



Oil and Gas Marine Ecology Studies

Marine Water Quality Monitoring for Exploration and Production Projects

Intertek upstream laboratories in Asia Pacific provide sampling and analytical support for oil and gas exploration and production projects related to marine water quality monitoring, including sea water, sub-sea water, sea bed, sediment sampling and analysis for platform installation.

Intertek marine ecology testing expertise can be applied to many E&P activities:

- Dredging and backfilling activities
- Marine water quality environmental monitoring
- Detailed analysis of drill cuttings and muds
- Detailed water analysis services for heavy metals and organics in produced water
- Produced fluid analysis for developed and new fields
- Solid waste toxicity testing services
- Testing services on cuttings and drilling mud used during offshore drilling exercises
- Mercury wipe and mercury in metal analysis services
- Mercury in solid waste testing services.
- Trace levels of heavy metal in sludge and solid matter
- Micro-organism classification for photoplankton, zoo plankton and macro benthos sampling and analysis
- Complete facility environmental compliance monitoring, include routine water quality testing and detailed organic analysis breakdown services and more, contact Intertek for details

See pages 2 and 3 for detailed information regarding marine ecology services for the oil and gas industry.

**Table 1: Analytical Methods for Seawater and Micro Organism**

Test Parameters	Unit	Methods	MDL
Temperature	°C	Certified Thermometer	-
Dissolved Oxygen (DO)	mg/l	APHA 4500-G: Membrane Electrode Method (On-site measurement)	-
pH	pH unit	EPA 9040B: pH Electrometric Measurement	-
Salinity	ppt	APHA 2520B: Electrical Conductivity Method	-
Electro Conductivity	mS/cm	APHA 2510B: Electrical Conductivity Method	-
Turbidity	NTU	APHA 2130B: Nephelometric Method	-
Total Suspended Solids (TSS)	mg/l	APHA 2540D: Total Suspended Solids Dried at 103-105°C	1
Chemical Oxygen Demand (COD)	mg/l	APHA 5220D: Closed Reflux, Colorimetric Method ¹	5
Oil & Grease	mg/l	APHA 5520B: Partition-Gravimetric Method	1
TPH			
C6-C9 fraction	µg/l	mod.EPA 8015C: Nonhalogenated Organics using GC-FID	10
C10-C19 fraction	µg/l	mod.EPA 8015C: Nonhalogenated Organics using GC-FID	50
C20-C36 fraction	µg/l	mod.EPA 8015C: Nonhalogenated Organics using GC-FID	100
Trace Metals ²			
Arsenic (As)	µg/l	EPA 6010B: Inductively Coupled Plasma – Atomic Emission Spectrometry	1
Barium (Ba)	µg/l	EPA 6010B: Inductively Coupled Plasma – Atomic Emission Spectrometry	0.01
Cadmium (Cd)	µg/l	EPA 6010B: Inductively Coupled Plasma – Atomic Emission Spectrometry	0.5
Chromium (Cr)	µg/l	EPA 6010B: Inductively Coupled Plasma – Atomic Emission Spectrometry	0.5
Copper (Cu)	µg/l	EPA 6010B: Inductively Coupled Plasma – Atomic Emission Spectrometry	0.1
Lead (Pb)	µg/l	EPA 6010B: Inductively Coupled Plasma – Atomic Emission Spectrometry	0.5
Zinc (Zn)	µg/l	EPA 6010B: Inductively Coupled Plasma – Atomic Emission Spectrometry	0.5
Mercury (Hg)	µg/l	EPA 7470A: Mercury in Liquid Wastes (Manual Cold Vapor Technique)	0.04
Phytoplankton	cell/m ³	APHA 10200F: Phytoplankton Counting Techniques	-
Zooplankton	ind/m ³	APHA 10200G: Zooplankton Counting Techniques	-

Remarks: ¹ *Determination of low range COD with Cr(VI)-Cr(III)-Hg(II) for Sample with High Concentration Chloride*, Analytical Science 2001, Vol.17 Supplement, H.Sato,T.Ishikawa,T.Sato and Y.Yokoyama.
EPA : United State Environmental Protection Agency, SW-846
APHA : Standard Method for Examination of Water and Wastewater, 20th ed., 1998, APHA, AWWA, WEF.

² Sample preparation for trace metal analysis refer to “*Determination of trace elements*”, Method of Seawater Analysis, 3rd Edition, 1999, K.Grasshoff, K.Kremling and M.Ehrhardt.

Table 2: Analytical Methods for Seabed Sediment and Benthic Macro-invertebrates

Test Parameter	Unit	Method	MDL
Particle Size Distribution	wt %	Particle Size Analyzer	-
Total Organic Carbon (TOC)	mg/kg	mod. APHA 5310B: Combustion-Infrared Method	5
Oil & Grease	mg/kg	EPA 9071B: n-Hexane Extractable Material for Sludge, Sediment and Solid Samples	10
TPH			
C6-C9 fraction	mg/kg	mod.EPA 8015C: Nonhalogenated Organics using GC-FID	0.5
C10-C19 fraction	mg/kg	mod.EPA 8015C: Nonhalogenated Organics using GC-FID	0.5
C20-C36 fraction	mg/kg	mod.EPA 8015C: Nonhalogenated Organics using GC-FID	1
Trace Metals			
Arsenic (As)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	2
Barium (Ba)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	0.05
Cadmium (Cd)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	0.1
Chromium (Cr)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	0.5
Copper (Cu)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	0.3
Iron (Fe)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	0.5
Zinc (Zn)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	0.5
Lead (Pb)	mg/kg	EPA 3050B: Acid Digestion for Soil and Sediment / EPA 6010B	0.5
Mercury (Hg)	mg/kg	EPA 7471B: Mercury in Solid or Semi-solid Waste	0.01
Macrobenthos	amount/m ²	APHA 10500: Benthic Macroinvertebrates	-

Table 3: Analytical Method for Fish Specimen

Test Parameter	Unit	Method	MDL
Mercury (Hg)	mg/kg	Manual Cold Vapour Technique Method	0.001

Remarks: ¹Sample preparation refers to Methods for analysis of trace metals in marine and others samples, B.R.Jones and R.E.Laslett, MAFF Direct. Fish Res., Lowestoft, (11), 1994.

Table 4: Sampling Methods

Parameter	Sampling Method
Dissolved oxygen, DO	Grab sample and collect in glass bottle.
pH	Grab sample and collect in polyethylene or glass bottle.
Electro conductivity	Grab sample and collect in polyethylene or glass bottle.
Salinity	Grab sample and collect in glass bottle.
Turbidity	Grab sample and collect in polyethylene or glass bottle.
Total suspended solids, TSS	Grab sample and collect in polyethylene bottle.
Chemical oxygen demand, COD	Grab sample and collect in glass bottle or polyethylene.
Oil & grease	Grab sample and collect in glass bottle.
Total petroleum hydrocarbon, TPH	Grab sample and collect in glass bottle.
Arsenic	Grab sample and collect in glass bottle.
Barium	Grab sample and collect in polyethylene bottle.
Cadmium	Grab sample and collect in polyethylene bottle.
Chromium	Grab sample and collect in polyethylene bottle.
Copper	Grab sample and collect in polyethylene bottle.
Iron	Grab sample and collect in polyethylene bottle.
Lead	Grab sample and collect in polyethylene bottle.
Zinc	Grab sample and collect in polyethylene bottle.
Mercury	Grab sample and collect in glass bottle.
Phytoplankton	Grab sample and collect in polyethylene bottle.
Zooplankton	Grab sample and collect in polyethylene bottle.
Macrobenthos	Grab sample and collect in polyethylene bottle.