985	R	
12000,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Ciba-Geigy	d	Grenzach	Rhine		R,N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2000,0	kg/y	in	1985	N	
7900,0	kg/y	in	1992	R	<< 7900 kg/y, see note.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Fa. Bolsner	d	Neuwied	Rhine		R,N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
6000,0	kg/y	in	1985	N	
7900,0	kg/y	in	1992	R	<< 7900 kg/y, see note.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Pigment Chemie	d	Duisburg	Rhine		R,D,N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
87000,0	kg/y	in	1985	N	
7900,0	kg/y	in	1992	R/N	<< 7900 kg/y, see note.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRG	Sachtleben	d	Duisburg	Rhine		D,N,R	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
22000,0	kg/y	in	1985	N	
7900,0	kg/y	in	1992	R/N	<< 7900 kg/y, see note.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine**.

FRG	Stadtwerke Duisburg	d	Duisburg	Rhine		R	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
11000,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine**.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Dow Chemical Benelux BV	d	Rotterdam/ Botlek	Oude Maas	via 3th Petroleum harbour/ Scheur	D,N,R	tank storage

1,1,1-Trichloroethane

Discharge	Unit		Year	Refer.	Other remarks
105,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Pakhoed Chemicals BV (Botlek)	d	Rotterdam/ Botlek	Botlek - Scheur		R	tank storage (ex Paktank Botlek)

1,1,1-Trichloroethane

Discharge	Unit		Year	Refer.	Other remarks
195,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Dupont de Nemours	d	Dordrecht	Rhine / Beneden Merwede		D,N	organic chemical industry

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
130,0	kg/y	in	1985	R	
95,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Hydro Agri Rotterdam BV	d	Vlaardingen	Rhine	Nieuwe Maas	D,N,R	phosphate fertilizer plant

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
5775,0	kg/y	in	1985	R	
660,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Kemira Pernis BV	d	Rotterdam/ Pernis	Nieuwe Maas		D,N,R	phosphate fertiliser plant

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
500,0	kg/y	in	1985	R	
25,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Kemira Pigments BV	d	Rotterdam/ Roozenburg	Scheur		D,N,R	titanium dioxide plant (ex Tiofine)

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
11800,0	kg/y	in	1985	R	
190,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Hydro Agri Rotterdam BV	d	Vlaardingen	Rhine	Nieuwe Maas	D,N,R	phosphate fertilizer plant

Chromium

Discharge	Unit		Year	Refer.	Other remarks
11600,0	kg/y	in	1985	R	
2500,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Kemira Pernis BV	d	Rotterdam/ Pernis	Nieuwe Maas		D,N,R	phosphate fertiliser plant

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2400,0	kg/y	in	1985	R	
2800,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Kemira Pernis BV	d	Rotterdam/ Pernis	Nieuwe Maas		D,N,R	phosphate fertiliser plant

Copper

Discharge	Unit		Year	Refer.	Other remarks
3600,0	kg/y	in	1985	R	
1900,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
NL	Hydro Agri Rotterdam BV	d	Vlaardingen	Rhine	Nieuwe Maas	D,N,R	phosphate fertilizer plant

Lead

Discharge	Unit		Year	Refer.	Other remarks
4600,0	kg/y	in	1985	R	
2000,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
NL	Kemira Pernis BV	d	Rotterdam/ Pernis	Nieuwe Maas		D,N,R	phosphate fertiliser plant

Lead

Discharge	Unit		Year	Refer.	Other remarks
2400,0	kg/y	in	1985	R	
1200,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
NL	Hydro Agri Rotterdam BV	d	Vlaardingen	Rhine	Nieuwe Maas	D,N,R	phosphate fertilizer plant

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
6600000,0	kg/y	in	1985	R	
1410000,0	kg/y	in	1992	R	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
NL	Kemira Pernis BV	d	Rotterdam/ Pernis	Nieuwe Maas		D,N,R	phosphate fertiliser plant

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
5104000,0	kg/y	in	1985	R	
2080000,0	kg/y	in	1992	R	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhône.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Elf ATOCHEM Saint Auban	m	Saint Auban (w. of Nice)	Mediterranean	via Esceron -> Tineé.	W,D	dep 4.

1,1,1-Trichloroethane

Discharge	Unit		Year	Refer.	Other remarks
0,0	No Info.	in			

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Solvay and Cie SA	m	Tavaux (s-e Dijon)	Rhône	via Doubs -> Saône	N,W	Rhône Alps

1,1,1-Trichloroethane

Discharge	Unit		Year	Refer.	Other remarks
0,0	No Info.	in			

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	St Fons			N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
26280,0	kg/y	in	1986	N	
26280,0	kg/y	in	1988	N	
11315,0	kg/y	in	1989	N	
10840,0	kg/y	in	1990	N	
7847,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Roussel Uclaf		Neuville sur Saone	Rhône		N	DEP 69

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
255,0	kg/y	in	1991	N	
109,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Acieries de Bonpertuis	d	Apprieu	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
529,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhône.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	CFR	d	La Mede	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Elf	d	Feyzin	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2190,0	kg/y	in	1990	N	
1715,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Elf ATOCHEM la Milliere	d	Marseille	Rhône		N	dep 13; discharge via sewage.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1825,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Ets Humbert	d	Beaucourt	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2372,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Mollard	d	Villeurbanne	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
620,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Renault Usine M. Berliet	d	Venissieux	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2226,0	kg/y	in	1986	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Rhône**.

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Rhône Poulenc	d	Roches de Condrieu	Rhône		N	m-e France

Chromium

Discharge	Unit		Year	Refer.	Other remarks
6424,0	kg/y	in	1989	N	

FRA	Socatri	d	Bollene	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1533,0	kg/y	in	1986	N	
1241,0	kg/y	in	1989	N	

FRA	Somogal	d	Arc les Gray	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2153,0	kg/y	in	1986	N	

FRA	Ugine Gueugnon	d	Laudun	Rhône		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1990	N	

FRA	Bonmartin	d	Domene	Rhône		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
912,0	kg/y	in	1989	N	

FRA	Elf ATOCHEM SA	d	Lavera (Martigues)	Mediterranean		D,N	dep 13.

Copper

Discharge	Unit		Year	Refer.	Other remarks
693,0	kg/y	in	1986	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Rhône.**

Discharge	Unit		Year	Refer.	Other remarks
4161,0	kg/y	in	1989	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Elf ATOCHEM Saint Auban	d	Saint Auban (w. of Nice)	Mediterranean	via Esceron -> Tineé.	W,D	dep 4.

Copper

Discharge	Unit		Year	Refer.	Other remarks
1204,5	kg/y	in	1986	N	
803,0	kg/y	in	1988	N	
985,0	kg/y	in	1989	N	
208,1	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Elf ATOCHEM la Milliere		Marseille	Rhône		N	dep 13; discharge via sewage.

Copper

Discharge	Unit		Year	Refer.	Other remarks
1168,0	kg/y	in	1990	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Ets Brun		Villeurbanne	Rhône		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
438,0	kg/y	in	1991	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Ets Humbert	d	Beaucourt	Rhône		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
1788,0	kg/y	in	1986	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Graphcolour	d	Annecy			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
584,0	kg/y	in	1989	N	
584,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhône**.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Marquet	d	Cluses	Rhône		D,N	electroplating; DEP 74

Copper

Discharge	Unit		Year	Refer.	Other remarks
350,4	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Mollard	d	Villeurbanne	Rhône		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
1058,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	Roches de Condrieu	Rhône		N	m-e France

Copper

Discharge	Unit		Year	Refer.	Other remarks
6168,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	Roussillon	Rhône		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
3555,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc		St Fons			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1990	N	
1642,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhône**.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Ronis		Lyon			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
547,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Roussel Uclaf	d	Neuville sur Saone	Rhône		N	DEP 69

Copper

Discharge	Unit		Year	Refer.	Other remarks
1241,0	kg/y	in	1986	N	
730,0	kg/y	in	1989	N	
876,0	kg/y	in	1990	N	
1095,0	kg/y	in	1991	N	
408,8	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Soc. Soufre et Micron Couleurs	d	Narbonne (Langedoc)	Rhône		D,N	Manufacture of pigments

Copper

Discharge	Unit		Year	Refer.	Other remarks
4015,0	kg/y	in	1986	N	
2993,0	kg/y	in	1988	N	(4015 kg in previous report)
1277,0	kg/y	in	1989	N	
3358,0	kg/y	in	1990	N	
1934,0	kg/y	in	1991	N	
1606,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Solvay and Cie SA	d	Tavaux (s-e Dijon)	Rhône	via Doubs -> Saône	N,W	Rhône Alps

Copper

Discharge	Unit		Year	Refer.	Other remarks
1569,0	kg/y	in	1990	N	
584,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Creusot Loire Industrie		Le Creusot			N	dep 71.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Lead

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1991	N	
13165,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Glacier Sic		Annecy			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
73,0	kg/y	in	1991	N	
77,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	HBP		Gardanne			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
175,0	kg/y	in	1986	N	
376,0	kg/y	in	1988	N	
339,0	kg/y	in	1990	N	
182,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Roussel Uclaf		Neuville sur Saone	Rhône		N	DEP 69

Lead

Discharge	Unit		Year	Refer.	Other remarks
1825,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SIC	d	Annecy			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
219,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Elf ATOCHEM la Milliere	d	Marseille	Rhône		N	dep 13; discharge via sewage.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
337990,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhône.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Procida		Marseille	Rhône		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
416100,0	kg/y	in	1991	N	
429970,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Roussel Uclaf	d	Neuville sur Saone	Rhône		N	DEP 69

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
549690,0	kg/y	in	1986	N	
549690,0	kg/y	in	1988	N	
381425,0	kg/y	in	1989	N	
369745,0	kg/y	in	1990	N	
355145,0	kg/y	in	1991	N	
319010,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	SNPE		Sorgues	Rhône		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
327040,0	kg/y	in	1991	N	
329230,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Sanofi Bio Industrie		Aubagne	Rhône		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
225935,0	kg/y	in	1991	N	
246375,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Sanofi Bio Industrie	d	Isle sur Sorgue	Rhône		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
292000,0	kg/y	in	1988	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhône.**

Discharge	Unit		Year	Refer.	Other remarks
478150,0	kg/y	in	1989	N	
468660,0	kg/y	in	1990	N	
513190,0	kg/y	in	1991	N	
533630,0	kg/y	in	1992	N	

FRA Sollac — d — Fos sur mer — (Golfe de Fos?) — N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
153665,0	kg/y	in	1992	N	

FRA Elf ATOCHEM — Epierre — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
10220,0	kg/y	in	1991	N	
13870,0	kg/y	in	1992	N	

FRA Ets Brun — d — Villeurbanne — Rhône — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
5840,0	kg/y	in	1989	N	

FRA Graphcolour — d — Annecy — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
109500,0	kg/y	in	1989	N	
365000,0	kg/y	in	1991	N	

FRA Institut Pasteur Merieux — Marcy l'Etoile — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
18250,0	kg/y	in	1990	N	
18250,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhône.**

Discharge	Unit		Year	Refer.	Other remarks
13870,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Procter et Gamble	d	Marseille			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
18250,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Rhône Poulenc	d	Roches de Condrieu	Rhône		N	m-e France

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
6667455,0	kg/y	in	1986	N	
6667455,0	kg/y	in	1988	N	
6066300,0	kg/y	in	1989	N	
4096030,0	kg/y	in	1990	N	
3942000,0	kg/y	in	1991	N	
3725190,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Rhône Poulenc		St Fons			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
19345,0	kg/y	in	1990	N	
9855,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Solvay and Cie SA		Tavaux (s-e Dijon)	Rhône	via Doubs -> Saône	N,W	Rhône Alps

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
12775,0	kg/y	in	1990	N	meest recente geeft aan 12775, het boek van 1990 geeft aan 29200
10950,0	kg/y	in	1991	N	
12410,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: Rhône.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Bonmartin	d	Domene	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
4635,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Bull	d	Belfort	Rhône		N	near the Rhine catchment area.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1752,0	kg/y	in	1989	N	
912,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Charbon Couchoud	d	Villeurbanne	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
438,0	kg/y	in	1991	N	
438,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Couleurs de Paris	d	Aubagne	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
43800,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Elf	d	Feyzin	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
4015,0	kg/y	in	1990	N	
3285,0	kg/y	in	1991	N	
2555,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhône.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Elf ATOCHEM	d	Pierre Benite (m-e France)	Rhône		N	dep 69.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1991	N	
1825,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Elf ATOCHEM	d	St Fons	Rhône		N	dep 69.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
657,0	kg/y	in	1991	N	
792,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Elf ATOCHEM Saint Auban	d	Saint Auban (w. of Nice)	Mediterranean	via Esceron -> Tineé.	W,D	dep 4.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1642,0	kg/y	in	1986	N	
1642,0	kg/y	in	1988	N	
2810,0	kg/y	in	1989	N	
949,0	kg/y	in	1990	N	
438,0	kg/y	in	1991	N	
547,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Ets Brun	d	Villeurbanne	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
876,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Ets Humbert	d	Beaucourt	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
803,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Rhône**.

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Galvaest	d	Grandvillars	Rhône		N	
FRA	Galvanoplast	d	Les Aynans (n-e France)	Rhône	via	N	
FRA	Giovanelli	d	Mandeure	Rhône		N	
FRA	Gnuva Lucien 1	d	Scionzier	Rhône		N	
FRA	Laurent	d	Faverney	Rhône		N	
FRA	Mollard	d	Villeurbanne	Rhône		N	

Manufacturer	Substance	Discharge	Unit		Year	Refer.	Other remarks
Galvaest	Zinc	474,0	kg/y	in	1991	N	
Galvanoplast	Zinc	233,0	kg/y	in	1992	N	
Giovanelli	Zinc	1387,0	kg/y	in	1989	N	
Gnuva Lucien 1	Zinc	317,0	kg/y	in	1992	N	
Laurent	Zinc	2920,0	kg/y	in	1986	N	
Mollard	Zinc	1168,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Rhône**.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Rhône Poulenc	d	Roches de Condrieu	Rhône		N	m-e France

Zinc

Discharge	Unit		Year	Refer.	Other remarks
58400,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Roussel Uclaf	d	Neuville sur Saone	Rhône		N	DEP 69

Zinc

Discharge	Unit		Year	Refer.	Other remarks
730,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Somogal	d	Arc les Gray	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
20805,0	kg/y	in	1986	N	
11643,0	kg/y	in	1988	N	
251,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Thierry Dimier	d	Chassieu	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
730,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Trefileries de Conflandey	d	Conflandey	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1934,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Zindel	d	Seloncourt	Rhône		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1022,0	kg/y	in	1989	N	
730,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: Rhône.

233,0 kg/y in 1992 N

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Acec-Union-Miniere (Metallurgie)	d	Olen	Kleine Nete		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
236,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	BASF NV	d	Antwerpen	Zeeschelde- lower		W,E1	linkeroever

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
573,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Kempense Steenkoolmijn	d	Zolder	Grote Nete/ Boven Demer		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
95,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Metallurgie Hoboken	d	Hoboken	Zeeschelde- lower		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
95,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Tessenderlo Chemie	d	Vilvoorde	Zenne		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
81,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Tessenderlo Chemie (TCH)	d	Ham	Grote Nete		N	sampling point no. 39453.

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
133,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Tessenderlo Chemie (TCH)	d	Tessenderlo	Grote Nete		N	sampling point no. 398014.

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
221,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Vieille Montagne	d	Overpelt	Dommel/ Kempisch Canal	via Kempensch Kanaal -> Albert Kanaal -> Scheldt	E,N	south of Eindhoven

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
38,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	ARCO Chemical Products	d	Gent	Kanaal Gent-Terneuzen		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
847,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Associated Weavers	d	Ronse	Bovenschelde		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1784,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	BASF NV	d	Antwerpen	Zeeschelde- lower		W,E1	linkeroever

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1036,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt**.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References
BEL	Beaulieu Tufting PVBA	d	Wielsbeke	Leie	N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
407,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References
BEL	Bekaert-Pelzen	d	Oudenaarde	Bovenschelde	N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1720,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References
BEL	Eurantex BV	d	Oudenaarde	Bovenschelde	N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
554,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References
BEL	Ideal Tuft NV	d	Wielsbeke	Leie	N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
630,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References
BEL	Kronos nv	d	Gent	Kanaal Gent-Terneuzen	N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
401,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References
BEL	Metalix (ex Alcoat)	d	Schaffen	Beneden Demer	N

Chromium

Discharge	Unit		Year	Refer.	Other remarks
512,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Monsanto Europe nv	d	Antwerpen	Zeeschelde- lower		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
607,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Renault	d	Vilvoorde	Zenne		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
373,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Santens nv	d	Oudenaarde	Bovenschelde		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1406,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Sidmar	d	Gent	Kanaal Gent-Terneuzen		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
32051,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	U.G. Tan (Union Gantoise)	d	Sint-Amandsberg	Zeeschelde		N	linkeroever

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1171,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Acec-Union-Miniere (Metallurgie)	d	Olen	Kleine Nete		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
1300,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt.**

BEL Bekaert NV | d | Aalter | Kanaal Gent-Oostende | N

Copper	Discharge	Unit		Year	Refer.	Other remarks
	481,0	kg/y	in	1992	N	

BEL Bekaert NV | d | Zwevegem | Leie | N

Copper	Discharge	Unit		Year	Refer.	Other remarks
	711,0	kg/y	in	1992	N	

BEL Capelle Gebr. NV | d | Menen | Leie | N

Copper	Discharge	Unit		Year	Refer.	Other remarks
	1594,0	kg/y	in	1992	N	

BEL Fontier Degreve nv | d | Heist op den Berg | Grote Nete | N

Copper	Discharge	Unit		Year	Refer.	Other remarks
	426,0	kg/y	in	1992	N	

BEL K.F. Etablissements PVBA | d | Ternat | Dender | N

Copper	Discharge	Unit		Year	Refer.	Other remarks
	795,0	kg/y	in	1992	N	

BEL SCA Packaging Belgium | d | Buggenhout | Zeechelde midden | N | rechteroever

Copper	Discharge	Unit		Year	Refer.	Other remarks
	605,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Sidmar	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Copper	1741,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	ARCO Chemical Products	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Lead	9779,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Belgian Shell	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Lead	375,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Feldmuehle Langerbrugge nv	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Lead	446,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Kronos nv	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Lead	2231,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Sanofi-bio-industrie	d	Gent	Kanaal Gent-Terneuzen		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
851,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Sidal nv (LP15)	d	Duffel	Grote Nete		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
806,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Sidmar	d	Gent	Kanaal Gent-Terneuzen		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
1118,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Vuylsteke NV	d	Roeselare	Leie		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
3845,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	ARCO Chemical Products	d	Gent	Kanaal Gent-Terneuzen		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
150745,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Algist Bruggeman NV	d	Gent	Kanaal Gent-Terneuzen		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Discharge	Unit		Year	Refer.	Other remarks
438730,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Associated Weavers	d	Ronse	Bovenschelde		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
95630,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	A.L.Z.	d	Genk	Boven Demer		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
547500,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	BASF NV	d	Antwerpen	Zeeschelde- lower		W,E1	linkeroever

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
685835,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Bayer nv	d	Antwerpen	Zeeschelde- lower		N	linkeroever

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
223015,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Bekaert NV	d	Zwevegem	Leie		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
166440,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Capelle Gebr. NV	d	Menen	Leie		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
270830,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Catalysts and Chem. Europe	d	Vilvoorde	Zenne		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
86505,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Degussa nv	d	Antwerpen	Zeeschelde- lower		N	linkeroever

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
131035,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Fina LP4	d	Antwerpen	Zeeschelde- lower		N	linkeroever

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
140160,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	IVBO S.V.	d	Brugge	polders bij Zeebrugge		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
85045,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Kemira nv (ecased)	d	Willebroek	Vliet.		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
90885,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Metallurgie Hoboken	d	Hoboken	Zeeschelde- lower		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
95265,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt**.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Sanofi-bio-industrie	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-nitrogen	348575,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Santens nv	d	Oudenaarde	Bovenschelde		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-nitrogen	97820,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Sidmar	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-nitrogen	748980,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Tessenderlo Chemie	d	Vilvoorde	Zenne		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-nitrogen	354050,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Tessenderlo Chemie (TCH)	d	Tessenderlo	Grote Nete		N	sampling point no. 398014.

