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 Union 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 l'Espagne et l'Union européenne.

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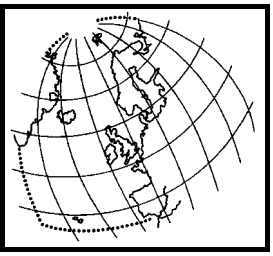

OSPAR Background Document on Organic Tin Compounds

Contents

SECRETARIAT NOTE:

This OSPAR background document was finalised by The Netherlands (as lead country) in the 1999/2000 intersessional period and endorsed by OSPAR 2000 for publication on the OSPAR web site. Actions recommended in this background are taken into account, as appropriate, in the work of OSPAR.

It should also be noted that on 12 July 2000, the Executive Secretary of OSPAR has written a letter to the Secretary General of the International Maritime Organization in line with the agreements made at OSPAR 2000 (cf. OSPAR 00/5/12 Rev.1 and OSPAR 00/20/1, §§ 5.15-5.16).

A monitoring strategy for organic tin compounds is annexed to this background document.

NOTE TO THE READER

0.1 The texts in chapters 1 and 2 relate to activities which were carried out within the framework of the former Oslo and Paris Commissions before organic tin compounds were identified at OSPAR/MMC 1998 as a group of substances for priority action under OSPAR's Strategy with regard to Hazardous Substances. On the basis of the state of affairs as described in chapters 1 and 2 (and taking into account the information in chapter 3 on desired reduction), the present situation is outlined in chapters 4 and 5. In chapter 4, which reflects upon the most recent developments, including developments in 1999 and 2000, possible measures are identified. In chapter 5 a choice for action/measures is given, i.e. those that have been or might be taken on organic tin compounds since and due to their selection as priority substance.

As a consequence of this division in past (chapters 1 and 2) and present (chapters 4 and 5), the reader should be aware that statements on the actual work on organic tin compounds within OSPAR should only be based on chapter 5 (and not on chapters 1 and 2).

CHAPTER 1 - IDENTIFICATION OF ALL SOURCES OF ORGANIC TIN COMPOUNDS AND ITS PATHWAYS TO THE MARINE ENVIRONMENT

Organic tin compounds as a group of substances

1.1 Organic tin compounds comprise mono-, di-, tri- and tetrabutyl and triphenyl tin compounds and their impact on the environment is well known. Tributyl tin compounds are considered to be the most hazardous of all tin compounds and several studies in various parts of the world oceans have shown the effects of tributyl tin compounds: shell malformations of oysters, imposex in marine snails, reduced resistance to infection (e.g. in flounder), effects on the human immune system. The effect of triphenyl tin seems to be the same. Other organic tin compounds (e.g. mono- and dibutyl tins) are considered to be of less importance from the marine environment point of view. Therefore, the attention of this background document focuses mainly on triorganic tin compounds.

Identified sources

1.2 In two Dutch reports published by RIZA in 1992 and by RIKZ in 1995, the available information on triphenyl tin and butyl tin compounds have been collected and summarised. Identified sources are:

- antifouling (tributyl tin and triphenyl tin): leaching/eroding from antifouling used on underwater structures and ships and discharges from docking activities. The information presented at DIFF 1998 and POINT 1998 by Seas at Risk underlined that shipbuilding and ship repair yards did constitute a major point source of tributyl tin in coastal areas;
- industrial discharges from production/formulation of all organic tin compounds;
- agricultural releases from the use of triphenyl tin in potato growing: surface run off, illegal dumping of the remainder of spraying agents, cleaning of the spraying machines, spray drift after plane application;
- atmospheric deposition of organic tin compounds;
- tributyl tin compounds used for wood conservation: application, leaching, dumping of conserved wood as waste;
- antiseptic or disinfecting use of tributyl tin compounds: canvas, carpet, cuttings;
- dibutyl tin compounds as stabiliser in plastics and as catalytic agents in soft foam production (cf. also the draft Report on Additives in Plastics, DIFF 98/15/01);
- disposal of harbour sediments contaminated with organic tin compounds.

1.3 In addition to the sources mentioned in the previous paragraph, the following additional point sources were mentioned in the draft Overview of Point and Diffuse Sources related to the OSPAR Chemicals for Priority Action (cf. PRAM 00/3/3):

- ferrous metal industry;
- paper/board industry;
- surface treatment.

CHAPTER 2 - MONITORING DATA, QUANTIFICATION OF SOURCES AND ASSESSMENT OF THE EXTENT OF THE PROBLEM

2.1 The following work has been carried out within the OSPAR Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME):

a. *OSPAR Joint Assessment and Monitoring Programme (JAMP)*:

   (i) TBT has been included in the JAMP as issue 1.3;

b. *Monitoring guidelines related to the OSPAR JAMP*:

   (i) the Technical Annex 3 to the JAMP guidelines for contaminant-specific biological effects monitoring concerning tributyl tin is available. It may be used, but quality assurance procedures are not yet in place;

   (ii) the Technical Annex to the JAMP sediment monitoring guidelines on the determination of tributyl tin in sediments has been adopted by ASMO 1999 (OSPAR reference number 1999-1);

c. *Ecotoxicological assessment criteria for TBT*:

   (i) ASMO 1997 adopted and OSPAR 1997 endorsed ecotoxicological assessment criteria (EAC) for tributyl tin (OSPAR reference number 1997-15).

2.2 At ASMO 1998, the Chairman of SIME presented a document on the assessment of available information concerning tributyl tin - JAMP issue 1.3 (cf. ASMO 98/4/3). In the view of SIME, there appears to be the following gaps in knowledge on TBT monitoring:

a. although surveys of the chemical concentrations of TBT/biological effects seem to be adequate in the inshore waters of the northern region of the OSPAR maritime area, there is a gap in knowledge regarding the extent of TBT contamination and possible subsequent biological effects around the coastlines of Spain and Portugal;

b. there is only limited information on the situation in offshore waters of the OSPAR maritime area and more data are required;

c. information from time trend studies is limited both in terms of the number of areas covered and of the duration of existing series.

