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## CHEMISTRY TESTS



**January 2008**

Our Chemistry Laboratory offers an extensive range of physical and chemical analytes for water, wastewater, soil, concrete/mortar, and aggregate matrices.

All analyses are covered by our ISO9001 and ISO17025 Quality Assurance System and most by our extensive NATA accreditation.

The following tables detail our full range of analyses, methods employed, and detection limits.



## **METHODS SUMMARY (WATERS/WASTEWATERS - CHEMICAL)**

(Unless otherwise stated, all method codes are reference to APHA Standard Methods - for the Examination of Water and Wastewater - 21<sup>st</sup> edition)

### **PHYSICO-CHEMICAL TESTING**

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC200 (2310-B)	Acidity	Hydrogen ions react with additions of standard alkali.	Dissolved gases (CO <sub>2</sub> , H <sub>2</sub> S, NH <sub>3</sub> ). Oil, suspended solids Iron, aluminium, manganese	1mg/L	NA.
WC205 (2320-B)	Alkalinity	Hydroxyl ions react with additions of standard acid.	Soaps, oily matter, suspended solids	20mg/L low level 5mg/L	NA
WP010 (2330)	Calcium Carbonate Saturation	The pH at which water is saturated with respect to calcium carbonate is known as the pH of saturation (pH <sub>s</sub> ).	Carbon dioxide in the atmosphere over the sample	0.1	NA
WP020. (APHA SM 8 <sup>th</sup> ed Sect.V, D)	Coefficient of Fineness	The ratio of suspended solids concentration and the raw turbidity value is used to indicate the size of the particles comprising the suspended material. A high value (>1.2) indicates a large proportion of particulate matter, while a low value (<0.8) indicates a high proportion of colloidal matter.	See WP100.4 and WP170.	0.1	NA
WP030. (2120-B - & WRC #22 Aug. 1979)	Colour	Colour is determined spectrophotometrically at a wavelength of 400nm against a set of calibration standards.	Turbidity must be removed (0.45µm filtration) prior to True Colour measurements	1PtCoU	NA
WP040 (2510)	Conductivity	Conductivity measurements of samples are measured against a calibration curve of potassium chloride solutions.	Oil and grease	1µS/cm	5µS/cm
WP050 (2580-B)	Eh - Redox	A platinum electrode undergoes electron exchange and hence assumes the potential that corresponds to the redox potential.	Oil and grease	NA	NA

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC260.1 (4500-O C)	Dissolved Oxygen (Azide Modification)	Dissolved oxygen rapidly oxidises added manganese. Oxidised manganese then reacts with added iodine which is then titrated with thiosulphate solution to give the concentration of dissolved oxygen.	Oxidising and reducing materials Organic matter	0.1mg/L	NA
WC260.2 (4500-O G)	Dissolved Oxygen (Membrane Electrode)	Dissolved oxygen passes through the semi-permeable membrane of an oxygen electrode and is reduced at the cathode. The current produced is directly proportional to the concentration of dissolved oxygen present.	Hydrogen sulphide	0.1mg/L	NA
WC249 (Vogel-Quant. Inorg Analysis p244)	Neutralising Value	Acidic or alkaline waters can be neutralised by the addition of a solution of an appropriate base or acid. The results determine the practical amounts of chemical required for large scale neutralisation.	As per Alkalinity and Acidity test methods.	1mg/L	NA
WP090 (4500-H <sup>+</sup> )	pH	pH measurement is the determination of the activity of the hydrogen ions using a standard hydrogen electrode.	Nil	NA	NA
WP140 (2160-D 17 <sup>th</sup> Ed.)	Taste	A panel of testers are used to identify and characterise offensive flavours that may occur against a background of documented sensory quality judged acceptable.	Bacteria, viruses, parasites Hazardous chemicals. (Not to be performed on wastewaters)	NA	NA
WP150 (2550-B)	Temperature	Temperature is measured mostly with a standard Celsius calibrated thermometer.	Nil	0.1 °C	0.1 °C
WP100.1 (2540-B)	Total Solids Dried at 103 - 105 °C	A well-mixed sample is dried to constant weight in an oven at 103 - 105 °C.	Hygroscopic salts Large floating particles Submerged conglomerates Floating oils and greases	1mg/L	NA
WP100.22 (2540-C)	Total Dissolved Solids Dried at 180 °C	A well-mixed sample is filtered through a glass fibre filter. The filtrate is dried to constant weight at 180 °C.	Bicarbonate Hygroscopic salts	1mg/L	NA
WP110.1 (1030-F)	Total Dissolved Solids (Estimated)	Estimated Total Dissolved Solids is based on a factor applied to the conductivity result.	Calcium Sulphate	1mg/L	NA

