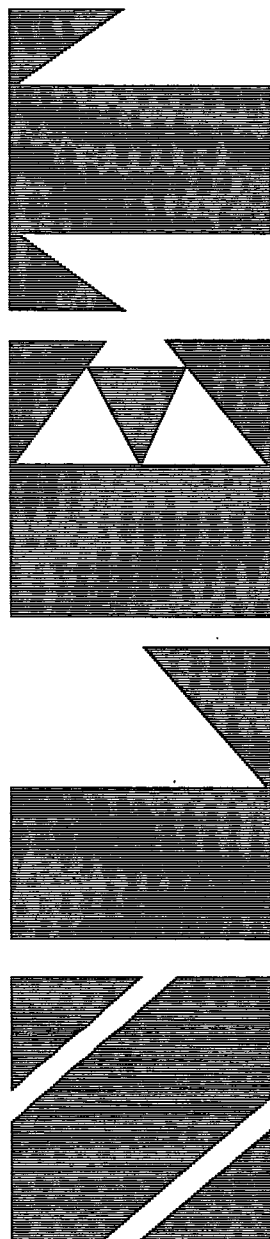


1998-99 SAMPLE COLLECTION SUMMARY



The National Laboratory for Environmental Testing

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No. 98-
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Sample Collection Summary

Background Information

The National Laboratory for Environmental Testing (NLET) receives numerous requests for analytical services each year. Although these requests vary in nature and complexity, they generally are made in reference to the determination of environmental constituents found in water, sediment and biota. To ensure the integrity of samples and to apply the appropriate analytical procedures, good laboratory practices must be adhered to; preferably from the time of collection until the data has been returned to the client. The purpose of this document is to provide information to clients with regards to sending samples to the laboratory for analysis. The topics covered include a summary of the appropriate preservation, container type and container preparation for samples. Following the procedures outlined in this document should ensure that sources of contamination and degradation are minimized before sample arrival at the laboratory.

Scope

This document summarizes the requirements for samples being submitted to NLET for standard methods of analysis where appropriate national standards must be met. The requirements for samples submitted in support of research and development activities or project specific requests may be different and may not adhere to the same rigorous system of control.

Purpose

The purpose of this document is to inform clients of the requirements for samples submitted to NLET.

Sample Collection Summary

NLET REQUIREMENTS

Samples and Sample Submission Forms

Sample requests must be made on either the ENVIRODAT/MISCELLANEOUS (02/95) or STAR Sample Submission Forms depending on the database destination for reported results. Instructions for completing the forms are included on the back of each form. If you require more information, contact the client liaison office at (905) 336-6261.

Sample Submission Forms must accompany all samples sent to NLET for analysis. If there is more than one shipping container with samples to be submitted, enclose copies of the submission form in all containers.

It is the responsibility of the project leader to ensure that field personnel collect the required quantity of sample in the correct container for the analyses requested.

Each sample submitted for analysis must be labeled with the following information:

- ◆ client/field sample number
- ◆ project number
- ◆ preservatives added
- ◆ analysis required (e.g. schema name or number assigned to the project)

Note: A client sample number is now mandatory for ENVIRODAT samples.

Samples are assigned a unique NLET sample number at the laboratory. All pertinent sample information is entered in ECOLIMS under the NLET sample number. Final reports will specify both the client sample number and the NLET sample number as a cross reference.

Sample Homogenization Services

Sediment samples must be submitted freeze-dried, unless specifically requested otherwise in Table II for inorganics and Table IV for organics. This service can be provided for a fee through the Sedimentology Laboratory at NWRI. Contact John Dalton at (905) 336-4878 for more information.

Sample Collection Summary

Fish or other biota samples must be homogenized before submitted for analysis. DFO (Burlington) is equipped to provide this service to clients at a charge. Contact Mike Whittle at (905) 336-4565 for details.

Container Types

The recommended container type for each analysis is shown in Tables I - IV.

Polypropylene containers may be used in place of polyethylene containers but are not recommended as they tend to become brittle and crack with age.

