COMMISSION
OF THE
EUROPEAN COMMUNITIES

Directorate-General
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NON-ORGANIC MICROPOLLUTANTS OF THE ENVIRONMENT

Volume 3

SYNTHESIS OF DATA

REPORT OF A WORKING GROUP OF EXPERTS

Prepared for the Commission of the European Communities

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Luxembourg July 1974

NON-ORGANIC MICROPOLLUTANTS OF THE ENVIRONMENT

VOLUME 3 : Synthesis of data

S U M M A R Y

LIST OF EXPERTS

COUNTRY	NAME	ADRESS	PRESENT AT THE MEETING N°
BELGIUM	J.BOUQUIAUX (Rapporteur)	Institut d'Hygiène et d'Epidémiologie Ministère de la Santé publique, de la Famille et de l'Environnement 14 rue Juliette Wytsman 1050 BRUXELLES	1-2-3
	A.DENTENEER	Economische Zaken Montoyerstraat, 3 1040 BRUSSEL	2
	P.HERMAN	Institut de Recherches chimiques Ministère de l'Agriculture 5 Molenstraat 1980 TERVUREN	1-2-3
	J.EXSTEYL	Ministère de l'Emploi et du Travail 51/53 rue Belliard 1040 BRUXELLES	1
	M.JURISSE	Ministère de la Santé publique, de la Famille et de l'Environnement Cité administrative de l'Etat Quartier Vésale 1010 BRUXELLES	2
	L.PATERNOTTE	Administration de l'Hygiène et de la Médecine du Travail 53 rue Belliard 1040 BRUXELLES	2
DENMARK	F.BRO-RASMUSSEN	National Food Institute Mørkhøj Bygade 19 2860 SØBORG	2-3
	B.KOCH	Agency of Environmental Protection 47 Store Kongensgade 1264 COPENHAGEN	3
	E.POULSEN	Institute of Toxicology National Food Institute Mørxhøs Bygade 19 2860 SØBORG	2
	J.STEENSBERG	Agency of Environmental Protection 47 Store Kongensgade 1264 COPENHAGEN	3

Meetings n°1 - 7 December 1972
n°2 - 20-21 March 1973
n°3 - 14-15-16 November 1973

COUNTRY	NAME	ADRESS	PRESENT AT THE MEETING N°
FRANCE	P.ANNE	Expert consultant C.C.E. Institut national de la Recherche agronomique -Station d'Agronomie 28 rue de Herrlisheim 68 COLMAR	2-3
	M.C.DUCHESNE	Ministère de l'Agriculture Service des Fraudes 42bis rue de Bourgogne PARIS 7ème	2
	B.FESTY	Laboratoire d'Hygiène de la Ville de Paris 1bis rue des Hospitalières Saint-Gervais 75004 PARIS 4ème	1-2
	J.GREFFARD	Bureau Recherches géologiques et minières 74 rue de la Fédération PARIS 15	1-3
	Y.THIBAUD	Institut de Pêches maritimes La Noë - Route de la Jonelière 44 NANTES	1-2-3
GERMANY	J.GREINER	Bundesministerium für Wirtschaft Postfach 53 BONN-DUISDORF	2
	KLEIN	Bundesanstalt für Gewässerkunde Kaiserin Augusta-Anlagen 15/17 D 54 KOBLENZ	2
	H.MUHLECK	Bundesministerium des Innern Rheindorfer Str. 198 D 53 BONN	2
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Meetings n°1 - 7 December 1972
n°2 - 20-21 March 1973
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COUNTRY	NAME	ADRESS	PRESENT AT THE MEETING N°
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	O.SORENSEN	Hygiene-Institut der Ruhrgebietes Abbendickweg 12 465 GELSENKIRCHEN	2
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	F.COTTA-RAMUSINO	Istituto Superiore di Sanità Viale Regina Elena, 299 ROMA	2-3
LUXEMBOURG	P.HANSEN	Ministère de la Santé publique Institut d'Hygiène et de la Santé publique 1a rue Auguste Lumière LUXEMBOURG	1-2-3
	M.MOLITOR	Administration des Eaux et Forêts 34 avenue de la Porte Neuve LUXEMBOURG	2-3
	PRUD'HOMME	Direction de la Santé publique (Inspection des Pharmacies) 37 rue F.Liszt LUXEMBOURG	2
	R.WENNIG	Ministère de la Santé publique Institut d'Hygiène et de Santé publique 1a rue Auguste Lumière LUXEMBOURG	1-2

Meetings n°1 - 7 December 1972

n°2 - 20-21 March 1973

n°3 - 14-15-16 November 1973

COUNTRY	NAME	ADRESS	PRESENT AT THE MEETING N°
NETHERLANDS	A.G.DE MOOR	Min.voor de Volksgezondheid en Milieuhygiene Leidshendam p/a 1e Vanden Bosch Straat 4 DEN HAAG	1-2-3
	H.W.KROES	Min.voor de Volksgezondheid en Milieuhygiene Dr.Reijersstr 8 LEIDSCHENDAM	3
	P.LEEUWANGH	Institut Vet.Farmacologie & Toxicologie Biltstraat 172 UTRECHT	1-3
	A.MINDERHOUD	Rijksinstituut voor de Volksgezondheid P.O.Box 1 BILTHOVEN	1-2-3
	P.SCHULLER	Rijksinstituut voor de Volksgezondheid P.O.Box 1 BILTHOVEN	1
	J.J.STRIK	Institut Vet.Farmacologie & Toxicologie Biltstraat 72 UTRECHT	1-2
	J.SUURLAND	Min.voor de Volksgezondheid en Milieuhygiene Dokter Reyersstraat 10 LEIDSCHENDAM	1
	F.VAN DER KREEK	Ministerie van Volksgezondheid Dokter Reyersstraat 10 LEIDSCHENDAM	1-2-3
	H.VAN GENDEREN	Institut voor Veterianary,Pharmacology and Toxicology 172 Biltstraat UTRECHT	3

Meetings n° 1 - 7 December 1972

n° 2 - 20-21 March 1973

n° 3 - 14-15-16 November 1973

COUNTRY	NAME	ADRESS	PRESENT AT THE MEE-TING N°
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	M.COHEN	Ministry of Agriculture,Fisheries and Food -Plant Pathology Laboratory HARPTENDEN, HERTS	1-2-3
	G.COLLINS	Laboratory of the Government Chemist Conwall House, Stanford Street LONDON SE1 9NQ	1
	P.S.ELIAS	Dept.of Health Social Security Alexander Fleming House LONDON SE1	2
	J.RUZICKA	Laboratory of the Government Chemist Conwall House, Stanford Street LONDON SE1 9NQ	2-3
	A.TOLAN	Ministry of Agriculture,fisheries and Food Great Westminster House Houseferry Road LONDON SW1	1

Meetings n°1 - 7 December 1972

n°2 - 20-21 March 1973

n°3 - 14-15-16 November 1973

COUNTRY	NAME	ADRESS	PRESENT AT THE MEETING N°
COMMISSION OF THE EUROPEAN COMMUNITIES	J.SMEETS (Chairman)	D.G. Affaires sociales Protection sanitaire V/F/1 Centre Louvigny LUXEMBOURG	1-2-3
	R.AMAVIS (Secretary)	D.G. Affaires sociales Protection sanitaire V/F/1 Centre Louvigny LUXEMBOURG	1-2-3
	A.BERLIN	D.G. Affaires sociales Protection sanitaire V/F/1 Centre Louvigny LUXEMBOURG	1
	A.BONINI	D.G. Affaires sociales Protection sanitaire V/F/1 Centre Louvigny LUXEMBOURG	1-2-3
	P.BONNET	Service de l'Environnement Protection des Consommateurs 200,rue de la Loi 1040 BRUXELLES	1-2-3
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	E.DI FERRANTE	D.G.Recherche,Science et Education 200, rue de la Loi 1040 BRUXELLES	3

Meetings n° 1 - 7 December 1972

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COUNTRY	NAME	ADRESS	PRESENT AT THE MEETING N°
COMMISSION OF THE EUROPEAN COMMUNITIES	R.MAGNAVAL	Association EURATOM /C.E.A. Protection sanitaire Boîte postale n°6 FONTENAY AUX ROSES (France)	3
	H.OTT	D.G.Recherche Science et Education 200 rue de la Loi 1040 BRUXELLES	2
	P.RECHT	D.G.Affaires sociales Protection sanitaire Centre Louvigny LUXEMBOURG	3
	G.SERRINI	Centre commun de Recherche 21020 ISPRA-Varese-	3
	M.Th.VAN DER VENNE	D.G. Affaires sociales Protection sanitaire V/F/1 Centre Louvigny LUXEMBOURG	3

Meetings n°1 - 7 December 1972

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NON - ORGANIC MICROPOLLUTANTS OF THE ENVIRONMENT

A. FOREWORD

This report has been prepared by the working group on the consequences for man and his environment, of environmental pollution due to non-organic micropollutants; it is part of the outline of actions that have to be undertaken at Community level in the domain of reduction of pollutions and nuisances. These actions are included in a comprehensive programme of the European Communities in the field of environment that has been accepted by the Council of Ministers on the 19th of July 1973.

Non-organic micropollutants are listed in the first category of pollutants of the environment which have to be considered primarily because of their toxicity and of the present state of knowledge concerning their sanitary and ecological importance.

The objective evaluation of risks being the aim of the general programme a knowledge is required of the level of these pollutants in the environment as well as a study and analysis of the undesirable effects which would result from exposure of the target to a given pollution or nuisance.

At a meeting held on December 7th 1972, the working group decided to prepare an inventory of the data available since 1968 on the levels of non-organic micropollutants in the environment. The report has been compiled by Mr BOUQUIAUX from information supplied by delegates of the various Member States. The list of micropollutants was examined at the meeting of December 7th, 1972. The final date agreed by the rapporteur for receipt of information was May 15th 1973.

A first draft of the report was examined at the meeting of March 20th and 21st 1973. The final text was discussed at the meeting on November 14th-16th 1973 and was agreed by the experts present except for Volume 4 which was written by Mr BOUQUIAUX after the last meeting.

It should be remembered that 2 important non-organic micropollutants were studied in depth at the Symposium "Problems of contamination of man and his environment by Mercury and Cadmium" organised by the Commission of the European Communities in Luxembourg on 3-5th July 1973.

The whole report appears in 4 volumes entitled:

Volume 1 - general presentation;
Volume 2 - detailed listing of levels present in the environment;
Volume 3 - synthesis of data;
Volume 4 - methods of analysis.

B. PRESENTATION OF THE DOCUMENT

Volume 3 contains an analysis of the results set out in tables that correspond to those in Volume 2 . The tables show the 'ordinary' levels of the non-organic micropollutants or micro-constituents that occur in waters, sediments, living organisms, food products, air and soil . The ' ordinary' level is expressed as a range of results from which extreme and exceptional concentrations as well as those from special situations have been omitted (they aure the subject of separate consideration) . In addition to the ' ordinary' concentration there is included a value on which the 'ordinary' concentration is centered . This value is not always the average of the results but covers a more restricted area than the range, in which the averages given by authors occur with greater frequency . The numbers of samples on which the ' ordinary ' and centre values have been established have been given in the tables so as to give some indication of the confidence that can be attached to them .

This kind of treatment of the data was considered necessary if a picture of the situation was to be presented since it was impossible to derive median values (in the statistical sense) in the absence of availability of every individual result and the fact that in many scientific publications only averages had been quoted . Even so the data have yielded a very useful picture helped by the fact that the majority of the results are of recent origin (1969 to 1973) and with few exceptions they have been obtained using modern methods of analysis such as atomic absorption ,neutron activation ,X-ray fluorescence and UV-spectrography . It is worth pointing out that although lead was the subject of special consideration by another Working Party, data were also submitted for this exercise and they have been included . In the case of cyanides no data were submitted and according to Belgian,Dutch and United Kingdom experience , the presence of cyanides is exceptional and is limited to specific and controllable pollution .

