

METHOD STATEMENT

The sampling operation is performed from a suitable marine vessel. Historically the marine vessel “MV Stanes Moor” has been used but the vessel may not be available in 2018. It may be necessary to use the Shetland Island Council work vessel “MV Shearwater” or charter a private vessel.

The sampling team will include at least one representative from the contractor performing the chemistry analysis and one contractor performing the macrobenthic analysis. The marine vessel typically provides 2-3 crew members to captain the vessel and operate the sampling equipment.

The survey has historically been performed in May or June and during a neap tide. This ensures that long term trend analysis of the data is meaningful.

The procedure for the sampling work performed is based on ISO 5667-19 Water Quality – Sampling – Part 19: Guidance on sampling of marine sediments.

APPROACH TO GRAB SAMPLING

The Sullom Voe sampling technique utilises a standard Day grab sampler.

Five grabs are taken at all stations, of which at least three samples are processed and analysed.

If there is a noticeable variation between the contents of the 5 grabs the 3 most similar grabs will be used as the primary samples for analysis and the remaining 2 grabs should be processed and retained.

If there is no noticeable difference between the 5 grabs taken, the 3 primary grabs will be processed and stored in the appropriate container. The sampling team should endeavour to process and store the additional 2 grab samples, but this should be considered against available manpower and available survey time. The 2 additional grab samples should be retained in the plastic storage boxes until the 3 primary samples have been processed and are stored securely. If there is insufficient time/manpower available to process the additional 2 grab samples then they should be returned to the seabed.

DAY GRAB SAMPLING PROCEDURE

1. The station location is determined using the marine vessel GPS system. The vessel should endeavour to maintain this position during the sampling operation and record any deviations. A vessel anchor is not utilised.
2. All the key details for each station must be recorded in the field notebook during the sampling procedure.
3. The Day grab is released to obtain a sample and then returned to the vessel using a winch.
4. The Day grab is placed onto the grab frame and the winch isolated. The grab is inspected to check that the mechanism has been fully released and that it is safe to open the sampling flaps. The sampling flaps are opened and the surface of the grabs is assessed. The lead weights on the grab can be adjusted to manage the amount of sediment the grab yields. There should be surface water retained within the grab which indicates that the grab has closed fully and retained its contents. If there is no surface water then the grab jaws should be inspected and if not fully closed then the grab should be released into the plastic storage box but not processed.
5. The grab jaws are carefully opened a small amount to release any free surface water.
Note: A grab sample which yields >5L of sediment is acceptable. A grab sample which yields <5L of sediment is not acceptable.
6. A landscape photograph of the sample in each side of the grab should be taken with a survey ruler with the station reference, grab reference (A-E), date and time recorded on it.
7. Using a suitable spatula take a 100-200g sample from the top 2cm of the Day grab and place it in a 250ml glass screw top bottle. Care should be taken to avoid visible macrobenthic species and minimise the surface area disturbed. No more than a fifth of the surface area should be sampled. The bottle is cleaned dried and labelled. The sample is stored at <-18C until analysis.

8. If samples have high mud content the PSA/TOC sub-samples should be taken while the sediment is in the grab.
9. The grab contents will be emptied in to a plastic box beneath the grab. If possible, this should be done carefully by raising the grab arms equally so that the sediment profile is maintained. The sample should be quickly covered to protect them from contamination on deck.
10. A landscape photograph of the released sample should be taken with a survey ruler with the station number, grab reference (A-E), date and time recorded on it.
11. Using a trowel take sub-samples for the PSA (250g) and TOC (50g) analysis, this should be taken as a vertical core of the grab (approximately 20cm). Sub-samples from the 3 primary grabs are combined to form a composite which is thoroughly homogenised prior to analysis. The PSA sub-samples are combined in a 1L plastic tub (screw top lid and inner cap), a water proof label is inserted into the container before it is sealed. The TOC sub-samples are combined into a 250ml glass screw top bottle. The outside of the bottles are cleaned, dried and labelled. The sub-samples are stored at <-18C until analysis.

MACROBENTHIC SAMPLE PROCESSING PROCEDURE

12. The remaining sample in the plastic storage box is lifted on to the sieve table (OPRA) style and carefully emptied onto the 1mm metal sieve in manageable portions (approximately 1kg).
13. Gently work the sample through the sieve using the water (local fresh sea water) from the hose only. Working as a pair while sieving can speed up the process. Some of the Sullom Voe sediments contain significant amount of mud which can make the sieving process laborious. The sediment material which <1mm is allowed to be washed back into the sea.
14. Once the sample is sufficiently reduced in size and can comfortably fit within a 1L bucket, a trowel can be used to gently remove the remaining matter from the net to the bucket. Top the bucket up with some seawater from your hose so that all of the sediment is submerged by an inch or so.
15. The residue left can then be washed in to the edge of the sieve into a small pile. The sediment can be carefully washed in to the bucket.
16. The appropriate amount of formalin should now be added to the bucket and the lid attached. Once the lid is firmly on the bucket, agitate the sample gently so that the formalin is mixed in with all of the sediment.
17. Place all the samples in a secure storage space until on shore when they can be transferred to <-18C conditions or suitable location for the macrobenthic samples.
18. The Day grab sampler should be cleaned in sea water between in station and particular care should be taken when moving from stations which have high levels of hydrocarbon in the sediment to stations which have low levels of hydrocarbon in the sediments.