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WP100.4 (2540-D)	Total Suspended Solids Dried 103 - 105°C	A well-mixed sample is filtered through a glass fibre filter. The residue on the filter is dried to constant weight in an oven at 103-105°C.	Hygroscopic salts Large floating particles Submerged conglomerates Floating oils and greases	1mg/L	NA
WP100.5 (2540-E)	Total Fixed and Volatile Solids Ignited at 550°C and 450°C	The residue from WP100.1, WP100.22 and WP100.4 is ignited to constant weight at 450°C or 550°C. The remaining solids represent the fixed total, dissolved, or suspended solids while the weight lost on ignition is the volatile solids.	High fixed solids concentrations	1mg/L	NA
WP170.1 (2130-B & WRC, #22 Aug. 1979	Turbidity (Raw)	Turbidity is an expression of the optical property that causes light to be scattered and absorbed	Air bubbles Colour	0.1NTU	NA
WP170.2 (2130-B & WRC, #22 Aug. 1979	Turbidity (Filtered 20µm)	Sample filtered through a 20µm filter prior to measurement by WP170.1	Air bubbles Colour	0.1NTU	NA
WP170.3 (2130-B & WRC, #22 Aug. 1979	Turbidity (Filtered 0.45µm)	Sample is filtered through a 0.45µm filter prior to measurement by WP170.1.	Air bubbles Colour	0.1NTU	NA
WP100.7 (2540-F)	Settleable Solids	A well mixed sample is added to an Imhoff cone. After a period of one hour the volume of settled material is recorded. Unsettled solids are determined by performing a suspended solids test on an aliquot from liquid portion of a settled sample.	As per WP100.4 for suspended solids	10mL/L (volume) 1mg/L (grav.)	NA
WP160.2 (2710-C)	Settled Sludge Volume	A continuously stirred sample is measured for occupied sludge volume at various time intervals	Temperature variation Agitation methods Time lag between sampling and test initiation	NA	NA

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WP160.3 (2710-D)	Sludge Volume Index	The Sludge Volume Index is the volume in millilitres occupied by 1g of a suspension after 30 minutes settling. It is used to monitor settling characteristics of activated sludge	As per WP160.2 and WP100.4.	NA	NA
WP160.5 (2710-F)	Specific Gravity	A comparison of the mass of a known volume of a sludge sample with the mass of the same volume of distilled water at 4°C	Air bubbles	NA	0.01g/L (sludge)
WP160.4 (2710-E)	Zone Settling Rate	High concentrations of suspended solids, suspensions settle under quiescent conditions. Settling is characterised by a distinct interface between the supernatant liquor and the sludge zone. The height of this distinct sludge interface is measured with time	High solids concentrations Poor settling characteristics	NA	cm vs time plot (sludge)

#### WET CHEMISTRY

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC265.1 (5210-B & WPCF Vol 51, No. 9, 1979)	Biochemical Oxygen Demand (BOD5)	A measure of the oxygen required for the biochemical degradation of organic material and the oxidisation of inorganic material over a five day period.	Settleable and floatable solids Particulate organics Iron, sulphur	2mg/L	NA
WC265.2 (5220-A - D)	Chemical Oxygen Demand (COD)	A measure of the oxygen equivalent of the organic matter content of a sample that is susceptible to oxidation by a strong chemical oxidant (potassium dichromate).	High halide concentrations Nitrite	20mg/L	NA
WC220.4 (4500-Cl <sup>-</sup> F)	Chloride (Ion Chromatography)	An ion chromatograph separates individual anions allowing their detection by conductivity detector and quantitation by comparison with known standards.	Compounds with similar retention times High concentrations of other anions.	1mg/L	5mg/kg

