Sources, consumer exposure and risks of organotin contamination in seafood

Final report of the European Commission Research Project "OT-SAFE" (QLK1-2001-01437)

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Abstract

The aim of the OT-SAFE project (QLK1-CT-2001-01437) was to establish the risk of tributyltin (TBT) for the European seafood consumer. The organotin compound tributyltin is very effective as an anti-fouling agent, and has therefore been added to many ship-paint formulations to keep ship hulls free from algae, barnacles and other fouling organisms. Although its use is now restricted TBT can still be found in the environment and can also still be found in seafood.

To devise a sampling strategy, all principal partners and subcontractors selected the most important seafood species, based upon a ranking list in terms of consumed amounts, weighted by a factor related to the expected TBT levels. For the distribution of the total number of samples between the countries the national consumptions were taken into account: for countries with high seafood consumption more species were selected than for countries with low seafood consumption.

Following the species selection, all principal partners and subcontractors traced down the most important catching locations of the species selected. Finally, all principal partners and subcontractors have selected the number of sampling moments, based upon an equal distribution over the catching and collecting season. On the average, about three locations per sample were selected and about two sampling moments per location. Countries with high seafood consumption (southern Europe) had more samples selected than countries with low seafood consumption (northern and central Europe).

All principal partners have determined TBT in the selected species of their own country and of one or two of the countries of subcontractors. All partners have long-term experience in the field of analysis of marine organisms for organotin compounds. For quality control, a certified reference material BCR-477 (tin species in mussel tissue) was distributed by ENEA. To further assist in quality control, ultra-pure standards were made available by IVM. The analysis of blanks was set mandatory as well.

In order to be able to take into consideration the breakdown of TBT during cooking, ENEA had selected different representative ways of mussel preparation, and applied them to mussels collected from a highly contaminated location. Mussels with high-expected TBT levels were used in order to detect significant changes in concentration, which might not be possible if the levels were near or below the limit of quantification. A total of 15 kg of mussels was cleaned and randomly subdivided into four groups in order to ensure inter-sample homogeneity. Samples from one group were directly analysed for the determination of organotin concentration levels in raw mussels; samples from the other three groups have been cooked following different European cooking recipes. Ingredients without any presumable effect on TBT degradation, like garlic, onion, pepper, etc have not been considered in order to minimize the matrix problems. However, ingredients that could have some effect on the final TBT content of the cooked mussels by influencing the cooking temperature or by a potential extraction solvent effect, like oil and wine, were taken into consideration.

TBT is never completely degraded after cooking and in some cases only a slight decrease of TBT concentration is observed. In particular, the TBT concentration in mussels cooked by microwave, steaming and boiling procedures was never lower than 70 % of the initial concentration. A significant TBT decrease, down to 40 % of the initial concentration, was observed only after cooking mussels in frying pan with wine or oil and when shelled, or when boiling the mussels for unrealistically long periods, e.g. 60 minutes. An industrial steaming process was also investigated, but this did not produce any significant breakdown of TBT.

Seafood consumption data have been compiled. Food consumption patterns however, are extremely difficult to capture. The most common type of survey that comes anywhere near recording consumption patterns is the food consumption survey. For reasons of practicality these surveys are usually conducted over a limited amount of time per subject, which results in (usually a large number of) snapshots of people's actual consumption. It is important to realise that food consumption surveys often do not focus on seafood at all, let alone individual species. For a number of countries no food consumption surveys were recovered at all. For these countries more crude data, such as import and export data, market data and catches and landings data were used. In the European setting, where it is unlikely that individuals catch considerable amounts of fish for their own consumption, all of these figures must be considered to produce overestimations of the actual average consumption.

Based on the analyses that had been performed and consumption data, intake levels were calculated and compared to the known tolerable daily intake (TDI).

In general it is fair to say that to be at risk of exceeding the TDI for TBT as a result of seafood consumption one has to be a high consumer of seafood *and* one has to consume seafood with a higher-than-average concentration. The average concentrations of TBT for the whole of set of European counties in the project or indeed for separate countries are such that most European consumers can consume their seafood without having to worry about TBT.

There is some concern however, about sardines in Greece, and molluscs are a cause for concern in Portugal and especially Italy. These cases need to be further investigated however, before there can be certainty about whether measures have to be taken and which measures are appropriate.

1. Introduction

TBT

The organotin compound tributyltin (TBT) is very effective as an anti-fouling agent, and has therefore been added to many ship-paint formulations to keep ship hulls free from algae, barnacles and other fouling organisms. In the late 1970s, the compound was shown to have distinct adverse effects on the farming of oysters. This and other adverse effects on aquatic ecosystems, such as imposex in marine snail species (the development of male sexual organs in female specimens), resulted in a ban on the application of TBT on small ships (smaller than 25 m) in many EU countries and North America. In Japan the use of TBT-based ship paints was recently banned completely. Notwithstanding this (partial) ban, TBT can still be encountered in the environment, because of its continued use on larger ships, its slow degradation and strong sorption to suspended matter and sediment (Fent, 1996). Relatively high levels can be found in areas with high shipping densities, such as commercial harbours, waterways and busy shipping lanes (Fent, 1996; Ten Hallers-Tjabbes et al., 1994). TBT also accumulates through the food chain, resulting in the occurrence of this compound as well as its breakdown products in fish, squid, shellfish and in top predators as whales, dolphins, seals and fish-eating birds (Kannan & Falandysz, 1997; Madhusree et al., 1997; Tanabe et al., 1998).

Banning the use of TBT on small ships and cleaner drydock practices have reduced the input in some areas, but as a result of very slow degradation of historic pollution in sediment (Fent, 1996), the environmental burden is likely to remain high for many years. In areas mainly affected by TBT from larger vessels no substantial changes in environmental levels are expected. This implies that TBT will continue to accumulate through the food chain and reach seafood products intended for human consumption.

Tolerable Daily Intake of TBT

The tolerable daily intake (TDI) for TBT is 0.25 μg per kg body weight per day (Penninks, 1993) and is widely accepted among researchers from industries, academia, and regulatory agencies. This value is based on the observed effect of TBT on the immune function in rats. Because of uncertainties in human-rat toxicity extrapolation, human-rat kinetics extrapolation, and inter-individual differences for both toxicity and kinetics, a safety factor of 100 was used for the final calculation of the TDI. For the breakdown product DBT no TDI has been derived, although there are indications that this compound is similar in toxicokinetics and –dynamics. Based on comparable effect levels for DBT and TBT and based on the same safety factors, an indicative TDI of 0.25 μg DBT per kg bodyweight per day can be derived.

Fate of TBT during seafood preparation

It is known that organotin compounds such as TBT undergo slow degradation in sediment or biota samples when stored for longer periods at ambient temperatures or higher (Gomez-Ariza et al., 1999). However, the effect of short-term heating, for instance during cooking or frying, is not known. In Europe, most seafood (except maybe oysters) is consumed after some form of heat treatment, but it is unclear whether this would significantly reduce the actual exposure to TBT.

Risk of TBT in seafood

Consensus exists regarding the Tolerable Daily Intake (TDI) for TBT set at 0.25 μg per kg bodyweight per day. The discussion on the risks of TBT is therefore not focussed on the TDI or effects, but on the exposure and the resulting risk for humans consuming seafood products. The onset to this discussion was given by Kannan and Falandysz (1997), who showed that organotin levels in muscle tissue of several fish species from the Baltic Sea intended for human consumption approached or exceeded the Tolerable Daily Intake (TDI) for humans. Based on these observations, the authors expressed their concern and the need for seafood consumption advisory guidelines. However, this conclusion was rejected by others (Keithly et al., 1997; Robinson et al., 1999). Based on fish samples from markets in eight countries around the world, these authors concluded that 'the data suggest that commercially marketed seafood caught from traditional fishery grounds poses negligible risk to the average consumer'.

This discussion prompted an extensive literature study (Belfroid et al., 2000) that revealed that for the majority of countries no data on TBT levels in seafood products are available and that therefore for these countries the claim has no scientific basis. Regarding the eight European countries for which (limited) information was available, the data showed that in the case of at least three countries one or more samples exceeded the level that is considered to pose no risk. In Italy, also the average TBT level in the seafood samples exceeded this level, implying that in this country the average consumer is exposed to TBT levels that are not considered safe. Several parameters were not taken into account in this study, such as statistical variation in consumer weight and seafood consumption, species preferences and import/export patterns.

In conclusion, since only few studies have been carried out on the occurrence of TBT in seafood and the implications for human health, it is still not clear whether the present TBT levels may pose a risk or not. It has not been possible to make a thorough risk assessment because of a lack of data on TBT in seafood and a lack of statistical information. This reports describes the results of a study aimed to fill this gap in knowledge.

2. Objectives

The overall goal of this project is to assess whether there is a reason for concern regarding human exposure to TBT through seafood from the European market. There are three major objectives:

1. To compile an EU-wide database on TBT levels in seafood from major fishing grounds and shellfish farms, identifying high-risk areas. Samples collected in 4-5 areas in 11 countries in different seasons will be analysed for TBT;
2. To determine the fate of TBT in seafood during preparation (e.g., cooking, baking, frying, etc.);
3. The results obtained in 1) and 2) and consumer statistics from the 11 countries involved will form the basis of a risk assessment. Maximum residue limits for TBT in seafood will be estimated, and consumer groups at risk will be identified taking into account the statistical variation in seafood consumption, species preferences, consumer weight and import/export patterns.

If found necessary, the results of this study will be used to assist authorities in drafting seafood advisory guidelines.

3. Outline

The project can be subdivided into the following items.

- Collection of existing data on TBT in seafood, from scientific literature and reports not made public, to identify species with high TBT levels, to assist in species selection;
- Collection of seafood import and export data to identify the most important seafood species in terms of amounts, to assist in species selection;
- Collection of consumption patterns, to identify the most important seafood species in terms of amounts, to assist in species selection;
- Selection of seafood species, based upon high consumption levels and high potential TBT levels, with sampling locations, based upon importance for consumption, and number of sampling moments for each species, as to allow for seasonal influences;
- Sampling of the selected seafood species at the selected locations and moments, for analysis on TBT;
- Analysis of the samples seafood species on TBT, to be taken as input for the risk assessment;
- Collection of household seafood preparation ways, to identify the most important preparation ways in terms of occurrence, to be applied during the study of TBT breakdown during seafood preparation;
- Study of TBT breakdown during household seafood preparation, to be taken into consideration at the risk assessment;
- Study of TBT breakdown during industrial seafood preparation, to be taken into consideration at the risk assessment;
- Collection of detailed consumption patterns, to identify groups with high seafood consumption and/or high vulnerability for exposure to TBT (e.g., children), to be taken into consideration at the risk assessment;
- Collection of data on other sources of TBT exposure, to be taken into consideration at the risk assessment;
- Risk assessment for TBT and seafood consumers, based upon TBT levels in collected seafood samples, TBT breakdown during seafood preparation, seafood consumption, the established tolerable daily intake, body weight and other TBT exposure sources, to identify possible consumer groups at risk and to advise maximum residue levels.

The work has been performed by a consortium of principal partners and subcontractors. The principal partners include:

- Institute for Environmental Studies - Vrije Universiteit Amsterdam - Vereniging voor Christelijk Wetenschappelijk Onderwijs, Amsterdam, The Netherlands (IVM);
- Italian Agency for New Technology, Energy and the Environment, Roma, Italy (ENEA);
- Université de Pau et des Pays de l'Adour, Pau, France (UPPA);
- GALAB Technologies GmbH, Geesthacht, Germany (GALABr);
- Universidad de Huelva, Huelva, Spain (UHCR);

- The Minister of Agriculture, Fisheries and Food, London, United Kingdom (CEFAS);
- Centre National de la Recherche Scientifique, Paris, France (CNRS).

The subcontractors include:

- Minister of the Flemish Community, Centre for Agricultural Research, Ostende, Belgium;
- Umeå University, Umeå, Sweden;
- University of the Aegean, Mytilene, Greece;
- Faculdade de Ciências - Universidade do Porto, Porto, Portugal;
- Szent István University, Budapest, Hungary;
- Association pour le développement de l'enseignement et des recherches auprès des universités, des centres de recherche es entreprises d'Aquitaine, Pessac, France.

4. Collection of existing data

Scope

To identify species with high TBT levels, to assist in species selection.

Methods

All principal partners and subcontractors are experts in the field of TBT analysis and have an up-to-date record of their scientific publications. For unpublished reports, all have contacted national fisheries and public health institutes. The information is collected by UPPA and IVM in the form of an Excel-file and made public on the project website. Only non-confidential information is taken into consideration.

Results

Data turned out to be very scanty. Only in France, Italy, Spain, Portugal, Germany and the United Kingdom data could be retrieved. It should be noted that only non-confidential data have been included. IVM has collected the data and published them in the form of an Excel-based database on the project website. An overview of the results is given in Annex I.

Conclusions

The data collected was insufficient to allow for any detail with regard to species or location within Europe in the process of species selection. The data was only used to provide estimates of the expected TBT concentration per taxonomic group (see Table 4.1).

Table 1 Estimated expected TBT concentrations for European seafood.

Taxonomic group	Average concentration (ng/g TBT/net weight)	Range (ng/g TBT/net weight)
Molluscs	228	1816-1
Fish	20	56-2
Cephalopods	354	655-8
Crustaceans	8	14-3

5. Collection of import and export data

Scope

To identify the most important seafood species in terms of amounts, to assist in species selection.

Methods

All principal partners and subcontractors collected information on import and export of seafood.

Results

Import and export data have been compiled by IVM. The most extensive database however, is the FISHSTAT PLUS database made publicly available by the FAO, which can be downloaded from the FAO website (http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp, 2004). Incorporation of this data into the project database turned out not to be feasible. For that, import and export streams are far too complex. In most countries, import and export streams mask the national consumption making it very difficult to derive useful information with regard to actual seafood consumption from these data.

Conclusions

Import and export streams often mask the actual national consumption, the import and export data could only to a limited extent be used to assist in the selection of the most important species. Some import/export data has been used to support assumptions as to where certain parts of a country's consumption were coming from.

6. Collection of consumption patterns

Scope

To identify the most important seafood species in terms of amounts, to assist in species selection.

Methods

All principal partners and subcontractors have collected information from their national food consumption pattern programs or, if unavailable, from their national market, and/or landings data recorded by the national fisheries or food institutes. The information is collected by the responsible partner in the form of a report and made public on the project website.

Results

Seafood consumption data have been compiled by IVM and published in the form of a report on the project website. Food consumption patterns however, are extremely difficult to capture. The most common type of survey that comes anywhere near recording consumption patterns is the food consumption survey. For reasons of practicality these surveys are usually conducted over a limited amount of time per subject, which results in (usually a large number of) snapshots of people's actual consumption.

In the early stages of the OT-SAFE project the choice was made to try and identify people's seafood consumption per species. Although this choice is justifiable, it is important to realise that food consumption surveys often do not focus on seafood at all, let alone individual species eaten as seafood. Aggregated categories with names such as "white fish", "fish, moderately fat", etcetera were the rule rather than the exception and were as such often of limited use for the OT-SAFE project.

For a number of countries no food consumption surveys were recovered at all. For these countries more crude data, such as import and export data, market data and catches and landings data were used. In the European setting, where it is unlikely that individuals catch considerable amounts of fish for their own consumption, all of these figures must be considered to produce overestimations of the actual average consumption.

No data was found on consumer weight, sex or age that could be linked in a useful way to seafood consumption. Especially in the case of children this is unfortunate, as they are known to be capable of eating relatively large amounts of food in relation to their bodyweight.

Conclusions

The ideal of having per country per species lists of consumption figures that could then be combined with the new measured values for TBT could not be achieved. The lack of reliable consumption data, that the consortium had not foreseen, forced us to take a significantly more limited approach, whereby only taxonomic groups were distinguished. An overview of these data is given in Table 6.1.

Table 6.1 Estimates of European seafood consumption per taxonomic group (gram/day); (ncr =no consumption recorded).

	Part of the population	Fish	Molluscs	Cephalo-pods	Crusta-ceans
Belgium	Consumers	13.4	0.7	ncr	ncr
Belgium	High consumers >95%	47.7	0.7	ncr	ncr
France	Consumers	37.6	12.0	18.2	14.9
France	High consumers >95%	94.3	23.0	29.7	33.6
Germany	Consumers	36.6	18.4	ncr	11.6
Germany	High consumers >97.5%	157.7	125.0	ncr	38.4
Greece[#]	General population	35.6	6.0	6.0	6.0
Greece[#]	High consumers 95%	106.1	86.0	86.0	86.0
Hungary	General population; based on internal supply (uncorrected)	3.1	0.0	ncr	ncr
Italy	Consumers	43.6	34.1	ncr	20.9
Italy	General population	23.5	6.2	ncr	1.4
Netherlands	General population	9.2	0.5	ncr	0.3
Netherlands	High population	16.0	0.6	ncr	0.6
Portugal	General population; based on internal supply (uncorrected)	129.7	1.6	4.1	2.1
Spain	General population	59.8	19.6	5.9	3.2
Sweden	General population	30.5	2.8	ncr	ncr
United Kingdom[#]	General population	19.4	1.0	1.0	1.0

[#] For UK and GR the non-fish is reported together so these are the maximum possible values.

Although most of the figures presented have simply been copied from the original data (source given in Table 6.2), in some cases, some adjustments have been made. This was the case for Italy, Germany and Greece where the original data included more detailed categories of (high) *consumers* than our four taxonomic groups. The problem here is that when average consumption figures for (high) *consumers* are presented, it is unclear how many there are, and that one does not know how much overlap exists between groups of consumers. In other words: is someone who is counted in group A as a consumer the same person as the consumer in group B or is this a different person? In this case simply adding the figures of such more detailed categories would only represent the unlikely case that someone is a (high) consumer in *each* category. This would lead to an overestimation of consumption. The approach we chose for such occasions was as follows: for each sub-category we assumed that a high consumer in that sub-category would have the general mean consumption in all other relevant sub-categories. In the case of three sub-categories (e.g. fish A, B &C) that leads to three different estimates for the total in the overall category (fish). These were then averaged to come to one final figure.

Although various point of criticism can be made, this method has one pleasant advantage: It produces a figure higher than the average of the only the sub-category values (a clear underestimation, because this equates to taking the average of those high consumers in each sub-category that consume *no* food from another sub-category), whilst giving a figure below the sum of the (high) consumer figures of each category which would equate to people who are a (high) consumer in all categories.

Table 6.2 Sources of seafood data.

Belgium	SCOOP report (DG SANCO, 2003)
France	OFIMER report "Family consumption of aquatic products" (OFIMER, 2000) + SCOOP report (DG SANCO, 2003)
Germany	SCOOP report (DG SANCO, 2003)
Greece	Greek national household budget survey, conducted in 1998-1999 (National statistical service of Greece, 1999)
Hungary	FAO data (FAO Database, 2001)
Italy	INN-CA Study 1994-1996 (Turrini et al., 2001)
Netherlands	Food consumption Survey 1997-1998 (Kistemaker et al., 1998)
Portugal	FAO data (FAO Database, 2001)
Spain	The Nutrition and Feeding National Study (Universidad Complutense de Madrid, 1991)
Sweden	Food intake survey, National Food Administration (Becker, 1989)
United Kingdom	FAO (FAO Database, 2001)

7. Selection of seafood species, locations and sampling moments

Scope

To select species at important sampling locations and moments, for field sampling.

Methods

At a first project meeting, all principal partners and subcontractors have selected the most important seafood species, based upon a ranking list in terms of consumed amounts, that is weighed by a factor related to the expected TBT levels. For the distribution of the total number of samples between the countries the national consumptions were taken into account: for countries with high seafood consumption more species were selected than for countries with low seafood consumption. Moreover, double sampling of species from approximately the same location at more than one country was avoided as much as possible (e.g., North Sea herring for the Dutch and German market).

Following the species selection, all principal partners and subcontractors have traced down the most important catch and breed locations of the species selected, based upon amounts. Finally, all principal partners and subcontractors have selected the number of sampling moments, based upon an equal distribution over the catching and collecting season, with a maximum period of one year.

Results

The results of the seafood species, sampling location and sampling moment selection are given in report compiled by UPPA (F. Pannier, Report on the selection of seafood species for TBT analysis in European countries – WP1 Building the database on TBT in seafood in Europe, May 2002). The report has been made available on the project website by IVM. Annex II summarises the results. Table 7.1 summarises the results in terms of number of species, locations and sampling moments per country.

On the average, about three locations per sample were selected and about two sampling moments per location. Countries with high seafood consumption (southern Europe) had more samples selected than countries with low seafood consumption (northern and central Europe).

Conclusions

Species selection was possible on the basis of the national consumption data and resulted in 25 species from 89 different locations, resulting in 170 samples. That is approximately 16 samples per country - however, for countries with high seafood consumption more samples were selected than for countries with low seafood consumption.

Table 7.1 Number of seafood species, locations and total samples selected per country.

Country	Number of species	Number of locations	Number of samples
Belgium	3	3	6
France	3	8	16
Germany	3	3	6
Greece	5	9	17
Hungary	3	3	6
Italy	3	12	23
Netherlands	3	4	10
Portugal	10	13	19
Spain	7	19	38
Sweden	3	4	8
United Kingdom	5	11	21
All	*25*	*89*	*170*

8. Sampling of seafood

Scope

Collection of samples to be analysed on TBT for risk assessment.

Methods

All principal partners and subcontractors have sampled the selected species at the selected locations and moments, following sampling guidelines based upon ICES guidelines (http://www.ices.dk/env/refcodes/guidelines.asp?topic=sample), of which were taken the following points: a) a sample should consist of 25 fish or large crustaceans such as crabs or lobsters, 50 mussels or other molluscs, or 100 small crustaceans such as shrimps; b) sampling should be conducted prior to spawning of the species concerned.

For large fish, 25 whole fish are replaced by 25 fillets, chunks, etc. The same principle is used in case of sampling cans from supermarkets: different supermarkets, different lots (if possible), coated/uncoated cans (if possible) are all purchased in the smallest units/portions possible, to arrive at a total of approximately 1-2 kg pooled sample.

All principal partners and subcontractors have prepared the samples by dissection of the edible parts that were homogenised and, in case of transportation to an external laboratory, freeze-dried. The water content was determined in the wet samples.

The subcontractors have sent their samples to the principal partners, with precautions to keep the sample at cold temperature, according to the following scheme: Belgian and Swedish samples were sent to CEFAS in the United Kingdom, Portuguese samples to GALAB in Germany, Hungarian samples to UHCR in Spain and Greek samples to IVM in The Netherlands.

The results for both the seafood sampling had to be reported on special sheets, to which also information concerning the chemical analyses had to be included (see Annex III).

Results

The actual sampling results followed the selected species, locations and moments closely. Deviations resulted from natural fluctuations in species occurrence at the selected locations and moments (whelk in the U.K.), earlier than anticipated end of catching seasons (Dutch herring), absence of catches due to oil spills (Northwest Spain), and so on. In many cases, alternatives could be sampled. Also, a considerable number of additional species were collected.

Annex IV contains the information on the species sampled and analysed, their sampling locations and sampling times. Table 8.1 gives an overview in terms of number of species, locations and sampling moments per country.

Table 8.1 Number of seafood species, locations and totals actually sampled per country.

Country	Number of species	Number of locations	Number of samples
Belgium	3	4	11
France	3	8	16
Germany	4	9	24
Greece	7	15	24
Hungary	3	3	6
Italy	2	37	55
Netherlands	3	5	12
Portugal	11	17	25
Spain	7	19	32
Sweden	3	5	8
United Kingdom	5	13	22
All	*25*	*135*	*235*

Conclusions

Actual sampling followed the planned sampling closely. Very few planned samples had to be cancelled or substituted for reasons beyond control. A relatively high number of extra samples were collected. Sampling followed the afore-set quality criteria.

9. Analysis of seafood samples

Scope

To generate TBT data, to be taken as input for the risk assessment.

Methods

All principal partners have determined TBT in the selected species of their own country and of one or two of the countries of subcontractors. All partners have long-term experience in the field of analysis of marine organisms for organotin compounds and have participated in several certification projects for reference materials (BCR-462, tin species in coastal sediment; BCR-477, tin species in mussel tissue; BCR-646, tin species in freshwater sediment). Annex V gives an overview of the analytical methods involved, which is summarised in Table 9.1. For quality control, a certified reference material BCR-477 (tin species in mussel tissue) was distributed by ENEA. All partners should be able to meet the following quality criteria for this reference material: accuracy 75 – 110 % of the certified value, max. 15 % relative standard deviation of the reproducibility. To further assist in quality control, ultra-pure standards were made available by IVM. The analysis of blanks was set mandatory as well. The results for both the seafood samples and the quality control samples had to be reported on special sheets, to which also sampling information had to be included (see Annex III).

Table 9.1 Summary of analytical methods.

Partner	Derivatisation	Determination
CEFAS	Hydride	GC-FPD
ENEA	Pentyl	GS-MSD
GALAB	Ethyl	MIP-AES
IVM	Pentyl	GC-MSD
UHCR	Pentyl	GC-FPD
UPPA	Hydride/ethyl	QF-AAS/GC-FPD

Results

The results of the analysis of the samples seafood species on TBT are given in Annex VII. This annex also includes the results for the quality control samples. The latter are summarised in Table 9.2 and Figure 9.1. The quality criteria as formulated above are met.

Table 9.3 summarises the TBT concentrations in seafood. For each species, minimum, maximum, median and average values (with standard deviations) are given for each country and for all countries. These data are also given for different levels of aggregation, such as species families and classes. A graphical presentation of the results is displayed in Annex VII, Figures 9.2-9.11.

Table 9.2 Accuracy (expressed as percentages found of certified values) and reproducibility (expressed as relative standard deviation) for TBT in BCR-477.

Partner	Accuracy	Reproducibility
CEFAS	90	9
ENEA	97	8
GALAB	102	7
IVM	80	7
UHCR	81	1
UPPA	96	6

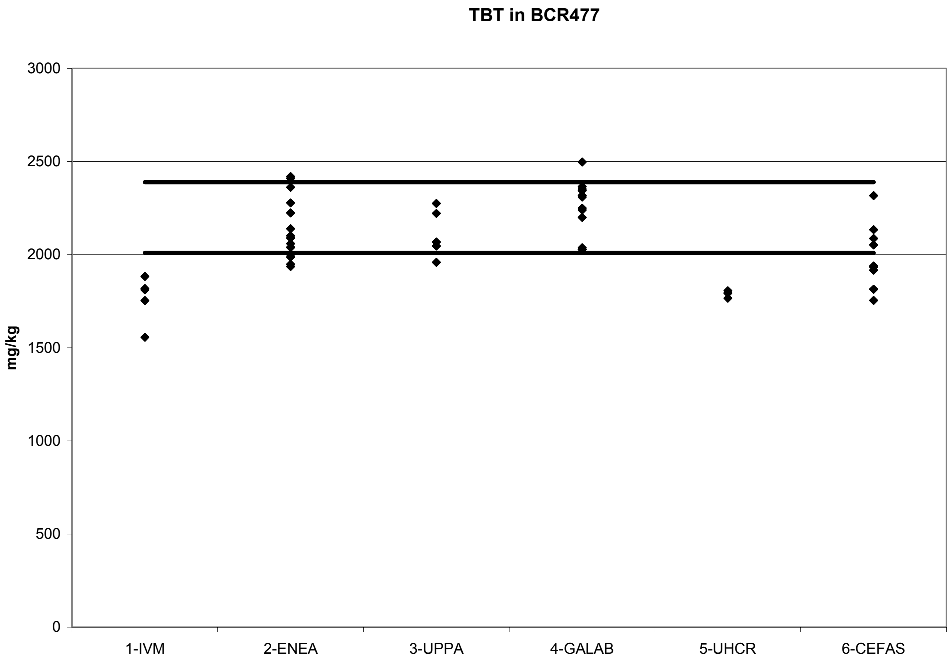

Figure 9.1 TBT in BCR-477 (the horizontals represent the 95 percent confidence interval of the certified value; the black diamonds represent the individual results as reported by the laboratories).

Average TBT levels over all species and countries increase in the order fish, crustaceans and mollusca. This is not surprising in view of the existing knowledge that fish are able to metabolise TBT and mollusca are not (knowledge about crustaceans was not existing).

Within the mollusca, high levels are found for bivalves only; cephalopods and gastropods have much lower values. For crustaceans, only shrimp were analysed. Within the fish category, the herring's family is clearly the most contaminated.

The high levels in the mollusca are more related to the country than to the species. Italian samples (mussels and clams, no cockles and oysters have been analysed) and, to a lesser extent, Portuguese samples (mussels, clams and cockles, no oysters have been analysed) are always high. Samples from other countries, Greece, Spain, France (mussels only) and the Netherlands and the United Kingdom (mussels and oysters) are always low.

Table 9.3 TBT levels in seafood, minimum and maximum values, medians and averages (with standard deviations) in mg cation per g fresh weight.

Species	Family	Class	Country	Min	Max	Med	Av	Sd	N
Herring			DE	1	38	5	11	14	13
			HU	1	15	8	8	6	4
			NL	9	51	30	30	29	2
			SE	2	10	5	5	4	4
			All	*1*	*51*	*5*	*11*	*14*	*23*
Anchovy			ES	4	30	17	19	10	5
			GR	31	51	38	39	7	5
			All	*4*	*51*	*31*	*29*	*14*	*10*
Sardines			ES	18	35	32	29	7	6
			GR	46	491	86	208	246	3
			PT	13	30	18	20	7	4
			All	*13*	*491*	*30*	*68*	*129*	*13*
	Herrings			1	491	17	31	72	46
Plaice			BE	2	2	2	2	0	2
Sole			ES	1	11	1	3	4	5
	Flat-fish			1	11	1	3	4	7
Cod			PT	2	2	2	2		1
			UK	4	4	4	4		1
			All	*2*	*4*	*3*	*3*	*2*	*2*
Hake			HU	1	1	1	1	0	2
			PT	1	3	2	2	1	2
			All	*1*	*3*	*1*	*1*	*1*	*4*
Pollack			DE	1	2	1	1	0	4
Haddock			UK	2	2	2	2		1
Pouting			PT	0	0	0	0	0	2
Whiting			ES	1	22	10	11	8	5
			NL	2	4	4	3	1	3
			All	*1*	*22*	*5*	*8*	*7*	*8*
	Codfish			0	22	2	4	6	21
Mackerel			PT	4	6	5	5	1	2
Tuna			DE	1	4	3	2	1	5
	Scombridae			1	6	3	3	2	7
Salmon			BE	2	2	2	2	0	2
			DE	1	8	8	6	4	4
			FR	6	7	6	6	1	2
			SE	2	11	7	7	6	2
			All	*1*	*11*	*6*	*6*	*3*	*10*
Sea bream			GR	13	13	13	13		1
Sea bass			GR	2	7	4	4	4	2
		Fish		*0*	*491*	*5*	*17*	*52*	*94*
Shrimp			BE	13	199	89	96	58	7
			ES	2	5	3	3	1	6
			PT	0	6	3	3	4	2
			All	*0*	*199*	*6*	*46*	*61*	*15*
		Crustaceans		*0*	*199*	*6*	*46*	*61*	*15*
Mussels			ES	26	26	26	26		1

Species	Family	Class	Country	Min	Max	Med	Av	Sd	N
			FR	5	64	13	24	24	6
			GR	8	30	12	14	7	9
			IT	32	751	144	202	181	36
			NL	5	20	16	14	6	6
			PT	70	100	85	85	21	2
			UK	6	52	9	16	14	10
			All	*5*	*751*	*41*	*114*	*159*	*70*
Clam			IT	15	289	197	175	79	19
			PT	33	275	154	154	171	2
			All	*15*	*289*	*197*	*173*	*84*	*21*
Oyster			FR	3	27	11	13	9	8
			UK	2	62	36	30	22	7
			All	*2*	*62*	*15*	*21*	*18*	*15*
Cockles			PT	64	240	152	152	124	2
	Bivalves			2	751	49	113	140	8
Squid			ES	4	24	12	13	10	4
			GR	1	4	3	3	2	2
			All	*1*	*24*	*5*	*10*	*10*	*6*
Octopus			GR	1	29	15	15	20	2
			PT	0	27	5	8	10	6
			All	*0*	*29*	*5*	*10*	*12*	*8*
	Cephalopods			0	29	5	10	10	14
Whelk			UK	2	18	2	7	9	3
	Gastropods			2	18	2	7	9	3
		Mollusca		*0*	*751*	*35*	*99*	*135*	*125*
All				*0*	*751*	*15*	*63*	*112*	*234*

Country codes: BE=Belgium, FR=France, DE=Germany, GR=Greece, HU=Hungary, IT=Italy, NL=Netherlands, PT=Portugal, ES=Spain, SE=Sweden, UK=United Kingdom.