2.3 Until now, no specific attention has been given to triphenyl tin by SIME, other than in the context of addressing pesticides as a whole.

2.4 The OSPAR Report on the Use of Pesticides in Agriculture, Horticulture and Forestry by Contracting Parties to the Paris Commission (published by OSPAR in 1996) provides environmental data on monitoring in river water, groundwater, estuaries, coastal water sediment and biota. Triphenyl tin has been detected in all compartments.

2.5 So far, there has been little concern about the presence of triphenyl tin in sea water. However, recent Dutch studies on bottom-dwelling whelks and starfish have shown that triphenyl tin is by far the most important contaminant of all the organic tin compounds in the North Sea.
2.6 Results of a recent study carried out by the World Wide Fund for Nature (WWF) on TBT pollution in the marine environment (cf. SEBA 99/4/4) show that, despite all measures, TBT continues to be present and to have an impact in the near shore marine and estuarine environment and near major shipping centres.

2.7 In its role of giving advice to other fora where chemical pollutants are regulated, the Advisory Committee of the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), a governmental observer to OSPAR, drew in June 1999 the attention of OSPAR to new concerns relating to potential effects of organotins (cf. DIFF 99/3/Info.1). Organic tin compounds had recently been identified in harbour porpoises and grey seals from England and Wales and in a range of marine organisms, including harbour porpoises, from the Polish coast of the Baltic Sea. Organic tin compounds had also been identified in sperm whales stranded on the Dutch and Danish coasts, thereby illustrating their widespread distribution as marine pollutants. Reported experimental effects of butyl tins in mammals include immunosuppression, and they might also interact with the endocrine system in marine mammals. They can also pass through the blood-brain barrier.

2.8 Information and concerns of the same nature as outlined in paragraph 2.6 were presented to OSPAR 1999 by WWF (cf. OSPAR 99/4/19), which outlined the accumulation and impact of organotins on marine mammals, seabirds and fish for human consumption.

2.9 The table below, taken from the progress report of the 4th International Conference on the Protection of the North Sea (4thNSC), shows figures of the estimated inputs of tributyl tin (TBT) and triphenyl tin (TPT) to water and the estimated percent reductions from 1985-1995 for the NSC countries. It should be noted that the character of the figures vary between countries, as is explained by the footnotes.

Estimated inputs to water of TBT and TPT in tonnes in 1995 and estimated reductions from 1985-1995
(source: Progress Report of the 4thNSC)

	TBT 1995 (t)	TBT red. %	TPT 1995(t)	TPT red. %
Belgium	*15-24* (i)	*4*	*0,5* (k)	-
Denmark (a)	*15,8* (j)	*0*	*0*	-
France (b)	-	-	-	-
Germany (c)	*0,05*	*88*	-	-
Netherlands (d)	*5,7*	*45*		
Norway (e)	*19*	*64*	*1*	*>65*
Sweden (f)	*7*	*>50*	*0*	-
Switzerland (g)	*0*	-	*0*	-
UK (h)	*0,02-0,1*	*>50*	*ca. 0 - 0,09*	-

Explanatory notes to the table:

a. point discharges for Denmark as a whole; 20% is discharged to the North Sea;
b. in France, measurements of these substances have been performed since 1991; but at present it is not appropriate to calculate inputs and reduction percentages;
c. point discharges includes rivers Rhine, Elbe, Weser, Ems and discharges into coastal waters; reductions for 1985-1990;
d. TBT and TPT figures are combined; no distinction has been made;
e. point discharges and losses from diffuse sources;
f. quantities sold in 1992;
g. point discharges into the Swiss Rhine basin;
h. low and high annual estimates averaged over 1991-93 are given; 1985 input estimates are not available and data are insufficient to determine specific reductions. However, where phase out or significant reductions in sales/uses are known, anticipated reductions in inputs are indicated;
i. TBT in antifouling paint sold in 1988;
j. sold quantity. % reductions calculated for the period 1986-93;
k. TPT in antifouling paint sold in 1988.

2.10 The OSPAR Report on the Use of Pesticides in Agriculture, Horticulture and Forestry by Contracting Parties to the Paris Commission (published by OSPAR in 1996) provides information on the agricultural uses of triphenyl tin (TPT) and tributyl tin (TBT). The use of TBT in agriculture is not allowed and indeed seems to have disappeared. Table 2 in this report presents information on the agricultural use of TPT. It had a relatively high use in Belgium (69,6 t), The Netherlands (152 t) and also had important uses in Germany (< 100 t) and the UK (61,1 t). TPT was not approved for use in France, Ireland, Norway or Sweden. Portugal noted that TPT was not recognised in that country. Recent information from Finland indicates that TPT has earlier been used as an agricultural acaricide in Finland but is currently not authorised for any pesticide purpose in Finland.

2.11 The OSPAR Report on the Non-agricultural Use of Pesticides (published by OSPAR in 1999) provides information on uses, types of application, available substitutes and environmental impact of triphenyl tin (TPT) and tributyl tin (TBT) compounds:

TPT: antifouling (minor use);

TBT: antifouling (widespread use): wood-preservation, fungicide in paint, specialist biocide for plastics, in-can preservative, preservation of film.

The following substitutes for antifouling use of organic tin compounds are being used or are in development: copper, metal-free chemical products (e.g. triazine compounds), products which are based on silicone to prevent organisms sticking to ships' hulls or biological biocides; electrochemical methods and improvement in mechanical cleaning methods (foils).

