

Schedule

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Certificate No. : LA-2015-0595-F
Issue No. : 13
Date : 03 April 2023
Expiry Date of Certificate : 18 May 2027
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FIELD OF TESTING : Environmental Testing

MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	SIGNATORIES
A. WATER ANALYSIS <ul style="list-style-type: none"> • Ballast water • Drinking water (Potable) • Non-potable water • Fresh water • Industrial water • Wastewater, Trade effluent • Ground water • RO water • DI water • Swimming pool water • Cooling tower water • Sea water 	1. Acidity	<u>APHA Methods are based on 24th Edition: 2023</u> APHA 2310B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	2. Acid and Base-Neutralizing Capacities	DIN 38409-7: 2005	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	3. Alkalinity	APHA 2320B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	4. Ammonia	APHA 4500-NH ₃ (D) APHA 4500-NH ₃ (H)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	5. Appearance	APHA 2110	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	6. Biochemical Oxygen Demand (BOD)	APHA 5210B	WPH, TTP, UFG, LYH, CVK, LJJ
	7. Bromide	APHA 4110B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	8. Calcite Saturation	DIN 38404-10: 1995	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	9. Carbon Dioxide and Forms of Alkalinity	APHA 4500-CO ₂ (D)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO

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	10. Cations by Ion Chromatography (IC)	ASTM D6919-17	WPH, TTP, UFG, LYH, CVK, LJJ
	11. Chemical Oxygen Demand (COD)	HACH Method 8000 (Jul 2021) APHA 5220B APHA 5220D	WPH, TTP, UFG, LYH, CVK, LJJ
	12. Chemical Oxygen Demand (COD) for Seawater or Water Samples with High Chloride Content	In-house Method MLS-SOP-WQ-029 Rev 1 (adapted from HACH)	WPH, TTP, UFG, LYH, CVK, LJJ
	13. Chloride Chloride (by Titration)	APHA 4110B APHA 4500-Cl ⁻ (D)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	14. Chlorine as Cl ₂ (Residual)	Lovibond Test Kit (DPD) Rev 1.0 APHA 4500-Cl (F)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	15. Chlorine (Free)	HACH Method 8021 (Jan 2014) HACH Method 10241 (Apr 2021) Lovibond Method 110	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	16. Chlorine (Total)	HACH Method 8167 (Jan 2022) Lovibond Method 110	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	17. Chlorophyll-a	APHA 10150B (Spectrophotometric) APHA 10150C (Fluorometric)	WPH, TTP, UFG, LYH, CVK, LJJ
	18. Chromium VI	APHA 3500-Cr (B)	WPH, TTP, UFG, LYH, CVK, LJJ
	19. Colour	APHA 2120B APHA 2120C In-House Method: MLS-SOP-WQ-036 Rev 0 (using Lovibond Tintometer)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO

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	20. Complex Cyanide (by Calculation)	In-House Method: MLS-SOP-WQ-035 Rev 0	WPH, TTP, UFG, CVK
	21. Conductivity	APHA 2510B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	22. Cyanide (Free)	USEPA 9016 (Jun 2010)	WPH, TTP, UFG, CVK
	23. • Cyanide (Total) • Cyanide (Weak acid dissociable)	APHA 4500-CN- (N)	WPH, TTP, UFG, CVK
	24. • Cyanide (Total) • Cyanide (Weak acid dissociable)	APHA 4500-CN- (O)	WPH, TTP, UFG, CVK
	25. Cyanogen Chloride	APHA 4500-CN- (J)	WPH, TTP, UFG, CVK
	26. Cyanuric acid	HACH Method 8139 (Jan 2014)	WPH, TTP, UFG, LYH, CVK, LJJ
	27. Cyindrospermopsin	USEPA 545 (Apr 2015)	WPH, TTP
	28. Detergents (MBAS)	APHA 5540C	WPH, TTP, UFG, LYH, CVK, LJJ
	29. Disinfectant by-products: • Bromochloroacetonitrile • Chloropicrin • Dibromoacetonitrile • Dichloroacetonitrile • Trichloroacetonitrile	USEPA 551.1 (1995)	WPH, TTP, UFG, LJJ, CBS
	30. Dissolved Oxygen	APHA 4500-O (G)	WPH, TTP, UFG, LYH, CVK, LJJ
	31. Elements / Metals	APHA 3125B (Refer to Appendix 1 for list of elements)	WPH, TTP, UFG, CVK, NKO