For metal analyses, no part of the container should be metal. Corrosion may occur which could taint the sample.

Do not submit samples in plastic containers for organic analyses. Plastics are organic compounds and can contaminate the sample.

If both organic and metal analyses are required for a fish or sediment sample use a glass or, preferably, a Teflon® type container. It is recommended that samples be subdivided for organic and metal analysis into two containers; a metal or Teflon® type container for organic analysis and a polyethylene or Teflon® type container for metal analysis.

Although glass containers can be used for wet substrates, there have been problems associated with substrates that have a high moisture content (e.g. on standing, the substrate has distinct solid and liquid phases). Expansion of the liquid phase on freezing often results in breakage with a corresponding loss of sample on thawing. It is helpful to leave at least one-half inch headspace but the degree of lateral expansion depends on the moisture content of the sample and breakage may still occur. The laboratory has encountered a 25% breakage rate for wet sediment samples submitted in glass containers. In these cases, analysis cannot proceed since a number of problems result which are related to: 1. Sample recovery; 2. The hazard posed by broken glass to the analyst; and 3. The potential for contamination. Most fish tissues generally have lower moisture content but the risk associated with any wet substrate submitted in glass containers remains.

Sample Collection Summary

Amounts Required for Analysis

Tables I - IV specify a "required amount for analysis" per sample submitted. This amount must be submitted to ensure that analytical requests can be met. All preservatives should be added as part of the sample collection process and before samples are submitted to the laboratory to maintain a sample that is representative of the testing environment. Accepted sampling practices must be followed for the collection of samples.

Because varying degrees of moisture content are possible in wet sediment and biota, it is difficult to specify a guideline. Submitters must use their judgement in submitting the amount of sample which will be necessary for the requested analysis.

If the required amount of sample is not available and a series of analyses is requested, a priority list of analyses should be made for the samples. List the order of priority prominently on the Sample Submission Forms.

Sample Transportation

Samples should be stored and transported in the condition specified in Tables I - IV. Ensure that the samples are properly packaged to remain intact during transportation so that analysis can proceed. Pre-arranged transportation will assist in keeping shipping time to a minimum, particularly for samples where degradation can occur quickly.

Specific Analytical Requirements

Nutrients

Total Phosphorus and Total Kjeldahl Nitrogen

Due to the automation of the method for Total Phosphorus (TP) and Total Kjeldahl Nitrogen (TKN), the size and shape of the glass bottles and caps to be used are specific. One type of glass bottle that meets these specifications for the automated system for Total Phosphorus is available from Canlab*.

Bottle Cat. No. B7786-120 (Flint glass wide-mouth, 125 ml)

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Caps Cat. No. 232-755 RC (for the above bottle)(specify linerless caps)

Bottles from other sources may also be suitable. If you think that you have found an equivalent, please call Bert Francoeur at (905) 336-4557 of the Nutrients Section at NLET before ordering a large quantity to ensure that the specifications are met.

For the TKN method, the bottle caps used for the Flint Winchester sample bottle should be white polyethylene. The black polyethylene bottle caps are brittle and often break on the automated system.

*This does not imply endorsement.

Miscellaneous

Particulate Organic Carbon and Nitrogen

Due to instrument limitations, samples for CHN analysis must be filtered on 2.5 cm GF/C filter papers or on 4.25 cm GF/C filter papers using a glass funnel with a rectangular base opening of 1x3 cm. The latter is custom-made. The volume of sample filtered must be included on the Sample Submission Forms to permit calculations for final results. Refer to the methodology for guidelines approximating the amount that should be filtered based on anticipated concentration levels of suspended matter.

Metals

Total Metals

Samples to be submitted for total metal analysis must not contain more than 1 mm of settled solids. It is recommended that samples with high suspended solids be filtered in the field and the filtered and solid fractions submitted separately for analysis.

QC Data

In the Trace Metals Laboratory, the QC data is available upon request in the ECOLIMS current format and must be arranged when the project is defined. A fee is attached to QC data requests from previous years.