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC225.1 (4500-Cl <sup>-</sup> B)	Chlorine (Titrimetric Method)	Chlorine will liberate free iodine from potassium iodide solutions at pH 8.0 or less. The liberated iodine is titrated with standard sodium thiosulphate at pH 3-4 with starch as the end point indicator.	Manganese oxides and other oxidising agents. Reducing agents such as organic sulphides.	1mg/L	5mg/kg
WC225.21 (Lovibond/ Hach)	Chlorine (Free)	N,N-diethyl-p-phenylenediamine (DPD) is used as an indicator in combination with ferrous ammonium sulphate. Free chlorine reacts instantly with DPD to produce a red colour.	> 250mg/L alkalinity >150mg/L acidity as CaCO <sub>3</sub> Monochloramine, bromine, iodine, ozone and oxidised forms of manganese and chromium.	0.01mg/L	0.05mg/kg
WC225.22 (Lovibond/ Hach)	Chlorine (Total)	As above plus addition of potassium iodide to give total or combined chlorine.	> 250mg/L alkalinity >150mg/L acidity as CaCO <sub>3</sub> Monochloramine, bromine, iodine, ozone, manganese, chromium	0.01mg/L	0.05mg/kg
WC235 (4500-ClO <sub>2</sub> D)	Chlorine Dioxide	A glycine treated sample (to remove chlorine positive error effects) is analysed as per free chlorine by DPD method.	Manganese and iron	0.01mg/L	NA
WC400 (10200-H)	Chlorophyll a	Chlorophyll a is concentrated by filtration, extracted with acetone, and measured spectrophotometrically. Correction is made for pheophytin content.	Pheophytin	1µg/L	5µg/L
WC240 (4500-CN <sup>-</sup> C,E)	Cyanide	The alkaline distillate is converted to cyanogen chloride (CNCl) in reaction with chloramine-T (pH<8.0). The addition of pyridine-pyrazolone reagent causes a reaction with CNCl to a red-blue colour.	Sulphides Fatty acids Carbonate	0.005mg/L	1mg/kg
WC245.2 (4500-F <sup>-</sup> C)	Fluoride	Fluoride ion activity is measured using an ion selective electrode in conjunction with a reference electrode.	>7000mg/L alkalinity >7000mg/L chloride >50000mg/L phosphate >3mg/L aluminium >200mg/L iron >50000mg/L sulphate Colour and turbidity	0.1mg/L	0.5mg/L

