



OSPAR
COMMISSION

MIME's considerations of using EQS_{biota} for OSPAR assessments

OSPAR Convention

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

Convention OSPAR

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

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Executive Summary

This paper presents MIME's considerations of using EQS_{biota} for assessing the levels of contaminants in fish. An EQS_{biota} has been set for 11 bioaccumulative chemicals through the Water Framework Directive (Directive 2000/60/EC, its daughter directive 2008/105/EC and the amendment 2013/39/EU). While OSPAR has been reluctant to use EQS_{biota} for some compounds, notably mercury, many contracting parties has expressed a desire to use apply EQS_{biota} wherever possible for consistency.

EU Guidance Document #32 states that the raw contaminant concentrations should be normalized by (1) normalizing to a specified lipid or dry weight %, and (2) adjustment to trophic level 4. However, due to few/uncertain data on trophic level, one may consider to follow the HELCOM approach, which is to only perform adjustment (1). This adjustment is already done in OSPAR's current assessment. OSPAR recognizes the potential offered by trophic level adjustment (adjustment 2), but concluded that a review is merited to assess the applicability of currently available datasets to enable such adjustment.

The principle of EQS_{biota} is to develop threshold values for both human health (QS_{HH}) and for secondary poisoning of food web top predators (QS_{sec.pois}) for each substance, and then to select the strictest of those thresholds as EQS_{biota}. A majority of MIME's discussion group question the reliability and appropriateness of the EQS_{biota} based on QS_{HH}. MIME discussed that both assessments, human and environmental health, should be conducted separately, which also is in line with the two MSFD descriptors D8 (protection of the environment) and D9 (protection of human health).

Récapitulatif

Le présent document comporte les réflexions du MIME sur l'application de EQS_{biota} pour évaluer le niveau des contaminants dans le poisson. Un EQS_{biota} a été déterminé pour 11 substances chimiques bioaccumulatives grâce à la Directive cadre sur l'eau (Directive 2000/60/CE, sa directive fille 2008/105/CE et l'amendement 2013/39/UE). OSPAR a démontré une certaine réticence à appliquer des EQS_{biota} pour certains composés, notamment le mercure mais nombre de Parties contractantes ont indiqué qu'elles souhaitent autant que possible appliquer des EQS_{biota} dans un souci de cohérence.

Le Document d'orientation #32 de l'UE déclare qu'il faudrait normaliser les teneurs brutes en contaminants en (1) normalisant à un pourcentage spécifié de poids de graisse ou de poids sec, et (2) ajustant au niveau trophique 4. Etant donné que les données sur le niveau trophique sont rares/incertaines, on pourrait cependant envisager de suivre l'approche appliquée par HELCOM, qui n'effectue qu'un ajustement (1). On effectue déjà cet ajustement dans le cadre de l'évaluation actuelle d'OSPAR. OSPAR reconnaît le potentiel de l'ajustement au niveau trophique (ajustement 2) mais a conclu qu'il conviendrait d'effectuer une revue afin d'évaluer l'applicabilité des séries de données actuellement disponibles permettant cet ajustement.

Le principe des EQS_{biota} consiste à développer des valeurs seuils aussi bien pour la santé de l'homme (QS_{HH}) que pour l'empoisonnement secondaire des prédateurs supérieurs de la chaîne trophique (QS_{sec.pois}) pour chaque substance et ensuite à sélectionner le seuil le plus stricte d'entre eux à titre de EQS_{biota}. La majorité des participants au groupe de discussion du MIME mettent en cause la fiabilité et la pertinence du EQS_{biota} se fondant sur le QS_{HH}. Le MIME s'est entretenu de la question de savoir si les deux évaluations, de la santé de l'homme et de celle de l'environnement, doivent être réalisées séparément, ce qui correspond également aux descripteurs de la DCSMM D8 (protection de l'environnement) et D9 (protection de la santé de l'homme).