Sample Collection Summary

Container Washing

Containers to be reused in the collection of samples should be washed using procedures that are equivalent to those proposed by NLET. A summary of the container washing procedures can be found on pages 7-9. These procedures are not adequate if clients are interested in ultra-trace levels. In this case, it is best to purchase new unused containers to avoid the possibility of sample contamination from reused containers.

Sample Stewardship

The laboratory assumes stewardship of the sample for the period that the sample is in use for analysis and ensures that the sample is held at prescribed conditions. Normally the samples are discarded shortly after the results are reported. If there is a need for sample retention (e.g. archiving) it is recommended that a sub-sample be submitted and the remaining sample retained by the client as space at NLET to accommodate long term storage is limited. If a client wishes to have the samples returned once analyses are completed, arrangements must be made in writing at the start of the project. The laboratory cannot accept responsibility for the loss of samples, regardless of written agreements.

Sample Collection Summary

Container Washing Procedures

Method 1 *Major Ions (Water)*

- Add 50 mL of 10% HCL per 1 litre bottle
- Fill the bottle to the rim with distilled deionized water (DDW)
- Cap and soak for at least three days
- Rinse 3-4 times with DDW

Method 2 *Total Phosphorus (Water)*

- Add 5 mL of 10% H₂SO₄ per 100 mL bottle
- Fill the bottle to the rim with DDW
- Cap and soak for at least three days
- Rinse 3-4 times with DDW

Method 3 *Nutrients (Water)*

- Add 5 mL of 10% H₂SO₄ per 100 mL bottle
- Fill the bottle to the rim with DDW
- Cap and soak for at least three days
- Rinse 3-4 times with DDW

Method 4 *Trace Metals (Water, Sediment*)*

- Add 50 mL of 10% HNO₃ per 1 litre bottle
- Fill the bottle to the rim with DDW
- Cap and soak for at least three days
- Rinse 3-4 times with DDW

* Residual sediment sample is first discarded.

(Containers with debris are rinsed with high pressure hot water before following the procedures above.)

Sample Collection Summary

Method 5 *Organics (Water)*

- Wash with high pressure hot water
- Scrub with a phosphate free liquid soap and water
- Rinse with high pressure hot water
- Rinse three times with DDW
- Rinse two times with reagent grade acetone
- Rinse two times with reagent grade petroleum ether
- Evaporate solvents in fume hood or in an oven at 125°C
- Rinse Aluminum foil (or Teflon® lining) twice with acetone and twice with petroleum ether and let dry in the fume hood
- Wash bottle caps with soap and hot water and rinse with DDW
- Cut Aluminum foil (or Teflon® lining) into size with acetone washed scissors
- Use cleaned Aluminum foil (or Teflon® lining) between cap and bottle

Method 6 *4-Litre Solvent Bottle (Water)*

- Affix a blank tape over the existing label
- Rinse the bottle twice with reagent grade acetone
- Rinse the bottle twice with reagent grade petroleum ether
- Let dry in the fumehood
- Use cleaned Aluminum foil (or Teflon®) between cap and bottle

Method 7 *Volatiles (Water)*

- Wash with high pressure hot water
- Scrub with a phosphate free liquid soap and water
- Rinse with high pressure hot water
- Rinse three times with DDW
- Rinse twice with reagent grade acetone
- Rinse twice with reagent grade petroleum ether
- Evaporate solvents in oven at 125°C
- Wash Teflon® septum with soapy water
- Rinse thoroughly with hot water
- Rinse four to five times with DDW
- Replace cleaned septum after each use
- Ensure that the Teflon® side of the septum is face down

Sample Collection Summary

Method 8 *Magnetic Stirrers (Water)*

- Wash with a phosphate free liquid soap and hot water
- Rinse with DDW
- Rinse twice with reagent grade acetone
- Rinse twice with reagent grade petroleum ether
- Place in proper bottle (before shipping)

