Passive Sampling for Emerging Compounds: An Irish Perspective

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IPSR IRISH PASSIVE SAMPLING RESEARCH

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A collaborative project investigating the potential of passive sampling technologies and integrative sampling to meet chemical monitoring requirements of the Water Framework Directive (2000/60/EC) in Ireland began in February 2013. Polar (POCIS) and non-polar (silicon rubber) passive sampling, grab samples and biota samples are being collected at ten sites across Ireland over two years. The first five sites (Fig. 1) are taking a catchment approach. All samples will be tested for emerging and priority compounds listed in the Environmental Quality Standard (EQS) Directive (2008/105/EC) and its 2012 amendment. These compounds are listed in Table 1, below.

Fig. 1 Catchment approach to sampling – upper to lower catchment with five sites in Cork, Ireland.

PRIORITY AND EMERGING COMPOUNDS

Amendments to legislation have included the compounds listed in Table 1 as emerging compounds of concern. No standard methods exist for most of these compounds, also in most of the cases no reported analytical methods have yet been shown to reach the required limits of detection for the EQS guidelines.

Table 1 Compounds in study, also included are the PAHs.

EDCs and pharmaceuticals	17b estradiol (E2) 17a ethinyl estradiol (EE2) Diclofenac Alkylphenols	**Pesticides**	Dicofol Cypermethrin
PFOS	PFOS	**Organohalogens**	HCB Heptachlor Heptachlor epoxide HBCDD PCBs PBDEs HCBD Dioxins and dioxin-like compounds
Pesticides	Aclonifen Bifenox Cybutryn Terbutryn Quinoxyfen Dichlorvos		

SAMPLING PROTOCOL

Sampling of water with 2 types of passive sampler POCIS and PDMS (Fig. 2 and 3). Also grab and biota samples are collected as well as supplementary data Is collected onsite:

- GPS co-ordinates
- Date and time of deployment
- Salinity
- Water temperature

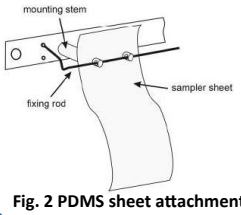

Fig. 2 PDMS sheet attachment

Fig. 3 POCIS canister

RESULTS

Early results of water analysis show no detected estrogens in the samples from 2 sites in Cork.

Method development and analysis is currently ongoing for the other emerging compounds with a focus on GC and LC based methods.

Table 2 Preliminary water results for estrogens

Site	Analyte	LOD	Result
Inchigeelagh	E2	0.07 ng/L	Not detected (nd)
	EE2	0.11 ng/L	nd
Iniscarra	E2	0.07 ng/L	nd
	EE2	0.11 ng/L	nd

CONCLUSIONS

The widely accepted method for water monitoring involves grab sampling which is both expensive and labour intensive, and is limited by the fact that it identifies only compounds present at a single point in time. Passive sampling is proving to be a valuable tool for the monitoring of priority substances in water, sediment and biota.

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NCSR National Centre for Sensor Research · Marine Institute Foras na Mara · epa Environmental Protection Agency · SSTI Strategy for Science, Technology and Innovation · NDP National Development Plan · DCU