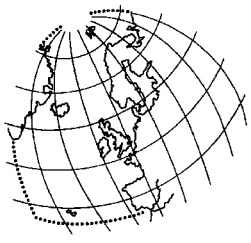
Biodiversity Series

Overview of Contracting Parties' National Action Levels for Dredged Material



OSPAR Commission
2004

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the "OSPAR Convention") was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.

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contents

Executive Summary

This document compiles Contracting Parties' national action levels (sediment quality criteria), and includes a survey of the approaches used by Contracting Parties in order to help understand how action levels for dredged material had been derived by different Contracting Parties.

The report was produced by Belgium on the basis of contributions from Contracting Parties completed with information from a general background document from the UK in order to fill the gaps. This report also has a value for those outside of OSPAR, and in particular the London Convention.

It consists of:

a. a draft overview of Contracting Parties' national action levels for dredged material (Annex 1);
b. approaches for deriving national action levels (Annex 2);
c. an overview of the present situation on action levels (Annex 3) which summarises current concentration ranges used by Contracting Parties in the assessment of dredged material for dumping at sea, and of the approaches used in dredged material assessment;
d. licensing procedures (Annex 4) which gives an overview of how action levels are used in the licensing procedures of Contracting Parties.

Récapitulatif

Dans le présent document sont regroupés les niveaux d'action nationaux des Parties contractantes (critères de qualité des sédiments) ; il fait également état des résultats d'une étude des stratégies appliquées par les Parties contractantes, pour faciliter la compréhension de la manière dont les niveaux des actions visant les matériaux de dragage ont été déduits par les diverses Parties contractantes. Le rapport a été dressé par la Belgique qui s'est fondée à cet effet sur les contributions des Parties contractantes, complétées, pour combler les lacunes, par des renseignements extraits d'un document de fond général émanant du Royaume-Uni. Le présent rapport est également utile aux personnes extérieures à OSPAR, et en particulier à la Convention de Londres.

Il est composé :

a. d'un projet de synthèse des niveaux d'action nationaux des Parties contractantes visant les matériaux de dragage (Annexe 1) ;
b. des stratégies adoptées pour déduire les niveaux d'action nationaux (Annexe 2) ;
c. d'une vue d'ensemble de la situation actuelle en ce qui concerne les niveaux d'action (Annexe 3), qui résume les fourchettes de teneurs actuellement appliquées par les Parties contractantes dans l'évaluation des matériaux de dragage devant être immergés en mer, ainsi que des approches appliquées à l'évaluation des matériaux de dragage ;
d. des modalités d'octroi des permis (Annexe 4), partie qui donne une vue d'ensemble de la manière dont les niveaux d'action sont appliqués dans le contexte des modalités d'octroi des permis des Parties contractantes.

Introduction

At the 2002 meeting of OSPAR's Working Group on the use of and impact on the seabed (SEABED 2002), Contracting Parties expressed their interest in exploring and understanding how the action levels had been developed by different Contracting Parties. Because some Contracting Parties had invested significant resources in developing their action levels (sediment quality criteria) for dredged material and others were in the process of developing or reviewing theirs, there has not been real support for establishing a common OSPAR approach on action levels. However, taking into account the possible next steps outlined in the attached report, the 2004 meeting of OSPAR's Working Group on the environmental impact of human activities (EIHA 2004) should reconsider the need, and as necessary the steps to be taken, to make progress towards a common approach for the definition of action levels.

The report was produced by Belgium on the basis of contributions from Contracting Parties completed with information from a general background document sent to Belgium by the UK in order to fill the gaps of those Contracting Parties who had not sent their replies.

It consists of:

a. a draft overview of Contracting Parties' national action levels for dredged material (Annex 1);
b. approaches for deriving national action levels (Annex 2);
c. an overview of the present situation on action levels (Annex 3) which summarises current concentration ranges used by Contracting Parties in the assessment of dredged material for dumping at sea, and of the approaches used in dredged material assessment;
d. licensing procedures (Annex 4) which gives an overview of how action levels are used in the licensing procedures of Contracting Parties.

General

Most countries use a "3 category action level" approach which means that 2 concentrations are provided. Concentrations of contaminants in the material falling below the lower limit represent those of little concern. Those falling between the lower limit and the upper limit may trigger further investigation of the material proposed for dumping. Those concentrations above the upper value generally mean that dumping of the material at sea is not permitted. Where action levels have not been developed, a "case by case" approach is taken for each application considered individually.