The high average level for shrimp is caused by the Belgian shrimp only. Spanish and Portuguese shrimp show low levels. For the herrings, the high average level is caused by the Greek sardines only. Again, the Spanish and Portuguese samples show low levels (as do the other members of the herring family, anchovy (including the Greek samples) and herring).

In general, the conclusion is that Italian and Portuguese bivalves show high TBT levels as do Greek sardines and Belgian shrimp. For the Italian bivalves this conclusion is not very surprising in view of the general high contamination level of the Mediterranean near the coast of Italy as well as the afore-mentioned fact that bivalves are known to be unable to metabolise TBT. The Portuguese bivalves, however, are sampled in the presumably less contaminated Atlantic, so the results for these samples are somewhat surprising. Surprising too are the results for the Greek sardines and Belgian shrimp, because 1) these species show low levels when from other countries, 2) sardines are expected to metabolise TBT and 3) the Belgian location (North Sea) is not expected to be highly contaminated.

Finally, it should be noted that this section deals with the results for all samples, including those that cannot be considered representative for consumer groups; the latter will not be included in risk assessment.

Conclusions

On average, the TBT levels found seem to follow the expected trends: low levels for fish and high levels for bivalves. Upon a closer look however, the geographical factor is as important: Italian and Portuguese bivalves, Belgian shrimp and Greek sardines show high levels were these species from other countries do not. Only in case of the Italian bivalves a satisfying explanation can be found: they come from a relatively highly contaminated Mediterranean location and cannot metabolise TBT.

10. Collection of household seafood preparation ways

Scope

To identify the most important preparation ways in terms of occurrence, to be applied during the study of TBT breakdown during seafood preparation.

Methods

All principal partners and subcontractors have typical national mussel recipes and submitted them to ENEA, the partners responsible for the TBT breakdown study during preparation.

Results

Recipes were received from Great Britain, The Netherlands, Portugal, Greece and Italy. From the recipes only the factors with a conceivable effect on TBT were taken into account. These factors were: 1) the way of heating the mussels: steaming, cooking, microwave and pan frying; and 2) the addition of substances that could have a solvent effect: frying oil and wine (because of its alcohol content).

Conclusions

The ways of preparing mussels in the different countries are –understandably- quite similar. There is usually a short period in which the mussels are heated to cook them be it by steam, (partly) submersed or by microwave, and then in some recipes after she short cooking period they are pan-fried. Long cooking periods are not common because this results in a rubbery texture, which makes the mussels difficult to eat.

11. TBT breakdown during household seafood preparation

Scope

TBT breakdown to be taken into consideration at the risk assessment.

Methods

ENEA has selected different and representative ways of mussel preparation, and applied them to mussels collected from a highly contaminated location. Mussels with high-expected TBT levels were used in order to detect significant changes in concentration, which might not be possible if the levels were near or below the limit of quantification.

A total of 15 kg of mussels was cleaned and randomly subdivided into four groups in order to ensure inter-sample homogeneity.

Samples from one group were directly analysed for the determination of organotin concentration levels in raw mussels; samples from the other three groups have been cooked following different European cooking recipes. Recipes from the United Kingdom, The Netherlands, Portugal, Greece and Italy have been considered. Cooking conditions have been chosen to represent the common elements in the different ways of cooking. Furthermore, ingredients without any presumable effect on TBT degradation, like garlic, onion, pepper, etc have not been considered in order to minimize the matrix problems. However, ingredients that could have some effect on the final TBT content of the cooked mussels by influencing the cooking temperature or by a potential extraction solvent effect, like oil and wine, have been taken into consideration. So, mussels were cooked in microwave, by steaming and in a frying pan with and without oil or wine. According to the different recipes, mussels were cooked for different time and with or without the shells. Finally, mussels were also boiled at increasing time, up to 60 minutes, in order to individuate an eventual kinetic of TBT degradation.

All the cooking experiments have been carried out in a dedicated food science laboratory of the Italian nutrition institute (Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione, INRAN).

The selected cooking conditions are reported in Table 11.1. The amount of each batch of mussels was around 250 grams. The temperature was measured just at the end of the cooking procedure for each trial by inserting a thermocouple in the edible part of the mussels.

After cooking the mussels were shelled, homogenized in a blender and stored at -20 °C until analysis. In case of cooking by microwave oven and frying pan procedures, a liquid fraction was present at the end of the cooking. In these cases the liquid fractions were separated from the cooked mussels and separately analysed.

Table 11.1 Selected home cooking conditions.

Cooking procedure	Code	Time of cooking (min)	Seasoning
Microwave	MW-1	2	None
Microwave	MW-2	5	None
Frying pan	FP-1	5	None
Frying pan	FP-2	5	Oil
Frying pan	FP-3	5	Wine
Frying pan shelled mussels	FP-S1	5	Hot oil
Frying pan shelled mussels	FP-S2	7	Hot oil
Steamed	ST-1	Until shell opening	None
Steamed	ST-2	5 min after shell opening	None
Steamed	ST-3	10 min after shell opening	None
Boiled	K-5	5	None
Boiled	K-10	10	None
Boiled	K-20	20	None
Boiled	K-30	30	None
Boiled	K-60	60	None

The same method as for the Italian seafood samples has been used (see Annex V) and the same quality control samples have been used (blanks and BCR-477). The quality criteria are given in Table 11.2.

Table 11.2 Quality criteria for organotins in certified reference material BCR-477.

	Accuracy in percentage of certified value	Relative standard deviation of the reproducibility
TBT	75 - 110	0 - 15
DBT	75 - 125	0 - 15
MBT	75 - 125	0 - 15

Results

Due to the progressive loss of water and mineral salts content during the cooking, particularly in microwave and vapour procedures, the butyltin concentrations on wet weight basis before and after cooking are not comparable. Hence, the absolute amount (nanograms) of analyte found before and after cooking must be considered. Furthermore, due to the slight variation in the initial weight of the different batches of mussels, a normalisation to a common initial batch of 250 grams has been done. The normalized organotin data are reported in Table 11.3.

Organotin compounds in the liquid fractions were always below the detection limit (from 7 $ng.l^{-1}$ to 16 $ng.l^{-1}$) indicating that no significant extraction of butyltins occurred during the cooking.

Table 11.3 Results from home cooking experiments: amount of liquid collected, measured temperature and organotin concentrations (in microgram per 250 g fresh weight mussels) before and after different cooking procedures. Dibutyltin (DBT) and monobutyltin (MBT) are degradation products of TBT.

Treatment code	Collected liquid (ml)	Temperature measured (°C)	TBT (microgram)	DBT (microgram)	MBT (microgram)
Untreated	-	-	14.0	9.8	2.2
MW-1	77	77	7.7	5.0	0.9
MW-2	36	87	11.2	6.2	0.9
FP-1	29	88	9.5	5.5	1.0
FP-2	40	85	7.3	4.6	1.1
FP-3	86	88	5.9	5.0	1.2
FP-S1	32	87	7.4	4.5	0.9
FP-S2	0	99	6.6	5.0	1.3
ST-1	-	76	10.2	6.6	1.6
ST-2	-	89	11.1	7.1	1.3
ST-3	-	91	11.0	7.7	1.7
K-5	-	89	12.1	7.3	1.6
K-10	-	93	13.4	8.8	1.8
K-20	-	89	11.6	8.1	1.8
K-30	-	88	11.8	7.7	1.8
K-60	-	92	8.2	5.0	1.2

Table 11.4 presents the results for the certified reference material BCR-477. The quality criteria, as listed in Table 11.2 are met.

Table 11.4 Accuracy and reproducibility for organotins in BCR-477.

	Accuracy in percentage of certified value	Relative standard deviation of the reproducibility
TBT	97	8
DBT	93	8
MBT	107	12

The data given in Table 11.3 are presented graphically in Annex VII, Figures 11.1-11.6 where a number of comparisons are made. In Figures 11.1-11.3, the comparison of the butyltin amounts in 250 grams of mussels before and after cooking in microwave, frying pan and by steaming, respectively, is reported. The same comparison for increasing boiling time is reported in Figure11.4. Figure 11.5 shows the comparison between the TBT amount in 250 grams of mussels before and after the different cooking procedures. Finally, the comparison between the total butyltin (sum of TBT, DBT and MBT) amount in 250 grams of mussels before and after the different cooking procedures is reported in Figure 11.6.

All the results are average of duplicate trials. The standard deviation of the reproducibility of each couple of replicates was almost always lower than 10 %.

However, taking into account the existence of other eventual uncertainty sources, like for example the differences in the amount of edible part between the different batches of mussels, it has been arbitrarily decided, in a conservative manner, to consider a total uncertainty of 20 % for all the obtained results.

As can be seen from the figures, TBT is never completely degraded after cooking and in some case only a slight decrease of TBT concentration is observed. In particular, the TBT concentration in mussels cooked by microwave, steaming and boiling procedures was never lower than 70 % of the initial concentration. A significant TBT decrease, down to 40 % of the initial concentration, was observed after cooking mussels in frying pan with wine or oil and when shelled.

In general, the temperature reached in the edible part of mussels during the cooking procedures, was almost always ranging between 80 °C and 90 °C because of the high amount of water that the mussels release during the cooking. Only in case of shelled mussels cooked for 7 minutes in hot oil, the temperature goes slightly up, although still remaining under 100 °C.

The data obtained for DBT and MBT showed the same trend as for TBT (see Table 11.3). These trends could indicate a lack of TBT degradation products (DBT and MBT) accumulation even in presence of a small decrease of TBT content. This finding seems to be confirmed by considering the sum of all the butyltin compounds (see Figure 11.6) as the relative observed trend is very similar to the TBT ones.

The kinetic study, carried out by increasing the boiling time (see Figure 11.5 and Table 11.3), showed that no significant degradation of any butyltin compounds was observed for the first 30 minutes whereas a degradation of about 50 % for the three considered analytes was observed after 60 minutes of boiling.

Conclusions

There is no significant loss of TBT during common household mussel cooking procedures. Significant loss only occurs after prolonged heating, a procedure that is not common in most European countries and produces mussels that we expect most people would not want to eat.

12. TBT breakdown during industrial seafood preparation

Scope

TBT breakdown during industrial seafood preparation to be taken into consideration at the risk assessment.

Methods

IVM has selected representative ways of industrial mussel preparation, by enquiring at different processing plants, and applied these procedures to mussels collected by ENEA from a highly contaminated location. Mussels with high-expected TBT levels were used in order to detect significant changes in concentration, which might not be possible if the levels were near or below the limit of quantification. The actual cooking process was conducted at the mussel plant of Roem van Yerseke B.V. (Yerseke, The Netherlands), the subsequent pasteurisation steps and analyses at IVM.

Samples were divided into twelve subsamples of approximately equal size (ca. 800 grams each). Six subsamples (three for analysis of raw mussels and three for spare) were stored at -20 °C and six were combined to a single batch and steamed in the industrial mussel plant. This steaming process was extremely quick with a total exposure time of roughly 90 seconds.

After steaming, the sample was divided into six subsamples of approximately equal size. Three of the subsamples were analysed in singlefold for organotins content. The remaining three were put in a glass jar with vinegar (resulting pH= 4,0–4,2) and pasteurised (30 minutes at 80 °C). After pasteurisation the subsamples were analysed in singlefold.

The same analytical method as for the Dutch seafood samples has been used (see Annex V) and the same quality control samples have been used (blanks and BCR-477). The quality criteria are the same as for the home cooking experiments, see Table 11.2. All subsamples were kept at -20 °C until the moment of analysis, and were analysed at the same time.

Results

Study of TBT breakdown during industrial seafood preparation.

Due to the progressive loss of water and mineral salts content during the storage and during the cooking procedure, the butyltin concentrations on wet weight basis before and after cooking are not comparable and the absolute amount (nanograms) of analyte found before and after cooking have been considered. Furthermore, as the initial weight of the different batches of shelled mussels differed slightly, normalization to a common initial batch of 80 grams of shelled mussels has been done.

The normalized organotin data are reported in Table 12.2. Table 12.3 presents the results for the certified reference material BCR-477. The quality criteria, as described in Table 11.2 are met.

Table 12.1 TBT, DBT and MBT concentrations (microgram cation per 80 g raw shelled mussels), raw, steamed and steamed and pasteurised mussels.

Treatment	TBT	DBT	MBT
None (raw)	10.4	2.0	0.54
Steamed	9.9	2.0	0.41
Steamed and pasteurised in vinegar	7.9	1.7	0.49

Table 12.2 Accuracy and reproducibility for organotins in BCR-477.

	Accuracy in percentage of certified value	Relative standard deviation of the reproducibility
TBT	80	7
DBT	84	11
MBT	90	11

All the results are average of triplicate trials. The standard deviation of the reproducibility of each triplicate trial was almost always lower than 13% (as in the case of home cooking). Taking into account the existence of other eventual uncertainty sources, it has been arbitrarily decided, in a conservative manner, to consider a total uncertainty of 20% for all the obtained results for tests for significance.

In Annex VII, Figure 12.1 the comparison of the butyltin amounts in 80 grams of shelled mussels before and after steaming and steaming plus pasteurization in vinegar is presented graphically. There is an insignificant decrease in TBT levels after steaming and a significant decrease of about 20 % of the initial TBT content after steaming and pasteurization in vinegar. In this last case the utilization of vinegar probably helps organotin extraction as this cooking method can be seen as a classical acidic extraction method.

The comparison between the total butyltin amount in 80 grams of shelled mussels before and after the different industrial cooking procedures is presented in Annex VII, Figure 12.2. The results are the same as for TBT alone: an insignificant decrease after steaming and a significant decrease of about 20 % after steaming and pasteurization in vinegar. These results confirm the hypothesis that extraction into vinegar is the main cause of the TBT reduction, and that degradation of TBT into DBT and MBT has no significant contribution during the short heating times related to industrial cooking.

Conclusions

There is no significant loss of TBT during industrial mussel cooking procedures.

13. Collection of detailed consumption patterns

Scope

To identify groups with high seafood consumption and/or high vulnerability for exposure to TBT (e.g., children), to be taken into consideration at the risk assessment.

Methods

During the project, all principal partners and subcontractors have searched for data of detailed consumption patterns, to improve upon the relatively crude data that was found used for the species selection.

Results

Only the Greek partner retrieved more detailed consumption data. This data is presented in Annex VI.

Conclusions

Detailed consumption data in a form that is suitable for making detailed exposure assessments is either non-existent or not publicly available.

14. Other sources of TBT exposure

Scope

Collection of data on other sources of TBT exposure, to be taken into consideration at the risk assessment.

Methods

A literature search was carried out to identify literature mentioning other sources of TBT exposure and their importance.

Results

Besides antifouling (TBT), organotins are being used as biocides (TPT, Cyhexatin, FBTO), wood preservatives, stabilizers in plastics (mono and dialkyltins) and additive in textiles (TBT, TPT). Whereas use of organotin as antifouling has received the most attention, it is in fact the use as stabilizer that takes the largest share of the world production of organotins (around 70% of world production, Hoch, 2001). These organotins have indeed been identified in several plastics (Takahashi et al., 1999) as well as in surprisingly high concentrations in some textiles and consumer products (Gaaikema and Alberts, 1999; Reus, 2000; Reus en Westerhof 2001, Peeters, 2000). Specifically for TBT however, only two groups of consumer products have attracted attention: silicone-coated baking paper and various textile products. The European Commission's Scientific Committee on Food concluded that in the light of the foreseen phasing-out of the use of organotin in the production of silicone coated baking paper, it does not pose a threat to the European consumer. Janssen et al. arrive at a significant exposure only in their worst-case scenarios that are presented as a first steps in a step-wise investigation towards more and more realistic exposure scenarios (Jansen et al., 2000). After their first refining of the exposure scenario the calculated exposure drops to well below the TDI at which point they stop calculating more refined scenarios.

Conclusions

Exposure of European consumers to TBT via exposure routes other than seafood is relatively insignificant. It is important however, to note that this may not necessarily be true for all other organotins. The EFSA Scientific Panel on contaminants has decided that in future risk assessments TBT, DBT, TPT and DOT (dioctyltin) should together be compared to the TDI of 0.25ug/kg bodyweight as for TBT. As this range of compounds is found in a far wider spectrum of foodstuffs and consumer products, this might lead to very different conclusions.

15. Risk assessment

Scope

To identify possible consumer groups at risk and to advise maximum residue levels.

Methods

The basis for defining what constitutes a high risk and concurrently what defines a high concentration site is the Tolerable Daily Intake (TDI) which is in turn derived from the NOAEL for immunotoxicity in rats (Vos et al., 1990). The World Health Organisation recommends a TDI of 0.3 μg/kg bodyweight (bw) per day (WHO, 1999). This is however a figure that was rounded off so for our calculations we will use 0.25μg/kg bw per day.

For our calculations we assume a bodyweight of 60 kg. The established figure of 0.25μg/kg bw per day means that in that case a safe level is maintained with an intake of 15 μg per day. Although 60 kg is a very common figure for calculations like we present here, it is important to realise that every population, especially if one includes children, has a wide variety in bodyweights, so that not too much emphasis should be placed on the absolute amount of TBT used in the calculations. For example, if in a certain type[1] of seafood a TBT concentration is found that leads to exceeding the TDI if a 60 kg person consumes 180 grams a day, this may seem rather a lot, but the TDI would also be exceeded if a 20 kg person (e.g. a 4-year old) consumes 60 grams.

This study focuses on the risk of TBT-exposure through consumption of seafood. Although there may be other exposure routes, these are assumed not to contribute significantly to the total exposure levels where these levels approach or exceed the TDI, as is explained in Section 14.

Because of the limited consumption data the risk assessment is based on taxonomic groups rather than single species. For specific risks this is further elaborated upon where the underlying data is good enough to allow a more detailed assessment.

For each country a selection is made of which samples should be included into that country's median TBT value per taxonomic group. This selection is based on geography and sometimes on export data. For example: no shrimp were sampled in The Netherlands and Germany. Belgian shrimp were sampled, so in this case these are assumed comparable to Dutch shrimp due to the geographical proximity of the catching area, and as a large part of the German shrimp imports are from The Netherlands, in this case the value for crustaceans used in calculations is the same for Belgium, The Netherlands and Germany.

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[1] A 'type' of seafood is typically a species-origin combination e.g. Dutch mussels, but a combination of species and/or locations is also possible, e.g. molluscs from the Mediterranean.

Based on the appropriate median TBT values and the consumption data the extent to which the TDI of consumers (or the average population) is approached is calculated. Because amounts of seafood consumed by the average population, the average consumer and even the average high consumer in most cases tend to be low compared to the amounts where TBT intakes would approach the TDI more specific calculations are also presented. These calculations are important because the average consumer does not exist as such. Consumption averages by definition cannot shed much light on the extremes that inevitably exist in consumption patterns.

Without going into the question whether deriving Maximum Residue Levels is the most suitable policy option to keep the exposure of the European seafood consumer below acceptable levels we will make recommendations of what such levels might be, if they were implemented.

Results

First of all the consumption estimates are presented in Table 15.1. For details see Section 6. The medians of TBT content in the country specific samples are given in Table 15.2. These are derived from the data presented in Annex IV, but to clarify the process this has been put into a separate Annex VIII.

Table 1 Estimates of European seafood consumption per taxonomic group (gram/day); (ncr=no consumption recorded).

	Part of the population	Fish	Molluscs	Cephalo-pods	Crusta-ceans
Belgium	Consumers	13.4	0.7	ncr	ncr
Belgium	High consumers >95%	47.7	0.7	ncr	ncr
France	Consumers	37.6	12.0	18.2	14.9
France	High consumers >95%	94.3	23.0	29.7	33.6
Germany	Consumers	36.6	18.4	ncr	11.6
Germany	High consumers >97.5%	157.7	125.0	ncr	38.4
Greece[#]	General population	35.6	6.0	6.0	6.0
Greece[#]	High consumers 95%	106.1	86.0	86.0	86.0
Hungary	General population; based on internal supply (uncorrected)	3.1	0.0	ncr	ncr
Italy	Consumers	43.6	34.1	ncr	20.9
Italy	General population	23.5	6.2	ncr	1.4
Netherlands	General population	9.2	0.5	ncr	0.3
Netherlands	High population	16.0	0.6	ncr	0.6
Portugal	General population; based on internal supply (uncorrected)	129.7	1.6	4.1	2.1
Spain	General population	59.8	19.6	5.9	3.2
Sweden	General population	30.5	2.8	ncr	ncr
United Kingdom[#]	General population	19.4	1.0	1.0	1.0

[#] For UK and GR the non-fish is reported together so these are the maximum possible values.

Table 2 Medians of TBT-content (ng/g) of location-specific selections of seafood.

	Fish	Molluscs	Cephalopods	Crustaceans
Belgium	0.4	15	4.4#	89
France	5.7	15	4.4#	5.5#
Germany	3.6	15.5	4.4#	89
Greece	34.5	12	2.4	5.5#
Hungary	0.0	15.5#	4.4#	5.5#
Italy	4.5#	113	4.4#	5.5#
Netherlands	2.0	15.5	4.4#	89
Portugal	4.1	85	4.6	1.0
Spain	13.0	26	12.0	1.0
Sweden	4.0	15.5#	4.4#	5.5#
United Kingdom	3.9	11	4.4#	5.5#

These figures are the median of all samples of all countries in that taxonomic group. These are used where too little information or too few location-specific samples were available to make a selection.

To further clarify what these figures mean and how they compare to possible maximum residue levels the inverse of these figures are given in Table 15.3 multiplied by 15000 giving the amount a 60 kg person would have to eat of this kind of seafood to reach the TDI.

Table 3 Amounts at which a 60 kg individual would reach the TDI (grams per day).

	Fish	Molluscs	Cephalopods	Crustaceans
Belgium	42857	1000	3409	169
France	2618	1000	3409	2727
Germany	4167	968	3409	169
Greece	435	1250	6061	2727
Hungary	inf.	968	3409	2727
Italy	3333	133	3409	2727
Netherlands	7692	968	3409	169
Portugal	3704	176	3261	14634
Spain	1153	575	1244	14634
Sweden	3750	968	3409	2727
United Kingdom	3846	1364	3409	2727

Comparing the amounts of table 15.3 with the actual amounts eaten froom Table 15.1 gives a measure of the risk that is associated with a group of consumers in a certain country. Most amounts from 15.3 however, are so high that there is little use for such a comparison. Therefore we have chosen to describe the different cases in four categories as can be seen in the Conclusions section.

Conclusions

Double low risk countries

The first category consists of countries that have low risk as a result of both low seafood consumption and low TBT content in the location-specific medians of each taxonomic group. These countries are Hungary, Sweden and The United Kingdom. In these countries relatively little seafood is eaten and TBT values are so low that high consuming individuals would have to eat unrealistic amounts (upwards of 1 kg a day) to be at risk of taking in an amount of TBT exceeding the TDI.

Low seafood consumption countries

The second category consists of countries that have a low general consumption of seafood but not low TBT contents in the whole spectrum of seafood eaten. In this category we find the three neighbouring countries Belgium, Germany and The Netherlands. In these countries the general consumption of seafood is low, even if for Germany a high-consuming group was identified. The TBT values for fish, molluscs and cephalopods are low, but in Belgian shrimp relatively high TBT concentrations were found. Belgian shrimp in this case are taken to be comparable to Dutch shrimp due to the geographical proximity of the catching area, whereas a large part of the German shrimp imports are from The Netherlands. The low overall consumption of crustaceans do not exclude the possibility of the existence of small groups of high consumers, while 100% of the TDI (for a 60 kg individual) could be reached with consumption of around 160 grams daily.

High seafood consuming counties with relatively low TBT contents in seafood

France and Spain can be considered high seafood consuming countries. Even though there are marked differences between the two counties (Spain's seafood consumption per capita being around twice that of France), both fit into the same risk category. For both countries considerable amounts of samples were analysed for TBT and the medians of the samples (as well as the averages) are so low that even with high consumption of seafood being common in large section of the French and Spanish population, it seems unlikely that anyone could get near the TDI that way. The amounts need to get near the TDI (for a 60 kg individual) are typically around 1 kg and over, depending on the (group of) species.

High seafood consuming countries with relatively high TBT content in one or more seafoods

The final category is the most serious one, and this category will be described in most detail. For each of the three countries in this category, Greece, Italy and Portugal, samples with high TBT content have been found while the countries have high seafood consumption at the same time.

In the case of Portugal high TBT values were found in samples of clams, cockles and mussels, with the range of TBT values being 32-275 ng/g and a median value of 85 ng/g. Based on the median of all mollusc samples this means that for a 60 kg person 176 grams would constitute exposure at 100% of the TDI. The highest contaminated samples however would produce that exposure level at a consumption of 55 grams a day. The relatively poor consumption information found for Portugal gives very little indication of what amount of clams, cockles and mussels are actually eaten. The levels found however are so high, that it seems very likely that certain parts of the population (e.g. in coastal communities) are exceeding the TDI.

In Italy mussels were found to contain 35-488 ng/g with a median value of 113 ng/g. Based on the median of all mollusc samples this means that for a 60 kg person 133 grams would constitute exposure at 100% of the TDI. The highest contaminated samples however would produce that exposure level at a consumption of just 31 grams a day. Italian consumers of molluscs consume an average of 34.1 grams per day. The size of this group of consumers must be estimated at around 10 million individuals based on the consumption figure for the general population and a population of 58 million. Because of differences in geographical location, consumer preference, differences in body weight (e.g. children) this group of consumers will inevitably contain a large number of people exposed at or even above the TDI.

In Greece the picture is somewhat mixed. The range of TBT levels found in fish is very wide. Several samples were below the detection limit giving a range of <3-491 ng/g with a median value of 34.5 ng/g (including data from Spain, as Greece imports a large amount of anchovy and sardines from Spain). Based on this median of all fish samples this means that for a 60 kg person 434 grams would constitute exposure at 100% of the TDI. This clearly poses very little risk. The highest contaminated sample however would produce a 100% of TDI exposure at a consumption of just 31 grams a day. Therefore the more detailed consumption information was used to further investigate the figures found. In the Greek household expenditure survey, three categories of fish are distinguished based on quality, although quality in this case seems to relate to a combination of perceived quality, price and possibly other attributes. Sardines are in the 'lowest' category in this survey. This is however the category of seafood eaten most by the Greek population with 41% of Greeks being regarded as a consumer in this category. The 95th percentile of consumers of this category (approximately 200,000 consumers) consume on average 95 grams a day. Based on the median of Greek sardines and anchovy, 37 ng/g, these people would be exposed to just under one quarter of the TDI for a 60 kg individual.

Using the median of sardines only (86 ng/g) that goes up to 54% of the TDI so exposure at levels near or over the TDI seems realistic for a part of these high consumers because within the 95th percentile there will still be differences with regard to preference, location, body weight, etcetera. With the current data however, it is not possible to estimate how large such a group might be, although it obviously consists of fewer than 200,000 individuals.

16. Conclusions

Very little is known about what seafood people actually eat. Information on consumption patterns, consumption of specific groups, regional differences, etc. is lacking and this hampers the risk assessment severely.

The main conclusion from the cooking experiments is that TBT does not break down significantly in most typical cooking procedures. Only very long cooking times, unusual for most seafood, or combinations of cooking and frying, uncommon for practically every seafood but molluscs, show a significant decrease.

Although there is a large spread in concentrations and the averages and median are usually not very high, some very high values are still being found. The highest concentrations measured (491 and 488 ng/g TBT) in this project would cause a 60 kg individual to exceed his or her TDI with a consumption of 31 grams. In the risk calculations lower levels found in the same (group of) species, compensate for these high values. Although this is likely to be a fair representation of what happens in reality this is not certain.

As has been pointed out in the previous section, there is cause for concern regarding shellfish (molluscs) in Portugal and Italy and to a lesser extent regarding sardines in Greece. The number of people that are exposed to levels near the TDI however, cannot be determined without further research. Although this research should aid decisions about what policy measures to take this should not be used as an excuse not to take any measures at all.

A positive finding of this study is that there is a large number of countries where TBT in seafood does not appear to be a problem at all. And although in Northern European countries this may be 'helped' by the low seafood consumption it is also a very much a result of the low TBT levels found in most areas.

17. Exploitation and dissemination of results

The results have been disseminated mainly by providing the relevant sub-committee of the EFSA with the information uncovered in this project. Not only is EFSA the proper organisation for dealing with issues such as organotin in seafood, but it was agreed at an early stage of the project that the results could potentially cause a food scare if they were not disseminated in a responsible manner. Seeing that the afore mentioned EFSA sub-committee was already involved in assessing the risk of organotin in food rather than just the risk of tributyltin in seafood as we were doing, it was agreed that providing the sub-committee with the relevant information was the most likely way to strike a balance between getting the results entered into the policy-making process and avoiding the risk of creating unnecessary concern in (parts of) the European seafood-consuming public.

Dissemination of results to the scientific community has also taken place, albeit with the considerations mentioned above in mind. The most relevant presentations were:

Willemsen, F.H. & Wegener, J.W. (2004). *Exposure of the European seafood consumer to Tributyltin*. 5th European pesticides residues workshop - pesticides in food and drink, Stockholm, Sweden, June 13-16, 2004

Willemsen, F.H., Morabito, R. & Wegener, J.W. (2003). *Sampling seafood for assessment of tributyltin exposure of the European consumer: Did we get it right?*. 13th Annual conference of the International Society of Exposure Analysis, Stresa, Italy, September 21-25, 2003

Massaniso, P., Di Rosa, F., Willemsen, F.H. & Morabito, R.(2003). *Fate of TBT during seafood cooking*. ICEBAMO 2003, Pau, France, 3-5 December 2003.

Exploitation of results is likely to involve further research in several areas identified here as problematic. As was elaborated in Section 16 it is likely that in some areas measures have to be taken. The experiences from the OT-SAFE project should be used in the practical implementation of such future policies.

18. Policy related benefits

The results of this research project have important bearings on the EU policy concerning contaminants in food. Since very little regulation with regard to organotin compounds in food is in effect yet. Although it is not up to the research team to say where and how policies should be implemented there is a strong case for regulation. Local and EU policymakers will have to coordinate their actions and make decisions on how to act.

One more important issue that must be mentioned here is the role of trade in the supply of seafood to the European market. There is a definite trend towards a larger share of -especially farmed- seafood imports. This may pose a problem if the exporting countries are not as advanced when it comes to restricting the use of organotin as anti-fouling paint as the EU is. Because local and regional effects seem to play a role in the current distribution of TBT in seafood in Europe, one might at this point look at local measures for control. If seafood imports were to have a higher TBT content than locally produced seafood and reliance on imports increases, it could mean that local measures become in-effective and maximum residue levels and a mechanism for adhering to such levels might have to be put in place.