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-nitrogen	91980,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	UCB Chemie BV	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-nitrogen						

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Substance	Discharge	Unit		Year	Refer.	Other remarks
	266085,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Uneklo NV	d	Eeklo	Leopoldkanaal		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-nitrogen	105850,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Algist Bruggeman NV	d	Gent	Kanaal Gent-Terneuzen		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-phosphorous	83950,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	BASF NV	d	Antwerpen	Zeeschelde- lower		W,E1	linkeroever

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-phosphorous	750805,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Bayer nv	d	Antwerpen	Zeeschelde- lower		N	linkeroever

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-phosphorous	66430,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Primeur nv	d	Sint- Eloois- Vijve	Leie		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-phosphorous	22265,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
BEL	Van de Moortele nv	d	Izegem	Leie		N	

Substance	Discharge	Unit		Year	Refer.	Other remarks
Total-phosphorous	82490,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	ARCO Chemical Products	d	Gent	Kanaal Gent-Terneuzen		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1935,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	BASF NV	d	Antwerpen	Zeeschelde- lower		W,E1	linkeroever

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1703,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Beaulieu Hermosa	d	Wielsbeke	Leie		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1629,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Bekaert NV	d	Zwevegem	Leie		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1969,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Eurantex BV	d	Oudenaarde	Bovenschelde		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1220,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Fabelta nv	d	Nivove	Dender		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1268,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

BEL IVBO S.V. — d — Brugge — polders bij Zeebrugge — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
5879,0	kg/y	in	1992	N	

BEL Ideal Tuft NV — d — Wielsbeke — Leie — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1078,0	kg/y	in	1992	N	

BEL Latexco nv — d — Tielt — Leie — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1052,0	kg/y	in	1992	N	

BEL Metalix (ex Alcoat) — d — Schaffen — Beneden Demer — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1039,0	kg/y	in	1992	N	

BEL Moerman Etabl. — d — Meulebeke — Leie — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1073,0	kg/y	in	1992	N	

BEL Sidal nv (LP15) — d — Duffel — Grote Nete — N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
680,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Sidmar	d	Gent	Kanaal Gent-Terneuzen		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
10932,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Vieille Montagne	d	Overpelt	Dommel/ Kempisch Canal	via Kempensch Kanaal -> Albert Kanaal -> Scheldt	E,N	south of Eindhoven

Zinc

Discharge	Unit		Year	Refer.	Other remarks
12706,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
BEL	Vuylsteke NV	d	Roeselare	Leie		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
3501,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Ascometal et Valounes		Leffrinckoucke			N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
73,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Bellier	d	Calais	Scheldt		N	indirect discharge

Chromium

Discharge	Unit		Year	Refer.	Other remarks
401,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	Wattrelos (?)	Scheldt		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
30660,0	kg/y	in	1986	N	
30660,0	kg/y	in	1988	N	
31390,0	kg/y	in	1989	N	
9855,0	kg/y	in	1990	N	
6424,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Soc. Niles des Couleurs (SNCZ)	d	Bouchain	Scheldt		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1241,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sollac	d	Dunkerque (n-w France)	Atlantic Ocean		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1022,0	kg/y	in	1990	N	
876,0	kg/y	in	1991	N	
803,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Sollac	d	Mardyck	Scheldt		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2482,0	kg/y	in	1991	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Tioxide	d	Calais	Scheldt		N	DEP 62

Chromium

Discharge	Unit		Year	Refer.	Other remarks
119355,0	kg/y	in	1986	N	
119355,0	kg/y	in	1988	N	
141255,0	kg/y	in	1989	N	
125925,0	kg/y	in	1990	N	
141255,0	kg/y	in	1991	N	
135780,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Visseries Boulonneries (de)	d	Fourmies	Scheldt		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1387,0	kg/y	in	1986	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Interor/ Inter II	d	Calais	Scheldt		N	dep 62

Copper

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Lambin		Lomme			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
10147,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

FRA	Rhône Poulenc	d	La Madeleine	Scheldt		N	DEP 59

Copper

Discharge	Unit		Year	Refer.	Other remarks
693,5	kg/y	in	1990	N	
401,0	kg/y	in	1991	N	
328,5	kg/y	in	1992	N	

FRA	S.F.G.	d	Bernaville			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
401,0	kg/y	in	1986	N	

FRA	Tioxide	d	Calais	Scheldt		N	DEP 62

Copper

Discharge	Unit		Year	Refer.	Other remarks
292,0	kg/y	in	1992	N	

FRA	CEAC		Lille			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
474,0	kg/y	in	1986	N	
365,0	kg/y	in	1988	N	
1241,0	kg/y	in	1989	N	
1679,0	kg/y	in	1990	N	
1095,0	kg/y	in	1991	N	
328,0	kg/y	in	1992	N	

FRA	Capelle Freres		Halluin	Scheldt		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
109,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Fical	d	Loison sous Lens	Scheldt		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Metaleurop (ex Pennarroya)		Noyelles Godault (n-w France)	Haute Deule		D,N	non-ferrous/ production primary batteries

Lead

Discharge	Unit		Year	Refer.	Other remarks
241630,0	kg/y	in	1986	N	
151110,0	kg/y	in	1988	N	
3102,0	kg/y	in	1989	N	
3321,0	kg/y	in	1990	N	
6716,0	kg/y	in	1991	N	
5949,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Oldham	d	Arras			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
547,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SFPO		Boulogne sur Mer	Scheldt		N	dep 62.

Lead

Discharge	Unit		Year	Refer.	Other remarks
0,0	kg/y	in	1988	N	
0,0	kg/y	in	1990	N	
766,0	kg/y	in	1991	N	
36,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Saprotec		Douai	Scheldt		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
18,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sollac	d	Dunkerque (n-w France)	Atlantic Ocean		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
438,0	kg/y	in	1989	N	
511,0	kg/y	in	1990	N	
401,0	kg/y	in	1991	N	
511,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Tioxide		Calais	Scheldt		N	DEP 62

Lead

Discharge	Unit		Year	Refer.	Other remarks
438,0	kg/y	in	1990	N	
401,0	kg/y	in	1991	N	
292,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Trefilerie de Bourbourg		Bourbourg			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
18,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Trefilunion		Loison sous Lens	Scheldt		N	dep 62.

Lead

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1986	N	
219,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Usinor	d	Dunkerque			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
401,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Verreries d'Arques		Arques			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
620,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	AZF	d	Mazingarbe			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
322295,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Bonduelle	d	Estrees Mons			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
365000,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	CECA	d	Feuchy			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
1201580,0	kg/y	in	1986	N	
1201580,0	kg/y	in	1988	N	
492750,0	kg/y	in	1989	N	
192720,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Calaire	d	Calais	Scheldt		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
377775,0	kg/y	in	1990	N	
189070,0	kg/y	in	1991	N	
244915,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Capelle Freres		Halluin	Scheldt		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
365000,0	kg/y	in	1990	N	
200020,0	kg/y	in	1991	N	
200750,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Cokes de Drocourt		Drocourt			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
200385,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Gist Brocades	d	Prouvy	Scheldt		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
150745,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Nitrochimie		Billy Berclay			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
268640,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rexim	d	Ham			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
1058865,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Rhône Poulenc	d	La Madeleine	Scheldt		N	DEP 59

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
1338090,0	kg/y	in	1990	N	
905930,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Discharge	Unit		Year	Refer.
973090,0	kg/y	in	1992	N

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Roquette	d	Vecquemont			N	dep 80.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
3650000,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SC Grande Paroisse-Sav	d	Mazingarbe	Scheldt		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
1131500,0	kg/y	in	1988	N	
1131500,0	kg/y	in	1989	N	
625245,0	kg/y	in	1990	N	
321200,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SFPO		Boulogne sur Mer	Scheldt		N	dep 62.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
313900,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Soc. Chimique GRD		Mazingarbe			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
1131500,0	kg/y	in	1988	N	
429970,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sollac	d	Dunkerque (n-w France)	Atlantic Ocean		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
823805,0	kg/y	in	1990	N	
1184425,0	kg/y	in	1991	N	
803740,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRA	Ugine Aciers SA	d	Isbergues	Scheldt	N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
392375,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRA	Lever		Haubourdin		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
12045,0	kg/y	in	1990	N	
13870,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRA	Penarroya	d	Noyelles Godault		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
241630,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRA	Sa Cargill		St Andre		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
9125,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRA	Asturienne France	d	Auby	Scheldt	N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
21900,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	References	Remarks concerning the site
FRA	Bellier	d	Calais	Scheldt	N	indirect discharge

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2883,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

FRA	Fical	d	Loison sous Lens	Scheldt		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
3248,0	kg/y	in	1986	N	
1460,0	kg/y	in	1989	N	

FRA	Metaleurop (ex Pennarroya)	d	Noyelles Godault (n-w France)	Haute Deule		D,N	non-ferrous/ production primary batteries

Zinc

Discharge	Unit		Year	Refer.	Other remarks
213525,0	kg/y	in	1986	N	
240170,0	kg/y	in	1988	N	
9745,0	kg/y	in	1989	N	
5438,0	kg/y	in	1990	N	
6716,0	kg/y	in	1991	N	
6351,0	kg/y	in	1992	N	

FRA	Pirelli	d	Saleux	Scheldt		N	(Sapsa Bedding from 1992 on ?)

Zinc

Discharge	Unit		Year	Refer.	Other remarks
24272,0	kg/y	in	1990	N	

FRA	Produits Chimiques Ugine Kuhlmann	d	Loos (near Lille)	La Deûle		E1,N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
25185,0	kg/y	in	1990	N	
24090,0	kg/y	in	1991	N	
25915,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Scheldt.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Promerac	d	Flers en Escrebieux	Scheldt		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
328,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	SFPO	d	Boulogne sur Mer	Scheldt		N	dep 62.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
10220,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Saprotec	d	Douai	Scheldt		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
8760,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Saprotec	d	Frais Marais	Scheldt		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
59860,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Sapsa Bedding (ex Pirelli)	d	Saleux	Scheldt		N	dep 80; ex Pirelli þ 1992.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
7300,0	kg/y	in	1986	N	
16060,0	kg/y	in	1990	N	
2920,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Selnor	d	Lesquin	Scheldt		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
4380,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

Discharge	Unit		Year	Refer.	Other remarks
2993,0	kg/y	in	1991	N	
474,0	kg/y	in	1992	N	

FRA Soc. Niles des Couleurs (SNCZ) | d | Bouchain | Scheldt | | N

Zinc

Discharge	Unit		Year	Refer.	Other remarks
949,0	kg/y	in	1991	N	
365,0	kg/y	in	1992	N	

FRA Tioxide | d | Calais | Scheldt | | N | DEP 62

Zinc

Discharge	Unit		Year	Refer.	Other remarks
9855,0	kg/y	in	1988	N	
31025,0	kg/y	in	1989	N	
10548,0	kg/y	in	1990	N	
24090,0	kg/y	in	1991	N	
7665,0	kg/y	in	1992	N	

FRA Trefilunion | d | Loison sous Lens | Scheldt | | N | dep 62.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
3248,0	kg/y	in	1986	N	
3285,0	kg/y	in	1988	N	
2920,0	kg/y	in	1991	N	
5840,0	kg/y	in	1992	N	

FRA Union miniere (ex Vieille Montagne) | d | Auby (n-w France) | Scarpe | Scheldt? | D,N | non-ferrous/production primary batteries; ex Vieille Montagne þ 1992.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
21900,0	kg/y	in	1986	N	
27010,0	kg/y	in	1988	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Scheldt.**

11680,0	kg/y	in	1989	N
19892,0	kg/y	in	1990	N
18797,0	kg/y	in	1991	N
17775,0	kg/y	in	1992	N

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Vachette Ymos	d	Abbeville	Scheldt		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
255,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Visseries Boulonneries (de)	d	Fourmies	Scheldt		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
17483,0	kg/y	in	1986	N	
17483,0	kg/y	in	1988	N	
14235,0	kg/y	in	1989	N	
3285,0	kg/y	in	1991	N	
255,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Cofaz	d	Le Havre	Seine		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
2555,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Hydro Agri Fr. (SNA, ex Norsk H.Az)	d	Le Havre	Seine		N	dep 76; ex Norsk Hydro Azote, þ 1992 (?).

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
2555,0	kg/y	in	1986	N	
5475,0	kg/y	in	1988	N	
5110,0	kg/y	in	1989	N	
5110,0	kg/y	in	1990	N	
4489,0	kg/y	in	1991	N	
4050,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)		Grand Couronne	Seine		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
1277,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)	d	Grand Quevilly	Seine		N	dep 76.

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
329,0	kg/y	in	1990	N	
529,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Thann et Mulhouse	d	Le Havre (n-w France)	Seine		N	

Arsenic

Discharge	Unit		Year	Refer.	Other remarks
182,0	kg/y	in	1989	N	
36,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	ALB	d	Beautor	Seine		N?	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2628,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	CFR	d	Gonfreville	Seine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1460,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Chausson	d	Montataire	Seine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
150,0	kg/y	in	1986	N	
237,0	kg/y	in	1988	N	
157,0	kg/y	in	1990	N	
215,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Cofaz	d	Le Havre	Seine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
2883,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Costil Tanneries	d	Pont Audemer	Seine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
8030,0	kg/y	in	1986	N	
10841,0	kg/y	in	1988	N	
7118,0	kg/y	in	1990	N	
4234,0	kg/y	in	1991	N	
6643,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Crompton & Knowles (ICI Francolor)	d	Oissel (n-w France)	Seine ?		D,N	ex ICI Francolor þ 1992, dep 76.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1496,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Hispano Suiza	d	Le Havre	Seine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Hydro Agri Fr. (SNA, ex Norsk H.Az)	d	Le Havre	Seine		N	dep 76; ex Norsk Hydro Azote, þ 1992 (?).

Chromium

Discharge	Unit		Year	Refer.	Other remarks
11242,0	kg/y	in	1988	N	
6570,0	kg/y	in	1989	N	
6570,0	kg/y	in	1990	N	
5767,0	kg/y	in	1991	N	
4124,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Manufacture Parisienne de	d	Crisolles	Seine		N	dep 60.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1825,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Moulinex	d	Cormelles le Royal	Seine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
255,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Polychrome	d	Avranches	Seine		R	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
438,0	kg/y	in	1990	N	
328,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Raclot	d	Nogent	Seine		N	dep 52.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
803,0	kg/y	in	1989	N	
803,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Renault (RNUR)	d	Flins sur Seine	Seine		N	dep 78.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1350,0	kg/y	in	1986	N	
1350,0	kg/y	in	1988	N	
584,0	kg/y	in	1989	N	
511,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)	d	Grand Quevilly	Seine		N	dep 76.

Chromium

Discharge	Unit		Year	Refer.	Other remarks
1277,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Thann et Mulhouse	d	Le Havre (n-w France)	Seine		N	

Chromium

Discharge	Unit		Year	Refer.	Other remarks
155125,0	kg/y	in	1986	N	
133955,0	kg/y	in	1988	N	
127385,0	kg/y	in	1989	N	
73000,0	kg/y	in	1990	N	
92710,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Discharge	Unit		Year	Refer.
96360,0	kg/y	in	1992	N

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	ACI	d	Champagne sur Seine	Seine		N	dep 77

Copper

Discharge	Unit		Year	Refer.	Other remarks
219,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Alcatel	d	Coutances			N	dep 50

Copper

Discharge	Unit		Year	Refer.	Other remarks
292,0	kg/y	in	1990	N	
182,5	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Christofle		Yainville			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
474,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Comptoir Lyon Alemand Louyot	d	Bornel	Seine		N	indirect discharge; Bornel ? Noisy le Sec ?

Copper

Discharge	Unit		Year	Refer.	Other remarks
303,0	kg/y	in	1986	N	
1518,0	kg/y	in	1988	N	
1095,0	kg/y	in	1989	N	
1095,0	kg/y	in	1990	N	
803,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Comptoir Lyon Alemand Louyot	d	Noisy le Sec	Seine?	indirect discharge via POTW	N	dep 93 !?

Copper

Discharge	Unit		Year	Refer.	Other remarks

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Discharge	Unit		Year	Refer.	Other remarks
6570,0	kg/y	in	1986	N	
6570,0	kg/y	in	1986	N	
365,0	kg/y	in	1990	N	
423,4	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Desnoyers	d	Laigneville			N	dep 60.

