

Schedule

Setsco Services Pte Ltd
No. 18 Teban Gardens Crescent
Singapore 608925

Certificate No. : LA-2000-0181-F

Issue No. : 27

Biological & Chemical Technology Division (BCTD)

Date : 27 April 2018

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FIELD OF TESTING : Environmental Testing

MATERIALS/ PRODUCTS TESTED	TESTS/PROPERTIES	STANDARD METHODS/ TECHNIQUES
		<u>APHA Methods are based on 22nd Edition : 2012</u>
1. Water Analysis	1. Acidity	APHA 2310 B
(i) Potable water	2. Alkalinity	APHA 2320 B
(ii) Non-potable water	3. Aluminium	APHA 3120 B, 3111(B) (D)
(iii) Sewage, effluents and trade wastes	4. Ammonia	) APHA 4500-NH ₃ C/F/H
(iv) Water for industrial purposes	5. Antimony	) APHA 3120 (B)
(v) Swimming pool water		) APHA 3114 (C)
(vi) Ground water	6. Arsenic	APHA 3114 C& 3120 B
(vii) RO Water	7. Barium	APHA 3120 B, 3111(B) (D)
(viii) Sea Water	8. Beryllium	APHA 3120 B
	9. Bicarbonate	APHA 2320 B
	10. Biochemical Oxygen Demand (BOD)	APHA 5210 B
	11. Boron	APHA 3120 B
	12. Bromide	) APHA 4110 (B)
		) APHA 4500-Br (B)
	13. Cadmium	APHA 3120 B, 3111(B) (D)
	14. Calcium	APHA 3120 B, APHA 3500-Ca (B)
	15. Carbon Dioxide	APHA 4500-CO ₂ B/C/D
	16. Chemical Oxygen Demand (COD)) APHA 5220 B
) HACH Method 8000
) BCTD/SOP/Env/049

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	17. Chloride	APHA 4500-Cl (B) (D) & 4110 B
	18. Chlorine(residual)	APHA 4500-Cl & Lovibond Manual
	19. Chromium	APHA 3120 B, 3111(B) (D)
	20. Cobalt	APHA 3120 B, 3111(B) (D)
	21. Colour	APHA 2120 B & ISO 7887 : 1994
	22. Conductivity	APHA 2510 B
	23. Copper	APHA 3120 B, APHA 3111(B) (D)
	24. Cyanide	APHA 4500-CN (C) (E) (N) (O)
	25. Detergents (Linear alkylate sulphonate as methylene blue active substances)	APHA 5540 (C)
	26. Dissolved Oxygen	) APHA 4500-O, Dissolved) Oxygen Meter
	27. Fluoride	) APHA 4500-F (C) & 4110 B &) Lovibond
	28. Hardness	APHA 2340 B, C
	29. Iron	APHA 3120 B, 3111(B) (D)
	30. Lead	APHA 3120 B, 3111(B) (D)
	31. Lithium	APHA 3120 B
	32. Magnesium	APHA 3120 B, 3111(B) (D)
	33. Manganese	APHA 3120 B, 3111(B) (D)
	34. Mercury	APHA 3112 B & 3120 B
	35. Molybdenum	APHA 3120 B
	36. Nickel	APHA 3120 B, 3111(B) (D)
	37. Nitrate	APHA 4500-NO ₃ (B) (I) & 4110 B
	38. Nitrite	APHA 4500-NO ₂ (B) & 4110 B
	39. Nitrogen	APHA 4500-N (C)
	40. Oil & grease Oil & grease (Hydrocarbon) Oil & grease by FTIR	APHA 5520 B APHA 5520 F APHA 5520C