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Annex I. Existing data on TBT (and other organotins) in seafood in Europe

codex category[a)]			country study code[b)]	origin[c)]	Latin name[d)]	English name[e)]	date[f)]	sampling location[g)]	ng cation per g wet weight[h)]						reference
I	II	III							MBT	DBT	TBT	MPT	DPT	TPT	
9	1	2	FR	"local"	Mytilus galloprovincialis	mediter. mussel	1997	Marseille, from fish markets			87				1
9	1	1	FR	"local"	Thynnus thynnus	red tuna	1997	Marseille, from fish markets			56				1
9	1	4	FR	"local"	Carcinus maenas	green crab	1997	Marseille, from fish markets			4				1
9	1	3	FR	"local"		cuttlefish	1997	Marseille, fish market, composite sample			376				1
9	1	3	FR	"local"	Loligo vulgaris	squid, european	1997	Marseille, fish market, part of composite sample			655				1
9	1	3	FR	"local"		cuttlefish	1997	Marseille, fish market, composite sample reanalysed			14				1
9	1	1	DE	North Sea		eelpout	1993		19	24	66				2
9	1	2	DE	North Sea, Eckwarderhorne		mussel	1993		37	45	54				2
9	1	2	DE	North Sea, Sylt-List		mussel	1993		14	18	24				2
9	1	2	IT	Bari	Mytilus galloprovincialis	mussel			30	135	699	20	41	71	3
9	1	2	IT	Cagliari	Mytilus galloprovincialis	mussel			57	253	963	13	23	97	3
9	1	2	IT	Genova	Mytilus galloprovincialis	mussel			103	646	2724	0	71	133	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	summer	1	130	382	513	182	35	283	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	winter	1	55	379	1076	18	37	429	3

codex category [a)]			country study code[b)]	origin[c)]	Latin name[d)]	English name[e)]	date[f)]	sampling location[g)]	ng cation per g wet weight[h)]						reference
I	II	III							MBT	DBT	TBT	MPT	DPT	TPT	
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	summer	2	87	171	348	117	23	217	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	winter	2	23	112	513	17	28	217	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	summer	3	36	71	234	50	21	49	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	winter	3	12	38	271	18	23	35	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	summer	4	33	68	234	40	23	53	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	winter	4	14	53	370	13	18	53	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	summer	5	80	191	403	112	25	247	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	winter	5	28	144	648	18	55	172	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	summer	6	99	221	590	119	41	305	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	winter	6	12	74	469	15	23	212	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	summer	7	57	103	289	74	18	110	3
9	1	2	IT	La Spezia Gulf	Mytilus galloprovincialis	mussel	winter	7	26	168	831	20	32	393	3
9	1	2	IT	Roma	Mytilus galloprovincialis	mussel			10	32	242	0	9	49	3
9	1	2	IT	Spezia	Mytilus galloprovincialis	mussel			55	379	1076	18	37	429	3
9	1	2	IT	Taranto	Mytilus galloprovincialis	mussel			70	359	1219	20	431	415	3
9	1	2	IT	Taranto harbour	Mytilus galloprovincialis	mussel	summer	1	18	79	198	0	28	18	3
9	1	2	IT	Taranto harbour	Mytilus galloprovincialis	mussel	summer	2	10	50	293	0	21	71	3
9	1	2	IT	Taranto harbour	Mytilus galloprovincialis	mussel	summer	3	14	65	154	0	28	119	3
9	1	2	IT	Taranto harbour	Mytilus galloprovincialis	mussel	summer	4	10	56	146	0	21	146	3
9	1	2	IT	Venezia	Mytilus galloprovincialis	mussel			3	15	114	0	0	22	3
9	1	1	IT	Egadi Islands	Thunnus thynnus thynnus	bluefin tuna	1993		15	9	39				4
9	1	2	IT	Genoa	Mytilus galloprovincialis	mussel	1994	Genoa Oil Port, Genoa	80*	1810*	250*				5

codex category [a)]			country study code[b)]	origin[c)]	Latin name[d)]	English name[e)]	date[f)]	sampling location[g)]	ng cation per g wet weight[h)]						reference
I	II	III							MBT	DBT	TBT	MPT	DPT	TPT	
9	1	2	IT	Genoa	Mytilus galloprovincialis	mussel	1994	Genoa Oil Port , Genoa	260**	4940**	1060**				5
9	1	2	PT	Sado Estuary system A	Mytilus galloprovincialis	mussel	Jan-86		25	12	11				6
9	1	2	PT	Sado Estuary system A	Mytilus galloprovincialis	mussel	May-86		20	11	17				6
9	1	2	PT	Sado Estuary system B	Mytilus galloprovincialis	mussel	Jan-86		12	6	9				6
9	1	2	PT	Sado Estuary system B	Mytilus galloprovincialis	mussel	May-86		8	1	4				6
9	1	2	PT	Sado Estuary system C	Mytilus galloprovincialis	mussel	Jan-86		4	2	2				6
9	1	2	PT	Sado Estuary system C	Mytilus galloprovincialis	mussel	May-86		7	4					6
9	1	2	PT	Sado Estuary system D	Mytilus galloprovincialis	mussel	Jan-86		2	2	5				6
9	1	2	PT	Sado Estuary system D	Mytilus galloprovincialis	mussel	May-86		8	2					6
9	1	2	PT	Sado Estuary system E	Mytilus galloprovincialis	mussel	Jan-86		0	1	3				6
9	1	2	PT	Sado Estuary system E	Mytilus galloprovincialis	mussel	May-86		2	4					6
9	1	2	PT	Sado Estuary system F	Mytilus galloprovincialis	mussel	Jan-86		1	2					6
9	1	2	PT	Sado Estuary system F	Mytilus galloprovincialis	mussel	May-86		3	2					6
9	1	2	PT	Sado Estuary system G	Mytilus galloprovincialis	mussel	Jan-86		2	1	3				6

codex category [a)]			country study code[b)]	origin[c)]	Latin name[d)]	English name[e)]	date[f)]	sampling location[g)]	ng cation per g wet weight[h)]						reference
I	II	III							MBT	DBT	TBT	MPT	DPT	TPT	
9	1	2	PT	Sado Estuary system G	Mytilus galloprovincialis	mussel	May-86		2						6
9	1	2	PT	Sado Estuary system H	Mytilus galloprovincialis	mussel	Jan-86		10	3	6				6
9	1	2	PT	Sado Estuary system H	Mytilus galloprovincialis	mussel	May-86		8						6
9	1	2	UK	"local"	Mytilus sp.	mussel	1997	fish markets, London			6				1
9	1	1	UK	"local"	Scromber scromber	mackerel	1997	fish markets, London			7				1
9	1	1	UK	"local"	Clupea harengus	herring, atlantic	1997	fish markets, London			11				1
9	1	1	UK	"local"	Pleuronectes platessa	plaice	1997	fish markets, London			2				1
9	1	4	UK	"local"	Crangon alaskensis	shrimp	1997	fish markets, London			14				1
9	1	4	UK	"local"	Pandalus tridens	shrimp	1997	fish markets, London			14				1
9	1	4	UK	"local"	Cancer productus	crab	1997	fish markets, London			3				1
9	1	2	UK	"local"	Cerastoderma edule	cockel	1997	fish markets, London			3				1
9	1	2	UK	"local"	Crassostrea sp.	oyster	1997	fish markets, London			43				1
9	1	4	UK	"local"	Crangon alaskensis	shrimp	1997	fish markets, London			5				1
9	1	4	UK	"local"	Pandalus tridens	shrimp	1997	fish markets, London			5				1
9	1	3	UK	"local"	Loligo sp.	squid	1997	fish markets, London			8				1
9	1	2	ES	South Spanish Atlantic coast		****	1992	estuary			31.0				7
9	1	2	ES	Northwestern Mediterranean	Mytilus galloprovincialis	mussel	May-96	Masnou	66.0	357.8	584.2			58.9	8
9	1	2	ES	Northwestern Mediterranean	Mytilus galloprovincialis	mussel	May-96	Barcelona	163.0	1240.0	1521.3			141.4	8

codex category [a)]			country study code[b)]	origin[c)]	Latin name[d)]	English name[e)]	date[f)]	sampling location[g)]	ng cation per g wet weight[h)]						reference
I	II	III							MBT	DBT	TBT	MPT	DPT	TPT	
9	1	2	ES	Northwestern Mediterranean	Mytilus galloprovincialis	mussel	May-96	Sant Carles	21.7	171.2	316.9			10.0	8
9	1	2	ES	South Spanish Atlantic coast	Mytilus galloprovincialis	mussel	93-94	Canela	4.0	6.1	24.4				9
9	1	2	ES	South Spanish Atlantic coast	Mytilus galloprovincialis	mussel	May-Aug 94	Canela	4.7	14.9	53.7				9
9	1	2	ES	South Spanish Atlantic coast	Venerupis decussata	clam	93-94	Canela	2.4	5.7	20.0				9
9	1	2	ES	South Spanish Atlantic coast	Venerupis decussata	clam	May-Aug 94	Canela	2.4	5.7	43.9				9
9	1	2	ES	South Spanish Atlantic coast	Crassostrea angulata	oyster	93-94	Pinillos	5.2	19.4	70.8				9
9	1	2	ES	South Spanish Atlantic coast	Crassostrea angulata	oyster	May-Aug 94	Pinillos	4.4	19.6	80.5				9
9	1	2	ES	South Spanish Atlantic coast	Cerastoderma edulis	cockel	93-94	Pinillos	4.4	17.8	68.3				9
9	1	2	ES	South Spanish Atlantic coast	Cerastoderma edulis	cockel	May-Aug 94	Pinillos	4.3	15.5	90.3				9
9	1	2	ES	South Spanish Atlantic coast	Venerupis decussata	clam	93-94	Pinillos	7.7	13.1	46.4				9
9	1	2	ES	South Spanish Atlantic coast	Venerupis decussata	clam	May-Aug 94	Pinillos	11.7	23.5	75.6				9
9	1	2	ES	South Spanish Atlantic coast	Venerupis semidecussata	clam	93-94	Pinillos	7.7	13.7	51.2				9
9	1	2	ES	South Spanish Atlantic coast	Venerupis semidecussata	clam	May-Aug 94	Pinillos	10.7	25.5	78.1				9

Note:

a) Food categorization as found in the “Codex Alimentarius” split out into different columns to allow for logical operations;
b) The country (if known) where the study was conducted;
c) Origin of the sample, if known;
d) Latin name of the species concerned if known and applicable;
e) English name, in case of conflict the Latin name takes precedence;
f) Date of sampling, if known;
g) Location where the sample was aquired by the researchers, note that this may differ from “origin”;
h) MBT = monobutyltin, DBT = dibutyltin, TBT = tributyltin, MPT = monophenyltin, DPT = diphenyltin, TPT = triphenyltin.

* Lower limit;
** Upper limit;
*** TPT was not detected in one of three samples, 0.5*detection limit (=3 ng) was used;
**** Three different edible bivalves.

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Annex II. Species selection

country	species	location	sampling rounds
Belgium	salmon *(Oncorhynchus spp.)*	Denmark	2
	common shrimp *(Crangon spp)*	Southern North Sea	2
	plaice *(Pleuronectes platessa)*	The Netherlands	2
France	mussel *(Mytilus galloprovinciallis)*	Mediterranean (Toulon)	2
	mussel *(Mytilus edulis)*	Bretagne	2
		North Sea-Normandie	2
	oyster *(Crassostrea gigas)*	Arcachon	2
		Bretagne	2
		Marennes	2
		Normandie	2
	salmon *(Salmo salar)*	Imported form Norway	2
Germany	frozen pollock *(Theragra chalcogramma)*	supermarket	2
	processed herring *(Culpea harengus)*	supermarket	2
	canned tuna *(Thunnus albacares)*	supermarket	2
Greece	mussels (*Mytilus Galloprovinciallis*)	Thermaikos Gulf Halastra 1	1
		Thermaikos Gulf Halastra 2	1
		Thermaikos Gulf Pieria	1
	anchovy (*Engraulis encrasicholus*)	Saronikos Gulf	2
		Thermaikos Gulf	2
		Gulf of Kavala	2
	sea bass (*Dicentrarchus labrax*)	Attica (Saronikos Gulf)	2
	squid (*Loligo vulgaris*)	Imported from India	2
	octopus (*Octopus vulgaris*)	Imported from Morocco	2
Italy	mussel *(Mytilus galloprovincialis)*	Italian North West coast	2
		Italian North East coast	2
		Sardinia South coast	2
		Sardinia South West coast	2
		Sardinia West coast	2
		Sardinia North West coast	2
		Sardinia North coast	2
		Sardinia North East coast	2
		Sardinia East coast	2
		Sardinia South East coast	2
	clam *(Venus "chamelea" gallina)*	Venice	2
	preserved tuna	supermarket	1
Hungary	canned herring *(Clupea harengus)*	imported from Poland	2
	canned sardine *(Clupea pilchardus)*	imported from Thailand	2
	fried hake *(Merluccius hubbis)*	imported from Argentina	2
Netherlands	mussel *(Mytilus edulis)*	Oosterschelde	2
		Waddenzee	2
	herring *(Clupea harengus)*	North Sea (North)	3
	whiting *(Merlangius merlangus)*	North Sea	3

Portugal	cod (dried) *(Gadus morhua)*	Norway	1
	octopus *(Octopus vulgaris)*	North	2
		Central	2
		South	2
	sardine *(Sardina pilchardus)*	North	2
		South	2
	hake *(Merluccius merluccius)*	Spain	2
	horse mackerel *(Trachurus trachurus)*	Spain	2
	Pouting *(Trisopterus luscus)*	North of Portugal	2
	clams *(Ruditapes decussatus)*	South of Portugal	2
	cockles *(Cerastoderma edule)*	central	2
	shrimp *(Paneus* sp.*)*	Spain	2
	mussel *(Mytilus edulis)*	Spain	2
Spain	whiting *(Merlangius merlangus)*	Galicia	2
		Cadiz Gulf	2
		Cantabric sea	2
	sole *(Solea solea)*	Galicia	2
		Cadiz Gulf	2
		Cantabric sea	2
	sardine *(Sardina pilchardus)*	Western Mediteranean	2
		Cadiz Gulf	2
		Cantabric sea	2
	anchovy *(Engraulis encrasicholus)*	Western Mediteranean	2
		Cadiz Gulf	2
		Cantabric sea	2
	squid *(Loligo vulgaris)*	Galicia	2
		Cadiz Gulf	2
		Saharian Morrocco	2
	prawn *(Crangon crangon)*	Cadiz Gulf	2
		Alicante coast	2
		Morocco Argelian	2
	mussel *(Mytilus edulis)*	Galicia	2
Sweden	herring *(Clupea harengus)*	baltic IIIa	2
		Baltic IIIbcd	2
	salmon *(Salmo salar)*	Norway	2
	Swedish caviar, cod *(Gadus morhua)* eggs	Norway, Iceland	*2*
United	haddock *(Melanogrammus aeglefinus)*	UK	1
Kingdom	blue mussel *(Mytilus edulis)*	East coast	2
		South coast	2
		West coast	2
	European oyster *(Ostrea edulis)*	East coast	2
		South coast	2
		West coast	2
	Pacific oyster *(Crassostrea gigas)*	East coast	2
		South coast	2
		West coast	2
	common whelk *(Buccinum undatum)*	Channel Islands	2

Annex III. Data reporting sheets

Sheet III.1 Sea food samples.

serial number[1]			*NL01*	*NL02*	*NL03*
location of origin code			*North Sea North (IVa)*		
species code			*Clupea harengus*		
sampling date			*24-04-2002*		
sampling location code			*Ijmuiden Auction*		
sampled amount of tissue		kg wet wt	*5.7*		
sampled number of animals			*25*		
dry weight		% wet wt	*35*		
lipids		% wet wt	*4.3*		
sample intake for organotin analysis		g wet wt	*15*		
corresponding quality control samples[2]			*1,4*		
organotin concentration [3]	MBT	ng Sn / g wet wt	*2**		
	DBT		*4*		
	TBT		*34*		
	MPT		*<1*		
	DPT		*<1*		
	TPT		*<1*		

1) Prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK);

2) Indicate serial number of control samples in sheet 2 that have been analysed together with this sample;

3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Sheet III.2 Quality control for biota analyses.

sample type			*blank*	*blank*	*BCR477*	*BCR477*
quality control sample number			*1*	*2*	*5*	*6*
sample intake for organotin analysis		g dry wt				
amount of water added		g				
organotin concentration	MBT	ng Sn/g dry wt				
	DBT					
	TBT					
	MPT					
	DPT					
	TPT					

Annex IV. Organtin results

Report sheets are listed in the following order:

- The Netherlands
- Greece
- Italy
- France
- Germany
- Portugal
- Spain
- Hungary
- United Kingdom
- Belgium
- Sweden

For each country, the report sheets with results for the seafood samples are given first, followed by the report sheets with results for the quality control samples.

The Netherlands

serial number[1)]			*NL01*	*NL02*	*NL03*	*NL04*	*NL05*	*NL06*
location of origin code			*Oosterschelde*	*Waddenzee*	*Oosterschelde (Kokhaan)*	*Oosterschelde (Mastgat 5)*	*Waddenzee (Inschot)*	*Waddenzee (Meep)*
species code			*mussels*	*mussels*	*mussels*	*mussels*	*mussels*	*mussels*
sampling date			*03-10-2002*	*03-10-2002*	*22-04-03*	*22-04-03*	*22-04-03*	*22-04-03*
sampling location code			*Yrseke auction*	*Yrseke auction*	*Yrseke auction*	*Yrseke auction*	*Yrseke auction*	*Yrseke auction*
sampled amount of tissue		kg wet wt	*1*	*1*	*1*	*1*	*1*	*1*
sampled number of animals								
dry weight		% wet wt	*18*	*24*	*14*	*13*	*14*	*14*
Lipids		% wet wt	*1.1*	*1.4*	*5.6*	*5.6*	*6.3*	*5.6*
sample intake for organotin analysis		g wet wt	*1.9*	*1.5*	*3.0*	*3.2*	*2.5*	*2.9*
Corresponding quality control samples[2)]			*1,2,3,4*	*1,2,3,4*	*9,10,11*	*9,10,11*	*5,6,7,8*	*5,6,7,8*
organotin concentration [3)]	MBT	ng cation / g wet wt	*2.5*	*<0.5*	*0.8**	*1.3*	*1*	*1**
	DBT		*5.2*	*2.9*	*2.1*	*2.1*	*2.9*	*2.6*
	TBT		*7**	*5**	*20*	*15*	*19*	*16*
	MPT		*<0.5*	*<0.5*	*<0.3*	*<0.3*	*<1.3*	*<0.5*
	DPT		*0.7**	*<1*	*<0.4*	*<0.4*	*<0.5*	*<0.5*
	TPT		*3.3*	*1.1**	*1.6**	*3*	*1**	*1*

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

The Netherlands

serial number[1)]			NL07	NL08	NL09	NL10	NL11
location of origin code			North Sea	North Sea	North Sea	Channel	North Sea
species code			herring	herring	whiting	whiting	whiting
sampling date			16/20-12-02	23-04-03	04-01-03	27-03-03	22-04-03
sampling location code			Ijmuiden auction	Ijmuiden auction	Stellendam auction	Ijmuiden auction	Ijmuiden auction
sampled amount of tissue		kg wet wt	25	32	29	25	29
sampled number of animals							
dry weight		% wet wt	24	22	20	18	19
lipids		% wet wt	17	2.7	0.5	0.6	0.5
sample intake for organotin analysis		g wet wt	0.74	3.4	6	6	6
Corresponding quality control samples[2)]			5,6,7,8	5,6,7,8	5,6,7,8	5,6,7,8	5,6,7,8
organotin concentration[3)]	MBT	ng cation / g wet wt	<1	0.4*	<0.2	<0.2	<0.2
	DBT		<2	3	0.9	0.7	0.5*
	TBT		9.3	51	3.5	3.8	2.1
	MPT		<3	<0.7	<0.3	<0.5	<0.3
	DPT		<4	0.9*	<0.2	<0.2	<0.2
	TPT		<2	5.6	1.5	1.6	0.8*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

The Netherlands

sample type		NL	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*CRM 477*	*CRM 477*	*CRM 477*	*CRM 477*
quality control sample number			*1*	*2*	*3*	*5*	*6*	*9*	*10*	*4*	*7*	*8*	*11*
sample intake for organotin analysis		g dry wt	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*0.2*	*0.2*	*0.2*	*0.2*
amount of water added		g											
organotin concentration	MBT	ng cation/g dry wt	*0.5*	*0.8*	*0.6*	*0.9*	*0.6*	*0.8*	*0.7*	*1241*	*1545*	*1496*	*1210*
	DBT		*0.5*	*0.9*	*0.4*	*0.0*	*0.0*	*0.9*	*0.6*	*1313*	*1379*	*1374*	*1046*
	TBT		*0.6*	*3.7*	*1.3*	*0.9*	*1.0*	*3.7*	*2.5*	*1754*	*1884*	*1812*	*1557*
	MPT		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*754*	*759*	*771*	*619*
	DPT		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*157*	*50*	*48*	*105*
	TPT		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*910*	*1125*	*1068*	*979*

Greece

serial number[1)]			*GR01*	*GR02*	*GR03*	*GR04*	*GR05*
location of origin code			*Thermaikos Gulf*	*Thermaikos Gulf*	*Thermaikos Gulf*	*Thermaikos Gulf*	*Saronikos Gulf*
species code			*Mussels*	*Mussels*	*Mussels*	*Mussels*	*Mussels*
sampling date			*26-06-2002*	*27-06-2002*	*27-06-2002*	*1-07-2002*	*5-09-2002*
sampling location code			*Halasta1 (zone 6)*	*Halasta2 (zone 7)*	*Imathia (zone 8)*	*Pieria*	*Elefsis*
sampled amount of tissue		kg wet wt					
sampled number of animals			*70*	*70*	*70*	*80*	*75*
dry weight		% wet wt	*30.1*	*31.1*	*29.9*	*28.7*	*25.5*
lipids		% dry wt	*6.5*	*6.8*	*6.2*	*6.7*	*10.2*
sample intake for organotin analysis		g dry wt	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*
Corresponding quality control samples[2)]			*1,2,3*	*1,2,3*	*1,2,3*	*1,2,3*	*1,2,3*
organotin concentration [3)]	MBT	ng cation / g wet wt	*3.6*	*1.3**	*3.0*	*2.9*	*1.8**
	DBT		*15*	*7.2*	*9.7*	*8.3*	*12.0*
	TBT		*14**	*12**	*15**	*11**	*15**
	MPT		*<2*	*1.6**	*1.6**	*<2*	*<2*
	DPT		*<2*	*5.4*	*5.6*	*<2*	*<1*
	TPT		*13*	*51*	*36*	*6.4*	*1.8**

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Greece

serial number[1)]			GR06	GR07	GR08	GR09	GR10	GR11
location of origin code			Thermaikos Gulf	Gulf of Kavala	Saronikos Gulf	Attica (Korinthi-akos gulf)	India	Morocco
species code			Anchovy	Anchovy	Anchovy	Seabass	Squid	Octopus
sampling date			11-07-2002	07-08-2002	05-09-2002	10-07-2002	01-08-2002	01-08-2002
sampling location code			Thessaloniki auction	Kavala auction	Piraeus auc-tion	Fishing farm	Indian Ocean	Mediterrenean
sampled amount of tissue		kg wet wt	3	3	3	4.8	5	4
sampled number of animals						15	25	3
dry weight		% wet wt	25.2	27.5	28.1	28.9	16.0	26.9
lipids		% dry wt	2.0	3.5	2.0	27	5.0	1.0
sample intake for organotin analysis		g dry wt	1.0	0.6	1.0	0.1	0.5	2.0
corresponding quality control samples[2)]			1,2,3	1,2,3	1,2,3	4,5,6,7	4,5,6,7	4,5,6,7
organotin concentra-tion [3)]	MBT	ng cation / g wet wt	1.1	1.1*	1.4	<4	<0.3	0.23*
	DBT		4.1	3.7	4.0	<6	<0.4	0.23*
	TBT		51	38	41	<22	4.1*	0.85*
	MPT		<0.5	<1	<0.5	<5	<0.5	<0.3
	DPT		<3	<6	<3	<5	<0.4	<0.2
	TPT		5.3	4.4	12	1.6	<0.9	<0.4

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Greece

serial number[1)]			*GR09 (duplo)*	*GR10 (duplo)*	*GR11 (duplo)*
location of origin code			*Attica (Korinthiakos gulf)*	*India*	*Morocco*
species code			*Seabass*	*Squid*	*Octopus*
sampling date			*10-07-2002*	*01-08-2002*	*01-08-2002*
sampling location code			*Fishing farm*	*Indian Ocean*	*Mediterrenean*
sampled amount of tissue		kg wet wt	*4.8*	*5*	*4*
sampled number of animals			*15*	*25*	*3*
dry weight		% wet wt	*28.9*	*16.0*	*26.9*
Lipids		% dry wt	*27*	*5.0*	*1.0*
sample intake for organotin analysis		g dry wt	*0.1*	*0.5*	*2.0*
corresponding quality control samples[2)]			*4,5,6,7*	*4,5,6,7*	*4,5,6,7*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<4*	*<0.3*	*0.14**
	DBT		*<4*	*<0.4*	*0.18**
	TBT		*<3*	*4.4**	*<0.7*
	MPT		*<3*	*<0.3*	*<0.1*
	DPT		*<5*	*<0.4*	*<0.2*
	TPT		*<6*	*<0.5*	*<0.3*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).

[2)] indicate serial number of control samples that have been analysed together with this sample.

[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Greece

serial number[1]			GR12	GR13	GR14	GR15	GR16	GR17
location of origin code			*Thermaikos Gulf*	*Thermaikos Gulf*	*Thermaikos Gulf*	*Thermaikos Gulf*	*Korinthiakos Gulf*	*Thermaikos Gulf*
species code			*Mussels*	*Mussels*	*Mussels*	*Mussels*	*Sea bream*	*Anchovy*
sampling date			*26-12-2002*	*27-12-2002*	*27-12-2002*	*10-01-2003*	*11-02-2003*	*07-04-2003*
sampling location code			*Halasta1 (zone 6)*	*Halasta2 (zone 7)*	*Naziki (zone 4-5)*	*Vespasianou (zone 14)*	*Fishing farm*	*Thessaloniki auction*
sampled amount of tissue		kg wet wt					*4.1*	*3*
sampled number of animals			*80*	*80*	*80*	*80*	*20*	
dry weight		% wet wt	*24.1*	*22.9*	*19.6*	*29.5*	*27.5*	*26.4*
lipids		% dry wt	*9.2*	*6.9*	*8.2*	*6.5*	*22.4*	*14.9*
sample intake for organotin analysis		g dry wt	*0.3*	*0.3*	*0.20*	*0.3*	*0.09*	*0.14*
Corresponding quality control samples[2]			*8,9,10*	*8,9,10*	*8,9,10*	*8,9,10*	*8,9,10*	*8,9,10*
organotin concentration [3]	MBT	ng cation / g wet wt	*1.1**	*1.6**	*1.2**	*1.4**	*<2*	*<2*
	DBT		*6.9*	*5.5*	*8.1*	*12*	*<6*	*<2*
	TBT		*7.5**	*8**	*10**	*30*	*<25*	*31**
	MPT		*<1*	*0.8**	*<1*	*<1*	*<1*	*<2*
	DPT		*2.0*	*6.3*	*5.3*	*2.1*	*<2*	*<4*
	TPT		*9.1*	*38*	*16*	*5.6*	*<5*	*6**

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Greece

Serial number[1]			*GR18*	*GR19*	*GR20*	*GR21*	*GR22*	*GR23*	*GR24*
location of origin code			*Pagasi-tikos Gulf*	*Saronikos Gulf*	*Korinthiakos gulf*	*India*	*Morocco*	*Saronikos Gulf*	*Evoiikos Gulf*
species code			*Anchovy*	*Sardines*	*Seabass*	*Squid*	*Octopus*	*Sardines*	*Sardines*
sampling date			*07-04-2003*	*07-04-2003*	*05-04-2003*	*07-02-2003*	*05-02-2003*	*28-05-03*	*28-05-03*
sampling location code			*Volos auction*	*Piraeus auction*	*Fishing farm*	*Indian Ocean*	*Mediterrenean*	*Piraeus auction*	*Piraeus auction*
sampled amount of tissue		kg wet wt	*3*	*3*	*4.7*	*5*	*4*	*3*	*3*
sampled number of animals					*16*	*25*	*3*		
dry weight		% wet wt	*26.5*	*27.0*	*27.0*	*20.8*	*21.8*	*31.4*	*37.1*
lipids		% dry wt	*15.0*	*16.7*	*19.0*	*3.1*	*1.4*	*35.3*	*43.1*
sample intake for organotin analysis		g dry wt	*0.14*	*0.13*	*0.12*	*0.6*	*1.5*	*0.16*	*0.15*
corresponding quality control samples[2]			*8,9,10*	*8,9,10*	*8,9,10*	*8,9,10*	*8,9,10*	*11,12,13,14*	*11,12,13,14*
organotin concentration [3]	MBT	ng cation / g wet wt	*<2*	*2.8**	*<2*	*<0.5*	*<0.2*	*<2*	*<3*
	DBT		*<2*	*20*	*<3*	*<0.5*	*0.6**	*5**	*4**
	TBT		*36**	*491*	*<14*	*<2*	*29*	*86*	*46*
	MPT		*<2*	*<2*	*<2*	*<0.5*	*<0.2*	*<3*	*<4*
	DPT		*<4*	*<3*	*<4*	*<0.5*	*<0.3*	*<3*	*<4*
	TPT		*5**	*49*	*<4*	*<1*	*<0.3*	*6**	*9**

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Greece

sample type		GR	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*
quality control sample number			*1*	*2*	*4*	*5*	*6*	*8*	*9*	*11*	*12*
sample intake for organotin analysis		g dry wt	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
amount of water added		g									
organotin concentration	MBT	ng cation/g dry wt	*1.1*	*0.8*	*0.5*	*0.8*	*0.6*	*0.8*	*0.7*	*0.9*	*0.6*
	DBT		*1.0*	*0.0*	*0.5*	*0.9*	*0.4*	*0.9*	*0.6*	*0.0*	*0.0*
	TBT		*7.9*	*3.6*	*0.6*	*3.7*	*1.3*	*3.7*	*2.5*	*0.9*	*1.0*
	MPT		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	DPT		*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
	TPT		*0.8*	*0.8*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

sample type		*GR*	*CRM 477*	*CRM 477*	*CRM 477*	*CRM 477*	*CRM 477*
quality control sample number			*3*	*7*	*10*	*13*	*14*
sample intake for organotin analysis		g dry wt	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*
amount of water added		g					
organotin concentration	MBT	ng cation/g dry wt	*1327*	*1241*	*1210*	*1545*	*1496*
	DBT		*1366*	*1313*	*1046*	*1379*	*1374*
	TBT		*1818*	*1754*	*1557*	*1884*	*1812*
	MPT		*858*	*754*	*619*	*759*	*771*
	DPT		*111*	*157*	*105*	*50*	*48*
	TPT		*1129*	*910*	*979*	*1125*	*1068*

Italy

serial number[1)]			*IT1*	*IT2*	*IT3*	*IT4*	*IT5*	*IT6*	*IT7*
location of origin code			*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*
species code			*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*
sampling date			*16/1/2002*	*21/1/2002*	*22/1/2002*	*25/1/2002*	*29/1/2002*	*31/1/2002*	*06/2/2002*
sampling location code			*1: Salso channel*	*2: Libertà Bridge*	*5: North East inhabited*	*7: North East open lagoon*	*9: Punta Fogolana*	*10: Chioggia hydrobiological station*	*12: Brenta river mouth*
sampled amount of tissue		kg wet wt	*0.450*	*0.521*	*0.551*	*0.478*	*0.512*	*0.598*	*0.415*
sampled number of animals			*100*	*100*	*100*	*100*	*100*	*100*	*100*
dry weight		% wet wt	*21.8*	*16.5*	*18.3*	*20.7*	*19.9*	*15.0*	*13.1*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 2.5*	*ca. 3*	*ca. 3*	*ca. 2.5*	*ca. 2.5*	*ca. 3*	*ca. 3*
corresponding quality control samples[2)]			*1, 11*	*1, 11*	*1, 11*	*1, 11*	*2, 12*	*2, 12*	*2, 12*
organotin concentration [3)]	MBT	ng cation/g wet wt	*46*	*36*	*45*	*11*	*6*	*50*	*23*
	DBT		*190*	*103*	*108*	*32*	*25*	*413*	*66*
	TBT		*224*	*259*	*494*	*145*	*35*	*751*	*251*
	MPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] n.c. not considered.

