

OTHER RELEVANT STUDIES ON BFRs IN SALMON

Environmental Science & Technology Study – Aug 2004

A recent study was published by *Hites et al.* in the American journal *Environmental Science & Technology* highlighting that levels of PBDEs in farmed Atlantic salmon (*Salmo salar*) are higher than wild Pacific salmon (the authors did not test wild Atlantic Salmon).

As the authors only presented summary results and full results are not yet available, it is not possible as yet to compare MI results directly to those published by *Hites et al.* It appears that Irish results are within the range reported for farmed salmon.

It is to be expected that wild salmon would have a lower level of these contaminants as their diet differs from farmed salmon. At sea wild Atlantic salmon feed on crustaceans, fish and squids whereas feed used in fish farming contains a substantial proportion of fish oil.

The European Food Safety Authority (EFSA) has considered this paper and does not see the need to issue a statement regarding the possible risks from the consumption of salmon due to the presence of these contaminants, also noting that application of the COT UK assessment approach to a worst-case estimate based on *Hites et al.* data suggested a considerable safety margin.

FSAI/MI/BIM Survey of Environmental Contaminants in Fish – 2004

The FSAI, MI and Bord Iascaigh Mhara (BIM) are currently undertaking a more comprehensive survey on the levels of certain persistent organic pollutants, including BFRs, in various fish species, including farmed and wild Irish salmon. This study will be completed by the end of 2004.

More detailed information on this topic as well as similar leaflets on other Marine Institute Monitoring Programmes are also available

Monitoring Programme for Veterinary Residues & Environmental Contaminants in Farmed Finfish

Monitoring Programme for Contaminants in Fish and Shellfish

Monitoring Nutrient Levels and Trends in Irish Coastal Waters

Marine Biotoxins in Shellfish and Toxic Phytoplankton

In addition, information on the marine chemistry monitoring programmes and other publications, including downloadable reports, can be obtained at the following Marine Institute website locations:

- www.marine.ie/chem
- www.marine.ie/environ

Contact

Dr. Evin McGovern
Chemistry Section

Marine Environment & Food Safety Services
Marine Institute, Abbotstown
Dublin 15, Ireland

Tel.: 01 8228200 Fax: 01 8205078

Email: info@marine.ie

<http://www.marine.ie>



MONITORING FOOD SAFETY AND THE MARINE ENVIRONMENT

Study of Brominated Flame Retardants in Irish Farmed Salmon



Information Leaflet



Marine Environment & Food Safety Services

WHAT DO WE DO?

The Marine Institute (MI) undertakes monitoring and research relating to contaminants and chemical residues in Irish fisheries products, and works with key agencies such as the Food Safety Authority of Ireland (FSAI) to ensure a high level of consumer protection. In 2004 the MI carried out a study of levels of brominated flame retardants, (BFRs), in Irish farmed salmon.

WHAT ARE BFRs?

Brominated flame retardants (BFRs) such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecanes (HBCD) are chemicals added to polymers, plastics, electronic equipment and to textiles in order to reduce the risk of fire. The discovery of BFRs in diverse environmental compartments, for example human breast milk, animal tissue and aquatic sediments, has led to concerns about their potential risk.

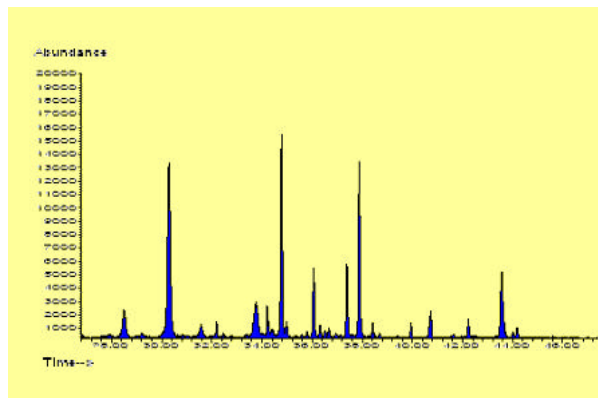
BFRs and other persistent organic pollutants (POPs) have become widespread environmental contaminants. POPs include dioxins, furans, polychlorinated biphenyls (PCBs) and BFRs, which all share the characteristic of toxicity and persistence. They can accumulate in the fat of fish and concentrations can magnify through the food chain. Therefore, concentrations of POPs in aquatic animals tend to be highest in long-lived predatory animals with high fat burden, such as whales and dolphins.

An EU ban on 2 BFR formulations (pentaBDE and octaBDE) came into force in 2004. Following these restrictions it is expected that levels of these substances in the environment will decrease.

WHY CARRY OUT THE STUDY?

Oily fish are recognized as an important part of a balanced diet and a very important source of key nutrients, such as omega-3 fatty acids, which help prevent heart disease. Consumption of fish can also be a source of human exposure to POPs.

While efforts are required to reduce levels of environmental pollutants, publicity over the exposure of consumers to contaminants from fish, and in particular farmed salmon, may well contribute to people eating less oily fish. This may have a detrimental effect on public health. Reliable and up-to-date information on levels of contaminants in various foodstuffs is required to provide sound assessment of potential risks. The Marine Institute carried out the above study against this backdrop.



GC-MS chromatogram of BFRs in farmed salmon sample

WHAT WERE THE FINDINGS OF MI STUDY?

7 individual farmed salmon samples were collected from 7 different Irish aquaculture sites. Analysis of fish fillet samples for PBDEs and HBCD by gas chromatography-mass spectrometry (GC-MS) was subcontracted to RIVO-DLO (the Netherlands).

Analysis focused on 17 PBDE congeners most frequently encountered in environmental matrices in addition to HBCD. Results show the presence of PBDEs and HBCD in all samples, although for a number of these congeners concentrations were less than the limit of quantification. The upperbound¹ mean concentration for sum of 17 PBDEs was $3.05 \pm 0.58 \mu\text{g.kg}^{-1}$ ww. The mean upperbound concentration of HBCD was $1.17 \pm 0.26 \mu\text{g.kg}^{-1}$ ww. These levels are similar to those reported in the literature for salmon and other fish species.

¹ Upperbound: Where concentrations are reported as less than the limit of quantification (LoQ), the concentration is taken as the LoQ.

WHAT DOES THIS MEAN FOR THE IRISH CONSUMER?

There are concerns about the possible toxicity of BFRs, as they are structurally similar to PCBs that exhibit a wide spectrum of toxic effects in animals and humans. At present there are no EU Maximum Limits for BFRs in food. Tolerable daily intakes (TDIs) have not been derived, primarily due to limited toxicological data for BFRs and the associated uncertainties with such studies. Considerably more work is required internationally on the toxicology and risk assessment of BFRs.

A recent study of BFR-contaminated trout and eel from the Skerne-Tees river system was carried out by the Food Standards Authority (UK). Levels in these fish were much higher than determined in the MI study.

Nonetheless, the independent Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) UK concluded that the estimated dietary intakes of PBDEs and HBCD from the consumption of a weekly single portion of fish from the Skerne-Tees river system, were unlikely to represent a risk to health.

Levels of these BFRs in Irish farmed salmon (as measured in the MI study) are over 1 order of magnitude lower for PBDEs and 3 orders of magnitude lower for HBCD than the levels at which COT assessed dietary intake. This would suggest that there is a correspondingly greater safety margin for consumers of farmed salmon as determined in this study.²

The FSAI maintains that the consumption of one portion of farmed salmon per week as part of a balanced diet is safe and has proven health benefits.

² It should be noted that COT's conclusions were tentative due to uncertainties surrounding the toxicological database and exposure assessment. Also, the MI study only tested a small number of samples.