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	32. Elements / Metals	APHA 3120B USEPA 6010D (Jul 2018) (Refer to Appendix 5 for list of elements)	WPH, TTP, UFG, CVK, NKO
	33. Fixed Solids (FS)	APHA 2540E	WPH, TTP, UFG, LYH, CVK, LJJ
	34. Flavor Threshold Number (FTN)	APHA 2160B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	35. Flocculated Filtered Chemical Oxygen Demand (ff COD)	Methods for Wastewater Characterization in Activated Sludge Modeling (2004) Section 7.4.1	WPH, TTP, UFG, LYH, CVK, LJJ
	36. Fluoride	APHA 4110B APHA 4500-F (C)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	37. Formaldehyde	APHA 6252B	WPH, TTP, UFG, LJJ, CBS
	38. Glyphosate and AMPA	In-House Method: MLS-SOP-WQ-040 Rev 0 (using LCMS-MS)	WPH, TTP
	39. Geosmin (GSM) 2-Methylisoborneol (MIB)	APHA 6040D	WPH, TTP, UFG

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	40. Haloacetic Acids & Dalapon: <ul style="list-style-type: none"> • Bromochloroacetic acid (BCAA) • Dibromoacetic acid (DBAA) • Dibromochloroacetic acid (DBCAA) • Dichloroacetic acid (DCAA) • Dichlorobromoacetic acid (DCBAA) • Monobromoacetic acid (MBAA) • Monochloroacetic acid (MCAA) • Tribromoacetic acid (TBAA) • Trichloroacetic acid (TCAA) • Dalapon 	USEPA 552.3 (2003)	WPH, TTP, UFG, LJJ, CBS
	41. Hardness as CaCO ₃	APHA 2340B	WPH, TTP, UFG, LYH, CVK, NKO
	42. Hydrazine	HACH Method 8141 (Aug 2019) ASTM D1385-07	WPH, TTP, UFG, LYH, CVK, LJJ
	43. Inorganic Anions (Bromate, Chlorite, Chlorate)	USEPA 300.1 (1997)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	44. Inorganic Anions (Bromate, Chlorite, Chlorate) in Seawater	In-house Method MLS-SOP-WQ-034 Rev 1 (Sample Preparation) USEPA 300.1 (1997) (Analysis)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	45. Inorganic Anions (Bromate, Chlorite, Chlorate) in NaOCl	In-house Method MLS-SOP-WQ-038 Rev 1 (Sample Preparation) USEPA 300.1 (1997) (Analysis)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO

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	46. Iron (Fe ²⁺)	HACH Method 8146 (Aug 2019)	WPH, TTP, UFG, LYH, CVK, LJJ
	47. Mercury	USEPA 245.1 (FIMS) (1994)	WPH, TTP, UFG, CVK, NKO
	48. Microcystins	Abraxis Test Kit	WPH, TTP, UFG LYH, CVK
	49. Microcystins-LR	USEPA 544 (Feb 2015)	WPH, TTP, LJJ
	50. Nitrate	APHA 4110B APHA 4500-NO ₃ (I)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	51. Nitrite	APHA 4110B APHA 4500-NO ₃ (I)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	52. Odor Threshold Number (OTN)	APHA 2150B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	53. Oil and Grease	USEPA 1664 (Feb 2010)	WPH, TTP, UFG, LYH, CVK, LJJ
	54. Oil & Grease (Hydrocarbon)	APHA 5520F	WPH, TTP, UFG, LYH, CVK, LJJ
	55. Oil & Grease (Total) by FTIR	In-house Method MLS-SOP-WQ-033 Rev 0 (adapted from APHA 5520C)	WPH, TTP, UFG, LYH, CVK, NKO, LJJ
	56. Oil & Grease (Total) by Gravimetric	APHA 5520B	WPH, TTP, UFG, LYH, CVK, LJJ
	57. Perchlorate (Freshwater and Seawater)	USEPA 314.0 (Nov 1999)	WPH, TTP, UFG, CVK, LJJ, NKO
	58. Perchlorate (NaOCl)	In-house Method: MLS-SOP-WQ-039 Rev 0 (Sample Preparation) USEPA 314.0 (Nov 1999) (Analysis)	WPH, TTP, UFG, CVK, LJJ, NKO