Method 9 *Organic Constituents (Sediment*)*

- Wash with high pressure hot water
- Scrub with a phosphate free liquid soap and water
- Rinse with high pressure hot water
- Rinse three times with DDW
- Rinse two times with reagent grade acetone
- Rinse two times with reagent grade petroleum ether
- Evaporate solvents in fume hood or in an oven at 125°C
- Rinse Aluminum foil (or Teflon® lining) twice with acetone and twice with petroleum ether and let dry in the fume hood
- Wash bottle caps with soap and hot water and rinse with DDW
- Cut Aluminum foil (or Teflon® lining) into size with acetone washed scissors
- Use cleaned Aluminum foil (or Teflon® lining) between cap and bottle

* Residual sediment sample is first discarded.

TABLE I - INORGANIC ANALYSES OF WATER

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
1. Major Ions					
Acidity	Polyethylene 500 mL Cylinder	100 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	8 weeks ² 7 days ⁷	Method 1
Alkalinity					
Calcium	Polyethylene 500 mL Cylinder	50 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	8 weeks ² 7 days ⁷	Method 1
Magnesium					
Chloride	Polyethylene 500 mL Cylinder	50 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	8 weeks ² 7 days ⁷	Method 1
Silica					
Sulphate					
Fluoride	Polyethylene 500 mL Cylinder	50 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	8 weeks ² 7 days ⁷	Method 1
Potassium	Polyethylene 500 mL Cylinder	50 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	8 weeks ² 7 days ⁷	Method 1
Sodium					
2. Physicals					
pH	Polyethylene 500 mL Cylinder	50 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	1 week ² 24 hours ⁷	Method 1
Conductivity	Polyethylene 500 mL Cylinder	50 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	8 weeks ² 7 days ⁷	Method 1
Colour	Polyethylene 500 mL Cylinder	100 mL	4°C - 6°C, Darkness ²	48 hours ²	Method 1
Turbidity	Polyethylene 500 mL Cylinder	100 mL	4°C - 6°C, Darkness ² or Room Temperature ⁷	7 days ² 24 hours ⁷	Method 1

TABLE I - INORGANIC ANALYSES OF WATER

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
3. Misc.					
Residue	Polyethylene 1000 mL	1000 mL	4°C - 6°C, Darkness ³ or Room Temperature ⁷	7 days ³ 24 hours ⁷	Method 1
Particulate Organic Carbon and Nitrogen	Plastic petri dish, filter on 2.5 cm GF/C filter paper or 4.25 cm GF/C filter paper with a rectangular sample area of 1x3 cm.	See Method for guidelines regarding volume to be filtered.	4°C - 6°C, Darkness ³	6 months ³	NA
Chlorophyll A	Plastic petri dish, filter on 4.25 cm GF/C filter paper.	1000 mL to be filtered.	1% (w/v) MgCO ₃ , Freeze, -20°C Darkness ³	7 days ³	NA
4. Nutrients					
Ammonia	Glass 100 mL, Round Flint Winchester	25 mL	4°C - 6°C ³	24 hours ³	Method 3
Nitrate-Nitrite					
Total Kjeldahl Nitrogen	Glass 100 mL, Round Flint Winchester	50 mL	4°C - 6°C ³	24 hours ³	Method 3
Total Nitrogen	Glass 100 mL, Round Flint Winchester	50 mL	4°C - 6°C ³	24 hours ³	Method 3
Soluble Reactive Phosphorus	Glass 100 mL, Round Flint Winchester	25 mL	4°C - 6°C ³	24 hours ³	Method 3
Dissolved Inorganic and Organic Carbon	Glass 100 mL, Round Flint Winchester	25 mL	4°C - 6°C ³	24 hours ³	Method 3

