LABORATORY LOCATION:
(PERMANENT LABORATORY)

SPECTRUM LABORATORIES (JOHOR) SDN. BHD.
18A, JALAN MOLEK 2/5
TAMAN MOLEK
81100 JOHOR BAHRU, JOHOR
MALAYSIA

FIELDS OF TESTING: **CHEMICAL AND 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
Environmental Monitoring		
• Effluent	Alkalinity	APHA 2320 B
	Biochemical Oxygen Demand (BOD)	APHA 5210 B
	Chromium, Hexavalent	APHA 3500-Cr B
	Chromium, Trivalent	In house method no. 19 based on APHA 3500-Cr B
	Chemical Oxygen Demand (COD)	APHA 5220 B APHA 5220 C APHA 5220 D
	Cyanide	APHA 4500 – CN^- C & F OSRMA P-456

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued) • Effluent	Colour	APHA 2120 B APHA 2120 F
	Free Chlorine	APHA 4500-Cl F
	Formaldehyde	OSRMA PG-458 APHA 6252 B
	pH	APHA 4500-H^+ B
	Phenol	APHA 5530 B C
	Sulphide	APHA 4500-S^{2-} F
	Total Solids	APHA 2540 B
	Total Dissolved Solid	APHA 2540 C
	Suspended Solids	APHA 2540 D
	Fixed and volatile solids ignited at 550ºC (Mixed Liquor Volatile Suspended Solids or MLVSS)	APHA 2540 E
	Mixed Liquor Suspended Solids (MLSS)	In house method No.23 based On APHA 2540 D
	Nitrite	APHA 4500-NO_2^-B
	Nitrogen/ Nitrate as N/ NO_3	AOAC 973.50
	Nitrate	APHA 4500-NO_3^- B
	Phosphorus as P (or PO_4)	APHA 4500-P B, C
	Chloride	APHA 4500-Cl^- C
	Fluoride	APHA 4500-F^- D
	Ammonia Nitrogen as N	APHA 4500-NH_3 B, C

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued)		
• Effluent	Oil & Grease	APHA 5520 B
	Dissolved Oxygen	APHA 4500-O G
	Silica as SiO_2	APHA 4500-SiO_2 D
	Anionic Surfactant as MBAS	APHA 5540 C
	Hardness (EDTA)	APHA 2340 C
	Hardness (Calculation)	APHA 2340 B
	Turbidity	APHA 2130 B
	Sulphate	APHA 4500-SO_4^{2-} E
	Bicarbonate Alkalinity	APHA 4500-CO_2 D
	Carbonate Alkalinity	APHA 4500-CO_2 D
	Free Carbon Dioxide Hydroxide Alkalinity Total Carbon Dioxide	APHA 4500-CO_2 D

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued)	**Preliminary Treatment of Samples:**	
• Effluent	Digestion for metals	APHA 3030 D
	Nitric Acid Digestion	APHA 3030 E
	Nitric Acid-Hydrochloric Acid Digestion	APHA 3030 F
	Aluminium	APHA 3500-Al B
	Antimony	In house method no. 20 based on APHA 3114 C
	Arsenic	APHA 3114 C
	Boron	APHA 4500-B C
	Mercury	APHA 3112 B
	Selenium	APHA 3114 C
	Tin	In house method No.1 based on APHA 3114 C

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued) • Effluent	Cadmium Calcium as Ca Chromium, Total Cobalt Copper Gold Iron Lead Magnesium Manganese Nickel Potassium Silver Sodium Zinc	APHA 3111 B
	Volatile Organic Compounds (VOC) Benzene Toluene Ethylbenzene o-Xylene m,p-Xylene Total Xylene	APHA 6200 B
	Trihalomethanes (THM) Chloroform Dichlorobromomethanes Dibromochloromethanes Bromoform	APHA 6232 C
	Chlorinated Phenoxy Acid Herbicides: 2,4-D	APHA 6640 B (21st Edition)