Copper

Discharge	Unit		Year	Refer.	Other remarks
401,0	kg/y	in	1986	N	
730,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Francolor Pigments (ex ICI)	d	Villers St Paul	Seine		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
6387,0	kg/y	in	1986	N	
5840,0	kg/y	in	1988	N	
5110,0	kg/y	in	1990	N	
12227,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Graindorge	d	Sens			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
27010,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Hydro Agri Fr. (SNA, ex Norsk H.Az)	d	Le Havre	Seine		N	dep 76; ex Norsk Hydro Azote, þ 1992 (?).

Copper

Discharge	Unit		Year	Refer.	Other remarks
12848,0	kg/y	in	1988	N	
9490,0	kg/y	in	1989	N	
9490,0	kg/y	in	1990	N	
7482,0	kg/y	in	1991	N	
5402,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine**.

FRA	ICI - Platforme Chimique	d	Villers st Paul			N	dep 60.

Copper

Discharge	Unit		Year	Refer.	Other remarks
6387,0	kg/y	in	1986	N	
1095,0	kg/y	in	1989	N	

FRA	Jean et Chaumont	d	Tinqueux	Seine		N	DEP 51

Copper

Discharge	Unit		Year	Refer.	Other remarks
120,5	kg/y	in	1986	N	
113,2	kg/y	in	1988	N	
1533,0	kg/y	in	1989	N	
94,9	kg/y	in	1990	N	
365,0	kg/y	in	1991	N	
372,3	kg/y	in	1992	N	

FRA	Nicolitch	d	Courcouronnes	?		N	dep 91.

Copper

Discharge	Unit		Year	Refer.	Other remarks
211,7	kg/y	in	1992	N	

FRA	Philips Composants		Evreux	Seine		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
1788,0	kg/y	in	1988	N	
4416,0	kg/y	in	1990	N	
2445,0	kg/y	in	1991	N	
2533,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Pont a Mousson SA	d	Bayard (n-e France)	Seine		N	DEP 52

Copper

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1986	N	
584,0	kg/y	in	1990	N	
255,5	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Quinoleine	d	Oissel			N	dep 76.

Copper

Discharge	Unit		Year	Refer.	Other remarks
547,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	RTC	d	Evreux			N	dep 27.

Copper

Discharge	Unit		Year	Refer.	Other remarks
1569,0	kg/y	in	1986	N	
2920,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)		Grand Quevilly	Seine		N	dep 76.

Copper

Discharge	Unit		Year	Refer.	Other remarks
693,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sa Electric Universal	d	Montreuil			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
766,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine**.

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Sa Griset	d	Aubervilliers			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
803,0	kg/y	in	1986	N	
803,0	kg/y	in	1988	N	
657,0	kg/y	in	1989	N	
803,0	kg/y	in	1990	N	
511,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Sarp Industrie	d	Limay			N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1986	N	
803,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Thann et Mulhouse	d	Le Havre (n-w France)	Seine		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
730,0	kg/y	in	1986	N	
912,0	kg/y	in	1989	N	
438,0	kg/y	in	1990	N	
292,0	kg/y	in	1991	N	
493,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Trefimetaux	d	Rai	Seine		N	

Copper

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Trefimetaux	d	Serifontaine	Seine		N	DEP 60

Copper

Discharge	Unit		Year	Refer.	Other remarks
80,3	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Discharge	Unit		Year	Refer.	Other remarks
43,8	kg/y	in	1988	N	
105,9	kg/y	in	1990	N	
226,3	kg/y	in	1992	N	

FRA Usine de Navarre — Evreux — Seine — N

Copper

Discharge	Unit		Year	Refer.	Other remarks
511,0	kg/y	in	1990	N	

FRA ACI — Champagne sur Seine — Seine — N — dep 77

Lead

Discharge	Unit		Year	Refer.	Other remarks
25,0	kg/y	in	1992	N	

FRA Alcatel — Coutances — N — dep 50

Lead

Discharge	Unit		Year	Refer.	Other remarks
55,0	kg/y	in	1990	N	
36,0	kg/y	in	1992	N	

FRA Baroclem — d — Grand Quevilly — N

Lead

Discharge	Unit		Year	Refer.	Other remarks
730,0	kg/y	in	1986	N	
182,0	kg/y	in	1989	N	

FRA CFEC — Outarville — N

Lead

Discharge	Unit		Year	Refer.	Other remarks
73,0	kg/y	in	1986	N	
55,0	kg/y	in	1988	N	
44,0	kg/y	in	1990	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Seine.**

Discharge	Unit		Year	Refer.	Other remarks
36,0	kg/y	in	1992	N	

FRA Chausson — Montataire — Seine — N

Lead

Discharge	Unit		Year	Refer.	Other remarks
474,0	kg/y	in	1986	N	
365,0	kg/y	in	1989	N	
219,0	kg/y	in	1990	N	
219,0	kg/y	in	1992	N	

FRA Comptoir Lyon Alemand Louyot — Noisy le Sec — Seine? — indirect discharge via POTW — N — dep 93 !?

Lead

Discharge	Unit		Year	Refer.	Other remarks
244,0	kg/y	in	1990	N	
29,0	kg/y	in	1992	N	

FRA Elf Antar — Grandpuits — N

Lead

Discharge	Unit		Year	Refer.	Other remarks
51,0	kg/y	in	1992	N	

FRA Federal Mogul — d — St Jean de la Ruelle — N

Lead

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1986	N	
219,0	kg/y	in	1989	N	

FRA Hydro Agri Fr. (SNA, ex Norsk H.Az) — Le Havre — Seine — N — dep 76; ex Norsk Hydro Azote, þ 1992 (?).

Lead

Discharge	Unit		Year	Refer.	Other remarks

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Discharge	Unit		Year	Refer.	Other remarks
2445,0	kg/y	in	1988	N	
1825,0	kg/y	in	1989	N	
1825,0	kg/y	in	1990	N	
1606,0	kg/y	in	1991	N	
1752,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Jaquemin	d	Saucourt			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
1460,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Metaleurop		Rieux			N	dep 60.

Lead

Discharge	Unit		Year	Refer.	Other remarks
208,0	kg/y	in	1986	N	
186,0	kg/y	in	1988	N	
120,0	kg/y	in	1990	N	
1131,0	kg/y	in	1991	N	
146,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Philips Circuits Imprimes (ex RTC)		Evreux			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
438,0	kg/y	in	1986	N	
438,0	kg/y	in	1988	N	
292,0	kg/y	in	1990	N	
47,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Philips Composants		Evreux	Seine		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
182,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Pont a Mousson SA		Bayard (n-e France)	Seine		N	DEP 52

Lead

Discharge	Unit		Year	Refer.	Other remarks
730,0	kg/y	in	1986	N	
730,0	kg/y	in	1989	N	
1022,0	kg/y	in	1990	N	
365,0	kg/y	in	1991	N	
365,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	RTC	d	Evreux			N	dep 27.

Lead

Discharge	Unit		Year	Refer.	Other remarks
438,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Renault (RNUR)		Flins sur Seine	Seine		N	dep 78.

Lead

Discharge	Unit		Year	Refer.	Other remarks
47,0	kg/y	in	1986	N	
43,0	kg/y	in	1988	N	
33,0	kg/y	in	1990	N	
25,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Renault (RNUR)		Sandouville			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
73,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)		Grand Quevilly	Seine		N	dep 76.

Lead

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SMN	d	Mondeville			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
547,0	kg/y	in	1986	N	
547,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sa Electric Universal	d	Montreuil			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
365,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sarp Industrie		Limay			N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
29,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Talbot	d	Poissy	Seine		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
255,0	kg/y	in	1989	N	
146,0	kg/y	in	1990	N	
146,0	kg/y	in	1991	N	
98,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Thann et Mulhouse		Le Havre (n-w France)	Seine		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
3650,0	kg/y	in	1986	N	
912,0	kg/y	in	1989	N	
438,0	kg/y	in	1990	N	
401,0	kg/y	in	1991	N	
459,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Seine.**

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Trefilac	d	Manois	Seine		N	dep 52.

Lead

Discharge	Unit		Year	Refer.	Other remarks
803,0	kg/y	in	1986	N	
474,0	kg/y	in	1989	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Trefimetaux		Serifontaine	Seine		N	DEP 60

Lead

Discharge	Unit		Year	Refer.	Other remarks
55,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Unimetal Normandie (SMN)		Mondeville	Seine		N	

Lead

Discharge	Unit		Year	Refer.	Other remarks
547,0	kg/y	in	1986	N	
547,0	kg/y	in	1990	N	
547,0	kg/y	in	1991	N	
36,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Valeo Thermique Moteurs		Reims			N	dep 51.

Lead

Discharge	Unit		Year	Refer.	Other remarks
77,0	kg/y	in	1986	N	
73,0	kg/y	in	1988	N	
62,0	kg/y	in	1990	N	
36,0	kg/y	in	1991	N	
44,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Azolacq	d	Oissel			N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
474500,0	kg/y	in	1986	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Discharge	Unit		Year	Refer.	Other remarks
284700,0	kg/y	in	1989	N	

FRA Cofaz | d | Le Havre | Seine | N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
620500,0	kg/y	in	1986	N	

FRA Costil Tanneries | Pont Audemer | Seine | N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
287255,0	kg/y	in	1990	N	

FRA Elf ATOCHEM | Villers St Paul | Seine | N | dep 60.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
182500,0	kg/y	in	1988	N	
178850,0	kg/y	in	1990	N	
177885,0	kg/y	in	1991	N	
401500,0	kg/y	in	1992	N	

FRA Esso/Exxon | d | N.D. de Gravenchon | Seine | N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
375950,0	kg/y	in	1986	N	
463550,0	kg/y	in	1988	N	
476690,0	kg/y	in	1990	N	
679630,0	kg/y	in	1992	N	

FRA Esso/Exxon | Port Jerome | N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
375950,0	kg/y	in	1988	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine**.

Discharge	Unit		Year	Refer.	Other remarks
433255,0	kg/y	in	1989	N	
530345,0	kg/y	in	1991	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Fould Springer	d	Alfortville	Seine ?			dep 94= Paris area; indirect discharge.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
358065,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Generale Sucriere	d	Cagny	Seine		N	

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
675250,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Hydro Agri Fr. (SNA, ex Norsk H.Az)	d	Le Havre	Seine		N	dep 76; ex Norsk Hydro Azote, þ 1992 (?).

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
185420,0	kg/y	in	1988	N	
270465,0	kg/y	in	1989	N	
339450,0	kg/y	in	1990	N	
392740,0	kg/y	in	1991	N	
413545,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	ICI - Platforme Chimique	d	Villers st Paul			N	dep 60.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
233600,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

FRA	La Rochette	d	Venizel	Seine		N	dep 2.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
784750,0	kg/y	in	1988	N	
657000,0	kg/y	in	1989	N	
338720,0	kg/y	in	1990	N	
338720,0	kg/y	in	1991	N	
401500,0	kg/y	in	1992	N	

FRA	Rhône Poulenc	d	Vitry sur Seine	?		N	dep 94.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
1842520,0	kg/y	in	1988	N	
1158145,0	kg/y	in	1990	N	
940240,0	kg/y	in	1992	N	

FRA	Rhône Poulenc Biochimie Sante	d	St Aubin les Elbeuf	Seine		N	dep 76.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
1241000,0	kg/y	in	1986	N	
919435,0	kg/y	in	1988	N	
916515,0	kg/y	in	1989	N	
915785,0	kg/y	in	1990	N	
774530,0	kg/y	in	1991	N	
488005,0	kg/y	in	1992	N	

FRA	SC Grande Paroisse (SCGP)	d	Grand Quevilly	Seine		N	dep 76.

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
664665,0	kg/y	in	1989	N	
574145,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences
FRA	SMN	d	Mondeville			N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
313900,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences
FRA	SNA	d	Le Havre			N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
275210,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences
FRA	Unimetal Normandie (SMN)		Mondeville	Seine		N

Total-nitrogen

Discharge	Unit		Year	Refer.	Other remarks
313900,0	kg/y	in	1991	N	
244550,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences
FRA	Bolaidor		St Hilaire de Briouze			N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
31755,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences
FRA	Bridel		St Martin de Bienfaite			N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
32850,0	kg/y	in	1991	N	
29200,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences
FRA	CDF Chimie	d	Rouen			N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
60590,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	CDF Chimie AZF	d	Grand Couronne (n-w France)	Seine		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
1706010,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	CDF Chimie AZF	d	Grand Queville			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
4743540,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Cofaz	d	Le Havre	Seine		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
8826430,0	kg/y	in	1986	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Cogesal		Argentan			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
14600,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Compagnie des Fromages		Ducey			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
34310,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Compagnie des Fromages		Vire			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
20075,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

FRA	Distillerie de Bucheres		Bucheres			N	dep 10.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
36500,0	kg/y	in	1990	N	

FRA	Elvir		Conde sur Vire			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
18250,0	kg/y	in	1992	N	

FRA	Ets Pierre Languetot		Les Veys			N	dep 50.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
14600,0	kg/y	in	1991	N	
9125,0	kg/y	in	1992	N	

FRA	Ets Vallee		Clecy			N	dep 14.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
14600,0	kg/y	in	1991	N	
14600,0	kg/y	in	1992	N	

FRA	Ets Vallee		St Georges des Groseillers			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
10950,0	kg/y	in	1992	N	

FRA	Fould Springer		Alfortville	Seine ?			dep 94= Paris area; indirect discharge.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
74460,0	kg/y	in	1988	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Discharge	Unit		Year	Refer.	Other remarks
51100,0	kg/y	in	1990	N	
33580,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Fromageries Vaudes		Vaudes			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
5840,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Generale Sucriere		Cagny	Seine		N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
5840,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Henkel	d	Chalons			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
116800,0	kg/y	in	1986	N	
36500,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Hydro Agri Fr. (SNA, ex Norsk H.Az)		Le Havre	Seine		N	dep 76; ex Norsk Hydro Azote, þ 1992 (?).

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
8826430,0	kg/y	in	1986	N	
10220000,0	kg/y	in	1988	N	
8760000,0	kg/y	in	1989	N	
8760000,0	kg/y	in	1990	N	
7592000,0	kg/y	in	1991	N	
4016825,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

FRA Maitres Laitiers du Cotentin — Valognes — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
7665,0	kg/y	in	1992	N	

FRA Procal — Langres — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
3650,0	kg/y	in	1988	N	
14600,0	kg/y	in	1990	N	
10950,0	kg/y	in	1992	N	

FRA Rhône Poulenc Biochimie Sante — d — St Aubin les Elbeuf — Seine — N — dep 76.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
316455,0	kg/y	in	1989	N	
155855,0	kg/y	in	1991	N	

FRA SC Grande Paroisse (SCGP) — Grand Couronne — Seine — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
1669510,0	kg/y	in	1988	N	
498955,0	kg/y	in	1989	N	
541660,0	kg/y	in	1990	N	
520855,0	kg/y	in	1991	N	

FRA SC Grande Paroisse (SCGP) — Grand Quevilly — Seine — N — dep 76.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
4743540,0	kg/y	in	1986	N	
2855030,0	kg/y	in	1988	N	
19984845,0	kg/y	in	1989	N	
1763315,0	kg/y	in	1990	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Discharge	Unit		Year	Refer.
1287355,0	kg/y	in	1991	N
835120,0	kg/y	in	1992	N

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)		Rouen	Seine		N	dep 76.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
60590,0	kg/y	in	1986	N	
14600,0	kg/y	in	1989	N	
11680,0	kg/y	in	1990	N	
54750,0	kg/y	in	1991	N	
6935,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Sanofi Bio Industrie		Baupte			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
10950,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Societe Fromagere Besnier		Domfront			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
87600,0	kg/y	in	1991	N	
75920,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Societe Fromagere Besnier		Isigny sur Mer			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
29200,0	kg/y	in	1991	N	
29200,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

FRA Societe Fromagere Besnier — Ste Cecile — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
69350,0	kg/y	in	1991	N	
75920,0	kg/y	in	1992	N	

FRA Soc. Laitiere d'Auge — d — Vimoutiers — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
10950,0	kg/y	in	1991	N	

FRA Sopad Nestle — Lisieux — N — dep 14.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
10950,0	kg/y	in	1991	N	
10950,0	kg/y	in	1992	N	

FRA Sucrerie d'Arcis sur Aube — Arcis sur Aube — N — dep 10.

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
90885,0	kg/y	in	1990	N	
130305,0	kg/y	in	1991	N	
141255,0	kg/y	in	1992	N	

FRA Union des Cooperratives Laitieres — Osmanville — N

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
51100,0	kg/y	in	1991	N	
51100,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Union laitiere normande		Conde			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
18250,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Union laitiere normande		Ducey			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
29200,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Union laitiere normande		Vire			N	

Total-phosphorous

Discharge	Unit		Year	Refer.	Other remarks
25550,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Ates	d	St Nicolas d'Aliermont	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1642,0	kg/y	in	1989	N	
730,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Beautor SA	d	Beautor	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
511,0	kg/y	in	1990	N	
511,0	kg/y	in	1991	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Chausson	d	Montataire	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2190,0	kg/y	in	1989	N	
1204,0	kg/y	in	1990	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site

Catchment area: **Seine.**

Discharge	Unit		Year	Refer.	Other remarks
1277,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Cipel	d	Louviers	Seine		N	dep 27.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1460,0	kg/y	in	1990	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Citron	d	Cormelles le Royal	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
985,0	kg/y	in	1990	N	
985,0	kg/y	in	1991	N	
730,0	kg/y	in	1992	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Cofaz	d	Le Havre	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
25550,0	kg/y	in	1986	N	

Coun- try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe- rences	Remarks concerning the site
FRA	Comptoir Lyon Alemand Louyot	d	Bornel	Seine		N	indirect discharge; Bornel ? Noisy le Sec ?

Zinc

Discharge	Unit		Year	Refer.	Other remarks
131,0	kg/y	in	1986	N	
201,0	kg/y	in	1988	N	
1460,0	kg/y	in	1989	N	
284,0	kg/y	in	1990	N	
313,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Comptoir Lyon Alemand Louyot	d	Noisy le Sec	Seine?	indirect discharge via POTW	N	dep 93 !?