Belgium

The action levels used in Belgium are as shown in the following table:

dry weight (d.w.) basis	Action level 1	Action level 2
Hg	0,3 ppm	1,5 ppm
Cd	2,5 ppm	7 ppm
Pb	70 ppm	350 ppm
Zn	160 ppm	500 ppm
Ni	70 ppm	280 ppm
As	20 ppm	100 ppm
Cr	60 ppm	220 ppm
Cu	20 ppm	100
TBT	3 ppb	7 ppb
mineral oil	14 mg/g_{oc}	36 mg/g_{oc}
PAKs	70 µg/g_{oc}	180 µg/g_{oc}
PCBs	2 µg/g_{oc}	2 µg/g_{oc}

Denmark

There are no specific values for action levels in Denmark, but the general principles are as follows:

a. the regional authorities (the Councils) are responsible for granting permits for dumping of dredged material, upon consent of the following authorities: the Royal Danish Administration of Navigation and Hydrography, the National Forest and Nature Agency and the Directorate for Fisheries, Ministry of Food, Agriculture and Fisheries. Appeals related to permits can be made to the Danish Environmental Protection Agency;

b. dumping of dredged materials are regulated according to the Marine Act of 1993 with later amendments. The detailed regulations are included in a Statutory Order on Dumping of Dredged Materials of 1986;

c. the regulations and the administrative practices follow the Guidelines from the London Convention 1972 and the OSPAR Convention, both of which correspond, to the Guidelines adopted within the Helsinki Convention (Baltic Sea) framework;

d. before a dumping of dredged materials is allowed an evaluation of the dump site and the material proposed for dumping is carried out. Given the big differences from east to west, the Danish action levels are based on the principle of local background values. The background or reference values must not be influenced by direct sources – but are inevitably slightly elevated due to interference with diffuse sources. The guiding principle is that heavy metals in dredged materials proposed for dumping must not exceed the background values more than twice;

e. the administrative practices are undergoing a thorough revision involving the Parliament. The main cause for this has been the elevated levels of TBT in many harbours. Revised regulations are expected to be finalised during 2003.

Finland

The action levels for dredged material in Finland were adopted by the Ministry of the Environment on 19 May 2004. These values are still, however, guidance values and not binding forms. The aim is to be able to give binding norms within a few years time. All measured contaminant contents are normalised to a "standard soil" - composition (10% organic material and 25% clay). The values in the table refer to the normalised values.

Contaminant	**Action level 1** **ppm d.w.**	**Action level 2** **pm d.w.**
Hg	0,1	1
Cd	0,5	2,5
Cr	65	270
Cu	50	90
Pb	40	200
Ni	45	60
Zn	170	500
As	15	60
PaHs		
naphthalene	0,01	0,1
anthracene	0,01	0,1
phenanthrene	0,05	0,5
fluoranthene	0,3	3
benzo(a)anthracene	0,03	0,4
chrysene	1,1	11
benzo(k)fluoranthene	0,2	2
benzo(a)pyrene	0,3	3
benzo(ghi)perylene	0,8	8
indeno(123-cd)pyrene	0,6	6
mineral oil	50	1500
DDT+DDE+DDD	0,01	0,03
	ppb d.w.	**ppb d.w.**
PCB (IUPAC-numbers)		
28	1	30
52	1	30
101	4	30
118	4	30
138	4	30
153	4	30
180	4	30
tributyltin (TBT)	3	200
	ng WHO-TEQ/kg	**ng WHO-TEQ/kg**
dioxins and furans (PCDD and PCDF)	20	500

France

In France the action levels are as shown in the following tables:

(ppm d.w)	Action level 1	Action level 2
Hg	0,4	0,8
Cd	1,2	2,4
As	25	50
Pb	100	200
Cr	90	180
Cu	45	90
Zn	276	552
Ni	37	74

PCB (ppm d.w)	Action level 1	Action level 2
CB 28	0,025	0,05
52	0,025	0,05
101	0,050	0,05
118	0,025	0,10
180	0,025	0,05
138	0,05	0,10
153	0,05	0,10
Total PCBs	0,5	1,0

Germany

In Germany action levels 1 and 2 for trace metals and organic contaminants in dredged material in the coastal area of the North Sea (related to the sediment fraction < 20 µm, dry weight) are as shown in the following table:

		Action level 1	Action level 2
Arsenic	ppm	30	150
Cadmium	ppm	2,5	12,5
Chromium	ppm	150	750
Copper	ppm	40	200
Mercury	ppm	1,0	5
Nickel	ppm	50	250
Lead	ppm	100	500
Zinc	ppm	350	1750
CB 28	ppb	2	6
CB 52	ppb	1	3
CB 101	ppb	2	6
CB 118	ppb	3	10
CB 138	ppb	4	12
CB 153	ppb	5	15
CB 180	ppb	2	6
Sum of 7 CBs	ppb	20	60
α - Hexachlorcyclohexane	ppb	0,4	1
γ - Hexachlorcyclohexane	ppb	0,2	0,6
Hexachlorbenzene	ppb	2	6
Pentachlorbenzene	ppb	1	3
p,p´-DDT	ppb	1	3
p,p´-DDE	ppb	1	3
p,p´-DDD	ppb	3	10
PAH [1] (Sum of 6 PAHs)	ppm	1	3
hydrocarbons	ppm	300	1000

Action levels for tributyltin (TBT) in dredged material (in µg TBT/kg total sediment) from 2001 onwards in Germany are as in the following table:

Action level 1	Action level 2	Valid from year
20	600	2001
20	300	2005
20	60	2010

Ireland

Derivation of actions levels is presently in hand. Current assessments are carried out on a case-by-case basis, using provisional action levels for metals, PCBs, OCPs, TBT and PAHs. Ecotoxicology testing (Microtox, whole sediment bioassays) is also required if the dredging is to take place from an area known to be contaminated. If chemical levels are considered elevated, then phase 2 testing (possibly including ecotox) is used to delineate.