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	59. pH	APHA 4500-H (B)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	60. Phenolic Compounds (as Phenol)	APHA 5530B (Distillation) APHA 5530D (Determination) In-house Method: MLS-SOP-WQ-009 Rev 2 using Microdist Method (Distillation) APHA 5530D using Flow Injection Analysis Colorimetry (Determination)	WPH, TTP, UFG, CVK WPH, TTP, UFG, CVK
	61. Phosphate as PO ₄	In-house Method: MLS-SOP-WQ-009 Rev 2	WPH, TTP, UFG, CVK
	62. Polybrominated Diphenyl Ethers (PBDEs)	APHA 4110B APHA 4500-P (E) APHA 4500-P (G)	WPH, TTP, UFG, LYH, CVK, NKO, LJJ (APHA 4110B only)
	63. Salinity	In-house Method: MLS-SOP-WQ-020 Rev 1	WPH, TTP, UFG, LJJ, CBS
	64. Settleable Solids	APHA 2520B	WPH, TTP, UFG, LYH, CVK, LJJ
	65. Silica as SiO ₂	APHA 2540F	WPH, TTP, UFG, LYH, CVK, LJJ
	66. Silt Density Index (SDI)	APHA 4500-SiO ₂ (D) HACH Method 8282 (Jan 2014) HACH Method 8186 (Sep 2019)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	67. Sulfate	ASTM D4189-07	WPH, TTP, UFG, LYH, CVK, LJJ
		APHA 4110B HACH Method 8051 (Oct 2019)	WPH, TTP, UFG, LYH, CVK, LJJ, NKO

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	68. Sulfide	APHA 4500-S ²⁻ (D) APHA 4500-S ²⁻ (F)	WPH, TTP, UFG, LYH, CVK, LJJ
	69. Taste	APHA 2160C	WPH, TTP, UFG, LYH, CVK, LJJ
	70. Temperature	APHA 2550B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	71. Thiocyanate	APHA 4500-CN- (M)	WPH, TTP, UFG, CVK
	72. Total Dissolved Solids	APHA 2540C	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	73. Total Kjeldahl Nitrogen Content (TKN)	APHA 4500-N _{org} (D)	WPH, TTP, UFG, CVK
	74. Total Nitrogen	APHA 4500-N (C)	WPH, TTP, UFG, CVK
	75. Total Nitrogen (TN) Total Phosphorus (TP)	APHA 4500-P (J)	WPH, TTP, UFG, CVK
	76. • Total Organic Carbon (TOC) • Dissolved Organic Carbon (DOC)	APHA 5310B	WPH, TTP, UFG, LYH, CVK, LJJ, NKO
	77. Total Organic Carbon (TOC)	APHA 5310C	WPH, TTP, UFG, LYH, CVK, LJJ, NKO

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	78. Total Phosphorus	APHA 4500-P (H) In-house Method: MLS-SOP-WQ-028 Rev 0 (Digestion) APHA 4500-P (E) (Determination)	WPH, TTP, UFG, CVK WPH, TTP, UFG LYH, CVK, NKO
	79. Total Solids	APHA 2540B	WPH, TTP, UFG, LYH, CVK, LJJ
	80. Total Suspended Solids	APHA 2540D	WPH, TTP, UFG, LYH, CVK, LJJ
	81. Total Volatile Solids	APHA 2540E	WPH, TTP, UFG, LYH, CVK, LJJ
	82. Tributyltin (TBT)	APHA 6710B	WPH, TTP, UFG, LJJ, CBS
	83. Turbidity	APHA 2130B	WPH, TTP, UFG, LYH, CVK, LJJ NKO
	84. Urea in Seawater	In-house Method: MLS-SOP-WQ-041 Rev 0	WPH, TTP, UFG, LYH, CVK, LJJ
	85. UV-Absorbing Organic Constituents at 254nm / UV Transmittance (UVT)	APHA 5910B	WPH, TTP, UFG, LYH, CVK, LJJ
	86. Volatile Suspended Solids	APHA 2540E	WPH, TTP, UFG, LYH, CVK, LJJ
	87. Volatile Fatty Acids (VFA)	APHA 5560C HACH Method 10240 (Mar 2015) APHA 5560D	WPH, TTP, UFG, LYH, CVK, LJJ WPH, TTP, LJJ, CBS