Italy

serial number[1]			*IT8*	*IT9*	*IT10*	*IT11*	*IT12*	*IT13*	*IT14*	*IT15*
location of origin code			*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*
species code			*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Tapes sp.*	*Tapes sp.*
Sampling date			*7/2/2002*	*8/2/2002*	*11/2/2002*	*12/2/2002*	*13/2/2002*	*14/2/2002*	*21/1/2002*	*23/1/2002*
Sampling location code			*13: San Leonardo*	*14: Pellestrina*	*15: Nuovissimo river mouth*	*16: Campalto*	*17: Tessera*	*18: Treporti*	*2: Libertà Bridge*	*3: Naviglio Brenta-oil channel confluence*
sampled amount of tissue		kg wet wt	*0.501*	*0.571*	*0.497*	*0.412*	*0.555*	*0.491*	*0.487*	*0.511*
sampled number of animals			*100*	*100*	*100*	*100*	*100*	*100*	*250*	*250*
dry weight		% wet wt	*23.6*	*17.7*	*18.6*	*19.8*	*20.4*	*16.9*	*19.0*	*17.3*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 2.5*	*ca. 3*	*ca. 3*	*ca. 2.5*	*ca. 2.5*	*ca. 3*	*ca. 2.5*	*ca. 3*
corresponding quality control samples[2]			*2, 12*	*3, 13*	*3, 13*	*3, 13*	*3, 13*	*4, 14*	*4, 14*	*4, 14*
Organotin concentration [3]	MBT	ng cation/g wet wt	*23*	*22*	*5*	*20*	*22*	*18*	*114*	*55*
	DBT		*55*	*133*	*13*	*52*	*42*	*34*	*98*	*66*
	TBT		*195*	*313*	*32*	*142*	*209*	*173*	*217*	*204*
	MPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) n.c. not considered.

Italy

serial number[1)]			*IT16*	*IT17*	*IT18*	*IT19*	*IT20*	*IT21*	*IT22*	*IT23*
location of origin code			*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*
species code			*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*
Sampling date			*24/1/2002*	*25/1/2002*	*28/1/2002*	*29/1/2002*	*31/1/2002*	*1/2/2002*	*6/2/2002*	*7/2/2002*
Sampling location code			*6: Sile rivermouth*	*7: North East open lagoon*	*8: Lido*	*9: Punta Fogolana*	*10: Chioggia hydrobiological Station*	*11: Chioggia*	*12:Brenta mouth*	*13: San Leonardo*
sampled amount of tissue		kg wet wt	*0.517*	*0.501*	*0.495*	*0.565*	*0.471*	*0.533*	*0.492*	*0.502*
sampled number of animals			*250*	*250*	*250*	*250*	*250*	*250*	*250*	*250*
dry weight		% wet wt	*16.9*	*18.9*	*19.2*	*17.6*	*15.9*	*18.6*	*20.1*	*18.9*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 3*	*ca. 2.5*	*ca. 2.5*	*ca. 3*	*ca. 3*	*ca. 2.5*	*ca. 2.5*	*ca. 2.5*
corresponding quality control samples[2)]			*4, 14*	*5, 15*	*5, 15*	*5, 15*	*5, 15*	*6, 16*	*6, 16*	*6, 16*
Organotin concentration [3)]	MBT	ng cation/g wet wt	*15*	*15*	*35*	*4*	*152*	*334*	*22*	*24*
	DBT		*36*	*31*	*40*	*6*	*222*	*248*	*62*	*46*
	TBT		*197*	*186*	*142*	*15*	*289*	*244*	*216*	*116*
	MPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] n.c. not considered.

Italy

serial number[1]			*IT24*	*IT25*	*IT26*	*IT27*	*IT28*
location of origin code			*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*
species code			*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*
Sampling date			*8/2/2002*	*11/2/2002*	*12/2/2002*	*13/02/2002*	*14/2/2002*
Sampling location code			*14: Pellestrina*	*15: Nuovissimo river mouth*	*16: Campalto*	*17: Tessera*	*18: Treporti*
sampled amount of tissue		kg wet wt	*0.514*	*0.495*	*0.547*	*0.485*	*0.528*
sampled number of animals			*250*	*250*	*250*	*250*	*250*
dry weight		% wet wt	*17.3*	*16.1*	*15.6*	*19.8*	*19.4*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 3*	*ca. 3*	*ca. 3*	*ca. 2.5*	*ca. 2.5*
corresponding quality control samples[2]			*6, 16*	*7, 17*	*7, 17*	*7, 17*	*7, 17*
Organotin concentration [3]	MBT	ng cation/g wet wt	*14*	*50*	*15*	*7*	*7*
	DBT		*33*	*103*	*22*	*17*	*11*
	TBT		*155*	*244*	*43*	*146*	*79*
	MPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] n.c. not considered.

Italy

serial number[1)]			*IT29*	*IT30*	*IT31*	*IT32*	*IT33*	*IT34*	*IT35*	*IT36*
location of origin code			*Sardinia South Coast*	*Sardinia Soth West Coast*	*Sardinia West Coast*	*Sardinia North West Coast*	*Sardinia North Coast*	*Sardinia North East Coast*	*Sardinia East Coast*	*Sardinia South East Coast*
species code			*Mytilus gal-loprovin-cialis*	*Mytilus gal-loprovin-cialis*	*Mytilus gal-loprovin-cialis*	*Mytilus gal-loprovin-cialis*	*Mytilus gal-loprovin-cialis*	*Mytilus gal-loprovin-cialis*	*Mytilus gal-loprovin-cialis*	*Mytilus gal-loprovin-cialis*
Sampling date			*25/03/2002*	*20/03/2002*	*21/03/2002*	*22/03/2002*	*27/04/2002*	*30/03/2002*	*18/03/2002*	*19/03/2002*
Sampling location code			*Cagliari*	*Calasetta,*	*Oristano*	*Alghero*	*Asinara*	*Olbia*	*Arbatax*	*Villasimius,*
sampled amount of tissue		kg wet wt	*0.120*	*0.133*	*0.328*	*0.210*	*0.261*	*0.219*	*0.210*	*0.143*
sampled number of animals			*60*	*60*	*60*	*60*	*60*	*60*	*60*	*60*
dry weight		% wet wt	*16.6*	*10.2*	*16.9*	*15.4*	*15.2*	*13.8*	*14.5*	*11.4*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 3*	*ca. 3.5*	*ca. 3*	*ca. 3*	*ca. 3*	*ca. 3*	*ca. 3*	*ca. 3.5*
corresponding quality control samples[2)]			*8, 18*	*8, 18*	*8, 18*	*8, 18*	*9, 19*	*9, 19*	*9, 19*	*9, 19*
Organotin concentration [3)]	MBT	ng cation/g wet wt	*27*	*40*	*< 0,3*	*< 0,3*	*< 0,3*	*< 0,3*	*38*	*33*
	DBT		*34*	*44*	*<0,4*	*81*	*75*	*63*	*36*	*42*
	TBT		*140*	*89*	*48*	*558*	*446*	*488*	*92*	*47*
	MPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) n.c. not considered.

Italy

serial number[1)]			*IT37*
location of origin code			*North Tyrrhenian sea*
species code			*Mytilus galloprovincialis*
Sampling date			*04/07/2002*
Sampling location code			*La Spezia Gulf*
sampled amount of tissue		kg wet wt	*0.650*
sampled number of animals			*200*
dry weight		% wet wt	*20.0*
Lipids		% wet wt	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 2.5*
corresponding quality control samples[2)]			*10, 20*
Organotin concentration [3)]	MBT	ng cation/g wet wt	*28*
	DBT		*122*
	TBT		*175*
	MPT		*n.c.*
	DPT		*n.c.*
	TPT		*n.c.*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] n.c. not considered.

Italy

serial number[1)]			*IT38*	*IT39*	*IT40*	*IT41*	*IT42*	*IT43*	*IT44*	*IT45*
location of origin code			*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*	*Venice lagoon*
species code			*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*	*Tapes sp.*
sampling date			*26/08/2002*	*28/08/2002*	*02/09/2002*	*04/09/2002*	*28/08/2002*	*02/09/2002*	*04/09/2002*	*06/09/2002*
sampling location code			*1: Salso channel*	*2: Libertà Bridge*	*7: North East open lagoon*	*10: Chioggia hydrobiological station*	*2: Libertà Bridge*	*7: North East open lagoon*	*10: Chioggia hydrobiological station*	*11: Chioggia*
sampled amount of tissue		kg wet wt	*0.470*	*0.510*	*0.495*	*0.554*	*0.491*	*0.521*	*0.478*	*0.523*
sampled number of animals			*100*	*100*	*100*	*100*	*250*	*250*	*250*	*250*
dry weight		% wet wt	*18.6*	*20.7*	*17.7*	*22.2*	*19.3*	*21.6*	*18.6*	*22.9*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 2.5*	*ca. 2.5*	*ca. 3*	*ca. 2.5*	*ca. 2.5*	*ca. 2.5*	*ca. 3*	*ca. 2.5*
corresponding quality control samples[2)]			*21, 26*	*21, 26*	*21, 26*	*21, 26*	*22, 27*	*22, 27*	*22, 27*	*22, 27*
organotin concentration [3)]	MBT	ng cation/g wet wt	*53*	*59*	*16*	*41*	*134*	*17*	*35*	*46*
	DBT		*253*	*307*	*64*	*117*	*116*	*33*	*58*	*180*
	TBT		*279*	*351*	*68*	*179*	*271*	*86*	*201*	*270*
	MPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*

[1)] prefix indicates country of sampling partner (BE. ES. DE. FR. HU. GR. IT. NL. PT. SE. UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] n.c. not considered.

Italy

serial number[1)]			*IT46*	*IT47*	*IT48*	*IT49*	*IT50*	*IT51*	*IT52*
location of origin code			*Sardinia South Coast*	*Sardinia Soth West Coast*	*Sardinia West Coast*	*Sardinia North East Coast*	*Sardinia North East Coast*	*Sardinia North West Coast*	*Sardinia North Coast*
species code			*Mytilus gallo-provincialis*	*Mytilus gallo-provincialis*	*Mytilus gallo-provincialis*	*Mytilus gallo-provincialis*	*Mytilus gallo-provincialis*	*Mytilus gallo-provincialis*	*Mytilus gallo-provincialis*
Sampling date			*19/08/2002*	*28/09/2002*	*01/10/2002*	*24/08/2002*	*01/09/2002*	*27/09/2002*	*25/09/2002*
Sampling location code			*Cagliari*	*Calasetta*	*Oristano*	*Olbia 1*	*Olbia 2*	*Alghero*	*Asinara*
sampled amount of tissue		kg wet wt	*0.146*	*0.149*	*0.233*	*0.156*	*0.211*	*0.154*	*0.136*
sampled number of animals			*60*	*60*	*60*	*60*	*60*	*60*	*60*
dry weight		% wet wt	*23.0*	*24.9*	*24.0*	*19.7*	*21.4*	*19.1*	*14.5*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 2.0*	*ca. 2.0*	*ca. 2.0*	*ca. 2.5*	*ca. 2.0*	*ca. 2.5*	*ca. 3.5*
corresponding quality control samples[2)]			*23, 28*	*23, 28*	*23, 28*	*23, 28*	*24, 29*	*24, 29*	*24, 29*
Organotin concentration [3)]	MBT	ng cation/g wet wt	*22*	*21*	*9*	*17*	*< 0.3*	*37*	*13*
	DBT		*71*	*97*	*13*	*76*	*< 0.4*	*351*	*59*
	TBT		*113*	*78*	*41*	*64*	*35*	*529*	*41*
	MPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*	*n.c.*

[1)] prefix indicates country of sampling partner (BE. ES. DE. FR. HU. GR. IT. NL. PT. SE. UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] n.c. not considered.

Italy

serial number[1)]			*IT53*	*IT54*	*IT55*
location of origin code			*Sardinia East Coast*	*Sardinia South East Coast*	*North Tyrrhenian sea*
species code			*Mytilus galloprovincialis*	*Mytilus galloprovincialis*	*Mytilus galloprovincialis*
Sampling date			*25/09/2002*	*26/09/2002*	*26/05/2003*
Sampling location code			*Arbatax*	*Villasimius.*	*La Spezia Gulf*
sampled amount of tissue		kg wet wt	*0.148*	*0.139*	*0.330*
sampled number of animals			*60*	*60*	*100*
dry weight		% wet wt	*19.9*	*18.0*	*10.0*
Lipids		% wet wt	*n.a.*	*n.a.*	*n.a.*
sample intake for organotin analysis		g wet wt	*ca. 2.5*	*ca. 2.5*	*ca. 3*
corresponding quality control samples[2)]			*24, 29*	*24, 29*	*25, 30*
Organotin concentration [3)]	MBT	ng cation/g wet wt	*21*	*21*	*23*
	DBT		*90*	*77*	*54*
	TBT		*62*	*33*	*108*
	MPT		*n.c.*	*n.c.*	*n.c.*
	DPT		*n.c.*	*n.c.*	*n.c.*
	TPT		*n.c.*	*n.c.*	*n.c.*

1) prefix indicates country of sampling partner (BE. ES. DE. FR. HU. GR. IT. NL. PT. SE. UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) n.c. not considered.

Italy

sample type		IT	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*
quality control sample number			*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
organotin concentration	MBT	*ng cation/g dry wt	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*
	DBT		*< 2*	*< 2*	*< 2*	*< 2*	*< 2*	*< 2*	*< 2*	*< 2*	*< 2*	*< 2*
	TBT		*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*

* Considering 0.5 g of dry weight sample.

sample type		*IT*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*
quality control sample number			*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
sample intake for organotin analysis		g dry wt	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*
amount of water added		g	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
organotin concentration	MBT	ng cation/g dw	*1521*	*1785*	*1718*	*1615*	*1637*	*1499*	*1753*	*1848*	*1740*	*2047*
	DBT		*1385*	*1596*	*1622*	*1560*	*1556*	*1490*	*1303*	*1328*	*1324*	*1406*
	TBT		*2039*	*2410*	*2420*	*2362*	*2278*	*2225*	*1937*	*1987*	*1949*	*2102*

Italy

sample type		*IT*	*blank*	*blank*	*blank*	*blank*	*blank*
quality control sample number			*21*	*22*	*23*	*24*	*25*
organotin concentration	MBT	*ng cation/g dry wt	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*	*< 1.5*
	DBT		*< 2*	*< 2*	*< 2*	*< 2*	*< 2*
	TBT		*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*	*< 2.4*

* Considering 0.5 g of dry weight sample.

sample type		*IT*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*	*BCR 477*
quality control sample number			*26*	*27*	*28*	*29*	*30*
sample intake for organotin analysis		g dry wt	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*
amount of water added		g	*0*	*0*	*0*	*0*	*0*
organotin concentration	MBT	ng cation/g dw	*1480*	*1350*	*1360*	*1350*	*1770*
	DBT		*1370*	*1520*	*1410*	*1420*	*1300*
	TBT		*2090*	*2140*	*2060*	*2000*	*2040*

France

serial number[1)]			*FR1*	*FR2*	*FR3*	*FR4*	*FR5*	*FR6*	*FR7*
location of origin code			*FAO 27 VIII b Atlantic ocean Arcachon bay*	*FAO 27 VIII b Atlantic ocean Arcachon bay*	*FAO 27 VII e Atlantic ocean Bretagne Aber*	*FAO 27 VIII a Atlantic ocean Marennes island*	*FAO 27 VII d Atlantic ocean Normandie Calvados*	*FAO 27 Atlantic North east*	*FAO 27 VII e Atlantic ocean Bretagne Sud*
species code			*Crassostrea gigas*	*Crassostrea gigas*	*Crassostrea gigas*	*Crassostrea gigas*	*Crassostrea gigas*	*Salmo salar*	*Mytilus edulis*
sampling date			*23/10/02*	*27/02/03*	*23/01/03*	*24/01/03*	*11/12/02*	*21/12/02*	*07/02/03*
sampling location code			*Oyster farm (producer-seller)*	*Oyster farm (producer-seller)*	*Oyster farm (producer-seller)*	*Oyster farm (producer-seller)*	*Oyster farm (producer-seller)*	*Imported from Norway Supermarket Pau*	*Supermarket Pau*
sampled amount of tissue		kg wet wt	*0.358*	*0.295*	*0.178*	*0.225*	*0.328*	*4.2*	*0.177*
sampled number of animals			*50*	*50*	*50*	*50*	*50*	*25 slices*	*50*
dry weight		% wet wt	*17.9%*	*17.7*	*20*	*21.4*	*23.5*	*36.4*	*14.37*
Residual moisture in dried sample			*7.7*	*8.8*	*9.3*	*8.7*	*7*	*1*	*7.8*
lipids		% wet wt							
sample intake for organotin analysis		g dry wt	*1*	*1*	*1*	*1*	*1*	*1*	*1*
corresponding quality control samples[2)]			*1, 5, 8*	*1, 5, 8*	*1, 5, 8*	*1, 5, 8*	*1, 5, 8 (2,6 for third extract)*	*2, 6*	*2,6*
organotin concentration [3)]	MBT	ng cation/ g wet wt	*<0.7*	*<0.7*	*<0.8*	*<0.9*	*<0.9*	*<1.4*	*<0.6*
	DBT		*0.76 ± 0.049*	*<0.6*	*<0.6*	*<0.7*	*<0.7*	*<1.1*	*<0.5*

serial number[1]			FR1	FR2	FR3	FR4	FR5	FR6	FR7
	TBT		7.81 ± 0.49	17.27±0.85	24.64± 0.97	9.93±0.66	3.1±0.195	5.73± 0.22	9.76±0.93
	MPT		<3	<3	<4	<4	<4	<6	<3
	DPT		<4	<4	<4	<4	<5	<7	<3
	TPT		<4	<4	<5	<5	<6	<9	<4

1) prefix indicates country of sampling partner (BE. ES. DE. FR. HU. GR. IT. NL. PT. SE. UK).

2) indicate serial number of control samples that have been analysed together with this sample.

3) <x: values below limit of quantification, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

France

serial number[1)]			FR8	FR9	FR10	FR11	FR12	FR13	FR14
location of origin code			*FAO 27 VIIe Atlantic ocean Normandie Baie Mont Saint Michel*	*FAO 27 VII d Atlantic ocean Normandie Calvados*	*FAO 27 VIII a Atlantic ocean Marennes island*	*FAO 27 VII e Atlantic ocean Bretagne Aber*	*FAO 37 1.2 Mediterra-nean sea* Var	*FAO 27 At-lantic North east*	*FAO 27 VIIe Atlantic ocean Normandie Baie Mont Saint Michel*
species code			*Mytilus edulis*	*Crassostrea gigas*	*Crassostrea gigas*	*Crassostrea gigas*	*Mytilus gal-loprovincialis*	*Salmo salar*	*Mytilus edulis*
sampling date			*02/12/02*	*11/04/03*	*14/04/03*	*22/04/03*	*12/02/03*	*03/04/03*	*22/05/03*
sampling location code			*Wholesaler Pau*	*Oyster farm (producer-seller)*	*Oyster farm (producer-seller)*	*Oyster farm (producer-seller)*	*Mussel farm (producer-seller)*	*Imported from Norway Supermarket Pau*	*Wholesaler Pau*
sampled amount of tis-sue		kg wet wt	*0.251*	*0.338*	*0.229*	*0.193*	*0.209*	*2.6*	*0.143*
sampled number of animals			*50*	*50*	*50*	*50*	*50*	*25 slices*	*50*
dry weight		% wet wt	*19.4*	*22*	*21.9*	*17.8*	*16.6*	*40*	*27*
Residual moisture in dried sample			*11*	*9*	*6.5*	*5.9*	*8*	*9*	*10.8*
lipids		% wet wt							
sample intake for or-ganotin analysis		g dry wt	*1*	*1*	*1*	*1*	*1*	*1*	*1*
corresponding quality control samples[2)]			*3,7*	*3,7*	*4,9*	*4,9*	*4',10*	*4',10*	*4'', 11*
organotin con-centration [3)]	MBT	ng cation / g wet wt	*<0.8*	*<0.9*	*<0.9*	*<0.7*	*17.39±1.18*	*<1.6*	*<1.1*

serial number[1)]			*FR8*	*FR9*	*FR10*	*FR11*	FR12	*FR13*	*FR14*
	DBT		*<0.6*	*<0.7*	*<0.7*	*<0.6*	*37.69± 3.49*	*<1.2*	*<0.8*
	TBT		*4.73 ± 0.46*	*6.15± 0.44*	*11.10 ±0.70*	*27.33± 2.07*	*41.65± 3.85*	*6.73± 0.53*	*5.46 ± 0.49*
	MPT		*<4*	*<4*	*<4*	*<3*	*<3*	*<7*	*<5*
	DPT		*<4*	*<4*	*<4*	*<4*	*<3*	*<7*	*<5*
	TPT		*<5*	*<5*	*<5*	*<4*	*<4*	*<9*	*<6*

[1)] prefix indicates country of sampling partner (BE. ES. DE. FR. HU. GR. IT. NL. PT. SE. UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of quantification, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

France

serial number[1)]			*FR15*	FR16
location of origin code			*FAO 27 VII e Atlantic ocean Bretagne sud*	*FAO 37 1.2 Mediterranean sea* Var
species code			*Mytilus edulis*	*Mytilus galloprovincialis*
sampling date			*26/05/03*	*30/05/03*
sampling location code			*Supermarket Pau*	*mussel farm (producer-seller)*
sampled amount of tissue		kg wet wt	*0.139*	*0.216*
sampled number of animals			*50*	*50*
dry weight		% wet wt	*17.63*	*18.47*
Residual moisture in dried sample			*9.2*	*8.8*
lipids		% wet wt		
sample intake for organotin analysis		g dry wt	*1*	*1*
corresponding quality control samples[2)]			*4'', 11*	*4'',11*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<0.7*	*12.24±1.09*
	DBT		*<0.6*	*45.43± 2.19*
	TBT		*16.47 ± 1.195*	*63.75± 5.54*
	MPT		*<3*	*<4*
	DPT		*<3*	*<4*
	TPT		*<4*	*<5*

[1)] prefix indicates country of sampling partner (BE. ES. DE. FR. HU. GR. IT. NL. PT. SE. UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of quantification, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

France

sample type		FR	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*
quality control sample num-			*1*	*2*	*3*	*4*	*4'*	*4''*
sample intake for organotin		g dry wt	*1g*	*1g*	*1g*	*1g*	*1g*	*1g*
Residual moisture in sample								
amount of water added		g						
organotin concen-tration	MBT	ng cation/g dry wt	*<1.18*	*<1.18*	*<1.18*	*<1.18*	*<1.18*	*<1.18*
	DBT		*<1*	*<1*	*<1*	*<1*	*<1*	*<1*
	TBT		*<1.22*	*<1.22*	*<1.22*	*<1.22*	*<1.22*	*<1.22*
	MPT							
	DPT							
	TPT							

sample type		*FR*	*CRM*	*CRM*	*CRM*	*CRM*	*CRM*	*CRM*	*CRM*
quality control sample num-			*5*	*6*	*7*	*8*	*9*	*10*	*11*
sample intake for organotin		g dry wt	*0.753*	*0.754*	*0.617*	*0.514*	*0.502*	*0.533*	*0.485*
Residual moisture in sample			*6.5%*	*6.8%*	*6.8%*	*8%*	*8%*	*10%*	*6.8%*
amount of water added		g							
organotin concen-tration	MBT	ng cation/g dry wt	*1916*	*1750*	*1250*	*33.2*	*42.5*	*1394*	*1360*
	DBT		*1533*	*1418*	*1414*	*68.9*	*89.8*	*1419*	*1626*
	TBT		*2275*	*2047*	*2222*	*118*	*109*	*1959*	*2068*
	MPT								
	DPT								
	TPT								

Germany

serial number[1)]			*DE01*	*DE02*	*DE03*	*DE04*	*DE05*	*DE06*
location of origin code			*NorthAtlantik*	*Pacific*	*NorthAtlantik*	*NorthAtlantik*	*NorthSea*	*Alaska*
species code			*canned Herring in tomato sauce*	*Tuna fish canned without oil*	*canned Herring in jelly*	*salmon, frozen*	*fresh Herring*	*Alaska Pollok, frozen*
sampling date			*1-7-2002*	*1-7-2002*	*1-7-2002*	*1-7-2002*	*1-7-2002*	*1-7-2002*
sampling location code			*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*
sampled amount of tissue		kg wet wt	*0.5*	*0.5*	*0.5*	*0.2*	*0.1*	*0.2*
sampled number of animals			*unknown*	*unknown*	*unknown*	*1*	*1*	*1*
dry weight		% wet wt	*30.2*	*42.5*	*29.1*	*32.4*	*32.5*	*15.9*
lipids		% wet wt	*16.5*	*15.9*	*12.2*	*11.9*	*17.1*	*2.1*
sample intake for organotin analysis		g wet wt	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
corresponding quality control samples[2)]			*1,5*	*1,5*	*1,5*	*1,5*	*1,5*	*1,5*
organotin concentration [3)]	MBT	ng cation / g wet wt	*0.7*	*18.5*	*4.7*	*0.4*	*0.4*	*0.8*
	DBT		*0.9*	*4.9*	*1.5*	*1.0*	*0.8*	*2.3*
	TBT		*1.5*	*3.9*	*4.5*	*8.2*	*4.5*	*1.8*
	MPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	DPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	TPT		*<0.3*	*0.5*	*0.6*	*1.9*	*1.3*	*<0.3*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Germany

serial number[1)]			*DE07*	*DE08*	*DE09*	*DE10*	*DE11*	*DE12*
location of origin code			*NorthAtlantik*	*Pacific*	*NorthAtlantik*	*NorthAtlantik*	*NorthSea*	*Alaska*
species code			*canned Herring in tomato sauce*	*Tuna fish canned without oil*	*canned Herring in jelly*	*salmon, frozen*	*fresh Herring*	*Alaska Pollok, frozen*
sampling date			*8-8-2002*	*8-8-2002*	*8-8-2002*	*8-8-2002*	*8-8-2002*	*8-8-2002*
sampling location code			*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*
sampled amount of tissue		kg wet wt	*0.5*	*0.5*	*0.5*	*0.2*	*0.1*	*0.2*
sampled number of animals			*unknown*	*unknown*	*unknown*	*1*	*1*	*1*
dry weight		% wet wt	*31.4*	*39.5*	*27.2*	*33.9*	*30.5*	*16.9*
lipids		% wet wt	*15.1*	*14.5*	*11.6*	*10.8*	*16.1*	*0.9*
sample intake for organotin analysis		g wet wt	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
corresponding quality control samples[2)]			*2,6*	*2,6*	*2,6*	*2,6*	*2,6*	*2,6*
organotin concentration [3)]	MBT	ng cation / g wet wt	*0.7*	*19.7*	*5.6*	*0.4*	*0.6*	*0.3*
	DBT		*0.7*	*4.7*	*1.3*	*0.9*	*1.8*	*0.7*
	TBT		*1.4*	*2.9*	*4.5*	*8.2*	*34.3*	*0.7*
	MPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	DPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	TPT		*<0.3*	*0.3*	*0.5*	*2.1*	*1.9*	*<0.3*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Germany

serial number[1)]			*DE13*	*DE14*	*DE15*	*DE16*	*DE17*	*DE18*
location of origin code			*NorthAtlantik*	*Pacific*	*NorthAtlantik*	*NorthAtlantik*	*NorthSea*	*Alaska*
species code			*canned Herring in tomato sauce*	*Tuna fish canned without oil*	*canned Herring in jelly*	*salmon, frozen*	*fresh Herring*	*Alaska Pollok, frozen*
sampling date			*16-9-2002*	*16-9-2002*	*16-9-2002*	*16-9-2002*	*16-9-2002*	*16-9-2002*
sampling location code			*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*
sampled amount of tissue		kg wet wt	*0.5*	*0.5*	*0.5*	*0.2*	*0.1*	*0.2*
sampled number of animals			*unknown*	*unknown*	*unknown*	*1*	*1*	*1*
dry weight		% wet wt	*32.7*	*34.9*	*24.2*	*31.2*	*33.1*	*15.1*
lipids		% wet wt	*14.2*	*17.6*	*13.6*	*14.3*	*17.3*	*1.9*
sample intake for organotin analysis		g wet wt	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
corresponding quality control samples[2)]			*3,6*	*3,6*	*3,6*	*3,6*	*3,6*	*3,6*
organotin concentration [3)]	MBT	ng cation / g wet wt	*0.5*	*16.1*	*7.1*	*0.4*	*0.6*	*<0.3*
	DBT		*0.9*	*3.7*	*2.1*	*1.0*	*1.8*	*0.7*
	TBT		*1.4*	*2.9*	*5.9*	*8.2*	*30.8*	*0.8*
	MPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	DPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	TPT		*<0.3*	*0.6*	*0.6*	*2.3*	*1.8*	*<0.3*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Germany

serial number[1)]			DE19	DE20	DE21	DE22	DE23	DE24
location of origin code			*NorthAtlantik*	*Pacific*	*Pacific*	*NorthAtlantik*	*NorthSea*	*NorthSea*
species code			*canned Herring in tomato sauce*	*Tuna fish salat canned without oil*	*tuna fish filets canned without oil*	*canned Herring salat*	*canned Herring filets*	*canned Herring filets in fruity sauce*
sampling date			*28-7-2003*	*28-7-2003*	*28-7-2003*	*28-7-2003*	*28-7-2003*	*28-7-2003*
sampling location code			*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*	*Supermarket*
sampled amount of tissue		kg wet wt	*1*	*3*	*3*	*1*	*1*	*1*
sampled number of packages			*20 cans from 4 supermarkets*	*20 cans from 4 supermarkets*	*20 cans from 4 supermarkets*	*20 cans from 4 supermarkets*	*20 cans from 4 supermarkets*	*20 cans from 4 supermarkets*
dry weight		% wet wt						
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
corresponding quality control samples[2)]			*11,12,13,15,16,17*	*11,12,13,15,16,17*	*11,12,13,15,16,17*	*11,12,13,15,16,17*	*11,12,13,15,16,17*	*11,12,13,15,16,17*
organotin concentration [3)]	MBT	ng cation/ g wet wt	*1.7*	*<0.3*	*<0.3*	*0.9*	*21.3*	*12.6*
	DBT		*0.3*	*0.4*	*0.5*	*5.3*	*3.7*	*0.8*
	TBT		*3.3*	*1.4*	*1.1*	*37.5*	*4.5*	*3.9*
	MPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	DPT		*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*	*<0.3*
	TPT		*<0.3*	*<0.3*	*<0.3*	*1.8*	*0.6*	*<0.3*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Germany

serial number[1)]			*DE25*	*DE26*
location of origin code			*Pacific*	*NorthAtlantic*
species code			*salmon filet, frozen*	*Alaska Pollok,fish sticks, frozen*
sampling date			*28-7-2003*	*28-7-2003*
sampling location code			*Supermarket*	*Supermarket*
sampled amount of tissue		kg wet wt	*5*	*5*
sampled number of packages			*20 bags from 4 supermarkets*	*20 cartons from 4 supermarkets*
dry weight		% wet wt		
lipids		% wet wt		
sample intake for organotin analysis		g wet wt	*1.0*	*1.0*
corresponding quality control samples[2)]			*11,12,13,15,16,17*	*11,12,13,15,16,17*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<0.3*	*<0.3*
	DBT		*1.3*	*<0.3*
	TBT		*1.2*	*1.0*
	MPT		*<0.3*	*<0.3*
	DPT		*<0.3*	*<0.3*
	TPT		*<0.3*	*0.3*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Germany

sample type		DE	blank	blank	blank	blank	blank	blank
quality control sample number			1	2	3	11	12	13
sample intake for organo-tin analysis		g dry wt	0	0	0	0	0	0
amount of water added		g	10	10	10	10	10	10
organotin con-centration	MBT	ng cation /g dry wt	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	DBT		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	TBT		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	MPT		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	DPT		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	TPT		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

sample type		DE	CRM 477	CRM 477	CRM 477	CRM 477	CRM 477	CRM 477
quality control sample number			5	6	7	15	16	17
sample intake for organo-tin analysis		g dry wt	0.1	0.1	0.1	0.1	0.1	0.1
amount of water added		g	10	10	10	10	10	10
organotin con-centration	MBT	ng cation /g dry wt	2550	2680	2620	2349	2389	2272
	DBT		1910	1880	1930	1618	1736	1553
	TBT		2240	2310	2200	2365	2353	2344
	MPT		1440	1640	1650	1618	1739	1553
	DPT		70	72	63	79,3	83,9	96,7
	TPT		1250	1170	1130	1248	1318	1300

