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LABORATORY LOCATION:
(PERMANENT LABORATORY)

CHEMSAIN KONSULTANT SDN. BHD.
LOT 1942 & 1943, BLOCK 5
JALAN MAIGOLD
DESA SENADIN INDUSTRIAL AREA
98100 KUALA BARAM, MIRI
SARAWAK
MALAYSIA

FIELDS OF TESTING: **CHEMICAL & MICROBIOLOGY**

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017).

This laboratory's fulfillment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF TESTING: **CHEMICAL**

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Petroleum and Petroleum Products Crude Oil	Density, Specific Gravity and API Gravity	ASTM D1298-17 Hydrometer Method
	Density	ASTM D5002-19
	Water Content	ASTM D4928-12 Coulometric Karl Fisher Titration
	Total Acid Number	ASTM D664-18e2 Potentiometric Titration
	Water & Sediment	ASTM D4007-16e1 Centrifuge Method
	Kinematic Viscosity	ASTM D445-21
	Mercury	UOP 938-10
	Salt	ASTM D3230-19 Electrometric Method
	Pour Point	ASTM D5853-17
	Sediments	ASTM D4807-05 (Reapproved 2010) (By membrane filtration)
	Vapor Pressure	ASTM D323-20a Reid Method
	Asphaltene	ASTM D6560-17

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SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Petroleum and Petroleum Products Crude Oil	Wax	UOP 46-85
	Compositional Analysis C1 – C40	In-House Method 0522 based on ASTM D5442-17
	Water	In-House Method 0524 based on ASTM D4007–16e1 Centrifuge Method
	Sand	In-House Method 0529 based on Sieving Method
	Na, Fe, Pb, Cd, Mn, Ni	In-House Method 0557 based on ASTM D5863-11 & ASTM D5184– 12
	Wax Appearance Temperature (WAT)	In-House Method 0578 based on ASTM D4419-10
	Determination of Shrinkage Factor	In-House Method 0531 based on API MPMS Chapter 20 (Section 1)
Condensate	Density	ASTM D4052-18
	Saybolt Color	ASTM D156-15
	Reid Vapour Pressure	ASTM D323–20a
	Hydrogen Sulphide	UOP 163-87
	Mercury	UOP 938 –10
Liquid Hydrocarbon	Mercaptan	UOP 163 - 87
Natural Gas	Composition analysis C1 – C11, C12+	GPA 2286–14 Gas Chromatography
	Mercury	ASTM D6350-14 Cold Vapor Atomic Fluorescence Spectroscopy (Analysis)
Petroleum Products and Liquid Fuels	Cloud Point	ASTM D2500-11
Petroleum Products	Density	ASTM D4052-18
	Composition analysis C1 – C7, C8+	In-House Method 0522 based on ASTM D5442 – 17 Gas Chromatography

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Biodiesel	Water Content	ASTM D6304-20
	Flash Point	ASTM D93-20
	Density	ASTM D4052-18
Diesel	Distillation	ASTM D86-20a
	Flash Point	ASTM D93-20
	Density	ASTM D4052-18
	Pour Point	ASTM D97-17b
	Sediment	ASTM D4807 (Reapproved 2010) (By Membrane Filtration)
	Ash Content	ASTM D482-13
Glycol	pH	ASTM D1287-91 (2002)
	Iron	In-House Method 0557 based on ASTM D5863-11 & ASTM D5184-12
	Total Suspended Solids	In-House Method 0584 based on APHA 2540 D, 2017
	Density	ASTM D1122-97a by Hydrometer
	Density	ASTM D 4052-18 by Density Meter

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Lubricating Oil	Water Content	ASTM D6304-20 Coulometric Karl Fisher Titration
	Flash Point	ASTM D93-20
	Total Acid Number	ASTM D664-18e2
	Kinematic Viscosity	ASTM D445-21
	Pour Point	ASTM D97-17b
	Na, Fe, Pb, Cu, Ag, Sn	In-House Method 0557 based on ASTM D5863-11 & ASTM D5184- 12
	Ash Content	ASTM D482-13
JET A1	Density @ 15°C	ASTM D4052-18
	Colour Saybolt	ASTM D156-15
	Distillation	ASTM D86-20a
	Electrical Conductivity	ASTM D2624-15
	Freezing Point	ASTM D2386-19
	Flash Point (Abel)	IP170-14
	Corrosion : Copper Strip	ASTM D130-19
	Water Separation (MSEP-A)	ASTM D3948-11
	Existent Gum	ASTM D381-12
Fuel Oil	Ash Content	ASTM D482-13