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued) • Effluent	**Organochlorine Pesticides** Aldrin α-BHC β-BHC δ-BHC γ-BHC (Lindane) 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Endrin Ketone Heptachlor Heptachlor epoxide (isomer B) 4,4'-Methoxychlor Chlordane Hexachlorobenzene	APHA 6630 B

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued) • Effluent	Ammoniacal Nitrogen	APHA 4500-NH_3 F
	Beryllium	APHA 3120 B
	Molybdenum	APHA 3120 B
	Vanadium	APHA 3120 B
	Palladium	In house method No. 31 based on APHA 3120 B
	Phosphorus as P (or PO_4)	APHA 4500-P B F
	Nitrate as N (or NO_3) Nitrite as N (or NO_2)	USEPA 353.2
	Ammoniacal Nitrogen	APHA 4500-NH_3 G
	Phenol	USEPA 420.2
	Cyanide	APHA 4500-CN^- C E
	Fluoride	APHA 4500-F^-C

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring • Rubber/ Palm Oil Mill Effluent	pH	APHA 4500-H^+B
	Chemical Oxygen Demand (COD) Ammoniacal Nitrogen as NH_4-N	DOE (M) 1985 (Reference Method)
	Suspended Solids Oil & Grease Biochemical Oxygen Demand (BOD_3) 3 days at 30°C	DOE (M) 1985 (Alternative Method)
• Sewage • Effluent	Antimony Aluminium Arsenic Boron Barium Bismuth Calcium Cadmium Cobalt Chromium Copper Iron Gallium Indium Potassium Lithium Magnesium Manganese Sodium Nickel Lead Silicon Silver Selenium Strontium Thallium Zinc	APHA 3120 B

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued) • Sewage • Effluent	Mercury	In-house method No. 24 based on APHA 3120 B
	Tin	In-house method No. 25 based on APHA 3120 B
• Sewage	Chemical Oxygen Demand (COD)	APHA 5220 C
	Biochemical Oxygen Demand (BOD)	APHA 5210 B, APHA 4500-O G
	Suspended Solid	APHA 2540 D
	Ammonia Nitrogen As N	APHA 4500-NH_3 B, C
	Nitrate as N	APHA 4500-NO_3^- B
	Phosphorus as P (or PO_4)	APHA 4500-P, B, C
	Oil & Grease	APHA 5520 B
	Phosphorus as P (or PO_4)	APHA 4500-P B F
	Nitrate as N (or NO_3) Nitrite as N (or NO_2)	USEPA 353.2
	Ammoniacal Nitrogen	APHA 4500-NH_3 G
	Phenol	USEPA 420.2
	Cyanide	APHA 4500-CN^- C E

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water • Marine Water	Antimony Aluminium Arsenic Boron Barium Cadmium Chromium Copper Iron Manganese Nickel Lead Silver Selenium Zinc	APHA 3120 B
	Mercury	In-house method No. 24 based on APHA 3120 B
	Tin	In-house method No. 25 based on APHA 3120 B
	Ammoniacal Nitrogen	APHA 4500-NH_3 F
	Phosphorus as P (or PO_4)	USEPA 365.1
	Nitrate as N (or NO_3) Nitrite as N (or NO_2)	USEPA 353.4
	Ammoniacal Nitrogen	USEPA 349.0
	Phenol	USEPA 420.4
• Drinking Water	Beryllium	APHA 3120 B
	Molybdenum	APHA 3120 B
	Vanadium	APHA 3120 B
	Palladium	In house method No. 31 based on APHA 3120 B

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water • Drinking Water • Potable Water • Processed Water • Surface Water • Ground Water • Mineral Water	Alkalinity	APHA 2320 B
	Biochemical Oxygen Demand (BOD)	APHA 5210 B
	Chromium, Hexavalent	APHA 3500-Cr B
	Chromium, Trivalent	In house method no. 19 based on APHA 3500-Cr B
	Chemical Oxygen Demand (COD)	APHA 5220 B APHA 5220 C APHA 5220 D
	Cyanide	APHA 4500 – CN^- C & F OSRMA P-456
	Colour	APHA 2120 B APHA 2120 F
	Free Chlorine	APHA 4500-Cl F
	Formaldehyde	OSRMA PG-458 APHA 6252 B
	pH	APHA 4500-H^+ B
	Phenol	APHA 5530 B C
	Sulphide	APHA 4500-S^{2-} F
	Total Solids	APHA 2540 B
	Total Dissolved Solid	APHA 2540 C