Sb.1 - River water
Sb.5 - Fresh water organisms
Sb.8 - Food
Sb.9 - Air

ANTIMONY

Element : Antimony

Medium : River water

Unit : µg/ℓ

ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
n		centered on		
2	0.5 to 0.8		Danube, Illerkanal	65
6	1 to 5		Lech , Lechkanal	65

Element : Antimony

Medium : Fresh water organisms

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS	6	0.16 to 0.56	0.3	Danube, Lech , Illerkanal, Alz	65
	6	0.6 to 12.2		Lechkanal, Alzkanal, near chemical plants; Wartach	65

Element : Antimony

Medium : Food

Unit : mg/kg WET matter

Sb.8

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT	81	0 to 0.009	0.001	F.R.G.	60

Element : Antimony

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/g air particulates- 6 sampling places	53	3.4 to 55.5	15	F.R.G. (München)	56

As.1 - River water
As.4 - Sea sediments
As.5 - Fresh water organisms
As.6 - Sea organisms
As.7 - Drinking water
As.8 - Food
As.9 - Air

ARSENIC.

Element : Arsenic

Medium : River water

Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	3		1.2	Zürichsee	51
	505	0 to 10	3 to 7	Danube, Illerkanal, Lechkanal	45-65
				Havel-Spree in Berlin	46
				Weser in Bremen	46
				Bodensee, Rhine above Bimmen, Main Mosel	41-45-46-48-51
				Maas in the Netherlands	41
Special cases					
X max > 10		up to 25		Ruhr, upper part	47
				Rhine from Bimmen to Nijmegen and Ketelmeer	41-46
				Maas at Dutch frontier	41
$\overline{X}$ > 10		up to 26	12 to 15		
	12			Ruhr, lower part	47
	38			Rhine in Bimmen and Emmerich	46-48

(a) Generally unfiltered.

Element : Arsenic

Medium : Sea sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On dry matter	31	1 to 20	10	Flensburg fjord (Denmark)	62

Element : Arsenic

Medium : Fresh water organisms

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS	8	0.7 to 7.7	2 to 4.5	Danube, Lech, Illerkanal, Lechkanal, Wartach	65
	4	0.7 to 30.9	13.9	Alz and Altzkanal, near chemical plant	65

Element : Arsenic

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MOLLUSCS					
Oysters	12	0.5 to 1.5	1.1	Galway Bay (Ireland)	1
Limpets	10	1 to 3.7	2.6	Severn estuary (a)	21

(a) Severn estuary polluted by domestic and industrial effluents (Bristol, Cardiff)

Element : Arsenic

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	27	0 to 6	1 to 3	F.R.G.: Lindau, Düsseldorf	45-46
	2	<0.5		The Netherlands : Rotterdam-Honingerdijk, Andijk	4
Origin : groundwater	66	0 to 8	1.5 to 2	F.R.G. : Mainz	51
				The Netherlands : Haarlem	4
Origin : dunes recharged with surface water (Rhine)	3	0 to 1		The Netherlands	4

Element : Arsenic

Medium : Food

Unit : mg/kg or ppm (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
BEVERAGES					
Soft drinks, beer, wine	110	0 to 0.1	0.01 to 0.02	Ireland, F.R.G.	1-55
EGGS	900	0.01 to 0.04	0.02	F.R.G.	55
CANNED FISH (salmon)	2		0.05	Ireland	1
MEAT					
Muscle	122	0 to 0.06	0.001 to 0.02	F.R.G.	55-60
Organs (lever, kidney-beef, pork, chicken)	237	0 to 0.35	0.04 to 0.06	F.R.G., The Netherlands	40-55
CEREALS (grain, flour)	14	0.08 to 1.85	0.5	F.R.G.	55
VEGETABLES	86	0 to 0.6	0.01 to 0.1	The Netherlands, F.R.G.	40-55
FRUIT	78	0 to 0.4	0.01 to 0.05	F.R.G., The Netherlands	40-55

(a) On material as presented .

Element : Arsenic
Medium : Air
Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air - 7 sampling places		0.002 to 0.025		UK	43
µg/g air particulates-6 sampling places	52	1.8 to 75	20	F.R.G. (München)	56
µg/l rain (+ fallout)- 1 sampling place(pure area)			1.6	UK	43

Ba.8 - Food

BARIUM.

Element : Barium
Medium : Food
Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT	65	0.003 to 0.96	0.15 to 0.5	F.R.G.	60

Be.1 - River water
Be.7 - Drinking water

BERYLLIUM

Element : Beryllium
Medium : River water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	199	<0.2		Rhine from Bodensee to Wiesbaden, Zürichsee, Main	51

Element : Beryllium

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : groundwater	93	<0.2		F.R.G. : Wiesbaden, Mainz	51

Bi.1 - River water

BISMUTH

Element : Bismuth

Medium : River water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	21	30 to 150	70	Rhine and affluents from Bonn to Dutch frontier	54

B.8 - River water
B.7 - Drinking water
B.10- Soil
B.11- Miscellaneous

BORON.

Element : Boron

Medium : River water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	18	22 to 39	27	Bodensee	45
	78	50 to 370	100 to 200	Danube, 2 places	45
				Tegel lake	57
				Weser in Bremen	46
				Rhine in Bimmen and Düsseldorf	46
Special cases					
$\bar{X}$ > 370	18	up to 560	420 to 440	Tegel river and Nordgraben (mouth in Tegel lake)	57

Element : Boron

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
				F.R.G. :	
Origin : surface water	7		22	- Lindau (Bodensee)	45
	4		120	- Düsseldorf (Rhine)	45

Element : Boron

Medium : Soil

Unit : mg/kg

B.10

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 3 types	13	15 to 60	35	Belgium	32

Element : Boron
Medium : Miscellaneous
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
4 different plants from 2 different soils	11	0.7 to 37	9	Belgium	32
3 different plants, vicinity of a metallurgical plant	4	19 to 24	22	Belgium	32

Br.1 - River water
Br.5 - Fresh water organisms
Br.8 - Food
Br.9 - Air

BROMINE

Element : Bromine
Medium : River water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	2	3 to 15		Danube, Illerkanal	65
	6	600 to 800		Lech, Lechkanal	65

Element : Bromine

Medium : Fresh water organisms

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS	8	10 to 300	(a)	Danube, Lech, Lechkanal, Illerkanal, Wartach	65

(a) Depends on river

Element : Bromine
Medium : Food
Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT	107	0.1 to 6	1.8 to 2.6	F.R.G.	60

Element : Bromine

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/g air particulates - 6 sampling places	52	85 to 6760	1820	F.R.G. (München)	56

Cd.1 - River water
Cd.2 - Sea water
Cd.3 - River sediments
Cd.4 - Sea sediments
Cd.5 - Freshwater organisms
Cd.6 (1-3) - Sea organisms
Cd.7 - Drinking water
Cd.8 (1-4) - Food
Cd.9 - Air
Cd.10 - Soil

CADMIUM

Element : Cadmium

Medium : River water

Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	22	0 to 1.2	~ 0.5	East affluents of river Conway (Wales), unmineralized area	26
	101	0 to 3	2	Bodensee (b)	45-51
	~862	0 to 10	2 to 3	West affluents of river Conway ((Wales), mineralized area (former mining activity)	26
				Danube	45-50
				Continental tributaries of North Sea (Weser, Rhine, Maas, Scheldt) and affluents	5-9-13.4 to 6-15-25-26-41-46-47-48-50-51-52-5
Special cases					
X max >10				Some places in river Rhine	46-48
				River Vesdre in Liège (Belgium) (c)	15
$\overline{X}$ > 10	9		10.4	River Maas after-affluent Vesdre (locally)	15

(a) Generally unfiltered
(b) These values seem to be the background concentration in continental Europ
(c) River Vesdre is polluted by industrial effluents .

Element : Cadmium
Medium : Sea water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	48	0 to 0.6	~ 0.05	West of Scotland, Atl. Ocean and coastal area	27
				Irish Sea, offshore	27
				English Channel, UK coastal area	27
	~ 190	0 to 1.4	0.2 to 0.4	East and west shorelines of Irish Sea	24-27
				North Sea, UK coastal area	42
				North Sea, south east part	13.1 to 13.5
	~ 35	0.3 to 4	0.8 to 1.1	Conway Bay (Wales) (b)	26
				Cardigan Bay (Wales) (b)	24
				Bristol Channel (c)	19-24
Special cases					
X max > 4				Shoreline of Belgium	15
$\overline{X}$ > 4	4	up to 5.8	3.2	Severn estuary (c)	19

(a) Filtered. According to ref. 27, percentage of total cadmium in filtered water : 80 to 83
(b) Dominant source of pollution : runoff from mineralized areas of Wales (former mining activity)
(c) Dominant source of pollution : domestic and industrial effluents (Bristol, Cardiff).

Element : Cadmium

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction <2 µm		5 to 50	10 to 20	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On dry matter	8	0 to 3.5	2	Dam of Esch/Sûre	9
	31	4 to 60	15 to 20	Elbe, Hamburg harbour	53
				Ruhr	47
	40	<200		Scheldt and affluents above Ghent	15
				Maas and affluents above Liège	15
Special cases (dry matter)	2		230	Maas in Liège, locally (a)	15
				Maas after affluent Vesdre, locally	15
	2		430	River Vesdre, lower part (a)	15

(a) Industrial pollution .

Element : Cadmium
Medium : Sea sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On dry matter	42	0.1 to 4.5	1 to 3	Flensburg fjord	62
				Severn estuary (a)	19

(a) Dominant source of pollution : domestic and industrial effluents (Bristol, Cardiff)

Element : Cadmium

Medium : Fresh water organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH	96	0 to 0.35	~0.1	England and Wales, Scotland	70
				Dam of Esch/Sûre	9 (a)
	16	0.1 to 1	0.3 to 0.5	Ruhr	47 (a)
WATERPLANTS	2		~0.1	Dam of Esch/Sûre	9 (a)

(a) Converted from dry to wet matter (X 0.1)

Element : Cadmium

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fucus vesiculosus, laverweed	61	0.01 to 0.3	~0.1	Coastal waters around UK	27 (a)
Special cases: X max >0.3				Fucus from English Channel, coastal area	27 (a)
$\bar{X}$ >0.3	11	0.2 to 7.5	~2	Fucus from Bristol Channel	19(a)-20(a)
	12	0.6 to 22	~5	Fucus from Severn estuary	19(a)-20(a)
MOLLUSCS					
Oyster, mussel, scallop, Queen scallop, cockle, clam, winckle, whelk	207	0 to 0.8	0.3 to 0.6	Coastal waters around UK	70
				Galway Bay (Ireland), oysters only	1
Special cases :					
X max >0.8				Some places around UK	70
$\bar{X}$ >0.8	23	0.36 to 2.6	1.17	Oyster from Thames estuary and east part of English Channel	70
	36	0.2 to 30	3.5	Mussel from Poole Harbour, Bristol Channel and Severn estuary	20(a) -70
	18	0.3 to 5.6	1.4	Scallops from N.W. of Scotland and Isle of Man	70
	24	0.8 to 4	~2	Winckel from Poole Harbour, Carmarthan Bay, Cardigan Bay, Bristol Channel	19(a)- 20(a)-70
	29	1.3 to 27	3.5 to 17	Winckel from Severn estuary	19(a)-20(a)-70

Element : Cadmium

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MOLLUSCS (continuation)					
Special cases					
$\bar{X}$ >0.8	17	0.3 to 3.5	1	Limpet from shoreline of Irish Sea	27(a)
	27	0.9 to 34	3 to 15	Limpet, dog whelk from Bristol Channel	19(a)-20(a)-21
	53	5 to 120	20 to 80	Limpet, dog whelk from Severn estuary	19(a)-20(a)-21-70
CRUSTACEANS					
Shrimp(d), lobster, crowfish, Norway lobster	109	0 to 0.75	0.1 to 0.3	Coastal waters of UK(shrimps), or landed in UK (others)	70
Special cases					
$\bar{X}$ >0.75	32	0.1 to 5.7	2.1 to 4.8	Shrimps(d) from Thames estuary	70
				Shrimps (d) from Bristol Channel and Severn estuary	21-70
Crab (Cancer pagurus)					
-white meat	162	0 to 0.9	0.19	Waters around UK	70-71
-brown or body meat	161	0 to 49	6.4	Waters around UK	70
-mixed meat	38	0.17 to 10	5.6	Waters around UK	71
Crab (Carcinus maenas)	5	15 to 33	22	Bristol Channel and Severn estuary	21

Element : Cadmium
Medium : Sea organisms
Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH, various species	1969	0 to 0.75	0.08 to 0.09	Distant, middle distance and coastal waters of UK	70
	65	0.05 to 0.6	0.2	Bristol Channel and Severn estuary	21-70
	2		1.17	Flounder from bristol Channel and Severn estuary	21

(a) Converted from dry to wet matter (X 0.1)
(b) Severn estuary and Bristol Channel are polluted by domestic and industrial effluents (Bristol, Cardiff)
(c) For ref.70 : on edible portion on the sample as received
(d) Whole, unpeeled shrimps .Cd in tail (edible portion) : <20% of total Cd.