Portugal

serial number[1)]			*PT01*	*PT02*	*PT03*	*PT04*	*PT05*	*PT06*	*PT07*
location of origin code			*Atlantic*	*Atlantic*	*Atlantic*	*Argentine*	*Atlantic*	*Atlantic*	*Atlantic*
species code			*Sardina pilchardus*	*Sardina pilchardus*	*Trachurus trachurus*	*Merluccius. sp*	*Trisopterus Luscus*	*Octopus vulgaris*	*Octopus vulgaris*
sampling date			*28-07-02*	*02-08-02*	*18-02-02*	*28-07-02*	*18-07-02*	*18-07-02*	*26-07-02*
sampling location code			*Fishing market in Leixões*	*Fishing market in Olhão*	*Fishing market in Leixões*	*Supermarket in North Portugal*	*Fishing market in Leixões*	*Fishing market in Leixões*	*Fishing market in Sesimbra*
sampled amount of tissue		kg wet wt							
sampled number of animals			*25*	*25*	*25*	*25*	*25*	*25*	*25*
dry weight		% wet wt							
lipids		% wet wt							
sample intake for organotin analysis		g wet wt							
corresponding quality control samples[2)]			*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<0,3*	*<0,3*	*0,5*	*<0,3*	*<0,3*	*0,5*	*0,5*
	DBT		*1,2*	*1,5*	*1,1*	*1,2*	*<0,3*	*3,4*	*9,5*
	TBT		*17,5*	*13,2*	*4,1*	*1,3*	*<0,3*	*4,3*	*27,1*
	MPT								
	DPT								
	TPT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Portugal

serial number[1)]			*PT08*	*PT09*	*PT10*	*PT11*	*PT12*
location of origin code			*Atlantic*	*Atlantic*	*Atlantic*	*Atlantic*	*Nigeria*
species code			*Octopus vulgaris*	*Mytillus galoprovinciallis*	*Cerastoderma edule*	*Tapes sp.*	*Paneus sp.*
sampling date			*02-08-02*	*02-08-02*	*23-07-02*	*02-08-02*	*28-07-02*
sampling location code			*Fishing market in Olhão*	*Supermarket in North Portugal*	*Fishing market in Aveiro*	*Fishing market in Olhão*	*Supermerket in North Portugal*
sampled amount of tissue		kg wet wt					
sampled number of animals			*25*	*50*	*50*	*50*	*100*
dry weight		% wet wt					
lipids		% wet wt					
sample intake for organotin analysis		g wet wt					
corresponding quality control samples[2)]			*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*	*1,2,3,5,6,7*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<0,3*	*3,8*	*2,5*	*2,1*	*<0,3*
	DBT		*1,0*	*32,2*	*19,0*	*10,5*	*2,6*
	TBT		*2,6*	*100,0*	*64,3*	*32,7*	*5,5*
	MPT						
	DPT						
	TPT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Portugal

serial number[1)]			*PT13*	*PT14*	*PT15*	*PT16*	*PT17*	*PT18*
location of origin code			*Atlantic, Ria of Aveiro (Centre Portugal)*	*Mozambique*	*Atlantic, North Spain*	*Atlantic (Norway)*	*Atlantic, North Portugal*	*Atlantic, Ria Formosa (South Portugal)*
species code			*Cerastoderma edule*	*Paneus sp.*	*Trachurus trachurus*	*Gadus sp.*	*Trisopterus Luscus*	*Mytillus galoprovinciallis*
sampling date			*7-04-03*	*20-12-02*	*26-03-03*	*20-12-02*	*26-03-03*	*07-04-03*
sampling location code			*Fishing market in Aveiro*	*Supermarket in North Portugal*	*Fishing market in Leixões*	*Supermarket in North Portugal*	*Fishing market in Leixões*	*Supermarket in North Portugal*
sampled amount of tissue		kg wet wt	*2*	*2*	*4*	*20*	*4*	*2*
sampled number of animals			*50*	*100*	*25*	*25*	*25*	*50*
dry weight		% wet wt						
lipids		% wet wt						
sample intake for organotin analysis		g wet wt						
corresponding quality control samples[2)]			*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*
organotin concentration [3)]	MBT	ng cation / g wet wt	*13,1*	*1,1*	*1,6*	*1,3*	*1,4*	*9,1*
	DBT		*77,7*	*1,7*	*3,4*	*2,1*	*1,4*	*29,1*
	TBT		*240*	*<0,3*	*6,1*	*1,7*	*<0,3*	*70,3*
	MPT							
	DPT							
	TPT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).

2) indicate serial number of control samples that have been analysed together with this sample.

3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Portugal

serial number[1)]			*PT19*	*PT20*	*PT21*	*PT22*	*PT23*	*PT24*	*PT25*
location of origin code			*South Africa*	*Atlantic, Centre of Portugal*	*Atlantic, North Portugal*	*Atlantic, South Portugal*	*Atlantic, North Portugal*	*Atlantic, South Portugal*	*Atlantic, Ria Formosa (South Portugal)*
species code			*Merluccius. sp*	*Octopus vulgaris*	*Octopus vulgaris*	*Octopus vulgaris*	*Sardina pilchardus*	*Sardina pilchardus*	*Ruditapes decussatus.*
sampling date			*20-12-02*	*27-03-03*	*20-12-02*	*16-03-03*	*20-12-02*	*16-03-03*	*27-03-03*
sampling location code			*Supermarket in North Portugal*	*Fishing market in Sesimbra*	*Fishing market in Leixões*	*Fishing market in Olhão*	*Fishing market in Leixões*	*Fishing market in Olhão*	*Fishing market in Olhão*
sampled amount of tissue		kg wet wt	*5*	*15*	*15*	*15*	*3*	*3*	*2*
sampled number of animals			*25*	*25*	*25*	*25*	*25*	*25*	*50*
dry weight		% wet wt							
lipids		% wet wt							
sample intake for organotin analysis		g wet wt							
corresponding quality control samples[2)]			*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*	*11,12,13,15, 16,17*
organotin concentration [3)]	MBT	ng cation / g wet wt	*2,5*	*1,2*	*<0,3*	*2,7*	*3,1*	*1,7*	*10,1*
	DBT		*2,4*	*3,1*	*<0,3*	*5,9*	*5,1*	*2,4*	*28,5*
	TBT		*2,6*	*8,2*	*<0,3*	*4,9*	*29,6*	*19,1*	*275*
	MPT								
	DPT								
	TPT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*

[1).] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Portugal

sample type		PT	blank	blank	blank	blank	blank	blank	CRM 477	CRM 477	CRM 477	CRM 477	CRM 477	CRM 477
quality control sample number			*1*	*2*	*3*	*11*	*12*	*13*	*5*	*6*	*7*	*15*	*16*	*17*
sample intake for organotin analysis		g dry wt	*1*	*1*	*1*	*1*	*1*	*1*	*0,1*	*0,1*	*0,1*	*0,1*	*0,1*	*0,1*
amount of water added		g	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*10*	*10*
organotin concentration	MBT	ng cation / g wet wt	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*1782*	*2607*	*2498*	*2264*	*2419*	*2360*
	DBT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*2288*	*2239*	*2312*	*1952*	*1810*	*1784*
	TBT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*2037*	*2028*	*2498*	*2028*	*2250*	*2318*
	MPT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*1450*	*1725*	*1620*	*1328*	*1517*	*1456*
	DPT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*70*	*59*	*61*	*62*	*64*	*58*
	TPT		*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*<0,3*	*1110*	*1236*	*1056*	*1021*	*1089*	*1057*

Spain

serial number[1)]			*ES01*	*ES02*	*ES03*	*ES04*	*ES05*	*ES06*
location of origin code			*Western Mediterranean*	*Cadiz Gulf*	*Cantabric Sea*	*Alicante coast*	*Imported from Morocco-Argelian*	*Cadiz Gulf*
species code			*Engraulis encrasicholus*	*Engraulis encrasicholus*	*Engraulis encrasicholus*	*Crangon crangon*	*Crangon crangon*	*Crangon crangon*
sampling date			*18-Jul-02*	*30-Jul-02*	*11-Sep-02*	*18-Jul-02*	*18-Jul-02*	*30-Jul-02*
sampling location code			*Wholesaler in Madrid*	*Wholesaler in Huelva*	*Wholesaler in Santander*	*Wholesaler in Madrid*	*Wholesaler in Madrid*	*Wholesaler in Huelva*
sampled amount of tissue		kg wet wt	*2*	*2*	*2*	*2*	*2*	*2*
sampled number of animals			*25*	*25*	*25*	*100*	*100*	*100*
dry weight		% wet wt	*31.2*	*30.5*	*35.4*	*31.3*	*29.3*	*28*
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	*3.316*	*3.334*	*2.904*	*3.234*	*3.468*	*3.732*
corresponding quality control samples[2)]			*1, 5*	*1, 5*	*2, 6*	*1, 5*	*1, 5*	*1, 5*
organotin concentration [3)]	MBT	ng cation / g wet wt	*6.60*	*2.40**	*1.29**	*<2*	*6.83*	*2.00**
	DBT		*<2*	*1.85**	*1.79**	*<2*	*<2*	*<2*
	TBT		*28.51*	*16.57*	*4.42**	*5.44**	*2.05**	*2.93**
	MPT		*<5*	*<5*	*<5*	*<5*	*<5*	*<5*
	DPT		*<8*	*<8*	*<8*	*<8*	*<8*	*<8*
	TPT		*<8*	*<8*	*<8*	*<8*	*<8*	*<8*

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Spain

serial number[1]			*ES07*	*ES08*	*ES09*	*ES10*	*ES11*	*ES12*
location of origin code			*Western Mediterranean*	*Cadiz Gulf*	*Cantabric Sea*	*Cadiz Gulf*	*Cantabric Sea*	*Imported from Saharian-Morocco*
species code			*Sardina pilchardus*	*Sardina pilchardus*	*Sardina pilchardus*	*Solea solea*	*Solea solea*	*Loligo vulgaris*
sampling date			*18-Jul-02*	*30-Jul-02*	*11-Sep-02*	*30-Jul-02*	*12-Sep-02*	*18-Jul-02*
sampling location code			*Wholesaler in Madrid*	*Wholesaler in Huelva*	*Wholesaler in Santander*	*Wholesaler in Huelva*	*Wholesaler in Santander*	*Wholesaler in Madrid*
sampled amount of tissue		kg wet wt	*2*	*2*	*2*	*2*	*2*	*2*
sampled number of animals			*25*	*25*	*25*	*15*	*15*	*20*
dry weight		% wet wt	*41.4*	*33.9*	*40.3*	*31.9*	*32.7*	*26.3*
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	*2.459*	*2.993*	*2.519*	*3.27*	*3.113*	*3.93*
corresponding quality control samples[2]			*1, 5*	*2, 6*	*2, 6*	*1, 5*	*2, 6*	*1, 5*
organotin concentration [3]	MBT	ng cation / g wet wt	*<2*	*1.39**	*7.71*	*7.18*	*<2*	*5.76*
	DBT		*1.42**	*<2*	*6.96*	*<2*	*<2*	*2.80**
	TBT		*35*	*24.44*	*34.83*	*<2*	*<2*	*19.34*
	MPT		*<5*	*<5*	*<5*	*<5*	*<5*	*<5*
	DPT		*<8*	*<8*	*<8*	*<8*	*<8*	*<8*
	TPT		*<8*	*<8*	*<8*	*<8*	*<8*	*<8*

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Spain

serial number[1]			ES13	ES14	ES15	ES16	ES17	ES18
location of origin code			*Cantabric Sea*	*Cadiz Gulf*	*Cantabric Sea*	*Western Mediterranean*	*Cadiz Gulf*	*Galicia*
species code			*Loligo vulgaris*	*Merlangus merlangius*	*Merlangus merlangius*	*Engraulis encrasicholus*	*Engraulis encrasicholus*	*Mytilus edulis*
sampling date			*9-Sep-02*	*30-Jul-02*	*16-Sep-02*	*17-Oct-02*	*6-Nov-02*	*9-Nov-02*
sampling location code			*Wholesaler in Santander*	*Wholesaler in Huelva*	*Wholesaler in Santander*	*Wholesaler in Madrid*	*Wholesaler in Huelva*	*Supermarket in La Coruña*
sampled amount of tissue		kg wet wt	*2*	*2*	*2*	*2*	*2*	*2*
sampled number of animals			*20*	*15*	*15*	*25*	*25*	*50*
dry weight		% wet wt	*30.4*	*29.4*	*29.9*	*38.6*	*33.8*	*30.9*
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	*3.361*	*3.451*	*3.432*	*2.621*	*3.049*	*3.434*
corresponding quality control samples[2]			*1, 5*	*1, 5*	*2, 6*	*2, 6*	*4, 8*	*3, 7*
organotin concentration [3]	MBT	ng cation / g wet wt	*2.88**	*2.77**	*4.69*	*3.08**	*<2*	*4.58*
	DBT		*<2*	*<2*	*4.66**	*9.5*	*<2*	*23.36*
	TBT		*4.43**	*22.17*	*15.46*	*16.01*	*30.09*	*26.08*
	MPT		*<5*	*<5*	*<5*	*<5*	*<5*	*<5*
	DPT		*<8*	*<8*	*<8*	*<8*	*<8*	*<8*
	TPT		*<8*	*<8*	*<8*	*<8*	*<8*	*<8*

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Spain

serial number[1]			ES19	ES20	ES21	ES22	ES23	ES24
location of origin code			Alicante coast	Imported from Morocco-Argelian	Cadiz Gulf	Western Mediterranean	Cadiz Gulf	Cadiz Gulf
species code			Crangon crangon	Crangon crangon	Crangon crangon	Sardina pilchardus	Sardina pilchardus	Solea solea
sampling date			17-Oct-02	17-Oct-02	7-Nov-02	17-Oct-02	6-Nov-02	7-Nov-02
sampling location code			Wholesaler in Madrid	Wholesaler in Madrid	Wholesaler in Huelva	Wholesaler in Madrid	Wholesaler in Huelva	Wholesaler in Huelva
sampled amount of tissue		kg wet wt	2	2	2	2	2	2
sampled number of animals			100	100	100	25	25	15
dry weight		% wet wt	31.8	32	32.3	40.7	42.8	31.3
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	3.301	3.122	3.143	2.537	2.488	3.238
corresponding quality control samples[2]			3, 7	2, 6	3, 7	2, 6	3, 7	3, 7
organotin concentration [3]	MBT	ng cation / g wet wt	2.40*	<2	<2	1.53*	<2	3.72*
	DBT		1.71*	<2	<2	2.97*	<2	3.68*
	TBT		<5	<5	<5	33.9	18.01	10.57
	MPT		<5	<5	<5	<5	<5	<5
	DPT		<8	<8	<8	<8	<8	<8
	TPT		<8	<8	<8	<8	<8	<8

1) prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
2) indicate serial number of control samples that have been analysed together with this sample.
3) <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Spain

serial number[1)]			*ES25*	*ES26*	*ES27*	*ES28*	*ES29*
location of origin code			*Galicia*	*Imported from Saharian-Morocco*	*Galicia*	*Cadiz Gulf*	*Galicia*
species code			*Solea solea*	*Loligo vulgaris*	*Loligo vulgaris*	*Merlangus merlangius*	*Merlangus merlangius*
sampling date			*9-Nov-02*	*17-Oct-02*	*9-Nov-02*	*8-Nov-02*	*9-Nov-02*
sampling location code			*Supermarket in La Coruña*	*Wholesaler in Madrid*	*Supermarket in La Coruña*	*Wholesaler in Huelva*	*Supermarket in La Coruña*
sampled amount of tissue		kg wet wt	*2*	*2*	*2*	*2*	*2*
sampled number of animals			*15*	*20*	*20*	*15*	*15*
dry weight		% wet wt	*35.6*	*30.4*	*33.4*	*30.8*	*33.9*
lipids		% wet wt					
sample intake for organotin analysis		g wet wt	*2.888*	*3.392*	*3.131*	*3.297*	*3.103*
corresponding quality control samples[2)]			*4, 8*	*2, 6*	*3, 7*	*3, 7*	*4, 8*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<2*	*6.28*	*<2*	*<2*	*<2*
	DBT		*<2*	*7.77*	*<2*	*<2*	*<2*
	TBT		*<2*	*24.38*	*4.78**	*9.79*	*<2*
	MPT		*<5*	*<5*	*<5*	*<5*	*<5*
	DPT		*<8*	*<8*	*<8*	*<8*	*<8*
	TPT		*<8*	*<8*	*<8*	*<8*	*<8*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Spain

serial number[1)]			*ES38*	*ES39*	*ES43*
location of origin code			*Cantabric Sea*	*Cantabric Sea*	*Cantabric Sea*
species code			*Sardina pilchardus*	*Solea solea*	*Merlangus merlangius*
sampling date			*19-May-03*	*19-May-03*	*19-May-03*
sampling location code			*Wholesaler in Santander*	*Wholesaler in Santander*	*Wholesaler in Santander*
sampled amount of tissue		kg wet wt	*2*	*2*	*2*
sampled number of animals			*25*	*15*	*15*
dry weight		% wet wt	*38.2*	*36.6*	*34.2*
lipids		% wet wt			
sample intake for organotin analysis		g wet wt	*2.804*	*2.895*	*3.088*
corresponding quality control samples[2)]			*4, 8*	*4, 8*	*4, 8*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<2*	*<2*	*<2*
	DBT		*<2*	*<2*	*<2*
	TBT		*29.14*	*<2*	*6.15*
	MPT		*<5*	*<5*	*<5*
	DPT		*<8*	*<8*	*<8*
	TPT		*<8*	*<8*	*<8*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high a 100%.

Spain

sample type		ES	*Blank*	*Blank*	*Blank*	*Blank*	*CRM 477*	*CRM 477*	*CRM 477*	*CRM 477*
quality control sample number			*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
sample intake for organotin analysis		g dry wt	*0*	*0*	*0*	*0*	*0.5*	*0.5*	*0.1*	*0.1*
amount of water added		g	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
organotin concentration	MBT	ng cation/g dry wt	<2	<2	<2	<2	1284	1263	1306	1296
	DBT		<2	<2	<2	<2	1297	1301	1318	1309
	TBT		<2	<2	<2	<2	1767	1793	1807	1795
	MPT		<5	<5	<5	<5	<5	<5	<5	<5
	DPT		<8	<8	<8	<8	<8	<8	<8	<8
	TPT		<8	<8	<8	<8	<8	<8	<8	<8

Hungary

serial number[1]			HU01	HU02	HU03	HU04	HU04a	HU05	HU06
location of origin code			Poland	Thailand	Argentina	Poland		Thailand	Argentina
species code			Clupea harengus	Clupea pil-chardus	Merluccius hubbis	Clupea harengus	vinegar dress-ing of HU04	Clupea pil-chardus	Merluccius hubbis
sampling date			24-May/ 07-Jun-02	24-May/ 07-Jun-02	24-May/ 07-Jun-02	09/13-Sep-02		09/13-Sep-02	09/13-Sep-02
sampling location code			4 importers	4 importers	2 importers	4 importers		4 importers	2 importers
sampled amount of tis-sue		kg wet wt	1.66	1.75	2.5	2.5		1.28	1.6
sampled number of animals			55	116	15 slices	68		79	10 slices
dry weight		% wet wt	27.6	28.5	21	30	8.6	22.3	19.1
lipids		% wet wt							
sample intake for or-ganotin analysis		g wet wt	3.7	3.5	5.2	3.5	12.0	4.6	5.4
corresponding quality control samples[2]			4, 8	4, 8	3, 7	4, 8	4,8	4, 8	3, 7
organotin con-centration [3]	MBT	ng cation / g wet wt	<2	<2	<2	<2	<2	<2	<2
	DBT		<2	<2	<2	<2	<2	<2	<2
	TBT		<2	14.56	<2	5.93	<2	9.19	<2
	MPT		<5	<5	<5	<5	<5	<5	<5
	DPT		<8	<8	<8	<8	<8	<8	<8
	TPT		<8	<8	<8	<8	<8	<8	<8

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Hungary

sample type		HU	*Blank*	*Blank*	*CRM 477*	*CRM 477*
quality control sample number			*3*	*4*	*7*	*8*
sample intake for organotin analysis		g dry wt	*0*	*0*	*0.1*	*0.1*
amount of water added		g	*0*	*0*	*0*	*0*
organotin concentration	MBT	ng cation/g dry wt	<2	<2	1306	1296
	DBT		<2	<2	1318	1309
	TBT		<2	<2	1807	1795
	MPT		<5	<5	<5	<5
	DPT		<8	<8	<8	<8
	TPT		<8	<8	<8	<8

United Kingdom

serial number[1]			*UK01*	*UK02*	*UK03*	*UK04*	*UK05*	*UK06*
location of origin code			*VIA North West Uk*	*VIA North West Uk*	*IVc East coast*	*IVc East coast*	*IVc East coast*	*IVc East coast*
species code			*Gadus morhua*	*Melanogammus aeglefinus*	*Buccinum unda-tum*	*Buccinum unda-tum*	*Buccinum unda-tum*	*Mytilus edulis*
sampling date			*Oct-02*	*Oct-02*	*Jul-02*	*Aug-02*	*Jul-02*	*Sep-02*
sampling location code			*Whitehaven fish market*	*Whitehaven fish market*	*East Coast Beach*	*East Coast Beach*	*East Coast Beach*	*Mussel beds on the East Coast*
sampled amount of tis-sue		kg wet wt	*42.5*	*16.5*	*0.065*	*0.043*	*0.326*	*0.13*
sampled number of animals			*25*	*25*	*8*	*5*	*38*	*35*
dry weight		% wet wt	*21.6*	*22.7*	*27.5*	*27.9*	*25.8*	*24.5*
lipids		% wet wt						
sample intake for or-ganotin analysis		g wet wt	*2*	*2.03*	*2.18*	*2.02*	*2.03*	*2.08*
corresponding quality control samples[2]			*7,17*	*7,17*	*3,13*	*3,13*	*3,13*	*2,12*
organotin con-centration [3]	MBT	ng cation / g wet wt	*5*	*<5*	*13*	*16*	*21*	*4*
	DBT		*4*	*<4*	*7*	*9*	*9*	*5*
	TBT		*4*	*<4*	*<4*	*18*	*<4*	*11*
	MPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	DPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	TPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

United Kingdom

serial number[1]			*UK07*	*UK08*	*UK09*	*UK10*	*UK11*	*UK12*
location of origin code			*VIIe South coast*	*VIIf West coast*	*VIIe South coast*	*VIIa West Coast*	*IVc East coast*	*VIIe South coast*
species code			*Mytilus edulis*	*Mytilus edulis*	*Mytilus edulis*	*Mytilus edulis*	*Crassostrea gigas*	*Crassostrea gigas*
sampling date			*Sep-02*	*Sep-02*	*Sep-02*	*Sep-02*	*Sep-02*	*Sep-02*
sampling location code			*Mussel beds on the South Coast*	*Mussel beds on the West Coast*	*Mussel beds on the South Coast*	*Mussel beds on the West Coast*	*Oyster beds on the East Coast*	*Oyster beds on the South Coast*
sampled amount of tissue		kg wet wt	*0.236*	*0.164*	*0.456*	*0.184*	*0.054*	*0.355*
sampled number of animals			*50*	*50*	*50*	*50*	*10*	*10*
dry weight		% wet wt	*27.8*	*22*	*26.1*	*31.1*	*16*	*18.9*
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	*2.09*	*2.01*	*2.02*	*2.04*	*2.01*	*2.08*
corresponding quality control samples[2]			*5,15*	*2, 12*	*2,12*	*2,12*	*5,15*	*1,11*
organotin concentration [3]	MBT	ng cation / g wet wt	*20*	*7*	*7*	*<5*	*<5*	*<5*
	DBT		*44*	*6*	*9*	*5*	*<4*	*5*
	TBT		*52*	*6*	*15*	*7*	*15*	*38*
	MPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	DPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	TPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*

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[2] indicate serial number of control samples that have been analysed together with this sample.
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United Kingdom

serial number[1)]			*UK13*	*UK14*	*UK15*	*UK16*	*UK17*	*UK18*
location of origin code			*VIIa West Coast*	*VIId South coast*	*VIIf West coast*	*IVc East coast*	*VIIe South coast*	*VIIe South coast*
species code			*Crassostrea gigas*	*Ostrea edulis*	*Ostrea edulis*	*Mytilus edulis*	*Mytilus edulis*	*Mytilus edulis*
sampling date			*Sep-02*	*Sep-02*	*Sep-02*	*Feb-03*	*Jan-03*	*Jan-03*
sampling location code			*Oyster beds on the West Coast*	*Oyster beds on the South Coast*	*Oyster beds on the West Coast*	*Mussel beds on the East Coast*	*Mussel beds on the South Coast*	*Mussel beds on the South Coast*
sampled amount of tissue		kg wet wt	*0.379*	*0.1*	*0.521*	*0.286*	*0.263*	*0.292*
sampled number of animals			*10*	*10*	*10*	*25*	*25*	*25*
dry weight		% wet wt	*13.7*	*16.9*	*20.9*	*17.6*	*25.3*	*21.1*
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	*2*	*2.06*	*2.02*	*2*	*2*	*2*
corresponding quality control samples[2)]			*1,11*	*1,11*	*1,11*	*5,15*	*5,15*	*5,15*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<5*	*<5*	*<5*	*<5*	*14*	*<5*
	DBT		*<4*	*8*	*<4*	*5*	*24*	*7*
	TBT		*9*	*36*	*<4*	*8*	*29*	*9*
	MPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	DPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	TPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*

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2) indicate serial number of control samples that have been analysed together with this sample.
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United Kingdom

serial number[1]			*UK19*	*UK20*	*UK21*	*UK22*
location of origin code			*VIIf West coast*	*VIIa West Coast*	*IVc East coast*	*VIIe South coast*
species code			*Mytilus edulis*	*Mytilus edulis*	*Crassostrea gigas*	*Crassostrea gigas*
sampling date			*Dec-03*	*Jan-03*	*Feb-03*	*Dec-03*
sampling location code			*Mussel beds on the West Coast*	*Mussel beds on the West Coast*	*Oyster beds on the East Coast*	*Oyster beds on the South Coast*
sampled amount of tissue		kg wet wt	*0.08*	*0.128*	*0.093*	*0.099*
sampled number of animals			*50*	*30*	*5*	*10*
dry weight		% wet wt	*29*	*21.5*	*14.8*	*17*
lipids		% wet wt				
sample intake for organotin analysis		g wet wt	*2.06*	*2.01*	*2.01*	*2.06*
corresponding quality control samples[2]			*5,15*	*5,15*	*5,15*	*5,15*
organotin concentration [3]	MBT	ng cation / g wet wt	*<5*	*<5*	*<5*	*9*
	DBT		*5*	*5*	*<4*	*22*
	TBT		*9*	*9*	*49*	*62*
	MPT		*<80*	*<80*	*<80*	*<80*
	DPT		*<80*	*<80*	*<80*	*<80*
	TPT		*<80*	*<80*	*<80*	*<80*

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

United Kingdom

sample type		UK	*blank*	*blank*	*blank*	*blank*	*blank*	*BCR477*	*BCR477*	*BCR477*	*BCR477*	*BCR477*
quality control sample number			*1*	*2*	*3*	*5*	*7*	*11*	*12*	*13*	*15*	*17*
sample intake for organotin analysis		g dry wt	*1*	*1*	*1*	*1*	*1*	*0.51*	*0.52*	*0.50*	*0.52*	*0.52*
amount of water added		g	*2*	*2*	*2*	*2*	*2*	*2.00*	*2.00*	*2.00*	*2.00*	*2.00*
organotin concentration	MBT	ng cation / g wet wt	*<5*	*<5*	*<5*	*<5*	*<5*	*1434*	*1596*	*1818*	*1601*	*1583*
	DBT		*<4*	*<4*	*<4*	*<4*	*<4*	*1304*	*1330*	*1156*	*1267*	*1112*
	TBT		*<4*	*<4*	*<4*	*<4*	*<4*	*2087*	*1814*	*1935*	*2135*	*1917*
	MPT		*<80*	*<80*	*<80*	*<80*	*<80*	*168*	*288*	*1183*	*281*	*736*
	DPT		*<80*	*<80*	*<80*	*<80*	*<80*	*9*	*<80*	*133*	*141*	*<80*
	TPT		*<80*	*<80*	*<80*	*<80*	*<80*	*622*	*509*	*1151*	*1177*	*658*

Belgium

serial number[1)]			*BE01*	*BE02*	*BE03*	*BE04*	*BE05*	*BE06*	*BE07*
location of origin code			*North Sea – Belgian continental shelf*	*North Sea - Dutch continental shelf*	*Norway*	*North Sea - Belgian continental shelf*	*North Sea – Belgian continental shelf*	*North Sea - Dutch continental shelf*	*Norway*
species code			*Crangon crangon.*	*Pleuronectes platessa*	*Oncorhynchus spp.*	*Crangon crangon.*	*Crangon crangon(cooked)*	*Pleuronectes platessa*	*Oncorhynchus spp.*
sampling date			*22-Oct-02*	*22-Oct-02*	*18-Nov-02*	*6-Mar-03*	*6-Mar-03*	*6-Mar-03*	*12-Feb-03*
sampling location code			*own sampling at sea*	*own sampling at sea*	*importer*	*own sampling at sea*	*own sampling at sea*	*own sampling at sea*	*importer*
sampled amount of tissue		kg wet wt	*0.67*	*0.401*	*0.741*	*0.088*	*0.103*	*0.821*	*0.367*
sampled number of animals			*792*	*25*	*25*	*100*	*100*	*25*	*25*
dry weight		% wet wt	*24.6*	*23.3*	*31.4*	*22.5*	*23.2*	*16.2*	*26.2*
lipids		% wet wt							
sample intake for organotin analysis		g wet wt	*2.02*	*2.06*	*0.5*	*0.51*	*0.51*	*0.53*	*0.52*
corresponding quality control samples[2)]			*7,17*	*5,15*	*8,18*	*9,19*	*9,19*	*9,19*	*9,19*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<5*	*<5*	*<5*	*<5*	*<5*	*<5*	*<5*
	DBT		*1.5*	*1.2*	*<4*	*4.7*	*5.7*	*<4*	*<4*
	TBT		*13*	*<4*	*<4*	*73*	*130*	*<4*	*<4*
	MPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	DPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*	*<80*
	TPT		*<80*	*<80*	*<80*	*<80*	*<80*	*<80*	*<80*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Belgium

serial number[1)]			*BE08*	*BE09*	*BE10*	BE11
location of origin code			*North Sea –Belgian continental shelf, Vlakte van de Raan*	*North Sea -Belgian continental shelf, Vlakte van de Raan*	*North Sea -Belgian continental shelf, Wenduinebank*	*North Sea -Belgian continental shelf, Wenduinebank*
species code			*Crangon crangon (raw)*	*Crangon crangon (cooked)*	*Crangon crangon (raw)*	*Crangon crangon (cooked)*
sampling date			*12-06-2003*	*12-06-2003*	*13-06-2003*	*13-06-2003*
sampling location code			*own sampling at sea*	*own sampling at sea*	*own sampling at sea*	*own sampling at sea*
sampled amount of tissue		kg wet wt	*0.0625*	*0.0338*	*0.0882*	*0.0397*
sampled number of animals			*100*	*100*	*100*	*100*
dry weight		% wet wt	*24.2*	*33.6*	*25.5*	*32.9*
lipids		% wet wt	*0.52*	*0.51*	*0.52*	*0.50*
sample intake for organotin analysis		g wet wt				
corresponding quality control samples[2)]			*10, 20*	*10, 20*	*10, 20*	*11, 21*
organotin concentration [3)]	MBT					
	DBT		*3.9*	*7.4*	*1.3*	*8.6*
	TBT		*89*	*199*	*66*	*103*
	MPT					
	DPT					
	TPT					

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.