Zinc

Discharge	Unit		Year	Refer.	Other remarks
9125,0	kg/y	in	1986	N	
507,0	kg/y	in	1990	N	
244,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Cousin	d	St Georges des Groseillers	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
292,0	kg/y	in	1990	N	
438,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Crompton & Knowles (ICI Francolor)	d	Oissel (n-w France)	Seine ?		D,N	ex ICI Francolor þ 1992, dep 76.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2263,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Dunlopillo	d	Mantes la Jolie	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
240,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Electropoli	d	Isigny Le Buat	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
328,0	kg/y	in	1988	N	
584,0	kg/y	in	1990	N	
255,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

FRA	Elf ATOCHEM	d	Gonfreville l'orcher	Seine		N	dep 76.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
912,0	kg/y	in	1990	N	

FRA	Hydro Agri Fr. (SNA, ex Norsk H.Az)	d	Le Havre	Seine		N	dep 76; ex Norsk Hydro Azote, þ 1992 (?).

Zinc

Discharge	Unit		Year	Refer.	Other remarks
25550,0	kg/y	in	1986	N	
25550,0	kg/y	in	1988	N	
23177,0	kg/y	in	1989	N	
23177,0	kg/y	in	1990	N	
20403,0	kg/y	in	1991	N	
14746,0	kg/y	in	1992	N	

FRA	Jean et Chaumont	d	Tinqueux	Seine		N	DEP 51

Zinc

Discharge	Unit		Year	Refer.	Other remarks
361,0	kg/y	in	1986	N	
153,0	kg/y	in	1988	N	
569,0	kg/y	in	1990	N	
4489,0	kg/y	in	1991	N	
4489,0	kg/y	in	1992	N	

FRA	Knorr-Dahl	d	Lisieux	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
292,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Manufacture Parisienne de	d	Crisolles	Seine		N	dep 60.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2883,0	kg/y	in	1986	N	
1095,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Paulstra	d	Chateaudun	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
306,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Pont a Mousson SA	d	Bayard (n-e France)	Seine		N	DEP 52

Zinc

Discharge	Unit		Year	Refer.	Other remarks
43800,0	kg/y	in	1986	N	
43800,0	kg/y	in	1988	N	
32850,0	kg/y	in	1989	N	
7300,0	kg/y	in	1990	N	
4197,0	kg/y	in	1991	N	
41975,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Renault (RNUR)	d	Flins sur Seine	Seine		N	dep 78.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
7300,0	kg/y	in	1986	N	
8395,0	kg/y	in	1988	N	
5475,0	kg/y	in	1989	N	
3431,0	kg/y	in	1990	N	
4599,0	kg/y	in	1991	N	
2777,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)	d	Grand Couronne	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2263,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	SC Grande Paroisse (SCGP)	d	Grand Quevilly	Seine		N	dep 76.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
4818,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Sogal	d	St Martin de Bienfaite	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
803,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Talbot	d	Poissy	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2993,0	kg/y	in	1986	N	
262,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Thann et Mulhouse	d	Le Havre (n-w France)	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
48180,0	kg/y	in	1986	N	
45990,0	kg/y	in	1988	N	
11680,0	kg/y	in	1989	N	
44895,0	kg/y	in	1991	N	
29930,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site

Catchment area: **Seine.**

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Trefilac	d	Manois	Seine		N	dep 52.

Zinc

Discharge	Unit		Year	Refer.	Other remarks
5840,0	kg/y	in	1986	N	
10950,0	kg/y	in	1989	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Trefilerie Jacquemin	d	Saucourt	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
912,0	kg/y	in	1990	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Trefimetaux	d	Rai	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1825,0	kg/y	in	1986	N	
1825,0	kg/y	in	1988	N	
1314,0	kg/y	in	1989	N	
657,0	kg/y	in	1990	N	
547,0	kg/y	in	1991	N	
4745,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Trefimetaux	d	Serifontaine	Seine		N	DEP 60

Zinc

Discharge	Unit		Year	Refer.	Other remarks
328,0	kg/y	in	1992	N	

Country	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	References	Remarks concerning the site
FRA	Tubecam	d	Chevillon	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1990	N	
1095,0	kg/y	in	1991	N	
1095,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

Catchment area: **Seine.**

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Tubecam	d	Sommeville	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1095,0	kg/y	in	1989	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Tubecam	d	St Florentin	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
1496,0	kg/y	in	1986	N	
1022,0	kg/y	in	1988	N	
1387,0	kg/y	in	1990	N	
1387,0	kg/y	in	1991	N	
1971,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Usine de Navarre	d	Evreux	Seine		N	

Zinc

Discharge	Unit		Year	Refer.	Other remarks
2737,0	kg/y	in	1990	N	
2737,0	kg/y	in	1991	N	
565,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site
FRA	Villard S.A.	d	Montereau Fault Yonne	Seine - Marne		D,N	electroplating

Zinc

Discharge	Unit		Year	Refer.	Other remarks
693,0	kg/y	in	1992	N	

Coun-try	Manufacturer, or Discharger	m/d	Site	Near by surface water	via..	Refe-rences	Remarks concerning the site

end of report

Appendix D2 Discharges of List II substances to Surface Waters in the EU

Additional Discharge Information

Slaney river (Ireland)

For this project, the catchment of the Slaney river on the basis of consultation with the Irish national representative.

For the Slaney River, annual loads (inputs) are reported for the List II substances: total-phosphorous, total-nitrogen, copper, lead and zinc (source: IRL611 concerning "PARCOM Pilot and Comprehensive Studies"). The results for these substances are given in Table D.1.

Table D.1: PARCOM: annual loads for the Slaney river (tonnes / year)

Substance	1986	1987	1990	1991	1992	1993	1994
Total-phosphorous	NM	NM	171	94	75	291	285
Total-nitrogen	NM	NM	4,663	5,711	2,799	5,980	8,651
Copper	6.9	5.5	1.7	NM	6.7	3.8	3.16
Lead	6.4	5	0.72	NM	0.79	1.6	2.95
Zinc	28.1	16.7	12.3	NM	17.9	28.1	12.4

NM= Not Measured

Data in Table D.1 give no trend of annual loads for the substances concerned. 1986-1987 estimates for lead are "maximum" estimates due to higher analysis detection limits. Furthermore, the data are not linked to individual dischargers.

Denmark

In sources DK1001 and DK1004, Denmark reported on the discharge via industrial waste water of many polluting (List I and List II) substances. With the exception of total-phosphorous and total-nitrogen source DK1001 does not make a distinction between individual List II substances. The overall results are given below in Table D.2.

Table D.2: Discharge via industrial waste water in Denmark in tonnes / year

Group of substances	discharge in 1985	discharge in 1988/1989	discharge in 1993	expected discharge in 1995
Heavy metals	20	11	5	
Total-phosphorous	2,300	1,150		< 100
Total-nitrogen	2,250	1,900		< 350
Chlorinated aromatic hydrocarbons	52.8	12.8		< 1.9
Chlorinated aliphatic hydrocarbons	26.5	17.4		< 0.1
Adsorbable organo halogens	14.4	4.0		< 1.6

Source DK1001 states that in Denmark industrial discharges in general take place to the sea or estuaries. The majority of the industries are located in or near major cities around the coast. Only a limited number of industries have an inland location discharging into a river or canal.

Specific statements on discharge trends for List II heavy metals and chlorinated List II hydrocarbons can not be given based on the information given in sources DK1001 and DK1004. However, it seems that the discharge of total-phosphorous has been reduced significantly; to a lesser extend this also seems to be true for the discharge of total-nitrogen.

Tagus and Sado river (Portugal)

As far as environmental planning is concerned, Portugal adopted a national environmental policy plan considering all environmental compartments according to 1994 legislation (sources: P1201 and P1202). A National water policy plan is currently being developed. Based on this latter, the river basins will have to develop water management plans including such aspects as making inventories of discharges, etc.

In the framework of the Oslo and Paris Convention, Portugal prepared a data report on riverine and direct inputs of contaminants to the maritime area of the Paris Convention (ref: GEN032) in 1991 - 1994 concerning the Tagus (source: GEN021, P).

For the Tagus River, (direct and riverine) input data for 5 List II substances has been collected (total-phosphorous, total-nitrogen, copper, lead and zinc). These data are given in Table D.3.

Table D.3a: **Direct and riverine inputs in tonnes / year to the maritime area of the Paris Convention in 1991 by Portugal (Tagus river)**

Substance	sewage effluents)1	industrial effluents)1	riverine inputs)2	tributary rivers)3	total inputs
Total-phosphorous	1,900	NI	1,100 1,100	100 100	3,100 3,100
Total-nitrogen	6,900	NI	10,000 10,000	700 700	17,600 17,600
Copper	NI	NI	21 40	0 3	21 43
Lead	NI	NI	0 160	0 19	0 179
Zinc	NI	NI	130 140	8 9	138 149

Table D.3b: Direct and riverine inputs in tonnes / year to the maritime area of the Paris Convention in 1992 by Portugal (Tagus river)

Substance	direct effluents)1	riverine inputs)2	total inputs)**
Total-phosphorous	2,156	824.5	2980.5
Total-nitrogen	7444	1027.6	8471.6
Copper	NI	30.4)*	30.4
Lead	NI	240.1)*	240.1
Zinc	NI	22.2)*	22.2

Table D.3c: Direct and riverine inputs in tonnes / year to the maritime area of the Paris Convention in 1993 by Portugal (Tagus river)

Substance	direct effluents)1	riverine inputs)2	total inputs)**
Total-phosphorous	2,156	3553.3	5709.3
Total-nitrogen	7444	10,279.9	17,723.9
Copper	NI	15.7	15.7
Lead	NI	7.3	7.3
Zinc	NI	134.9)*	134.9

Table D.3d: Direct and riverine inputs in tonnes / year to the maritime area of the Paris Convention in 1994 by Portugal (Tagus river)

Substance	direct effluents)1	riverine inputs)2	total inputs)**
Total-phosphorous	2,156)**	12,082	14,238
Total-nitrogen	7444)**	8258	15702
Copper	NI	117	117
Lead	NI	6	6
Zinc	NI	113	113

key:

N.I.	:	no information
)*	:	upper estimate
)**	:	lower estimate since industrial discharges are not accounted for
)1 direct effluents	:	direct discharges into Tagus estuary
)2 riverine input	:	discharge via Tagus river before entering the estuary

Source: INAG (1995) Annual report on direct and riverine inputs to Convention waters provided in by the National Expert in P1207.

Specific statements on discharge trends for List II substances can not be made due to unknown uncertainties. For the Sado River, no discharge information exists.

Furthermore, one must keep in mind that the Tagus river is a transboundary surface water, also carrying Spanish discharges of List II substances before entering the Atlantic Ocean via Portuguese territory.

Tagus and Ebro river (Spain)

Spain developed a data system including all names of direct and indirect potential dischargers of List I and a number of List II)[1] substances (source: E1104). Potential in this context means, that the industrial activity gives rise to the possible discharge of List I and (a number of) List II substances. In time, actual discharges of these substances will be included in the data system, representing an effective tool to control discharges of List I and List II substances.

Specific statements on discharge trends for List II substances can not be given, considering the fact that the above mentioned data system does not (yet) contain information on actual discharges of List II substances.

Scheldt (Belgium / Flemish and Brussels region)

The Flemish region started elaborated discharge inventories into the Scheldt river of a number of List II substances (total-phosphorous, total-nitrogen, copper, lead, zinc and chromium: sources: B300 and B301). For these substances sufficient discharge information is available for 1991, 1992 and 1993; this period of time however, is too short to give specific statements on discharge trends for these substances.

No specific discharge information was made available by the Brussels region.

Meuse (Belgium / Walloon region).

No specific discharge information was made available by the Walloon region.

[1] 129 substances as adopted by Resolution of the Council of 7th of February 1983 and expanded at a later stage to 132 substances, minus 18 List I substances.

All of Belgium

Source B 328 however gives aggregated information of estimated discharges of dangerous substances to surface water in the period 1985-1995 for all of Belgium.
Table D. 4 gives the discharge reduction to Belgian surface waters of a number of List II substances.

Table D.4: Estimated discharge in tonnes / year of a number of List II substances to all Belgian surface waters in the period 1985 - 1995.

List II substance	1985	1995	discharge reduction in %
Arsenic	12	5	59
Chromium	157	44	72
Copper	148	123	17
Lead	103	73	29
Zinc	771	527	32
Total-phosphorous	17,800	< 9,860	> 45
Total-nitrogen	100,800	81,600	> 19
1,1,1-Trichloroethane	< 55	~ 0	~ 100

The discharge of arsenic and chromium and 1,1,1-trichloroethane seems to be reduced significantly. The discharge reduction of total-phosphorous is in the order of 50 % while the discharge reduction of the other mentioned substances is limited.

Trent, Mersey and Thames (United Kingdom)

Additionally, the UK reported on direct and riverine discharges (ref: GEN032) via the Oslo and Paris Commissions (sources: GEN025 and GEN026). The results for the catchment areas "Irish Sea" (Mersey is included) are given in Table D.5.

Table D.5: Direct and riverine inputs to Paris Convention Waters by UK rivers (river Mersey included) in tonnes / year.

	Copper		Lead		Zinc		Total-phosphorous		Total-nitrogen	
1987)[1]	170		210		520					
1988)[1]	360		230		1,400					
1990)[2]	110	120	64	99	750	760	1,000)[3]	1,000)[3]	47,000	47,000
1992)[2]	110	120	86	110	650	650	9,100	9,200	59,000	60,000

)[1] Irish Sea: only direct input data based on 1984
)[2] first figure = lower estimate
second figure = upper estimate
)[3] In the same reference, PO4-P discharge is higher (8,000 tonnes / year) than total-P

Additional information provided by the National Authority concerning the Mersey River (UK813) states that load data are available at the district level for the period 1990-1995 (PARCOM) for the List II metals and for the nutrients at Howley Weir (these were not obtained in this study). Total P has not been analyzed on a regular basis, due to difficulties in analyzing for true Total P, and the fact that the soluble ortho-Phosphate is the dominant form. Trends in load are difficult to distinguish in most cases, as they are heavily influenced by flow variations. A reduction in lead load has occurred (15.5 te in 1990 and 8 te in 1994), and this is the only List II metal for which a load reduction can be demonstrated at Howley Weir over the 1990-95 time period.

It is true to say that actual industrial loads from individual dischargers are not readily available. The approach taken for PARCOM (and UK Red List) purposes has been to measure the loads at the tidal limits, and then individual inputs downstream. There has been no systematic collection of load data from industry upstream in the catchment, on an individual basis. Concentrations of List II substances are measured at industrial sites, and there are a number of Authorizations in place in the Mersey catchment for such discharges. Consents for such discharges generally contain volume conditions and hence require flow measurements of some description.

Most of the industrial discharges to the Mersey do not occur upstream of Howley Weir, but downstream, to the Mersey estuary. In particular, there is a large input of lead from one industry (Associated Octel), who manufactures anti-knock agents for petrol. The graph in Figure D-1 shows the lead inputs since the early 1980's. This is the most significant lead input in the NRA NW region (source: UK813).

In addition, the following reductions in List II inputs to the estuary have occurred (no data provided to quantify each case):

Nickel:	reduced use a hydrogenetic catalyst;
Zinc:	reduced use as a corrosion inhibitor, clean up of effluents by flocculation or hydroxide precipitation techniques;
Chromium:	reduced use a corrosion inhibitor, and reduction in chrome plating industry;
Copper:	reduced use in cable manufacture (replacement by aluminium conductors and fibre optic cables).

In Table D.6 riverine inputs (i.e. inputs across the tidal limit of rivers) and direct inputs (direct discharges) to estuaries and to coastal areas of the North Sea are given for a number of List II heavy metals (source: GEN029). These inputs include among others the contribution of the Thames and the Trent.

Table D.6: Riverine and direct inputs by UK rivers into the North Sea in tonnes / year (rivers Thames and Trent are included)

Substance	1985	1990	1995	comments
Copper	575	399	305	1993 reference year for 1990 inputs. 1992 reference year for 1990 emissions. 1995/1998 worst/best range for 1995 emissions.
Zinc	2,050	2,026	1,730	As for copper.
Lead	1,350	402	280	As for copper.
Arsenic	254	107	< 120	As for copper. 1991 reference year for 1985 input.
Chromium	540	260	230	As for copper.

Source GEN029 gives comments on the input reductions given in Table D.6. The reductions for copper lead and chromium are caused by a tighter control of discharge standards coupled with changes in industrial practices. The application of unleaded gasoline gave a significant contribution to the input reduction via UK rivers and estuaries (reduction of atmospheric deposition of lead). For zinc the number and extent of diffuse sources limit the scope for achieving reductions. Significant input reductions have been achieved for zinc prior to 1985 (30-60 % between 1970 and 1985). The closure of a large tin smelter on the Humber has contributed to the drop in input of arsenic to the North Sea from 254 tonnes in 1991 to 107 tonnes in 1993. Considering the data of Table D.6 a "discharge trend" of decreasing inputs can be seen for zinc, lead and arsenic, and to a lesser extend for copper and chromium.

For a number of "List II pesticides" inputs to water have been estimated including the estimated percent reductions from 1985 to 1995 (source: GEN029). Table D.7 gives an overview.

Table D.7: Estimated inputs to water of pesticides in 1995 in tonnes/year and estimated percent reductions from 1985 to 1995 for UK rivers into the North Sea (rivers Thames and Trent are included).

Substance	1995 lower estimate)[1]	1995 higher estimate)[1]	percent reduction 1985 to 1995
Endosulphan	0.003	0.16	-
Atrazine	1.79	2.45	> 50
Parathion	0.003	0.25	> 50

)[1] Low and high estimates averaged over 1991-1993 are given. 1985 input estimates are not available and data are insufficient to determine specific reductions. However, where phase-out or significant reductions in sales/use are known, national reductions in inputs are indicated.

The inputs of nutrients tabulated in Table D.8 represent the gross inputs of nitrogen and phosphorous compounds to the North Sea via the Thames Estuary, where no account is being taken of removal processes within the estuary. The inputs for each year are made of a riverine input component relating to the inputs via rivers measured at points of unidirectional flow near the tidal limit and a direct input component comprising inputs via sewage and industrial effluent discharges to the River Thames Estuary downstream the points of unidirectional flow (source GEN 029).

Table D.8: Loads of nitrogen and phosphorous for the river Thames

Year	nitrogen in tonnes / year	phosphorous in tonnes /year
1974/1975	59,900	10,900
1985	40,500	10,900
1990	32,400	7,000
1991	26,000	7,100
1992	30,600	6,600
1993	39,000	5,800

From these figures, a "discharge trend" can only be seen for total-phosphorous (decreasing loads).