HELCOM approach to the application of EQS_{biota}

1. In response to the request to discuss the HELCOM approach to the application of EQS_{biota}, **MIME 2018**; concluded that;
 - a. the HELCOM approach utilises all EQS_{biota} as threshold/assessment values (whether human health or sec poisoning derived),
 - b. contaminant data in the proposed HELCOM approach are normalised to lipid and/or dry weight in accordance with TGD #32 but that there is no normalisation for trophic level using a correction factor for trophic magnification in the approach. This approach being similar to that currently completed by OSPAR, with the exception that the HELCOM approach utilises EQS_{biota} while the OSPAR complete assessment is completed relative to BAC/EAC (step 2 Figure 1).
2. Overall, the absence of trophic level and parameter trophic level adjustment will lead to an underestimation of the adjusted concentration data as envisaged in the TGD #32.ii).

Considerations concerning the use of EQS_{biota} in OSPAR-wide assessments of contaminant monitoring data

In general discussion concerning the use of EQS_{biota} MIME 2018;

3. Completed a review of the applicability and feasibility of incorporating individual EQS_{biota} to support its assessment (See Table 1).
4. Discussed the use of EQS_{biota} based on human health and a majority of the participants considered them as inappropriate for environmental assessment (see following points).
5. Is considering the potential to adopt the QS_{sec.pois} (and/or other suitable thresholds as available) for PFOS, HCB, HBCDD PCDD/Fs and to evaluate the potential to further develop assessment approaches for these parameters (see Table 1).
6. Considered the use of EQS_{biota} for Hg, but noted that OSPAR Background Assessment Concentrations are 90 and 180 µg/kg⁻¹ dry weight and 35 µg/kg-1 wet weight) for mussels, oysters and fish respectively. Referred also to previous evaluation of mercury EQS by MIME 2018 “*Mercury assessment in the marine environment: Assessment criteria comparison (EAC/EQS) for mercury*” where the conclusion, primarily based on the high uncertainties in TMFs and trophic level adjustment, was to focus on the trends and possibly distance to the BAC until a robust value was developed.
7. Recognised that OSPAR at the moment already utilises a number of food safety thresholds to support assessments (e.g. mercury, cadmium and lead) in the absence of suitable Environmental Assessment Criteria, but that the application of Human Health based thresholds is considered undesirable (as also stated in the in the Final draft revised WFD Guidance Document No. 27 (see 8 below). To overcome this issue, OSPAR are continuing to develop distance to target (i.e. distance Background Concentrations) approaches to support assessments, this approach being relevant in the case of mercury, cadmium and lead and PAHs.
8. Discussed that in principle an assessment of the marine environment should consider the whole marine ecosystem including humans in line with the NEAES 2010-2020; “to achieve

concentrations of contaminants at levels not giving rise to pollution effects, and contaminants in fish and other seafood for human consumption not exceeding levels established by EU legislation or other relevant standards". However there are still questions on reliability and appropriateness of some of the thresholds set as EQS_{biota} based on QS human health.

9. Discussed that both assessments, environmental and human health, should be conducted separately to reach reliable and robust conclusions for both protection levels. These assessments should then be aggregated at a later stage for an ecosystem approach. This is in line with the MSFD and the two descriptors D8 (protection of the environment) together with D9 (protection of human health) and would also align with the NEAES, dealt with in two steps.

10. Noted the inclusion (in the status box) in the June 2018 revision of Technical Guidance Document for Deriving Environmental Quality Standards (TGD-EQS) #27³ (status box) that discusses that *"The current approach favours the use of the standard from the food legislation over the standard derived using a toxicologically based formula to protect human health against contamination via consumption of seafood. The subgroup in charge of the revision proposed to change the approach, to use preferentially tox-based quality standard. No consensus could be found on this proposal. Because this change would impact the EQSs for the priority substances, and no immediate revision of the EQS Directive is planned, it is proposed to postpone this discussion to a next revision of the guidance document"*.

11. Concluded that further (expert) review and considerations of this guidance document #27 is merited.

12. Noted that conflicts exist between EFSA derived food and feed evaluations and environment thresholds (e.g. for PBDEs), such conflicts should be avoided where possible.

13. Noted that the EQS_{biota} for PCDD/F+dl-PCBs is based on QS_{human health} while the QS_{secondary poisoning} is stricter.

14. Discussed that "separate biota standards for freshwater and marine waters may be necessary" as also stated in the in the Final draft revised Guidance Document No. 27 (see 17 to 19 below).