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC285.3 (4500-S <sup>2-</sup> F)	Hydrogen Sulphide	Hydrogen sulphide and HS <sup>-</sup> constitute dissolved sulphide. They are in equilibrium as with hydrogen ions: H <sub>2</sub> S = H <sup>+</sup> + HS <sup>-</sup> . Sulphide concentration, conductivity, and pH are used to calculate the concentration of H <sub>2</sub> S.	As per sulphide, pH and conductivity determinations.	Depends on pH and conductivity	Depends on pH and conductivity
WC405.32 (5520-B, F)	Petroleum Hydrocarbons	The oil and grease collected in WC405.11 exposed to silica gel. The materials not eliminated by silica gel adsorption are weighed.	Other hexane soluble substances may interfere	10mg/L	50mg/kg
WC415 (5530-B& D)	Phenols	Steam-distillable phenolic compounds react with 4-amino antipyrine at pH 7.9 to form a pink dye that is quantified using colorimetry.	Mostly removed by distillation	0.1mg/L	0.5mg/kg
WC275.2 (4500-Si D)	Reactive Silica	Ammonium molybdate reacts with silica and any phosphate present to produce a blue molybdosilicate complex that is measured photometrically.	Glassware Tannin, iron, colour, turbidity, sulfide, phosphate	1mg/L	5mg/L
WC275.1 (4500-Si C)	Silica	Hydrochloric acid decomposes silicates and dissolved silica forming silicic acids that are precipitated. Samples are ignited to complete dehydration of silica, volatilised with HF, and the silica determined by weight difference.	Glassware	1mg/L	5mg/L
WC280.2 (4500-SO <sub>4</sub> <sup>2-</sup> E)	Sulphate (Turbidimetric)	Sulphate ion is precipitated with barium chloride to form barium sulphate crystals. Light absorbance of the barium sulphate suspension is measured photometrically.	Colour Suspended matter >500mg/L silica	1mg/L	5mg/L
WC280.4 (4500-SO <sub>4</sub> <sup>2-</sup> B)	Sulphate (Ion Chromatography)	An ion chromatograph separates individual anions allowing their detection by conductivity detector and quantitation by comparison with known standards.	Compounds with similar retention times High concentrations of other anions.	1mg/L	5mg/L
WC285.1 (4500-S <sup>2-</sup> D)	Sulphide (colorimetric)	Sulphide reacts with ferric chloride and dimethyl-p-phenylenediamine to form methylene blue.	Thiosulphate, sulphite, various organic compounds, strong reducing agents, iodide	0.1mg/L	0.5mg/L
WC285.2 (4500-S <sup>2-</sup> E)	Sulphide (titrimetric)	Iodine reacts with sulphide in acid solution, oxidising it to sulphur. The remaining iodine is titrated with thiosulphate solution to a clear starch indicator solution endpoint. The amount of consumed iodine is determined.	Thiosulphate, sulphite, various organic compounds, strong reducing agents, iodide	0.1mg/L	0.5mg/L

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC290 (4500-SO <sub>3</sub> <sup>2-</sup> )	Sulphite	Sulphite is titrated with a potassium iodate-iodide. Free iodine, liberated by the iodate-iodine reagent reacts with the SO <sub>3</sub> <sup>2-</sup> . The titration endpoint is signalled by the blue colouration using starch indicator.	Sulphide, thiosulphate, iron Copper, nitrite	2mg/L	NA
WC425.1 (5540-B,C)	Surfactants Anionic (MBAS)	Methylene blue active substances (MBAS) are extracted into an organic liquid forming a blue colour that is measured photometrically.	Sulphonates, sulphates, carboxylates, phenols, inorganic thiocyanates, cyanates, nitrates and chlorides	0.01mg/L	NA
WC425.2 (5540-B,D)	Surfactants Nonionic (CTAS)	Cobalt thiocyanate active substances (CTAS) react with cobalt thiocyanate solution to give a cobalt containing product extractable into an organic liquid in which it can be measured photometrically.	Anionic and cationic surfactants	0.1mg/L	NA
WC430 (5550-B)	Tannin and Lignin	Tannin and lignin contain aromatic hydroxyl groups that react with Folin phenol reagent to form a stable blue colour that can be measured colorimetrically.	Any substance able to reduce Folin phenol reagent	1mg/L	1:5 water extract
WC405.11 (5520-D)	Total Oil and Grease (TOG)	Oil and grease is separated from the liquid samples by filtration. After extraction in a Soxhlet apparatus with hexane, the residue remaining after evaporation is weighed to determine the oil and grease content.	Includes all substances soluble in hexane	10mg/L	50mg/kg
WC410 (J. Water Pollution Control Fed. 1961)	Volatile Acids	Volatile acids are the end products of the hydrolysis of fats, proteins, and carbohydrates that comprise the organic matter in sludges. Boiling at acid pH removes bicarbonate ions, carbonic acid, and carbon dioxide. The sample is then titrated with sodium hydroxide from pH 4.0 to pH 7.0.	Any strong acids or bases present in sludges will interfere	10mg/L	10mg/L (sludges)
WC440	Volatile Acids Alkalinity	As per WC410.	As per WC410	10mg/L	NA