The Netherlands

In the Netherlands, all measured contaminant contents, except PAHs, are normalised to a "standard soil"-composition (of 10 % organic material and 25 % luttite) before they are compared to the action level. Since 1 January 2001, measured PAHs contents in sandy soils (with organic matter < 10%) are no longer

[1] total of 6 PAH compounds: fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene

normalised to a standard soil composition. The action levels in the Netherlands are as shown in the following tables:

ppm d.w	**Action level 1** [2]	**Action level 2**[3]
As	29	29
Cd	0,8	4
Cr	100	120
Cu	36	60
Hg	0,3	1,2
Pb	85	110
Ni	35	45
Zn	140	365
Mineral oil (C10-40)	50	1250
Sum 10 PAHs[4]		8,0
Sum 7 PCBs[5]		0,1
Alpha-HCH	0,003	-
Beta-HCH	0,009	-
Gamma-HCH (lindane)	0,00005	0,02
Sum HCHs	0,01	-
Heptachlor	0,007	-
Heptachlorepoxide	0,0000002	0,02
Aldrin	0,00006	0,03
Dieldrin	0,0005	0,03
Endrin	0,00004	0,03
Sum Aldrin+Dieldrin+Endrin	0,005	-
DDT	0,00009	-
DDD	0,00002	-
DDE	0,00001	-
Sum DDT+DDD+DDE	0,01	0,02
Hexachlorbenzene	0,00005	0,02
TBT	0,000007	0,24 (100 µg Sn/kg dw)
Sum organic compounds	0,001	

Additional levels for 3 bio-assays (only valid for the North Sea)

Slijkgarnaaltje (Corophium volutator)	50 (% death)
Vibro fischeri (MICROTOXÔ SP)	100 (1/EC50)
Calux DRE test	100 (ng TEQ/kg d.w.)

[2] General environmental quality objective (water system)
[3] Numerical values for the content test distribution into salt waters (2001)
[4] Naphthalene, fenanthrene, anthracene, fluoranthene, chrysene, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, indenopyrene, benzo(ghi)perylene
[5] PCBs 28, 52, 101, 118, 138, 153 and 180

Norway

The Norwegian action levels are based on analysis of whole sediment samples in the 0-2 cm upper fraction. This is often the most polluted fraction in Norwegian sediments.

According to Norwegian information it seems that since 1996 Norway no longer works with the same system of action levels. The sediment is put into three categories (good/fair; poor/bad; very bad) without being explicit about how this assessment is used in the permit procedures.

Parameter	**Category 1** good/fair **(class I&II)**	**Category 2** poor/bad **(class III&IV)**	**Category 3** very bad **(class V)**
Metals (ppm dry weight)			
Arsenic	< 20 - 80	80 - 1000	> 1000
Lead	< 30 - 120	120 - 1500	> 1500
Fluoride	< 800 - 3000	3000 - 20000	> 20000
Cadmium	< 0,25 - 1	1 – 10	> 10
Copper	< 35 - 150	150 - 1500	> 1500
Mercury	< 0,15 - 0,6	0,6 - 5	> 5
Chromium	< 70 - 300	300 - 5000	> 5000
Nickel	< 30 - 130	130 - 1500	> 1500
Zinc	< 150 - 700	700 - 10000	> 10000
Silver	< 0,3 - 1,3	1,3 - 10	> 10
Organic component (ppb dry weight)			
Sum PAH[6]	< 300 - 2000	2000 - 20000	> 20000
B(a)P[7]	< 10 - 50	50 – 500	> 500
Sum PCB[8]	< 5 - 25	25 – 300	> 300
HCB[9]	< 0,5 - 2,5	2,5 – 50	> 50
EPOCl[10]	< 100 - 500	500 - 15000	> 15000
2, 3, 7, 8-TCDD eqv.[11]	< 0,03 - 0,12	0,12 - 1,5	> 1,5

Spain

In Spain the concentrations are referred to fine fractions (< 63µm). Action levels are as follows:

ppm d.w.	**Action level 1**	**Action level 2**
Hg	0,6	3,0
Cd	1,0	5,0
Pb	120	600
Cu	100	400
Zn	500	3000
Cr	200	1000
As	80	200
Ni	100	400
S 7 PCBs*	0,03	0,1
* Sum of congeners n° 28, 52, 101, 118, 138, 153 and 180		

6 Polycyclic aromatic hydrocarbons (EPA 16)
7 Benzo(a)pyrene
8 Polychlorinated biphenyls
9 Hexachlorobenzene
10 Extractable persistent organic chlor
11 Total toxicity potential for polychlorinated dibenzofurans/dioxins, given as equivalents of the most toxic of these components (2, 3, 7, 8-tetrachlordibenzo-p-dioxin)

Sweden

In Sweden, action levels are based on the following background concentrations without providing information on the possible link between these concentrations and action levels:

	Background value (ppm dry weight)
As	10
Pb	10
Fe	40 000
Cd	0,3
Co	15
Cu	20
Cr	20
Hg	0,1
Ni	15
Sn	1
V	20
Zn	125

United Kingdom

The following table includes an overview of existing and revised action levels for all recorded determinants. The existing action levels were used as guideline action levels. It should be noted that the revised action levels have not been formally adopted yet.