Element : Cadmium

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	30	0.6 to 5	1.1 to 2.2	F.R.G. : Lindau, Düsseldorf	45-46
	2	<0.1		The Netherlands : Rotterdam-Honingerdijk, Andijk	4
	3	<1		Luxemburg	9
Origin : groundwater	132	0 to 5	~2	F.R.G. : Mainz, Wiesbaden	51
Origin : Dunes and dunes recharged with surface water (Rhine)	3	<0.1		The Netherlands	4
Special cases :					
X max >5		up to 13		Düsseldorf (surface water)	46
		up to 9		Mainz (groundwater)	51

Element : Cadmium

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
BEVERAGES					
Soft drinks , beers, wines, spirits, ices (lollies)	111	<0.05		Ireland, UK	1-70
FISH AND FISH PRODUCTS					
Fresh or frozen:					
crab- white meat	7	0.02 to 0.6	0.2	Ireland	1-2
- brown meat	6	0.09 to 16	3.6	Ireland	2
Canned or bottled					
Crustaceans and crustacean products	60	0 to 6.4	0.4 to 0.9	Ireland, UK	1-2-70
Fish and fish products	28	0 to 0.3	<0.18	Ireland, UK	1-70
Frozen - Fish	3	0.01 to 0.02		UK	70
Composite fish component of UK diet	40	<0.01 to 0.06	<0.02	UK	70
MILK AND MILK PRODUCTS					
Milk, evaporated and condensed milk, milk powder, cream, butter cheese, ice-cream	~50	0 to 0.23	<0.08	F.R.G., UK	50-70
Composite milk component of UK diet	30	<0.001 to 0.011	<0.002	UK	70
EGGS	10	0 to 0.03	<0.01	UK	70

Element : Cadmium

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT AND MEAT PRODUCTS					
Meat (beef, pork, mutton, chicken)	147	0 to 0.1	0.025 to 0.05	F.R.G., UK	55-60-70
Organs					
Kidney (beef, pork, mutton)	81	0 to 2.3	0.3 to 0.9	The Netherlands, UK	40-70
Liver (beef, pork, mutton, duck, rabbit)	14	0 to 0.11	0.04	UK	70
Liver (chicken)	33	0.06 to 1.57	0.35	The Netherlands	40
Organ not specified	33	0.02 to 0.73	0.13	F.R.G.	55
Meat meals and meat products	38	0 to 0.05	<0.05	Ireland, UK	1-70
Composite meat and fish component of UK diet	42	<0.01 to 0.09	<0.02	UK	70
CEREAL AND CEREAL PRODUCTS					
Maize, flour, bread, corn, wheatgerm	~60	0 to 0.4	0.04	F.R.G., UK	50-70
Composite cereal component of UK diet	42	<0.01 to 0.1	<0.03	UK	70

Element : Cadmium

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
VEGETABLES					
Fresh : beans, Brussels sprouts, cabbages, carrots, celery, chicory Witloof, leeks, mushrooms, onions, peas, potatoes, rhubarb, scorzonera, swedes, tomatoes, watercress	~180	0 to 0.4	<0.1	Ireland, Belgium, F.R.G., UK	1-32-50-70
Frozen : beans, broccoli, Brussels sprouts, peas, spinach	24	0 to 0.13	<0.08	UK	70
Canned : asparagus, beans, carrots, mushrooms, peas, rhubarb, spinach, tomatoes	54	0 to 0.19	0.04	Ireland, UK	1-70
Miscellaneous : veg. juices, veg. oil, soja products, flaxgrain products		0 to 0.5		F.R.G.	50
Composite vegetables component of UK diet :					
- root vegetables	42	<0.01 to 0.07	<0.02	UK	70
- green vegetables	42	<0.01 to 0.03	<0.01	UK	70
Special case : vegetables grown near a metal refining plant :					
- leafy vegetables		up to 5.7		UK	70
- root vegetables		up to 1		UK	70

Element : Cadmium

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FRUIT					
Fresh : apples, pears, bilberry, plums	~50	0 to 0.35	0.02 to 0.15	Belgium, F.R.G., UK	32-50-55-70
Canned : apples, apricots, damsons, grapefruit, mandarin, peaches, pears, pineapples, plums, prunes	47	0 to 0.04	0.01	F.R.G., UK	55-70
Juices	27	0 to 0.4	<0.05	Ireland, F.R.G., UK	1-50-70
Composite fruit and preserves component of UK diet	42	<0.01 to 0.02	<0.01	UK	70
PREPARED FOODS					
Baby foods, dessert, jam, jellies, meat pies, sauces, soups, spreads	164	0 to 0.33	<0.08	Ireland, F.R.G., UK	1-50-70
SPICES					
Herbs, salt, mustard, vinegar	13	0 to 0.08	<0.08	Ireland, F.R.G.	1-50
Herbs	15	0.02 to 3.1	0.8	UK	70
MISCELLANEOUS					
See Vol.1, p.Cd.8.19					
Composite fats component of UK diet	42	<0.01 to 0.25	<0.03	UK	70
Total UK diet, 5 quarters, 13 towns			0.01 to 0.02	UK	70

Element : Cadmium
Medium : Air
Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air- 10 sampling places		0.001 to 0.32	(a)	UK, F.R.G.	43-45-63
µg/g air particulates- 6 sampling places	44	0.5 to 2000	140	F.R.G. (München)	56
µg/l rain (+ fallout) - 1 sampling place (pure area)			<18	UK	43

(a) Depending on sampling place

Element : Cadmium

Medium : Soil

Unit : mg/kg

Cd.10

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 4 places		0.07 to 5		F.R.G.	50
Garbage compost (5 different)		0.8 to 18.5		F.R.G.	50

Cr.1	- River water
Cr.2	- Sea water
Cr.3	- River sediments
Cr.4	- Sea sediments
Cr.5	- Fresh water organisms
Cr.7	- Drinking water
Cr.8	- Food
Cr.9	- Air
Cr.10	- Soil
Cr.11	- Miscellaneous

CHROME

Element : Chromium

Medium : River water

Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	313	1 to 20	5 to 10	Danube	45
				Havel-Spree in Berlin	50
				Weser in Bremen	46-52
				Bodensee	45-51
				Zürichsee	51
				Main to Garstadt	51
				Dam of Esch/Sûre	9
				Maas, Scheldt, Yser	15
	426	2 to 60	20 to 30	Rhineand affluents from Mannheim to Dutch frontier	46-47-48-50-51-54
				Vesdre (affluent of Maas)	15
Special cases					
X max >60				Some places in Rhine, Wupper (mouth) Lippe (mouth)	48-51-54
$\overline{X}$ >60	~25		90 to 150	Rhine at Dutch frontier	48-54
	2		660	Scheldt after affluent Espierre (locally) (b)	15

(a) Generally unfiltered
(b) River Espierre is polluted by industrial effluents .

Element : Chromium
Medium : Sea water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	48	< 5		Belgian shoreline	15

(a) Unfiltered.

Element : Chrome

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction <2 µm		50 to 1200	150 to 350	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On 80 - mesh fraction	315	20 to 200	70 to 80	River Conway (Wales) and affluents	26
On dry matter	8	15 to 30	22	Dam of Esch/Sûre	9
	58	25 to 400	50 to 300	Maas and affluents excluding Vesdre, Scheldt and affluents excluding Espierre, Yser and affluents, on Belgian territory	15
Special cases (dry matter)					
X max >400				Maas after affluent Vesdre	15
$\bar{X}$ > 400	10	150 to 1500	500	River Vesdre (affluent of Maas)(a)	15
	2	>2000		Affluent Espierre (a) + 1 place in Scheldt after Espierre	15

(a) Industrial pollution

Element : Chrome

Medium : Sea sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	16 to 60	36	Conway Bay(Wales), offshore	26
On dry matter	78	0 to 120	20 to 40	Flensburg fjord(Denmark)	62
				Belgian shoreline	15

Element : Chrome

Medium : Fresh water organisms

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS AND FISH	20	up to 7		Dam of Esch/Sûre	9
				Ruhr	47

Element : Chrome

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	33	0.1 to 10	2 to 3	F.R.G. : Lindau, Düsseldorf	45-46
				Luxemburg	9
Origin : groundwater	60	<1		F.R.G. : Wiesbaden	51
	68	1 to 48	5	F.R.G. : Mainz	51

Element : Chrome Cr.8.

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT	83	0.006 to 0.3	0.01 to 0.06	F.R.G.	60
CEREAL					
Maize		0.34 to 2.6		F.R.G.	50
VEGETABLES		0.8 to 1.55		F.R.G.	50

Element : Chrome
Medium : Air
Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air - 8 sampling places		0.001 to 0.015		UK- F.R.G.	43-45
µg/g air particulates - 6 sampling places	52	5.8 to 206	79	F.R.G (München)	56
µg/l rain (+ fallout) 1 sampling place(pure area)			2.9	UK	43

Element : Chrome
Medium : Soil
Unit : mg/kg

Cr.10

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 4 places		0.06 to 4.5		F.R.G.	50
Soil, 5 types	24	35 to 100	70	Belgium	32
Garbage compost (5 different)		3 to 1000		F.R.G.	50

Element : Chrome
Medium : Miscellaneous
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
6 different plants from 2 different soils	10	<1 to 18	6	Belgium	32

Co.1	- River water
Co.2	- Sea water
Co.3	- River sediments
Co.4	- Sea sediments
Co.5	- Fresh water organisms
Co.7	- Drinking water
Co.8	- Food
Co.9	- Air
Co.10	- Soil

COBALT

Element : Cobalt

Medium : River water

Unit : µg/l

ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
n		centered on		
58	<0.05		River Conway(Wales)and affluents	26
486	0 to 20	5 to 10	Danube	45
			Havel-Spree in Berlin	46
			Weser in Bremen	46
			Continental tributaries of the North Sea , (Rhine,Maas,Yser) and affluents	9-15-45-46-48-51

Element : Cobalt

Medium : Sea water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
		< 0.05		Conway Bay (Wales)	26
	48	< 5		Belgian shoreline	15

Element : Cobalt

Co.3

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction < 2 µm		20 to 70	30 to 55	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On 80 -mesh fraction	315	10 to 1300	20 to 80	River Conway (Wales) and affluents	26
On dry matter	92	3 to 50	7 to 23	Elbe	53
				Dam of Esch/Sûre	9
				Maas, Scheldt, Yser and affluents on Belgian territory	15

Element : Cobalt

Co.4

Medium : Sea sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	5 to 13	9	Conway Bay (Wales), offshore	26
On dry matter	43	0.3 to 7.6	2.6	Belgian shoreline	15

Element : Cobalt
Medium : Fresh water organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS AND FISH	4	up to 6		Dam of Esch/Sûre	9

Element : Cobalt

Co.7

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	33	1 to 8	4 to 6	F.R.G. : Lindau, Düsseldorf,	45-46
				Luxemburg	9
Origin : groundwater	58	0 to 7	~1	F.R.G. : Wiesbaden	51
	71	4 to 40	11	F.R.G. : Mainz	51