More specifically concerning the applicability and adjustment of OSPAR data to be fully comparable to EQS_{biota} in accordance with TGD #32 MIME 2018;

15. Noted that there are a number of key considerations that need to be considered in order that biota monitoring data can be adjusted to be fully comparable to EQS_{biota} in accordance with the guidance offered in TGD #32 (See 15 to 20).

16. Emphasised that OSPAR monitoring programmes recognise the (necessity and added value) of the completion of normalisation to lipid/dry weight basis and currently incorporate these normalisations where appropriate prior to completion of assessments (effectively step 2 Figure 1). This is considered as being similar to the normalisation procedure adopted by HELCOM, with the key difference being that the HELCOM approach uses EQS_{biota} for final assessment with OSPAR using BAC/EAC.

17. Concluded that a review is merited to assess the applicability of currently available OSPAR datasets to enable trophic adjustment assessments. OSPAR data has primarily been collected for the purpose of temporal trend monitoring. Thus a full evaluation of matrix suitability and/or the

availability of other supporting information such as appropriate conversion factors is merited at an individual contaminant level.

18. Noted that the completion of the full stepwise process to adjust contaminant data for trophic level (as suggested in TGD#32) involves a number of assumptions concerning TL and TMF. It is well documented that these trophic magnification factors can exhibit wide variability dependent on the characteristics of the ecosystems in question (e.g. marine vs freshwater), the constituent biology, experimental design, and statistical methods used for TMF calculation.

19. Noted that Fliedner 2016¹, when evaluating the application of TGD #32 to biota, concluded that *“results indicate that the normalization procedure proposed in the WFD Guidance Document No. 32 on biota monitoring (EC 2014) may be feasible for rather simple lipophilic compounds like HCB. However, it might oversimplify the real situation for substances like Hg and PFOS that behave in a more complicated manner (i.e., binding to sulfhydryl groups of proteins or to proteins in general)”*. The authors further note that, *“The generic application of the same TMF for different waters may therefore lead to erroneous results.”*

20. Further noted that Fliedner² et al (2018) state that, *ideally, TMFs be reflective of the respective water body under investigation. This, however, is labour-intensive and expensive and impractical considering thousands of sites which have to be monitored EU-wide. Where relevant TMFs for the respective substances and water bodies are not available it was deemed reasonable to assess compliance using measured or lipid/dry mass normalized data directly against the EQS_{biota} threshold”*. In the absence of suitable TMF information Fliedner et al propose completion of normalisation for lipid/dry weight but without trophic level adjustment, this approach being similar to both current OSPAR and the adopted HELCOM approach (i.e. stop at step 2).

21. Noted the Section 4.4.1.2 of the recently revision of Technical Guidance Document for Deriving Environmental Quality Standards (TGD-EQS) #27³ notes that, *“In the marine environment, the fish-eating predator is, similar to the freshwater compartment, usually a bird or mammal. As for the freshwater compartment, the risk assessor should investigate which of the food items is critical for the quality standard in biota. This means for the marine food chain that as well as establishing acceptable concentration limits in aquatic organisms such as fish and molluscs, the concentration limits in predators of these (fish-eating birds and mammals, e.g. seals) have to be established to protect top predators (section 4.4.3.2). A consequence of this additional step is that separate biota standards for freshwater and marine waters may be necessary and, for biomagnifying substances, the biota standard in marine systems will usually be more stringent”*.

22. OSPAR specific ecosystem TMF information and monitoring species trophic level information is currently lacking. The selection of ecosystem specific appropriate TMF values is critical to enable full trophic level assessment.

¹ Fliedner et al 2016. Biota monitoring and the Water Framework Directive—can normalization overcome shortcomings in sampling strategies. *Environ Sci Pollut Res* (2016) 23:21927–21939 DOI 10.1007/s11356-016-7442-2.

