

Exposmeter Lipophilic for Water series Sampling Operation

Sampling Procedures for lipophilic compounds in water

Standard Operating Procedure SPMD-00001

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1.0 APPLICATION AND SCOPE

- 1.1 This SOP is written as a guide to perform sampling of lipophilic compounds in water.
- 1.2 This procedure assumes the use of Exposmeter Lipophilic for water (EWL) serie samplers. Below in the text it will refer as to EWL.

2.0 DEFINITIONS

The following terms and definitions are used in this procedure.

Lipophilic compounds - compounds that are soluble in lipids and only slightly soluble in the water. Lipophilic molecules have no charge and repel water.

Field control EWLs - field-control EWLs consists of individual EWLs (at least one per sampling occasion) obtained from the same manufactured lot or batch as the EWLs used in an exposure study. Field-control EWLs are used as QC samples for transport, deployment and retrieval (note that these EWLs are sealed back in the same shipping cans and stored frozen during the exposure period), and for calculations using the PRCs concept. The field-control EWLs are treated in the same way as deployed devices, with the exception that they are not exposed to waters at study sites. These field controls account for potential contaminants during transport (both to and from study sites), and during exposure to site air and contamination from personal handling while deploying and retrieving EWLs.

QC samples – samples used for controlling the quality of sampling and analysis

QC compounds – compounds added to the sampler prior to use for in situ calibration of uptake of compounds (PRC – permeability/performance reference compounds) and for controlling losses during analysis.

Target Compound(s) - compounds sampled for

3.0 TARGET COMPOUNDS

EWLs are designed to concentrate lipophilic chemicals with log K_{OWs} large than 3,0.

4.0 PROCEDURES

4.1 STORAGE OF EWLs

- 4.1.1 *EWLs* that must be stored prior to field deployment in the sealed metal cans at less than -15°C .
- 4.1.2 The canned samplers should be shipped to the field in efficient coolers specifically designated for *EWL* transport. While it is not always essential to transport the *EWLs* to the field at low temperatures (the *EWLs* are in sealed can), it is always good practice to maintain the samplers frozen or at near freezing temperatures.

Note: A variety of coolants can be used for shipping, which include ice, blue ice, and dry ice. Some coolants contain preservatives that might contaminate the sample.

- 4.1.3 When *EWLs* with *PRCs* are used, *EWLs* should be maintained at freezing or near-freezing conditions during transport to minimize losses of these *QC compounds*.
- 4.1.4 Following retrieval from the exposure medium, the *EWLs* should immediately be sealed inside the same metal cans and transported (frozen or near frozen) back to the analytical laboratory in the same cooler.
 - 4.1.4.1.1 If it is necessary to delay the shipping of exposed *EWLs* more than a few hours, then they should be stored frozen at $\leq -15^{\circ}\text{C}$ in the sealed metal cans.

Caution: failure to maintain exposed *EWLs* under freezing conditions can result in significant losses of analytes with relatively high fugacities (e.g. naphthalene).

4.2 DEPLOYMENT

- 4.2.1 Before aqueous deployment and prior to retrieval, carefully inspect study sites for sources of vapor-phase contaminants, which include fumes from engines, oils, tars, gasoline, diesel fuel, paints, solvents, cigarette smoke, asphalt pavement, etc., and record any findings for each site.
- 4.2.2 A record should be kept on site conditions during exposures. Relevant data include temperature (a minimum of the beginning and end of the deployment), the visual extent of fouling (i.e. light, medium, heavy, none), and an estimation of turbulence-flow rates (i.e. cm/s).

- 4.2.3 Notes describing the site, events occurring during deployment and retrieval, etc. should be recorded. Pictures of sampling sites are recommended for site description
- 4.2.4 Ensure that cans with *EWL field control* are open to the air while sample *EWLs* are being deployed and retrieved.
 - 4.2.4.1 *Field-control EWLs* are taken to the field in sealed metal cans and one or more cans are opened to the atmosphere at each site (note that *field-control EWLs* are typically handled in the equal manner as *EWLs* for sampling) during both deployment and retrieval of exposed *EWLs*.
 - 4.2.4.2 The time period that *field-control EWLs* are exposed to site air should exactly mirror the time required to deploy and retrieve sample *EWLs*.
 - 4.2.4.3 Afterwards, the cans with the *field-control EWLs* are processed and analyzed exactly as deployed *EWLs*.
- 4.2.5 If waterborne chemicals are visible as surface layers of oils, tars, gasoline, etc., or a biofilm on the surface of the water, where target compounds are potentially elevated, precautions may be needed to reduce contamination during aqueous insertion of deployment devices.
- 4.2.6 Hand lotions, perfumes, colognes, powdered gloves (use powder free gloves) should not be used when handling samplers or deployment devices, as they likely contain chemicals accumulated by the *EWLs*.
- 4.2.7 There are commercially available stainless steel deployment devices, which have a capacity from 1 to 5 *EWLs*. Each *EWL* is placed on a separate spiders and spiders are held in place by a threaded center pin as shown in the picture in *Annex 2*. Commercial source for deployment device is presented in *Annex 1*.
- 4.2.8 Pre-clean stainless steel containers in the laboratory before deployment using suitable solvents.
- 4.2.9 Storage and transportation of deployment devices should be handled in the way that devices would not be exposed to contamination.
- 4.2.10 Place selected number of *EWLs* mounted on sampling spiders in one device
- 4.2.11 The metal protective device is submerged in the running river water at monitoring sites. The sampling devices have to be properly fastened to prevent accidental losses during sampling. Deployment scheme are presented in *Annex 3*.
- 4.2.12 The *EWLs* must be exposed for time period indicated in sampling plan (it could range from 2 days to several months depending on target compounds).

4.3. RETRIEVAL

- 4.3.1 The procedure for retrieval of the *EWLs* is essentially the reverse of the deployment sequence and the same precautions apply.

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- 4.3.2 After retrieval clean the membrane in the sampling water and dry with kleenex or clean tissue paper. Heavily dirty membranes can be mechanically cleaned using for example a toothbrush.
- 4.3.3 Metal can should be properly closed after placing EWL inside the can in order to prevent them from contamination during transport and storage.

Annex 1

Commercial Availability of EWLs, deployment devices and metal cans

EWL is based on SPMD technology which is the subject of two government patents (Huckins et al., U.S. Patents, #5,098,573 and #5,395,426). The patents cover both assembly of SPMD and dialytic recovery of analytes from SPMDs. Various SPMD configurations and deployment apparatuses are available from the manufacturer. The **European and Asian** source of EWLs is Exposmeter, Trehorningen 34, S-922 66, Travelsjo, Sweden, e-mail: info@exposmeter.com

Annex 2

A commercially available stainless steel EWLs deployment device



Annex 3