2.12 Several times, the issue of tributyl tin compounds has been discussed by the OSPAR Working Group on Inputs into the Marine Environment (INPUT). As a reply to a request for information, The Netherlands presented a document entitled 'Emissions and Riverine Input to the Convention Area of TBT Compounds in The Netherlands' to INPUT 1996 (cf. INPUT 96/11/3). The conclusions drawn in this document showed that the main source of tributyl tin is leaching from sea ship hulls and that contributions from inland sources are negligible. No added information can be expected from riverine input, since it is perfectly clear that sea ship traffic and docking activities are the main activities that bring along emissions of TBT.

2.13 As a follow up to this document, INPUT 1996 and ASMO 1997 agreed that the OSPAR Secretariat should contact the International Maritime Organisation (IMO) with a view to determining whether the IMO could provide estimates or quantitative data on tributyl tin inputs to the maritime area due to shipping. However, it emerged that the IMO has no recent information on this topic.

2.14 INPUT(1) 1998 and ASMO 1998 considered information on studies of the inputs of the antifouling substances Irgarol, Diuron and Sea-Nine 211 which are used as alternatives to tributyl tin (TBT). These alternatives might have the same types of unwanted environmental effects as TBT has (cf. ASMO 98/5/5 – ASMO 98/5/5 Add.2)[1]. ASMO 1998 agreed to recommend that Contracting Parties should:

a. report to INPUT national estimates of inputs of the alternative antifouling agents Irgarol, Diuron and Sea-Nine 211;

b. consider including monitoring of the alternative antifoulings in national monitoring programmes/surveys and to inform SIME of their plans in this respect.

Moreover, in relation to the OSPAR Strategy with regard to Hazardous Substances and the implementation of the principle of substitution set out therein, Denmark was invited to submit relevant information to DIFF and to the IMO.

2.15 The inputs of triphenyl tin compounds have never been on the agenda of INPUT.

[1] More information on the intrinsic properties of Sea Nine 211 has become available. This information has not yet been examined by OSPAR. The information might warrant a re-evaluation of the statement in section 2.14 with regard to this alternative. Actions related to the final assessment of this and other alternatives are identified and described in sections 5.3 and 5.4.

CHAPTER 3 - DESIRED REDUCTION

3.1 Organic tin compounds are on the OSPAR List of Chemicals for Priority Action (cf. Annex 2 of the OSPAR Strategy with regard to Hazardous Substances). The OSPAR objective with regard to hazardous substances on this list is to prevent pollution of the maritime area by continuing to reduce discharges, emissions and losses of hazardous substances, with the ultimate aim of achieving concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances. Every endeavour will be made to move towards the target of cessation of discharges, emissions and losses of hazardous substances by the year 2020.

3.2 Organic tin compounds can be considered as man-made synthetic substances. Therefore, the final concentration in the marine environment that ideally has to be reached is close to zero. The ecotoxicological assessment criteria for tributyl tin, as adopted by ASMO 1997 (cf. paragraph 2.1c) can be used as an intermediate target to monitor the progress in reaching the close-to-zero concentration.

3.3 The target to aim for is the cessation of discharges, emissions and losses of organic tin compounds by the year 2020. As an interim target, efforts can be focused on the main sources. The information on sources, pathways and inputs in chapter 2 indicates that as yet:

a. **the main primary source of tributyl tin** is leaching from sea ship hulls. The related main activities that cause emissions of tributyl tin compounds are sea ship traffic, docking activities and dumping of dredged material;

b. **the main primary source of triphenyl tin** is agricultural use.

CHAPTER 4 - IDENTIFICATION OF POSSIBLE MEASURES

OSPAR

4.1 At the moment, two PARCOM Recommendations on tributyl tins are applicable under the OSPAR Convention:

- PARCOM Recommendation 87/1 on the use of tributyl-compounds;
- PARCOM Recommendation 88/1 on measures to reduce organotin compounds reaching the aquatic environment through docking activities.

It should be noted that these PARCOM Recommendations are not part of the OSPAR BAT/BEP review activities.

4.2 At the Ministerial Meeting of the OSPAR Commission in 1998, Ministers made the following political commitment (cf. Sintra Statement):

> "*We shall co-operate, especially in the work of the International Maritime Organisation, to tackle threats to the marine environment from shipping through banning the use of tributyl tin antifouling treatment and replacing them with clean antifouling systems.*"

4.3 Triphenyl tin compounds are not specifically regulated under OSPAR. PARCOM Recommendation 94/7 on the Elaboration of National Action Plans and Best Environmental Practice for the Reduction of Inputs to the Environment of Pesticides from Agricultural Use provides for general actions with respect to pesticides. Implementation reports for this PARCOM Recommendation were available at DIFF 1999.

4.4 The OSPAR Report on the Use of Pesticides in Agriculture, Horticulture and Forestry by Contracting Parties to the Paris Commission (published by OSPAR in 1996), provides detailed information on application rates, crops treated and pests controlled, available substitutes and restrictions on uses of triphenyl tin. TPTs are mainly used for the control of fungal infections on potato and some other minor uses.

Dithiocarbamates, tolylfluamid and fluazinam are mentioned as substitutes for controlling fungal infections on potato. Restriction in uses is reached by e.g. a 10 m water protection zone.

4.5 The management of dredged materials containing identified hazardous substances such as organic tin compounds is regulated by the OSPAR Guidelines on the Management of Dredged Materials (OSPAR reference number 1998-20) and any programmes or measures adopted under Annex II of the OSPAR Convention.

HELCOM

4.6 HELCOM has adopted a recommendation concerning antifouling paints containing organotin compounds. A format for implementation reporting is available. A revision of the recommendation is in progress.