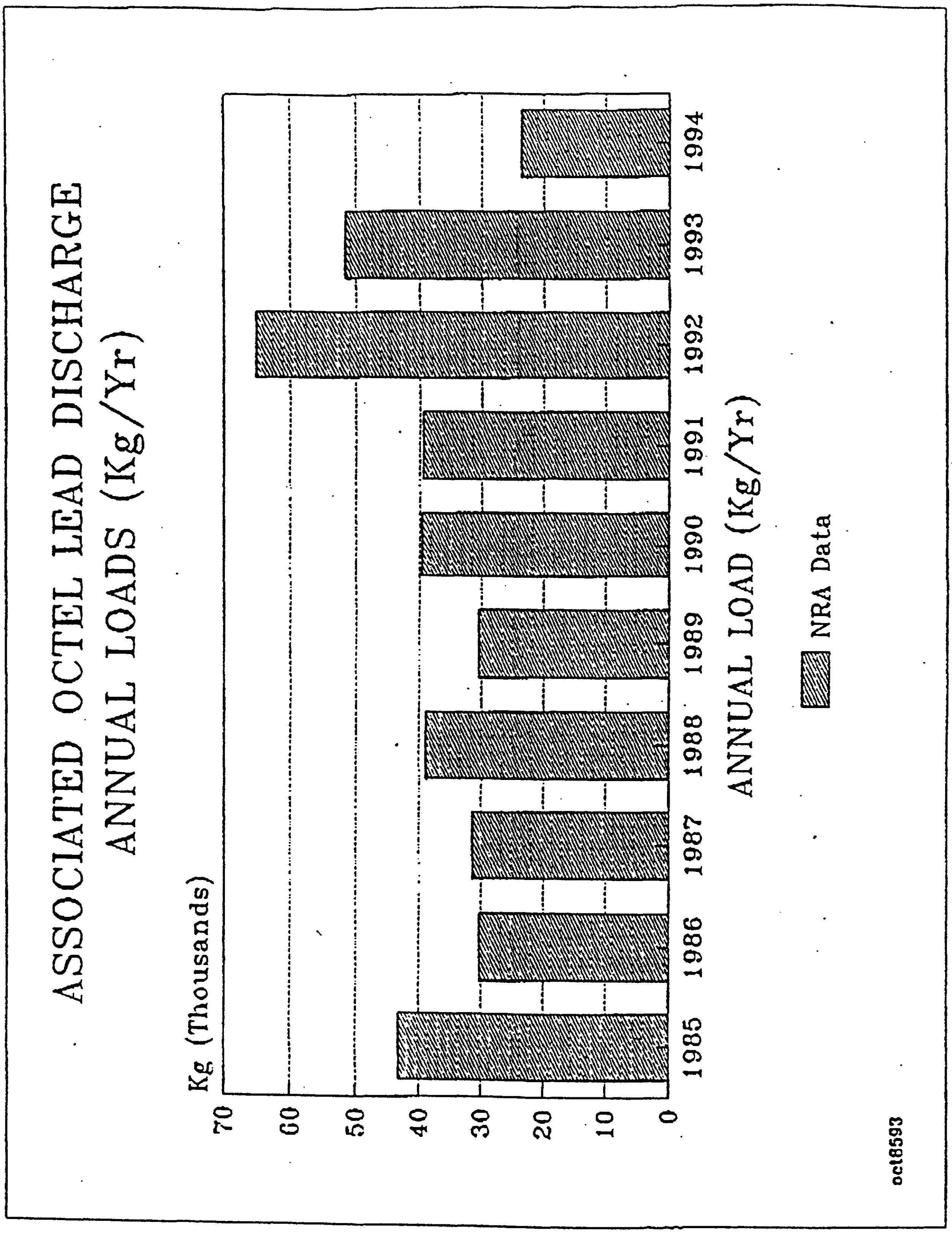

Figure D-1 Lead discharges to the Mersey estuary (1985-1994)

Netherlands

In source NL531 the Netherlands reported on the discharge of polycyclic aromatic hydrocarbons (PAH) via industrial waste water in the period 1985 - 1985. These data are given in Table D.9.

Table D.9: industrial discharge of PAH ("6 of Borneff") in the Netherlands in kg / year in the period 1985 -1995

year	catchment area of the Rhine	remaining catchment areas (Meuse, Scheldt etc.)	all of the Netherlands
1985	470	670	1140
1989	260	250	510
1990	350	1300	1650
1991	240	100	340
1992	240	100	340
1995	190 prognosis made in 1990	440 prognosis made in 1990	630 prognosis made in 1990

Considering the reported discharge data, but also taking into account the reported abatement measures taken by major PAH discharging industries mentioned in source NL 545, it can be concluded, that the discharge of PAH via industrial waste water in the Netherlands is significantly declining. The discharge in 1991 and 1992 is lower than the initial prognosis for the year 1995 (made in 1990).

Po (Italy)

No discharge information was made available.

Axios (Greece)

No discharge information was made available.

Luxembourg

For the catchment area of the Rhine, Luxembourg provided information on discharges of 6 List II substances for the year 1985 (discharge into the Luxembourg part of the Moselle (source: GEN024). The data provided are given in Table D.10.

Table D.10: Discharge of a number of List II substances in 1985 in the Luxembourg catchment area of the Moselle (a tributary of the Rhine):

Substance	direct discharge via industrial waste water (kg/year)	direct discharge via municipal waste water (kg/year)	total discharge (kg/year)
Total-phosphorous		620,000	620,000
Total-nitrogen		1,160,000	1,160,000
Chromium	324	350	674
Copper	1,107	2,710	3,817
Zinc	2,510	8,140	10,650
Lead	941	750	1,691

No further discharge data was made available.

Appendix E Water Quality of List II Substances in Selected Main Waters

EC List 2 (grey list) River 'Axios' Monitoring station '1020-01' (Axioupolis)

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	142.20		GR905																								
1981	253.30		GR905																								
1982	173.78		GR905																								
1983	95.99		GR905																								
1984	175.63		GR905																								
1985	81.92		GR905																								
1986	172.50		GR905																								
1987	98.25		GR905																								
1988	44.50		GR905																								
1989	67.71		GR905																								
1990	38.00		GR905																								
1991	85.42		GR905																								
1992	51.50		GR905																								
1993																											

year	Zinc			Copper			Chromium			Lead			Total N *			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980													1.162		GR905	0.135		GR905									
1981													1.102		GR905	0.268		GR905									
1982													1.043		GR905	0.354		GR905									
1983													1.160		GR905	0.407		GR905									
1984													1.300		GR905	0.335		GR905									
1985													1.626		GR905	0.601		GR905									
1986													1.928		GR905	0.489		GR905									
1987													1.905		GR905	0.543		GR905									
1988													1.815		GR905	0.931		GR905									
1989													2.031		GR905	0.560		GR905									
1990													2.216		GR905	0.840		GR905									
1991													2.024		GR905	0.541		GR905									
1992													2.032		GR905	0.626		GR905									
1993																											

* (NNO3+NNO2+NNH4)

EC List 2 (grey list) River 'Axios Monitoring station '1020-02' (Prochama/Koufalia)

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	88.62		GR905																								
1981	195.42		GR905																								
1982	170.33		GR905																								
1983	93.67		GR905																								
1984	176.05		GR905																								
1985	87.82		GR905																								
1986	174.00		GR905																								
1987	97.67		GR905																								
1988	43.17		GR905																								
1989	71.67		GR905																								
1990	38.00		GR905																								
1991	113.00		GR905																								
1992																											
1993																											

year	Zinc			Copper			Chromium			Lead			Total N *			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980													1.359		GR905	0.424		GR905									
1981													1.119		GR905	0.291		GR905									
1982													1.136		GR905	0.358		GR905									
1983													1.198		GR905	0.379		GR905									
1984													1.629		GR905	0.334		GR905									
1985													1.509		GR905	0.624		GR905									
1986													2.473		GR905	0.402		GR905									
1987													2.225		GR905	0.603		GR905									
1988													1.799		GR905	0.871		GR905									
1989													1.955		GR905	0.497		GR905									
1990													2.158		GR905	0.964		GR905									
1991													1.821		GR905	0.604		GR905									
1992													2.799		GR905	0.690		GR905									
1993																											

* (NNO3+NNO2+NNH4)

EC List 2 (grey list) River 'Axios' Monitoring station '1020-03' (Chalastra)

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	73.68		GR905																								
1981	182.82		GR905																								
1982	160.50		GR905																								
1983	79.58		GR905																								
1984	162.64		GR905																								
1985	155.92		GR905																								
1986	170.50		GR905																								
1987	128.54		GR905																								
1988	35.00		GR905																								
1989	71.67		GR905																								
1990	38.00		GR905																								
1991	113.00		GR905																								
1992																											
1993																											

year	Zinc			Copper			Chromium			Lead			Total N *			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980													1.546		GR905	0.324		GR905									
1981													1.125		GR905	0.296		GR905									
1982													1.129		GR905	0.368		GR905									
1983													2.254		GR905	0.395		GR905									
1984													1.260		GR905	0.281		GR905									
1985													1.356		GR905	0.570		GR905									
1986													2.245		GR905	0.416		GR905									
1987													1.486		GR905	0.470		GR905									
1988													1.789		GR905	0.740		GR905									
1989													1.835		GR905	0.521		GR905									
1990													1.878		GR905	0.856		GR905									
1991													1.614		GR905	0.601		GR905									
1992													2.158		GR905	0.719		GR905									
1993																											

* (NNO3+NNO2+NNH4)

EC List 2 (grey list) River 'Ebro' Monitoring station 'Asco'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981	685		SP1102	0.018		SP1102																					
1982	543		SP1102	0.01	<	SP1102																					
1983				0.01	<	SP1102																					
1984				0.01	<	SP1102																					
1985	471		SP1102	0.01	<	SP1102																					
1986	460		SP1102	0.01	<	SP1102																					
1987	435		SP1102	0.01	<	SP1102																					
1988	458		SP1102	0.01	<	SP1102																					
1989	186		SP1102	0.01	<	SP1102																					
1990	207		SP1102	0.01	<	SP1102																					
1991	280		SP1102	0.01	<	SP1102																					
1992	403		SP1102	0.01	<	SP1102																					
1993	257		SP1102	0.01	<	SP1102																					

year	Zinc			Copper			Chromium			Lead			Total N *			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980													1.75		GEN023												
1981	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102	1.91		GEN023												
1982	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102	2.96		GEN023												
1983	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102															
1984	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102															
1985	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102															
1986	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102															
1987	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102															
1988	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102															
1989	100	<	SP1102	10	<	SP1102	10	<	SP1102	10	<	SP1102															
1990	100	<	SP1102	11		SP1102	10	<	SP1102	10	<	SP1102															
1991	24		SP1102	12		SP1102	10	<	SP1102	12		SP1102															
1992	34		SP1102	11		SP1102	10	<	SP1102	16		SP1102															
1993	47		SP1102	10		SP1102	10	<	SP1102	14		SP1102															

* Station Mendavia

EC List 2 (grey list) River 'Loire' Monitoring station '137000' (Ste Luce)

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	1165.58		F202																								
1981	1174.50		F202																								
1982	1172.75		F202																								
1983	1335.58		F202																								
1984	987.67		F202																								
1985	600.13		F202																								
1986	967.42		F202																								
1987	873.42		F202																								
1988	1177.83		F202																								
1989	375.83		F202																								
1990	396.25		F202																								
1991	488.08		F202										0.1625		F203												
1992													0.200		F203												
1993													0.2929		F201												

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980							5.0		F 206																		
1981							5.0		F 206																		
1982							5.0		F 206							0.303		F 206									
1983							5.0		F 206							0.285		F 206									
1984							2.5		F 206							0.265		F 206									
1985																0.305		F 206									
1986							2.0		F 206							0.361		F 206									
1987							2.7		F 206							0.285		F 206									
1988																0.297		F 206									
1989																0.435		F 206									
1990																0.445		F 206									
1991																0.356		F 206									
1992																0.458		F 206									
1993																0.590		F 219									

Mersey

EC List 2 (grey list) River 'Mersey' Monitoring station ' Howley Weir '

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	57.6		UK801																								
1981	51.4		UK801																								
1982	40.8		UK801																								
1983	57.2		UK801																								
1984	48.5		UK801																								
1985	37.4		UK801																								
1986	35.1		UK801	0.0		UK801																					
1987	33.4		UK801																								
1988	34.1		UK801																								
1989	20.9		UK801																								
1990	34.9		UK801																								
1991	21.7		UK801																								
1992	39.4		UK801																								
1993	29.5		UK801																								

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	43.4		UK801	18.6		UK801	10.0		UK801	15.1		UK801	2.5		UK801												
1981	41.3		UK801	11.5		UK801				14.8		UK801	2.4		UK801												
1982	37.7		UK801	10.9		UK801				18.6		UK801	2.6		UK801												
1983	30.8		UK801	9.0		UK801	9.3		UK801	12.7		UK801	2.4		UK801												
1984	36.6		UK801	8.7		UK801	10.8		UK801	8.7		UK801	2.4		UK801												
1985	34.8		UK801	9.1		UK801	12.1		UK801	10.7		UK801	3.4		UK801												
1986	37.3		UK801	10.1		UK801	13.3		UK801	10.4		UK801	3.5		UK801												
1987	39.9		UK801	9.5		UK801	10.4		UK801	11.2		UK801	3.2		UK801												
1988	38.6		UK801	9.2		UK801	7.7		UK801	9.2		UK801	2.9		UK801												
1989	40.5		UK801	10.8		UK801	9.7		UK801	11.2		UK801	3.1		UK801												
1990	40.9		UK801	7.6		UK801	8.5		UK801	8.8		UK801	3.0		UK801												
1991	43.7		UK801	8.2		UK801	8.6		UK801	7.8		UK801	3.6		UK801												
1992	39.6		UK801	8.5		UK801	5.5		UK801	6.6		UK801	3.4		UK801												
1993	30.4		UK801	8.2		UK801	5.9		UK801	5.8		UK801	3.6		UK801												

EC List 2 (grey list) **River 'Meuse'** **Monitoring station 'Tailfer'**

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983	229		NL516	1		NL516																					
1984	212		NL516	1		NL516																					
1985	126		NL517	1		NL517																					
1986	207		NL517																								
1987	209		NL518																								
1988	257		NL518										0.2		NL518												
1989	152		NL530										0.2		NL530												
1990	150		NL519							0.01	<	NL530	0.23		NL530												
1991	156		NL520	1		NL530				0.01	<	NL530	0.14		NL530												
1992	165		NL521	1		NL530	0.01	<	NL530	0.01	<	NL530	0.19		NL530	0.03		NL530									
1993	159		NL534	2		NL534																					

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983				3		NL516	5		NL516	3		NL516	1.21		NL516				0.02		NL516	0.03		NL516	0.17		NL516
1984				3		NL516	8		NL516	5		NL516	1.45		NL516				0.03		NL516	0.04		NL516	0.22		NL516
1985				3		NL517	15		NL517	5		NL517	1.69		NL517	0.12		NL517	0.02		NL517	0.03		NL517	0.15		NL517
1986				4		NL517	14		NL517	6		NL517	1.64		NL517	0.07		NL517	0.02		NL517	0.03		NL517	0.18		NL517
1987				3		NL518	8		NL518	4		NL518	1.84		NL518				0.02		NL518	0.04		NL518	0.20		NL518
1988				3		NL518	6		NL518	3		NL518	1.56		NL518	0.08		NL518									
1989				4		NL530	3		NL530	2		NL530	4.15		NL530	0.09		NL530	0.02		NL530	0.02		NL530	0.09		NL530
1990	39		NL530	3		NL530	3		NL530	2		NL530	4.10		NL519	0.11		NL519	0.01		NL530	0.01		NL530	0.05		NL530
1991	34		NL530	2		NL530	2		NL530	2		NL530	3.27		NL520	0.10		NL520	0.01		NL530	0.01		NL530	0.05		NL530
1992	30		NL530	2		NL530	2		NL530	2		NL530	3.62		NL521	0.14		NL521	0.02	<	NL530	0.03	<	NL530	0.13		NL530
1993	23		NL534	3		NL534	1		NL534	1		NL534	3.25		NL534	0.12		NL534	0.01		NL534	0.01		NL534	0.07		NL534

EC List 2 (grey list) River 'Meuse' Monitoring station 'Eijsden'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	284		NL542	12		NL512										1.31		NL542									
1981	337		NL542	8		NL513										0.46		NL542									
1982	275		NL542	8		NL515							0.1	<	NL515	0.60		NL542									
1983	285		NL542	5		NL516										0.87		NL542									
1984	311		NL542	2		NL516																					
1985	182		NL542	2		NL517										1.03		NL542									
1986	274		NL542	2		NL517										0.05		NL542									
1987	314		NL542	2		NL518							0.1		NL518	0.44		NL542									
1988	359		NL542	2		NL518							0.1		NL518	1.83		NL542									
1989	203		NL542	2		NL530										0.07	<	NL542									
1990	191		NL542	3		NL519				0.01		NL530	0.12		NL530	0.23	<	NL542									
1991	184		NL542	2		NL520	0.01		NL520	0.01		NL530	0.33		NL530	0.14		NL542									
1992	214		NL542	1		NL521	0.01	<	NL530	0.01	<	NL530	0.23		NL530	0.53	<	NL542									
1993	249		NL542													0.34		NL542									