## METALS

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
SC###.4 WC###.4/41 (3120B)	Lithium Boron Beryllium Aluminium Titanium Vanadium Chromium Iron Manganese Nickel Copper Zinc Arsenic Selenium Strontium Molybdenum Silver Cadmium Lead Barium Uranium Tin Antimony Thallium Bismuth Gold Palladium Cobalt (others on request)	Nitric acid digestion with inductively coupled plasma with mass spectrometer detection (ICP-MS)	Various	1µg/L 5µg/L 1µg/L 2µg/L 1µg/L 1µg/L 1µg/L 5µg/L 1µg/L 1µg/L 4µg/L 2µg/L 1µg/L 1µg/L 1µg/L 2µg/L 1µg/L 1µg/L 1µg/L 1µg/L 1µg/L 6µg/L 1µg/L 1µg/L 1µg/L 1µg/L 1µg/L	0.5mg/kg 2.5mg/kg 0.5mg/kg 1.0mg/kg 0.5mg/kg 0.5mg/kg 2.5mg/kg 0.5mg/kg 0.5mg/kg 2.0mg/kg 1.0mg/kg 0.5mg/kg 0.5mg/kg 0.5mg/kg 1.0mg/kg 0.5mg/kg 0.5mg/kg 0.5mg/kg 3.0mg/kg 0.5mg/kg 0.5mg/kg 0.5mg/kg
WC065 (3112B)	Mercury	Cold vapour atomic absorption spectrometer (CV-AAS).		0.5µg/L	0.05mg/kg

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC11 (3111B)	Sodium Magnesium Potassium Calcium	Atomic absorption spectrometer (AAS).		1mg/L	5mg/kg

## NUTRIENTS

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC250.13 (4500-NH <sub>3</sub> B, C)	Ammonia	Ammonia is distilled from the sample and determined by titration with sulphuric acid.	Free ammonia in surroundings	0.1mg/L	0.5mg/kg
WC250.15 (4500-NH <sub>3</sub> F)	Ammonia (colorimetric)	Ammonia is distilled from the sample. Ammonia turns blue when reacted with hypochlorite and phenol. The blue colour can be measured colorimetrically.	>500mg/L alkalinity >100mg/L acidity	0.1mg/L	0.5mg/kg
WC250.19 (4500-NH <sub>3</sub> F)	Ammonia (discrete analyser)	Ammonia reacts with hypochlorite and phenol to form a blue indophenol that can be measured colorimetrically.	Calcium, magnesium Colour, turbidity >2mg/L sulphide	0.006mg/L	0.05mg/L
WC250.22 (4500-NO <sub>3</sub> <sup>-</sup> E)	Nitrate	Nitrate is reduced to nitrite in a cadmium reduction column and determined along with nitrite using NED reagent (see WC250.23). Nitrite is determined separately (see WC250.3) and nitrate calculated by difference.	High metal concentrations Colour, suspended solids Oil and grease, chlorine	0.01mg/L	0.05mg/kg
WC250.232 (4500-NO <sub>3</sub> <sup>-</sup> E)	Nitrate + Nitrite	Nitrate is reduced to nitrite in the presence of cadmium. The nitrite produced is reacted with sulphanilamide and N-(1-naphtha)-ethylene diamine to produce a highly coloured azo dye that is measured colorimetrically via discrete analyser.	High metal concentrations Colour, suspended solids Oil and grease, chlorine	0.01mg/L	0.05mg/kg