TABLE I - INORGANIC ANALYSES OF WATER

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
Phosphorus (Total)	Glass 125 mL, Flint ①	25 mL	4°C - 6°C at pH <2 using H ₂ SO ₄ ⊗	1 year ⊗	Method 2
5. Metals					
Total Metals/ Dissolved Metal (Inductively Coupled Plasma)	Polyethylene or Teflon®	500 mL	Room Temperature at pH <2 using HNO ₃ ⁴	6 months ⁴	Method 4
Extractable Metals (Inductively Coupled Plasma)	Polyethylene or Teflon®	100-125 mL	Room Temperature at pH <2 using HNO ₃ ⁴	6 months ⁴	Method 4
Direct Aspiration (Atomic Absorption)	Polyethylene or Teflon®	100 mL	Room Temperature at pH <2 using HNO ₃ ⁴	6 months ⁴	Method 4
Dissolved Metals (ICP/MS)	** BEFORE SAMPLING CONTACT THE TRACE METAL LABORATORY CHEMIST AT (905) 336-4640 FOR METHOD LIMITATIONS AND SPECIAL INSTRUCTIONS.				
Extractable Metals (ICP/MS)	** BEFORE SAMPLING CONTACT THE TRACE METAL LABORATORY CHEMIST AT (905) 336-4640 FOR METHOD LIMITATIONS AND SPECIAL INSTRUCTIONS.				
Mercury	Glass (Sovirel/ Wheaton) or Teflon®	100 mL	Room Temperature at pH <2 (1 mL Conc. H ₂ SO ₄ and 1 mL 5% K ₂ CrO ₇ per 100 mL) ³	28 days ³	Method 2
Arsenic Selenium (Antimony)	Polyethylene or Teflon®	250 mL (an additional 250 mL for Sb)	4°C - 6°C ³	6 months ³	Method 4

Footnotes:

- ① Use 125 mL flint glass wide mouth bottles, Catalogue No. B7786-120, with linerless caps, Catalogue No. 232-755RC, available from Canlab.

- Helpful Hints:**
- (i) One 500 mL container can be submitted for analysis of more than one major ion parameter with similar container type and preservation condition requirements.
 - (ii) One 100 mL container can be submitted for analysis of more than one nutrient parameter with similar container type and preservation condition requirements.
 - (iii) Two separate containers must be submitted for analysis of total and dissolved metals using the ICP.
 - (iv) One container may be used to submit samples for total and extractable metals using the ICP.

* Elapsed time between sample collection and either sample preparation or analyses, as specified. ¹

※ Published reference not available.

TABLE II - INORGANIC ANALYSES OF SEDIMENT AND BIOTA

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
1. Metals					
Total Metals in Sediment	Polyethylene, Teflon® or Glass jar (125 mL for wet)	3 g Freeze Dried or 10 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	6 months ³	Method 4
Total Metals in Fish	Polyethylene, Teflon® or Glass jar (125 mL for wet)	1 g Freeze Dried or 15 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	6 months [⊗]	Method 4
Extractable Metals in Sediment	Polyethylene or Glass jar (125 mL for wet)	10 g Freeze Dried or 30 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	6 months ³	Method 4
Arsenic Selenium	Polyethylene bag or jar, Teflon® (125 mL for wet)	Sediment: 2 g Freeze Dried or 5 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	6 months [⊗]	Method 4
		Fish: 0.5 g Freeze Dried or 5 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	6 months [⊗]	Method 4

TABLE II - INORGANIC ANALYSES OF SEDIMENT AND BIOTA

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
Mercury	Polyethylene (125 mL for wet)	Sediment: 15 g Wet or 3 g Freeze Dried. Homogeneous sample.	Freeze, -20°C (wet) or Room Temperature (freeze dried)	6 months ³	Method 4
		Fish: 3 g Wet or 0.5 g Freeze Dried. Homogeneous sample.	Freeze, -20°C (wet) or Room Temperature (freeze dried)	6 months ³	Method 4
2. Misc.					
Phosphorus in Sediment	Polyethylene bag or jar, Teflon®	3 g Freeze Dried or 10 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	NA ⁵	NA
Total Organic and Inorganic Carbon and Total Nitrogen	Polyethylene or Teflon® jar	Sediment: 0.5 - 1 g Freeze Dried. Homogeneous sample.	Room Temperature (freeze dried)	6 months ²	NA

- Helpful Hints:**
- (i) Leave room for expansion of frozen samples submitted in glass containers.
 - (ii) Sediment, biota and fish samples should be **FREEZE DRIED ONLY** (not heat dried).
 - (iii) Keep wet samples frozen at -20° C unless stated otherwise.
 - (iv) Teflon® containers are strongly recommended, for samples submitted frozen, to prevent container breakage, especially during thawing.
 - (v) Fish, biota and sediment samples must be homogenized before being submitted for analysis.