Element : Cobalt

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MILK PRODUCTS					
Butter	12	<0.002		The Netherlands	34
MEAT	98	0.002 to 0.017	0.007	F.R.G.	60

Element : Cobalt

Medium . Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air - 8 sampling places		0.0001 to 0.002		UK, F.R.G.	43-45
µg/g air particulates - 6 sampling places	52	2.3 to 55	20	F.R.G.	56
µg/l rain (+ fallout) 1 sampling place(pure area)			0.25	UK	43

Element : Cobalt

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 4 types	19	<0.5 to 17	8	Belgium	32

Cu.1	- River water
Cu.2	- Sea water
Cu.3	- River sediments
Cu.4	- Sea sediments
Cu.5	- Fresh water organisms
Cu.6	- Sea organisms
Cu.7	- Drinking water
Cu.8	- Food
Cu.9	- Air
Cu.10	- Soil
Cu.11	- Miscellaneous

COPPER

Element : Copper

Medium : River water

Unit : µg/l (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	99	1 to 6	2 to 3	River Conway (Wales) and affluents	25-26
				River Altmühl (affluent of Danube)	50
				Dam of Esch/Sûre	9
				Zürichsee	51
	905	1 to 50	10 to 30	Danube	45
				Havel-Spree in Berlin	46
				Continental tributaries of North Sea (Weser, Rhine to Braubach, Maas, Scheldt, Yser) and affluents, excluding special cases	15-30.2-41-45-46-47-48-50-51-52-54
Special cases					
X max > 50		up to 130		Some isolated cases in Continental tributaries of North Sea and affluents	13.6-15-46-47-48-51-54
	122	up to 300	42	Rhine from Bimmen to Nijmegen	41-46-48-54
$\overline{X}$ > 50	4		160	River Wupper (mouth in Rhine)	54

(a) Generally unfiltered.

Element : Copper

Medium : Sea water

Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	13	0 to 0.8	0.3	West of Scotland, Atl. Ocean and coastal area	27
	252	0 to 4	1 to 2	Irish Sea	24-26-27
				English Channel, UK coastal area	27
				North Sea, UK coastal area	42
Special cases					
X max > 4				Coastal areas of Wales (b)	24-26
				Bristol Channel (c)	24
$\overline{X}$ > 4	140	up to 34	9 to 15	North Sea, south east part	13.1 to 13.5
				Belgian shoreline	15

(a) Filtered. Acoording to reference 27, percentage of total copper in filtered water : 17 to 29
(b) Dominant source of pollution : runoff from mineralized areas of Wales (former mining activity)
(c) Dominant source of pollution : domestic and industrial effluents (Bristol, Cardiff)

Element : Copper
Medium : River sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction < 2 µm		20 to 500	100 to 200	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On fraction <16 µm		30 to 150		Ems estuary	30.1
		150 to 570		Rhine estuary	30.1
			325	Maas in the Netherlands	30.1
			155	Scheldt estuary	30.1
On 80-mesh fraction	148		40	River Conway (Wales)	26
	14		60	Affluents of R. Conway from mineralized area	26
	153		20	Affluents of R. Conway from unmineralized area	26
On dry matter		3 to 1500		Dispersed results - See vol. 1, page Cu.3 for details	

Element : Copper

Medium : Sea sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On fraction <16 µm			40 to 55	Waddenzee (the Netherlands)	30.1
On 80-mesh fraction	3	5 to 16	9	Conway Bay (Wales), offshore	26
On dry matter	58	1 to 58	16 to 25	Belgian shoreline	15
				Flensburg fjord (Denmark), sea side	62
	20	30 to 220	95	Flensburg fjord, continental side	62

Element : Copper
Medium : Fresh water organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS AND FISH	4	up to 4		Dam of Esch/Sûre	9
FISH	16	9 to 30	17	Ruhr	47

Element : Copper

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fuscus vesiculosus, laverweed	62	0.3 to 3	0.6 to 1	Coastal waters around UK	27(a)
MOLLUSCS					
Oyster	12	3 to 21	6.8	Galway Bay(Ireland)	1
Limpet	17	0.5 to 2.2	1 to 1.4	Shorelines of Irish Sea	27(a)
	10	5 to 12	~8	Severn estuary	21
CRUSTACEANS					
Brown shrimp	89	6.6 to 22	~13	Belgian coast	32
FISH					
Plaice, sole, cod	241	0.25 to 1.7	0.6 to 0.7	Irish Sea, Bristol Channel, Dutch and Belgian waters of North Sea	30.3- 32
Whiting , sprat	167	0.3 to 3.4	1 to 1.3	Belgian coastal waters	32

(a) Converted from dry to wet matter (X 0.1)

Element : Copper
Medium : Drinking water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	3	<2		Luxemburg	9
	7	2.5 to 18	10	F.R.G. : Lindau	45
	23	4 to 136	24	F.R.G. : Düsseldorf	46
Origin : groundwater	56	0 to 26	~1	F.R.G. : Wiesbaden	51
	78	0 to 100	12 to 16	F.R.G. : Berlin (groundwater), Mainz	46-51
	91	50 to 600	92	F.R.G : Berlin (mainwater)	46

Element : Copper Cu.8

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
BEVERAGES (soft drinks, beer)	62	0.1 to 3	0.4 to 0.5	Ireland	1
MILK AND MILK PRODUCTS					
Milk, butter	~2000	0.01 to 0.05	0.025	The Netherlands	37-39
Milk powder	309	0.1 to 1	0.4 to 0.6	The Netherlands	38-39
MEAT	102	0.2 to 8	1 to 3	F.R.G.	60
CEREALS	~20	0.8 to 12	1 to 3	F.R.G.	50-55
VEGETABLES	~28	0.1 to 17	0.1 to 1	F.R.G., Belgium	32-50-55
FRUIT					
Preserves, canned fruit	29	0.4 to 7	0.5 to 2.5	F.R.G.	50-55
Grapes, fresh	22	1.3 to 6.6	4	F.R.G.	55-65
PREPARED FOODS	9	0.2 to 5	2 to 3	Ireland	1
SPICES	119	0.5 to 27	4 to 9	Ireland	1
Tea	36	1 to 40	17	Ireland	1

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air- 10 sampling places		<0.001 to 0.70	(a)	UK, F.R.G.	43- 45 -63
µg/g air particulates - 6 sampling places	43	41 to 34000	1480	F.R.G. (München)	56
µg/l rain (+ fallout) 1 sampling place (pure area)			23	UK	43

(a) Depending on sampling place.

Element : Copper

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 4 places		3 to 56		F.R.G.	50
Soil, 5 types	24	2 to 22	11	Belgium	32
Special cases					
- Soil, 1.5km from a metallurgical plant		350 to 1000		Belgium	32
- Soil from a hop culture, fungicides treated		up to 522 (a)		F.R.G.	73
Garbage compost (5 different)		29 to 1175		F.R.G.	50

(a) Depending on duration of treatment (up to 43 years)

Element : Copper
Medium : Miscellaneous
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
8 different plants from 3 different soils	26	3 to 15	8	Belgium	32
3 different plants, vicinity of a metallurgical plant	5	52 to 630	187	Belgium	32

F.1 - River water

F.10- Soil

FLUORINE

Element : Fluorine
Medium : River water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	100	100 to 250	150	Weser in Bremen	46

Element : Fluorine

Medium : Soil

Unit : mg/kg

F.10

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil (sandy)	4314	2 to 5040		F.R.G.	64

Fe.1	- River water
Fe.2	- Sea water
Fe.3	- River sediments
Fe.6	- Sea organisms
Fe.7	- Drinking water
Fe.8	- Food
Fe.9	- Air
Fe.10	- Soil
Fe.11	- Miscellaneous

IRON

Element : Iron

Medium : River water

Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	3		8	Zürichsee	51
	117	10 to 500	40 to 170	Havel-Spree in Berlin	46
				Main	51
				Maas above Liège, Scheldt , Yser	15
	404	10 to 3000	200 to 1800	Weser un Bremen	46-52
				Rhine and affluents	46-51-54
				Maas below Liège	15
				Sambre (affluent of Maas)	14
Special cases					
X max > 3000				Rhine at Dutch frontier	54
$\bar{X}$ > 3000	3	up to 20000	8200	Rheinberger -Altrhein	54

(a) Generally unfiltered.

Element : Iron
Medium : Sea water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	82	0 to 2.5	0.2 to 0.4	Irish Sea, offshore	27
				English Channel, UK coastal area	27
				North Sea, UK coastal area	27
Special cases					
$\bar{X}$ > 2.5	20	up to 25	6 to 12	East and west shorelines of Irish Sea	27
	72	up to 600	180 to 210(b)	North Sea, south east part	13.7
				Belgian shoreline	15

(a) Filtered - According to ref. 27, percentage of iron in filtered water : 1 to 7
(b) Unfiltered .

Element : Iron

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On dry matter	12	4000 to 61000		Elbe, Hamburg harbour	53

Element : Iron
Medium : Sea organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fucus vesiculosus	40	60 to 1500	125 to 250	Coastal waters around UK	27
Laverweed	22	100 to 3800	300 to 400	Shorelines of Irish Sea	27
MOLLUSCS					
Limpet	17	1400 to 7800	2000 to 2500	Shorelines of Irish Sea	27

Element : Iron

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	23	8 to 640	116	F.R.G. : Düsseldorf	46
Origin : groundwater	41	0 to 40	7 to 10	F.R.G. : Wiesbaden	51
	167	1 to 1500	50 to 100	F.R.G. : Berlin, Mainz	46-51
	~400	1000 to 8000	2500 to 6500	F.R.G. : Bremen	46

Element : Iron
Medium : Food
Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MILK PRODUCTS					
Butter	12	<1		The Netherlands	34
MEAT	103	3 to 70	10 to 40	F.R.G.	60

Element : Iron

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air- 9 sampling places		0.1 to 11		UK, F.R.G.	43-63
µg/l rain (+ fallout) 1 sampling place (pure area)			200	UK	43

Element : Iron

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 3 types	17	490 to 31200	12000	Belgium	32

Element : Iron

Medium : Miscellaneous

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
10 different plants from 4 different soils	30	190 to 2582	475	Belgium	32

Pb.1 - River water
Pb.2 - Sea water
Pb.3 - River sediments
Pb.4 - Sea sediments
Pb.5 - Fresh water organisms
Pb.6 (1-3) - Sea organisms
Pb.7 - Drinking water
Pb.8 (1-4) - Food
Pb.9 - Air
Pb.10 - Soil
Pb.11 - Miscellaneous

LEAD

Element : Lead

Medium : River water

Unit : µg/l (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	427	1 to 25	6 to 8	Havel-Spree in Berlin	46
				Zürichsee	51
				Dam of Esch/Sûre	9
				Ruhr, upper part	47
				Maas above Liège (Belgium) and affluents	15
				Maas in Grave (The Netherlands)	5
				Scheldt (tidal zone)	13.4,5,6
				River Conway (Wales) and affluents	25-26
	564	1 to 50	20 to 30	Danube	45
				Weser in Bremen	46-52
				Rhine and affluents	41-45-46-48-51-5.
				Maas below Liège	15-41
				Scheldt and affluents	15
Special cases					
X max > 50				Rhine from Bimmen to Nijmegen	41-46-48-54
				Ruhr (mouth in Rhine)	54
				Maas from Liège to Dutch frontier	15
$\overline{X}$ > 50	24	up to 128	65	Rhine in Bimmen	46
		up to 120	80	Rhine at Dutch frontier	54
	3	up to 100	62	Rheinberger-Altrhein	54

(a) Generally unfiltered.

