Technical Guideline No. 04 – Collection of plankton samples

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To be used in conjunction with:

GUIDELINES FOR THE ENVIRONMENTAL MONITORING AND IMPACT ASSESSMENT ASSOCIATED WITH SUBSEA OIL RELEASES AND DISPERSANT USE IN UK WATERS

1 Purpose and Scope

Plankton communities can be assessed in order to establish potential harm caused by the spilled oil. This is particularly pertinent to areas that are known spawning grounds.

This document covers the deployment and retrieval of equipment for obtaining plankton samples at a range of depths from just subsurface to ~500 m. It does not include survey design or analysis of samples.

This document supports and should be used in conjunction with environmental monitoring guidelines for subsea oil releases (Law et al., 2014).

2 Health and Safety considerations

The types of equipment discussed in this document are deployed via a winch, and so usual precautions should be taken for this type of activity. When deploying gear from the deck of a boat, appropriate PPE should be worn. This includes, but is not limited to, toe protected waterproof boots, lifejacket and hard hat. Before the survey starts, the scientist-in-charge (SIC) and ship's safety officer should ensure that all scientists and crew have been adequately briefed in relation to the safe operating procedures relating to the deployment and recovery of the plankton sampling equipment to be used. When preserving the samples, personnel should be aware of the risks associated with the use of formaldehyde. A COSHH form should be completed to mitigate the risks detailed on the Safety Data Sheet (SDS). All personnel using or handling the formaldehyde should be conversant with the requirements of the COSHH, SDS and in dealing with any spillages. Formaldehyde is classified as **R40 – Limited evidence of carcinogenic effect** and therefore should be treated with utmost care. Personal protective equipment should be worn at all times to prevent skin exposure. Inhalation risks should also be mitigated

3 Equipment

Gulf VII samplers -

- 76cm or 53 cm diameter unencased plankton sampler frames.
- 40cm or 20cm diameter aperture conical nosecones with flowmeter mount.
- Plankton Nets (270µm and 425µm mesh)
- Standard Scripps depressors.
- Twin depressor frame.
- Accessories including end buckets, end bags, drogues, lines, chains, shackles, swivels etc.
- CTD and electronic flowmeters for 'real-time' monitoring if a cored cable and slip-ring winches are available.

If a cored cable is not available:

- Self logging Flowmeter display unit, cables and magnets
- Self logging box bracket
- Self logging CTD

- Depth sensors for sampler frame and transducer/receiver for mounting on the vessel to obtain real-time sampler depth.

Bongo samplers can be used as alternative sampling devices and require all of the above equipment except a conical nosecone.

In shallow water i.e. <100m it is possible to collect low volume samples with vertically hauled ring nets. These require:

- Towing bridles
- 80µm, 270µm or 500µm mesh nets
- Flowmeter mounting bar and mechanical flowmeter
- End buckets and end bags.
- Lead weights

The resultant samples collected should be preserved in 4 % neutrally buffered formaldehyde in glass jars with sealable lids. A waterproof label should be placed inside the sample jar containing the collection details.

4 Procedure

When sampling in depths of up to 100 m, a ring net sampler can be used. In deeper water, it is necessary to use a high speed plankton sampler such as a Gulf VII or Bongo sampler. These should be capable of deployment down to at least 500m. Beyond this it maybe difficult to get these light gears to dive without the addition of significant extra weight. These samplers generally incorporate conductivity, temperature, and depth probes (CTD's), and either contain mechanical or electronic flowmeters to enable the volume of water filtered on each deployment to be calculated. These sensors either relay 'real time' environmental data back to a shipboard computer display, or log the information ready for downloading once the station has been completed. In either case it is imperative to have ‘real-time’ monitoring of the depth of the samplers to avoid collision with the sea bed.

A Gulf VII plankton sampler consists of an unencased frame 2.75 m in length X 0.76 m in diameter fitted with a conical fibreglass nose cone. Smaller, 0.53m diameter frames are also suitable but will filter less water per unit time. A conical filtering net (made from 270 micron aperture monofilament nylon mesh) and a cod end bag, made from impermeable woven polyester with a filtering section of 270 micron mesh are mounted within the sampler frame. Two flow meters are fitted: one mounted inside the aperture (internal) and one mounted on the sampler frame (external) to measure the volume of water filtered and monitor clogging on each deployment.

The sampling equipment should be constructed by trained and experienced personnel.

- It is recommended that a Gulf VII sampler should be towed at a ships speed of 4-5 knots. A bongo sampler should be towed between 3.5-4 knots. A depth integrated sample should be taken by deploying the Gulf VII or Bongo on a ‘v’ shape dive profile from the surface to within 2m of the sea-bed if bottom topography allows. In deeper water it is wise to allow for a greater margin of error.

- If a ring net is used then this is to be lowered vertically through the water column, as close to the seabed as possible, with the ship drifting.
- A ring net may need to be deployed several times to ensure that an adequate volume of water is sampled.
- The survey plan and Standard Operating Procedures will provide the required detail for the specific sampling required on each occasion.
- Attach a clean end bag and wash the net gently from a deck hose until the net is clean. Replace the end bag again, if necessary. Wash the contents of each end bag into the jug as described above.
- Empty the contents of the jug onto the sieve and wash the sieve contents with the 4 % buffered formaldehyde into the jar using the funnel. (Be careful not to damage the plankton during this process).
- Fill the jar with ample formaldehyde to approximately double the sample volume.
- Insert the completed sample label and screw on the jar lid tightly.

Do not overfill each jar with plankton. The un-preserved plankton should NEVER fill more than 50 % volume of the jar. Over-filling will lead to poor preservation and rotten samples. If a large volume of plankton has been collected, it may be necessary to preserve the sample in several jars. In this case make sure the jars are labelled 1 of X, 2 of X etc. and this is recorded in the sample log book and on the labels.

5 References

Law, R.J., Brant, J.L., Kirby, M.F., Lee, J. Morris, D. and Rees, J. 2014. Guidelines for the environmental monitoring and impact assessment associated with subsea oil releases and dispersant use in UK waters. Science Series Technical Report. Cefas, Lowestoft, 58 pp.

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