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	41. pH	APHA 4500-H(B) ISO 10523 : 2008
	42. Phosphorus	APHA 4500-P(C)(E)(G)(H) & 4110 B
	43. Phenolic Compounds (as Phenol)	APHA 5530 (C) (D) BCTD/ENV/IHM015/2001 Rev(0)
	44. Potassium	APHA 3120 B, 3111(B) (D)
	45. Salinity	APHA 2520 B
	46. Selenium	APHA 3120 B, 3114(C)
	47. Silica	APHA 3120 B, 4500 SiO ₂ (C) (D)
	48. Silver	APHA 3120 B, 3111(B) (D)
	49. Sodium	APHA 3120 B, 3111(B) (D)
	50. Solids	APHA 2540 B,C,D,E
	51. Strontium	APHA 3120 B
	52. Sulphate	APHA 4500-SO ₄ ²⁻ (C) & 4110 B
	53. Sulphide	APHA 4500-S ²⁻ (D) (F)
	54. Sulphite	APHA 4500-SO ₃ ²⁻
	55. Temperature	APHA 2550 B
	56. Tin	APHA 3120 B
	57. Total Organic Carbon, TOC	APHA 5310 (B) (C)
	58. Total Kjeldahl Nitrogen Content	APHA 4500-Norg (D)
	59. Turbidity	APHA 2130 B
	60. Vanadium	APHA 3120B
	61. Volatile Fatty Acids	APHA 5560 C
	62. Zinc	APHA 3120 B, 3111(B) (D)

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	63. Chlorophyll a	APHA 10200H
	64. UV-Absorbing Organic Constituents	APHA 5910B
	65. Settleable Solids	APHA 2540F
	66. Silt Density Index	ASTM D4189-07
	67. Borate	ISO 9390 : 1990
	68. Iodine	APHA Pt 4500-I
	69. Acrylamide	EPA 8032A:1996
	70. Bromate Chlorate Chlorite	) USEPA 300.1 Rev 1.0))
	71. Cyanuric acid	HACH 8139
	72. Cyanogen Chloride	APHA Pt 4500-CN (J)
	73. Hydrazine	ASTM D1385-07
	74. Total Chlorine	HACH 8167 (9 th Edn Jan 2014)
	75. Free Chlorine	HACH 8021(9 th Edn Jan 2014)
	76. Ammonium	APHA 4500-NH3-(D)
	77. Chloramines (Mono) and Nitrogen, Free Ammonia	HACH 10200 (12 th Edn Nov 2014)
	78. Iodine	HACH 8031 (8 th Edn Mar 2014)
(vii) Sea Water and Water with high chloride content	1. Chemical Oxygen Demand	BCTD/ENV/IHM 045/2002 Rev(0)

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2. Water Microbiology (i) Potable (ii) Non-potable (iii) Sewage, effluents & trade waste (iv) Swimming Pool Water	1. Total Bacteria Count	ISO : 8199 : 2005 ISO : 6222 : 1999 APHA 9215 B (PP Method) APHA 9215 C (SP Method) APHA 9215 D (MF Method)
	2. Coliforms	APHA 9221 B (MPN Method) APHA 9222 B & C (MF Method)
	3. Faecal coliforms	APHA 9221 E (MPN Method) APHA 9222 D & E (MF Method)
	4. <i>Escherichia coli</i>	) APHA 9221 F (MPN Method)) (Proposed)) APHA 9222 G (MF Method)
	5. <i>Faecal streptococci</i>	APHA 9230 C (MF Method)
	6. <i>Pseudomonas aeruginosa</i>	APHA 9213 E (MF Method)
	7. <i>Staphylococcus aureus</i>	APHA 9213 B Baird Parker Agar (MF Method)
	8. Spore of sulphite reducing Anaerobes	) BSEN 26461-2 : 1993) ISO 6464/2 : 1986
	9. <i>Clostridium perfringens</i>	NSM HPA Reference No W5i3.1
	10. <i>Aeromonas</i>	APHA 9260L
	11. <i>Campylobacter</i>	ISO 17995:2005
	12. <i>Enterococci</i>	APHA 9230 C

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(v) Cooling Tower and Water Fountain 3. Environmental Samples (Water, Soil, Sediment Sludge)	13. Detection and Enumeration of Escherichia coli and Coliform Bacteria Part 1: Membrane Filtration Method	ISO 9308-1: 2000
	14. <i>Klebsiella</i> species by membrane filter procedure.	APHA 9222F
	15. <i>Salmonella</i> spp	APHA 9260 B & D
	16. <i>Vibrio cholera</i>	APHA 9260 H
	17. <i>Shigella</i> spp	APHA 9260 E
	18. Aerobic Endospore Bacteria	APHA 9218B
	19. Yeast and Mould	APHA 9610D
	20. Actinomycete using Double-Layer Agar Technique	APHA 9250B
	21. Sulfate-Reducing Bacteria using MPN Technique	ASTM International 2009, D4412-84
	22. Detection and Enumeration of Legionella	BS 6068-4.12 : 1998 ISO 11731 : 1998
	1. Toxicity characteristics leaching procedure As, Ag, Ba, Cr, Cd, Cu, CN, Fe, F, Hg, Mn, Ni, Pb, Se, Zn and Phenolic Compounds (as phenol)	EPA Method 1311 : 1992 -1st Edition (exclude ZHE : Zero-Headspace Extraction)