Element : Lead
Medium : Sea water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	8	< 0.05		West of Scotland ,coastal area	27
	39	0 to 1.2	0.1 to 0.2	Irish Sea, offshore	27
				English Channel, UK coastal area	27
				North Sea, UK coastal area	27
	~ 65	0 to 3	1 to 2	West and east shorelines of Irish Sea	27
				Coastal areas of Wales	24-26-27
				Bristol Channel and Severn estuary	19-24
Special cases					
X max > 3				Liverpool Bay	24
				Cardigan Bay(Wales) (b)	24
				Bristol Channel (c)	24
$\overline{X}$ > 3			3.6	Conway Bay(Wales) (b)	26
	94	up to 70	4.9	North Sea,south-east part	13.1 to 13.5
	48	up to 58	23 (d)	Belgian shoreline	15

(a) Filtered- Acoording to ref.27 ,percentage of total lead in filtered water : 18 to 50
(b) Dominant source of pollution : runoff from mineralized areas of Wales (former mining activity)
(c) Dominant source of pollution : domestic and industrial effluents (Bristol,Cardiff)
(d) Unfiltered.

Element : Lead

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction <2 µm		50 to 700	150 to 400	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On 80-mesh fraction	148	60 to 600	160 to 200	River Conway (Wales)	26
	14	up to >10000	2400	Affluents of R. Conway from mineralized area	26
	153	20 to 400	160	Affluents of R. Conway from unmineralized area	26
On dry matter	8	25 to 40	32	Dam of Esch/Sûre	9
	72	25 to 500	100 to 200	Maas, Scheldt, Yser and affluents on Belgian territory	15
	19	up to 2700	840	Ruhr	47

Element : Lead
Medium : Sea sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	30 to 85	55	Conway Bay(Wales),offshore	26
On dry matter	85	2 to 200	40 to 160	Flensburg fjord (Denmark)	62
				Belgian shoreline	15
				Severn estuary	19

Element : Lead

Medium : Fresh water organisms

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS AND FISH	58	0.5 to 10	~ 5	Dam of Esch/Sûre	9
				England and Wales, Scotland	29 (a)

(a) Converted from wet to dry matter (X 10)

Element : Lead

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fucus vesiculosus, laverweed	84	0 to 2	0.3 to 0.4	Coastal waters around UK	19(a)-20(a)-27(a
MOLLUSCS					
Oyster,mussel	19	0 to 1	0.2 to 0.3	Oysters from Galway Bay(Ireland)	1
				Mussels from Bristol Channel	20(a)
Limpet,winckle, dog whelk	72	0 to 1	0.3 to 0.8	Bristol Channel	19(a)-20(a)
				Shorelines of Irish Sea(limpet only)	27(a)
Special cases :					
X max >1				Limpet ,winckel from Bristol Channel	20(a)
				Limpet from Shorelines of Irish Sea	27(a)
$\bar{X}$ >1	69	up to 18	2 to 10	Mussel, limpet, winckel,dog whelk from Severn estuary	20(a)- 29
				Mussel,limpet,winckle from Cardigan Bay (Irish Sea)	29
CRUSTACEANS					
Brown shrimp	28	0.4 to 17	4	Severn estuary	29(c)
				Belgian coast	32

Element : Lead

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SHELLFISH, various species	42	0 to 1.2	~0.4	Coastal waters of Scotland	29
	223	0 to 5.5	~1	Coastal waters of England and Wales + Firth of Clyde, Morey Firth, Firth of Forth	29
	41	0 to 5	~2	Thames estuary, Bristol Channel	29
	57	0.5 to 18	5.9	Cardigan Bay, Severn estuary	29
FISH					
Pleuronectidae (plaice, dab, flounder, brill) Gadidae (cod, pout, pollack, whiting) Red gurnard	172	0 to 1	<0.5	Bristol Channel and Severn estuary	29
				Morecambe Bay (Irish Sea) (Plaice only)	32
				Belgian coastal areas (cod and whiting only)	32

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH (continuation)					
Various species	1382	0 to 1	<0.5	Distant, middle distance and coastal waters of UK	29
Special cases :					
X max >1				Plaice from Morecambe Bay	32
				Flounder from Severn estuary	29
				Whiting from Belgian coastal area	32
				Some samples of various species in middle distance and coastal waters of UK	29
$\overline{X}$ >1	23	0.1 to 5.3	2	Sprat from Belgian coastal waters	32

(a) Converted from dry to wet matter (X 0.1)
(b) for ref.29 : on edible portion of the sample as received
(c) Whole, unpeeled shrimps. Pb in tail (edible portion) :<12% of total Pb.
(d) Severn estuary and Bristol Channel are polluted by domestic and industrial effluents (Bristol, Cardiff)

Element : Lead

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	5	0 to 8	1 to 4	The Netherlands : Rotterdam-Honingerdijk, Andijk	4
				Luxemburg	9
	30	5 to 110	12 to 15	F.R.G. : Lindau, Düsseldorf	45-46
Origin : groundwater	56	0 to 58	8 to 9	F.R.G. : Wiesbaden	51
	71	7 to 59	25	F.R.G. : Mainz	51
Origin : dunes and dunes recharged with surface water (Rhine)	4		1	The Netherlands	4

Element : Lead
Medium : Food
Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
BEVERAGES					
Soft drinks, beers	82	0.01 to 0.5	0.1	Ireland	1
Soft drinks, concentrates	20	0.15 to 0.7	0.36	Ireland	1
FISH AND FISH PRODUCTS					
Fresh	39	0 to 0.75	0.3	F.R.G.	55
Canned or bottled					
Crustaceans and crustaceans products	7	0.02 to 0.1	0.06	Ireland	1
Fish and fish products	15	0.05 to 2	<0.5	Ireland, UK	1-29
Composite fish component of UK diet	22	<0.01 to 0.4	0.08	UK	29
MILK AND MILK PRODUCTS					
Milk, evaporated and condensed milk, cream, butter, cheese	357	0 to 3.7	0.05 to 0.1	Ireland, UK, F.R.G.	1-29-50-55
Composite milk component of UK diet	33	<0.01 to 0.08	0.03	UK	29

Element : Lead

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT AND MEAT PRODUCTS					
Meat (beef, pork)	71	0 to 1.1	~0.4	UK, F.R.G.	29-55-60
Organs (kidney, liver-beef, pork, chicken)	135	0.06 to 1.9	0.3 to 0.6	The Netherlands, F.R.G.	40-55
Meat meals and meat products	10	<0.05		Ireland	1
	22	0.16 to 5.5	1	Ireland, UK	1-29
Composite meat and fish component of UK diet	37	<0.01 to 0.7	0.17	UK	29
EGGS	10	0 to 0.1	0.03	UK	29
CEREALS AND CEREAL PRODUCTS					
Grain, flour, bread, corn	60	0 to 1.8	<0.2	UK, F.R.G.	29-50-55-58
Cereals	18	0.7 to 5.8	2.4	F.R.G.	55
Composite cereals component of UK diet	37	<0.01 to 0.8	0.17	UK	29
Special cases :					
Wheat near a highway (10m)	3		0.56	F.R.G.	58
Wheat near a zinc metallurgical plant		up to 1.2		F.R.G.	58

Element : Lead
Medium : Food
Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
VEGETABLES					
Fresh : beans, Brussels sprouts, cabbage, carrots, celery, chicory Witloof, gherkin, leeks, onions, potatoes, peas, radish, scorzonera, swedes, tomatoes, watercress	193	0 to 2.7	0.05 to 0.2	Ireland, UK, Belgium, the Netherlands, F.R.G.	1-29-32-40-50-55
Beans, cabbage, lettuce, parsley	76	0.02 to 9.7	1 to 2.2	F.R.G.	55
Frozen : beans, broccoli, Brussels sprouts, peas, spinach	24	0.01 to 0.08	0.02 to 0.05	UK	29
Canned : asparagus, beans, cabbage, carrots, peas, spinach	82	0 to 1.9	0.2 to 0.3	UK, F.R.G.	29-55
Miscellaneous : veg. juice, veg. oil, soja products, flaxgrain products		0.04 to 1.7		F.R.G.	50
Composite vegetables component of UK diet :					
- root vegetables	37	<0.01 to 1.5	0.20	UK	29
- green vegetables	37	<0.01 to 1.0	0.24	UK	29

Element : Lead
Medium : Food
Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FRUIT					
Fresh : apples, grapes, pears, berries, pipfruit, stonefruit	~285	0 to 16	0.01 to 0.5	UK, Belgium, F.R.G.	29-32-50-55
Canned : pineapple, pipfruit, stonefruit, berries, mixed fruit	35	0.08 to 4	~0.6	F.R.G.	55
Juices	~20	0 to 1.9	~0.5	Ireland, UK, F.R.G.	1-29-50
Composite fruit and preserves component of UK diet	37	<0.01 to 0.76	0.12	UK	29
PREPARED FOODS					
Baby foods, jam, sauces, soups	~200	0 to 3.6	0.2 to 0.3	Ireland, UK, F.R.G.	1-29-50
SPICES					
Herbs, mustard, spices	114	0 to 17	1 to 5	Ireland, UK	1-29
MISCELLANEOUS					
See Vol.1, p.Pb.8.15					
Composite fats component of UK diet	37	<0.01 to 0.4	0.08	UK	29
Total UK diet, 6 quarters, 13 towns			~0.13	UK	29

Element : Lead
Medium : Air
Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air -13 sampling places		0.05 to 25	(a)	UK, F.R.G.	43-45-46-63
µg/l rain(+ fallout) 1 sampling place(pure area)			39	UK	43

(a) Depending on sampling place.

Element : Lead

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 4 places		3 to 92		F.R.G.	50
Soil, 5 types	24	6 to 180	50	Belgium	32
Special cases					
- Soil, 1.5km from a metallurgical plant		200 to 600		Belgium	32
- Soil, at a round-about crossroad	32	8 to 656 (a)	30	F.R.G.	72
Garbage compost(5 different)		5 to 850		F.R.G.	50

(a) Depending on distance from road (0, 15-40m) and depth in soil (0-50 cm)

Element : Lead
Medium : Miscellaneous
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
4 different plants from 2 different soils	11	2.5 to 44	12	Belgium	32
3 different plants, vicinity of a metallurgical plants	4	23 to 27	25	Belgium	32

Mn.1	- River water
Mn.2	- Sea water
Mn.3	- River sediments
Mn.4	- Sea sediments
Mn.6	- Sea organisms
Mn.7	- Drinking water
Mn.8	- Food
Mn.9	- Air
Mn.10	- Soil
Mn.11	- Miscellaneous

Element : Manganese

Medium : River water

Unit : µg/l (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	3		2	Zürichsee	51
	101	0 to 50	7 to 13	Bodensee(with 3 or 4 exceptions)	45-51
	459	0 to 500	50 to 250	Danube	45
				Havel-Spree in Berlin	46
				Continental tributaries of North Sea and affluents (Weser, Rhine,Maas,Scheldt, Yser)	15-45-46-51-52-54
Special cases					
X max > 500		up to 650	488	Scheldt and affluents	15

(a) Generally unfiltered.

Element : Manganese

Medium : Sea water

Unit : µg/ℓ (a)

ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
n		centered on		
13	0 to 0.5	0.10 to0.15	West of Scotland,Atl.Ocean and coastal area	27
141	0 to 25	0.5 to 2	Irish Sea	27
			English Channel,UK coastal area	27
			North Sea, UK coastal area	27
48	14 to 270	77 (b)	Belgian shoreline	15

(a) Filtered- Acoording to ref.27, percentage of manganese in filtered water : 19 to 34
(b) Unfiltered.