Belgium

sample type		BE	*blank*	*blank*	*blank*	*blank*	*blank*	*blank*
quality control sample number			*7*	*5*	*8*	*9*	*10*	*11*
sample intake for organotin analysis		g dry wt	*1*	*1*	*1*	*1*	*1*	*1*
amount of water added		g	*2*	*2*	*2*	*2*	*2*	*2*
organotin concentration	MBT	ng cation / g wet wt	*<5*	*<5*	*<5*	*<5*		
	DBT		*<4*	*<4*	*<4*	*<4*	*<4*	*<4*
	TBT		*<4*	*<4*	*<4*	*<4*	*<4*	*<4*
	MPT		*<80*	*<80*	*<80*	*<80*		
	DPT		*<80*	*<80*	*<80*	*<80*		
	TPT		*<80*	*<80*	*<80*	*<80*		

sample type		BE	*BCR477*	*BCR477*	*BCR477*	*BCR477*	*BCR477*	*BCR477*
quality control sample number			*17*	*15*	*18*	*19*	*20*	*21*
sample intake for organotin analysis		g dry wt	*0.51*	*0.505*	*0.503*	*0.55*	*0.47*	*0.50*
amount of water added		g	*2*	*2*	*2*	*2*	*2*	*2*
organotin concentration	MBT	ng cation / g wet wt	*1583*	*1797*	*2297*	*1137*		
	DBT		*1112*	*1210*	*1296*	*1152*	*1154*	*1191*
	TBT		*1917*	*2317*	*2053*	*1939*	*1946*	*2105*
	MPT		*736*	*477*	*908*	*275*		
	DPT		*<80*	*152*	*120*	*130*		
	TPT		*658*	*831*	*846*	*790*		

Sweden

serial number[1]			SE01	SE02	SE03	SE04	SE04 duplo	SE05
location of origin code			27(IIID)	27(IIID)	N63 37.5O20 15.9(310	N63 37.5O20 15.9(310	N63 37.5O20 15.9(310	Nergard AS TSK-04 Norway (IIa)
species code			Clupea harrengus	Clupea harrengus	Clupea harrengus	Clupea harrengus	Clupea harrengus	Salmo salar
sampling date			13-Nov-02	11-Nov-02	10-Jun-02	10-Jun-02	10-Jun-02	10-Jun-02
sampling location code								
sampled amount of tissue		kg wet wt	6	6	3	3	3	3
sampled number of animals								
dry weight		% wet wt	24.2	24.2	21.9	21.9	21.9	36.6
lipids		% wet wt						
sample intake for organotin analysis		g wet wt	0.52	0.52	0.53	2.01	1.05	2.07
corresponding quality control samples[2]			8,18	8,18	8,18	5,15	4,14	4,14
organotin concentration [3]	MBT	ng cation / g wet wt	<5	<5	<5	<5	<5	<5
	DBT		<4	<4	<4	<4	<4	<4
	TBT		<4	<4	10	7.4	7	11
	MPT		<80	<80	<80	<80	<80	<80
	DPT		<80	<80	<80	<80	<80	<80
	TPT		<80	<80	<80	<80	<80	<80

[1] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2] indicate serial number of control samples that have been analysed together with this sample.
[3] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Sweden

serial number[1)]			*SE06*	*SE07*	*SE08*
location of origin code			*St/H-19 Knaver Norway (IIa)*	*Lofoten Norway (IIa)*	*(IIB)*
species code			*Salmo salar*	*Caviar from gdaus morhua*	*Caviar from gdaus morhua*
sampling date			*10-Nov-02*	*02-Apr-01*	*03-Apr-01*
sampling location code					
sampled amount of tissue		kg wet wt	*3*		
sampled number of animals					
dry weight		% wet wt	*29.8*	*66.3*	*59.8*
lipids		% wet wt			
sample intake for organotin analysis		g wet wt	*2.06*	*2.05*	*2.17*
corresponding quality control samples[2)]			*4,14*	*5,15*	*5,15*
organotin concentration [3)]	MBT	ng cation / g wet wt	*<5*	*<5*	*<5*
	DBT		*<4*	*3.3*	*<4*
	TBT		*<4*	*<4*	*<4*
	MPT		*<80*	*<80*	*<80*
	DPT		*<80*	*<80*	*<80*
	TPT		*<80*	*<80*	*<80*

[1)] prefix indicates country of sampling partner (BE, ES, DE, FR, HU, GR, IT, NL, PT, SE, UK).
[2)] indicate serial number of control samples that have been analysed together with this sample.
[3)] <x: values below limit of detection, x*: values between limit of detection end lower limit of quantification, standard deviation can be as high as 100 %.

Sweden

sample type			blank	blank	blank	BCR477	BCR477	BCR477
quality control sample number			4	5	8	14	15	18
sample intake for organotin analysis		g dry wt	1	1	1	0.51	0.52	0.51
amount of water added		g	2	2	2	2	2	2
organotin concentration	MBT	ng cation / g wet wt	<5	<5	<5	1693	1596	2297
	DBT		<4	<4	<4	1176	1330	1296
	TBT		<4	<4	<4	1755	1814	2053
	MPT		<80	<80	<80	549	288	908
	DPT		<80	<80	<80	177	<80	120
	TPT		<80	<80	<80	708	<80	846

Annex V. Analytical methods

ENEA
Pre-treatment: 100 mg sample, ultrasonic extraction with tropolone and HCl; addition of dichloromethane; drying with anhydrous sodium sulphate; addition of isooctane solution
Derivatization: addition of ethereal solution of pentylmagnesium bromide (2 mol/L); destruction of excess reagent with H_2SO_4; clean-up with florisil and elution with hexane:toluene 1:1
Separation: CGC column of 30 m length; 0.53 mm i.d.; methylphenylsilicone as stationary phase; 1.5 mm film thickness; He as carrier gas; column temperature ranging from 80 to 280 °C)
Detection: MS-SIM
Calibration: with pentylated standards from IVM: MBT (>98%), DBT (>99%), TBT (>98%), TPrT (>99%, as internal standard). Samples have not been corrected for recovery

GALAB
Pre-treatment: 100 mg sample, digestion with TMAH
Derivatization by addition of acetate buffer, acetic acid and 0.2% $NaBEt_4$ along with hexane containing Pr_4Sn as internal standard; clean-up with alumina, elution with hexane
Separation: CGC (DB-5 column, 30 m length; 0.25 mm i.d.; 0.17 µm film thickness; He as carrier gas; column temperature ranging from 60 to 280 °C)
Detection: MIP-AES
Calibration: calibration graph using ethylated butyltin compounds as organic salts in methanol

UPPA 1
Pre-treatment: 100 mg sample, digestion by addition of protease, lipase and phosphate buffer
Derivatization: hydride generation in ethanoic acid with 10% $NaBH_4$ in 1% NaOH
Separation: cryogenic trapping in an U-tube filled with chromatographic material (Chromosorb WHP 80-100 mesh, loaded with 10% 0V-101; 0.5 m length; 4 mm i.d.; He as carrier gas; column temperature range from -196 to 220°C)
Detection: QFAAS, wavelength 286.3 nm, addition of O_2/H_2 with resp. flow rates of 45 and 200 mL/min
Calibration: standard additions using butyltin chloride calibrants in methanol

UPPA 2 ?
Pre-treatment: 500 mg sample, extraction with methanol; addition of HCl; buffering with ethanoate buffer
Derivatization: addition of 2% $NaBEt_4$; back-extraction with isooctane
Separation: CGC (column of 30 m length; 0.25 mm i.d.; DB-1 as stationary phase; 0.25 µm film thickness; N_2 as carrier gas; column temperature ranging from 80 to 270 °C)
Detection: FPD
Calibration : standard additions using butyltin chlorides in methanol

CEFAS
Pre-treatment: 500 mg sample, digestion with 0.1% NaOH in methanol/H_2O, followed by hexane extraction
Derivatization: hydride generation with $NaBH_4$
Separation: CGC (column of 25 m length, 0.32 mm i.d.; 5% PHMe silicone as stationary phase; 0.52 µm film thickness; He as carrier gas; N_2 as make-up gas; column temperature ranging from 40 to 225 °C)
Detection: FPD
Calibration : standard additions using $MBTCl_3$, $DBTO_2$ and TBTO as calibrants; TPrT as internal standard

UHCR
Pre-treatment : 200 mg sample, addition of HBr/H_2O mixture followed by extraction with 0.05% tropolone in dichloromethane
Derivatization: pentylation with 1 mol/L pentylmagnesium chloride; derivatization yield verified with pentylated butyltins (85 to 119%); clean-up with Florisil; drying extract under N_2 flow and redissolution in a Pe_2Me_2Sn hexane solution
Separation: CGC (column of 15 m length; 0.53 mm i.d.; SPB-1 as stationary phase; 1.5 µm film thickness; He as carrier gas; column temperature ranging from 80 to 250 °C)
Detection: FPD
Calibration: standard additions using pentylated butyltin calibrants

IVM
Pre-treatment : 20 mg sample (on lipid base), addition of water, adjustment to pH=1.5-2.2, extraction into diethylether with tropolon, volume reduction to 1 ml
Derivatization: pentylation with pentylmagnesiumchloride; extraction into n-hexane, volume reduction to 1 ml, clean-up over alumina (5 g) with n-hexane/diethylether, volume reduction to 1 ml
Separation: GC, SGE 25QC2 BPX-5 column of 25 m length, 0.22 mm i.d., 0.25 µm film thickness, He as carrier gas; column temperature ranging from 60 to 285 °C)
Detection: MSD
Calibration: with pentylated standards from IVM: MBT (>98%), DBT (>99%), TBT (>98%)

Annex VI. Detailed consumption patterns

Greece

Househol budget survey	General population, mean	95%	Mean (g/person/day)	Median (g/person/day)	95th perc. (g/person/day)	Rate of consumers(%)		
Fish (Quality A), fresh	6	36	41	36	95	15	1998-99	Nationally representative sample of Greek households
Fish (Quality B), fresh	6.1	36	37	29	89	16	1998-99	Nationally representative sample of Greek households
Fish (Quality C), fresh	18	71	41	36	95	41	1998-99	Nationally representative sample of Greek households
Fish (Quality A, B and C), frozen	5.5	36	39	30	89	14	1998-99	Nationally representative sample of Greek households
Fresh seafood (incl. snails)	2.6	18	37	25	95	6.4	1998-99	Nationally representative sample of Greek households
Frozen seafood (incl. snails)	3.4	24	31	24	71	9.8	1998-99	Nationally representative sample of Greek households
Cured, dried and smoked fish (hake excluded)	0.6	2.7	10	6	33	5.1	1998-99	Nationally representative sample of Greek households
Cured hake	1.8	14	32	27	71	5.6	1998-99	Nationally representative sample of Greek households
Canned fish, fish roe, caviar, fish pies	1.5	10	12	8	34	13	1998-99	Nationally representative sample of Greek households

Annex VII. Figures

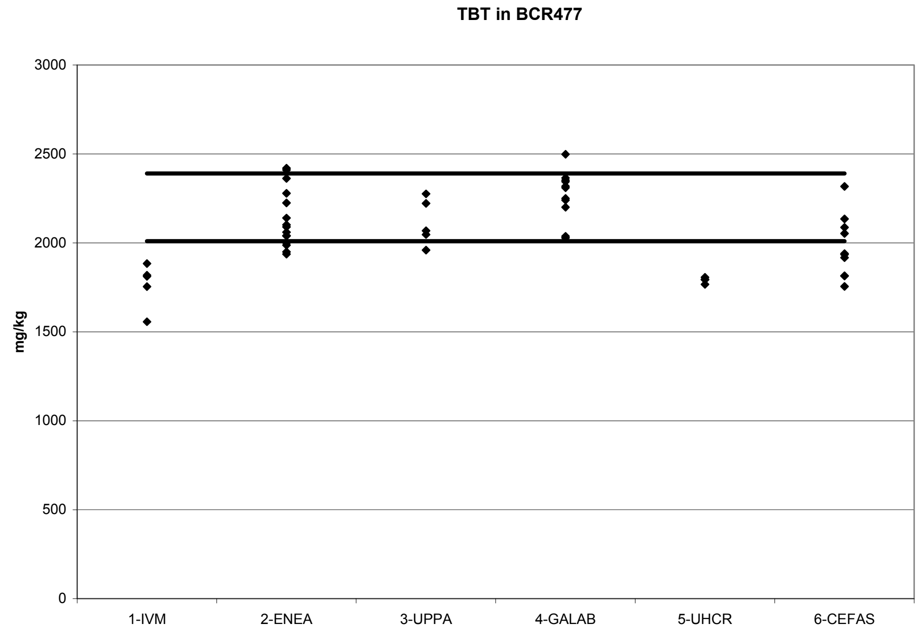

Figure 9.1 TBT in BCR-477 (the horizontals represent the 95 percent confidence interval of the certified value; the black diamonds represent the individual results as reported by the laboratories).

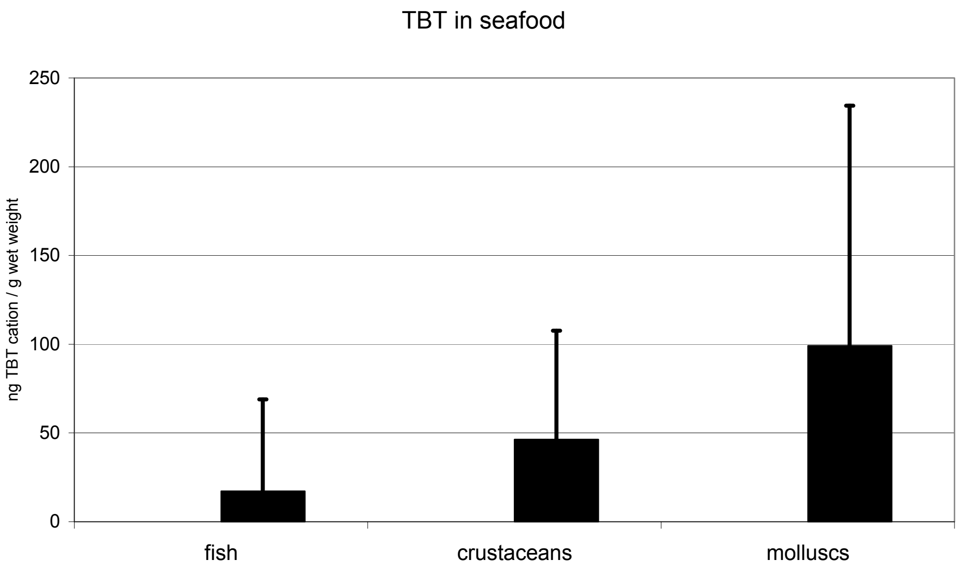

Figure 9.2 TBT in the three main categories seafood, average values(with standard deviations) over all species and all countries.

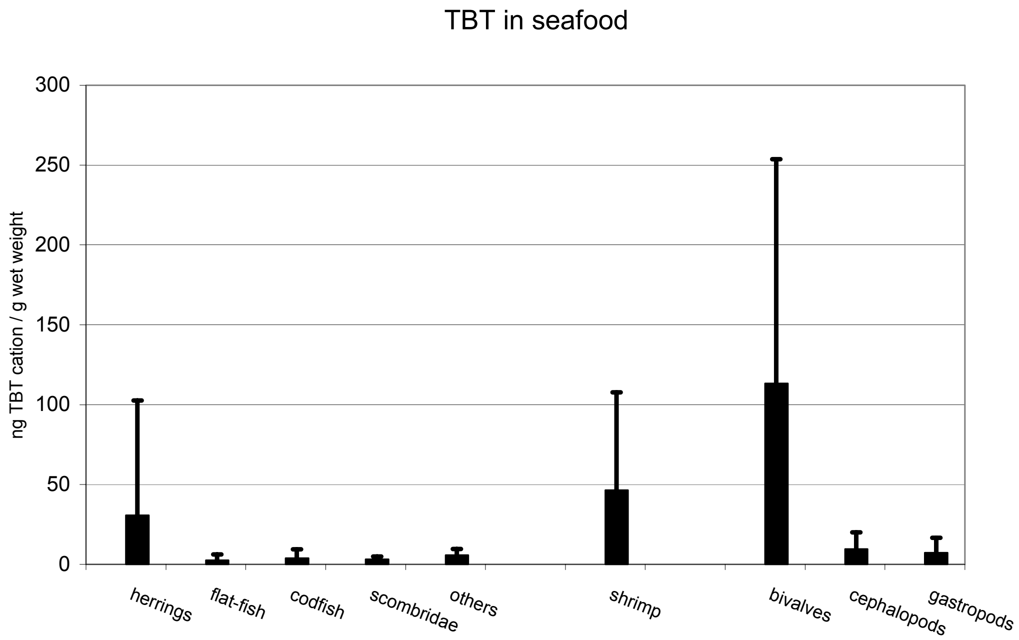

Figure 9.3 TBT in the nine species families seafood, average values (with standard deviations) over all species and all countries.

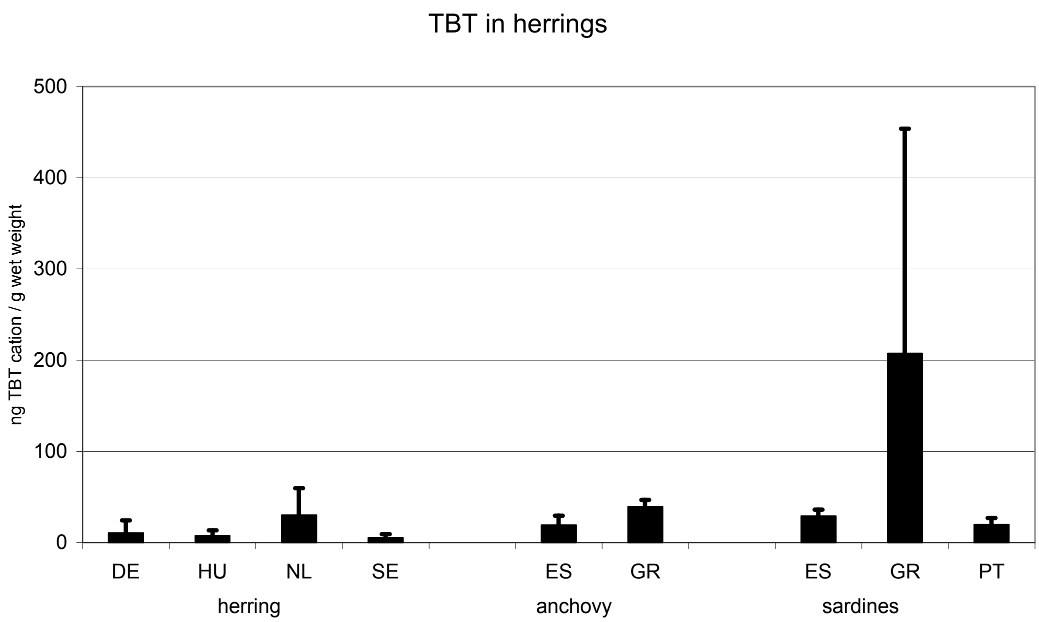

Figure 9.4 TBT in the three herring family species, average values (with standard deviations) per country.

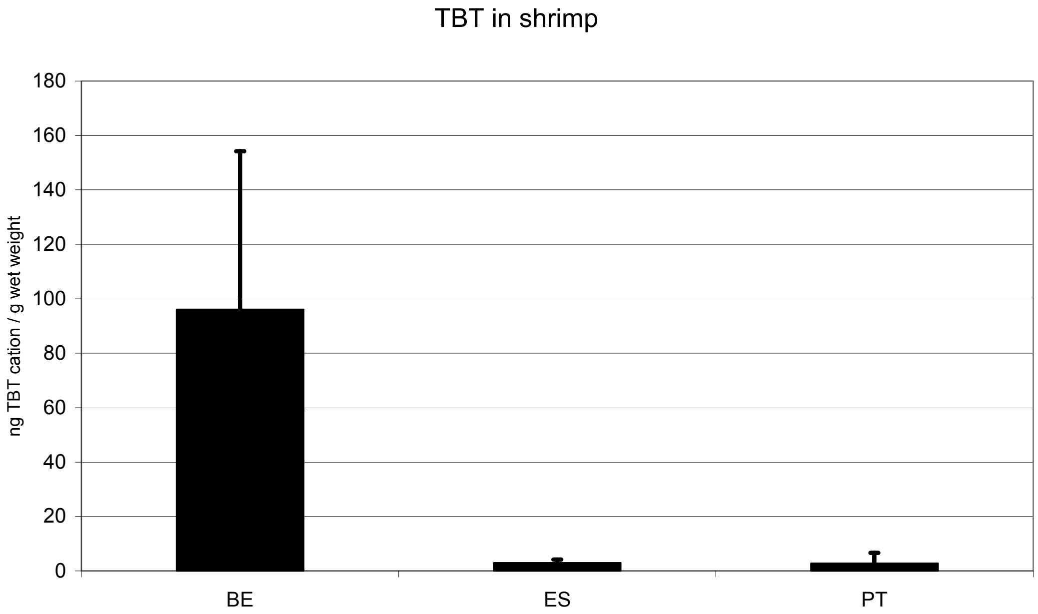

Figure 9.5 TBT in shrimp, average values (with standard deviations) per country.

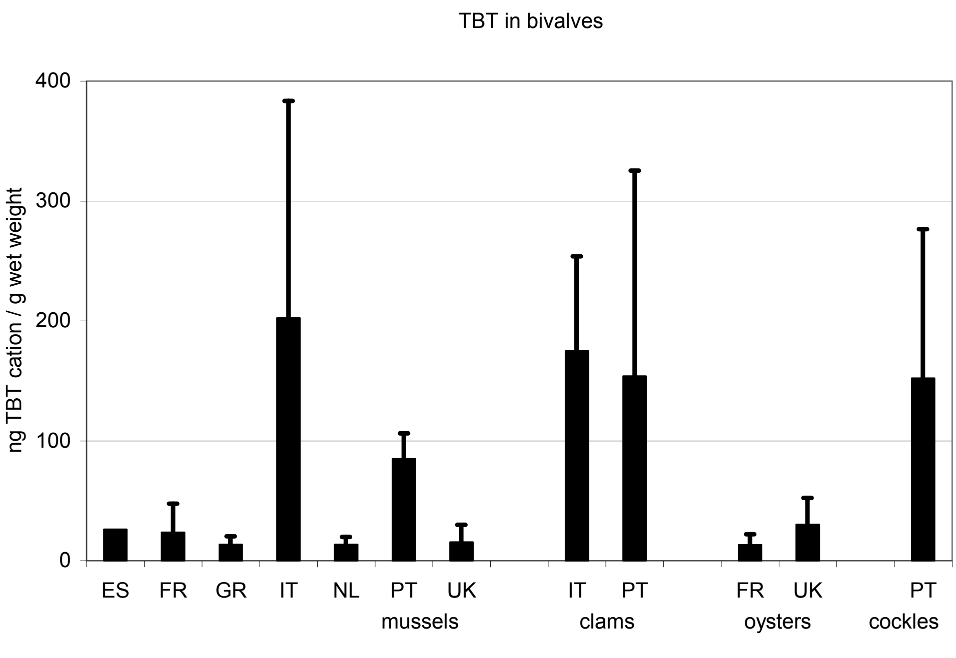

Figure 9.6 TBT in the four bivalve species, average values (with standard deviations) per country.

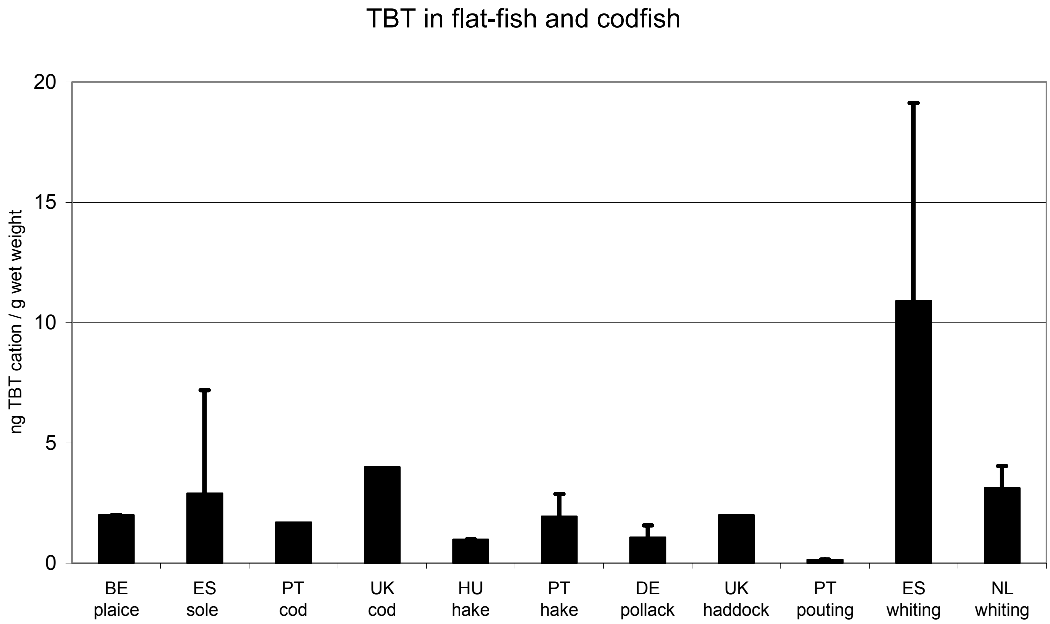

Figure 9.7 TBT in flat-fish and codfish species, average values (with standard deviations) per country.

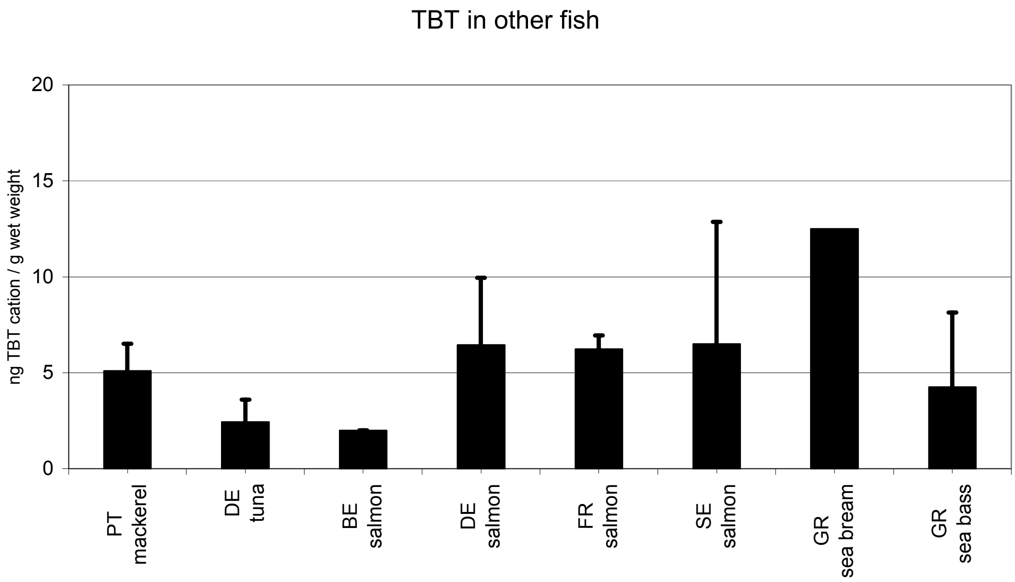

Figure 9.8 TBT in the five other fish species, average values (with standard deviations) per country.

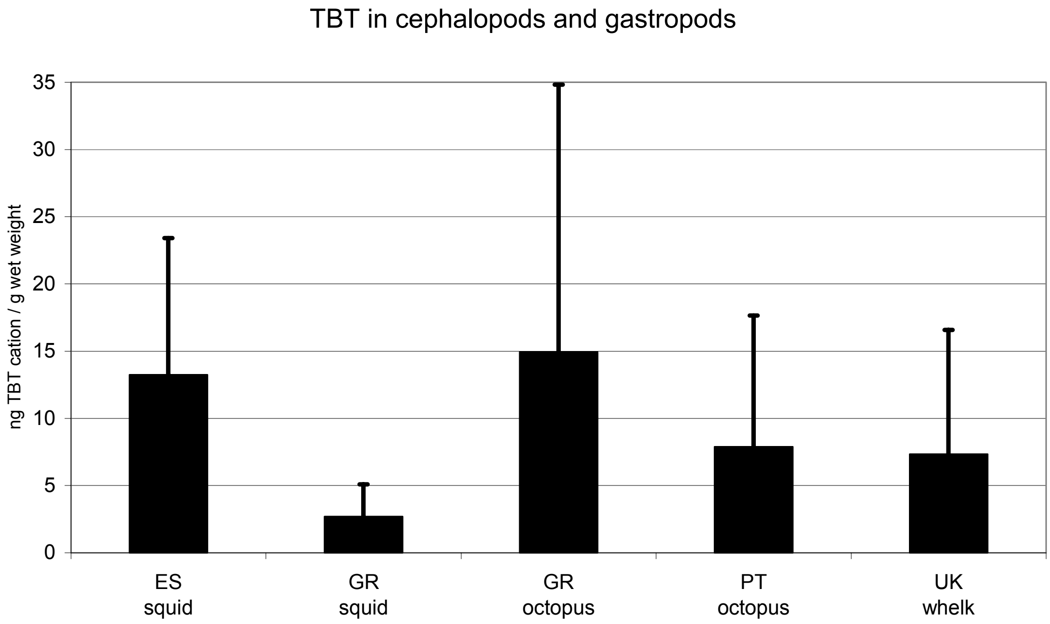

Figure 9.10 TBT in the three cephalopods and gastropods, average values (with standard deviations) per country.