Contaminant	**Existing Action level 1 mg.kg^{-1} (ppm)**	**Existing Action level 2 mg.kg^{-1} (ppm)**	**Revised Action level1 mg.kg^{-1} (ppm) dry weight**	**Revised Action level 2 mg.kg^{-1} (ppm) dry weight**
Arsenic (As)	20	50-100	20	70
Cadmium (Cd)	0,4	2	0,4	4
Chromium (Cr)	40	400	50	370
Copper (Cu)	40	400	30	300
Mercury (Hg)	0,3	3	0,25	1,5
Nickel (Ni)	20	200	30	150
Lead (Pb)	50	500	50	400
Zinc (Zn)	130	800	130	600
Tributyltin (TBT,DBT,MBT)	0,1	1,0	0,1	0,5
Polychlorinated Biphenyls (PCBs)	0,02	0,2	0,02	0,18
Polyaromatic Hydrocarbons				
Acenaphthene			0,1	
Acenaphthylene			0,1	
Anthracene			0,1	
Fluorene			0,1	
Naphthalene			0,1	
Phenanthrene			0,1	
Benzo[a]anthracene			0,1	
Benzo[b]fluoranthene			0,1	
Benzo[k]fluoranthene			0,1	
Benzo[g]perylene			0,1	
Benzo[a]pyrene			0,1	
Benzo[g,h,i]perylene			0,1	
Dibenzo[a,h]anthracene			0,01	
Chrysene			0,1	
Fluoranthene			0,1	
Pyrene			0,1	
Indeno(1,2,3cd)pyrene			0,1	
Total hydrocarbons	100		100	
Booster Biocide and Brominated Flame Retardants *	-	-	-	-

* Provisional Action levels for these compounds are subject to further investigation.

Approaches for Deriving National Action Levels

Belgium

The assessment of the ecotoxicological acceptability of the dumping of dredged material into the North Sea has to be based upon quantitative action levels which must comply with the following stipulations. They have to be:

a. manageable in practice;
b. scientifically founded;
c. realistic in practice.

The scenario is based on:

a. an action level 1 (AL1 = target value) which enables, if it is fulfilled, the dumping of dredged material into the North Sea. This criterion depends on a "safe concentration" and on the partition coefficients of the contaminants;
b. a limit value (AL2) which prohibits, if being exceeded, the dumping of dredged material into the North Sea. This criterion is based on a number of parameters of which the specification is part of this study;
c. the presence of a "grey zone" between these two values of which the decision concerning the ecotoxicological acceptability can be based on e.g. bio-assays or limiting conditions.

In order to fulfill this approach a study was carried out. Its methodology is given below and more detailed information was presented to the 2003 meeting of OSPAR's Working Group on the environmental impact of human activities (EIHA 2003):

a. a first important phase concerned the investigation of different methodologies which were applied in the scientific world for obtaining action levels. Furthermore these methodologies have been evaluated with regard to their utility for the siting of dredged material dumping in the North Sea. Based on the analysis of these different methodologies, the equilibrium partitioning method (EV) has been selected. In addition, further study has been carried out concerning the different parameters which are of importance in establishing action levels, namely the ecotoxicological characteristics as well as the partition of pollutants between the different phases in sediment;
b. firstly a detailed description has been drafted of the mechanisms relevant to the partitioning of pollutants between the different phases in sediments, because this is of primarily importance to the bioavailability of pollutants in sediments. To that aim, distinction has been made between anorganic pollutants, including heavy metals and organic pollutants such as PAHs, PCBs, TBT compounds and mineral oil. Based on this analysis, partition coefficients for the different pollutants were eventually selected from literature as well as from analyses of the sediments concerned;
c. in addition, the ecotoxicological basis necessary for the development of action levels has been studied. Primarily, the ecotoxicity data relevant for the drafting of the so-called "exotoxicological value" or "safe concentration" were studied. Literature shows that to this aim it is possible to use water-only ecotoxicity data. Therefore, such ecotoxicity data were collected from literature for the different pollutants. In addition, a detailed summary has been given of the different methods used to obtain such an "ecotoxicological value", also called "water quality criterion". Based on existing ecotoxicity data, one of these methods has been applied to determine this value for each of the pollutants concerned;
d. subsequently, in order to avoid discrepancies between the safe ecotoxicity values and the background values, the natural background concentrations of the concerned pollutants both in seawater and in sediments were studied. Where necessary, adaptations of the derived action levels to these background concentrations are carried out;
e. finally, in view of the protection of higher organisms such as sea birds and man, an evaluation of the ecotoxicological value has been carried out as function of bioaccumulation and biomagnification. If necessary, based on that evaluation, a second adaptation of the derived action levels is carried out.