Element : Manganese
Medium : River sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	315	300 to >10000	1500 to 3500	River Conway (Wales) and affluents	26
On dry matter	84	100 to 3000	350 to 1000	Elbe, Hamburg harbour	53
				Maas, Scheldt, Yser and affluents on Belgian territory	15

Element : Manganese

Medium : Sea sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	300 to 500	400	Conway Bay(Wales), offshore	26
On dry matter	43	37 to 1500	550	Belgian shoreline	15

Element : Manganese
Medium : Sea organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fucus vesiculosus	40	33 to 190	70 to 90	Coastal waters around UK	27
Laverweed	22	13 to 93	29	Shorelines of Irish Sea	27
MOLLUSCS					
Limpet	17	18 to 94	36	Shorelines of Irish Sea	27

Element : Manganese

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	7	2 to 16	4.5	F.R.G. : Lindau	45
	23	2 to 387	63	F.R.G. : Düsseldorf	46
Origin ; groundwater	58	0 to 19		F.R.G. : Wiesbaden	51
	70	2 to 540	20 to 30	F.R.G. : Mainz	51

Element : Manganese
Medium : Food
Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MILK PRODUCTS					
Butter	12	0.006 to 0.04	0.017	The Netherlands	34
CEREALS					
Maize		7 to 10		F.R.G.	50
VEGETABLES		4 to 6		F.R.G.	50

Element : Manganese

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air -10 sampling places		0.005 to 0.32		UK, F.R.G.	43-45-63
µg/l rain (+ fallout) 1 sampling place (pure area)			8.1	UK	43

Element : Manganese
Medium : Soil
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 4 types	19	30 to 450	205	Belgium	32

Element : Manganese

Medium : Miscellaneous

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
10 different plants from 4 different soils	31	14 to 912	177	Belgium	32

Hg.1		- River water
Hg.2		- Sea water
Hg.3		- River sediments
Hg.4		- Sea sediments
Hg.5	(1-2)	- Fresh water organisms
Hg.6	(1-5)	- Sea organisms
Hg.7		- Drinking water
Hg.8	(1-3)	- Food
Hg.9		- Air
Hg.11		- Miscellaneous

MERCURY

Element : Mercury

Medium : River water

Unit : µg/l (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	734	<0.03		19 big drinking water reservoirs of FRG	47
	153	0 to 0.5	~0.15	Danube and affluents	45-50
				Bodensee See remark (b)	45-51
	1364	0 to 3	0.4 to 0.7	Tributaries of North Sea (Weser, Rhine, Maas, Scheldt, Yser, Thames)	5-6.1-9 13.8-14-15-16-17-22-41-45-46-47-48-50-51-52-54
Special cases					
X max >3				Some places in river Rhine or affluents (locally)	6.1-41-48-51
				River Sambre (Begium) (locally)	14
				Canal below a factory (The Netherlands)	6.1
$\overline{X}$ >3	3		4.45	Grindstedt river (Denmark), below a factory (c)	22

(a) Generally unfiltered.

(b) These values seem to be the background concentration in continental Europ (Perhaps already altered by agricultural practices ?)

(c) Grindstedt river is polluted by a large industrial source of Hg.

Element : Mercury
Medium : Sea water
Unit : µg/ℓ

ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
n		centered on		
~ 60	0 to 0.15	0.02 to 0.03	Open Ocean, from west of Africa, around Africa, to Japan	67
			Eastern North Atlantic, mid latitudes	67
			Irish Sea, almost everywhere	66
			English Channel	16
~ 60	up to 0.76	~ 0.15	Waddenzee (The Netherlands)	6.1
			Belgian shoreline	15
			Some places in eastern Irish Sea (Morecambe Bay)	66

Element : Mercury
Medium : River sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction <2 µm		1 to 20	1 to 6	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On fraction <16 µm		1 to 23		Rhine on the Netherlands territory	6.2
On dry matter	383	0 to 1	<0·02	19 big drinking water reservoirs in F.R.G.	47
				Dam of Esch/Sûre	9
				Grindstedt river above Grindstedt town (Denmark)	22
	60	0 to 0.7	0.1 to 0.3	Maas above Liège and affluents excluding Sambre and Vesdre	15
				Scheldt, Yser and affluents on Belgian territory	15
Special cases (dry matter)					
$\bar{X}$ >0.7	8	0.8 to 1.7	1.2	Maas after affluent Vesdre (locally)	15
	1		2.6	Sambre (affluent of Maas), lower part (a)	15
	2		1.2	Vesdre (affluent of Maas), lower part (a)	15
	6		3.6	Grindstedt river after Grindstedt town (a)	22
Fraction not specified	23	0.4 to 34		Danube, Lech, Isar, Regen	45-50
	50	0.4 to 12		Rhine, Necker, Main	49
	4	0.1 to 1		Lake Windermere, UK	68

(a) Industrial pollution

Element : Mercury
Medium : Sea sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On dry matter	77	0 to 1.2	~0.3	Belgian shoreline	15
				Aarhus Bay (Denmark)	22
				Flensburg fjord (Denmark), eastern side (sea side)	62
	19	0.26 to 3.5	1.14	Flensburg fjord, western side (continental side)	62
On wet matter	5	0.2 to 5.7 (a)		Southampton water, estuary (UK) (b)	16

(a) Depending on depth
(b) Region of very low or negligible pollution by mercury.

Element : Mercury

Medium : Fresh water organisms

Unit : mg/kg WET matter (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS (b)	205	0.03 to 0.5	<0.2	Danube and affluents	50
				Dam of Esch/Sûre	9
				19 big drinking water reservoirs in F.R.G.	47
				Ruhr	47-61
FISH					
- Perch	26	0.07 to 0.5	0.2 to 0.3	UK, F.R.G.	28-59-69
- Pike-perch	10	0.08 to 0.5	0.3 to 0.4	F.R.G., The Netherlands	6.5-59
- Pike	148	0.06 to 0.7	0.4 to 0.5	The Netherlands, UK, F.R.G, Belgium, Denmark	6.5-18-23-28-59-(
- Eel	103	0.05 to 0.5	0.2 to 0.3	The Netherlands, UK, F.R.G., Belgium	6.5-18-28-59-69
- Ciprinidae	105	0.03 to 0.5	0.2 to 0.4	UK, F.R.G.	28-59-69
- Trout	366	0 to 0.3	0.05 to 0.2	UK, F.R.G., Belgium	18-28-59-69
- Organs of trout	42	0.02 to 0.15	0.1	The Netherlands	40
- Salmon parr	7	0.05 to 0.16	0.1	UK	28
- Various species	683	0.01 to 0.5	0.2 to 0.4	Luxembourg, F.R.G.	9- 47 -55

Element : Mercury
Medium : Fresh water organisms
Unit : mg/kg WET matter (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH					
Special cases					
X max >0.5				Pike-perch -the Netherlands	6.5
				Eel- Ijsselmeer(The Netherlands) (d)	6.5
				Perch,roach,chub,trout- UK	28
				Tench-F.R.G.	59
				Various species -F.R.G.	47-55
X max >0.7				Pike- UK	28-69
$\bar{X}$ > 0.7	6	0.57 to 1.9	0.85	Perch - the Netherlands	6.5
	15	1.7 to 10.8	5.0	Pike-Grindstedt river (Denmark)(c)	23
	38	up to 20		Trout,grayling-UK,below a Hg contamination	69
METHYL-MERCURY, expressed as Hg					
FISH, various species	60	0.02 to 1.8	0.6 to 0.7	Ijsselmeer, the Netherlands (d)	6.4

(a) On edible parts (generally specified)
(b) Converted from dry to wet matter (X 0.1)
(c) Grindstedt river is polluted by a large industrial source of Hg
(d) Ijsselmeer receives a part of the water of the Rhine

Element : Mercury

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
ZOOPLANCTON	0.5 liter		0.4	Waddenzee (The Netherlands)	6.7
SEAWEEDS (Fucus, Ulva, Enteromorpha)	237	0 to 0.2	0.05 to 0.08	Coastal areas of :	
ANNELIDAE (Arenicola)				- the Netherlands (Seaweeds, arenicola, cockle, clam)	6.7
MOLLUSCS (Cockle, Quahaug, Clams, Oysters, Scallop, Queen scallop, Whelk, Limpet)				- France (Quahaug, oysters, scallop)	11
				- Ireland (Oyster)	1
				- UK (Cockel, clam, oyster, scallop, Queen scallop, Whelk, limpet)	16-21-28-69
Mussel	1127	0 to 0.3	0.10 to 0.12	Coastal areas of the Netherlands (a), France, UK	6.7-11-18-28-30.
Special case :					
X max >0.5				Mussel from Ems estuary (Dollard)	30.4
CRUSTACEANS					
Shrimps (mainly brown shrimps)	164	0 to 0.2	0.10 to 0.12	Coastal areas of the Netherlands, Belgium, France, UK	6.7-18-28-31-32
Crab (Cancer pagurus), claw and body meat	191	0 to 0.5	0.1 to 0.2	Coastal areas of UK	69
Lobster , claw and tail meat	22	0.1 to 0.7	0.4	Landed in Scotland	69

(a) Concentration regulary diminishes from Rhine mouth to the north (Waddenzee) .Ref.30.4

Element : Mercury
Medium : Sea organisms
Unit : mg/kg WET matter (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH					
Serranidae, Sparidae, Mullidae	~130			Atlantic ocean, North Sea, Baltic Sea, English Channel, Coastal areas of Denmark, the Netherlands, Belgium, France .	3-6.5-6.7-11-18-31-32-36
Mackerel	28				
Pleuronectidae	559				
Scorpaenidae	47				
Lophidae	46				
Gadidae	625				
Percaesocae	10				
Congridae	25				
Clupeidae	167				
	1637	0 to 0.5	~0.15		
Salmon	244	0 to 0.15	0.05	Pacific ocean coast of Canada (French market), Belgian market, Atl. ocean and Baltic Sea	18-23-31
Elasmobranchs	217	0.2 to 1	0.3 to 0.5	Atlantic ocean-French coastal areas	11-18-23-31
Tuna: Skipjack, White tuna, Yellowfin	911	0 to 1	0.2 to 0.3	Atlantic, Pacific, Indian oceans	11-31
Bluefin	285	0.2 to 0.8	0.5	Biscaye Bay	31
	136	0.5 to 2.5	1.1	Mediterr. Sea	31-11
Bigeye	20	0.4 to 1		various origins	31
Variety not specified	5204	0 to 1.75	0.3 to 0.5	Italy	3
Swordfish	40	0.65 to 1.75	1.3	Italy	3

(a) On edible parts (generally specified)

Element : Mercury

Medium : Sea organisms

Unit : mg/kg WET matter(a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH					
Special cases :					
X max >0.5					
				- Flounder from the Sound (Denmark)	23
				- Whiting from Belgian coastal areas	32
				- Pleuronectidae ,Angler from Belgian market	18
				- Angler from French coastal areas	31
				- Plaice from Morecambe Bay (Irish Sea)	32
				- Serranidae,Sparidae,Mullidae, Poor Cod ,Dogfish from French coast of Mediterr.Sea	11-31
				- Tuna from everywhere	3-11-31
$\bar{X}$ >0.5					
		0.1 to 1.4	0.7	Ray from French coastal areas	31
	~135	0.1 to 3.2	0.8	Porbeagle from Atlantic Ocean, North sea and French coastal areas	23-31
	136	0.5 to 2.5	1.1	Tuna Bluefin from Mediterr.Sea	31
	40	0.65 to 1.75	1.3	Swordfish (Italy)	3
Remarks :					
1. Observation of a relation between weight and concentration of Hg.				- Plaice,Cod,Whiting	32
				- Linear:White tuna,Yellowfin, Porbeagle	31
				- C + cW :Pike,Plaice,Flounder, Cod,Herring, Porbeagle(b)	23
2. Liver of FISH,BIRDS,MAMMELS :	See Vol.1 p.Hg.6.		23		

(a-)On edible parts(generally specified) (b) C= concentration of Hg in a fish of standard weight
c= increase in Hg conc.per unit weight increase in fish weight
W= deviation of weight from the standard weight.