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Pigging Debris	Mercury	UOP 938-10
	Scales, Sand & Silt	In-House Method 0532-1
	Wax & Asphaltene	
	Light Hydrocarbon	
	Calcium	In-House Method 0532-2
	Iron	
	Magnesium	
	Manganese	
	Sand and Silt	In-House Method 0532-3
	Carbonate	In-House Method 0532-4
	Sulphide	In-House Method 0532-5
	Sulphate	In-House Method 0532-6
	Calcium Carbonate (CaCO ₃)	In-House Method 0551 based on XRD Instruction Manual, ASTM D934-80 (Reapproved 2003) (Qualitative Method)
	Silicon Dioxide (SiO ₂)	
	Aluminium	In-House Method 0552 based on XRF Instruction Manual (Semi-Quantitative Method)
	Barium	
	Calcium	
	Chlorine	
	Iron	
	Manganese	
Magnesium		
Phosphorus		
Silicon		
Sodium		
Sulphur		

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SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Formation Water / Produced Water	Turbidity	APHA 2130 B, 2017
	Alkalinity	APHA 2320 B, 2017
	Conductivity	APHA 2510 B, 2017
	Total Dissolved Solids	APHA 2540 C, 2017
	Temperature	APHA 2550 B, 2017
	pH Value	APHA 4500-H ⁺ B, 2017
	Sulphide	APHA 4500-S ²⁻ D, 2017
	Hardness by Calculation	APHA 2340 B, 2017
	Total Hardness by EDTA Titration	APHA 2340 C, 2017
	Free Carbon Dioxide	APHA 4500-CO ₂ C, 2017
	Sulphate	APHA 4500-SO ₄ ²⁻ E, 2005 (By Turbidimetry)
	Chloride	APHA 4500-Cl ⁻ B, 2017
	Salinity	APHA 210 C, 1985
	Quaternary Ammonium Compounds (QAC)	In-House Method 0579 Based on HACH 8337
	Tetrakis Hydroxymethyl phosphonium sulphate (THPS)	In-House Method 0580 Based on Iodometry
Calcium Hardness by EDTA Titration	APHA 3500 Ca B,-2017	
Total Suspended Solids	APHA 2540 D, 2017	

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Formation Water / Produced Water	Sample Digestion	APHA 3030 F, 2017 (Nitric Acid - Hydrochloric acid Digestion)
	Aluminum (Al) Arsenic (As) Barium (Ba) Bismuth (Bi) Boron (B) Cadmium (Cd) Calcium (Ca) Chromium (Cr) Copper (Cu) Cobalt (Co) Gallium (Ga) Indium (In) Iron (Fe) Lead (Pb) Lithium (Li) Magnesium (Mg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni) Potassium (K) Selenium (Se) Silicon (Si) Silver (Ag) Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Vanadium (V) Zinc (Zn)	APHA 3120 B, 2017 (By ICP – OES)
	Anions: Bromide, Br ⁻ Chloride, Cl ⁻ Fluoride, F ⁻ Nitrate, NO ₃ ⁻ Nitrite, NO ₂ ⁻ Phosphate, PO ₄ ³⁻ Sulfate, SO ₄ ²⁻	APHA 4110 B, 2017 (By Ion Chromatography)