European Community

4.7 The marketing and use of organic tin compounds as antifoulings is restricted under Directive 1999/51/EC of the Commission of 26 May 1999 adapting to technical progress for the fifth time Annex I to Council Directive 76/769/EEC (on the approximations of the laws, regulations, and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (tin, PCP and cadmium)) as follows:

"Organostannic compounds

1. *May not be placed on the market for use as substances and constituents of preparations when acting as biocides in free association antifouling paint.*
2. *May not be used as substances and constituents of preparations when acting as biocides to prevent the fouling by microorganisms, plants or animals of:*
   (a) the hulls of:
      - *boats of an overall length, as defined by ISO 8666, of less than 25 metres;*
      - *vessels of any length for use predominantly on inland waterways and lakes;*
   (b) cages, floats, net and any other appliances or equipment used for fish or shellfish farming;
   (c) any totally or partly submerged appliance or equipment.

   Such substances and preparations
   - *may be placed on the market only in packages of a capacity equal to or greater than 20 litres;*
   - *may not be sold to the general public but only to professional users.*

   Without prejudice to the application of other Community provisions on the classification, packaging and labelling of dangerous substances and preparations, the packaging of such preparations shall be legible and indelibly marked as follows:

   "Not to be used on boats of an overall length of less than 25 metres, or on vessels of any length for use predominantly on inland waterways and lakes, or any appliances or equipment used in fish or shellfish farming."

   "Restricted to professional users".
3. *The provisions referred to in Section 2(a) and the special labelling provisions of Section 2 are applicable to Sweden and Austria from 1 January 2003 and will be reviewed by the Commission in cooperation with Member States and stakeholders before this date.*
4. *May not be used as substances and constituents of preparations intended for the use in the treatment of industrial waters."*

4.8 Moreover, antifouling products are included in the Council Directive 98/8/EC on placing on the market of biocides. After full implementation of this Directive, all active substances have to be assessed and approved on the Community level and all the biocidal products have to be authorised by the Member States. Concerning antifouling products, a specific exemption has been given relating to specific acceptance criteria. By way of derogation from these criteria, Member States may, however, authorise an antifouling product used on commercial public service and naval seagoing vessels for a period of up to 10 years from the date of this Directive entering into force, if similar fouling control cannot be achieved by other practicable means.

When implementing this provision, Member States shall, if appropriate, take into account relevant IMO resolutions and recommendations.

4.9 The agricultural use of triphenyl tin will be assessed within the framework of Council Directive 91/414/EEC concerning the placing of plant protection products on the market. The use of existing substances that will not be defended will probably be allowed only until the 26th of July 2003. As effective less hazardous alternatives are available, it was expected that the use of TPT as a plant protection product will not be defended. However, information has been provided in order to defend the use of triphenyl tin as a plant protection product and at present it is unclear whether it will be allowed to use TPT after 2003.

Marine Environment Protection Committee of the International Maritime Organisation (MEPC-IMO)

4.10 IMO MEPC 42 prepared and agreed in November 1998 a draft assembly resolution on anti-fouling systems used on ships. By adopting this resolution in November 1999, the Assembly:

a. urges the MEPC to work toward the expeditious development of a global legally-binding instrument to address the harmful effects of anti-fouling systems used on ships;

b. agrees that the globally instrument to be developed by MEPC should ensure a global prohibition on the application of organotin compounds which act as biocides in anti-fouling systems on ships by 1 January 2003, and a complete prohibition on the presence of organotin compounds acting as biocides on ships by 1 January 2008;

c. calls upon various actions for the development of anti-fouling systems which do not adversely degrade the marine environment.

4.11 MEPC 43 (28 June 2 - July 1999) has further developed the basic structure and content of the legally-binding instrument and has discussed the methodology on the assessment of less and preferably non hazardous substitutes for organic tin compounds. After an intense debate and a roll call vote in the plenary session, MEPC 43 expressed their support for holding a Diplomatic Conference in the next biennium. The Council of the IMO agreed to MEPC's request for a Diplomatic Conference in 2001. The purpose of this conference would be to create an internationally legally-binding instrument to prohibit the use of harmful antifouling systems. MEPC 44 (March 2000) made good progress in developing the draft international convention on the control of harmful anti-fouling systems.

4.12 The information on ship trials with non-toxic antifouling paints on the German coast, presented by WWF at OSPAR 1999 (cf. OSPAR 99/4/16 Rev.1), underlines the availability of effective non-toxic alternatives to organotin antifoulings.

North Sea Conference

4.13 Ministers at the 4th International Conference on the Protection of the North Sea (4thNSC) made the following political commitment (cf. paragraph 42 v c/d of the Esbjerg Declaration):

"to take concerted action within the International Maritime Organisation (IMO) in order:

.....

c) to ultimately phase out the use of tributyl tin compounds on all ships world wide; and

d. to promote environmentally safe antifouling technologies."

4.14 In the progress report of the 4thNSC it is stated that the IMO has concluded that a total ban on the use of TBT compounds would not be justified on cost/benefit grounds and, furthermore, that alternative antifouling systems were not available at present. Nevertheless, the IMO urged Governments to take appropriate steps to reduce the use of TBT paints on small ships and those operating in coastal waters, to develop guidelines for sound dockyard practices and to continue efforts to develop environmentally less harmful antifouling alternatives.

4.15 Ministers at the 4thNSC also made the following political commitment (cf. paragraph 27 of the Esbjerg Declaration):

> *"The Ministers of EU Member States agree, within the framework of Council Directive 91/414/EEC concerning the placing of plant protection products on the market, to give priority to review pesticides that have been detected in the North Sea (see Annex 2, Appendix 1, Esbjerg Declaration) or might pose a risk to the marine environment and to carry through any action thus indicated."*

Organotin pesticides are included in the list at Annex 2, Appendix 1 of the Esbjerg Declaration.