* Elapsed time between sample collection and either sample preparation or analyses, as specified. ¹

⊗ Published reference not available.

TABLE III - ORGANIC ANALYSES OF WATER

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
1. Organics					
Organo-chlorine Pesticides, Chlorobenzenes and PCBs	Amber Glass, aluminum foil-lined or Teflon® lined cap	1000 mL	4°C - 6°C ⁵	Extraction: 7 days; Analysis: 40 days after extraction ⁵	Method 5
Organo-phosphorous Pesticides	Amber Glass, aluminum foil-lined or Teflon® lined cap	1000 mL	4°C - 6°C at pH 4 (1 mL 50% H ₂ SO ₄) or 100 mL DCM ⁸	Extraction: 7 days; Analysis: 40 days after extraction ⁵	Method 5
Chlorophenols	Amber Glass, aluminum foil-lined or Teflon® lined cap	1000 mL	4°C - 6°C at pH 2 (1-2 mL 50% H ₂ SO ₄) ⁴	28 days ⁴	Method 5
Acid Herbicides	Amber Glass, aluminum foil-lined or Teflon® lined cap	1000 mL	4°C - 6°C at pH <2 (2-4 mL 50% H ₂ SO ₄) ³	Extraction: 7 days; Analysis: 40 days after extraction ⁵	Method 5
Polynuclear Aromatic Hydrocarbons (includes empore disk extraction)	Amber Glass, aluminum foil-lined or Teflon® lined cap	1000 mL	4°C - 6°C at pH 5 - 9 ⁵	Extraction: 7 days; Analysis: 40 days after extraction ⁵	Method 5
Neutral Herbicides	Amber Glass, aluminum foil-lined or Teflon® lined cap	1000 mL	4°C - 6°C ⁵	Extraction: 7 days; Analysis: 40 days after extraction ⁵	Method 5

TABLE III - ORGANIC ANALYSES OF WATER

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
Immunoassay	NLET will supply field sampling kit	Greater than 1.0 mL	4°C - 6°C, Darkness ⁶	7 days [⊗]	NA

* Elapsed time between sample collection and either sample preparation or analyses, as specified.¹

⊗ Published reference not available.

TABLE IV- ORGANIC ANALYSES OF SEDIMENT AND BIOTA

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
1. Organics					
Chlorophenols	Amber glass jar, aluminum foil-lined or Teflon® cap	Sediment: 25 g Freeze Dried or 75 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet); Dark; pH 2 *	NA ⁵	Method 9
Neutral Herbicides	Amber glass jar or metal container, aluminum foil-lined or Teflon® cap	Sediment: 10 g Freeze Dried or 20 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	NA ⁵	Method 9
		Biota: 10 g (15 g to include lipids). Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	NA ⁵	Method 9
Organo-chlorine Pesticides, Chlorobenzenes, PCBs and Polynuclear Aromatic Hydrocarbons	Amber glass jar or metal container, aluminum foil-lined or Teflon® cap	Sediment: 10 g Freeze Dried or 20 g Wet. Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	NA ⁵	Method 9
		Biota: 10 g (15 g to include lipids). Homogeneous sample.	Room Temperature (freeze dried) or Freeze, -20°C (wet)	NA ⁵	Method 9

TABLE IV- ORGANIC ANALYSES OF SEDIMENT AND BIOTA

Parameter or Parameter Grouping	Recommended Container Type	Required Amount for Analysis	Preservation Condition	Holding Time *	Container Washing Technique
Organo-phosphorous Pesticides	Amber glass jar or metal container, aluminum foil-lined or Teflon® cap	Sediment: 20 g Wet. Homogeneous sample.	Freeze, -20°C	NA ⁵	Method 9
		Biota: 10 g Wet. Homogeneous sample.	Freeze, -20°C	NA ⁵	Method 9

