SAMPLE COLLECTION , FIELD-TESTING PROCEDURES & REFERENCE GUIDES

PIONEERS

ENVIRONMENTAL LAB.

SAMPLE COLLECTION AND FIELD-TESTING PROCEDURES

Samples Should Only Be Collected By Personnel Who Have Proper Training And Adequate Experience.

1. Field Observations

During every sampling event, observations of field conditions that could assist in the interpretation of monitoring data are to be recorded. This can provide useful information about the water being sampled, which can help diagnose the source and potential impact of pollutants found by chemical analysis. Examples of such field conditions are as follows:

- Rain can wash potential pollutants from surrounding land in to waterways
- Winds may drive some constituents toward one side of the water body or create mixing which might help dissipate them more quickly
- shading from cloud and vegetation can influence the level of dissolved oxygen.

Any abnormalities that may indicate pollution or affect water quality, such as absence of flow, presence of surface scum, water colour or odours, excessive algal or plant growth, dead fish or invertebrates should also be noted.

2. Field Measurements

Analytes that quickly degrade after they are sampled must be tested in the field. Field testing may also be used for other samples that can be reliably and cheaply measured in the field. Where possible, field measurements should be undertaken in situ. EPA recommends the following analytes be measured in the field as concentrations of these analytes can be significantly changed during transport and storage:

- Chlorine.
- Conductivity.
- Dissolvedoxygen(DO).
- pH.
- Redox(reduction/oxidationpotential).
- Temperature.
- Turbidity.

Many of these analytes can be reliably measured using multi-parameter meters—usually with an electrode for each analyte .

3. Labeling And Identification

Samples need to be labeled so they can be readily identified at all times. Sample containers should be marked in such a way that they can be clearly identified and distinguished from other samples in the laboratory. Without appropriate labeling, all samples may look alike. Labels will need to be durable. Most samples will be preserved in ice so labels which will not come off when we need to be used and the ink used will need to be insoluble in water. It is important to take care when packing samples, as samples are often subject to vibration during transport causing identification to rub off or become illegible. It should be noted that xylene in permanent markers can contaminate samples intended for organic analysis. Biro or pencil should be used for organic samples. Labeling on samples should contain as much information as practical. Sample labels must specify a clear and unique identifying code that can be cross-referenced to the monitoring location and time of sampling (eg via sampling record sheet).

Labels May Also Contain:

- Date Of Sampling.
- Time Of Sampling.
- Location And Name Of Sampling Site (Include GPS Coordinates If Available).
- Job Or Project Number.
- Name of Sampler.
- Container Pre-Treatment And Preservations Added.
- Other Observations That May Affect The Method Or Results Of The Analysis.

The information above should be recorded on the Field Record Sheet and retained as a permanent record. Hazardous or potentially hazardous samples (such as solvents) should be clearly marked as such. Similarly, any samples that could reasonably be expected to have particularly high concentrations of a particular analyte should be brought to the attention of the laboratory, as this may affect the analytical technique.

4. Preservation Techniques

Preservation techniques are vital to minimize changes to the sample following sampling. Changes that may occur if poor or incorrect preservation occurs are summarized in Section 2.2. Required preservation techniques for specific analytes are detailed in Appendix 2. Some common preservatives are described below.

Refrigeration: Keeping samples between 1°C and 4°C will preserve the majority of physical, chemical and biological characteristics in the short term (< 24 hours) and as such is recommended for all samples between collection and delivery to the laboratory. It is recommended that microbiological samples be refrigerated between 2°C and 10°C (as per AS/NZS 2031:2001). Ice can be used to rapidly cool samples to 4°C before transport. Ice bricks are preferred over loose ice or dry ice.

Freezing: In general, freezing at<–20°C will prolong the storage period. However, the freezing process significantly alters some nutrients and biological analytes such as chlorophyll, and the laboratory should be consulted before samples are frozen. Filtering samples in the field before freezing may be required. This is usually done for soluble nutrients, particularly when same day delivery to the laboratory is not possible.