UN POP Convention

4.16 Within the UN, preparations/negotiations are ongoing to arrive at a new UN Persistent Organic Pollution (POP) Convention. In this context, discussions take place on the criteria for inclusion of new substances in this Convention. Depending on those criteria, TBT might be considered for inclusion.

CHAPTER 5 - CHOICE FOR ACTION/MEASURES

5.1 In the light of the preceding chapters and especially the information on the main sources and the existing measures, the following activities on organic tin compounds were undertaken within OSPAR since 1998.

Activities related to diffuse sources

5.2 In order to assess the effectiveness of applicable OSPAR measures on organic tin compounds used as antifoulings, the implementation reporting on PARCOM Recommendations 87/1 and 88/1 has been carried out in 1999 to enable a verification of the need for further measures within the OSPAR framework. The results of the implementation reporting has been discussed and assessed by DIFF and PRAM and the overview assessment report was agreed for publication on the OSPAR web site. The main conclusions of the report concerned the need for further work on the application on sea going vessels, quality standards for marine waters and discharges from shipyards. In the overview assessment report it was concluded that reporting on the implementation of both PARCOM Recommendation 87/1 and PARCOM Recommendation 88/1 is valuable in the future to obtain information on the progress of:

- the further reduction of (the use of) organotin antifoulings, especially the application on sea going vessels;
- the development of measures to reduce organotin compounds reaching the aquatic environment through docking activities;
- the adoption of quality standards on organotin compounds for sea water;
- implementation by those Contracting Parties that have not reported until now.

5.3 The International Maritime Organisation (IMO) is the right framework to draw up programmes and measures related to the ban on tributyl tin compounds on sea going ships and that, besides good co-operation of OSPAR-countries within the IMO (cf. Sintra Statement), no OSPAR activities are needed to formulate measures. The IMO work on programmes and measures include the necessary actions to avoid the substitution of organotin antifouling by other antifouling systems containing hazardous substances. This line of action by OSPAR entails in practice that national delegations to OSPAR should contact their representatives at IMO/MEPC to ensure an unambiguous contribution and support of all OSPAR countries within the IMO. This concerted action of OSPAR countries within the IMO might consist of coordination at European Community level. A large degree of considerable coordination of OSPAR Contracting Parties is already facilitated by the coordinated position of the EU Member States in the IMO negotiations. The EU could explore with the non-EU OSPAR Contracting Parties (Switzerland, Norway and Iceland) the possibility of presenting a broader common position or coordination of positions in these negotiations. OSPAR's Hazardous Substance Committee (HSC) is the appropriate OSPAR body to monitor and examine

the progress achieved within the IMO, including the progress on substitutes. If progress within the IMO is considered to be too slow, development of additional OSPAR actions/measures on organotin antifouling for sea going vessels, based on the various existing national measures/actions, might be considered (cf. OSPAR overview assessment of the implementation of PARCOM Recommendations 87/1 and 88/1, published on the OSPAR web site in 2000).

5.4 Besides the actions related to the IMO (cf. paragraph 5.3), no further specific actions have been identified on the potential alternative antifouling agents Irgarol, Diuron and Sea-Nine 211 in relation to OSPAR's Strategy with regard to Hazardous Substances and the implementation of the principle of substitution set out therein. Consideration of these and other substitutes within OSPAR can be taken into account in the application of the DYNAMEC mechanism.

5.5 As effective less hazardous alternatives are available, there seems no need to further allow the agricultural use of organotins, especially triphenyl tin. Within the framework of Directive 91/414/EEC, a development towards a ban on the placing on the market of organotins as plant protection products will possibly take place within the near future. Regulation within the EC framework might be the most appropriate way of action. The Hazardous Substance Committee is the appropriate OSPAR subsidiary body to monitor progress on the developments within the EC and to decide whether to urge the EC, via a formal request from OSPAR to the EC, to work towards a ban on the placing on the market of organotins as plant protection products. If the use of organotins as plant protection products will not be banned within the framework of Directive 91/414/EEC, HSC should reconsider the necessity of additional measures within OSPAR.

Activities related to point sources

5.6 At this stage there is no need for action on (industrial discharges from) production/formulation of organic tin compounds.

5.7 The discussion on releases of organic tin compounds from shipyards resulted in an agreement to include shipyards as a candidate sector in POINT's 1999/2000 work programme. This work should be carried out by The Netherlands as lead country and focus on emissions and discharges of hazardous substances (and not only organic tin) from cleaning, stripping and conservation of ship hulls. The implementation reporting on PARCOM Recommendation 88/1 showed that a lack of information exists on (the impact of) emissions/discharges from shipyards and the effectiveness of existing measures. POINT 1999 therefore agreed that the justification document for inclusion of shipyards on the work programme, presented by The Netherlands to POINT 1999 (cf. POINT 99/11/1), should be further elaborated and presented for consideration at the meeting of POINT (or its successor) in 2000. This elaboration will be accommodated by collecting the necessary information via a questionnaire.

Activities related to the offshore oil and gas industry and to dredged materials

5.8 There is no need for separate OSPAR action on TBT with respect to shipping and TBT sources related to the offshore oil and gas industry. Any further action in this field should be pursued in the form of concerted action from OSPAR Contracting Parties within the framework of the IMO (cf. paragraph 5.2).