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Formation Water / Produced Water	Organic Acids: Formic Acid Acetic Acid Propionic Acid Butyric Acid Pentanoic Acid Hexanoic Acid	In-House Method 0543 based on ICApplication Work AW CH6- 01910- 062007 (By Ion Chromatography)
	Density	In-House Method 0555 based on ASTM D 4052-18
	Mercury	In-House Method 0556 based on UOP 938- 10
	Salinity	APHA 2520 B, 2017
	Oil & grease	APHA 5520 B 2017
	Oil & Grease (Mineral) / Hydrocarbon	APHA 5520 F, 2017
	Oil & Grease (Emulsified Edible)	APHA 5520 B & F, 2017
Water Drinking Water / Potable Water / Fresh Water / Treated Water	Turbidity	APHA 2130 B, 2017
	Alkalinity	APHA 2320 B, 2017
	Conductivity	APHA 2510 B, 2017
	Total Dissolved Solids	APHA 2540 C, 2017
	Temperature	APHA 2550 B, 2017
	pH Value	APHA 4500-H ⁺ B, 2017
	Sulphide	APHA 4500-S ²⁻ D, 2017
	Hardness by Calculation	APHA 2340 B, 2017
	Total Hardness by EDTA Titration	APHA 2340 C, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Drinking Water / Potable Water / Fresh Water / Treated Water	Free Carbon Dioxide	APHA 4500-CO ₂ C, 2017
	Free, Combined and Total Residual Chlorine	In House Method 0501 Based on Palintest Comparator
	Sulphate	APHA 4500-SO ₄ ²⁻ E, 2017
	Chloride	APHA 4500-Cl ⁻ B, 2017
	Permanganate Index (Oxidisability)	In House Method 0533 Based on Methods for The Examination of Water and Associated Materials
	Sample Digestion	APHA 3030 F, 2017 (Nitric Acid - Hydrochloric acid Digestion)
	Aluminum (Al) Arsenic (As) Barium (Ba) Bismuth (Bi) Boron (B) Cadmium (Cd) Calcium (Ca) Chromium (Cr) Copper (Cu) Cobalt (Co) Gallium (Ga) Indium (In) Iron (Fe) Lead (Pb) Lithium (Li) Magnesium (Mg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni) Potassium (K) Selenium (Se) Silicon (Si) Silver (Ag) Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Vanadium (V) Zinc (Zn)	APHA 3120 B, 2017 (By ICP – OES)