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water (continued)		
• Drinking Water • Potable Water • Processed Water • Surface Water • Ground Water • Mineral Water	Suspended Solids	APHA 2540 D
	Fixed and volatile solids ignited at 550ºC (Mixed Liquor Volatile Suspended Solids or MLVSS)	APHA 2540 E
	Mixed Liquor Suspended Solids (MLSS)	In house method No.23 based On APHA 2540 D
	Nitrite	APHA 4500-NO_2^-B
	Nitrogen/ Nitrate as N/ NO_3	AOAC 973.50
	Nitrate	APHA 4500-NO_3^- B
	Phosphorus as P (or PO_4)	APHA 4500-P B, C
	Chloride	APHA 4500-Cl^- C
	Fluoride	APHA 4500-F^- D
	Ammonia Nitrogen as N	APHA 4500-NH_3 B, C
	Oil & Grease	APHA 5520 B
	Dissolved Oxygen	APHA 4500-O G
	Silica as SiO_2	APHA 4500-SiO_2 D
	Anionic Surfactant as MBAS	APHA 5540 C
	Hardness (EDTA)	APHA 2340 C
	Hardness (Calculation)	APHA 2340 B
	Turbidity	APHA 2130 B
	Sulphate	APHA 4500-SO_4^{2-} E
	Bicarbonate Alkalinity	APHA 4500-CO_2 D
	Carbonate Alkalinity	APHA 4500-CO_2 D

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water (continued) • Drinking Water • Potable Water • Processed Water • Surface Water • Ground Water • Mineral Water	Free Carbon Dioxide Hydroxide Alkalinity Total Carbon Dioxide	APHA 4500-CO_2 D
	Preliminary Treatment of Samples: Digestion for metals Nitric Acid Digestion Nitric Acid-Hydrochloric Acid Digestion Aluminium Antimony Arsenic Boron	 APHA 3030 D APHA 3030 E APHA 3030 F APHA 3500-Al B In house method no. 20 based on APHA 3114 C APHA 3114 C APHA 4500-B C
	Cadmium Calcium Chromium, Total Cobalt Copper Gold Iron Lead Magnesium Manganese Nickel Potassium Silver Sodium Zinc	APHA 3111 B

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water (continued) • Drinking Water • Potable Water • Processed Water • Surface Water • Ground Water • Mineral Water	Mercury Selenium Tin	APHA 3112 B APHA 3114 C In house method No.1 based on APHA 3114 C
	Volatile Organic Compounds (VOC) Benzene Toluene Ethylbenzene o-Xylene m,p-Xylene Total Xylene	APHA 6200 B
	Trihalomethanes (THM) Chloroform Dichlorobromomethanes Dibromochloromethanes Bromoform	APHA 6232 C

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water (continued) • Drinking Water • Potable Water • Processed Water • Surface Water • Ground Water • Mineral Water	**Organochlorine Pesticides** Aldrin α-BHC β-BHC δ-BHC γ-BHC (Lindane) 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Endrin Ketone Heptachlor Heptachlor epoxide (isomer B) 4,4'-Methoxychlor Chlordane Hexachlorobenzene	APHA 6630 B
	Chlorinated Phenoxy Acid Herbicides: 2,4-D	APHA 6640 B (21st Edition)

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water • Drinking Water • Potable Water • Processed Water • Surface Water • Ground Water • Mineral Water	Antimony Aluminium Arsenic Boron Barium Bismuth Calcium Cadmium Cobalt Chromium Copper Iron Gallium Indium Potassium Lithium Magnesium Manganese Sodium Nickel Lead Silicon Silver Selenium Strontium Thallium Zinc	APHA 3120 B
	Mercury Tin	In-house method No. 24 based on APHA 3120 B In-house method No. 25 based on APHA 3120 B
	Phosphorus as P (or PO_4)	APHA 4500-P B F USEPA 365.1
	Nitrate as N (or NO_3)	USEPA 353.2 USEPA 353.4