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	300		NL542	11.2		NL542	10.3		NL542	22.9		NL542	4.09		NL542	0.58		NL542	0.02		NL512	0.02		NL512			
1981	236		NL542	9.4		NL542	10.3		NL542	13.9		NL542	4.04		NL542	0.46		NL542	0.11		NL513	0.11		NL513	1.11		NL513
1982	108		NL542	7.6		NL542	7.1		NL542	10.0		NL542	4.06		NL542	0.51		NL542	0.06		NL515	0.08		NL515	0.58		NL515
1983	78		NL542	8.1		NL542	9.1		NL542	11.8		NL542	4.24		NL542	0.53		NL542	0.06		NL516	0.08		NL516	0.50		NL516
1984	101		NL542	10.2		NL542	13.4		NL542	13.7		NL542	4.33		NL542	0.50		NL542	0.03		NL516	0.05		NL516	0.37		NL516
1985	80		NL542	5.5		NL542	6.4		NL542	6.2		NL542	4.56		NL542	0.58		NL542	0.03		NL517	0.05		NL517	0.31		NL517
1986	102		NL542	6.0		NL542	5.7		NL542	5.7		NL542	4.50		NL542	0.54		NL542	0.07		NL517	0.10		NL517	0.56		NL517
1987	88		NL542	6.9		NL542	10.9		NL542	9.0		NL542	4.36		NL542	0.46		NL542	0.04		NL518	0.07		NL518	0.39		NL518
1988	72		NL542	5.2		NL542	7.4		NL542	7.8		NL542	3.97		NL542	0.54		NL542	0.04		NL518	0.04		NL518	0.29		NL518
1989	63		NL542	3.9		NL542	4.4		NL542	4.9		NL542	4.46		NL542	0.51		NL542	0.03		NL530	0.03		NL530	0.19		NL530
1990	63		NL542	5.0		NL542	5.6		NL542	3.7		NL542	4.15		NL542	0.51		NL542	0.01		NL530	0.02		NL530	0.10		NL530
1991	55		NL542	6.9		NL542	4.3		NL542	5.7		NL542	4.37		NL542	0.54		NL542	0.01		NL530	0.02		NL530	0.11		NL530
1992	72		NL542	6.0		NL542	3.8		NL542	4.5		NL542	4.58		NL542	0.42		NL542	0.02		NL530	0.03		NL530	0.21		NL530
1993	78		NL542	6.1		NL542	7.6		NL542	7.1		NL542	4.58		NL542	0.56		NL542									

EC List 2 (grey list) River 'Meuse' Monitoring station 'Keizersveer'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	390		NL512	7		NL512																					
1981	462		NL513	4		NL513																					
1982	359		NL515	4		NL515							0.1		NL515												
1983	384		NL516	2		NL516																					
1984	404		NL516	2		NL516																					
1985	259		NL517	2		NL517																					
1986	346		NL517	2		NL517							0.1		NL517												
1987	404		NL518	2		NL518							0.1		NL518	0.15		NL518									
1988	444		NL518	2		NL518							0.1		NL518	0.1		NL518									
1989																											
1990	224		NL519	2		NL519										0.09		NL519									
1991	221		NL520	2		NL520	0.01	<	NL520	0.01		NL520	0.16		NL520	0.06		NL520									
1992	270		NL521	2		NL521	0.01	<	NL521	0.01	<	NL521	0.19		NL521	0.02		NL521									
1993	288		NL534																								
year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	144		NL542	7.9		NL542	6.8		NL542	12.5		NL542	5.17		NL542	0.50		NL542									
1981	108		NL542	6.1		NL542	5.3		NL542	10.0		NL542	4.86		NL542	0.42		NL542	0.05		NL513	0.05		NL513	0.48		NL513
1982	79		NL542	5.8		NL542	5.1		NL542	7.1		NL542	4.93		NL542	0.42		NL542	0.04		NL515	0.06		NL515	0.55		NL515
1983	51		NL542	7.5		NL542	4.6		NL542	5.7		NL542	5.10		NL542	0.42		NL542	0.02		NL516	0.03		NL516	0.22		NL516
1984	50		NL542	5.4		NL542	3.3		NL542	5.2		NL542	5.32		NL542	0.39		NL542	0.02		NL516	0.02		NL516	0.14		NL516
1985	52		NL542	3.5		NL542	3.0		NL542	3.6		NL542	5.86		NL542	0.48		NL542	0.01		NL517	0.02		NL517	0.12		NL517
1986	39		NL542	4.9		NL542	4.2		NL542	3.4		NL542	5.52		NL542	0.42		NL542	0.04		NL517	0.03		NL517	0.22		NL517
1987	64		NL542	6.2		NL542	7.3		NL542	8.3		NL542	5.45		NL542	0.39		NL542	0.02		NL518	0.02		NL518	0.12		NL518
1988	39		NL542	4.7		NL542	4.2		NL542	3.3		NL542	5.12		NL542	0.39		NL542	0.02		NL518	0.02		NL518	0.11		NL518
1989	50		NL542	4.6		NL542	4.5		NL542	4.9		NL542	5.71		NL542	0.37		NL542									
1990	31		NL542	3.1		NL542	2.1		NL542	2.4		NL542	5.37		NL542	0.31		NL542	0.01		NL519	0.01		NL519	0.08		NL519
1991	24		NL542	5.0		NL542	3.0		NL520	6		NL520	5.75		NL542	0.30		NL542	0.01		NL520	0.01		NL520	0.09		NL520
1992	40		NL542	5.3		NL542	4.0		NL521	4.0		NL521	5.59		NL542	0.29		NL542	0.01		NL521	0.02		NL521	0.10		NL521
1993	38		NL542	4.0		NL542	2.3		NL542	3.8		NL542	5.68		NL542	0.30		NL542									

EC List 2 (grey list) River 'Moselle' Monitoring station 'Grevenmacher / Palzem'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984	197.0		L403																								
1985	117.0		L403																								
1986	192.0		L403																								
1987	155.0		L403																								
1988	194.0		L403																								
1989	91.6		L403																								
1990	118.0		L403																								
1991	59.0		L403																								
1992	135.0		L403							0.05	<	L404 (*)	0.21		L404 (*)	0.12		L404 (*)									
1993																											

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982	163	<	L403	58	<	L403	100	<	L403	5	<	L403				0.518		L403									
1983	74		L403	3.3		L403	8.8	<	L403	2.3	<	L403				0.558		L403									
1984	15		L403	4.3		L403	4.0		L403	3.3		L403				0.543		L403									
1985	39		L403	9.4		L403	5.0		L403	2.0	<	L403				0.684		L403									
1986	33		L403	3.7		L403	2.4		L403	1.3	<	L403				0.623		L403									
1987	37		L403	5.2		L403	1.3	<	L403	2.2	<	L403				0.467		L403									
1988	38		L403	13.9		L403	1.8		L403	1.9	<	L403				0.478		L403									
1989	34		L403	9.8	<	L403	5.0	<	L403	33.0	<	L403				0.586		L403									
1990	26		L403	7.0		L403	5.4		L403	4.2		L403				0.768		L403									
1991	166		L403	5.0	<	L403	3.3	<	L403	1.0	<	L403				0.568		L403									
1992																0.724		L403									
1993																											

(*) Data from Reference L404 are from Monitoring station 'Palzem'

Po

EC List 2 (grey list) River 'Po' Monitoring station 'Pontelaguscuro'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987																											
1988													345		I 701												
1989													79		I 701												
1990				1.76		I 707																					
1991																											
1992																											
1993																											

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987																											
1988																											
1989																											
1990	20.91		I 707	6.59		I 707	9.31		I 707	3.74		I 707	3.36		I 707	0.165		I 707									
1991																											
1992																											
1993																											

EC List 2 (grey list) River 'Rhine' Monitoring station 'Koblenz'

Annual averages (< below detection limit)

Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion (methyl)			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	1924		GEN012	3.0		GEN012																					
1981	2204		GEN012	1.0		GEN012																					
1982	2164		GEN012	2.0		GEN012																					
1983	1981		GEN012	2.0		GEN012																					
1984	1762		GEN012	2.0		GEN012																					
1985	1484		GEN012	2.1		GEN012																					
1986	1865		GEN012	2.3		GEN012																					
1987	2191		GEN012	1.6		GEN012																					
1988	2217		GEN012	2.0		GEN012																					
1989	1424		GEN012	1.6		GEN012																					
1990	1470		GEN012	1.9		GEN012	0.010	<	GEN012																		
1991	1353		GEN012	1.3		GEN012	0.005	<	GEN012																		
1992	1623		GEN012	2.1		GEN012	0.005	<	GEN012																		
1993	1561		GEN012	1.8		GEN012	0.005	<	GEN012	0.05	<	GEN012	0 .04		GEN012				0.01	<	GEN012	0.01	<	GEN012	0.01	<	GEN012

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	63.0		GEN012	10.4		GEN012	6.1		GEN012	5.9		GEN012				0.53		GEN012									
1981	41.0		GEN012	7.6		GEN012	4.6		GEN012	5.0	<	GEN012				0.50		GEN012									
1982	45.0		GEN012	7.4		GEN012	5.3		GEN012	5.0	<	GEN012				0.45		GEN012									
1983	42.0		GEN012	4.8		GEN012	2.8		GEN012	3.2		GEN012				0.44		GEN012									
1984	48.0		GEN012	6.5		GEN012	3.8		GEN012	4.3		GEN012				0.47		GEN012									
1985	61.0		GEN012	6.1		GEN012	2.4		GEN012	3.1		GEN012				0.49		GEN012									
1986	40.0		GEN012	6.5		GEN012	3.9		GEN012	4.8		GEN012				0.44		GEN012									
1987	36.0		GEN012	7.1		GEN012	3.7		GEN012	4.7		GEN012				0.38		GEN012									
1988	33.0		GEN012	7.0		GEN012	4.2		GEN012	4.7		GEN012				0.32		GEN012									
1989	27.0		GEN012	6.6		GEN012	3.0		GEN012	2.6		GEN012				0.37		GEN012									
1990	43.0		GEN012	6.8		GEN012	4.1		GEN012	2.3		GEN012				0.31		GEN012									
1991	25.7		GEN012	6.3		GEN012	2.7		GEN012	2.7		GEN012	4.14		GEN012	0.21		GEN012									
1992	52.0		GEN012				4.9		GEN012				3.67		GEN012	0.28		GEN012									
1993	32.0		GEN012	6.7		GEN012	5.8		GEN012	3.1		GEN012	3.50		GEN012	0.27		GEN012									

EC List 2 (grey list) River 'Rhine' Monitoring station 'Bimmen-Lobith'

Annual averages (< below detection limit)

Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion (methyl)			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
								B			B			B			B			B			B			B	
1980	2545		GEN012	8.0		GEN012																					
1981	2990		GEN012	9.0		GEN012																					
1982	2791		GEN012	6.0		GEN012																					
1983	2682		GEN012	3.0		GEN012																					
1984	2492		GEN012	2.0		GEN012																					
1985	1995		GEN012	2.0		GEN012																					
1986	2510		GEN012	2.0		GEN012																					
1987	2826		GEN012	2.0		GEN012																					
1988	2828		GEN012	2.0		GEN012																					
1989	1815		GEN012	1.0		GEN012																					
1990	1886		GEN012	2.0		GEN012				0.10	<	GEN012	0.09		GEN012	0.05	<	GEN012									
1991	1751		GEN012	1.7		GEN012	0.100	<	GEN012	0.10	<	GEN012	0.09		GEN012	0.05	<	GEN012									
1992	2019		GEN012	1.4		GEN012	0.050	<	GEN012	0.10	<	GEN012				0.05	<	GEN012									
1993	1941		GEN012	1.1		GEN012				0.10	<	GEN012				0.02	<	GEN012	0.1	<	GEN012	0.1	<	GEN012	0.1	<	GEN012

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	118.0		GEN012	16.0		GEN012	19.0		GEN012	7.0		GEN012				0.48		GEN012									
1981	125.0		GEN012	18.0		GEN012	16.0		GEN012	12.0		GEN012				0.46		GEN012									
1982	96.0		GEN012	18.0		GEN012	9.0		GEN012	9.0		GEN012				0.47		GEN012									
1983	71.0		GEN012	19.0		GEN012	9.0		GEN012	8.0		GEN012				0.59		GEN012									
1984	73.0		GEN012	11.0		GEN012	8.0		GEN012	9.0		GEN012				0.50		GEN012									
1985	64.0		GEN012	10.0		GEN012	8.0		GEN012	9.0		GEN012				0.53		GEN012									
1986	70.0		GEN012	9.0		GEN012	9.7		GEN012	9.2		GEN012				0.44		GEN012									
1987	44.0		GEN012	7.5		GEN012	7.9		GEN012	7.8		GEN012				0.31		GEN012									
1988	39.0		GEN012	8.7		GEN012	7.7		GEN012	6.0		GEN012				0.30		GEN012									
1989	32.0		GEN012	7.2		GEN012	5.2		GEN012	3.6		GEN012				0.30		GEN012									
1990	35.0		GEN012	8.1		GEN012	5.0		GEN012	7.1		GEN012				0.26		GEN012									
1991	33.2		GEN012	8.6		GEN012	4.6		GEN012	5.5		GEN012	4.82		GEN012	0.22		GEN012									
1992	28.7		GEN012	7.2		GEN012	3.8		GEN012	5.0		GEN012	5.10		GEN012	0.25		GEN012									
1993	34.0		GEN012	11.9		GEN012	5.3		GEN012	5.7		GEN012	4.9		GEN012	0.19		GEN012									

B = only Bimmen

EC List 2 (grey list) River 'Rhine' Monitoring station 'Lobith'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	2547		N510													0.03		N532									
1981	3001		N510													0.06		N532									
1982	2801		N510													0.15		N532									
1983	2652		N510	3		N522										1.01		N532									
1984	2520		N510	3		N523							0.1		N523												
1985	2010		N510	3		N523							0.1		N523	0.08		N532									
1986	2462		N510	2		N524							0.1		N524	0.02		N532									
1987	2861		N510	2		N524							0.1		N524	0.02		N532									
1988	2832		N510	1.5		N525							0.1	<	N525	0.42		N532									
1989	1821		N510	1		N525							0.1	<	N525	0.05	<	N532									
1990	1856		N510	3		N526							0.1	<	N526	0.05	<	N532									
1991	1754		N510	1		N526	0.01	<	N526				0.1	<	N526	0.07	<	N532									
1992	2010		N529	1		N529	0.01	<	N529	0.01	<	N529	0.05	<	N529	0.12	<	N532									
1993	2014		N529	1		N529	0.01	<	N529	0.01	<	N529	0.05		N529	0.10	<	N529									

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	102		N532	14.1		N532	19.4		N532	14.7		N532	5.84		N510	0.66		N510									
1981	82		N532	12.2		N532	15.2		N532	13.4		N532	5.46		N510	0.60		N510									
1982	69		N532	8.1		N532	9.0		N532	6.2		N532	5.06		N510	0.55		N510									
1983	57		N532	9.7		N532	10.5		N532	7.0		N532	5.72		N510	0.59		N510	0.03		N522	0.03		N522	0.16		N522
1984	54		N532	8.3		N532	8.1		N532	5.7		N532	6.04		N510	0.57		N510	0.03		N523	0.03		N523	0.21		N523
1985	51		N532	5.9		N532	7.6		N532	4.2		N532	6.49		N510	0.62		N510	0.03		N523	0.04		N523	0.30		N523
1986	51		N532	6.6		N532	9.4		N532	6.0		N532	6.09		N510	0.52		N510	0.03		N524	0.03		N524	0.19		N524
1987	34		N532	5.3		N532	7.5		N532	4.0		N532	5.61		N510	0.38		N510	0.01		N524	0.01		N524			
1988	34		N532	5.1		N532	8.3		N532	3.4		N532	5.21		N510	0.34		N510	0.03		N525	0.03		N525	0.28		N525
1989	31		N532	6.0		N532	6.5		N532	4.9		N532	6.06		N510	0.34		N510	0.02		N525	0.03		N525	0.17		N525
1990	46		N532	5.7		N532	6.2		N532	5.1		N532	5.56		N510	0.30		N510	0.02		N526	0.04		N526	0.19		N526
1991	30		N532	6.5		N532	4.9		N532	4.7	<	N532	5.37		N510	0.27		N510	0.03		N526	0.04		N526	0.21		N526
1992	23		N532	5.8		N532	4.3		N532	4.0		N532	5.20		N532	0.24		N532	0.06		N529	0.03		N529	0.15		N529
1993	22		N529	5.0		N529	4.0		N529	5.0		N529	4.65		N529	0.22		N529	0.01		N529	0.02		N529	0.11		N529

Rhine(Maassluis)

EC List 2 (grey list) River 'Rhine' Monitoring station 'Maassluis'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																0.29		N532									
1981																0.44		N532									
1982																0.32		N532									
1983																0.21		N532									
1984																											
1985																0.1		N532									
1986																0.09		N532									
1987																0.25		N532									
1988																0.07		N532									
1989																0.05	<	N532									
1990																0.06	<	N532									
1991																0.07	<	N532									
1992																0.11	<	N532									
1993	1481		GEN012	1.6		GEN012										0.04		GEN012									

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	80		N532	11.5		N532	18.9		N532	10.8		N532	5.50		N510	0.65		N510									
1981	51		N532	9.9		N532	8.0		N532	6.2		N532	5.22		N510	0.54		N510									
1982	43		N532	5.7		N532	6.5		N532	4.3		N532	4.84		N510	0.48		N510									
1983	36		N532	5.9		N532	6.4		N532	4.5		N532	5.05		N510	0.56		N510									
1984	35		N532	6.1		N532	4.3		N532	3.1		N532	5.55		N510	0.54		N510									
1985	29		N532	4.9		N532	5.3		N532	1.9		N532	5.64		N510	0.55		N510									
1986	32		N532	5.9		N532	5.8		N532	2.6		N532	5.52		N510	0.52		N510									
1987	26		N532	4.1		N532	4.5		N532	2.5		N532	5.48		N510	0.39		N510									
1988	35		N532	6.9		N532	10.9		N532	3.0		N532	4.90		N510	0.51		N510									
1989	20		N532	4.6		N532	4.9		N532	2.9		N532	5.15		N510	0.44		N510									
1990	18	<	N532	4.9		N532	3.3		N532	3.3		N532	4.71		N510	0.36		N510									
1991	13		N532	4.8		N532	3.3		N532	2.7		N532	4.77		N510	0.30		N510									
1992	17		N532	4.8		N532	3.2		N532	2.9		N532	4.70		N532	0.26		N532									
1993	19		GEN012	4.6		GEN012	4.1		GEN012	4.2		GEN012	4.70		GEN012	0.30		GEN012									

EC List 2 (grey list) River 'Rhone' Monitoring station ' Arles '

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987	1690		F206																								
1988	1703		F206																								
1989	952		F206																								
1990	1220		F206																								
1991	1204		F206	10.0	<	F206							0.250		F206	0.2	<	F206									
1992	1698		F206	10.0	<	F206							0.050	<	F206	0.2	<	F206									
1993	1527		F206																								

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987																0.241		F 219									
1988																0.169		F 219									
1989																0.240		F 219									
1990																0.200		F 219									
1991	50	<	F206	50	<	F206	10	<	F206	10	<	F206							0.010	<	F206	0.010	<	F206			
1992	50	<	F206	50	<	F206	10	<	F206	10	<	F206				0.142		F 219	0.010	<	F206	0.010	<	F206			
1993																0.113		F 219									