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Drinking Water / Potable Water / Fresh Water / Treated Water	Anions: Bromide, Br ⁻ Chloride, Cl ⁻ Fluoride, F ⁻ Nitrate, NO ₃ ⁻ Nitrite, NO ₂ ⁻ Phosphate, PO ₄ ³⁻ Sulfate, SO ₄ ²⁻	APHA 4110 B, 2017 (By Ion Chromatography)
	Calcium Hardness by EDTA Titration	APHA 3500 Ca B, 2017
	Total Suspended Solids	APHA 2540 D, 2017
	Density	In-House Method 0555 based on ASTM D 4052-18
	Mercury	In-House Method 0556 based on UOP 938- 10
	Tin Uranium Phosphorus	In-House Method 0582 based on APHA 3120B, 2017
	Anionic Surfactant as MBAS	APHA 5540C, 2017
	Chromium Hexavalent Cr ⁶⁺	APHA 3500 Cr B, 2017
	Chromium Trivalent Cr ³⁺	In-House Method 0508 based on APHA 3500 Cr B, 2017
	Formaldehyde	In-House Method 0527 based on AOAC 931.08
	Cyanide	APHA 4500 CN C & F, 2017
	Color	APHA 2120 C, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Swimming Pool	Turbidity	APHA 2130 B, 2017
	Alkalinity	APHA 2320 B, 2017
	Conductivity	APHA 2510 B, 2017
	Total Dissolved Solids	APHA 2540 C, 2017
	Temperature	APHA 2550 B, 2017
	pH Value	APHA 4500-H ⁺ B, 2017
	Sulphide	APHA 4500-S ²⁻ D, 2017
Water Surface Water / River Water	Turbidity	APHA 2130 B, 2017
	Alkalinity	APHA 2320 B, 2017
	Conductivity	APHA 2510 B, 2017
	Total Dissolved Solids	APHA 2540 C, 2017
	Temperature	APHA 2550 B, 2017
	pH Value	APHA 4500-H ⁺ B, 2017
	Sulphide	APHA 4500-S ²⁻ D, 2017
	Free, Combined and Total Residual Chlorine	In-House Method 0501 based on Palintest Comparator
	Free Carbon Dioxide	APHA 4500-CO ₂ C, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Surface Water / River Water	Sample Digestion	APHA 3030 F, 2017 (Nitric Acid - Hydrochloric acid Digestion)
	Aluminum (Al) Arsenic (As) Barium (Ba) Bismuth (Bi) Boron (B) Cadmium (Cd) Calcium (Ca) Chromium (Cr) Copper (Cu) Cobalt (Co) Gallium (Ga) Indium (In) Iron (Fe) Lead (Pb) Lithium (Li) Magnesium (Mg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni) Potassium (K) Selenium (Se) Silicon (Si) Silver (Ag) Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Vanadium (V) Zinc (Zn)	APHA 3120 B, 2017 (By ICP – OES)
	Hardness by Calculation	APHA 2340 B, 2017
	Calcium Hardness by EDTA Titration	APHA 3500 Ca B, 2017
	Sulphate	APHA 4500-SO ₄ ²⁻ E, 2017
	Chloride	APHA 4500-Cl ⁻ B, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Surface Water / River Water	Total Suspended Solids	APHA 2540 D, 2017
	Mercury	In-House Method 0556 based on UOP 938- 10
	Salinity	APHA 2520 B, 2017
	Ammoniacal Nitrogen	APHA 4500 NH3 B & C, 2017
	Biochemical Oxygen Demand	APHA 5210 B & 4500 OC, 2017 APHA 5210 B & APHA 4500 OG, 2017
	Dissolved Oxygen	APHA 4500 OC, 2017 by Azide method APHA 4500 OG, 2017
	Phenol	APHA 5530 B & D, 2017
	Chemical Oxygen Demand	APHA 5220 C, 2017
	Oil & grease	APHA 5520 B 2017
	Oil & Grease (Mineral) / Hydrocarbon	APHA 5520 F, 2017
	Oil & Grease (Emulsified Edible)	APHA 5520 B & F, 2017
	Tin Uranium Phosphorus	In-House Method 0582 based on APHA 3120B, 2017
	Anionic Surfactant as MBAS	APHA 5540C, 2017
	Chromium Hexavalent Cr6+	APHA 3500 Cr B, 2017
	Chromium Trivalent Cr3+	In-House Method 0508 based on APHA 3500 Cr B, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Surface Water / River Water	Cyanide	APHA 4500 CN C & F, 2017
	Formaldehyde	In-House Method 0527 based on AOAC 931.08
	Color	APHA 2120 C, 2017
	Nitrite Nitrite – N	APHA 4500- NO3- B, 2017
	Nitrate Nitrate – N	APHA 4500- NO3- E, 2017
Water Ground Water	Turbidity	APHA 2130 B, 2017
	Alkalinity	APHA 2320 B, 2017
	Conductivity	APHA 2510 B, 2017
	Total Dissolved Solids	APHA 2540 C, 2017
	Temperature	APHA 2550 B, 2017
	pH Value	APHA 4500-H ⁺ B, 2017
	Sulphide	APHA 4500-S ²⁻ D, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Ground Water	Sample Digestion	APHA 3030 F, 2017 (Nitric Acid - Hydrochloric acid Digestion)
	Aluminum (Al) Arsenic (As) Barium (Ba) Bismuth (Bi) Boron (B) Cadmium (Cd) Calcium (Ca) Chromium (Cr) Copper (Cu) Cobalt (Co) Gallium (Ga) Indium (In) Iron (Fe) Lead (Pb) Lithium (Li) Magnesium (Mg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni) Potassium (K) Selenium (Se) Silicon (Si) Silver (Ag) Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Vanadium (V) Zinc (Zn)	APHA 3120 B, 2017 (By ICP – OES)
	Hardness by Calculation	APHA 2340 B, 2017
	Total Hardness by EDTA Titration	APHA 2340 C, 2017
	Free Carbon Dioxide	APHA 4500-CO ₂ C, 2017
	Sulphate	APHA 4500-SO ₄ ²⁻ E, 2017
	Chloride	APHA 4500-Cl ⁻ B, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Ground Water	Anions: Bromide, Br ⁻ Chloride, Cl ⁻ Fluoride, F ⁻ Nitrate, NO ₃ ⁻ Nitrite, NO ₂ ⁻ Phosphate, PO ₄ ³⁻ Sulfate, SO ₄ ²⁻	APHA 4110 B, 2017 (By Ion Chromatography)
	Calcium Hardness by EDTA Titration	APHA 3500 Ca B, 2017
	Total Hardness by EDTA Titration	APHA 2340 C, 2017
	Total Suspended Solids	APHA 2540 D, 2017
	Mercury	In-House Method 0556 based on UOP 938- 10
	Ammoniacal Nitrogen	APHA 4500 NH ₃ B & C, 2017
	Biochemical Oxygen Demand	APHA 5210 B & 4500 OC, 2017
	Dissolved Oxygen	APHA 4500 OC, 2017 by Azide method
	Phenol	APHA 5530 B & D, 2017
	Oil & grease	APHA 5520 B 2017
	Oil & Grease (Mineral) / Hydrocarbon	APHA 5520 F, 2017
	Oil & Grease (Emulsified Edible)	APHA 5520 B & F, 2017
	Cyanide	APHA 4500 CN C & F, 2017
	Color	APHA 2120 C, 2017
	Nitrite Nitrite – N	APHA 4500- NO ₃ - B, 2017
Nitrate Nitrate – N	APHA 4500- NO ₃ - E, 2017	