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water (continued) • Drinking Water • Potable Water • Processed Water • Surface Water • Ground Water • Mineral Water	Nitrite as N (or NO_2)	USEPA 353.2 USEPA 353.4
	Ammoniacal Nitrogen	APHA 4500-NH_3 G USEPA 349.0
	Phenol	USEPA 420.2 USEPA 420.4
	Cyanide Fluoride	APHA 4500-CN^- C E APHA 4500-F^-C

SCOPE OF TESTING: CHEMICAL

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Foods • Seafood	Salt (Chlorine as Sodium Chloride)	AOAC 937.09
• Meats	Sulfurous acid (Free)	AOAC 892.02
• Non-solid Food and Beverages	Benzoic acid	AOAC 960.38
• Vitamin Preparations and Juices	Ascorbic acid	AOAC 967.21
• Molasses	Total Sugar expressed as Invert Sugar	AOAC 968.28
• Baking Powders	Starch	AOAC 920.44
• Cured Meat	Nitrites	AOAC 973.31
• Cocoa Products	Fat Moisture	AOAC 963.15 AOAC 931.04
• Fruits and Fruits Products	Phosphorus	AOAC 970.39
• Vinegar	Total acids	AOAC 930.35 (J) (1995)
• Milk	Nitrogen (Total)	AOAC 991.20 (1995)
• Food	Zinc Na, Pb, Ca, Cu, K, Mn, Mg, Zn, Cd, Ag, Ni, Cr and Fe Ash	AOAC 969.32 and In-house method no. 18 based on AAS Instrument Manual AOAC 31.012 (method 1)

SCOPE OF TESTING: CHEMICAL

SITE: CATEGORY I

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring		
• Flue Gas	Determination of particulate emissions from stationary sources	EPA 40 CFR 60, App.A, Method - 5
	Determination of sulfur dioxide emissions from stationary sources	EPA 40 CFR 60, App.A, Method - 6
	Determination of nitrogen oxide emissions from stationary sources	EPA 40 CFR 60, App.A, Method - 7
	Determination of sulfuric acid mist and sulfur dioxide emissions from stationary sources	EPA 40 CFR 60, App.A, Method - 8
	Determination of metals emissions from stationary sources	EPA 40 CFR 60, App.A, Method -29
	Determination of concentration & mass flow of particulate matter in flue gas for stationary source emissions	MS 1596 : 2003
	Determination of dark smoke emissions from chimney using Ringelmann Smoke Chart	United Stated Department of the Interior Bureau of Mines IC 8333, 1967
	Determination of dark smoke emissions from chimney using Ringelmann Smoke Chart	BS 2742:1969
	Sampling of hydrogen halide and halogen emissions from stationary sources – isokinetic method	US EPA Method 26A, 1998 (sampling)
	Determination of NO & NO_2 (Sum of NO and NO_2 expressed as NO2 by calculation)	In house method No. 28 based on Manufacturer Method (Sum of NO and NO_2 expressed as NO2 by calculation)
	Determination of CO & O_2	In house method No. 29 based on Manufacturer Method

SCOPE OF TESTING: CHEMICAL

SITE: CATEGORY I

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring		
• Air	Ambient Air-Determination of Total Suspended Particulates (TSP)	AS 2724.3
	Ambient Air-Determination of Lead (Pb)	AS 2800
	Nitrogen Dioxide (NO_2) in the atmosphere (24 hrs Average)	ISC Method 408
	Sulphur Dioxide (SO_2) in the atmosphere	ISC Method 704A
	Suspended Particulate Matter – PM_{10}	AS 3580.9.6 - 1990
	Determination of lead from workplace	NIOSH 7082
	Volatile Organic Compounds (screening) at workplace (Refer to Appendix I)	NIOSH 2549
	Ambient Air- Determination of PM 2.5	In house method no. 27 based on Manufacturer Method
	Ambient Air- Determination of PM 10	In house method no. 27A based on Manufacturer Method
• Environment	Measurement of noise	ISO 1996/1
• Effluent	pH	APHA 4500 H^+B
	Temperature	APHA 2550 B
	Dissolved oxygen	APHA 4500-O G
• Water	pH	APHA 4500 H^+B
	Temperature	APHA 2550 B
	Dissolved oxygen	APHA 4500-O G