5.9 The OSPAR Strategy with regard to Hazardous Substances recognises that the management of dredged materials containing hazardous substances requires special consideration because of the existing occurrence of such substances in sediments and the problem of their removal. The management of such materials, including those that are contaminated with organic tin compounds, is regulated by the OSPAR Guidelines for the Management of Dredged Materials. In this context, it was agreed that these OSPAR Guidelines should be reviewed after Contracting Parties had gained some experience with their application and use. This review should take into account, amongst others, the work carried out within OSPAR on substances identified for priority action. To facilitate this review with respect to organotin compounds, SEBA 1999 agreed that Contracting Parties should forward by 1 April 1999 information to The Netherlands

on levels of TBT in sediments of ports and harbours and the problems experienced as regards analysis of TBT in sediments.

Activities related to inputs into the marine environment

5.10 France, UK and The Netherlands will calculate (Denmark already has calculated) national estimates of inputs of tributyl tin and the alternative antifouling agents Irgarol and Diuron, with the intention of giving insight in the extent of the problem of the use of these hazardous alternatives. An overview report of the results will be considered by INPUT (or its successor).

Activities related to monitoring and assessment in the marine environment

5.11 Contracting Parties have been invited to consider alternative antifouling substances for inclusion in their national monitoring programmes/surveys and to inform SIME of their plans in this respect. Denmark informed SIME that Irgarol and Diuron were covered by the Danish monitoring programme. Sea-Nine 211 had not been included in particular because suitable sampling methods were not available, but ongoing research was intended to fill this gap. The UK informed SIME that they had some ongoing work on 'booster' biocides and that this work would develop some relevant data. Pending the availability of more information, the UK would consider which future monitoring actions on alternative antifouling substances might be necessary.

5.12 The JAMP work and the work on ecotoxicological assessment criteria related to tributyl tin will be continued. The 1999 ICES/ACME Report contains an update to mid-1999 on the distribution and effects of tributyl tin. At SIME 2000, the UK presented results from a survey on the effects of TBT on dogwhelk and periwinkle communities between 1992 and 1998 in the coastal regions of a number of Contracting Parties (cf. SIME 00/5/8). SIME and ASMO 2000 agreed to recommend to OSPAR 2000 to make trend monitoring of levels and effects of TBT mandatory for all Contracting Parties from 1 January 2003 onwards under OSPAR's Coordinated Environmental Monitoring Programme (CEMP). As the reporting on the implementation of PARCOM Recommendation 87/1 shows that not all Contracting Parties have adopted a quality standard for organic tin compounds in sea water, the adoption of such a standard might be stimulated by this SIME work.

5.13 Moreover, it has been concluded that triphenyl tin should be included as part of national and co-ordinated monitoring programmes. Therefore, issue 1.3 of OSPAR's Joint Assessment and Monitoring Programme (JAMP) on TBT has been revised by expanding this JAMP issue to cover all organic tin compounds.

Verification of the identified activities by the holistic Quality Status Report 2000 for the OSPAR Convention Area

5.14 The Quality Status Report 2000 (QSR 2000) confirms and subscribes the need for priority action towards organotins. In the QSR 2000 it is concluded that:

- the issues covered by the OSPAR Strategy with regard to Hazardous Substances (particularly with regard to organotin antifouling treatments) are among the most important issues raised by the assessment in all five regions;
- vessels with a length of more than 25 m using TBT antifouling paints represent the main source of TBT for the marine environment (for which action within the IMO is most appropriate);
- monitoring of the impacts of alternatives to organotin antifouling treatments (for example, copper and booster biocides) should be urgently undertaken;
- the measures in PARCOM Recommendations 87/1 and 88/1 should be completed with the development of a measure on BAT for the disposal of organic tin wastes resulting from the removal of such anti-fouling treatments from ships.

The last conclusion might be included in the work programme of the appropriate OSPAR subsidiary body without the need for a preceding justification document.

5.15 The need for priority action is demonstrated and justified in the QSR 2000 by monitoring results of concentrations and effects (e.g. imposex) of organotins in sediments, sea water and organisms. There is a significant correlation between shipping intensity and TBT levels in biota/sediments and the occurrence of imposex. The ecotoxicological assessment criteria (EAC) for TBT are extremely low and many of the reported data significantly exceed these values. A practical difficulty is that EAC for TBT and the actual concentrations are often lower than the detection limit.

Summary of actions

5.16 The identified actions in the sections 5.1 to 5.13 can be summarised as follows:

Source/Issue	**Proposed Action to be taken by OSPAR**
Shipping	1a to examine and assess implementation reports from Contracting Parties on PARCOM Recommendation 87/1 (on organotins); 1b to arrange for concerted action of OSPAR countries within the IMO on the drawing up of programmes and measures for a ban on organotin antifoulings on sea ships; 1c to communicate to the IMO (via a letter) the request of OSPAR for achieving a ban on organotin antifoulings without delay; 1d to monitor and examine the achieved progress within the IMO (including the progress on substitutes for organotins) and, if progress is too slow, development of additional OSPAR actions/measures on organotin antifouling;
Agriculture	2 to monitor the progress on the developments within the EC on a development towards a ban on the placing on the market of organotins as plant protection products (within the framework of Directive 91/414). If the use of organotins as plant protection products will not be banned within that framework, the necessity of additional measures within OSPAR should be reconsidered.
Dredged materials	3 to collect information on TBT levels in dredged materials and sediments in ports/harbours and on problems experienced as regards analysis of TBT in sediments
Shipyards	4a to examine and assess implementation reports from Contracting Parties on PARCOM Recommendation 88/1 (organotins related to docking activities) 4b to consider to develop measures on shipyards with focus on emissions and discharges of hazardous substances (not only organotins) from cleaning, stripping and conversation of ship hulls
Inputs to the marine environment	5 to collect information on inputs of organotins and alternative antifouling agents
Monitoring and assessment in the marine environment	6a Contracting Parties to monitor (on a mandatory basis) concentrations and effects of TBT and TPT 6b Contracting Parties to consider to include alternative antifoulings in monitoring programmes

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ANNEX 1: MONITORING STRATEGY FOR ORGANIC TIN COMPOUNDS

As part of the Joint Assessment and Monitoring Programme (*reference number 2003-22*), OSPAR 2004 adopted an Agreement on monitoring strategies for OSPAR Chemicals for Priority Chemicals (*reference number 2004-15*) to implement the following monitoring for tracking progress towards the objectives of the OSPAR Hazardous Substances Strategy (*reference number 2003-21*) with regard to organic tin compounds. The Monitoring Strategy for organic tin compounds will be updated as and when necessary, and redirected in the light of subsequent experience.