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	2. All Heavy Metals in soil As, Al, Ag, B, Be, Ba, Ca, Cd, Co, Cr, Cu, Fe, K, Mg,Mn, Mo, Na, Ni, Pb, Se, Sn, Sr, V, Zn and Hg	USEPA 3050 B : 1996 USEPA 3051A : 2007
	3. Semi-Volatile organic scan analysis	USEPA 8270 D (2007) Refer to Appendix 1 for list of semi volatile organics
	4. For determination of volatile organic compounds by GC/MS method	USEPA 8260 C Refer to Appendix 2 for list of volatile organics
	5. Diesel range organics, gasoline range organics - DRO: range of alkanes from C ₁₀ to C ₂₈ and covering a boiling point range of approximately 170°C to 430°C. - GRO: range of alkanes from C ₆ to C ₁₀ and covering a boiling point range of approximately 60°C to 170°C.	US EPA 8015C : 2000
	6. Determination of Volatile Organic Compounds and Solvents	USEPA 1666 Rev A USEPA 8260C Refer to Appendix 3 for list of VOC and Solvents
	7. Oil & Grease for Sludge	APHA 5520E
	8. 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane 1,4-Dioxane Epichlorohydrin	) USEPA 8260C)))
	9. Metals by ICP-MS	APHA 3125B Refer to Appendix 4 for list of metals
	10. Chromium VI	APHA Pt 3500-Cr (B)

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	11. Microcystin	Envirologix Test Kit
	12. Metals by ICP-OES	USEPA 3051A : 2007 USEPA 6010C
	13. TOC for solid sample	BS EN 13137 : 2001
	14. Toxicity	Toxic Chromo Test Kit
	15. Ready Biodegradability	OECD Method 301D
	16. Dissolved/Dispersed Petroleum Hydrocarbon in Marine Water and Beaches	Intergovernmental Oceanographic Commission, Manual and Guides Chapter 13
	17. Total, Fixed and Volatile Solids in solid and semisolid samples	APHA 2540G
4. Non-metallic Products for Use in Contact with Water, and Glass Reinforced Polyester Sectional Water Tanks for PUB Potable Water	Effects on water 1. Taste 2. Appearance 3. Extraction of metals 4. Microbiological growth 5. Cytotoxicity	SS 375 : 2015 BS 6920 : 2014
5. Metallic Products for use with Drinking Water	Extraction of Metals 1. Antimony (Sb) 2. Arsenic (As) 3. Barium (Ba) 4. Cadmium (Cd) 5. Chromium (Cr) 6. Copper (Cu) 7. Lead (Pb) 8. Mercury (Hg) 9. Molybdenum (Mo) 10. Nickel (Ni) 11. Selenium (Se) 12. Silver (Ag)	AS/NZS 4020 : 1999 Appendix H AS/NZS 4020 : 1999 Appendix I AS/NZS 4020 : 2005 Appendix H AS/NZS 4020 : 2005 Appendix I
6. Water for making Concrete	1. Suitability of water	BS EN 1008: 2002

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7. Indoor Air Quality	1. Temperature	BCTD/Env/IHM135/2015 Rev (1)
	2. Relative Humidity	BCTD/Env/IHM135/2015 Rev (1)
	3. Carbon Dioxide	BCTD/Env/IHM135/2015 Rev (1)
	4. Carbon Monoxide	BCTD/Env/IHM135/2015 Rev (1)
	5. Air Velocity	BCTD/Env/IHM002/2015 Rev(1)
	6. Total Volatile Organic Compounds	BCTD/Env/IHM129/2017 Rev(2)
	7. Ozone	BCTD/Env/IHM104/2015 Rev(1)
	8. Formaldehyde	BCTD/Env/IHM005/2015 Rev(1) BCTD/Env/IHM143/2017 Rev(1)
	9. Respirable Dust	BCTD/Env/IHM138/2015 Rev(1)
	10. Total Bacterial Count	BCTD/Env/IHM007/2002 Rev(2) BCTD/Env/IHM023/2015 Rev(4)
	11. Total Yeast & Mould Count	BCTD/Env/IHM008/2002 Rev(2) BCTD/Env/IHM017/2015 Rev(3)
	12. Operative Temperature	BCTD/Env/IHM133/2015 Rev(1)
	13. Dust	BCTD/Env/IHM142/2017 Rev(1)
8. Source Emission	1. Sampling and Velocity Traverse for Stationary Sources	USEPA Method 1
	2. Determination of Stack Gas Velocity and Volumetric Flow Rate	USEPA Method 2
	3. Gas Analysis for Determination of Dry Molecular Weight	USEPA Method 3a

