



### Analytical Methods

- **Polynuclear Aromatic Hydrocarbons (PAH).** Since most of the toxicity in oil is due to the PAHs, it is the preferred analysis for assessing ingestion risk. The analytes must include the alkyl-substituted PAH homologs, in addition to the standard PAH “priority pollutants”. This method is referred to as Modified EPA Method 8270, because the list of PAHs is expanded to include the alkylated homologs, using GC/MS in the selected ion monitoring mode. Detection levels should be 1 ppb for individual PAHs to support injury assessment using toxicity thresholds. PAHs are also used for fingerprint analysis and differentiating between the spilled material and background contamination.
- **Lipid Content.** Lipid content is defined as the percent of sample tissue extracted and remaining after solvent evaporation using dichloromethane. It is used to normalize organic contaminants in tissues, to aid in spatial and temporal comparisons among samples.
- **Water Content.** Most results are reported as dry weight, to reduce sample variability.

### Other Considerations

- Temperature can have a very large impact on shellfish physiology. Some animals stop feeding or even passing water over their gills at low or high temperatures. Be aware of these differences when selecting species for monitoring and comparing results among species.
- Uptake and depuration rates vary widely among species. Depuration usually takes weeks; thus shellfish sampling should be initiated within 1-2 weeks after maximum exposure.
- For mapping exposure, it is best to sample species with wide distribution in the study area. For ingestion risk assessment, target key food species.
- Avoid sources of contamination such as exhaust fumes and engine cooling systems on vessels. Work up-wind of any exhausts. Segregate dirty/clean areas. Lay out clean substrates to work on and replace frequently.
- Collect background samples from clean sites representative of pre-oiling conditions, as well as areas not yet oiled but in the potential path of the oil. These data will provide the best evidence of changes in contamination due to exposure to the spilled material.
- NOAA National Status and Trends, EPA EMAP, or state Mussel Watch programs may have background data for contaminants in shellfish and sampling protocols.
- Use a physical or mental model of the extent of water and sediment contamination to determine the number and location of samples. Minimum guidelines are at least three samples per area of relatively uniform exposure or distinct waterbody. Also, sample along exposure gradients at regular intervals proportionate to the exposure area so that at least six stations are sampled.

### Key References

- NOAA, 1993. Sampling and analytical methods of the National Status and Trends Program, National Benthic Surveillance and Mussel Water Projects, 1984-1992. Volumes I-IV, Comprehensive descriptions of trace organic analytical methods. Lauenstein, G.G. and A.Y. Cantillo (eds.). NOAA Tech. Memo NOS ORCA 71, Silver Spring, MD.
- Sauer, T.C. and P.D. Boehm, 1995. Hydrocarbon chemistry for analytical methods for oil spill assessments. Marine Spill Response Corporation Technical Report Series 95-032, Washington, D.C. 114 pp.
- USEPA, 1979. Methods for chemical analysis of water and wastes. EPA-600/4-79/020. USEPA Environmental Monitoring Systems Laboratory, Office of Research and Development, Cincinnati, Ohio.
- USEPA, 1986. Test methods for evaluating solid waste. SW 846 Third Edition (and updates).