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B. ENVIRONMENTAL SAMPLES <ul style="list-style-type: none"> • Water • Soil • Sediment • Sludge 	1. Aliphatics and Aromatics Hydrocarbons (C6-C35)	In-house Method: MLS-SOP-WQ-042 Rev 0	WPH, TTP, LJJ, CBS
	2. Dimethylformamide (DMF) Dimethyl sulfoxide (DMSO)	In-house Method: MLS-SOP-WQ-043 Rev 0 (using GC-FID)	WPH, TTP, LJJ, CBS
	3. Heavy Metals by ICP-MS	USEPA 3015A (2007) USEPA 3050B (1996) USEPA 3051A (2007) USEPA 3052 (1996) APHA 3125B (Refer to Appendix 1 for list of elements)	WPH, TTP, UFG, CVK, NKO
	4. Heavy Metals by ICP-OES	USEPA 3015A (2007) USEPA 3050B (1996) USEPA 3051A (2007) USEPA 3052 (1996) APHA 3120B USEPA 6010D (Jul 2018) (Refer to Appendix 5 for list of elements)	WPH, TTP, UFG, CVK, NKO
	5. Leaching of Granular Waste Materials and Sludges	BS EN 12457-1:2002	WPH, TTP, UFG, CVK, NKO
	6. Mercury Speciation by FIMS: <ul style="list-style-type: none"> • Total Mercury • Inorganic Mercury • Organic Mercury 	In-house Method: MLS-SOP-SED-006 Rev 1	WPH, TTP, UFG, CVK, NKO
	7. Oil & Grease	USEPA 9071B (1998)	WPH, TTP, UFG, CVK
	8. Oil & Grease for Sludge	APHA 5520E	WPH, TTP, UFG, CVK

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	9. Per- and polyfluoroalkyl substances (PFASs) by LCMS-MS: <ul style="list-style-type: none"> • Perfluorooctanesulfonic acid (PFOS) • Perfluorooctanoic acid (PFOA) 	USEPA 537.1 (Mar 2020) USEPA 8327 (Jul 2021)	WPH, TTP, LJJ
	10. Pesticides and Toxaphene	USEPA 8081B (2007) USEPA 3510C (1996) USEPA 3545A (2007) (Refer to Appendix 6 for list of compounds)	WPH, TTP, LJJ, CBS
	11. Pharmaceutical and Personal Care Products in Environmental Samples: <ul style="list-style-type: none"> • Caffeine • Triclocarban • Ibuprofen • Naproxen • Gemfibrozil • Diclofenac Sodium • Ketoprofen • Acetaminophen 	USEPA 1694 (2007)	WPH, TTP, LJJ
	12. Polychlorinated Biphenyls (PCB)	USEPA 8082A (2007) USEPA 3510C (1996) USEPA 3545A (2007) (Refer to Appendix 6 for list of compounds)	WPH, TTP, LJJ, CBS
	13. Semi-Volatile Organic Compounds (SVOC)	USEPA 8270E (Jun 2018) (Refer to Appendix 4 for list of compounds)	WPH, TTP, LJJ, CBS
	14. Settled Sludge Volume	APHA 2710C	WPH, TTP, UFG, CVK, LJJ
	15. Sludge Volume Index (SVI)	APHA 2710D	WPH, TTP, UFG, CVK, LJJ

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	16. Synthetic Precipitation Leaching Procedure (SPLP)	USEPA 1312 (1994) APHA 3120B APHA 3125B USEPA 6010D (Jul 2018)	WPH, TTP, UFG, CVK, NKO
	17. Time-to-Filter	APHA 2710H	WPH, TTP, UFG, CVK, LJJ
	18. Total, Fixed & Volatile Solids in Solid & Semi-solid Samples	APHA 2540G	WPH, TTP, UFG, CVK, LJJ
	19. Total Organic Carbon (TOC)	BS EN 15936:2022	WPH, TTP, UFG, LJJ, NKO
		In-House Method: MLS-SOP-SED-007 Rev 0 (by Suspension)	WPH, TTP, UFG, LJJ, NKO
	20. Total Petroleum Hydrocarbon (TPH) by FTIR	USEPA 8440 (1996) USEPA 3540C (1996) (Extraction)	WPH, TTP, UFG, CVK, NKO
	21. Total Petroleum Hydrocarbon: • Diesel Range Organics (DRO) • Gasoline Range Organics (GRO)	USEPA 8015C (2007)	WPH, TTP, LJJ, CBS
	22. Toxicity Characteristic Leaching Procedure (TCLP): Ag, As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, Zn, CN, F, Phenolic compounds as Phenol	USEPA 1311 (1992) (exclude Zero-Headspace Extraction) APHA 3120B APHA 3125B USEPA 6010D (Jul 2018)	WPH, TTP, UFG, CVK, NKO