EC List 2 (grey list) River 'Sado' Monitoring station ' Alvalade do Sado'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987																											
1988																											
1989																											
1990																											
1991				14.0		P1206																					
1992																											
1993																											

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987																											
1988																											
1989	47.0		P1206	4.0		P1206	1		P1206	1		P1206	0.56		P1206	0.15		P1206									
1990	78.0		P1206	10.0		P1206	4		P1206	4		P1206	0.68		P1206	0.57		P1206									
1991	32.0		P1206	5.0		P1206	1		P1206	1	<	P1206	0.34		P1206	0.07		P1206									
1992													0.23		P1206	0.02		P1206									
1993	21.0		P1206	5.0	<	P1206	5	<	P1206	5	<	P1206	0.41		P1206	0.05		P1206									

EC List 2 (grey list) River 'Scheldt' Monitoring station ' Doel (B) '

Annual averages (< below detection limit) (DL = Detection Limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985							DL		B324																		
1986							DL		B324																		
1987							0.001		B324																		
1988	197		B321																								
1989	123		B321																								
1990	96		B321	8.8		B324	0.001		B324																		
1991	105		B321	6.8		B324	DL		B324																		
1992																											
1993																											

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N /l	<	source	mg N /l	<	source	mg P /l	<	source	mg N /l	<	source	mg N /l	<	source	mg N /l	<	source
1980																											
1981	160		B324	21.2		B324	14.4		B324	27		B324															
1982	68		B324	10.3		B324	14.3		B324	19		B324	9.27		B324	1.41		B324									
1983	153		B324	9.2		B324	13.8		B324	15		B324	7.12		B324	1.77		B324									
1984	150		B324	30.1		B324	31.6		B324	35.8		B324	7.96		B324	0.76		B324	DL		B324	DL		B324	0.012		B324
1985	77		B324	11		B324	44.1		B324	4.63		B324	11.52		B324	0.71		B324	0.006		B324	0.013		B324	0.098		B324
1986	96		B324	12.6		B324	17.6		B324	5.2		B324	7.92		B324	0.79		B324	0.009		B324	0.011		B324	0.068		B324
1987	144		B324	65.7		B324	20.9		B324	13.8		B324	8.29		B324	0.76		B324	0.039		B324	0.045		B324	0.260		B324
1988				10.7		B321	15.9		B321	10.9		B321				0.64		B321									
1989				9.3		B321	6.7		B321	5.9		B321				0.62		B321									
1990	60		B324	9.5		B324	14.7		B324	9.3		B324	7.78		B324	0.55		B324							0.340		B324
1991	68		B324	16.3		B324	9.8		B324	5.6		B324	8.69		B324	0.72		B321	0.037		B324	0.043		B324	0.278		B324
1992																0.62		B321									
1993																0.4		B321									

EC List 2 (grey list) River 'Seine' Monitoring station 'Paris'

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	345		GEN023	1.75		GEN023																					
1981	450		GEN023	1.83		GEN023																					
1982	367		GEN023	1.08		GEN023																					
1983	456		GEN023	1.0		GEN023																					
1984	300		GEN023	1.1		GEN023																					
1985	224		GEN023	3.5		GEN023																					
1986	277		GEN023	5.6		GEN023																					
1987	327		GEN023	5.0		GEN023																					
1988																											
1989	216		GEN023	5.0		GEN023																					
1990				5.0		GEN023																					
1991				5.0		GEN023																					
1992																											
1993																											

year	Zinc			Copper			Chromium			Lead			Total N			Total P *			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	53.3		GEN023	33.3		GEN023	17.0		GEN023	11.3		GEN023				0.897		F 206									
1981	62.5		GEN023	25.0		GEN023	21.7		GEN023	7.6		GEN023				0.814		F 206									
1982	53.3		GEN023	21.7		GEN023	20.0		GEN023	6.7		GEN023				1.069		F 206									
1983	48.3		GEN023	20.0		GEN023	20.8		GEN023	7.3		GEN023				1.054		F 206									
1984	63.0		GEN023	25.0		GEN023	20.0		GEN023	9.5		GEN023				1.117		F 206									
1985	152.0		GEN023	34.5		GEN023	8.6		GEN023	13.1		GEN023				1.517		F 206									
1986	28.6		GEN023	13.4		GEN023	2.1		GEN023	3.45		GEN023				0.982		F 206									
1987	30.8		GEN023	37.5		GEN023	2.4		GEN023	7.8		GEN023				0.893		F 206									
1988																0.902		F 206									
1989	36.8		GEN023	10.9		GEN023	3.0		GEN023	6.7		GEN023				1.495		F 206									
1990	25.0		GEN023	5.7		GEN023	2.7		GEN023	3.2		GEN023				1.238		F 206									
1991	25.9		GEN023	11.3		GEN023	2.5		GEN023	3.6		GEN023				1.150		F 206									
1992																1.005		F 206									
1993																0.879		F 206									

* Station Poissy

EC List 2 (grey list) River 'Slaney' Monitoring station : Enniscorthy

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987																											
1988																											
1989																											
1990																											
1991																											
1992																											
1993																											
1994	46.7		IRL619																								

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980																											
1981																											
1982																											
1983																											
1984																											
1985																											
1986																											
1987																											
1988																											
1989	26		IRL611	5		IRL611																					
1990	191		IRL611	6		IRL611																					
1991	42.5		IRL611	7.5		IRL611																					
1992	49		IRL611	5	<	IRL611																					
1993	16.2		IRL611	1.4		IRL611	1.6		IRL611	1	<	IRL611															
1994	8.4		IRL619	2.2 *		IRL619	-		IRL619	0.73 *		IRL619	5.89		IRL619	0.194		IRL619									
						(* = max. value)																					

Tagus (SP)

EC List 2 (grey list) River 'Tagus' Monitoring station 'Talavera (SP)'

Annual averages (< below detection limit)

Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*
1980																											
1981	44		SP1103																								
1982	52		SP1103																								
1983	39		SP1103																								
1984	62		SP1103																								
1985	70		SP1103	0.01	<	SP1103																					
1986	54		SP1103																								
1987	107		SP1103																								
1988	97		SP1103	0.01	<	SP1103																					
1989	133		SP1103	0.01	<	SP1103																					
1990	24		SP1103	0.01	<	SP1103																					
1991				0.01	<	SP1103																					
1992				0.01	<	SP1103																					
1993				0.01	<	SP1103																					

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*mg N/l*	<	*source*	*mg P/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*	*ug/l*	<	*source*
1980																											
1981																											
1982																											
1983				12		SP1103	1	<	SP1103																		
1984				20		SP1103																					
1985	100	<	SP1103	10	<	SP1103				10	<	SP1103															
1986	100	<	SP1103	30		SP1103				10	<	SP1103															
1987	100	<	SP1103	24		SP1103				10	<	SP1103															
1988	100	<	SP1103	10	<	SP1103	10	<	SP1103	10	<	SP1103															
1989	100	<	SP1103	10	<	SP1103	10	<	SP1103	10	<	SP1103															
1990	100	<	SP1103	40		SP1103				10	<	SP1103															
1991	18		SP1103	10		SP1103	10	<	SP1103	10	<	SP1103															
1992	12		SP1103	13		SP1103	10	<	SP1103	10	<	SP1103															
1993	13		SP1103	30		SP1103	10	<	SP1103	10	<	SP1103															

EC List 2 (grey list) River 'Tagus' Monitoring station 'Santarem (P)'

Annual averages (< below detection limit)

Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	276		GEN023																								
1981	110		GEN023																								
1982	263		GEN023																								
1983	176		GEN023																								
1984	225		GEN023																								
1985	441		GEN023																								
1986	342		GEN023																								
1987	226		GEN023																								
1988	431		GEN023																								
1989				15.0		GEN023																					
1990				15.0		GEN023																					
1991				17.8		GEN023																					
1992				31.8		GEN023																					
1993																											

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	50.0		GEN023	50.0		GEN023	10.0		GEN023	44.0		GEN023	0.776		GEN023	2.1		GEN023									
1981							88.5		GEN023	162.0		GEN023	0.955		GEN023	0.3		GEN023									
1982							224.0		GEN023				1.3		GEN023	0.387		GEN023									
1983							95.0		GEN023				0.775		GEN023	0.75		GEN023									
1984							100.0		GEN023				1.25		GEN023	0.313		GEN023									
1985													1.45		GEN023	0.189		GEN023									
1986																0.166		GEN023									
1987																0.29		GEN023									
1988																0.202		GEN023									
1989	27.5		GEN023	13.3		GEN023	10.0		GEN023	163.0		GEN023	0.572		GEN023	0.236		GEN023									
1990	15.5		GEN023	5.5		GEN023	20.0		GEN023	35.0		GEN023	1.12		GEN023	0.174		GEN023									
1991	31.3		GEN023	6.4		GEN023	5.0		GEN023	30.0		GEN023	1.03		GEN023	0.213		GEN023									
1992	26.6		GEN023	18.9		GEN023	12.2		GEN023	30.0		GEN023	0.708		GEN023	0.29		GEN023									
1993																											

For Cu, Zn and Pb dissolved values are used !

NO3NO2 + NH3 (1980 - 1985) !

NO3-N (1989 - 1992) !

EC List 2 (grey list) River 'Thames' Monitoring station ' Teddington Weir '

Annual averages (< below detection limit) Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	68.3		UK801	5.0		UK801																					
1981	81.0		UK801	7.5		UK801																					
1982	77.8		UK801																								
1983	57.2		UK801																								
1984	55.5		UK801																								
1985	65.0		UK801																								
1986	86.3		UK801	0.3		UK801																					
1987	63.5		UK801	2.5		UK801																					
1988	72.2		UK801	2.5		UK801							0.50	<	UK807												
1989				2.5		UK801							0.26	<	UK807												
1990	38.1		UK801	2.5		UK801							0.29		UK807												
1991	23.2		UK801	2.5		UK801							0.11		UK807												
1992				2.5		UK801							0.20		UK807												
1993	60.7		UK801	2.5		UK801																					

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	25.2		UK801	5.9		UK801	5.9		UK801	5.4		UK801	6.9		UK801												
1981	32.6		UK801	6.5		UK801	5.0		UK801	10.6		UK801	7.0		UK801												
1982	23.8		UK801	5.4		UK801	5.0		UK801	5.2		UK801	6.9		UK801												
1983	23.6		UK801	6.0		UK801	5.0		UK801	5.0		UK801	7.1		UK801												
1984	21.7		UK801	5.4		UK801	5.0		UK801	5.4		UK801	7.5		UK801												
1985	24.5		UK801	6.1		UK801	5.0		UK801	6.1		UK801	8.0		UK801												
1986	19.1		UK801	7.3		UK801	4.7		UK801	5.7		UK801	6.9		UK801												
1987	15.4		UK801	6.4		UK801	5.0		UK801	3.8		UK801	6.9		UK801												
1988	18.1		UK801	4.9		UK801	4.2		UK801	2.2		UK801	6.8		UK801												
1989	27.6		UK801	4.8		UK801	2.5		UK801	2.2		UK801	7.0		UK801	3.353		UK807									
1990	29.1		UK801	7.5		UK801	2.5		UK801	3.2		UK801	7.7		UK801	1.661		UK807									
1991	33.6		UK801	7.2		UK801	4.3		UK801	4.8		UK801	8.3		UK801												
1992	20.1		UK801	6.2		UK801	5.0		UK801	3.5		UK801	8.0		UK801	1.629		UK807									
1993	16.8		UK801	5.6		UK801	5.0		UK801	3.3		UK801	7.3		UK801												

EC List 2 (grey list) River 'Trent' (Humber) Monitoring station 'Dunham'

Annual averages (< below detection limit)

Annual averages calculated with values below detection limit set to half value

year	flow			Arsenic			Endosulfan			Parathion			Atrazine			1,1,1-Trichl.-ethane			1-chloro-2-nitrobenz.			1-chloro-3-nitrobenz.			1-chloro-4-nitrobenz.		
	m3/s	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	107.7		UK801	3.0		UK801																					
1981	117.1		UK801	4.6		UK801																					
1982	82.8		UK801	4.2		UK801																					
1983	84.3		UK801	4.2		UK801																					
1984	92.6		UK801	3.8		UK801																					
1985	79.6		UK801	4.4		UK801																					
1986	111.0		UK801																								
1987	104.2		UK801																								
1988	98.1		UK801																								
1989	53.9		UK801	3.0		UK801																					
1990	66.4		UK801	3.1		UK801																					
1991	62.1		UK801	4.8		UK801																					
1992	87.7		UK801	4.2		UK801																					
1993				3.0		UK801																					

year	Zinc			Copper			Chromium			Lead			Total N			Total P			3,4-benzo(a)pyrene			3,4-benzo(b)fluoranth			PAH (total)		
	ug/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source	mg N/l	<	source	mg P/l	<	source	ug/l	<	source	ug/l	<	source	ug/l	<	source
1980	73.9		UK801	26.5		UK801	13.9		UK801	16.1		UK801	10.8		UK801												
1981	53.3		UK801	22.1		UK801	19.0		UK801	20.9		UK801	7.6		UK801												
1982	51.5		UK801	23.0		UK801	23.0		UK801	18.2		UK801	8.3		UK801	1.420		UK801									
1983	52.9		UK801	16.7		UK801	10.7		UK801	19.5		UK801	8.6		UK801												
1984	149.0		UK801	25.5		UK801	15.6		UK801	50.2		UK801	9.4		UK801												
1985				18.0		UK801	8.3		UK801	14.8		UK801	9.5		UK801												
1986	80.8		UK801	19.8		UK801	7.4		UK801	18.1		UK801	9.8		UK801												
1987	101.2		UK801	46.8		UK801	5.9		UK801	12.3		UK801	8.7		UK801												
1988	55.4		UK801	17.7		UK801	4.9		UK801	12.0		UK801	8.5		UK801												
1989	64.0		UK801	17.6		UK801	5.1		UK801	11.8		UK801	9.5		UK801												
1990	56.4		UK801	14.9		UK801	4.2		UK801	8.1		UK801	9.8		UK801												
1991	56.1		UK801	15.9		UK801	5.5		UK801	11.6		UK801	10.2		UK801				0.0043		UK801	0.0025		UK801			
1992	52.4		UK801	13.5		UK801	4.4		UK801	11.3		UK801	9.6		UK801				0.0135		UK801	0.0215		UK801			
1993	45.2		UK801	12.5		UK801	3.8		UK801	8.6		UK801	9.1		UK801				0.0698		UK801	0.0552		UK801			

Appendix F National and International water quality objectives and standards

[summary.wk1]
28-Mar-96

Water Quality Objectives and Standards - National

	Substance	Belgium (1)	Vlaanderen					Germany (3)	
		Basic WQ	Basic WQ	drink_A1	drink_A2	drink_A3	Denmark	General	'Zeilvorgabe'
1	TotN (mg/l)		<=16						(ammonium) 200
2	TotP (mg/l)	1 (M)	<=0.3(G) <1(A)	0.17(G)	0.3 (G)	0.3 (G)		<=0.3	150
3	arsenic (ug/l)	50 (M)	<=30 (A)	10(G); 50(I)	50(I)	50(G); 100(I)			40.0 mg/kg
4	chromium (ug/l)	50 (M)	<=50 (A)	50 (I)	50 (I)	50 (I)	10	<=30	100.0 mg/kg
5	copper (ug/l)	50 (M)	<=30 (A)	20(G); 50(I)	50 (G)	1000 (G)	12	<=40	50.0 mg/kg
6	lead (ug/l)	50 (M)	<=50 (A)	50 (I)	50 (I)	50 (I)	3.2	<=20	100.0 mg/kg
7	zinc (ug/l)	300 (M)	<=200 (A)	500(G); 3000(I)	1000(G); 5000(I)	1000(G); 5000(I)	110	<=300	200.0 mg/kg
8	endosulfan (ug/l)						0.0001		0.001
9	parathion (ug/l)						0.01 (methyl)		(ethyl) 0.0002 (methyl) 0.01
10	atrazine (ug/l)						0.1		0.1
11	1,1,1-Trichloroethane (ug/l)						100	100(A) 1(T)	1
12	1-chloro-2-nitrobenz (ug/l)						1	10(A) 1(T)	1
13	1-chloro-3-nitrobenz (ug/l)						1		1
14	1-chloro-4-nitrobenz (ug/l)						1	30(A) 1(T)	1
15	3,4-benzo(a)pyrene (ug/l)								
16	3,4-benzo(b)fluoranth (ug/l)						0.001		
17	PAH(total) (ng/l)	100 (M)	<=100 (M)	200 (I)	200 (I)	1000 (I)			

for explanation of annotations, see last page of the table

Water Quality Objectives and Standards - National

Substance	Greece (4) Litheos	Greece Xanthi/Rodopi	Kosinthos R.	Ireland (5)	Italy	Lux (6)	Netherlands (7)
1 TotN (mg/l)						2.3 (nitrate) 0.2 (ammonium)	(norm) 2.2
2 TotP (mg/l)	(P2O5) .07		(PO4) 0.2(G); 0.4(I)			0.15	(norm) 0.15
3 arsenic (ug/l)	50 (M)	50(I)(L)	10(G); 50(I)	50(A1,A2) 100(A3)			(target) 5; (norm) 10
4 chromium (ug/l)	50 (M)	30(I)(L);30(I)(R)	30 (I)	50 (A1,A2,A3)		100 (mg/kg)	(target) 5; (norm) 20
5 copper (ug/l)	50 (G)	40(I)(L);40(I)(R) (dissolved)	(diss) 20(G); 40(I) (dissolved)	50(A1) 100(A2) 1000(A3)		50 (mg/kg)	(target) 3; (norm) 3
6 lead (ug/l)	50 (M)	1(I)(L);1(I)(R)	1 (I)	50 (A1,A2,A3)		100 (mg/kg)	(target) 4; (norm) 25
7 zinc (ug/l)	1000(G); 5000(M)	300(I)(L);1000(I)(R)	500(G); 1000(I)	3000(A1) 5000(A2,A3)		200 (mg/kg)	(target) 9; (norm) 30
8 endosulfan (ug/l)							
9 parathion (ug/l)							(ethyl)(trgt) 0.00005; (norm) 0.005 (methyl) (norm) 0.2
10 atrazine (ug/l)						0.1	(target) 0.0075; (norm) 0.1
11 1,1,1-Trichloroethane (ug/l)							
12 1-chloro-2-nitrobenz (ug/l)							
13 1-chloro-3-nitrobenz (ug/l)							
14 1-chloro-4-nitrobenz (ug/l)							
15 3,4-benzo(a)pyrene (ug/l)							(target) 0.003; (norm) 0.005
16 3,4-benzo(b)fluoranth (ug/l)							
17 PAH(total) (ng/l)	2000			200 (A1,A2) 1000(A3)			