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Marine Water / Sea Water	Sulphate	APHA 4500-SO ₄ ²⁻ E, 2017
	Chloride	APHA 4500-Cl ⁻ B, 2017
	Aluminum (Al) Arsenic (As) Barium (Ba) Bismuth (Bi) Boron (B) Cadmium (Cd) Calcium (Ca) Chromium (Cr) Copper (Cu) Cobalt (Co) Gallium (Ga) Indium (In) Iron (Fe) Lead (Pb) Lithium (Li) Magnesium (Mg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni) Potassium (K) Selenium (Se) Silicon (Si) Silver (Ag) Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Vanadium (V) Zinc (Zn)	APHA 3120 B, 2017 (By ICP – OES)
	Salinity	APHA 210 C, 1985
	Quaternary Ammonium Compounds (QAC)	In-House Method 0579 based on HACH 8337
	Tetrakis Hydroxymethyl phosphonium sulphate (THPS)	In-House Method 0580 based on Iodometry

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Marine Water / Sea Water	Anions: Bromide, Br ⁻ Chloride, Cl ⁻ Fluoride, F ⁻ Nitrate, NO ₃ ⁻ Nitrite, NO ₂ ⁻ Phosphate, PO ₄ ³⁻ Sulfate, SO ₄ ²⁻	APHA 4110 B, 2017 (By Ion Chromatography)
	Calcium Hardness by EDTA Titration	APHA 3500 Ca B, 2017
	Total Suspended Solids	APHA 2540 D, 2017
	Density	In-House Method 0555 based on ASTM D 4052-18
	Mercury	In-House Method 0556 based on UOP 938- 10
	Salinity	APHA 2520 B, 2017
	Ammoniacal Nitrogen	APHA 4500 NH ₃ B & C, 2017
	Biochemical Oxygen Demand	APHA 5210 B & 4500 OC, 2017 APHA 5210 B & APHA 4500 OG, 2017
	Dissolved Oxygen	APHA 4500 OC, 2017 by Azide method APHA 4500 OG, 2017
	Phenol	APHA 5530 B & D, 2017
	Oil & grease	APHA 5520 B 2017
	Oil & Grease (Mineral) / Hydrocarbon	APHA 5520 F, 2017
	Oil & Grease (Emulsified Edible)	APHA 5520 B & F, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water Marine Water / Sea Water	Chromium Hexavalent Cr6+	APHA 3500 Cr B, 2017
	Chromium Trivalent Cr3+	In-House Method 0508 based on APHA 3500 Cr B, 2017
	Uranium Phosphorus	In-House Method 0582 based on APHA 3120B, 2017
	Formaldehyde	In-House Method 0527 based on AOAC 931.08
	Chemical Oxygen Demand	In House Method 0560 based on APHA 5220 C, 2017 & USGS Method of Analysis of Organic substances in water Chemical Oxygen Demand
	Cyanide	APHA 4500 CN C & F, 2017
Water Estuarine Water	Salinity	APHA 2520 B, 2017

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring Sludge, Sediment and Soil	Oil & Grease	USEPA 9071B-1998
	Mercury	In-House Method 0556 based on UOP 938-10
Environmental Monitoring Sludge, Sediment, Soil and Solid Waste	Aluminum (Al) Arsenic (As) Barium (Ba) Boron (B) Bismuth (Bi) Cadmium (Cd) Calcium (Ca) Chromium (Cr) Copper (Cu) Cobalt (Co) Gallium (Ga) Indium (In) Iron (Fe) Lithium (Li) Lead (Pb) Magnesium (Mg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni) Potassium (K) Selenium (Se) Silver (Ag) Silicon (Si) Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Vanadium (V) Zinc (Zn)	EPA 200.2 & EPA 6010B