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WC250.312 (4500-NO <sub>2</sub> <sup>-</sup> C)	Nitrite	Nitrite is reacted with sulphanilamide and N-(1-naphtha)-ethylene diamine to produce a highly coloured azo dye that is measured colorimetrically via discrete analyser.	High metal concentrations Colour, suspended solids Oil and grease, chlorine	0.002mg/L	0.01mg/kg
WC250.4 (4500-N <sub>org</sub> B)	Organic Nitrogen	Organic nitrogen compounds are converted to ammonium sulphate by reaction with sulphuric acid and potassium sulphate. Free ammonia is removed before measuring ammonium sulphate concentration using a discrete analyser.	>10mg/L nitrate Inorganic salts and solids Organic matter	0.02mg/L	0.5mg/kg
WC270.111 (QuikChem 10-115-01-1A)	Orthophosphate	Orthophosphorus reacts with ammonium molybdate, potassium antimonyl tartrate, and ascorbic acid to form a blue compound that is measured photometrically using discrete analyser.	>0.1mg/L arsenate Hexavalent chromium, nitrite >1mg/L sulphide >10mg/L silicate	0.006mg/L	0.05mg/kg
WC270.312	Total Phosphorus	Samples are digested in sulphuric acid and persulphate to convert organic phosphorous and polyphosphates to orthophosphate. Samples are then analysed as per WC270.111 by discrete analyser.	>0.1mg/L arsenate Hexavalent chromium Nitrite >1mg/L sulphide >10mg/L silicate	0.02mg/L	2mg/kg
WC250.5 (4500-N <sub>org</sub> B, C)	Total Kjeldahl Nitrogen	As for organic nitrogen but ammonia nitrogen is not removed prior to analysis. Ammonia and TKN are determined separately by Tecator distillation. Organic nitrogen = TKN - ammonia.	>10mg/L nitrate Inorganic salts and solids Organic matter	0.1mg/L	0.5mg/kg
WC250.65 (4500-N C)	Total Nitrogen	Samples are digested with alkaline potassium persulphate oxidising nitrogen compounds to nitrate. Nitrate is then determined as per WC250.312 (discrete analyser).	High metal concentrations Colour, suspended solids Oil and grease, chlorine	0.02mg/L	2mg/kg

## ORGANICS

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
GC030 (EPA Method 5021A)	Benzene, Toluene, Ethyl Benzene, Xylene (BTEX)	Headspace analysis by gas chromatography with a flame ionisation detector (GC/FID).	Compounds other than BTEX responding to FID.	1µg/L	0.1µg/kg
GC020 (APHA 6630, AOAC 1984, Vol 29)	Organochlorine (OC) & Organophosphorus (OP) Pesticides	Gas chromatography with an electron capture detector (GC/ECD). OC's - BHC, heptachlor, heptachlor epoxide, aldrin, endosulphan I, endosulphan II, endosulphan sulphate, chlordane, DDE, DDD, DDT, dieldrin, endrin, methoxychlor OP's - dioxathion, trichlorfon, thionazin, carbophenothion, ethion, chlorpyrifos methyl, famphur, terbufos, fenitrothion, dichlofenthion, fonophos	Compounds other than OC's\OP's responding to ECD. PCB's and phthalate esters used in plasticisers.	0.1-0.5µg/L (OC's) 0.1-0.5µg/L (OP's)	0.02-0.05mg/kg (OC's) 0.1-0.4mg/kg (OP's)
GC040 (USEPA Method 3500C)	Total Petroleum Hydrocarbons (TPH)	Solvent extracted, concentrated, and analysed by gas chromatography with a flame ionisation detector (GC/FID). Separated into fractions C <sub>6</sub> - C <sub>9</sub> , C <sub>10</sub> - C <sub>14</sub> , C <sub>15</sub> - C <sub>28</sub> , C <sub>29</sub> - C <sub>36</sub>	Compounds other than TPH's responding to FID. PCB's and phthalate esters used in plasticisers.	C <sub>6</sub> -C <sub>9</sub> 10mg/L C <sub>10</sub> -C <sub>14</sub> 50mg/L C <sub>15</sub> -C <sub>28</sub> 100mg/L C <sub>29</sub> -C <sub>36</sub> 50mg/L	C <sub>6</sub> -C <sub>9</sub> 1mg/kg C <sub>10</sub> -C <sub>14</sub> 5mg/kg C <sub>15</sub> -C <sub>28</sub> 10mg/kg C <sub>29</sub> -C <sub>36</sub> 5mg/kg