A. Explanatory Note and Supporting Considerations

Nature of the substances that are addressed

The OSPAR list of chemicals for priority action includes organic tin compounds as a group with no further specification on individual substances. The OSPAR Background Document on organic tin compounds as adopted in 2000 focuses on tributyltins (TBT) and triphenyltins (TPT). At a later stage, attention has also been paid to other organic tin compounds such as mono- and dibutyltins (DBT). This monitoring strategy addresses TBT, TPT and DBT. Organic tin compounds are man-made substances; the subsequent objectives that have to be checked are the cessation target for discharges, emissions and losses and a concentration close to zero in the marine environment.

Analytical methods

Suitable methods for chemical analyses of organic tin compounds and for related biological effects are available and appropriate quality assurance is already in place within OSPAR for measurements in sediments and for measurements of biological effects:

- *JAMP guidelines available for monitoring contaminants in sediments, especially Annex 4 'determination of TBT' – adopted in 1999, revised in 2002 – OSPAR Other agreement 2002-16.*
- ***JAMP Guidelines available for contaminant-specific biological effects monitoring (adopted in 1997), especially technical annex 3 on 'TBT-specific biological effects monitoring' (revised in 2003) OSPAR Other agreement 2003-10.***

As a consequence, there are no obstacles of an analytical nature preventing the development of a broad monitoring strategy for organic tin compounds. Ongoing technical improvements e.g. on the sensitivity of the method, will find their way to revised JAMP guidelines. Organotin analyses are expensive, costs are 250-500 Euro per analysis.

Production and use

At the moment, production and (some) use of organic tin compounds takes place in OSPAR countries and will continue for a while. Therefore, the monitoring strategy for organotins addresses both releases to the environment and the concentrations and effects in the marine environment.

Source monitoring

In the Background Document, various relevant sources and pathways for organotin releases have been identified. Releases to ambient air of organic tin compounds are negligible. Releases to water concern both diffuse and point sources and land-based and sea-based sources, i.e.

a. losses due to antifouling use (and removal of antifouling) – main source in the past;

b. losses due to pesticide use;

c. losses due to use as stabiliser in plastics;

d. discharges at production sites.

These sources are considered in paragraphs 5-10. The major uses (as antifouling and pesticide) have been banned recently. These bans make it more complicated to collect data on use in practice, as the only correct formal information on use data is 'use is zero'.

LOSSES DUE TO USE AS ANTIFOULING – LEACHING FROM SHIPS IN FRESH WATER AND MARINE WATER

Since 2003, a general ban exists on the use of TBT as antifouling on all ships. This is laid down in an IMO Convention and also implemented by EU Legislation; the IMO Convention is not in force yet, as not enough Contracting States have ratified yet. Within OSPAR, information on the use as antifouling is at the moment collected via implementation reporting on PARCOM Recommendations 87/1 and 88/1. The last round of implementation reporting resulted in some quantitative information on use and sale statistics. Use and sale statistics seems the most appropriate instrument to trace progress in reaching the cessation target for losses due to antifouling use. However, as use as antifouling is at least not allowed anymore in the EU, it is probably more realistic not to focus on collection of use/sale data (as use should be zero) but to obtain qualitative information on problems in the implementation and enforcement of the PARCOM Recommendations, the IMO Convention and the related EU Legislation. To collect this information the format for implementation reporting of the PARCOM recommendations will be revised (i.e. by deletion of the part dealing with use data and inclusion of a question dealing with eventual enforcement problems) and implementation reporting should be continued for the time being. For antifouling leaching in fresh water this could be accompanied by a one-off survey of riverine input of TBT via the main rivers to verify whether the ban is well implemented by every single (inland) ship which should result in a decline in riverine TBT input into the marine area. Information on the TBT content of sediments in ports and of dredged materials dumped into the marine area is also an instrument to trace progress on the ban on sea ships.

LOSSES/DISCHARGES AT SHIPYARDS DUE TO THE REMOVAL FROM ANTIFOULING SYSTEMS

Implementation reports on PARCOM recommendations 87/1 and 88/1 contain mainly qualitative descriptions on the use as antifouling and releases via shipyards. The present implementation reporting format asks for qualitative information on discharges/losses via shipyards. A very limited set of discharge figures concerning shipyards was received during the last round of implementation reporting (2001). Shipyards are not addressed in EPER and IPPC Directive and might be addressed at European level via the WFD in relation to the priority substance TBT. Formally, in 2008 all organotin antifouling has to be removed from all ships due to the IMO convention and no organotin discharges/losses should occur from shipyards from 2008 onwards. In practice, the presence of some ships with organotin antifouling will continue also after 2008 due to problems with the timely ratification of the IMO Convention by all relevant countries in the world and the consequent implementation and enforcement.

In order to assess the progress in reaching the cessation target for organotin releases from shipyards there is a need (to continue) to collect information on organotin discharges and losses via improved implementation reporting on Recommendations 87/1 and 88/1. Contracting Parties are therefore urged to fully answer question 5 in part B of the existing implementation format.