Denmark

In Denmark no action levels for dredged material are applied but the guiding principle for dredged material proposed for dumping is that the concentration of heavy metals in the dredged material must not exceed the (local) background value more than twice.

Denmark is currently developing its system for licensing disposal at sea, and the planned approach is to use locally-derived background concentrations. The current view of the EPA is to develop a 3-category system according to the above limits.

Finland

The national criteria were initially based on data from the Netherlands, but some justifications have also been made. For metals level 1 is set by multiplying the natural background level by 1,5, except for Hg by 2,5. The level 2 has, in general, been set by using ecotoxicological data. Natural background levels have, however, also been taken into account. For PAH's level 2 is set by using ecotoxicological data and level 1 is calculated by dividing level 2 by 10. Action levels for DDT and PCB have relied very much on data from the Netherlands. For DDT level 1 equals detection limit. For dioxins and furans the action level 1 represent concentrations of unloaded areas and level 2 is estimated on the basis of human health risk. For TBT action level 1 represents detection limit. Action level 2 is originally determined by multiplying so called natural background level from Archipelago Sea by 5.

France

All existing data (between 1986 and 1990) from French harbours were collected: in total 445 data files. The data were collected with the double aim of:

a. obtaining overall information on the distribution of heavy metals and PCBs in dredged material;
b. defining action levels (a reference level and a limit level) for heavy metals and PCBs.

The data were plotted in Gaussion mathematical curves. For each heavy metal were calculated: the value resulting from the extrapolation till 95% of the rectilinear part of the distribution curve (X95) and the median (Md).

On the basis of the X95 and MD the following reference values for heavy metals were defined:

a. the geological background value for metals, it was considered that the X95 value was representative for this background value;
b. a level 1; it was adopted that the level 1 would equal 2 times the Md value;
c. a level 2; it was adopted that the level 2 would equal 4 times the Md value.

A different approach was held for PCBs since they have an exclusive anthropogenic origin. A geological background value therefore could not be defined because it does not exist. Level 2 for PCBs was then defined on the basis of the value for fish consumption for fishes living at the disposal site. By homology with the relation between level 1 and level 2 for heavy metals, level 1 was then defined as half the value of level 2.

Germany

The national action levels 1 and 2 applied to dredged material from German federal waterways for trace metals and organic contaminants represent "management" values. They were introduced in 1992 and 1997, respectively. The action levels are neither ecotoxicological quality criteria nor quality targets. These action levels are not applied to dredged material from waters under the responsibility of the federal states (Länder).

The basis for the definition of action levels is as follows:

a. quality criteria are derived from contaminant concentrations in North Sea wadden sediments. For trace metals, reference data are from 1982 - 1987, and for organic contaminants from 1989 - 1992;
b. the reference values for trace metals equal the mean concentrations c_m multiplied by a factor of 1,5 in order to take into account accidental uncertainties due to sampling and chemical analysis. All concentrations of trace metals refer to the fraction <20 µm;
c. the reference values for organic contaminants correspond to the 90 percentile value of concentrations that were measured in the whole sample, i.e. <2 mm, and normalised to the fraction <20 µm.

Action levels are defined as below:

action level 1 = reference value

action level 2 = reference value * 5 for trace metals

action level 2 = reference value * 3 for organic contaminants

The action levels for trace metals and organic contaminants are under revision, and harmonisation between the federal authorities and the federal states is in process.

TBT

For TBT, action levels were implemented in 2001. They are agreed between the Federal Authorities and those of the federal states (Länder) and are applicable to dredged material from all coastal waterways. The implementation of action levels is tiered in three phases according to the schedule of IMO for the ban of TBT in antifouling coatings of ships, although with a time lag of two years.

Action level 1 for TBT is ecologically oriented, and takes into consideration the lowest effect concentration (LOEL) observed for snails in the marine area. Whereas action level 1 remains constant over time, action level 2 decreases with time.

For the short and medium term, the upper action level 2 takes into consideration the existing contamination and the technical and economic possibilities to reduce the TBT load in dredged material. In addition, reduction of TBT contamination in coastal waters should be promoted. In the long run, an action level 2 will be introduced, which is based on the assumption of a total ban of TBT in antifouling paints.

Ireland

No information from Ireland was received by Belgium. However, according to the UK report (October 2003) "The Republic of Ireland is developing action levels for use in dredged material assessment as required by OSPAR guidelines for the management of dredged material. A 3-category approach is applied. Currently, provisional criteria are in use for assessment but they have not yet been adopted nationally."

The Netherlands

Target levels (level 1) are either the negligible concentration or the natural background level in the event that the latter is higher than the former. This value is to be reached before the year 2010. For the North Sea however background values prevail above the calculated negligible concentration also in the event that these are lower than the negligible concentration. The precautionary principle and the stand still principle are at the basis of this policy decision.