Chemical addition: The appropriate chemical preservative and dose rate can vary between analytes and according to container size. The analytical laboratory should always be consulted to establish which chemical preservative is appropriate for the analytical technique employed by that laboratory. Preservatives include acidic and basic solutions, and biocides. It is important these are used in the form of concentrated solutions so that the volume of preservatives required is minimized. This will minimize the dilution effect the preservative has on the sample. Chemical additives are normally added by the laboratory and supplied pre prepared. When sampling with pre-prepared additives, it is important that the bottle is not flushed during sampling. It is also important to minimize the amount of spillage from the bottle during collection. All preservation procedures employed should be recorded such as on the field sheet or chain of custody form. Some preservatives need to be removed or negated before analysis (eg pH corrections) and are required to be considered by the laboratory before analysis. It is crucial that a clear record of any sample treatments is available to the laboratory.

5. Holding Times

While preservation techniques can reduce degradation rates, they may not completely halt such changes. All analytes therefore have a holding time, which is the maximum time that can elapse between sampling and analysis, and where the sample is unlikely to be significantly modified under the recommended preservation conditions. Holding times for each analyte are included in Appendix 2. Samples must be delivered to the laboratory within the required holding times.

Sampling Reference Guides

CONTAINERS, PRESERVATION METHODS AND HOLDING TIMES

Aqueous Sample Reference Guide

Physical Analysis

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
Acidity	SM 2310 B	mg/l	Plastic/glass	250 ml	fill container completely to exclude air 4°C	chilled to 4^{0}C	14 days
Alkalinity	SM 2320 B	mg/l	Plastic/glass	250 ml			14 days
Carbonates, TH, Ca & Mg	SM 2340 C	mg/l	Plastic/glass	500 ml			14 days
Colour	SM 2120 C	Pt/Co	Plastic/glass	100 ml			2 days
Dissolved Oxygen (DO)	SM 4500-O G	mg/l	Plastic/glass	100 ml	store in the dark	chilled to 4^{0}C	Immediate
Electrical Conductivity (at 25 °C)	SM 2510 B	µS/cm	glass	500 ml	fill container completely to exclude air	chilled to 4^{0}C	7 days
Fixed and Volatile solids (TVS) Ignited @ 550^{o}C	SM 2540 E	mg/l	Plastic/glass	500 ml			7 days
Odour	SM 2150	---	Plastic/glass	250 ml	none required	chilled to 4^{0}C	12 days
pH	EPA 150.1 SM 9040 B	H^+ Activity	Plastic/glass	250 ml	carry out test ASAP	carry out test ASAP	6 hours
Salinity	SM 2520 B	mg/l	Plastic/glass	500 ml	none required	chilled to 4^{0}C	14 days
Taste	SM 2160	mg/l	Plastic/glass	500 ml	none required	chilled to 4^{0}C	14 days
Total DissolvedSolids (TDS) @ 180^{o}C	SM 2540 C	mg/l	Plastic/glass	250 ml	fill container completely to exclude air	chilled to 4^{0}C	7 days
Total Settleable Solids	SM 2540 F	mg/l	Plastic/glass	250 ml			7 days
Total Suspended Solids (TSS) @103-105^{o}C	SM 2540 D	mg/l	Plastic/glass	1000 ml			7 days
Total Solids Dried @ 103–105°C	SM 2540 B	mg/l	Plastic/glass	1000 ml			7 days
Turbidity	EPA 180.1 SM 2130 B	mg/l	Plastic/glass	500 ml			48 hours

* The information in this appendix is sourced from EPA, APHA & ASTM unless otherwise noted. This table is not comprehensive but provides an overview of the most common analytes sampled. Where analytes are not listed in this table, please refer to EPA, ASTM or APHA. Standards.