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	4. Determination of Moisture Content in Stack Gases	USEPA Method 4	
	5. Determination of Particulate Matter Emission from Stationary Sources	USEPA Method 5	
	6. Determination of Sulfur Dioxide Emission from Stationary Sources by Gas Analyser	USEPA Method 6C	
	7. Determination of Oxides of Nitrogen Emission from Stationary Sources by Gas Analyser	USEPA Method 7E	
	8. Determination of Carbon Monoxide Emission from Stationary Sources by Gas Analyser	USEPA Method 10	
	9. Sampling for determination of Dioxin and Furan from Stationary Sources	USEPA Method 23	
	10. Sampling for Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic method	USEPA 26a	
	11. Sampling for Determination of Metals Emissions from Stationary Sources	USEPA 29	
	9. 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
		2. Bromine & Chlorine	NIOSH 6011 – 1994
3. Formic Acid		NIOSH 2011- 1994	
4. Ammonia		NIOSH 6015 -1994	

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	5. Alcohols 1:Ethanol, isopropyl alcohol	NIOSH 1400 – 1994	
	6. Alcohols : n-butanol, isobutyl alcohol,n-propyl alcohol	NIOSH 1401 – 1994	
	7. Cresol & Phenol : o-cresol, m-cresol,p-cresol, phenol	NIOSH 2546 – 1994	
	8. Hydrocarbons, Aromatic : Benzene, Toluene, Ethylbenzene, o-Xylene, m-Xylene, p-Xylene, Styrene	NIOSH 1501 – 2003	
	9. Hydrocarbons, Halogenated : Chloroform, Carbon Tetrachloride, cis-1, 2- Dichloroethylene, trans-1, 2-Dichloroethylene, Tetrachloroethylene, Trichloroethylene	NIOSH 1003 – 2003	
	10. Hydrocarbons, 36-126°C bp : n-heptane,n-hexane, n-pentane, cyclohexane	NIOSH 1500 – 2003	
	11. Ketones 1 : Acetone, methyl isobutyl ketone	NIOSH 1300 - 1994	
	12. Methylene Chloride	NIOSH 1005 – 1998	
	13. Methyl Ethyl Ketone	NIOSH 2500 – 1996	
	14. Oil Mist	NIOSH 5026 – 1996	
	10. SOIL	1. Moisture) BS 1377 :Part 2 :1990
		2. pH value)
		3. Organic matter) BS 1377 :Part 3 :1990
		4. Mass loss on Ignition and total volatile solids (440°C)) BS 1377 :Part 3 :1990
5. Sulphates)	
6. Carbonates)	
7. Chlorides)	

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Approved Signatories

- | | |
|----------------------------|--|
| 1) Mr Chung Tying Chun | All accredited tests except Section 8 and items 11-12 of Section 5 |
| 2) Ms Ding Jian |) Section 5 |
| 3) Ms Joanne Soh |) |
| 4) Mr Tang Chee Meng |) Section 7, items 1 to 13 |
| 5) Ms Ang Qi Yin |) |
| 6) Mr Denny Lee Wei Wah | Section 1 (exclude item 69)
Section 3 (item 3, 4, 5, 6, 8, 9,10,11,12,14,15 & 16), Section 6 and
Section 9 |
| 7) Mr Lim Meng Hoong |) Section 8 (item 1-11) |
| 6) Mr Lim Meng Fei |) |
| 7) Ms Marivie Viana Gapud | Section 1 (exclude item 69)
Section 3 (item 9,10,11,12,14,15 & 16) and Section 6 |
| 8) Mr Gabriel Choo Peiyong | Section 3 (exclude item 11, 14, 15 & 16) and Section 10 |
| 9) Ms Hnin Le Le Kyi | Section 9 (exclude item 4) |
| 10) Ms Cindy Sim Mei | Section 2 |