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C. FINE AGGREGATE / SOIL / SEDIMENT	23. Volatile Organic Compounds (VOC)	USEPA 8260D (Jun 2018) (Refer to Appendix 2 for list of compounds)	WPH, TTP, LJJ, CBS
	24. Volatile Organic Compounds (VOC) and Solvents	USEPA 8260D (Jun 2018) USEPA 1666 Rev A (1998) (Refer to Appendix 3 for list of compounds)	WPH, TTP, LJJ, CBS
	1. Bioaccessibility Arsenic and Lead	In-house Method: MLS-SOP-SED-002 Rev 2	WPH, TTP, UFG, CVK, NKO
	2. Carbonate	BS 1377-3:2018+A1:2021 Section 8	WPH, TTP, UFG, LJJ
	3. Chloride • Acid-soluble • Water-soluble	BS 1377-3:2018+A1:2021 Section 9	WPH, TTP, CVK, LJJ
	4. Conductivity in Soil	Australian Standard (Soil Survey Standard Method: EC-C1-A-3)	WPH, TTP, UFG, CVK, LJJ
	5. Fall Velocity by Owen Tube Method	In-house Method: MLS-SOP-SED-001 Rev 0	WPH, TTP, UFG, CVK
	6. Mass Loss on Ignition (440°C)	BS 1377-3:2018+A1:2021 Section 6	WPH, TTP, CVK, LJJ
	7. Material in Soils Finer than 75 µm	ASTM D1140-17	WPH, TTP, CVK, LJJ
	8. Moisture (Water Content)	BS EN ISO 17892-1: 2014+A1:2022	WPH, TTP, CVK, LJJ
9. pH	BS 1377-3:2018+A1:2021 Section 12	WPH, TTP, CVK, LJJ	
10. Shell / Coral Content	SANS 5840: 2008 Ed 2.2	WPH, TTP, UFG, LJJ	

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	11. Sulfate • Acid-soluble • Water-soluble	BS 1377-3:2018+A1:2021 Section 7	WPH, TTP, CVK, LJJ
	12. Total Phosphorus (TP) (Plant)	USEPA 3052 (1996) (Digestion) APHA 3120B (Determination)	WPH, TTP, UFG, CVK, NKO
D. WATER FOR MAKING CONCRETE	1. Suitability of Water	BS EN 1008: 2002 (Preliminary assessment)	WPH, TTP, UFG, LYH, CVK, LJJ
E. WATER MICROBIOLOGY • Ballast water • Drinking water (Potable) • Non-potable water • Fresh water • Industrial water • Wastewater, Trade effluent • Ground water • RO water • DI water • Swimming pool water • Cooling tower water • Sea water	1. Actinomycete using Double-Layer Agar Technique	APHA 9250B	WPH, JRG, LCH, LWE, CWY
	2. Aerobic Endospore Bacteria	APHA 9218B	WPH, JRG, LCH, LWE, CWY
	3. Aeromonas	APHA 9262	WPH, JRG, LCH, LWE, CWY
	4. Aspergillus	In-house Method: MLS-SOP-MB-017 Rev 2	WPH, JRG, LCH, LWE, CWY
	5. Assimilable Organic Carbon (AOC)	APHA 9217B	WPH, JRG, LCH, LWE, CWY
	6. <i>Bacillus subtilis</i>	In-house Method: MLS-SOP-MB-018 Rev 3	WPH, JRG, LCH, LWE, CWY
	7. Campylobacter	ISO 17995: 2019	WPH, JRG, LCH, LWE, CWY
	8. Clostridium perfringens	NSM HPA Reference No. W5i3.1:2005	WPH, JRG, LCH, LWE, CWY
	9. Coliforms	APHA 9221B (MPN Method) APHA 9222B (MF Method) APHA 9222C (MF Method)	WPH, JRG, LCH, LWE, CWY