Element : Mercury

Medium : Sea organisms

Unit : mg/kg WET matter (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH AND SHELLFISH-UK survey					28-69
Fish from distant waters	159	0.01 to 0.3	0.06	Greenland, Iceland, Norway coast, Barents Sea	
Fish from middle distance waters	352	0.03 to 0.7	0.16	Mid and southern North Sea	
Fish from coastal waters of England and Wales	3346	up to 2.5	0.28		
Fish from coastal waters of Scotland	107	0.01 to 0.4	0.11		
Shellfish from coastal waters of England and Wales	260	up to 2.5	0.16		
Special cases					
X max >0.5				Fish from : - Mid North Sea (Mackerel, Plaice, Whiting, Dogfish) - Thames estuary (Mussels, Cod, Whiting, Plaice, Dab, Herring) - Southern coast of England - Bristol Channel - Irish Sea, specially : -Sole and Cod from Mersey estuary -Cod from Morecambe Bay Shellfish from coastal waters of England and Wales	
$\bar{X}$ >0.5	214	0.1 to 1.5	0.6 to 0.8	Plaice, Flounder, Dab, Whiting from Morecambe Bay and Mersey estuary	
	133	0.1 to 2.5	0.7 to 1.5	Bass, Flounder, Gray mullet, Eel, Skate, Lesser spotted dogfish from Thames estuary.	

(a) On edible portions of the samples as received

Element : Mercury

Medium : Sea organisms

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
LIVER of sea animals					
Fish : Cod, Haddock	7	0.02 to 0.15	0.05	The Netherlands	6.6.
Sea birds: Eider, Stern (a)	12	2.4 to 14	~8	The Netherlands	6.7
Sea mammels: Seals (a)	7	0.45 to 6.4	4	- jong The Netherlands	6.7
	3	18 to 36	27	- 2 jong, 1 adult	6.7
	4	225 to 765	400	- adult females	6.7

(a) Found dead or ill on Dutch shore.

Element : Mercury
Medium : Drinking water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	15	0 to 0.1	<0.1	F.R.G.: Lindau, Koblenz, 14 big drinking water reservoirs	45-47-48
				The Netherlands : Rotterdam - Honingerdijk, Andijk	4
				Luxemburg	9
Special case : X max >1	24	0 to 1.4	0.2	F.R.G. : Düsseldorf	46
Origin : groundwater	9	0.02 to 0.08	0.05	F.R.G. : München	45
				Denmark : Grindstedt town	22
Special case : X max >1	71	0 to 13.5	0.2 to 0.8	F.R.G. : Mainz	51
Origin : dunes and dunes recharged with surface water (Rhine)	4	<0.1		The Netherlands	4

Element : Mercury

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
BEVERAGES					
Soft drinks, beer, cider	5	0 to 0.02	<0.01	UK	28a
FISH AND FISH PRODUCTS					
Fresh : crustaceans and fish	45	0 to 0.3	0.04 to 0.07	UK	28-28a
Canned :					
Fish (mainly mackerel, herring, sardine, salmon), shellfish, crustaceans	736	0 to 0.5	0.03 to 0.07	Ireland, the Netherlands, France, Luxemburg, Belgium, UK, F.R.G.	1-6.6-11-12-18-28-28a-31-59-69
Tuna	1826	0 to 4	0.2 to 0.5	Ireland, the Netherlands, France, Luxemburg, Belgium, UK, F.R.G.	1-6.6-11-12-18-28-28a-31-55-59 69
Composite fish component of UK diet	71	0.02 to 0.38	0.08	UK	28-69
MILK AND MILK PRODUCTS					
Milk, milk powder, cream, butter, cheese	81	0 to 0.04	0.006	UK, F.R.G.	28-28a-55-59
Composite milk component of UK diet	55	<0.005	<0.005	UK	28-69
EGGS	440	0 to 0.1	0.01 to 0.02	UK, FRG, Denmark	22-28-28a-55

Element : Mercury

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT AND MEAT PRODUCTS					
Meat : beef, pork, mutton, chicken, partridge, pheasant	297	0 to 0.3	0.01 to 0.02	UK, F.R.G.	28-28a-55-59-60
Organs : kidney, liver-beef, pork, chicken	672	0 to 0.3	0.01 to 0.04	Denmark, UK, The Netherlands, F.R.G	22-28-28a-40-55-59-69
Meat products	23	0 to 0.07	<0.02	UK, The Netherlands, F.R.G.	28a-40-55-59
Composite meat and fish component of UK diet	55	<0.005 to 0.03		UK	28-69
CEREALS AND CEREAL PRODUCTS					
Cereals : wheat, rye, barley, oat, maize, rice	2114	0 to 0.02	0.003	UK, F.R.G.	28-55-58-59
Cereal products : flour, bread, other products	72	0 to 0.08	0.02	UK, F.R.G.	28-28a-55-59
Composite cereals component of UK diet	56	<0.005 to 0.03		UK	28-69

Element : Mercury

Medium : Food

Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
VEGETABLES					
Fresh : Brussels sprouts, cabbage, carrots, celery, chicory Witloof, leeks, muskrooms, onions, potatoes scorzonera, tomato, swedes turnips	~180	0 to 0.05	< 0.01	UK, Belgium, F.R.G.	28-28a-32-55-59
Canned : peas, tomatoes	30	0 to 0.06		UK	28a
Composite vegetables component of UK diet					
- root vegetables	56	<0.005 to 0.04		UK	28-69
- green vegetables	56	<0.005 to 0.03		UK	28-69
FRUIT					
Apples, grapes, pears, others	84	0 to 0.18	<0.01	UK, F.R.G.	28-28a-55-59
Composite fruit and preserves component of UK diet	56	<0.005 to 0.02		UK	28-69
PREPARED FOODS					
Baby foods, sauces, soups, jams	16	0 to 0.02	<0.01	UK, F.R.G.	28a-59
MISCELLANEOUS					
See Vol.1, p.Hg.8.18					
Composite fats component of UK diet	56	<0.005 to 0.01		UK	28-69
Total UK diet, 8 quarters, 8 towns			<0.01	UK	28-69
Animals feeds	92	0 to 4	0.1 to 0.2	UK	28

Element : Mercury
Medium : Air
Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air- 8 sampling places		<0.00005 to 0.0004		UK, F.R.G.	43-45
µg/g air particulates - 6 sampling places	51	0.02 to 16.6	1.61	F.R.G.(München)	56
µg/l rain(+fallout) - 1 sampling place(pure area)			<0.2	UK	43

Element : Mercury

Medium : Miscellaneous

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
See Vol.1 , p.Hg 11.1 and 2					

Mo;1 - River water
Mo.3 - River seaiments
Mo.4 - Sea sediments
Mo.7 - Drinking water
Mo.8 - Food

MOLYBDENUM

Element : Molybdenum

Medium : River water

Unit : µg/ℓ

ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
n		centered on		
146	0 to 0.7	<0.2	Danube	45
			Zürichsee	51
			Bodensee	45-51
			Main, upper part	51
135	0 to 15	1 to 2	Weser in Bremen	46
			Rhine	46-51
			Main, lower part	51

Element : Molybdenum

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	148	0 to 5	<2	River Conway (Wales)	26
	14	up to 30	10	Affluents of R.Conway from mineralized area	26
	153	up to 50	<2	Affluents of R.Conway from unmineralized area	26

Element : Molybdenum

Medium : Sea sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	<2		Conway Bay(Wales), offshore	26

Element : Molybdenum
Medium : Drinking water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	22	0 to 2	0.2	F.R.G. : Lindau, Düsseldorf	45-46
Origin : groundwater	66	0 to 1	0.2 to 0.5	F.R.G. : Mainz	51

Element : Molybdenum

Medium : Food

Unit : mg/kg WET matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT	100	0.002 to 0.09	0.01 to 0.04	F.R.G.	60

Ni.1	- River water
Ni.2	- Sea water
Ni.3	- River sediments
Ni.4	- Sea sediments
Ni.5	- Fresh water organisms
Ni.6	- Sea organisms
Ni.7	- Drinking water
Ni.9	- Air
Ni.10	- Soil

NICKEL

Element : Nickel

Medium : River water

Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	79	0 to 10	2 to 3	Rivers Conway and Dwyryd (Wales)	25-26
				Dam of Esch/Sûre	9
	305	0 to 75	5 to 20	Danube	45
				Havel-Spree in Berlin	46
				Weser in Bremen	46-52
				Bodensee	45-51
				Zürichsee	51
				Maas and affluents	5- 15
				Scheldt and affluents	15
				Yser and affluents	15
	554	0 to 100	20 to 50	Rhine and affluents	46-47-48-50-51-5
Special cases					
X max >100				Some places in rivers Rhine and Ruhr	47-51-54
$\overline{X}$ > 100	8		110 to 140	River Wupper (affluent of Rhine)	54
				Rheinberger - Altrhein	54

(a) Generally unfiltered.

Element : Nickel
Medium : Sea water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	212	0 to 5	0.5 to 1	West of Scotland, Atl. Ocean and coastal area	27
				Irish Sea	26-27
				English Channel	27
				North Sea, UK coastal area	42
				Belgian shoreline	15
Special cases					
X max >5				Irish Sea, eastern part	27
				Conway Bay (Wales) (b)	26

(a) Filtered - According to ref. 27, percentage of nickel in filtered water : 50
(b) Dominant source of pollution : runoff from mineralized areas of Wales (former mining activity)

Element : Nickel

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction < 2 µm		50 to 400	100 to 200	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On 80-mesh fraction	301	20 to 160	50	River Conway (Wales) and affluents from unmineralized areas	26
	14	40 to 300	80	Affluents of R. Conway from mineralized area	26
On dry matter	80	10 to 100	30 to 50	Dam of Esch/Sûre	9
				Maas, Scheldt, Yser, and affluents, on Belgian territory	15
Special cases (dry matter)					
X max >100				River Maas after on industrial zone (locally)	15
$\overline{X}$ >100	19	60 to 500	235	Ruhr	47

Element : Nickel
Medium : Sea sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	20 to 30	27	Conway Bay (Wales), offshore	26
On dry matter	43	0.4 to 27	12	Belgian shoreline	15

Element : Nickel

Medium : Fresh water organisms

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS AND FISH	4	up to 7		Dam of Esch/Sûre	9
FISH	16	up to 24	13	Rahr	47

Element : Nickel
Medium : Sea organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fucus vesiculosus	40	2 to 18	4 to 6.5	Coastal waters around UK	27
Laverweed	22	0.2 to 10	2.1	Shorelines of Irish Sea	27
MOLLUSCS					
Limpet	17	3 to 24	7	Shorelines of Irish Sea	27
Oyster	12	<1		Galway Bay (Ireland)	1 (a)

(a) Converted from wet to dry matter (x 10)

Element : Nickel
Medium : Drinking water
Unit : µg/l

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	33	0.5 to 18	4 to 8	F.R.G. : Lindau, Düsseldorf	45-46
				Luxemburg	9
Origin : groundwater	57	0 to 8	3	F.R.G. : Wiesbaden	51
	66	1 to 67	14	F.R.G. : Mainz	51

Element : Nickel

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air- 8 sampling places		0.001 to 0.060		UK, F.R.G.	43-45
µg/l rain (+ fallout) - 1 sampling place(pure area)			<6	UK	43

Element : Nickel

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil,5 types	24	1 to 66	31	Belgium	32

Se.1	- River water
Se.5	- Fresh water organisms
Se.7	- Drinking water
Se.8	- Food
Se.9	- Air

SELENIUM

Element : Selenium

Medium : River water

Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	101	0 to 5	<1	Bodensee	45-51
				Zürichsee	51
	350	0 to 10	1 to 5	Danube, Illerkanal, Lechkanal	45-65
				Weser in Bremen	46
				Rhine, Main, Mosel, Ruhr	45-46-47-48-51
Special cases					
X max >10				Some places in river Rhine	46-48-51

(a) Generally unfiltered.

