



## **Sediment Analysis**

### **‘Analysis to meet National Ocean Disposal Guidelines for Dredged Material (NODG).**

The ‘National Ocean Guidelines for Dredged Material (2002)’ is the primary guidance document in Australia for assessing the acceptability of disposing of dredged materials at sea. Procedures in these guidelines differ markedly from sampling and analysis protocols in the NEPM. In recent cases, regulatory authorities have rigorously applied protocols in the NODG.

There are several key points to be aware of when undertaking sediment projects to help avoid potential data quality non-conformances. In addition, both the NODG and overseas experts in this field recommend the use of highly experienced service providers for such projects.

#### **Potential Pitfalls –Sediment Sampling and Analysis:**

- Sampling aquatic sediments often requires specialist equipment and can be costly to undertake. Care should be taken to ensure the laboratory has sufficient sample volume to perform all required analyses, including grain size determinations, elutriate ‘leaching’ tests etc.
- Sediment samples are often collected from remote locations where logistics are difficult. Prior consideration (and finalisation) of logistics with your laboratory is very important given holding times and the often high mobilisation costs when re-sampling. The NODG (section 3.3.6) recommends that samples be stored in the dark and transported to the Laboratory within 72 hours (preferably within 24 hours) of collection.
- Given a common requirement for additional tests, freezing the samples (within 12 hours) of sampling may prove beneficial in extending the holding times. If this is required, it may help to half-fill the jar, place it in a plastic zip-seal bag and lay it on its side in the freezer to help reduce jar cracking. Your laboratory may also be able to assist and freeze a portion of the sample for you.
- Normalization of organic contaminant concentrations to 1% total organic carbon (TOC) is used to account for lower availability of contaminants to organisms due to binding to organic carbon. The TOC determination is also important as it must involve a high temperature CO<sub>2</sub> evolution (e.g. via ‘Leco’ furnace) type method. Note that the NEPM (105) method is not appropriate for marine or saline sediments as this method is subject to interferences from chloride.
- Elutriate testing is used to assess the amount of contaminants potentially released during dredging and disposal of sediment containing contaminants that exceed the NODG Screening Levels. Seawater from the proposed disposal site is required for these tests (refer to NODG Section 3.5.3) and in this case the seawater matrix ‘blank’ should be analysed by appropriate methodology e.g. saline water analysis for metals. This site water may also deteriorate over time and consideration should be given to meeting the NODG holding times for site water (14 days).
- Trace metals and organics in seawater can adsorb to sediment during the elutriate process. This can lead to the resulting elutriate water analyte levels being less than the site water ‘blank’. For this reason ALS does not subtract blank data (as recommended in NODG) as this may lead to the loss of valuable information.



- There are 19 PAHs listed in various NODG tables and these are not the standard suite of 16 PAHs routinely analysed by most laboratories. Care should be taken to ensure that all required PAHs are determined by the Laboratory
- Holding times. The NODG holding times for sediment *elutriate* analyses differ to that of conventional water samples tested by many laboratories. Some examples of holding times recommended by the NODG include Hg (14 days), TOC (48 hours), TKN (24 hours) and Total Phosphorous (7days).

**Table 1 – Commonly Requested Analyses on Marine Sediment.**

Parameters	ALS Method Code	NODG PQLs*	ALS LOR
TOC	EP005	0.1%	0.02%
BTEX	EP080-UT	200µg/kg	200µg/kg
Organochlorine Pesticides	EP131A	1µg/kg	0.5µg/kg
Total PCBs	EP131B	5µg/kg	5µg/kg
PAHs – Individual species	EP132-SD	5µg/kg	4-5µg/kg
Sum of PAHs <sup>(1)</sup>	EP132-SD	100µg/kg	90µg/kg <sup>(2)</sup>
Organophosphate pesticides	EP130A	10-100µg/kg	10µg/kg
Dioxins	EP300	0.02µg/kg	0.005-0.01 µg/kg <sup>(3)</sup>
Organotin compounds (TBT)	EP090	1µgSn/kg	0.5µgSn/kg
Mercury	EG035-Low	0.01mg/kg	0.01mg/kg
Trace Metals: Ag, Cd, Se	EG020T	0.1mg/kg	0.1mg/kg
Co, Sb		0.5mg/kg	0.5mg/kg
Cu, Pb, Zn, Cr, Ni, As,		1mg/kg	1mg/kg
V, Mn		2 -10mg/kg	2-10mg/kg
Other metals: Al, Fe	EG005T	100-200mg/kg	50mg/kg

\*Reference: Table 3 NODG 2002 Page 42 – ‘Substances for which Testing may be Required’. Corresponding Practical Quantitation Limits are also included in this table.

### Notes

<sup>(1)</sup> The sum of PAHs equals the total of all PAHs analysed and detected at or above the individual PAH analyte LOR.

<sup>(2)</sup> The LOR for total PAHs is recorded as the lowest individual PAH LOR (4 µg/kg) to allow positive PAHs to be reported in the ‘total’. The total quoted above is the sum of the LORs for all PAHs analysed.

<sup>(3)</sup> Dioxin results in sediment are reported in pg/g (1pg/g = 0.001 ug/kg).

**Table 2 –Total Trace Metals Elutriate Analyses on Marine Sediment.**

Parameters	ALS Method Code	ALS LOR in Seawater Elutriate
Mercury (total)	EG035T	0.1ug/L
Ag, Be, Bi, Mo, Th, Tl, U	EG093T	0.1ug/L
Cd, Co, Pb		0.2ug/L
As, Cr, Mn, Ni, Sb, V, Ba, Cu, Li		0.5-1ug/L
Se, Sn, Zn, Fe		2 - 5ug/L 5ug/L
Elutriate preparation	EN68	N/A

### ALS Recommendations

Project specific quotations are strongly recommended for sediment work. These quotations will clearly specify LORs, suites, sample containers and sample volumes and will provide detail on delivery logistics. Prior warning will also allow for the appointment of an ALS internal project manager.

For further details contact ALS Sydney or your Local ALS Laboratory.

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