Chemical indications and Nutrients Analysis

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
Ammonia (NH_3-N)	EPA 350.1 SM 4500 NH_3 D	mg/l	glass	250 ml	H_2SO_4 pH<2 4°C	field filter through 0.45 µm	carried out ASAP
Anionic Surfactants (MBAS)	EPA 425.1, SM 5540 C	mg/l	plastic or glass	1000 ml	none required	chilled to 4^{0}C	48 hours
Biological Oxygen Demand (BOD)	SM 5210 B	mg/l	glass	1000 ml	none required	chilled to 4^{0}C	48 hours
Chemical Oxygen Demand (COD)	EPA 410.4 SM 5220 D	mg/l	glass	100 ml	H_2SO_4 pH<2 4°C	store in the dark	7 days
					freeze		28 days
Chloride	EPA 300.0 SM 4500-Cl^- B	mg/l	plastic or glass	250 ml	pH 6.5 – 9.0 4° C	field filter through 0.45 µm	28 days
Chlorine, free	SM 4500 Cl G	mg/l	plastic or glass	250 ml	carry out test ASAP	chilled to 4^{0}C	6 hours
Chlorine, total	SM 4500 Cl D	mg/l	plastic or glass	250 ml	carry out test ASAP	chilled to 4^{0}C	6 hours
Chlorophyll			glass	500 ml	carry out test ASAP	chilled to 4^{0}C	12 hours
Cyanide, free	EPA 335.1 SM 4500 CN H J	mg/l	plastic or glass	250 ml	NaOH pH ≥12 Dark store	chilled to 4^{0}C	14 days
Bromate (BrO_3^{3-})	EPA 300.1	mg/l	plastic or glass	250 ml	none required	chilled to 4^{0}C	14 days
Bromide	EPA 300.1 SM 4500-Br^- B	mg/l	plastic or glass	250 ml	none required	chilled to 4^{0}C	14 days
Fluoride	EPA 300.1 SM 4500 C D	mg/l	plastic or glass	500 ml	none required	chilled to 4^{0}C	28 days
Hexavalent Chromium (Cr+6)	EPA 7196A, SM 3500-Cr B	mg/l	plastic or glass	500 ml	HNO_3 pH<2 4°C	field filter through 0.45 µm	carried out ASAP
Nitrate	EPA 300.1, EPA353.2 SM 4500 NO_3 -F	mg/l	plastic or glass	250 ml	none required	chilled to 4^{0}C	14 days
Nitrite	EPA 300.1, EPA353.2 SM 4500 NO_2 -B	mg/l	plastic or glass	250 ml	none required	4° C freeze	48 hours 14 days
Nitrogen, Total Kjeldahl (TKN)	EPA 353.3/.1 (Modified), SM 4500 N(org) C	mg/l	plastic or glass	250 ml	H_2SO_4 pH<2	chilled to 4^{0}C	28 Days
Oil & Grease	EPA 1664 A SM 5520 B	mg/l	Amber Glass	(2) 1000 ml	H_2SO_4 or HCl pH<2	chilled to 4^{0}C	28 Days
Phosphorous, Total	SM 4500P E	mg/l	glass	250 ml	H_2SO_4 pH<2 4°C	Or freeze without any additions	48 hours 14 days
Sulphate	EPA 9038 SM 4500 SO_4 E EPA 300.1	mg/l	plastic or glass	250 ml	none required	chilled to 4^{0}C	28 Days
Sulphide	EPA 9030B SM 4500-S^{2-} D	mg/l	plastic or glass	250 ml	ZnOAC**, NaOH, pH>9	chilled to 4^{0}C	28 Days
Total Metals	EPA 200.7	mg/l	glass	500 ml	HNO_3, pH<2, 4° C	field filter through 0.45 µm	180 Days, Hg 28 days
Total Organic Carbon (TOC)	EPA 415.1 SM 5310 C	mg/l	Amber Glass	(2) 40 ml VOA Vials	H_2SO_4 or HClpH<2 4°C	bottle completely filled	28 Days
Total Phenol	EPA 420.1 SM 9065 SM 510 ABC	mg/l	Amber Glass	(2) 1000 ml	H_2SO_4 pH<2	chilled to 4^{0}C	28 Days

** Zinc Acetate

Volatile Organic Compounds (VOCs) by GC/MS

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
BTEX	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS
Fumigants	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS
Poly Aromatic Hydrocarbons (PAH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS
Terpenes	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS
Total Chlorinated Hydrocarbons (TCH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS
Total Petroleum Hydrocarbons (TPH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS
Trihalomethane (THM)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS
Volatile Organic Compounds (VOCs)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	14 DAYS

Semi Volatile Organic Compounds (SVOCs) by GC/MS

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
Semi Volatile Organic Compounds (SVOCs)	SM 8270 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	7 Days (Extraction)
Total Petroleum Hydrocarbons (TPH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	7 Days (Extraction)
Poly Aromatic Hydrocarbons (PAH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^0C	7 Days (Extraction)