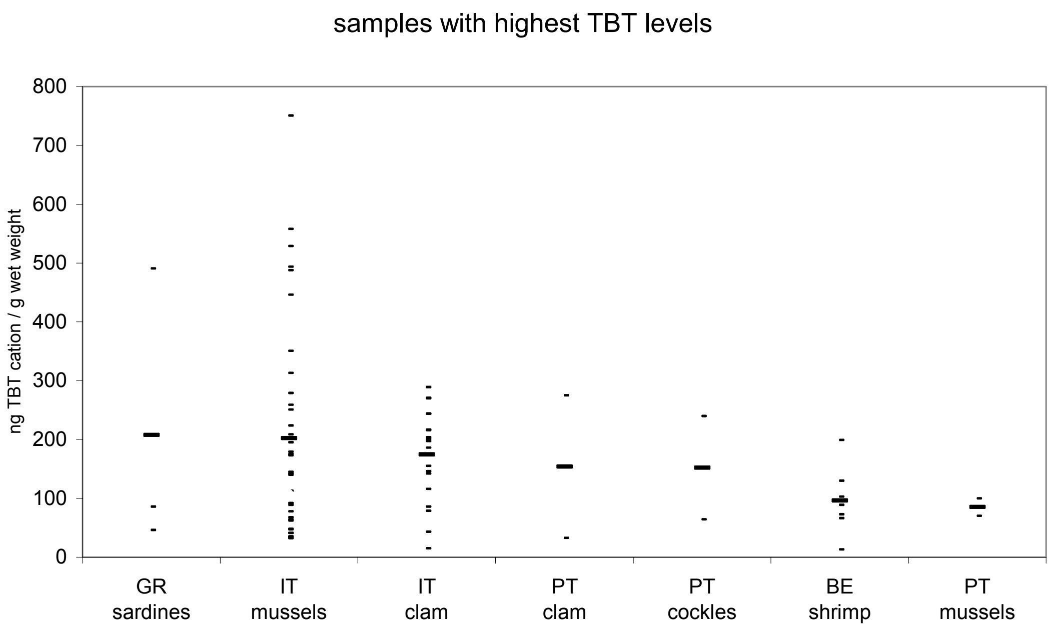

Figure 9.11 TBT in nine species / country combinations with the highest concentrations, averages (horizontal line) and individual values (dots).

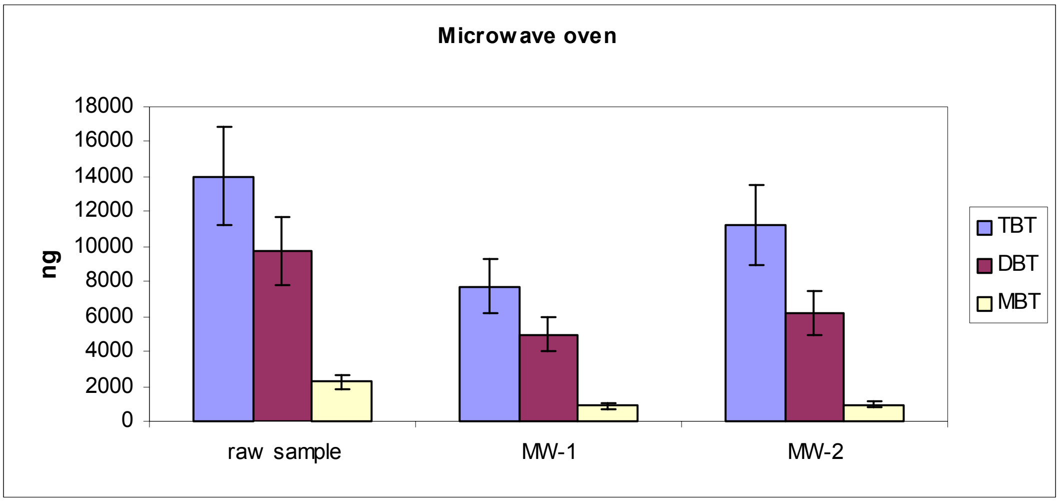

Figure 11.1 Comparison of organotin concentrations (in ng cation per 250 g of mussels), before and after cooking in microwave oven.

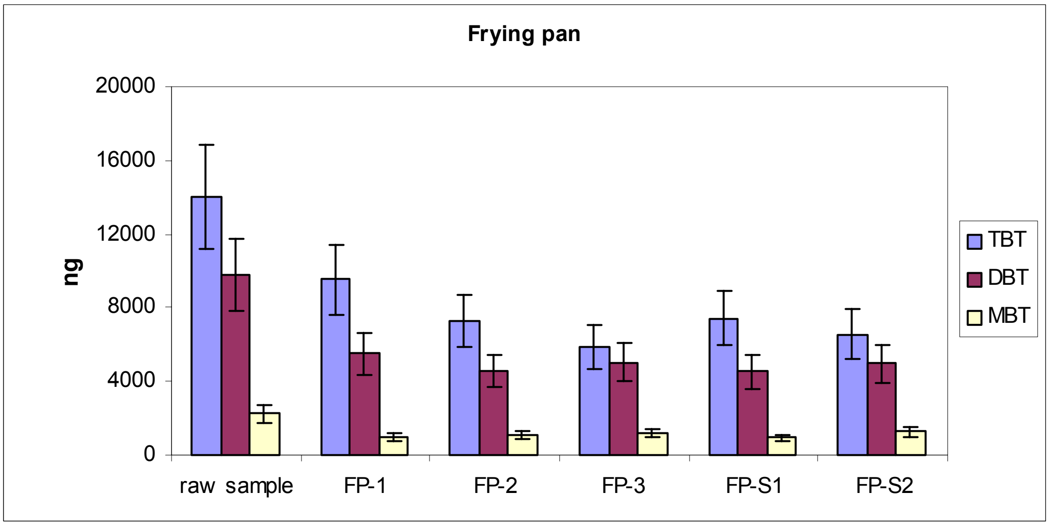

Figure 11.2 Comparison of organotin concentrations (in ng cation per 250 g of mussels), before and after cooking in frying pan.

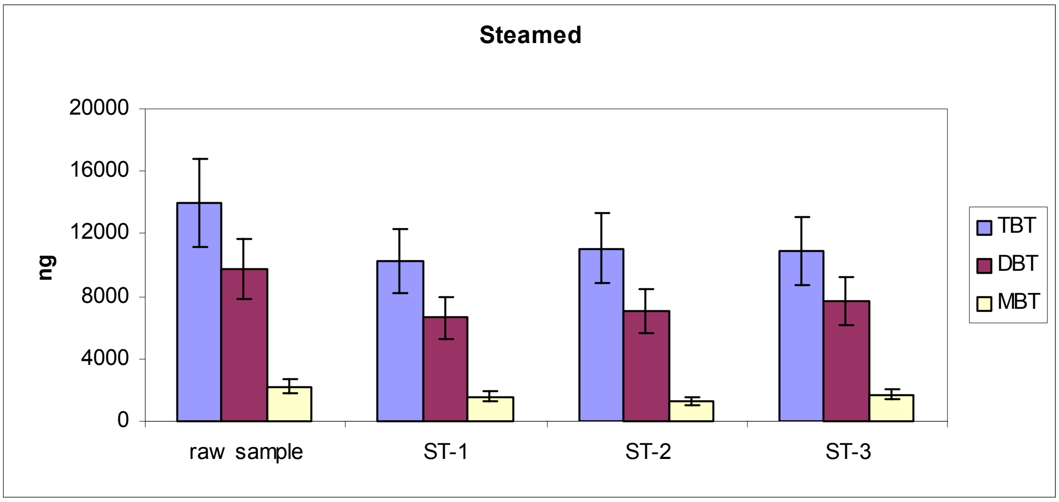

Figure 11.3 Comparison of organotin concentrations (in ng cation per 250 g of mussels), before and after cooking by steaming.

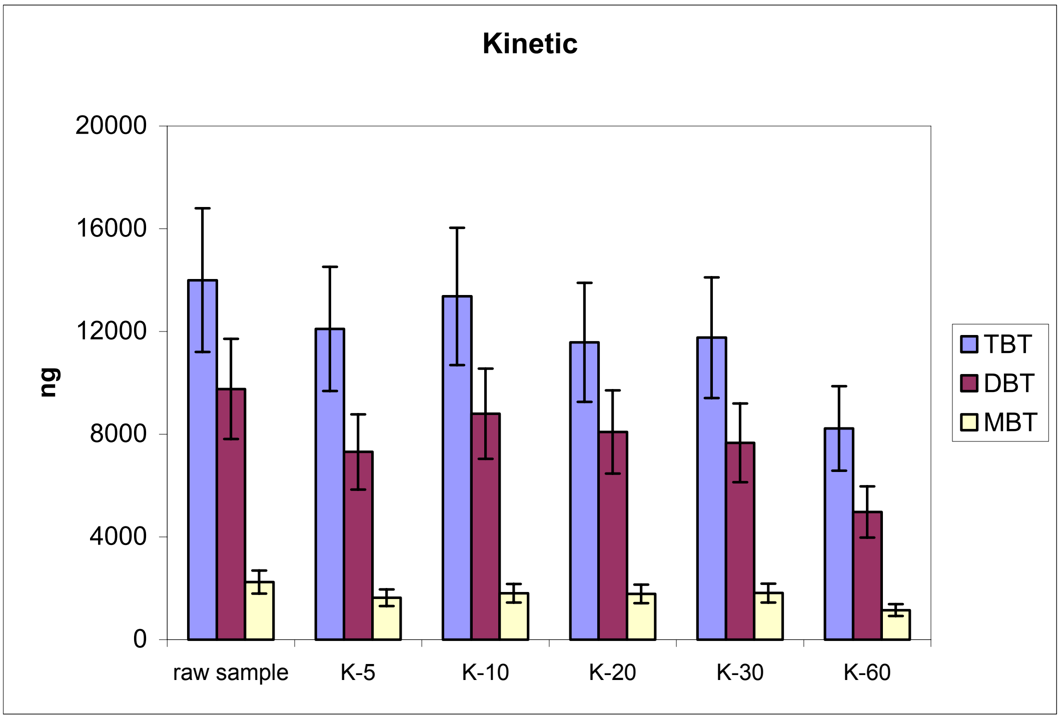

Figure 11.4 Comparison of organotin concentrations (in ng cation per 250 g of mussels), before and after boiling at different times.

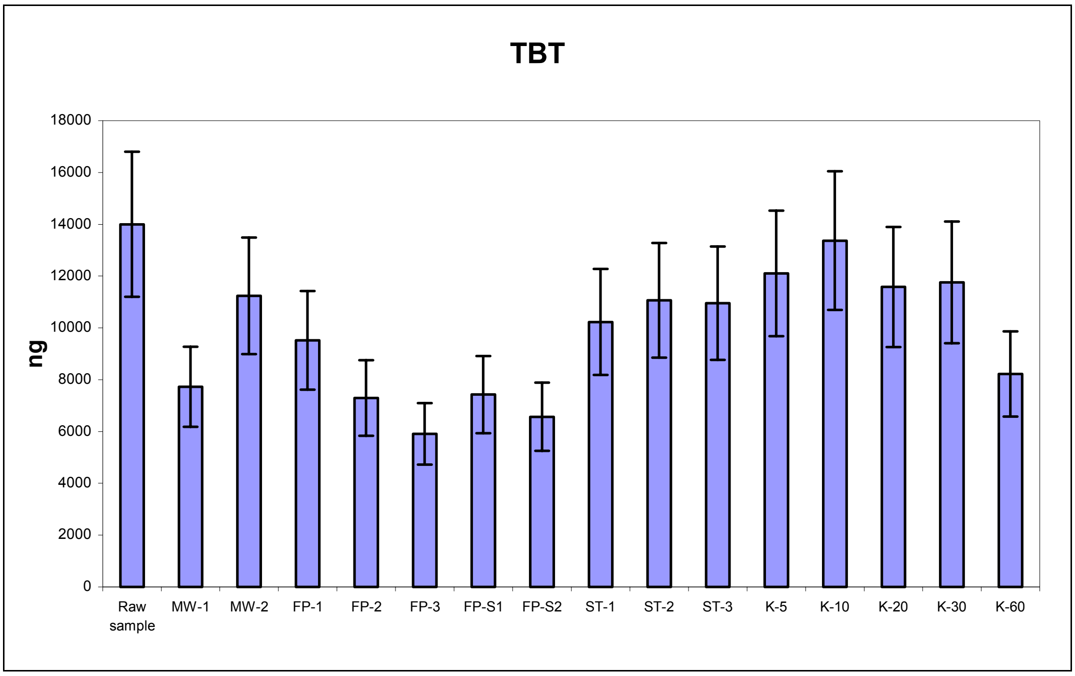

Figure 11.5 Comparison of TBT concentrations (in ng cation per 250 g of mussels), before and after cooking by different procedures.

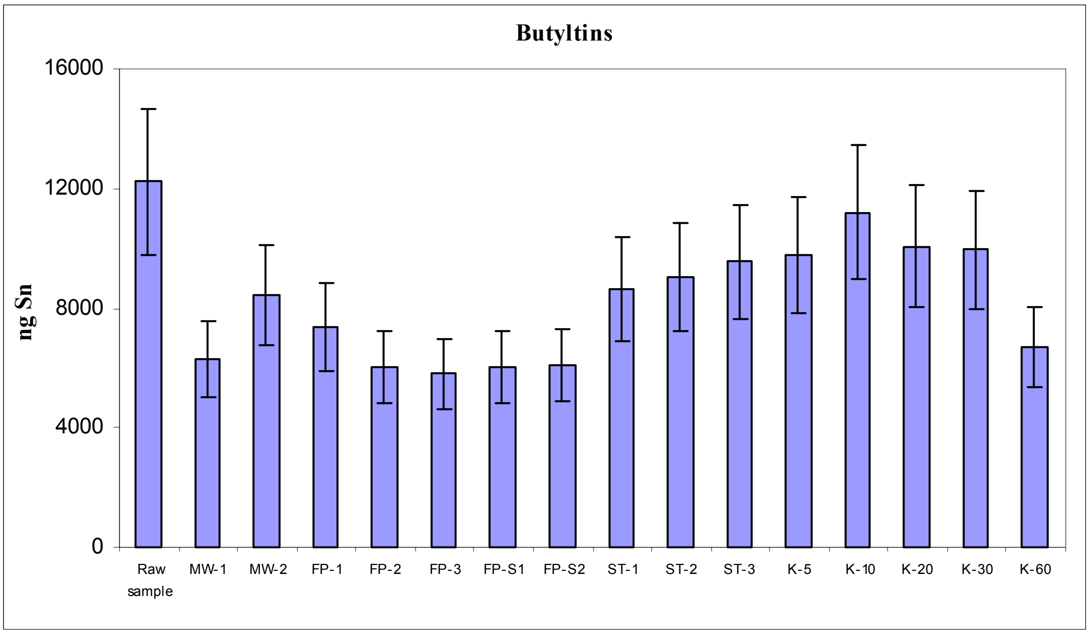

Figure 11.6 Comparison of total butyltin (sum of TBT, DBT and MBT) concentrations (in ng tin per 250 g of mussels), before and after cooking by different procedures.

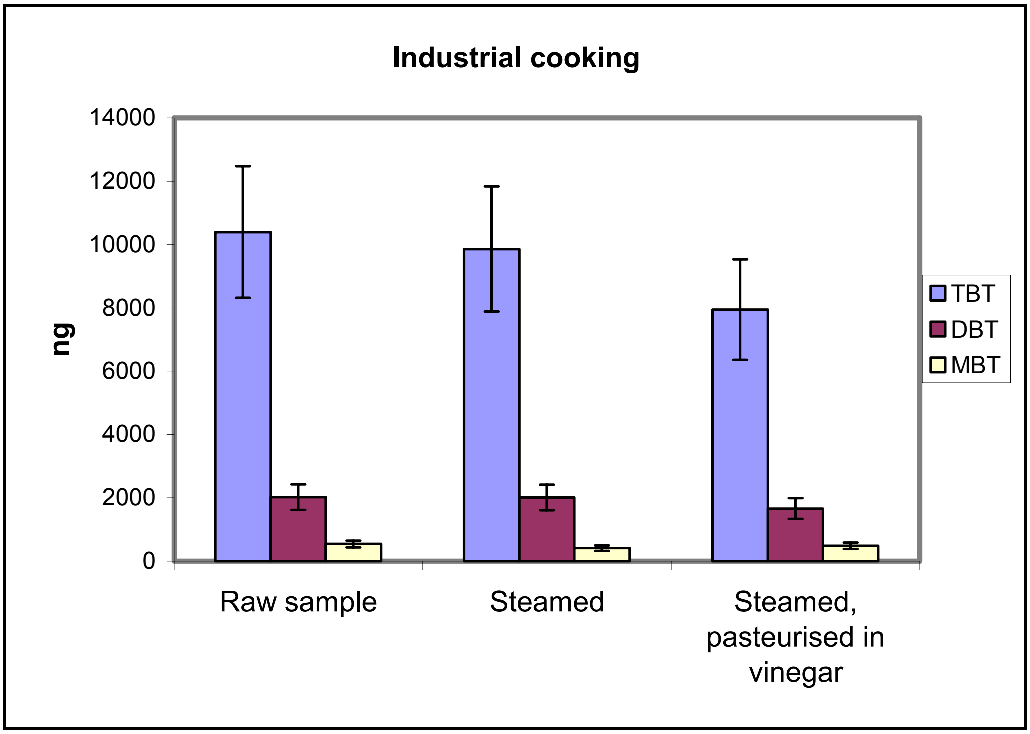

Figure 12.1 TBT, DBT and MBT concentrations (microgram cation per 80 g raw shelled mussels) in raw, steamed, and steamed plus pasteurised mussels.

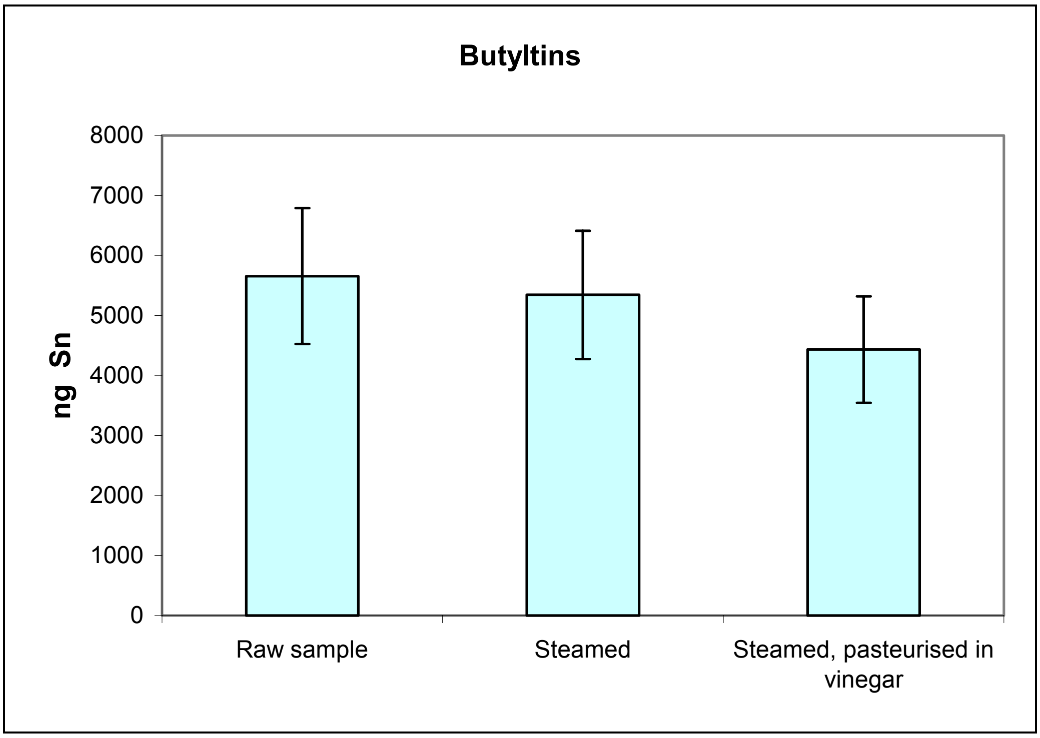

Figure 12.2 Sum of TBT, DBT and MBT (ng tin per 80 g raw shelled mussels) in raw, steamed, and steamed plus pasteurised mussels.

Annex VIII. Data used in calculations

codex III	Sample-number	origin	Name En	date	amount sampled(kg)	No. animals sampled	dry weight (% wet wt)
9.1.2	NL01	Oosterschelde	mussels	10-Mar-02	1		18.0
9.1.2	NL02	Waddenzee	mussels	10-Mar-02	1		24.0
9.1.2	NL03	Oosterschelde	mussels	22-Apr-03	1		14.0
9.1.2	NL04	Oosterschelde	mussels	22-Apr-03	1		13.0
9.1.2	NL05	Waddenzee	mussels	22-Apr-03	1		14.0
9.1.2	NL06	Waddenzee	mussels	22-Apr-03	1		14.0
9.1.1	NL07	North Sea	herring	16/20-Dec-02		25	24.0
9.1.1	NL08	North Sea	herring	23-Apr-03		32	22.0
9.1.1	NL09	North Sea	whiting	1-Apr-03		29	20.0
9.1.1	NL10	Channel	whiting	27-Mar-03		25	18.0
9.1.1	NL11	North Sea	whiting	22-Apr-03		29	19.0
9.1.2	GR01	Thermaikos Gulf	mussels	26-Jun-02		70	30.1
9.1.2	GR02	Thermaikos Gulf	mussels	27-Jun-02		70	31.1
9.1.2	GR03	Thermaikos Gulf	mussels	27-Jun-02		70	29.9
9.1.2	GR04	Thermaikos Gulf	mussels	1-Jul-02		80	28.7
9.1.2	GR05	Saronikos Gulf	mussels	5-Sep-02		75	25.5
9.1.1	GR06	Thermaikos Gulf	anchovy	11-Jul-02	3		25.2
9.1.1	GR07	Gulf of Kavala	anchovy	7-Aug-02	3		27.5
9.1.1	GR08	Saronikos Gulf	anchovy	5-Sep-02	3		28.1
9.1.1	GR09	Attica	seabass	7-Oct-02	4.8	15	28.9
9.1.3	GR10	India	squid	8-Jan-02	5	25	16.0
9.1.3	GR11	Morocco	octopus	8-Jan-02	4	3	26.9
9.1.1	GR09b	Attica	seabass	7-Oct-02	4.8	15	28.9
9.1.3	GR10b	India	squid	8-Jan-02	5	25	16.0
9.1.3	GR11b	Morocco	octopus	8-Jan-02	4	3	26.9
9.1.2	GR12	Thermaikos Gulf	mussels	26-Dec-02		80	24.1
9.1.2	GR13	Thermaikos Gulf	mussels	27-Dec-02		80	22.9
9.1.2	GR14	Thermaikos Gulf	mussels	27-Dec-02		80	19.6
9.1.2	GR15	Thermaikos Gulf	mussels	1-Oct-03		80	29.5
9.1.1	GR16	Korinthiakos Gulf	sea bream	2-Nov-03	4.1	20	27.5
9.1.1	GR17	Thermaikos Gulf	anchovy	7-Apr-03	3		26.4
9.1.1	GR18	Pagasitikos Gulf	anchovy	7-Apr-03	3		26.5
9.1.1	GR19	Saronikos Gulf	sardines	7-Apr-03	3		27.0
9.1.1	GR20	Korinthiakos gulf	seabass	4-May-03	4.7	16	27.0
9.1.3	GR21	India	squid	2-Jul-03	5	25	20.8
9.1.3	GR22	Morocco	octopus	2-May-03	4	3	21.8
9.1.1	GR23	Saronikos Gulf	sardines	28-May-03	3		31.4
9.1.1	GR24	Evoiikos Gulf	sardines	28-May-03	3		37.1
9.1.2	IT1	Venice lagoon	mussels	16-Jan-02	0.45	100	21.8
9.1.2	IT2	Venice lagoon	mussels	21-Jan-02	0.521	100	16.5
9.1.2	IT3	Venice lagoon	mussels	22-Jan-02	0.551	100	18.3
9.1.2	IT4	Venice lagoon	mussels	25-Jan-02	0.478	100	20.7
9.1.2	IT5	Venice lagoon	mussels	29-Jan-02	0.512	100	19.9
9.1.2	IT6	Venice lagoon	mussels	31-Jan-02	0.598	100	15.0
9.1.2	IT7	Venice lagoon	mussels	2-Jun-02	0.415	100	13.1
9.1.2	IT8	Venice lagoon	mussels	2-Jul-02	0.501	100	23.6
9.1.2	IT9	Venice lagoon	mussels	2-Aug-02	0.571	100	17.7
9.1.2	IT10	Venice lagoon	mussels	2-Nov-02	0.497	100	18.6
9.1.2	IT11	Venice lagoon	mussels	2-Dec-02	0.412	100	19.8
9.1.2	IT12	Venice lagoon	mussels	13-Feb-02	0.555	100	20.4

MBT (<x=x)	MBT (<x=0)	DBT (<x=x)	DBT (<x=0)	TBT (<x=x)	TBT (<x=0)	MPT (<x=x)	MPT (<x=0)	DPT (<x=x)	DPT (<x=0)	TPT (<x=x)	TPT (<x=0)	Reprsv. (y/n)
2.5	2.5	5.2	5.2	7	7	0.5	0	0.7	0.7	3.3	3.3	y
0.5	0	2.9	2.9	5	5	0.5	0	1	0	1.1	1.1	y
0.8	0.8	2.1	2.1	20	20	0.3	0	0.4	0	1.6	1.6	y
1.3	1.3	2.1	2.1	15	15	0.3	0	0.4	0	3	3	y
1	1	2.9	2.9	19	19	1.3	0	0.5	0	1	1	y
1	1	2.6	2.6	16	16	0.5	0	0.5	0	1	1	y
1	0	2	0	9.3	9.3	3	0	4	0	2	0	y
0.4	0.4	3	3	51	51	0.7	0	0.9	0.9	5.6	5.6	y
0.2	0	0.9	0.9	3.5	3.5	0.3	0	0.2	0	1.5	1.5	y
0.2	0	0.7	0.7	3.8	3.8	0.5	0	0.2	0	1.6	1.6	y
0.2	0	0.5	0.5	2.1	2.1	0.3	0	0.2	0	0.8	0.8	y
3.6	3.6	15	15	14	14	2	0	2	0	13	13	y
1.3	1.3	7.2	7.2	12	12	1.6	1.6	5.4	5.4	51	51	y
3	3	9.7	9.7	15	15	1.6	1.6	5.6	5.6	36	36	y
2.9	2.9	8.3	8.3	11	11	2	0	2	0	6.4	6.4	y
1.8	1.8	12	12	15	15	2	0	1	0	1.8	1.8	y
1.1	1.1	4.1	4.1	51	51	0.5	0	3	0	5.3	5.3	y
1.1	1.1	3.7	3.7	38	38	1	0	6	0	4.4	4.4	y
1.4	1.4	4	4	41	41	0.5	0	3	0	12	12	y
4	0	6	0	22	0	5	0	5	0	1.6	1.6	y
0.3	0	0.4	0	4.1	4.1	0.5	0	0.4	0	0.9	0	y
0.23	0.23	0.23	0.23	0.85	0.85	0.3	0	0.2	0	0.4	0	y
4	0	4	0	3	0	3	0	5	0	6	0	y
0.3	0	0.4	0	4.4	4.4	0.3	0	0.4	0	0.5	0	y
0.14	0.14	0.18	0.18	0.7	0	0.1	0	0.2	0	0.3	0	y
1.1	1.1	6.9	6.9	7.5	7.5	1	0	2	2	9.1	9.1	y
1.6	1.6	5.5	5.5	8	8	0.8	0.8	6.3	6.3	38	38	y
1.2	1.2	8.1	8.1	10	10	1	0	5.3	5.3	16	16	y
1.4	1.4	12	12	30	30	1	0	2.1	2.1	5.6	5.6	y
2	0	6	0	25	0	1	0	2	0	5	0	y
2	0	2	0	31	31	2	0	4	0	6	6	y
2	0	2	0	36	36	2	0	4	0	5	5	y
2.8	2.8	20	20	491	491	2	0	3	0	49	49	y
2	0	3	0	14	0	2	0	4	0	4	0	y
0.5	0	0.5	0	2	0	0.5	0	0.5	0	1	0	y
0.2	0	0.6	0.6	29	29	0.2	0	0.3	0	0.3	0	y
2	0	5	5	86	86	3	0	3	0	6	6	y
3	0	4	4	46	46	4	0	4	0	9	9	y
46	46	190	190	224	224	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
36	36	103	103	259	259	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
45	45	108	108	494	494	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
11	11	32	32	145	145	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
6	6	25	25	35	35	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
50	50	413	413	751	751	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
23	23	66	66	251	251	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
23	23	55	55	195	195	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
22	22	133	133	313	313	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
5	5	13	13	32	32	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
20	20	52	52	142	142	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
22	22	42	42	209	209	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n

codex III	Sample-number.	origin	Name En	date	amount sampled(kg)	No. animals sampled	dry weight (% wet wt)
9.1.2	IT13	Venice lagoon	mussels	14-Feb-02	0.491	100	16.9
9.1.2	IT14	Venice lagoon	tapes sp.	21-Jan-02	0.487	250	19.0
9.1.2	IT15	Venice lagoon	tapes sp.	23-Jan-02	0.511	250	17.3
9.1.2	IT16	Venice lagoon	tapes sp.	24-Jan-02	0.517	250	16.9
9.1.2	IT17	Venice lagoon	tapes sp.	25-Jan-02	0.501	250	18.9
9.1.2	IT18	Venice lagoon	tapes sp.	28-Jan-02	0.495	250	19.2
9.1.2	IT19	Venice lagoon	tapes sp.	29-Jan-02	0.565	250	17.6
9.1.2	IT20	Venice lagoon	tapes sp.	31-Jan-02	0.471	250	15.9
9.1.2	IT21	Venice lagoon	tapes sp.	2-Jan-02	0.533	250	18.6
9.1.2	IT22	Venice lagoon	tapes sp.	2-Jun-02	0.492	250	20.1
9.1.2	IT23	Venice lagoon	tapes sp.	2-Jul-02	0.502	250	18.9
9.1.2	IT24	Venice lagoon	tapes sp.	2-Aug-02	0.514	250	17.3
9.1.2	IT25	Venice lagoon	tapes sp.	2-Nov-02	0.495	250	16.1
9.1.2	IT26	Venice lagoon	tapes sp.	2-Dec-02	0.547	250	15.6
9.1.2	IT27	Venice lagoon	tapes sp.	13/02/2002	0.485	250	19.8
9.1.2	IT28	Venice lagoon	tapes sp.	14-Feb-02	0.528	250	19.4
9.1.2	IT29	Sardinia South	mussels	25-Mar-02	0.12	60	16.6
9.1.2	IT30	Sardinia SWest	mussels	20-Mar-02	0.133	60	10.2
9.1.2	IT31	Sardinia West	mussels	21-Mar-02	0.328	60	16.9
9.1.2	IT32	Sardinia N West	mussels	22-Mar-02	0.21	60	15.4
9.1.2	IT33	Sardinia North	mussels	27-Apr-02	0.261	60	15.2
9.1.2	IT34	Sardinia North East	mussels	30-Mar-02	0.219	60	13.8
9.1.2	IT35	Sardinia East Coast	mussels	18-Mar-02	0.21	60	14.5
9.1.2	IT36	Sardinia South East	mussels	19-Mar-02	0.143	60	11.4
9.1.2	IT37	North Tyrrhen. sea	mussels	7-Apr-02	0.65	200	20.0
9.1.2	IT38	Venice lagoon	mussels	26-Aug-02	0.47	100	18.6
9.1.2	IT39	Venice lagoon	mussels	28-Aug-02	0.51	100	20.7
9.1.2	IT40	Venice lagoon	mussels	9-Feb-02	0.495	100	17.7
9.1.2	IT41	Venice lagoon	mussels	9-Apr-02	0.554	100	22.2
9.1.2	IT42	Venice lagoon	tapes sp.	28-Aug-02	0.491	250	19.3
9.1.2	IT43	Venice lagoon	tapes sp.	9-Feb-02	0.521	250	21.6
9.1.2	IT44	Venice lagoon	tapes sp.	9-Apr-02	0.478	250	18.6
9.1.2	IT45	Venice lagoon	tapes sp.	9-Jun-02	0.523	250	22.9
9.1.2	IT46	Sardinia South	mussels	19-Aug-02	0.146	60	23.0
9.1.2	IT47	Sardinia S West	mussels	28-Sep-02	0.149	60	24.9
9.1.2	IT48	Sardinia West	mussels	10-Jan-02	0.233	60	24.0
9.1.2	IT49	Sardinia North East	mussels	24-Aug-02	0.156	60	19.7
9.1.2	IT50	Sardinia North East	mussels	9-Jan-02	0.211	60	21.4
9.1.2	IT51	Sardinia N West	mussels	27-Sep-02	0.154	60	19.1
9.1.2	IT52	Sardinia North	mussels	25-Sep-02	0.136	60	14.5
9.1.2	IT53	Sardinia East	mussels	25-Sep-02	0.148	60	19.9
9.1.2	IT54	Sardinia South East	mussels	26-Sep-02	0.139	60	18.0
9.1.2	IT55	North Tyrrhen. sea	mussels	26-May-03	0.33	100	10.0