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	10. Cryptosporidium and Giardia	USEPA 1623.1 (2012)	WPH, JRG, LCH
	11. Enterococci	APHA 9230C (23 rd Ed., 2017)	WPH, JRG, LCH, LWL, CWY
	12. <i>Escherichia coli</i>	APHA 9221F (MPN Method) APHA 9222H (MF Method)	WPH, JRG, LCH, LWL, CWY
	13. Faecal Coliforms	APHA 9221E (MPN Method) APHA 9222D (MF Method) APHA 9222E (MF Method)	WPH, JRG, LCH, LWL, CWY
	14. Faecal Enterococci / <i>Streptococci</i>	APHA 9230C (MF Method)	WPH, JRG, LCH, LWL, CWY
	15. Faecal <i>Streptococci</i>	APHA 9230C (MF Method) (23 rd Ed., 2017)	WPH, JRG, LCH, LWL, CWY
	16. Klebsiella spp. by Membrane Filter Procedure	APHA 9222F	WPH, JRG, LCH, LWL, CWY
	17. Male-specific (F+) and Somatic Coliphage	USEPA 1602 (2001)	WPH, JRG, LCH, LWL, CWY
	18. <i>Pseudomonas aeruginosa</i>	APHA 9213E (MF Method)	WPH, JRG, LCH, LWL, CWY
	19. <i>Salmonella</i> spp.	APHA 9274	WPH, JRG, LCH, LWL, CWY
	20. Sampling and Extraction of Enterovirus	APHA 9510C	WPH, JRG, LCH
	21. <i>Shigella</i> spp.	APHA 9276	WPH, JRG, LCH, LWL, CWY
	22. Spore of Sulphite-reducing Anaerobes	BS EN 26461-2: 1993 ISO 6461/2: 1986	WPH, JRG, LCH, LWL, CWY
	23. <i>Staphylococcus aureus</i>	APHA 9213B (MF Method)	WPH, JRG, LCH, LWL, CWY

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MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	SIGNATORIES
	24. Sulfate-Reducing Bacteria using MPN Technique	ASTM D4412-19	WPH, JRG, LCH, LWE, CWY
	25. Total Bacteria Count	APHA 9215B (PP Method) APHA 9215C (SP Method) APHA 9215D (MF Method) ISO 6222: 1999	WPH, JRG, LCH, LWE, CWY
	26. <i>Vibrio cholera</i>	APHA 9278	WPH, JRG, LCH, LWE, CWY
	27. Yeast and Mould	APHA 9610D	WPH, JRG, LCH, LWE, CWY
F. COOLING TOWER AND WATER FOUNTAIN	1. Examination of Legionellae including Legionella pneumophila	AS 3896: 2017	WPH, JRG, LCH, LWE, CWY
	2. Detection and Enumeration of Legionella	BS 6068-4.12: 1998 ISO 11731: 2017	WPH, JRG, LCH, LWE, CWY
G. BIOLOGICAL ANALYSIS	1. Macrobenthos Analysis	APHA 10500C (Identification)	WPH, LCH, CWY
	• Fresh and Marine Water	2. Phytoplankton & Zooplankton Sampling, Identification and Counting Technique	APHA 10200F APHA 10200G
• Sand and Sediment	1. Cyst Analysis	In-house Method: MLS-SOP-SED-008 Rev 1	WPH, LCH, CWY
H. PURIFIED WATER, PROCESS, BIOLOGICS AND PHARMACEUTICAL WATER, MEDICAL DEVICES	1. Bacterial Endotoxin test by Chromogenic Kinetic Assay	USP 43 <85>	WPH, JRG, LCH,

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MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	SIGNATORIES
I. INDUSTRIAL HYGIENE	1. Elements by ICP Ag, Al, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, K, Li, Mg, Mn, Mo, Ni, Sb, Se, Sr, Sn, Ti, V, Zn	NIOSH 7301: 2003	WPH, TTP, UFG, CVK, NKO
J. SOURCE EMISSION	1. Determination of Hydrogen Halide and Halogen Emissions From Stationary Sources Isokinetic Method	USEPA Method 26a (Oct 2020) (Analysis only) APHA 4110B	WPH, TTP, UFG, CVK, NKO, LJJ
	2. Determination of Metals Emissions From Stationary Sources	USEPA Method 29 (Aug 2017) (Analysis only) APHA 3125B APHA 3120B USEPA 6010D (Jul 2018)	WPH, TTP, UFG, CVK, NKO

Approved Signatories

S/N	Names	Initials
1.	Mr Wong Pik Hung	WPH
2.	Mr Tan Thuan Piang	TTP
3.	Ms Umalia Flordelina Gabriel	UFG
4.	Mr Lee Chun Hao Eric	LCH
5.	Mr Jagadeesan Renugopal	JRG
6.	Mr Lim Yeu How	LYH
7.	Mr Chong Vui Ket, Xavier	CVK
8.	Mr Lee Yean Jie	LJJ
9.	Mr Leong Wei En, Isaac	LWE
10.	Mr. Ng Kok Ong	NKO
11.	Mr. Chua Bing Shiun	CBS
12.	Ms. Chai Wan Yin	CWY

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Note:

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment 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. 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.