² Fliedner et al 2018. Biota monitoring under the Water Framework Directive: On tissue choice and fish species selection. *Environmental Pollution* 235 (2018) 129e140

³ Final draft revised Guidance Document No. 27 Technical Guidance for Deriving Environmental Quality Standards

Overall MIME 2018;

23. Recognises the value that data normalisation processes add to assessments and additionally the potential offered by the completion of full trophic level assessments on monitoring data.
24. Recognises the need for convergence on the approach for WFD, MSFD and OSPAR, to ensure that MSFD assessment align with OSPAR outputs.
25. Noted that difficulties in alignment arise primarily as a consequence of the inclusion of human health based quality standards to support environmental assessment.
26. Further proposed investigating the feasibility of the incorporation of EQS for mercury in fish and QS_{sec.pois} for PFOS, HCB, HBCDD and PCDD/Fs as potential threshold values to support assessment.
27. Proposes to continue to complete data assessments (and distance to target approaches) using data normalised for dry weight/lipid as appropriate and completing assessments relative to current OSPAR agreed threshold values. This assessment being similar to that proposed by HELCOM (normalisation to dry/lipid basis but in absence of trophic adjustment).
28. Further concluded that significant knowledge gaps (e.g. ecosystem specific TMF and species specific trophic level data) currently hinder progress towards completion of full marine trophic level assessments and notes that MIME;
 - a. considers that the use of generic trophic level or TMF data to complete trophic adjustment of contaminant data in the absence of measured information is not advisable;
 - b. in order to support future development of monitoring and database procedures to incorporate trophic level normalisation there is a need for Contracting Parties to capture the reporting of species and ecosystem specific trophic level information (i.e. baseline and species stable isotope data required to derive species trophic level information);
 - c. is considering the potential to adopt the EQS for mercury in fish and QS_{sec.pois} (and/or other suitable thresholds as available) for PFOS, HCB, HBCDD PCDD/Fs and to evaluate the potential to further develop assessment approaches for these parameters.

MIME 2018 requests HASEC to consider whether MIME should;

29. Continue to complete assessments (including distance to target) using monitoring data that has been normalised for lipid/and/or dry weight as appropriate for assessment against OSPAR agreed thresholds. This process being similar to the adopted HELCOM approach with the exception that the latter uses EQS_{biota} threshold values based on a combination of human health and secondary poisoning.
30. Advise on the considerations to adoption the EQS for mercury in fish and QS_{sec.pois} (and/or other suitable thresholds as available) for PFOS, HCB, HBCDD PCDD/Fs.
31. Continue to further evaluate on a parameter by parameter basis whether current OSPAR monitoring data are suitable to complete trophic adjustment. And encourage Contracting Parties to provide additional information (from data submitted to OSPAR) on conversion factors (e.g. between tissues) and on stable isotopes and on marine ecosystem specific trophic magnification factors before MIME 2019.

32. Evaluate the resources required to further develop tropic level-based assessments.

Table 1

Substance	EQSbiota (µg/kg ww)	Matrix	Protection goal	EQS suitable?	Current / Considered threshold
Brominated diphenyl ethers	0.0085	Fish fillet	HH	NO	Current: FEQG; BDE28:120, BDE47: 44, BDE99:1, BDE100:1, BDE153:4, BDE154:4 µg/kg ww *
Fluoranthene	30	Crustaceans and molluscs	HH	NO	Current:EAC 110 µg/kg dw
Hexachlorobenzene	10	Fish fillet	HH	NO	Current:BAC 0.09 µg/kg ww Considered: QSsec.pois. 16.7 µg/kg
Hexachlorobutadiene	55	Whole fish	SP		few data, not assessed
Mercury and its compounds	20	Whole fish	SP	YES	Current: EC 500 µg/kg ww Considered: EQSbiota
PAHs Benzo[a]pyrene	5	Crustaceans and molluscs	HH	NO	Current: EAC 600 µg/kg dw
Dicofol	33	Whole fish	SP		few data, not assessed
PFOS	9.1	Fish fillet	HH	NO	Considered: QSsec.pois 33µg/kg ww
Dioxins and dioxin- like compounds	0.0065 TEQ2005	Fish fillet	HH	NO	Considered: QSsec.pois. 0.0012 µg/kg ww
HBCDD	167	Whole fish	SP	YES	Considered: EQSbiota
Heptachlor and heptachlor epoxide	0.0067	Fish fillet	HH		few data, not assessed

HH: Human health via consumption of fishery products

SP: secondary poisoning of aquatic food chain

*FEQG thresholds are preferred since it treat congeners separately compared to QS_{sec.pois}



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**OSPAR's vision is of a clean, healthy and biologically diverse
North-East Atlantic used sustainably**

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