- Helpful Hints:**
- (i) Leave room for expansion of frozen samples submitted in glass containers.
 - (ii) Sediment, biota and fish samples should be **FREEZE DRIED ONLY** (not heat dried).
 - (iii) Keep wet samples frozen at -20° C unless stated otherwise.
 - (iv) Teflon® containers are strongly recommended, for samples submitted frozen, to prevent container breakage, especially during thawing.
 - (v) Fish, biota and sediment samples must be homogenized before being submitted for analysis.

* Elapsed time between sample collection and either sample preparation or analyses, as specified. ¹
 x Published reference not available.

TABLE V - METHOD TABLE FOR WATER

Parameter	Method Used
Acid Herbicides	GC/ECD
Acidity	Electrometric Titration
Alkalinity	1. Electrometric Titration 2. Conductometric Titration
Ammonia	Automated Colorimetric - Indophenol / Traacs 800
Antimony	Flameless Hydride Generation, ICP
Arsenic	Flameless Hydride Generation, ICP
Calcium	ICP
Chloride	1. Automated Colorimetric - Ferric Thiocyanate 2. Ion Chromatographic
Chlorophenols	GC/MSD
Chlorophyll	Spectrophotometric
Colour	Spectrophotometric
Conductance	Wheatstone Bridge, Conductance Cell
Dissolved Inorganic and Organic Carbon	IR Detection and UV Digestion
Dissolved Metals	1. ICP 2. ICP/MS

TABLE V - METHOD TABLE FOR WATER

Parameter	Method Used
Extractable Metals	1. ICP 2. ICP/MS
Fluoride	Automated Selective Ion Electrode
Hardness	Calculated
Magnesium	ICP
Mercury	Cold Vapour Atomic Absorption
Neutral Herbicides	GC/ECD and GC/NPD
Nitrate	Ion Chromatographic
Organochlorine Pesticides, Chlorobenzenes and PCBs	GC/ECD
Nitrate-Nitrite	Automated Cadmium Reduction / Traacs 800
Organophosphorous Pesticides	GC/ECD and GC/NPD
Particulate Organic Carbon and Nitrogen	CHN Analyzer
pH	Electrometric, Isfet Probe
Polynuclear Aromatic Hydrocarbons	GC/MSD
Potassium	ICP

TABLE V - METHOD TABLE FOR WATER

Parameter	Method Used
Residue	Gravimetric
Selenium	Flameless Hydride Generation, ICP
Silica	Automated Colorimetric - Heteropoly Blue
Silver	ICP
Sodium	ICP
Soluble Reactive Phosphorus	Colorimetric - Ammonium Molybdate - Stannous Chloride
Sulphate	1. Automated Colorimetric - Methylthymol Blue 2. Ion Chromatographic
Total Kjeldahl Nitrogen	Colorimetric - Indophenol / Block Digestion
Total Metals	ICP
Total Phosphorus	Colorimetric - Stannous Chloride / Autoclave Digestion
Turbidity	Turbidimetric

TABLE VI - METHOD TABLE FOR SEDIMENT AND FISH

Parameter	Method Used
Arsenic	Flameless Hydride Generation, ICP
Chlorophenols	GC/MSD
Extractable Metals in Sediment	Atomic Absorption
Mercury	Cold Vapour Atomic Absorption
Neutral Herbicides	GC/ECD and GC/NPD
Organochlorine Pesticides, Chlorobenzenes and PCBs	GC/ECD
Organophosphorous Pesticides	GC/ECD and GC/NPD
Particulate Carbon and Nitrogen	CHN Analyzer
Phosphorus in Sediment	Atomic Absorption
Selenium	Flameless Hydride Generation, ICP
Total Metals in Fish	Wet Digestion / Atomic Absorption
Total Metals in Sediment	Wet Digestion / Atomic Absorption

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