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

SEMI-VOLATILE ORGANICS (EPA 8270D)	Water MDL/ug/L	SOIL MDL/mg/kg
TEST PARAMETER		
PHENOLS		
2-Chlorophenol	1	0.1
2-Nitrophenol	2	0.2
2,4-Dimethylphenol	1	0.1
2,4-Dichlorophenol	1	0.1
4-Chloro-3-methylphenol	1	0.1
2,4,6-Trichlorophenol	1	0.1
2,4-Dinitrophenol	20	2
4-Nitrophenol	2	0.2
2-Methyl-4,6-Dinitrophenol	20	2
Tetrachlorophenol	1	0.1
Pentachlorophenol	2	0.2
Cresoles	2	0.2
Catechol	8	0.8
Resorcinol	4	0.4
Hydroquinone	4	0.4
Phenol	1	0.1
POLYNUCLEAR AROMATICS HC		
Naphthalene	1	0.1
Anthracene	1	0.1
Acenaphthylene	1	0.1
Acenaphthene	1	0.1
Fluorene	1	0.1
Phenanthrene	1	0.1
Fluoranthene	1	0.1

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SEMI-VOLATILE ORGANICS (EPA 8270D)	Water MDL/ug/L	SOIL MDL/mg/kg
TEST PARAMETER		
POLYNUCLEAR AROMATICS HC		
Pyrene	1	0.1
Chrysene	1	0.1
2-Chloronaphthalene	2	0.2
Dibenz (a,h) anthracene	2	0.2
Benzo(a)pyrene	2	0.2
Benzo(ghi)pyrene	2	0.2
Benzo(b)fluoranthene	1	0.1
Benzo(k)fluoranthrene	1	0.1
Indeno(123cd)pyrene	2	0.2
PHTHALATE ESTERS		
Dimethyl phthalate	1	0.1
Diethyl phthalate	1	0.1
Di-n-butyl phthalate	1	0.1
Di-n-octyl phthalate	1	0.1
Bis (2-ethylhexyl) phthalate	1	0.1
NITROAMINES		
N-Nitrosodimethylamine	1	0.1
N-Nitrosodi-n-propylamine	1	0.1
Pyridine	2	0.2
NITROAROMATICS AND KETONES		
N-Nitrosodiphenylamine	1	0.1
Nitrobenzene	1	0.1
Isophorone	1	0.1
2,6-Dinitrotoluene	1	0.1
2,4-Dinitrotoluene	1	0.1

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SEMI-VOLATILE ORGANICS (EPA 8270D)	Water MDL/ug/L	SOIL MDL/mg/kg
TEST PARAMETER		
HALOETHERS		
Bis(2-chloroethyl)ether	1	0.1
Bis(2-chloroethoxy)methane	1	0.1
Bis(2-chloroisopropyl)ether	1	0.1
4-Chlorophenyl phenyl ether	1	0.1
4-Bromophenyl phenyl ether	1	0.1
CHLORINATED HYDROCARBONS		
1,3-Dichlorobenzene	1	0.1
1,4-Dichlorobenzene	1	0.1
1,2-Dichlorobenzene	1	0.1
Hexachloroethane	1	0.1
1,2,4-Trichlorobenzene	1	0.1
Tetrachlorobenzene	2	0.2
Pentachlorobenzene	1	0.1
Hexachlorobutadiene	1	0.1
Hexachlorocyclopentadiene	1	0.1
Hexachlorobenzene	1	0.1
BENZIDINES & HYDRAZINES		
Benzidene	30	3
3,3'-Dichlorobenzidine	8	0.8
1,2-Diphenylhydrazine	1	0.1