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Appendix 1: Metals by ICPMS (APHA 3125B)

Elements

1.	Silver as Ag
2.	Aluminium as Al
3.	Arsenic as As
4.	Gold as Au
5.	Boron as B
6.	Barium as Ba
7.	Beryllium as Be
8.	Bismuth as Bi
9.	Calcium as Ca
10.	Cadmium as Cd
11.	Cobalt as Co
12.	Chromium as Cr
13.	Copper as Cu
14.	Iron as Fe
15.	Germanium as Ge
16.	Mercury as Hg
17.	Holmium as Ho
18.	Indium as In
19.	Iridium as Ir
20.	Potassium as K
21.	Lanthanum as La
22.	Lithium as Li
23.	Magnesium as Mg
24.	Manganese as Mn
25.	Molybdenum as Mo
26.	Sodium as Na

27.	Niobium as Nb
28.	Neodymium as Nd
29.	Nickel as Ni
30.	Phosphorus as P
31.	Lead as Pb
32.	Palladium as Pd
33.	Platinum as Pt
34.	Rhodium as Rh
35.	Antimony as Sb
36.	Scandium as Sc
37.	Selenium as Se
38.	Silicon as Si
39.	Tin as Sn
40.	Strontium as Sr
41.	Tantalum as Ta
42.	Terbium as Tb
43.	Tellurium as Te
44.	Thorium as Th
45.	Titanium as Ti
46.	Thallium as Tl
47.	Uranium as U
48.	Vanadium as V
49.	Tungsten as W
50.	Yttrium as Y
51.	Zinc as Zn
52.	Zirconium as Zr

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Appendix 2: Volatile Organic Compounds, VOC (USEPA 8260D)

Compounds

MONOCYCLIC AROMATICS

Benzene
Toluene
Ethylbenzene
o,m,p-xylene
Styrene

HALOGENATED AROMATICS

1,4-Dichlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene

HALOGENATED ALIPHATICS

Vinyl Chloride
Chloromethane
Chlorobenzene
Chloroethene
Chloroethane
1,1-Dichloroethene
1,2-Dichloroethene (cis + Trans)
1,1-Dichloroethane
Dichloromethane
Carbon Tetrachloride
Trichloroethene
1,1,1-Trichloroethane
1,2-Dichloroethane
Tetrachloromethane
1,1,2-Trichloroethane
Tetrachloroethene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane

OXYGENATED COMPOUNDS

Cyclohexanone
Tetrahydrofuran
Tetrahydrothiophene

TRIHALOMETHANES

Chloroform
Bromodichloromethane
Dibromochloromethane
Bromoform

FUMIGANTS

1,2-Dichloropropane
1,3-Dichloropropane
2,2-Dichloropropane
1,3-Dichloropropene (Cis)
1,3-Dichloropropene (Trans)

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Appendix 3: Volatile Organic Compounds, VOCs and Solvents

S/N	Compound	Method
1	Methylene Chloride	USEPA 8260
2	Trichloroethylene (TCE)	USEPA 8260
3	1,1,1-trichloroethane	USEPA 8260
4	Perchloroethylene (PCE)	USEPA 8260
5	Tetrachloromethane	USEPA 8260
6	1,1,2-Trichloroethane	USEPA 8260
7	Toluene	USEPA 8260
8	Styrene	USEPA 8260
9	Methyl tert-butyl-ether (MTBE)	USEPA 8260
10	Nonane	USEPA 8260
11	Decane	USEPA 8260
12	Ethylbenzene	USEPA 8260
13	Xylenes (o,m,p)	USEPA 8260
14	Hexane	USEPA 8260
15	Heptane	USEPA 8260
16	Octane	USEPA 8260
17	1,2,4-Trimethylbenzene	USEPA 8260
18	Furan	USEPA 8260
19	Tetrahydrofuran (THF)	USEPA 8260
20	N,N-Dimethylformamide (DMF)	USEPA 1666
21	Benzene	USEPA 8260
22	Turpentine (<i>as alpha- & beta-Pinene</i>)	USEPA 8260
23	Isobutanol	USEPA 8260
24	Methyl Ethyl Ketone (MEK)	USEPA 8260
25	Methyl Isobutyl Ketone (MIBK)	USEPA 8260
26	Isopropyl ether	USEPA 8260
27	Diethyl ether	USEPA 8260
28	Dimethyl Sulphide	USEPA 8260
29	Dimethyl Sulphoxide (DMSO)	USEPA 1666

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Appendix 4: Semi-Volatile Organic Compounds, SVOC (USEPA 8270E)