Basis for level 2

Prior to 1993, there was a separate set of quality criteria for dredged material from the Western Scheldt, the Wadden Sea and the North Sea. The set of quality criteria which was used for the North Sea was derived from the data on the distribution of pollutant concentrations in the sediments from the four dredging areas in 1988. These quality data were standardised to a normal soil type and a weighted 99 percentile was calculated for each of the four areas. The reference concentration for soil was added to this set of four concentrations and the highest number of the set of five was selected as a quality criterion. In 1994 the quality criteria for dredged material were harmonised and one uniform set of quality criteria remained for the Western Scheldt, the Wadden Sea and the North Sea. The Uniform Quality Criteria for Dredged Material have been set in such a way that the marine environment is protected from marine disposal of material with a high level of contamination, while the generation of excessive amounts of dredged material that need to be stored in special facilities is avoided. In 1994 and 1998 the uniform quality criteria were decreased for several contaminants.

During 1998 several aspects were investigated: standard operation procedures (SOP) and a quality assurance system for bioassays with salty dredged material and the first ring test was conducted. In the period 1999-2000 other discussions on policy aspects and systematic monitoring (bioassays and chemistry) of marine dredged material by RWS in harbours and shipping channels along the Dutch coast. A new biological assessment system for the North Sea is now in place.

Norway

The Norwegian regulation on dumping activities (1980) is general and has not been changed. Dredging and dumping is managed on a case by case basis. The Norwegian sediment criteria for Classification of Environmental Quality and Degree of Pollution is the basis tool for managing dredging and dredged

material. These criteria are not, however, made for this purpose and some adjustments and simplifications are therefore made. Environmental Quality is described in five categories (classes) where class 1 represents what is believed to be a normal situation (slightly polluted) in an area without any point source. Class 5, on the contrary, represents an extremely polluted location.

Various action levels are proposed for sediments of different classes in regard to dredging and dumping respectively. More than one option is normally possible for every case.

Portugal

No information from Portugal was received by Belgium. A UK report (October 2003) states that "Quality criteria standards determine the method for disposal of the dredged material. A 5-category approach is used to classify material for disposal, from Class 1 (may be disposed of in the aquatic medium or at places exposed to erosion or used to feed beaches without restrictive norms) through to Class 5 (should not be dredged)."

Spain

The action levels are based on the results of a number of studies related to:

- background values in Spanish coastal sediments;
- anthropogenic load in dredged material;
- normalisation techniques;
- validation of bioassay techniques; and
- bioavailability of contaminants in material dredged from different places.

The following additional information was derived from a UK report (October 2003): "The Spanish recommendations were enacted by CEDEX in 1994 and are expected to be legally implemented towards the end of 2002. Standards apply to all sediments, carrying out analysis on the fine (<63 µm) fraction. In the absence of appreciable sources of contamination, the dredged material can be considered exempt from chemical characterization and biological tests if one of the following criteria is fulfilled:

- the material to be dredged is composed almost exclusively (>90 %) of sand, gravel or rock;
- the dredged material is utilised in the nourishment of beaches and is composed predominantly of sand, gravel or shells, with particle sizes compatible with those of the zone to be regenerated;
- the total amount dredged per year does not exceed 15 000 m³, and comes from small, isolated or simple dredging operations of which local information is available concerning the quality of sediments.

Sediments with metal concentrations above the second level and = 8x Level 2, have to be isolated and belong to category IIIa. Sediments with metal concentrations higher than 8x Level 2, must be isolated into containers or into a close space (category IIIb). Locally-derived background concentrations are under development.

The following bioassays have been tested for application to dredged material assessment:

- Screening: Microtox
- Solid phase: Amphipods, Arenicola, Bivalves and Echinocardium
- Liquid phase: Rotifers, Equinoderms fertilization

The final decision as to which bioassays should be included in the updated recommentations is still under consideration."

United Kingdom (England and Wales)

Internal guideline action levels were already in existence and what follows gives the review of these levels against some ecotoxicological data being available.

Approach for metals

Action levels for metals in dredge material applications in England and Wales have been reviewed. (There already existed guideline action levels). A nominal "background" concentration, based on sediment chemistry, was used in derivation of Action Level 1. Ecotoxicological data, based largely on datasets from the US, was used to guide the setting of Action Level 2.

Changes in existing, internal guidelines for Action Level 1 have been proposed – a reduction in value for copper and mercury, and an increase in the value for chromium and nickel. Reductions in the guideline Action Level 2 have been proposed for all the metals under consideration.

Approach for TBT

The revision of Action Levels for TBT in dredged material has been completed using both chemical data for the DAS database and Ecotoxicological data derived from the peer reviewed literature.

No change was made to Action Level 1 for TBT as this was deemed to be a suitable level at which primary anthropogenic impact can be detected. The value was taken from chemical data only. Action Level 2 was revised in line with current ecotoxicological data applied to the current DAS dataset.

Approach for PAHs

The Action Level 1 values proposed by the UK have been set so as to trigger further study in a proportion of the samples analysed. The proposed Action Levels are thought to be relatively strict but this is considered to be justified under the precautionary approach. Current research is directed towards the use of sediment bioassays to assess toxicity directly. The limited knowledge of sediment PAH toxicity has precluded the derivation of Action Level 2.