LOSSES DUE TO PESTICIDE USE

Most of the pesticide use of organotins has been banned recently within the EU-framework. Information on the use and losses to the environment of the pesticide TPT has been collected in the past within the North Sea Ministerial Conference (NSMC) Framework. Due to the recent bans, it is not proposed to start within OSPAR the collection of the same information on TPT as has been done within the NSMC-framework. In order to assess the implementation of the ban and the achievement of the cessation target for the many widespread diffuse losses, OSPAR will take steps to organise a one-off surveys riverine input data of TPT of main rivers, which if necessary, should be repeated in future.

DISCHARGES AT PRODUCTION SITES FOR ORGANOTINS AND AT PRODUCTION SITES FOR PRODUCTS CONTAINING ORGANOTINS

The production of organotins and (consumer) products containing organotins is covered by the IPPC-Directive. TBT is part of EPER, the reporting system under the IPPC-Directive (Commission Decision 2000/479/EC, 17 July 2000) – first round of EPER reporting was in 2003. TBT in the discharges of the production sites can be considered as a marker and representative for other organotins. OSPAR will therefore examine the EPER information to assess whether the cessation target has been achieved.

RELEASES TO WATER DUE TO THE USE OF PLASTICS AND OTHER (CONSUMER) PRODUCTS WITH ORGANOTIN-BASED STABILISERS

This is a rather recently identified source. The losses to the environment seem to be minor. A further assessment of whether this source needs attention in relation to the cessation target for organotins will be made. If monitoring seems to be necessary at a later stage, use and sales statistics or information of presence

of DBT and TBT in effluents of urban waste water treatment plants seems most appropriate to be able to check progress on the cessation target.

DISCHARGE/EMISSION LIMIT VALUES

There are no discharge or emission limit values for organotins in the present OSPAR Decisions/Recommendations or in the present relevant EU-legislation. Assessment of information on discharges and losses should be carried out in the light of the cessation target.

Environmental monitoring

No emissions to ambient air are expected and as a consequence atmospheric deposition of organotins is not relevant. Organotins are not part of CAMP and there is no need to change this situation.

As leaching from antifouling from sea ships are sea based diffuse sources, concentrations in the marine environment of organotins and related biological effects have been measured in the past. This should at least continue as long as there are sea ships with organotin antifouling in the convention area or related releases from contaminated sediments and dumped dredged materials from harbours. Under the CEMP monitoring of TBT in sediments and of biological effects of TBT will continue. These arrangements will be reviewed in the light of the assessment of CEMP data in 2004/05 and this review will also take into account the results of the North Sea Pilot Project with respect to the ecological quality objective on imposex in dogwhelks (nucella lapillus). No Background/Reference Concentration (B/RC) has been determined for TBT but OSPAR Ecotoxicological Assessment Criteria (EAC) have been set for TBT in water, sediment and mussels (OSPAR Other agreement 1997-15). Assessment criteria for TBT-specific biological effects are under development.

Sources of organotins other than TBT are mainly land-based. For these organotins, it is considered to be not appropriate to start monitoring in the marine environment.

In accordance with section 5 on antifouling use, OSPAR will continue the reporting on organotin loads via dredged material dumped in the marine environment within the framework of the annual OSPAR reporting on Dumping of Wastes.

In accordance with sections 5 and 7, OSPAR will to collect information on riverine input to be able to check progress on some widespread diffuse sources, where associated uses have been banned recently. TBT is on the list of Priority Hazardous substances of EU Water Framework Directive (annex X of this Directive) and as a consequence TBT has to be measured in fresh waters and could be combined with OSPAR RID flow data to calculate riverine input (assuming that the sampling stations are the same). For other organotins, the identification of pressures and impacts through the Water Framework Directive catchment assessments might be an opportunity to collect information on riverine input. OSPAR will have a one-off survey of riverine input of organotins (TBT, TPT and the degradation product DBT), in order to check whether riverine input of organotins is that low that it corresponds with the cessation/ban of the use of organotins as antifouling and pesticide. In this one-off survey best use should be made on the material available from the WFD as described above. If a one-off survey shows that riverine input of organotins is still present, such a survey should be repeated after some time.

Assessment tools

The development of assessment criteria for TBT-specific biological effects should be continued and finalised. There is no need to develop further assessment tools. The present EAC and the cessation target for discharges and losses are sufficient and it is not appropriate to formulate discharge and emission limit values other than the cessation target.

B. Resulting monitoring strategy

ORGANIC TIN COMPOUNDS MONITORING STRATEGY	
Implementation of actions and measures	• Examination of progress in the implementation of regulations on marketing and use of TBT, specifically PARCOM Recommendations, the IMO Convention and the related EU legislation, through a revision to the reporting format of PARCOM Recommendations 87/1 and 88/1
Discharges and losses to water	• Examination and assessment of trends in data on discharges from production sites reported annually by Contracting Parties to EPER • Collection of information on organotin discharges and losses from shipyards, through improved implementation reporting on Recommendations 87/1 and 88/1
Riverine inputs	• An exploratory one-off survey of riverine input of TBT, TPT and DBT will be carried out
Maritime area:	
Dredged materials	• Continued reporting to OSPAR of the concentrations of TBT in dredged materials disposed to the maritime area
Concentrations in sediments	• Monitoring of TBT will continue under the CEMP • Where available, data should be compiled from EC WFD monitoring
Concentrations in water	• Where available, data should be compiled from EC WFD monitoring
Biological effects	• Monitoring of the biological effects of TBT will continue under the CEMP but will be reviewed in the light of conclusions on the North Sea Pilot Project EcoQO on imposex in dogwhelks

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