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Appendix 2

VOLATILE ORGANICS (EPA 8260C)	Water MDL/ug/L	SOIL MDL/mg/kg
TEST PARAMETER		
MONOCYCLIC AROMATICS		
Benzene	2	0.1
Toluene	2	0.1
Ethylbenzene	2	0.1
Styrene	2	0.1
Xylene	2	0.1
OXYGENATED COMPOUNDS		
Cyclohexanone	12	0.6
Tetrahydrofuran	4	0.2
Tetrahydrothiophene	4	0.2
FUMIGANTS		
1,2-Dichloropropane	2	0.1
1,3-Dichloropropene (Cis)	2	0.1
1,3-Dichloropropene (Trans)	2	0.1
HALOGENATED ALIPHATICS		
Vinyl Chloride	2	0.1
Chlorobenzene	2	0.1
Chloroethane	2	0.1
1,1-Dichloroethene	2	0.1
1,2-Dichloroethene (Trans)	1	0.1
Dichloromethane	2	0.1
Carbon Tetrachloride	2	0.1
Trichloroethene	2	0.1
2-Chloroethylvinyl Ether	2	0.1
1,1,1-Trichloroethane	2	0.1
1,2-Dichloroethane	2	0.1

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VOLATILE ORGANICS (EPA 8260C)	Water MDL/ug/L	SOIL MDL/mg/kg
TEST PARAMETER		
HALOGENATED ALIPHATICS		
Tetrachloromethane	2	0.1
1,1,2-Trichloroethane	2	0.1
Tetrachloroethene	2	0.1
1,1,2,2-Tetrachloroethane	2	0.1
HALOGENATED AROMATICS		
1,4-Dichlorobenzene	2	0.1
1,2-Dichlorobenzene	2	0.1
1,3-Dichlorobenzene	2	0.1
TRIHALOMETHANES		
Chloroform	2	0.1
Bromodichloromethane	2	0.1
Dibromochloromethane	2	0.1
Bromoform	2	0.1
OTHERS		
Acrolein	1	0.1
Acrylonitrile	1	0.1

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Appendix 3

VOCs and Solvents	QDL, µg/L
TEST COMPOUNDS	
Methylene Chloride	1
Trichloroethylene (TCE)	1
1,1,1-trichloroethane	1
Perchloroethylene (PCE)	1
Tetrachloromethane	1
1,1,2-Trichloroethane	1
Toluene	1
Styrene	1
Methyl tert-butyl-ether (MTBE)	1
Acetone	20
Nonane	1
Decane	1
Ethylbenzene	1
Xylenes (o, m, p)	1
Ethanol	20
Hexane	1
Heptane	1
Octane	1
1,2,4-Trimethylbenzene	1
Isopropyl Alcohol (IPA)	20
Furan	1
Tetrahydrofuran (THF)	1
N,N-Dimethylformamide (DMF)	1000
Benzene	1
Turpentine (<i>as alpha- & beta-Pinene</i>)	1
Methanol	500

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VOCs and Solvents	QDL, µg/L
TEST COMPOUNDS	
Isobutanol	20
Methyl Ethyl Ketone (MEK)	1
Methyl Isobutyl Ketone (MIBK)	1
Isopropyl ether	1
Diethyl ether	1
Dimethyl Sulphide	1
Dimethyl Sulphoxide (DMSO)	1000

Schedule



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Appendix 4 – Metals by ICP-MS

Elements	
1. Silver as Ag	28. Neodymium as Nd
2. Aluminium as Al	29. Nickel as Ni
3. Arsenic as As	30. Lead as Pb
4. Gold as Au	31. Palladium as Pd
5. Boron as B	32. Phosphorus as P
6. Barium as Ba	33. Platinum as Pt
7. Beryllium as Be	34. Rhodium as Rh
8. Bismuth as Bi	35. Antimony as Sb
9. Calcium as Ca	36. Scandium as Sc
10. Cadmium as Cd	37. Selenium as Se
11. Cobalt as Co	38. Tin as Sn
12. Chromium as Cr	39. Strontium as Sr
13. Copper as Cu	40. Tantalum as Ta
14. Iron as Fe	41. Terbium as Tb
15. Germanium as Ge	42. Tellurium as Te
16. Mercury as Hg	43. Thorium as Th
17. Holmium as Ho	44. Titanium as Ti
18. Indium as In	45. Thallium as Tl
19. Iridium as Ir	46. Uranium as U
20. Potassium as K	47. Vanadium as V
21. Lanthanum as La	48. Tungsten as W
22. Lithium as Li	49. Yttrium as Y
23. Magnesium as Mg	50. Zinc as Zn
24. Manganese as Mn	51. Zirconium as Zr
25. Molybdenum as Mo	
26. Sodium as Na	
27. Niobium as Nb	