MBT (<x=x)	MBT (<x=0)	DBT (<x=x)	DBT (<x=0)	TBT (<x=x)	TBT (<x=0)	MPT (<x=x)	MPT (<x=0)	DPT (<x=x)	DPT (<x=0)	TPT (<x=x)	TPT (<x=0)	Reprsv. (y/n)
18	18	34	34	173	173	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
114	114	98	98	217	217	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
55	55	66	66	204	204	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
15	15	36	36	197	197	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
15	15	31	31	186	186	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
35	35	40	40	142	142	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
4	4	6	6	15	15	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
152	152	222	222	289	289	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
334	334	248	248	244	244	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
22	22	62	62	216	216	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
24	24	46	46	116	116	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
14	14	33	33	155	155	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
50	50	103	103	244	244	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
15	15	22	22	43	43	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
7	7	17	17	146	146	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
7	7	11	11	79	79	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
27	27	34	34	140	140	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	y
40	40	44	44	89	89	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
0.3	0	0.4	0	48	48	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
0.3	0	81	81	558	558	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
0.3	0	75	75	446	446	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
0.3	0	63	63	488	488	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	y
38	38	36	36	92	92	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
33	33	42	42	47	47	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
28	28	122	122	175	175	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	y
53	53	253	253	279	279	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
59	59	307	307	351	351	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
16	16	64	64	68	68	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
41	41	117	117	179	179	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
134	134	116	116	271	271	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
17	17	33	33	86	86	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
35	35	58	58	201	201	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
46	46	180	180	270	270	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
22	22	71	71	113	113	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	y
21	21	97	97	78	78	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
9	9	13	13	41	41	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
17	17	76	76	64	64	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	y
0.3	0	0.4	0	35	35	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	y
37	37	351	351	529	529	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
13	13	59	59	41	41	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
21	21	90	90	62	62	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
21	21	77	77	33	33	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	n
23	23	54	54	108	108	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.	y

codex III	Sample-number.	origin	Name En	date	amount sampled(kg)	No. animals sampled	dry weight (% wet wt)
9.1.2	FR1	Arcachon bay	oysters	23-Oct-02	0.358	50	18.0
9.1.2	FR2	Arcachon bay	oysters	27-Feb-03	0.295	50	24.0
9.1.2	FR3	Bretagne Aber	oysters	23-Jan-03	0.178	50	14.0
9.1.2	FR4	Marennes island	oysters	24-Jan-03	0.225	50	13.0
9.1.2	FR5	Normandie	oysters	12-Nov-02	0.328	50	14.0
9.1.1	FR6	Atlantic North east	salmon	21-Dec-02	4.2	25 slices	14.0
9.1.2	FR7	Bretagne Sud	mussels	2-Jul-03	0.177	50	24.0
9.1.2	FR8	Normandie	mussels	12-Feb-02	0.251	50	22.0
9.1.2	FR9	Normandie	oysters	4-Nov-03	0.338	50	20.0
9.1.2	FR10	Marennes island	oysters	14-Apr-03	0.229	50	18.0
9.1.2	FR11	Bretagne Aber	oysters	22-Apr-03	0.193	50	19.0
9.1.2	FR12	Mediterranean	mussels	2-Dec-03	0.209	50	30.1
9.1.1	FR13	Atlantic North east	salmon	4-Mar-03	2.6	25 slices	31.1
9.1.2	FR14	Normandie	mussels	22-May-03	0.143	50	29.9
9.1.2	FR15	Bretagne sud	mussels	26-May-03	0.139	50	28.7
9.1.2	FR16	Mediterranean	mussels	30-May-03	0.216	50	25.5
9.1.1	DE01	NorthAtlantik	herring	7-Jan-02	0.5	unknown	25.2
9.1.1	DE02	Pacific	tuna	7-Jan-02	0.5	unknown	27.5
9.1.1	DE03	NorthAtlantik	herring	7-Jan-02	0.5	unknown	28.1
9.1.1	DE04	NorthAtlantik	salmon	7-Jan-02	0.2	1	28.9
9.1.1	DE05	NorthSea	herring	7-Jan-02	0.1	1	16.0
9.1.1	DE06	Alaska	pollock	7-Jan-02	0.2	1	26.9
9.1.1	DE07	NorthAtlantik	herring	8-Aug-02	0.5	unknown	28.9
9.1.1	DE08	Pacific	tuna	8-Aug-02	0.5	unknown	16.0
9.1.1	DE09	NorthAtlantik	herring	8-Aug-02	0.5	unknown	26.9
9.1.1	DE10	NorthAtlantik	salmon	8-Aug-02	0.2	1	24.1
9.1.1	DE11	NorthSea	herring	8-Aug-02	0.1	1	22.9
9.1.1	DE12	Alaska	pollock	8-Aug-02	0.2	1	19.6
9.1.1	DE13	NorthAtlantik	herring	16-Sep-02	0.5	unknown	29.5
9.1.1	DE14	Pacific	tuna	16-Sep-02	0.5	unknown	27.5
9.1.1	DE15	NorthAtlantik	herring	16-Sep-02	0.5	unknown	26.4
9.1.1	DE16	NorthAtlantik	salmon	16-Sep-02	0.2	1	26.5
9.1.1	DE17	NorthSea	herring	16-Sep-02	0.1	1	27.0
9.1.1	DE18	Alaska	pollock	16-Sep-02	0.2	1	27.0
9.1.1	DE19	NorthAtlantik	herring	28-Jul-03	1	20 cans	20.8
9.1.1	DE20	Pacific	tuna	28-Jul-03	3	20 cans	21.8
9.1.1	DE21	Pacific	tuna	28-Jul-03	3	20 cans	31.4
9.1.1	DE22	NorthAtlantik	herring	28-Jul-03	1	20 cans	37.1
9.1.1	DE23	NorthSea	herring	28-Jul-03	1	20 cans	21.8
9.1.1	DE24	NorthSea	herring	28-Jul-03	1	20 cans	16.5
9.1.1	DE25	Pacific	salmon	28-Jul-03	5	20 bags	18.3
9.1.1	DE26	NorthAtlantic	pollock	28-Jul-03	5	20 cartons	20.7
9.1.1	HU01	Poland	herring	May/Jun-02	1.66	55	27.6
9.1.1	HU02	Thailand	sardines	May/Jun-02	1.75	116	28.5
9.1.1	HU03	Argentina	hake	May/Jun-02	2.5	15 slices	21.0
9.1.1	HU04	Poland	herring	09/13-Sep-02	2.5	68	30.0
9.1.1	HU04a		herring				8.6
9.1.1	HU05	Thailand	sardines	09/13-Sep-02	1.28	79	22.3
9.1.1	HU06	Argentina	hake	09/13-Sep-02	1.6	10 slices	19.1

MBT (<x=x)	MBT (<x=0)	DBT (<x=x)	DBT (<x=0)	TBT (<x=x)	TBT (<x=0)	MPT (<x=x)	MPT (<x=0)	DPT (<x=x)	DPT (<x=0)	TPT (<x=x)	TPT (<x=0)	Reprsv. (y/n)
0.7	0	0.76	0.76	7.81	7.81	3	0	4	0	4	0	y
0.7	0	0.6	0	17.27	17.27	3	0	4	0	4	0	y
0.8	0	0.6	0	24.64	24.64	4	0	4	0	5	0	y
0.9	0	0.7	0	9.93	9.93	4	0	4	0	5	0	y
0.9	0	0.7	0	3.1	3.1	4	0	5	0	6	0	y
1.4	0	1.1	0	5.73	5.73	6	0	7	0	9	0	y
0.6	0	0.5	0	9.76	9.76	3	0	3	0	4	0	y
0.8	0	0.6	0	4.73	4.73	4	0	4	0	5	0	y
0.9	0	0.7	0	6.15	6.15	4	0	4	0	5	0	y
0.9	0	0.7	0	11.1	11.1	4	0	4	0	5	0	y
0.7	0	0.6	0	27.33	27.33	3	0	4	0	4	0	y
17.39	17.39	37.69	37.69	41.65	41.65	3	0	3	0	4	0	y
1.6	0	1.2	0	6.73	6.73	7	0	7	0	9	0	y
1.1	0	0.8	0	5.46	5.46	5	0	5	0	6	0	y
0.7	0	0.6	0	16.47	16.47	3	0	3	0	4	0	y
12.24	12.24	45.43	45.43	63.75	63.75	4	0	4	0	5	0	y
0.7	0.7	0.9	0.9	1.5	1.5	0.3	0	0.3	0	0.3	0	y
18.5	18.5	4.9	4.9	3.9	3.9	0.3	0	0.3	0	0.5	0.5	y
4.7	4.7	1.5	1.5	4.5	4.5	0.3	0	0.3	0	0.6	0.6	y
0.4	0.4	1	1	8.2	8.2	0.3	0	0.3	0	1.9	1.9	y
0.4	0.4	0.8	0.8	4.5	4.5	0.3	0	0.3	0	1.3	1.3	y
0.8	0.8	2.3	2.3	1.8	1.8	0.3	0	0.3	0	0.3	0	y
0.7	0.7	0.7	0.7	1.4	1.4	0.3	0	0.3	0	0.3	0	y
19.7	19.7	4.7	4.7	2.9	2.9	0.3	0	0.3	0	0.3	0.3	y
5.6	5.6	1.3	1.3	4.5	4.5	0.3	0	0.3	0	0.5	0.5	y
0.4	0.4	0.9	0.9	8.2	8.2	0.3	0	0.3	0	2.1	2.1	y
0.6	0.6	1.8	1.8	34.3	34.3	0.3	0	0.3	0	1.9	1.9	y
0.3	0.3	0.7	0.7	0.7	0.7	0.3	0	0.3	0	0.3	0	y
0.5	0.5	0.9	0.9	1.4	1.4	0.3	0	0.3	0	0.3	0	y
16.1	16.1	3.7	3.7	2.9	2.9	0.3	0	0.3	0	0.6	0.6	y
7.1	7.1	2.1	2.1	5.9	5.9	0.3	0	0.3	0	0.6	0.6	y
0.4	0.4	1	1	8.2	8.2	0.3	0	0.3	0	2.3	2.3	y
0.6	0.6	1.8	1.8	30.8	30.8	0.3	0	0.3	0	1.8	1.8	y
0.3	0	0.7	0.7	0.8	0.8	0.3	0	0.3	0	0.3	0	y
1.7	1.7	0.3	0.3	3.3	3.3	0.3	0	0.3	0	0.3	0	y
0.3	0	0.4	0.4	1.4	1.4	0.3	0	0.3	0	0.3	0	y
0.3	0	0.5	0.5	1.1	1.1	0.3	0	0.3	0	0.3	0	y
0.9	0.9	5.3	5.3	37.5	37.5	0.3	0	0.3	0	1.8	1.8	y
21.3	21.3	3.7	3.7	4.5	4.5	0.3	0	0.3	0	0.6	0.6	y
12.6	12.6	0.8	0.8	3.9	3.9	0.3	0	0.3	0	0.3	0	y
0.3	0	1.3	1.3	1.2	1.2	0.3	0	0.3	0	0.3	0	y
0.3	0	0.3	0	1	1	0.3	0	0.3	0	0.3	0.3	y
2	0	2	0	2	0	5	0	8	0	8	0	y
2	0	2	0	14.56	14.56	5	0	8	0	8	0	y
2	0	2	0	2	0	5	0	8	0	8	0	y
2	0	2	0	5.93	5.93	5	0	8	0	8	0	y
2	0	2	0	2	0	5	0	8	0	8	0	y
2	0	2	0	9.19	9.19	5	0	8	0	8	0	y
2	0	2	0	2	0	5	0	8	0	8	0	y

codex	Sample number.	origin	Name En	date	amount sampled(kg)	No. animals sampled	dry weight (% wet wt)
9.1.1	PT01	Atlantic	sardine	28-Jul-02		25	
9.1.1	PT02	Atlantic	sardine	8-Feb-02		25	
9.1.1	PT03	Atlantic	horse mackerel	18-Feb-02		25	
9.1.1	PT04	Argentine	hake	28-Jul-02		25	
9.1.1	PT05	Atlantic	pouting	18-Jul-02		25	
9.1.3	PT06	Atlantic	octopus	18-Jul-02		25	
9.1.3	PT07	Atlantic	octopus	26-Jul-02		25	
9.1.3	PT08	Atlantic	octopus	8-Feb-02		25	
9.1.2	PT09	Atlantic	mussels	8-Feb-02		50	
9.1.2	PT10	Atlantic	Kockle	23-Jul-02		50	
9.1.2	PT11	Atlantic	clam	8-Feb-02		50	
9.1.4	PT12	Nigeria	shrimp	28-Jul-02		100	
9.1.2	PT13	Central Portugal	kockle	4-Jul-03	2	50	
9.1.4	PT14	Mozambique	shrimp	20-Dec-02	2	100	
9.1.1	PT15	North Spain	horse mackerel	26-Mar-03	4	25	
9.1.1	PT16	Atlantic (North)	Cod	20-Dec-02	20	25	
9.1.1	PT17	North Portugal	pouting	26-Mar-03	4	25	
9.1.2	PT18	South Portugal	mussels	4-Jul-03	2	50	
9.1.1	PT19	South Africa	hake	20-Dec-02	5	25	
9.1.3	PT20	Centre of Portugal	octopus	27-Mar-03	15	25	
9.1.3	PT21	North Portugal	octopus	20-Dec-02	15	25	
9.1.1	PT22	South Portugal	octopus	16-Mar-03	15	25	
9.1.1	PT23	North Portugal	sardine	20-Dec-02	3	25	
9.1.1	PT24	South Portugal	sardine	16-Mar-03	3	25	
9.1.2	PT25	South Portugal	clam	27-Mar-03	2	50	
9.1.1	ES01	W Mediterranean	anchovy	18-Jul-02	2	25	31.2
9.1.1	ES02	Cadiz Gulf	anchovy	30-Jul-02	2	25	30.5
9.1.1	ES03	Cantabric Sea	anchovy	11-Sep-02	2	25	35.4
9.1.4	ES04	Alicante coast	shrimp	18-Jul-02	2	100	31.3
9.1.4	ES05	Morocco-Argelian	shrimp	18-Jul-02	2	100	29.3
9.1.4	ES06	Cadiz Gulf	shrimp	30-Jul-02	2	100	28.0
9.1.1	ES07	W Mediterranean	sardine	18-Jul-02	2	25	41.4
9.1.1	ES08	Cadiz Gulf	sardine	30-Jul-02	2	25	33.9
9.1.1	ES09	Cantabric Sea	sardine	11-Sep-02	2	25	40.3
9.1.1	ES10	Cadiz Gulf	sole	30-Jul-02	2	15	31.9
9.1.1	ES11	Cantabric Sea	sole	12-Sep-02	2	15	32.7
9.1.3	ES12	Saharian-Morocco	squid	18-Jul-02	2	20	26.3
9.1.3	ES13	Cantabric Sea	squid	9-Sep-02	2	20	30.4
9.1.1	ES14	Cadiz Gulf	whiting	30-Jul-02	2	15	29.4
9.1.1	ES15	Cantabric Sea	whiting	16-Sep-02	2	15	29.9
9.1.1	ES16	W Mediterranean	anchovy	17-Oct-02	2	25	38.6
9.1.1	ES17	Cadiz Gulf	anchovy	6-Nov-02	2	25	33.8
9.1.2	ES18	Galicia	mussels	9-Nov-02	2	50	30.9
9.1.4	ES19	Alicante coast	shrimp	17-Oct-02	2	100	31.8
9.1.4	ES20	Morocco-Argelian	shrimp	17-Oct-02	2	100	32.0
9.1.4	ES21	Cadiz Gulf	shrimp	7-Nov-02	2	100	32.3
9.1.1	ES22	W Mediterranean	sardine	17-Oct-02	2	25	40.7
9.1.1	ES23	Cadiz Gulf	sardine	6-Nov-02	2	25	42.8
9.1.1	ES24	Cadiz Gulf	sole	7-Nov-02	2	15	31.3
9.1.1	ES25	Galicia	sole	9-Nov-02	2	15	35.6

MBT (<x=x)	MBT (<x=0)	DBT (<x=x)	DBT (<x=0)	TBT (<x=x)	TBT (<x=0)	MPT (<x=x)	MPT (<x=0)	DPT (<x=x)	DPT (<x=0)	TPT (<x=x)	TPT (<x=0)	Reprsv. (y/n)
0.3	0	1.2	1.2	17.5	17.5					0.3	0	y
0.3	0	1.5	1.5	13.2	13.2					0.3	0	y
0.5	0.5	1.1	1.1	4.1	4.1					0.3	0	y
0.3	0	1.2	1.2	1.3	1.3					0.3	0	y
0.3	0	0.3	0	0.3	0					0.3	0	y
0.5	0.5	3.4	3.4	4.3	4.3					0.3	0	y
0.5	0.5	9.5	9.5	27.1	27.1					0.3	0	y
0.3	0	1	1	2.6	2.6					0.3	0	y
3.8	3.8	32.2	32.2	100	100					0.3	0	y
2.5	2.5	19	19	64.3	64.3					0.3	0	y
2.1	2.1	10.5	10.5	32.7	32.7					0.3	0	y
0.3	0	2.6	2.6	5.5	5.5					0.3	0	y
13.1	13.1	77.7	77.7	240	240					0.3	0	y
1.1	1.1	1.7	1.7	0.3	0					0.3	0	y
1.6	1.6	3.4	3.4	6.1	6.1					0.3	0	y
1.3	1.3	2.1	2.1	1.7	1.7					0.3	0	y
1.4	1.4	1.4	1.4	0.3	0					0.3	0	y
9.1	9.1	29.1	29.1	70.3	70.3					0.3	0	y
2.5	2.5	2.4	2.4	2.6	2.6					0.3	0	y
1.2	1.2	3.1	3.1	8.2	8.2					0.3	0	y
0.3	0	0.3	0	0.3	0					0.3	0	y
2.7	2.7	5.9	5.9	4.9	4.9					0.3	0	y
3.1	3.1	5.1	5.1	29.6	29.6					0.3	0	y
1.7	1.7	2.4	2.4	19.1	19.1					0.3	0	y
10.1	10.1	28.5	28.5	275	275					0.3	0	y
6.6	6.6	2	0	28.51	28.51	5	0	8	0	8	0	y
2.4	2.4	1.85	1.85	16.57	16.57	5	0	8	0	8	0	y
1.29	1.29	1.79	1.79	4.42	4.42	5	0	8	0	8	0	y
2	0	2	0	5.44	5.44	5	0	8	0	8	0	y
6.83	6.83	2	0	2.05	2.05	5	0	8	0	8	0	y
2	2	2	0	2.93	2.93	5	0	8	0	8	0	y
2	0	1.42	1.42	35	35	5	0	8	0	8	0	y
1.39	1.39	2	0	24.44	24.44	5	0	8	0	8	0	y
7.71	7.71	6.96	6.96	34.83	34.83	5	0	8	0	8	0	y
7.18	7.18	2	0	2	0	5	0	8	0	8	0	y
2	0	2	0	2	0	5	0	8	0	8	0	y
5.76	5.76	2.8	2.8	19.34	19.34	5	0	8	0	8	0	y
2.88	2.88	2	0	4.43	4.43	5	0	8	0	8	0	y
2.77	2.77	2	0	22.17	22.17	5	0	8	0	8	0	y
4.69	4.69	4.66	4.66	15.46	15.46	5	0	8	0	8	0	y
3.08	3.08	9.5	9.5	16.01	16.01	5	0	8	0	8	0	y
2	0	2	0	30.09	30.09	5	0	8	0	8	0	y
4.58	4.58	23.36	23.36	26.08	26.08	5	0	8	0	8	0	y
2.4	2.4	1.71	1.71	5	0	5	0	8	0	8	0	y
2	0	2	0	5	0	5	0	8	0	8	0	y
2	0	2	0	5	0	5	0	8	0	8	0	y
1.53	1.53	2.97	2.97	33.9	33.9	5	0	8	0	8	0	y
2	0	2	0	18.01	18.01	5	0	8	0	8	0	y
3.72	3.72	3.68	3.68	10.57	10.57	5	0	8	0	8	0	y
2	0	2	0	2	0	5	0	8	0	8	0	y

Codex III	Sample-number.	origin	Name En	date	amount sampled(kg)	No. animals sampled	dry weight (% wet wt)
9.1.3	ES26	Saharian-Morocco	squid	17-Oct-02	2	20	30.4
9.1.3	ES27	Galicia	squid	9-Nov-02	2	20	33.4
9.1.1	ES28	Cadiz Gulf	whiting	8-Nov-02	2	15	30.8
9.1.1	ES29	Galicia	whiting	9-Nov-02	2	15	33.9
9.1.1	ES38	Cantabric Sea	sardine	19-May-03	2	25	38.2
9.1.1	ES39	Cantabric Sea	sole	19-May-03	2	15	36.6
9.1.1	ES43	Cantabric Sea	whiting	19-May-03	2	15	34.2
9.1.1	UK01	North West Uk	cod	2-Oct-04	42.5	25	21.6
9.1.1	UK02	North West Uk	haddock	2-Oct-04	16.5	25	22.7
9.1.2	UK03	IVc East coast	whelks	2-Jul-04	0.065	8	27.5
9.1.2	UK04	IVc East coast	whelks	2-Aug-04	0.043	5	27.9
9.1.2	UK05	IVc East coast	whelks	2-Jul-04	0.326	38	25.8
9.1.2	UK06	IVc East coast	mussels	2-Sep-04	0.13	35	24.5
9.1.2	UK07	VIIe South coast	mussels	2-Sep-04	0.236	50	27.8
9.1.2	UK08	VIIf West coast	mussels	2-Sep-04	0.164	50	22.0
9.1.2	UK09	VIIe South coast	mussels	2-Sep-04	0.456	50	26.1
9.1.2	UK10	VIIa West Coast	mussels	2-Sep-04	0.184	50	31.1
9.1.2	UK11	IVc East coast	oyster	2-Sep-04	0.054	10	16.0
9.1.2	UK12	VIIe South coast	oyster	2-Sep-04	0.355	10	18.9
9.1.2	UK13	VIIa West Coast	oyster	2-Sep-04	0.379	10	13.7
9.1.2	UK14	VIId South coast	oyster	2-Sep-04	0.1	10	16.9
9.1.2	UK15	VIIf West coast	oyster	2-Sep-04	0.521	10	20.9
9.1.2	UK16	IVc East coast	mussels	3-Feb-04	0.286	25	17.6
9.1.2	UK17	VIIe South coast	mussels	3-Jan-04	0.263	25	25.3
9.1.2	UK18	VIIe South coast	mussels	3-Jan-04	0.292	25	21.1
9.1.2	UK19	VIIf West coast	mussels	3-Dec-04	0.08	50	29.0
9.1.2	UK20	VIIa West Coast	mussels	3-Jan-04	0.128	30	21.5
9.1.2	UK21	IVc East coast	oyster(jap)	3-Feb-04	0.093	5	14.8
9.1.2	UK22	VIIe South coast	oyster(jap)	3-Dec-04	0.099	10	17.0
9.1.4	BE01	North Sea -Belgian	shrimp	22-Oct-02	0.67	792	24.6
9.1.1	BE02	North Sea -Dutch	plaice	22-Oct-02	0.401	25	23.3
9.1.1	BE03	Norway	salmon	18-Nov-02	0.741	25	31.4
9.1.4	BE04	North Sea -Belgian	shrimp	6-Mar-03	0.088	100	22.5
9.1.1	BE05	North Sea -Dutch	plaice	6-Mar-03	0.821	25	16.2
9.1.1	BE06	Norway	salmon	12-Feb-03	0.367	25	26.2
9.1.4	BE07	North Sea -Belgian	shrimp	6-Mar-03	0.103	100	27.2
9.1.4	BE08	North Sea -Belgian	shrimp	6-Dec-03	0.0625	100	24.2
9.1.4	BE09	North Sea -Belgian	shrimp	6-Dec-03	0.0338	100	33.6
9.1.4	BE10	North Sea -Belgian	shrimp	13-Jun-03	0.0882	100	25.5
9.1.4	BE11	North Sea -Belgian	shrimp	13-Jun-03	0.0397	100	32.9
9.1.1	SE01	27(IIID)	herring	13-Nov-02	3		24.2
9.1.1	SE02	27(IIID)	herring	11-Nov-02	3		24.2
9.1.1	SE03	N63 37.5O20 15.9	herring	10-Jun-02	3		21.9
9.1.1	SE04	N63 37.5O20 15.9	herring	10-Jun-02	3		21.9
9.1.1	SE04b	N63 37.5O20 15.9	herring	10-Jun-02	3		21.9
9.1.1	SE05	Norway (IIa)	salmon	10-Jun-02			36.6
9.1.1	SE06	Norway (IIa)	salmon	10-Nov-02			29.8
9.1.1	SE07	Norway (IIa)	cod eggs	2-Apr-01			66.3
9.1.1	SE08	(IIB)	cod eggs	3-Apr-01			59.8

MBT (<x=x)	MBT (<x=0)	DBT (<x=x)	DBT (<x=0)	TBT (<x=x)	TBT (<x=0)	MPT (<x=x)	MPT (<x=0)	DPT (<x=x)	DPT (<x=0)	TPT (<x=x)	TPT (<x=0)	Reprsv. (y/n)
5	5	4	4	4	4	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
13	13	7	7	4	0	80	0	80	0	80	0	n
16	16	9	9	18	18	80	0	80	0	80	0	n
21	21	9	9	4	0	80	0	80	0	80	0	n
4	4	5	5	11	11	80	0	80	0	80	0	y
20	20	44	44	52	52	80	0	80	0	80	0	y
7	7	6	6	6	6	80	0	80	0	80	0	y
7	7	9	9	15	15	80	0	80	0	80	0	y
5	0	5	5	7	7	80	0	80	0	80	0	y
5	0	4	0	15	15	80	0	80	0	80	0	y
5	0	5	5	38	38	80	0	80	0	80	0	y
5	0	4	0	9	9	80	0	80	0	80	0	y
5	0	8	8	36	36	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	0	5	5	8	8	80	0	80	0	80	0	y
14	14	24	24	29	29	80	0	80	0	80	0	y
5	0	7	7	9	9	80	0	80	0	80	0	y
5	0	5	5	9	9	80	0	80	0	80	0	y
5	0	5	5	9	9	80	0	80	0	80	0	y
5	0	4	0	49	49	80	0	80	0	80	0	y
9	9	22	22	62	62	80	0	80	0	80	0	y
5	0	1.5	1.5	13	13	80	0	80	0	80	0	y
5	0	1.2	1.2	4	0	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	0	4.7	4.7	73	73	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	0	5.7	5.7	130	130	80	0	80	0	80	0	y
		3.9	3.9	89	89							y
		7.4	7.4	199	199							y
		1.3	1.3	66	66							y
		8.6	8.6	103	103							y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	0	4	0	44	44	80	0	80	0	80	0	y
5	0	4	0	32	32	80	0	80	0	80	0	y
5	0	4	0	34	34	80	0	80	0	80	0	y
5	0	4	0	30	30	80	0	80	0	80	0	y
5	0	4	0	5	5	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
5	5	4	4	4	4	80	0	80	0	80	0	y
5	0	4	0	4	0	80	0	80	0	80	0	y
13	13	7	7	4	0	80	0	80	0	80	0	n
16	16	9	9	18	18	80	0	80	0	80	0	n
21	21	9	9	4	0	80	0	80	0	80	0	n
4	4	5	5	11	11	80	0	80	0	80	0	y
20	20	44	44	52	52	80	0	80	0	80	0	y

Note:

Also available from www.vu.nl/ivm/research/otsafe.

- Codex codex alimentarius code
- Name En: Species name in English
- MBT: monobutyltin
- DBT: dibutyltin
- TBT: tributyltin
- MPT: monophenyltin
- DPT: diphenyltin
- TPT: triphenyltin

Representative (y/n): is the sample representative of what would be available to the consumer

- Values below the detection limit are given as zero in the <x=0 columns
- Values below the detection limit are given as the detection limit in the <x=x columns
- This allows for different assumptions in calculations (worst case, <x=1/2x, etc.)

Origin of species included in the calculations (no data or all samples from the country considered are not mentioned)

Belgium	fish: BE+NL (herring)+PT (cod)+ DE (pollack)+ES (sole); molluscs: NL (mussels)+UK (oysters)+FR (oysters)
France	fish: FR + UK (cod)+PT (sardines, cod)+ES (sardines, whiting, sole) + DE (pollack)+NL (whiting); molluscs: FR+UK (oysters)
Germany	molluscs: NL (mussels)
Greece	fish: GR+ES (sardines from mediterranean only)
Netherlands	fish: NL+DE (salmon, pollack)+UK (cod)+BE (plaice, salmon)
Portugal	fish: PT+UK (cod); crustaceans: PT+ES (shrimp)
Spain	fish: ES+NL (whiting)
Sweden	fish: SE+UK (cod, haddock)
UK	fish: UK+ES (whiting)