Soil/Solid Sample Reference Guide

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
Ammonia	SM 4500 NH_3- B	mg/kg	Plastic	100 gm	none required	chilled to 4^0C	28 days
Cyanide	SM 9012 A SM 9014 SM 4500 CN-CE	mg/kg	Plastic	100 gm	NaOH pH>14	chilled to 4^0C	14 days
Hexavalent Chromium (Cr^{+6})	SM 7196 A SM 3060 A	mg/kg	Plastic	100 gm	none required	chilled to 4^0C	carried out ASAP
Metals	EPA 200.7	mg/kg	Plastic	100 gm	none required	chilled to 4^0C	carried out ASAP
pH	SM 9045 D	mg/kg	Plastic	100 gm	none required	chilled to 4^0C	carried out ASAP
Organic Matter	ASTM D2974 – 20	%	Plastic	300 gm	none required	chilled to 4^0C	6 hours
Ash	ASTM D2974 – 20	gm/kg	Plastic	300 gm	none required	chilled to 4^0C	6 hours
Humidity	ASTM D2974 – 20	%	Plastic	300 gm	none required	chilled to 4^0C	6 hours
Total Phenol	SM 8060 B	mg/kg	Plastic	100 gm	none required	chilled to 4^0C	carried out ASAP

Volatile Organic Compounds (VOCs) by GC/MS

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
BTEX	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS
Fumigants	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS
Poly Aromatic Hydrocarbons (PAH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS
Terpenes	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS
Total Chlorinated Hydrocarbons (TCH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS
Total Petroleum Hydrocarbons (TPH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS
Trihalomethane (THM)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS
Volatile Organic Compounds (VOCs)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	14 DAYS

Semi Volatile Organic Compounds (SVOCs) by GC/MS

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
Semi Volatile Organic Compounds (SVOCs)	SM 8270 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	7 Days to Extraction and 40 days after it
Total Petroleum Hydrocarbons (TPH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	7 Days to Extraction and 40 days after it
Poly Aromatic Hydrocarbons (PAH)	SM 8260 B	mg/l	Amber Glass	(2) 100 ml	HCL, pH<2	chilled to 4^{0}C	7 Days to Extraction and 40 days after it

Toxicity Characteristic Leaching Procedure (TCLP)

Parameters	Methods	Units	Container	Sugg. Qty.	Filtration and preservation	Filling technique	Holding Time
Heavy Metal	EPA 200.7 SM 1311	mg/l	Glass	250 ml	HNO_3, pH<2, 4° C	field filter through 0.45 µm	180 Days, Hg 28 days
		mg/kg	Plastic	250 gm	none required	chilled to 4^{0}C	
Chlorinated Herbicides	EPA 615 SM 1311	ug/l	Glass	250 ml	none required	chilled to 4^{0}C	7 Days to Extraction and 40 days after it
		ug/kg	Plastic	250 gm	none required	chilled to 4^{0}C	
Chlorinated Pesticides	EPA 1699 SM 1311	ug/l	Glass	250 ml	none required	chilled to 4^{0}C	7 Days to Extraction and 40 days after it
		ug/kg	Plastic	250 gm	none required	chilled to 4^{0}C	
Semi Volatile Organic Compounds (SVOCs)	SM 8270 B SM 1311	mg/l	Glass	250 ml	HCL, pH<2	chilled to 4^{0}C	7 Days to Extraction and 40
		mg/kg	Plastic	250 gm	none required	chilled to 4^{0}C	
Volatile Organic Compounds (VOCs)	SM 8260 B SM 1311	mg/l	Glass	250 ml	HCL, pH<2	chilled to 4^{0}C	7 Days to Extraction and 40
		mg/kg	Plastic	250 gm	none required	chilled to 4^{0}C	

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Working time:

Sun – Thu 9:00AM – 5:00PM
Sat 9:00AM –2:00PM

Turnaround Time:

Samples for routine analysis are normally analyzed and reported within **5 to 7 working days** after received.

Pioneers Environmental Lab. is an analytical testing laboratory specializing in the analysis of environmental and industrial monitoring samples, detection and quantification of Physical, metals, Inorganics Non-Metallics and organics substance in various media (Water& soil), and other parameters as needed.

We are providing sampling equipment, media and analytical services for water and Soil analysis using a variety of EPA approved methods.

Our Lab. provides its services to government, private, business, and residential clients.

We are committed to providing quality services to its clients through the application of a knowledgeable staff to good laboratory practices and strict adherence to the Quality Assurance/Quality Control Program.

The Lab. was founded with a mission to supply Jeddah and all cities of KSA with reliable data that met project requirements and reflected a strict standard of quality control.

Pioneers Environmental Lab. quickly became known for its reliability to provide quality in data as well as providing strict adherence to turn around time requirements.