SCOPE OF TESTING: CHEMICAL

SITE: CATEGORY I

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring (continued)		
• Sewage	Temperature	APHA 2550 B
	pH	APHA 4500-H^+ B

Note:

APHA	:	Standard Methods for the Examination of Water and Wastewater, American Public Health Association, American Water Works Association and Water Environment Federation, 21st Edition, 2005
OSRMA	:	Official Standardised and Recommended methods of Analysis, 2nd Edition, 1973
DOE	:	Revised Standard Methods for Analysis of Rubber and Palm Oil Mill Effluent , 2nd Edition, 1995
AS	:	Australia Standard
ISC	:	Methods of Air Sampling and Analysis, 3rd Edition, 1990. APHA Intersociety Committee.
AOAC	:	Association of Official Analytical Chemists, 13th Edition, 1995
NIOSH	:	National Institute of Occupational Safety and Health, 4th Edition 1984.
ISO	:	International Organization for Standardization, First Edition 1982.
BS	:	British Standard, First Revision 1969.
MS	:	Malaysian Standard , ICS 13.040.40, 2003
EPA	:	Environmental Protection Agency, Part 60 Revised as of July 1,1998
USEPA	:	United States of Environmental Protection Agency

Signatories:

1.	**Siew Yoke Lan**	**IKM No.: L/0747/1771/86**	
2.	**Kan King Choy**	**IKM No.: L/0797/1886/88**	**(Non-resident)**
3.	**Low Poh Ling**	**IKM No.: L/1237/4016/99**	
4.	**Efarizan binti Suradi**	**IKM No.: L/2676/7939/18**	

SCOPE OF TESTING: MICROBIOLOGY

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Food	Aerobic Plate Count/Total Plate Count	FDA – BAM Chapter 3
	Yeast and Mold	FDA – BAM Chapter 18
	Coliform, Fecal Coliform and E. coli	FDA – BAM Chapter 4
	Staphylococcus aureus	FDA – BAM Chapter 12
Water	Heterotrophic Plate Count/ Total Plate Count	APHA 9215 B
	Heterotrophic Plate Count/ Total Plate Count	APHA 9215 C
	Coliform	APHA 9221 B
	Fecal Coliform and *Escherichia coli*	APHA 9221 E
	Coliform	In house method No. 12 based on APHA 9222 B (Membrane Filtration method)
	Escherichia coli	In house method No. 13 based on APHA 9222 G (Membrane Filtration method)

Note:

APHA : Standard Methods for the Examination of Water and Wastewater, American Public Health Association, American Water Works Association and Water Environment Federation, 21st Edition, 2005

FDA : Bacteriological Analytical Manual, Food & Drug Administration , Edition 8 Revision A, 1998

Signatories:

1. **Prof. Dr. Thong Kwai Lin** **(Non-resident)**
2. **Siew Yoke Lan** **IKM No.: L/0747/1771/86**

SCOPE OF TESTING: MICROBIOLOGY

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Water	Pseudomonas aeruginosa	In-house method No. 38 based on APHA 9213 E (Membrane Filtration method)
	Enterococci	APHA 9230 C (Membrane Filtration method)
	Fecal Streptococci	APHA 9230 C (Membrane Filtration method)

Note:

APHA : Standard Methods for the Examination of Water and Wastewater, American Public Health Association, American Water Works Association and Water Environment Federation, 21st Edition, 2005

FDA : Bacteriological Analytical Manual, Food & Drug Administration , Edition 8 Revision A, 1998

Signatories:

1. **Prof. Dr. Thong Kwai Lin** **(Non-resident)**