Approach for PCBs

The approach to the derivation of PCB action levels has relied heavily on the toxicological data from the US and Canada since there is a significant lack of UK focused bioassay data which have been included UK marine species and this is considered to be a limiting factor in the refinement of Action Levels for the use in the marine environment.

Overview of the Present Situation on Action Levels

1. Summary of current concentration ranges used by Contracting Parties in the assessment of dredged material for dumping at sea

Contaminant	Units	TARGET VALUES ("action level 1") in		LIMIT VALUES ("action level 2") in	
		<2 mm fraction	fine fractions (<63 µm and 20 µm)	<2 mm fraction	fine fractions (<63 µm and 20 µm)
As	ppm	20 - 80	30 - 80	29 - 1000	150 - 200
Cd	ppm	0,4 - 2,5	1 - 2,5	2,4 - 10	5 - 12,5
Cr	ppm	40/50[12]- 300	150 - 200	120- 5000	750 - 1000
Cu	ppm	20 - 150	40 - 100	60 - 1500	200 - 400
Hg	ppm	0,3/0,25[12]- 0,6	0,6 - 1	0,8 - 5	3 - 5
Ni	ppm	20/30[12] - 130	50 - 100	45 - 1500	250 - 400
Pb	ppm	50 - 120	100 - 120	110 - 1500	500 - 600
Zn	ppm	130 - 700	350 - 500	365-10 000	1750 - 3000

The exercise had only been done for heavy metals because the variability of organic pollutants chosen does not allow the exercise to be carried out properly. Background values from Sweden have not been considered, since they are not linked to action levels.

2. Summary of approaches used in dredged material assessment by OSPAR Contracting Parties

Country	General approaches used			Notes
		No. categories in action level approach	***Methods used in development of action levels***	
Belgium	Action level	3	1) Sediment chemistry 2) Bioassays	Action levels based on mean contaminant concentration in marine navigation channels + scientific study
Denmark	Action level	3	Sediment chemistry	Not yet implemented in law
Finland	Action level	3	Sediment chemistry Ecotoxicological data	Guidance values
France	Action level	3	Sediment chemistry	
Germany	Action level	3	1) Sediment chemistry 2) Bioassays	
Portugal	Action level and case-by-case	5	sediment chemistry	
Netherlands	Action level	1 limit level	Sediment chemistry	Biological effects methods being used.
Norway	Action level + case-by-case	5	---	
R. of Ireland	Case-by-case	---	---	3 categories under development
Spain	Action level	3	Sediment chemistry	Sediment chemistry not yet implemented in law. Sediment bioassays under development
Sweden	Case-by-case ?	---	---	

[12] Existing/revised UK level

UK	England and Wales (E+W) and Scotland: Case-by-case approach.	--- ---	---	E+W: Under review. 3-category action level approach in preparation. Scotland: Data assessed against OSPAR BRCs

Licensing procedures

This section gives an overview of how action levels are used in the licensing procedures of Contracting Parties.

Belgium

If the analysis results exceed the value of action level 2 for three of the contaminants at the same time, the dredged material may not be dumped at sea. The result of the analysis is the numerical average of ten analyses.

If the result lies between action level 1 and action level 2, the number of samples has to be increased by five and new analyses should to be carried out. If the new analysis results confirm the previous ones, then bioassays prescribed at international level have to be conducted. Negative results from these bioassays may lead to a ban on dumping dredged material from these delimited areas at sea.

If all analysis results are lower than action level 1, the material may be dumped at sea.

Denmark

No action levels are defined in Denmark. But the guiding principle is that heavy metals in dredged material proposed for dumping must not exceed the background values more than twice.

Finland

When the contaminant content is under action level 1 dredged material is classified as "clean" and dumping of dredged material is allowed.

When concentration is above action level 2 the dredged material is considered contaminated and may not be dumped to the Baltic Sea.

Between action levels 1 and 2 there is a "grey zone" where further studies are needed and decision is made on case-by-case basis.

France

If analysis shows that concentrations are less than action level 1, a general permit is given without specific study.

If analysis shows that concentrations exceed action level 2, dumping at sea may be prohibited, especially when this dumping does not constitute the least detrimental solution for the environment (particularly with respect to other solutions, in situ or on land).

These values do not consider the toxic character and the bioavailability of each element.

If analysis shows that concentrations are situated between action level 1 and action level 2, a more comprehensive study might be necessary. The content of these studies will be established on a case by case basis taking account of the local circumstances and the sensibility of the environment.

Germany

If analysis shows that concentrations are less than action level 1, the material is considered to be uncontaminated or slightly contaminated, and only the physical impact of the dumping should be taken into account.

If analysis shows that concentrations (for at least one contaminant) are situated between action level 1 and action level 2, the material is considered to be moderately contaminated. In this case the following elements have to be taking into account before issuing a special permit:

- it has to be checked whether, compared to land disposal, sea disposal is the option of least detriment.
- a source-reduction programme has to be planned, where there is a source to reduce.
- the impact of the dumping operation has to be diminished as far as possible, e.g. by the use of containment or treatment methods.
- a detailed impact hypothesis has to be prepared.
- a monitoring programme at the disposal site and its surroundings has to be initiated.