Compounds

PHENOLS

Phenol
2-Chlorophenol
2-Nitrophenol
2,4-Dimethylphenol
2,4-Dichlorophenol
4-Chloro-3-methylphenol
2,4,6-Trichlorophenol
2,4-Dinitrophenol
4-Nitrophenol
Tetrachlorophenol
Pentachlorophenol
Cresoles
Catechol
Resorcinol
Hydroquinone

CHLORINATED HYDROCARBONS

1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichlorobenzene
1,2,4-Trichlorobenzene
Tetrachlorobenzene
Pentachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachlorobenzene
Chloroanilines

POLYNUCLEAR AROMATICS HC

Naphthalene
2-Chloronaphthalene
Anthracene
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Fluoranthene
Benzo(a)anthracene
Pyrene
Chrysene
Benzo(a)pyrene
Dibenz(a,h)anthracene
Benzo(ghi)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Indeno(123cd)pyrene

POLYCHLORINATED BIPHENYLS

PCB 28 (2,4,4'-Trichlorobiphenyl)
PCB 52 (2,2',5,5'-Tetrachlorobiphenyl)
PCB 101 (2,2',4,5,5'-Pentachlorobiphenyl)
PCB 118 (2,3',4,4',5-Pentachlorobiphenyl)
PCB 138 (2,2',3,4,4',5-Hexachlorobiphenyl)
PCB 153 (2,2',4,4',5,5'-Hexachlorobiphenyl)
PCB 180 (2,2',3,4,4',5,5'-Heptachlorobiphenyl)

PHTHALATE ESTERS

Dimethyl phthalate
Diethyl phthalate
Di-n-butyl phthalate
Butyl Benzyl phthalate
Bis(2-ethylhexyl)phthalate
Di-n-octyl phthalate

NITROAMINES

Pyridine
N-Nitrosodi-n-propylamine
N-Nitrosodiphenylamine

PESTICIDES

DDT
DDE
DDD
Aldrin
Dieldrin
Endrin
alpha-BHC
beta-BHC
gamma-BHC
delta-BHC
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Endrin ketone
Heptachlor
Heptachlor epoxide
Methoxychlor
Carbaryl
Carbofuran
Atrazine
Maneb

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Appendix 5: Metals by ICP-OES (APHA 3120B, USEPA 6010D)

Elements

1.	Silver as Ag
2.	Aluminium as Al
3.	Arsenic as As
4.	Gold as Au
5.	Boron as B
6.	Barium as Ba
7.	Beryllium as Be
8.	Bismuth as Bi
9.	Calcium as Ca
10.	Cadmium as Cd
11.	Cobalt as Co
12.	Chromium as Cr
13.	Copper as Cu
14.	Iron as Fe
15.	Gallium as Ga
16.	Mercury as Hg
17.	Indium as In
18.	Potassium as K
19.	Lithium as Li
20.	Magnesium as Mg
21.	Manganese as Mn
22.	Molybdenum as Mo

23.	Sodium as Na
24.	Niobium as Nb
25.	Nickel as Ni
26.	Phosphorus as P
27.	Lead as Pb
28.	Palladium as Pd
29.	Platinum as Pt
30.	Rhodium as Rh
31.	Antimony as Sb
32.	Selenium as Se
33.	Silicon as Si
34.	Tin as Sn
35.	Sulfur as S
36.	Strontium as Sr
37.	Tantalum as Ta
38.	Tellurium as Te
39.	Titanium as Ti
40.	Thallium as Tl
41.	Vanadium as V
42.	Tungsten as W
43.	Zinc as Zn

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Appendix 6: Pesticides, PCBs, Toxaphene (USEPA 8081B, 8082A)

Test Parameter

PESTICIDES (USEPA 8081B)	PCB AROCLORS (USEPA 8082A)	TOXAPHENE (USEPA 8081B)
Aldrin	Aroclor 1016	
a-BHC	Aroclor 1221	
b-BHC	Aroclor 1232	
d-BHC	Aroclor 1242	
g-BHC (Lindane)	Aroclor 1248	
cis-Chlordane	Aroclor 1254	
Trans-Chlordane	Aroclor 1260	
Chlorpyrifos		
DDD		
DDE		
DDT		
Dieldrin		
Endrin		
Endosulfan I		
Endosulfan II		
Endosulfan Sulphate		
Endrin Aldehyde		
Heptachlor		
Heptachlor Epoxide (Isomer B)		
Methoxychlor		
Mirex		