Element : Selenium
Medium : Fresh water organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS	12	0.5 to 16	1 to 6	Danube, Lech, Lechkanal, Illerkanal, Wartach, Alz, Alzkanal	65

Element : Selenium

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	23	0.5 to 5	1 to 2	F.R.G. : Lindau, Düsseldorf	45-46
Origin : groundwater	72	0 to 3	<1	F.R.G. : Mainz	51

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT	99	0.01 to 3	0.2 to 0.3	F.R.G.	60

Element : Selenium

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/g air particulates - 6 sampling places	53	0.3 to 20	5	F.R.G. (München)	56

Ag.1 - River water
Ag.2 - Sea water
Ag.6 - Sea organisms

SILVER

Element : Silver

Medium : River water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	6	1 to 8	3	Weser in Bremen	52

Element : Silver
Medium : Sea water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	20	0 to 0.24	0.04to0.08	West and east shorelines of Irish Sea	27

(a) Filtered -Percentage of total silver in filtered water : 31 to 53

Element : Silver

Medium : Sea organisms

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fucus vesiculosus	40	0.1 to 0.8	0.2 to 0.35	Coastal waters around UK	27
Laverweed	14	0.01 to 0.3	0.11	Shorelines of Irish Sea	27
MOLLUSCS					
Limpet	17	0.6 to 3.6	1.7	Shorelines of Irish Sea	27

Sr.1 - River water

STRONTIUM

Element : Strontium

Medium : River water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	15	40 to 500	150 to 250	Rhine and affluents from km 643 to Dutch frontier, excluding following item.	54
	6	500 to 9000	3500	Rheinberger-Altrhein	54
				Lippe (affluent of Rhine)	54

Sn.3 - River sediments
Sn.4 - Sea sediments
Sn.5 - Fresh water organisms
Sn.6 - Food
Sn.9 - Air
Sn.10- Soil

Element : Tin

Medium : River sediments

Unit : mg/kg

Sn.3

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	315	0 to 300	15 to 50	River Conway (Wales) and affluents	26

Element : Tin
Medium : Sea sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	0 to 5		Conway Bay(Wales), offshore	26

Element : Tin
Medium : Fresh water organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS	8	up to 37	20 to 25	Danube, Lech, Illerkanal, Wartach, Alz;	
				Alzkanal above chemical plant	65
	2	2370 & 3070		Alzkanal below chemical plant	65

Element : Tin

Medium : Food

Unit : mg/kg or ppm material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MEAT	93	0.05 to 9	0.7 to 1.3	F.R.G.	60
FRUIT					
Juice		130 to 160		F.R.G.	50
PREPARED MEALS					
Canned tomato soup	6	16 to 100	44	The Netherlands	

Element : Tin

Medium : Air

Unit :

Sn.9

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/g air particulates - 6 sampling places	42	34 to 4120	325	F.R.G. (München)	56

Element : Tin

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 3 types	14	1.5 to 82	10	Belgium	32
Special case :					
- Soil, 1.5km from a metallurgical plant		30 to 90		Belgium	32

Ti.3 - River sediments
Ti.4 - Sea sediments
Ti.10- Soil
Ti.11- Miscellaneous

TITANUM

Element : Titanum

Medium : River sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	148	850 to 6000	3000 to 4000	River Conway|Wales	26
	14	1600 to 8500	5500	Affluents of R.Conway from mineralized area	26
	153	1300 to 10000	2800	Affluents of R.Conway from unmineralized area	26

Element : Titanum

Medium : Sea sediments

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	600 to 1600	1070	Conway Bay (Wales), offshore	26

Element : Titane

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 2 types	11	4900 to 10400	8400	Belgium	32

Element : Titane

Medium : Miscellaneous

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
4 different plants from 3 different soils	13	n.d. to 178	37.5	Belgium	32

V.1 - River water
V.3 - River sediments
V.4 - Sea sediments
V.7 - Drinking water
V.9 - Air
V.10- Soil

VANADIUM

Element : Vanadium
Medium : River water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	300	0 to 25	3 to 6	Weser in Bremen	46
				Rhine to Düsseldorf, Zürichsee, Main	46-51

Element : Vanadium
Medium : River sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	315	40 to 400	110 to 140	River Conway(Wales) and affluents	26

Element : Vanadium
Medium : Sea sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	40 to 60	50	Conway Bay (Wales), offshore	26

Element : Vanadium
Medium : Drinking water
Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	28	0 to 14	<1.7	F.R.G. : Lindau, Düsseldorf	45-46
Origin : groundwater	44	0 to 7	<1.4	F.R.G. : Mainz	51

Element : Vanadium V.9

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air- 8 sampling places		0.003 to 0.06		UK, F.R.G.	43-63
µg/l rain (+ fallout) 1 sampling place (pure area)			4.1	UK	43

Element : Vanadium
Medium : Soil
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 5 types	24	2.5 to 110	53	Belgium	32

Zn.1		- River water
Zn.2		- Sea water
Zn.3		- River sediments
Zn.4		- Sea sediments
Zn.5		- Fresh water organisms
Zn.6	(1-2)	- Sea organisms
Zn.7		- Drinking water
Zn.8		- Food
Zn.9		- Air
Zn.10		- Soil
Zn.11		- Miscellaneous

ZINC

Element : Zinc
Medium : River water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	167	2 to 250	20 to 30	Bodensee	45-51
				Zürichsee	51
				Main, upper part	51
				Dam of Esch/Sûre	9
				Tributaries of river Conway (Wales) from unmineralized areas	26
	672	20 to 500	100 to 300	Danube	45-50
				Havel-Spree in Berlin	46
				Continental tributaries of North Sea (Weser, Rhine, Maas, Scheldt, Yser) and affluents (excluding special cases)	46-47-48-50-51-52-54
				River Conway (Wales)	26
Special cases					
X max >500				Some places in river Rhine and affluents	46-48-51-54
				River Maas from Liège to Dutch frontier	15
$\overline{X}$ >500	32	up to 1500	700 to 1000	Rivers Sambre and Vesdre (affluents of river Maas) (b)	14-15
	12	up to 3260	850	Affluents of river Conway from mineralized area	26

(a) Generally filtered
(b) Industrial pollution.

Element : Zinc
Medium : Sea water
Unit : µg/ℓ (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
	13	1 to 7	2 to 3	West of Scotland, Atl.Ocean and coastal area	27
	340	1 to 20	6 to 10	Irish Sea	24-26-27
				English Channel,UK coastal area	27
				North Sea, UK coastal area	42
Special cases					
X max > 20		up to 50		Irish Sea, eastern shoreline	24-27
				Bristol Channel (b)	19-24
				North Sea, south-east area	13.1 to 13.5
				Belgian shoreline	15
$\overline{X}$ >20	4	up to 52	36	Severn estuary (b)	19

(a) Filtered . Acoording to ref.27 ,percentage of total zinc in filtered water :53 to 56
(b) Dominant source of pollution : domestic and industrial effluents (Bristol, Cardiff)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On clay fraction <2 µm		100 to 3000	700 to 1500	Danube, Elbe, Weser, Ems, Rhine, Neckar, Main, on F.R.G. territory	44
On 80-mesh fraction	148	200 to 2000	500 to 900	River Conway (Wales)	26
	14	1000 to >10000	3700	Affluents of R. Conway from mineralized area	26
	153	<50 to 850	460	Affluents of R. Conway from unmineralized area	26
On dry matter	21	35 to 180	90 to 120	Dam of Esch/Sûre	9
				Yser and affluents	15
	31	60 to 1700	500 to 800	Maas to above Liège and affluents excluding special cases, Scheldt and affluents	15
Special cases (dry matter)					
X max >1700		up to 2000		Maas to above Liège	15
$\bar{X}$ >1700	19	1200 to 5000	2840	Ruhr	47
	21	500 to 5000	2000 to 4300	Maas from Liège to Dutch frontier and affluents Sambre, Hoyoux, Vesdre	15

Element : Zinc
Medium : Sea sediments
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
On 80-mesh fraction	3	200 to 400	265	Conway Bay(Wales), offshore	26
On dry matter	58	12 to 270	130	Belgian shoreline	15
				Flensburg fjord(Denmark), sea side	62
	20	120 to 910	312	Flensburg fjord, continental side	62
	7	420 to 590	470	Severn estuary	19

Element : Zinc
Medium : Fresh water organisms
Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
WATERPLANTS AND FISH	20	35 to 360		Dam of Esch/Sûre	9
				Ruhr	47

Element : Zinc

Medium : Sea organisms

Unit : mg/kg WET matter (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
SEAWEEDS					
Fucus vesiculosus, laverweed	85	3 to 50	10 to 20	Coastal waters around UK	27
Special case : X max >50		up to 90		Fucus from Severn estuary and from east part of Irish Sea	27
MOLLUSCS					
Mussel, limpet, winckle , dog whelk	27	5 to 20	9 to 10	West shoreline of Irish Sea (limpet)	27
				Bristol Channel (mussel, winckle)	19-20
	52	10 to 50	15 to 40	East shoreline of Irish Sea (limpet)	27
				Bristol Channel (limpet, dog whelk)	19-20-21
				Severn estuary (mussel, winckle)	19-20
Special cases					
X max >50				Limpet, dog whelk from Bristol Channel	20-21
$\overline{X}$ > 50	19	20 to 130	~50	Limpet from Severn estuary	19-20-21
	5	120 to 420	230	Dog whelk from Severn estuary	20
	12	125 to 250	175	Oysters from Galway Bay (Ireland)	1
CRUSTACEANS					
Brown shrimp	24	17 to 44	26	Belgian coast	32
	4	35 to 80	57	Severn estuary and Bristol Channel	21

Element : Zinc

Medium : Sea organisms

Unit : mg/kg WET matter (a)

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
FISH					
Plaice, cod, whiting	54	2.5 to 8	5	Belgian coastal area (cod, whiting)	32
				Morecambe Bay(E.Irish Sea), Bristol Channel,S.E.Ireland (plaice)	32
Special cases					
$\bar{X}$ >8	23	17 to 29	24	Sprat from Belgian coastal area	32
	17	4 to 52	14	Various species from Bristol Channel and Severn estuary	21

(a) For ref.19,20,27, values converted from dry to wet matter(X 0.1)
(b) Severn estuary and Bristol Channel are polluted by domestic and industrial effluents(Bristol ,Cardiff)

Element : Zinc

Medium : Drinking water

Unit : µg/ℓ

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Origin : surface water	3	4 to 11	7	Luxemburg	9
	24	up to 300	37	F.R.G. : Düsseldorf	46
				The Netherlands : Rotterdam-Honingerdijk, Andijk	4
	7	60 to 600	160	F.R.G. : Lindau	45
Origin : groundwater	135	1 to 90	10 to 20	F.R.G. : Berlin (groundwater), Mainz, Wiesbaden	46-51
	91	100 to 1670	680	F.R.G. : Berlin (mainwater)	46
Origin : dunes or dunes recharged with surface water (Rhine)	4		22.5	The Netherlands	4

Element : Zinc
Medium : Food
Unit : mg/kg material as presented

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
MILK PRODUCTS					
Butter	12	0.2 to 1.1	0.6	The Netherlands	34
MEAT	91	10 to 113	20 to 80	F.R.G.	60
CEREALS					
Maize		25 to 68		F.R.G.	50
VEGETABLES	~24	1 to 20	2 to 6	F.R.G., Belgium	32-50
FRUIT	~10	1 to 5	<2	Belgium	32

Element : Zinc

Medium : Air

Unit :

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
µg/m3 air- 8 sampling places		0.07 to 6.5	(a)	UK, F.R.G.	43-63
µg/g air particulates- 6 sampling places	52	355 to 43000	7800	F.R.G. (München)	56
µg/l rain (+ fallout) - 1 sampling place (pure area)			85	UK	43

(a) Depending on sampling place.

Element : Zinc
Medium : Soil
Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 4 places		3.5 to 717		F.R.G.	50
Soil, 3 types	13	6 to 230	98	Belgium	32
Special cases					
- Soil, 1.5km from a metallurgical plant		600 to 6800		Belgium	32
Garbage compost (5 different)		267 to 2410		F.R.G.	50

Element : Zinc

Medium : Miscellaneous

Unit : mg/kg DRY matter

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
PLANTS					
8 different plants from 3 different soils	26	35 to 95	53	Belgium	32
3 different plants, vicinity of a metallurgical plant	5	370 to 1450	846	Belgium	32

Zr.10 - Soil

ZIRCONIUM

Element : Zirconium

Medium : Soil

Unit : mg/kg

	ORDINARY CONCENTRATIONS			ILLUSTRATIONS	REFERENCES
	n		centered on		
Soil, 5 types	24	39 to 860	375	Belgium	32

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