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Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring <ul style="list-style-type: none"> • Effluent / Industrial Effluent <ul style="list-style-type: none"> – Leachate – Sewage – Waste Water 	Turbidity	APHA 2130 B, 2005
	Alkalinity	APHA 2320 B, 2005
	Conductivity	APHA 2510 B, 2005
	Total Suspended Solids	APHA 2540 D, 2005
	Total Dissolved Solids	APHA 2540 C, 2005
	Temperature	APHA 2550 B, 2005
	pH Value	APHA 4500-H ⁺ B, 2005
	Sulphide	APHA 4500-S ²⁻ D, 2005
	Hardness by Calculation	APHA 2340 B, 2005
	Total Hardness by EDTA Titration	APHA 2340 C, 2005
	Free Carbon Dioxide	APHA 4500-CO ₂ C, 2005
	Sulphate	APHA 4500-SO ₄ ²⁻ E, 2005 (By Turbidimetry)
	Chloride	APHA 4500-Cl ⁻ B, 2005
	Color	APHA 2120 C, 2005
	Free, Combined and Total Residual Chlorine	In-House Method 0501 based on Palintest Comparator
	Mercury	In-House Method 0556 based on UOP 938- 10
	Salinity	APHA 2520 B, 2005
Oil & grease	APHA 5520 B 2005	
Oil & Grease (Mineral) / Hydrocarbon	APHA 5520 F, 2005	
Oil & Grease (Emulsified Edible)	APHA 5520 B & F, 2005	
Hardness	APHA 2340 C, 2005	

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SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring <ul style="list-style-type: none"> • Effluent / Industrial Effluent <ul style="list-style-type: none"> – Leachate – Sewage – Waste Water 	Sample Digestion	APHA 3030 F, 2005 (Nitric Acid - Hydrochloric acid Digestion)
	Aluminum (Al) Arsenic (As) Barium (Ba) Bismuth (Bi) Boron (B) Cadmium (Cd) Calcium (Ca) Chromium (Cr) Copper (Cu) Cobalt (Co) Gallium (Ga) Indium (In) Iron (Fe) Lead (Pb) Lithium (Li) Magnesium (Mg) Manganese (Mn) Molybdenum (Mo) Nickel (Ni) Potassium (K) Selenium (Se) Silicon (Si) Silver (Ag) Sodium (Na) Strontium (Sr) Thallium (Tl) Tin (Sn) Vanadium (V) Zinc (Zn)	APHA 3120 B, 2005 (By ICP – OES)
	Ammoniacal Nitrogen	APHA 4500 NH3 B & C, 2005
	Biochemical Oxygen Demand	APHA 5210 B & 4500 OC, 2005 APHA 5210 B & APHA 4500 OG, 2005
	Dissolved Oxygen	APHA 4500 OC, 2005 by Azide method APHA 4500 OG, 2005
	Phenol	APHA 5530 B & D, 2005
	Chemical Oxygen Demand	APHA 5220 C, 2005

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SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring <ul style="list-style-type: none"> • Effluent / Industrial Effluent <ul style="list-style-type: none"> – Leachate – Sewage – Waste Water 	Chromium Hexavalent Cr6+	APHA 3500 Cr B, 2005
	Chromium Trivalent Cr3+	In-House Method 0508 based on APHA 3500 Cr B, 2005
	Uranium Phosphorus	In-House Method 0582 based on APHA 3120 B, 2005
	Formaldehyde	In-House Method 0527 based on AOAC 931.08
	Cyanide	APHA 4500 CN C & F, 2005
	Nitrate Nitrate – N	APHA 4500- NO3- E, 2005
	Nitrite Nitrite – N	APHA 4500- NO2- B, 2005

NOTE:

- APHA : American Public Health Association, 21st Edition (2005) & 22nd Edition (2017), (Standard Methods for the Examination of Water and Wastewater)
- API MPMS : American Petroleum Institute – Manual of Petroleum Measurement Standards
- ASTM : American Society for Testing and Materials
- GPA : Gas Producers Association
- UOP : Universal Oil Products

Signatories:

- | | | |
|----|-------------------------------------|--|
| 1. | Lahung Lah Keping | IKM No.: M/4886/7415/16/18 |
| 2. | Gilbert Kalaween Anak Mangga | IKM No.: M/4469/6673/13/16 |
| 3. | Sim Hang Thiew | IKM No.: M/0688/1530/83 (non-resident) |
| 4. | Margaret Anak Bain | IKM No.: M/2949/5745/10 (non-resident) |
| 5. | Josephine Anak Jonip | IKM No.: L/3005/8931/21 (non-resident for Lubricating Oil testing only) |