for explanation of annotations, see last page of the table

[summary.wk1]
28-Mar-96

Water Quality Objectives and Standards

Substance	Portugal	Spain	United Kindom (8) drink_A1	drink_A2	salmfish	cyprfish
1 TotN (mg/l)						
2 TotP (mg/l)						
3 arsenic (ug/l)			50 (PT)	50 (PT)	50 (AD)	50 (AD)
4 chromium (ug/l)			50 (PT)	75 (MT)	5-50 (AD)	150-250 (AD)
5 copper (ug/l)			20 (PT)	50 (PT)	1-28 (AD) 5-112 (P)	1-28 (AD) 5-112(P)
6 lead (ug/l)			50 (PT)	75 (MT)	4-20 (AD)	50-250 (AD)
7 zinc (ug/l)			3000 (PT)	5000 (PT)	8-125 (AT) 30-500 (P)	75-500 (AT) 300-2000(P)
8 endosulfan (ug/l)			0.003 (proposed water quality std. - annual mean)			
9 parathion (ug/l)						
10 atrazine (ug/l)			2 (proposed water quality std. - annual mean)			
11 1,1,1-Trichloroethane (ug/l)						
12 1-chloro-2-nitrobenz (ug/l)						
13 1-chloro-3-nitrobenz (ug/l)						
14 1-chloro-4-nitrobenz (ug/l)						
15 3,4-benzo(a)pyrene (ug/l)						
16 3,4-benzo(b)fluoranth (ug/l)						
17 PAH(total) (ng/l)						

for explanation of annotations, see last page of the table

RESUME FRANCE

Substances	Eaux destinées à la consommation humaine					Eaux piscicoles		Rejets en provenance d'installations classées		(Flux journalier autorisé)
	Général	A1	A2	A3		Salmonicoles	Cyprinicoles			
1 TotN (mg/l)								30		(< = 50kg/l)
2 TotP (mg/l)						< = 0,2 mg/l PO4	< = 0,4 mg/l PO4	10		(> = 15kg/l)
3 Arsenic (µg/l)	< = 50	10(G);50(I)	;50(I)	50(G);100(I)				100		(> 1g/l)
4 Chrome (µg/l)	< = 50	;50(I)	;50(I)	;50(I)	*Dureté*			500		(> 5g/l)
5 Cuivre (µg/l)	< = 1000	20(G);50(I)	50(G);	1000(G);	*(mg/l CaCO3)*			500		(> 5g/l)
					10	< = 5(G)	< = 5(G)			
					50	< = 22(G)	< = 22(G)			
					100	< = 40(G)	< = 40(G)			
					500	< = 112(G)	< = 112(G)			
6 Plomb (µg/l)	< = 50	;50(I)	;50(I)	;50(I)				500		(> 5g/l)
7 Zinc (µg/l)	< = 5000	500(G);3000(I)	1000(G);5000(I)	1000(G);5000(I)				2000		(> 20g/l)
					10	< = 30(I)	< = 300(I)			
					50	< = 200(I)	< = 700(I)			
					100	< = 300(I)	< = 1000(I)			
					500	< = 500(I)	< = 2000(I)			
								Valeur journalière	Valeur mensuelle	
8 Endosulfan (µg/l)	< = 0,1							100	50	(> 0,5g/l)
9 Parathion (µg/l)	< = 0,1							100	50	(> 0,5g/l)
10 Atrazine (µg/l)	< = 0,1									
11 1,1,1-Trichloroéthane (µg/l)										
12 1-chloro-2-nitrobenzène (µg/l)								8000	12000	(> 10g/l)
13 1-chloro-3-nitrobenzène (µg/l)										
14 1-chloro-4-nitrobenzène (µg/l)								8000	12000	(> 10g/l)
15 3,4-benzo(a)pyrène (µg/l)	< = 0,01									
16 3,4-benzo(b)fluoranthène (µg/l)										
17 PAH(total) (ng/l)	< = 200	;200(I)	;200(I)	;1000(I)				100	50	(> 0,5g/l)

Summary of Water Quality Objectives in Portugal

			drinking water		fish water		Direct Discharges	Discharges to STP
Substance	General	drink_A1	drink_A2	drink_A3	salmfish	cyprfish		
1 TotN (mg/l)							15 10	
2 TotP (mg/l)					0.2 (PO4)	0.4 (PO4)	1000	1000
3 arsenic (ug/l)	100	10(G); 50(I)	;50(I)	50(G); 100(I)			2000	2000
4 chromium (ug/l)	50	;50(I)	;50(I)	;50(I)			1000	1000
5 copper (ug/l)	50	20(G); 50(I)	50(G)	1000(G)	; 40(G) at 100 mg/l CaCO3	; 40(G)		
6 lead (ug/l)	50	;50(I)	;50(I)	;50(I)			1000	1000
7 zinc (ug/l)	1000	500(G); 3000(I)	1000(G); 5000(I)	1000(G); 5000(I)	; 300(I) at 100 mg/l CaCO3	; 300(I)	5000	
8 endosulfan (ug/l)								
9 parathion (ug/l)								
10 atrazine (ug/l)								
11 1,1,1-Trichloroethane (ug/l)								
12 1-chloro-2-nitrobenz (ug/l)								
13 1-chloro-3-nitrobenz (ug/l)								
14 1-chloro-4-nitrobenz (ug/l)								
15 3,4-benzo(a)pyrene (ug/l)								
16 3,4-benzo(b)fluoranth (ug/l)								
17 PAH(total) (ng/l)	100	;200(I)	;200(I)	;1000(I)				

(G) = recommended maxim um value
(I) = maximum admissible v alue

Water Quality Objectives and Standards - International

	Substance	75/440/EEC (9) drink_A1	drink_A2	drink_A3	76/160/EEC (10) Bathing water	79/923/EEC (11) Shellfish	78/659/EEC (12) fish
1	TotN (mg/l)						(NH4tot;salmon) <=.04 (G);<=1 (I) (NH4tot;carp) <=.2 (G);<=1 (I)
2	TotP (mg/l)						(PO4) 0.2 (salmon); 0.4 carp
3	arsenic (ug/l)	10(G); 50(I)	50(I)	50(G); 100(I)			
4	chromium (ug/l)	50 (I)	50 (I)	50 (I)			
5	copper (ug/l)	20(G); 50(I)	50 (G)	1000 (G)			(dissolved) <=40 (G) Salmon (5-112) (dissolved) <=40 (G) Carp (5-112)
6	lead (ug/l)	50 (I)	50 (I)	50 (I)			
7	zinc (ug/l)	500(G); 3000(I)	1000(G); 5000(I)	1000(G); 5000(I)			(total) <=300 (I) Salmon (30-500) (total) <=1000 (I) Carp (300-2000)
8	endosulfan (ug/l)						
9	parathion (ug/l)						
10	atrazine (ug/l)						
11	1,1,1-Trichloroethane (ug/l)						
12	1-chloro-2-nitrobenz (ug/l)						
13	1-chloro-3-nitrobenz (ug/l)						
14	1-chloro-4-nitrobenz (ug/l)						
15	3,4-benzo(a)pyrene (ug/l)						
16	3,4-benzo(b)fluoranth (ug/l)						
17	PAH(total) (ng/l)	200 (I)	200 (I)	1000 (I)			

Notes:

1) Belgium; Source: (B327) VMM Bestuur Meetnetten en Planning Dienst Water, Jaarverslag Meetnet Oppervlaktewater 1992.
A=Absolute (maximum?)
G=guideline value (w.q.o.); 90% of values should meet criterion
I=mandatory limit (w.q.s.); 95% of values must meet criterion
M=Median value
drink_A1: Type A1; suitable for drinking after simple physical treatment and disinfection
drink_A2: Type A2; suitable for drinking after normal physical treatment, chemical treatment and disinfection
drink_A3: Type A3; suitable for drinking after full physical treatment, chemical treatment, refinement and disinfection
Belgian standards for carp fish and for bathing water did not include any of the selected substances

2) Denmark; Source: (DK1003), miljo-og Energimin., Miljo styrelsen, J. nr. 2014-0026.

3) Germany; Sources: (D114) : Landesamt fur Wasser und Abfall Nordrhein-Westfalen, Gewasserguteberricht '91, for general water quality objectives;
Germany 'Zeilvorgabe' (GEN014) Commission internationale pour la protection du Rhin, Rapport sur L'etat du Rhin

4) Greece; Source: (GR904) letter and annex from greek ministry of environment to DGXI, December 1989
(G) = guideline values; (I) = mandatory limit
(L) = lake; (R) = river

5) Ireland: Source: (IRL614)
Surface Waters are classified on the basis of quality standards:
- Category A1: Simple physical treatment and disinfection;
- Category A2: Normal physical treatment, chemical treatment and disinfection;
- Category A3: Intensive physical treatment, chemical treatment, extended treatment and disinfection.
95% of samples must meet the quality standards;
The European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water), 1989 (Statutory Instrument No. 294 of 1989), contain all of the standards applicable to such waters (IRL618).

6) Luxembourg: Source (L408)

7) The Netherlands; Source: NL546, Derde Nota Waterhuishouding
(target) = G value; (norm) = I value

8) UK; Source: (UK810) Appendix, National environmental quality standards for List II substances
drink_A1: Type A1 as in 75/440/EEC; suitable for abstraction for drinking after simple physical treatment and disinfection
drink_A2: Type A2 as in 75/440/EEC; suitable for drinking after normal physical treatment, chemical treatment and disinfection
A=Annual average
P=95% of samples
M=maximum allowable concentration
D=dissolved
T=total
Ranges given are a function of water hardness (mg/l $CaCO_3$)

9) 75/440/EEC Drinking water Directive (EC015)
(G) = guideline values; (I) = mandatory limit

10) 76/160/EEC Bathing water Directive (EC016): Qualtitative standards are given for heavy metals; i.e. Concentrations are to be controlled by the competent authorities in the event that there is evidence for the presence of these substances and they could cause a decrease in bathing water quality.

11) 79/923/EEC Shellfish Directive (EC020): Qualitative conditions are given for Heavy metals;
(G) Conditions: The concentrations in the shellfish meat must be low enough to allow a good quality of the shellfish product
(I) Conditions: The concentrations in the shellfish water or shellfish meat cannot exceed a level causing damaging effects to shellfish or larvae.

12) 78/659/EEC Fish Directive (EC018):
Values for dissolved copper and total zink are a function of hardness (10-300 mg/l CaCO3). Higher metal concentrations are allowed with higher hardness values.

Appendix G Phosphorous Quality Objectives in Ireland)[1]

)[1] Text in full provided by the National Authority in Ireland (source: IRL619)

Phosphorus Quality Objective

My authorities cannot accept that the absence of statutory quality objectives for phosphorus calls into question their commitment to tackle pollution and to protect water quality.

It is acknowledged that phosphorus inputs are usually the main factor responsible for the impairment of water quality in Irish rivers and lakes and that contributions arise primarily from agriculture (diffuse sources in particular), sewage and industrial effluent discharges. A range of measures are in place to deal with each of these sources of phosphorus (and other pollutants).

In the case of agriculture, measures include:

- Promoting environmental awareness and responsible waste management practices among farmers. Initiatives undertaken by State agencies have been supported and supplemented by programmes conducted by farmer representative organisations. The most recent initiative by one of the latter organisations involves the promotion of a 10 point code on silage effluent control.

- Extensive farm surveys by local authorities, supported in many areas by Fisheries Board personnel, for the purpose of identifying potential sources of pollution. Where appropriate, survey findings have been followed-up by advice from Teagasc to farmers on pollution prevention measures and management practices tailored to their individual circumstances and statutory notices have been issued by local authorities under section 12 of the Local Government (Water Pollution) Act, 1977, specifying measures to avoid pollution and the period by which they must be put in place.

- The operation, with financial support from the European Union, of the Control of Farm Pollution grants scheme to assist with the provision of essential infrastructure on farms for the containment and storage of wastes and so facilitating land spreading in a manner and at times which entail least risk of pollution. Over 30,00 farmers received grants for pollution works under this scheme and the Farm Improvement Programme. Grant payments involved totalled some £170 million.

- Continuing Government support for the Control of Farm Pollution scheme is reflected in the National Development Plan and also in the Operational Programme for Agriculture, Rural Development and Forestry 1994-1999. A significant proportion of the £195 m allocated in the Operational Programme for On-Farm Investment is for pollution control investments under both the Control of Farm Pollution Scheme and outstanding commitments under the Farm Improvement Programme. The response to the Farm Pollution Scheme has greatly exceeded expectations - 18,600 applications were received by April, 1995 - leading to funding difficulties. The Department of Agriculture, Food and Forestry has taken arrangements so as to cater for the maximum possible number of applications within a reasonable timeframe.

- The Rural Environment Protection Scheme, which is the agri-environment measure of the 1992 CAP reform. The objectives of REPS are:
  - to establish farm production methods which reflect increasing public concern for conservation, landscape protection and wider environmental problems;
  - to protect wildlife habitats and endangered species of flora and fauna.

  Measures which are expected to prove particularly beneficial to the protection/improvement of water quality include those concerning:
  - Waste Management, Licensing and Fertilisation Plans;
  - Grassland Management Plans, and
  - Protection and Maintenance of Watercourses and Wells.

  The scheme was launched in June 1994 and it is expected that about 40,000 farmers will participate over the next 5 years, availing of projected grant expenditure totalling £230 million.

- Introduction of a code of good agricultural practice. While the code (being finalised at present) is primarily intended to meet obligations arising under Directive 91/676/EEC, observance of recommended practices should contribute significantly to reducing phosphorus losses to waters from agriculture. This aspect will be highlighted in the explanatory material accompanying the code, as will the environmental benefits and potential financial savings to farmers arising from measures which maximise the nutrient value of farm wastes while respecting the environment.

The foregoing measures operate nationally but the extent to which they are applied to individual river and lake catchments reflects the particular circumstances and requirements of each case. Where appropriate, the measures indicated have been supplemented by special studies and research (as, for example, in the case of Lough Derg, Lough sheelin and most recently Lough Conn which was the subject of a detailed letter forwarded by my authorities to the Commission on 25 November, 1994), as well as farm waste management strategies so as to fine-tune pollution controls to particular areas. The recent establishment of a broadly representative expert committee - along the lines of that which produced the report on the Trophic Status of Lough Conn - to consider matters concerning water quality in Loughs Mask and Carra is a further example of this focused approach.

The broad strategy of Government policy in relation to rivers and lakes has been set out in An Environment Action Programme, which, in the case of these waters, provides for the elimination by the year 2000 of pollution caused by sewage discharges. Implementation of this policy takes full account of the provisions of Directive 91/271/EEC on urban waste water treatment and is being pursued, inter alia, under the Operational Programme for Environmental Services 1994 - 1999. My authorities have recently forwarded to the Commission their programme for implementation of this Directive (Article 17 report) and have advised that estimated expenditure in excess of £1 billion will be required for this purpose up to 2005.

The position regarding sensitive areas under the Directive, and in particular, the applicable requirements in the case of water bodies in direct or indirect receipt of a discharge of less than 10,000 p.e. is dealt with later under separate heading. My authorities are prepared to go further than what they understand to be the requirements of the Directive where they are satisfied that such discharges warrant a higher level of treatment than secondary treatment.

A practical example of this approach is the provision of phosphorus reduction facilities at Ballinrobe (2,250 p.e.) as mentioned already. These facilities have been provided elsewhere where similar circumstances are considered to apply and this will continue to be my authorities approach, where warranted.

Phosphorus inputs from industry are subject to the regulatory controls in the Water Pollution Acts 1977 and 1990, or, in the case of certain activities, the integrated pollution controls of the Environmental Protection Agency Act, 1992. Local authorities/the EPA impose emission controls as appropriate in respect of this nutrient, based on their assessment of requirements needed to protect water quality. Decisions in this regard are made against the background of their pollution control responsibilities taking account of Memorandum No. 1, Water Quality Guidelines produces by the Technical Committee on Effluent and Water Quality Standards which includes guidance on loading values for Total Phosphorus in lakes. This approach is refined in the case of certain waters by the need to ensure that the general quality objectives applying to rivers and lakes designated under Directive 78/659/EEC are observed or by quality objectives contained in water quality management plan for the waters concerned.

As regards the setting of quality objectives nationally pursuant to Directive 76/464/EEC, the position is that work is proceeding on the determination of appropriate objectives for substances most prevalent in Ireland. The EPA is assisting the Department of the Environment in this process. Phosphorus has been identified as one of the priority substances for attention.

It will be necessary to engage in consultation with other relevant Departments before adopting and giving statutory effect to EQQ proposals emerging from this process. My authorities are endeavouring to complete this exercise for priority substances by the end of 1995 and will communicate further with the Commission about developments.

Detergents

The suggestions made by the complainant regarding measures to address nutrient enrichment have been noted. In this regard; my authorities would like to advise the Commission on the relevance of the contribution of phosphates in detergents to the condition of Irish freshwaters and the steps being taken in this area, viz:

- 80% of sewage waste loads in Ireland discharge to the marine environment and, as a consequence, detergents have only limited opportunity to impact on freshwater. (There is no apparent evidence of phosphate induced problems in estuarine and coastal waters).

- Use of phosphate-free detergents nationally - at 12,000 tonnes - now accounts for 40% of overall usage compared with a 0% situation in 1988.

- Where present, the content of phosphate in detergents has been reduced from 35% to 28%.

- While detailed figures on the quantities and trends in use of phosphate based industrial detergents are not available,. usage in this sector is believed to be low.

- Efforts by my authorities to conclude a voluntary agreement with the Irish Detergent and Allied Products Association to increase use of phosphate-free products are at an advanced stage and it is hoped that a satisfactory agreement can ben concluded shortly. The outcome will be conveyed to the Commission.

- Provision has been made in the Waste Bill (which is currently before Parliament) for new powers to prohibit or regulate the production, treatment, use, supply or sale of any specified substance or of any article containing such substance which could cause water pollution (copy of the relevant section of the Bill is attached for information). Consideration will be given to availing of these powers in respect of detergents should this prove necessary in the light of experience and taking account of further scientific research.

European Commission

Evaluation of Directive 76/464/EEC regarding List II substances on the quality of the most important surface waters in the Community

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