If analysis shows that concentrations (for at least one contaminant) exceed action level 2, the material is characterised as considerably contaminated. In this case, to mitigate the impact, additional steps should be considered. For each disposal option (either in coastal waters or alternatively at land) a comparative assessment should be carried out, of:

- the technical treatment of the dredged material;
- human health risk;
- hazard (including accidents) associated with treatment, transport and disposal;
- economics including energy costs and costs for environmental protection;
- exclusion of future uses of disposal areas.

If the assessment shows a land alternative to be more acceptable, sea dumping should not be permitted.

The Netherlands

The evaluation for dumping or not dumping dredged material at sea is based on the content test.

The area to be dredged is divided in a great number of compartments. A number of six samples are taken from each compartment and analyzed after mixing till one sample.

As soon as the content test for one sample is exceeded, the material of the whole compartment cannot be dumped at sea and must be stored on land.

Norway

All applications for dredging are evaluated case by case within each county. There may therefore be some differences in the way dredging operations presently are managed.

All cases are evaluated based on standard procedures for sampling and analysis, using concentrations in sediment as the main criteria. However, results from effect studies or toxicity tests may also be applied.

The main principles of the revised guidelines follow the line of requirements as presented below:

	Category 1 (Good/fair)	Category 2 (Poor/bad)	Category 3 (Very bad)
Dredging	- No requirements to equipment or monitoring	- Requirements for technical equipment (silt screen, environmentally improved dredging methodology etc.) - Sometimes monitoring requirements	- Requirements for technical equipment (silt screen, environmentally improved dredging methodology etc.) - Monitoring requirements - Sometimes requirements for toxicity testing - Sometimes no dredging allowed at all
Disposal	- Dumping at designated sites	-Restricted dumping with requirements for technical equipment. - Site evaluation	- No dumping, but solutions based on : - capping - CDF - land disposal -treatment

Spain

If the sediment quality of the area to be dredged corresponds to different classifications, the total area can be divided in different sub-areas, that will be managed in different ways. These sub-areas can either be planar areas or can consist of the vertical distinction of several layers within the same planar area.

For each of these parts, a weighted mean concentration, C^*, is calculated:

$$C^* = \frac{S\ C_i\ p_{FI}\ M_i}{S\ p_{FI}\ M_i}$$

where C_i = the result of the analysis
p_{FI} = the percentage of fine fraction
M_i = the mass of solids in the volume represented by sample # i.

C^* is compared with Action Levels 1 and 2. Three situations can occur:

- C^* is for all parameters below action level 1. The material is classified as Category I. and is allowed to be dumped at sea paying attention only to physical effects (general permit).
- C^* is for at least one parameter greater than action level 1 and all of them are lower than action level 2. The material is classified as Category II and may be dumped at sea but now it is necessary to prepare an impact hypothesis and a monitoring programme has to be set up (special permit).
- C^* exceeds for at least one parameter action level 2. The material is classified as Category III and separated from marine water or adequately treated.

Sweden

Action levels are based on background levels and/or the volume:

- action level 1 : average concentration (a_c) = 3 - 10 * background level and/or having a considerable volume;
- action level 2 : average concentration (a_c) > 10 * background level and/or total amount is large.

This facilitates the classification of dredged material in three cases:

- First case : the average concentration is lower than action level 1. The material to be dumped is uncontaminated and can be dumped on any suitable site bearing in mind:
  - broken rock should not be dumped on an accumulation bed, but used as a resource;
  - coarse grained material should be dumped where the sediment is of similar composition;
  - fine grained material should be dumped on an accumulation bed (i.e. where the water content of the top sediment is > 75 %) or on sites with the best possible accumulation characteristics.
- Second case: the average concentration lies between action level 1 and action level 2. The material to be dumped is noticeably contaminated and should be dumped on an accumulation bed.
- Third case: the average concentration exceeds action level 2. The material to be dumped is highly contaminated and should be dumped in a controllable manner by lagooning or placing it on land.

United Kingdom

In England and Wales action levels are used in the licensing process as follows:

The Action Levels are used as part of a 'weight of evidence' approach to assess dredged material and its suitability for disposal to sea. These values will be used in conjunction with a range of other assessment methods e.g. bioassays as well as historical data and knowledge regarding the site, to make management decisions regarding the fate of dredged material. This integrated approach is in line with recent discussions regarding weight of evidence approaches to environmental management of sediments. It considers balancing multiple lines of evidence concerning ecological assessment as an aid to decision making.

In general, contaminant levels in dredged material below Action Level 1 are of no concern and are unlikely to influence the licensing decision. However, dredged material with contaminant levels above Action Level 2 is generally considered unsuitable for sea disposal. The latter situation most often applies only to a part of a proposed dredging area and so that area can be excluded from disposal at sea and disposed of by other routes e.g. landfill. Dredged material with contaminant levels between Action Levels 1 and 2 requires further consideration and testing before a decision can be made.