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SCOPE OF TESTING: CHEMICAL**SITE: CATEGORY I**

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water <ul style="list-style-type: none"> Formation Water Potable Water 	Temperature	APHA 2550 B, 2005 APHA 2550 B, 2017
	pH Value	APHA 4500-H ⁺ B, 2005 APHA 4500-H ⁺ B, 2017
Crude Oil	Sampling for the Determination of Shrinkage Factor	In-House Method 0530 based on API MPMS Chapter 20 (Section 1)
Natural Gas	Sampling for Mercury	ASTM D 6350 – 98 (2003) Cold Vapor Atomic Fluorescence Spectroscopy
Environmental Monitoring <ul style="list-style-type: none"> Water and Effluent / Waste Water 	Temperature	APHA 2550 B, 2005 APHA 2550 B, 2017
	Oxygen (Dissolved)	APHA 4500-0 G, 2005 APHA 4500-0 G, 2017
	pH Value	APHA 4500-H ⁺ B, 2005 APHA 4500-H ⁺ B, 2017
	Free Residual Chlorine (DPD) Combined Residual Chlorine (DPD) Total Residual Chlorine (DPD)	In-House Method 0501 based on Palintest Comparator

NOTE:

- APHA : American Public Health Association, 21st Edition (2005) & 22nd Edition (2017), (Standard Methods for the Examination of Water and Wastewater)
- API MPMS : American Petroleum Institute – Manual of Petroleum Measurement Standards
- ASTM : American Society for Testing and Materials
- GPA : Gas Producers Association
- UOP : Universal Oil Products

Signatories:

- | | | |
|----|-------------------------------------|---|
| 1. | Lahung Lah Keping | IKM No.: M/4886/7415/16/18 |
| 2. | Gilbert Kalaween Anak Mangga | IKM No.: M/4469/6673/13/16 |
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SCOPE OF TESTING: MICROBIOLOGY

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Potable water, Drinking water, Effluent / Wastewater, Surface Water Ground Water Fresh / Treated Water	Heterotrophic Plate Count	APHA 9215 B, 2005 APHA 9215 B, 2017
Marine Water Surface Water Drinking Water / Potable / Treated Water Ground Water River Water Effluent / Wastewater / Leachate	Total Coliform Count, MPN/100mL	APHA 9221 B, 2017
	Fecal Coliform Count, MPN/100mL	APHA 9221 E, 2005
	Thermotolerant (Fecal) Coliform Count, MPN/100mL, 44.5± 0.2 °C/24h	APHA 9221 E, 2017
	E.coli Count MPN/100mL, 44.5± 0.2 °C/24h	In-House Method 0601 based on APHA 9221 E, 2017 & AS 4276.6, 1995
Marine Water Surface Water/ Ground Water/ River Water Drinking/Potable/ Treated Water Effluent/Wastewater/ Leachate	Fecal Enterococci 35±0.5 °C/48±4h	APHA 9230 B, 2017
Marine Water Drinking Water / Fresh Water / Treated Water/Surface Water River Water	Thermotolerant (Fecal) Coliform by Membrane Filtration	In-House Method 0609 based on APHA 9222 G, 2017
River Water Marine Water Surface Water Treated Water / Fresh Water / Drinking Water / Potable Water	Total Coliform by Membrane Filtration	In-House Method 0606 based on APHA 9222 B, 2017
	Escherichia coli by Membrane Filtration	In-House Method 0610 based on APHA 9222 H, 2017

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SCOPE OF TESTING: MICROBIOLOGY

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
River Water Marine Water	Fecal Enterococci/ Streptococci	APHA 9230 C, 2017
Water & Wastewater Marine water/Estuarine water/ Formation water/ Produced water	Total Coliform & E.coli by dual chromogen membrane filtration	In-house Method 0608 based on APHA 9222 J, 2017
	Thermotolerant Fecal Coliform by membrane filtration method	APHA 9222 D, 2017

Signatories:

- | | | |
|----|-----------------------------|---------------------------------|
| 1. | Stephanie Evert Jole | MJMM 0369 |
| 2. | Humaira Binti Kassim | MJMM 0849 |
| 3. | Goh Chia Mey | MJMM 0118 (non-resident) |