## SOILS

Method Code & Reference	Method Title	Scope	Interferences	Limit of Reporting
SC250.13 (4500-NH <sub>3</sub> B,C)	Ammonia	Distillation and titration.	Free ammonia in air	10mg/kg
G060	Acid Insolubles	Insoluble residue filtered from acid digest, dried, and weighed.	None	0.1%
SC120	Acid Sulphate Potential	Sulphate increase and pH decrease measured after oxidation of soil. Potential neutralising effect of calcium carbonate also measured.	None	0.03%
G100 (AS/NZS 3580.10.1)	Atmospheric dust fallout	Dust collected over known period, filtered, and weighed.	Small insects	1mg
SC015 (R&H 19A1)	Carbonate Content	Treated with dilute hydrochloric acid. Residual acid titrated.	Other carbonates Alkaline materials	1%
A220.1 (AS 1012.20)	Chloride - Acid Soluble	Chloride dissolved in nitric acid. Titrated with silver nitrate and ammonium thiocyanate.	Bromide, iodide, or fluoride	0.01%
SC220.4 (4500-Cl <sup>-</sup> F)	Chloride - Water Soluble	1:5 soil:water extract. Chloride measured using ion chromatography.	Compounds with similar retention times High anion concentrations	1mg/kg
SC040 (Hesse pp160-16)	Exchangeable Cations	Shaken with ammonium acetate solution. Sodium, magnesium, potassium, and calcium measured using atomic absorption spectroscopy (AAS).	CaCO <sub>3</sub> or gypsum	10mg/kg
SC040.6 (Baumann Gully Method)	Exchangeable Soil Acids	Titration with sodium hydroxide.	None	0.1mEq/100g
G020 (J.Paleo. 25:101-110)	Loss on Ignition	Water evaporates totally at 180°C, organic matter is oxidised to carbon dioxide at 550°C, and carbonates are removed at 950°C. Each fraction is quantified by weighing.	None	0.1%

Method Code & Reference	Method Title	Scope	Interferences	Limit of Reporting
G030.1 (AS1289.2.1.1)	Moisture Content	Dried to constant weight at 105±5°C.	None	0.1%
G090 (AS1289.4.3.1)	pH	1:5 soil:water extract. pH probe.	None	NA
SC080.1 (J.Paleo. 25:101-110)	Organic Matter	Weight loss when heated between 180°C and 550°C.	None	1%
A020 (AS1141)	Potential or Alkali Reactivity	Amount of reaction measured between sodium hydroxide solution and aggregate after 24hr at 80°C.	None	1mmol/L
SP050 (AS1289.4.4.1)	Resistivity	Resistivity meter.	None	1Ω/cm
SP050.1 (AS1289.4.4.1)	Saturated Resistivity and Water Content	Resistivity measured after soil saturated with water.	None	1Ω/cm
SC125 (ASS 21)	SPOCAS	Tests include:- pH(KCl), pH(Ox), total actual acidity (TAA), total potential acidity (TPA), total sulphidic activity (TSA), sulphate content (S <sub>p</sub> %), soluble and absorbed sulphur (S <sub>KCl</sub> %), unoxidised sulphur compounds (S <sub>pos</sub> %).	Various	NA
A280.1 (AS 1012.20)	Sulphate - Acid Soluble	Sulphate dissolved in nitric acid. Precipitated as barium sulphate and weighed.	Sulphides	0.1%
SC280.4 (AS1289.4.2.1)	Sulphate - Water Soluble	1:5 soil:water extract. Sulphate measured using ion chromatography.	Compounds with similar retention times High anion concentrations	1mg/kg
SC285 (ASTM C114)	Sulphide	Sulphur evolved as hydrogen sulphide from acid solution of soil. Measured photometrically.	Sulphites, thiosulphate	0.1mg/kg
SC250.5 (4500-N <sub>org</sub> A)	Total Kjeldahl Nitrogen	Distillation and titration.	>10mg/L nitrate Inorganic salts and solids Organic matter	10mg/kg
G110.1 (R&H Sect 3, pp15-16)	Water Soluble Salts	1:5 soil:water extract. Conductivity probe.	Sulphates Calcium carbonate	1mg/kg

## FIELD TESTING

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WP040 (2510)	Conductivity (Probe)	Conductivity measurements of samples are measured against a calibration curve of potassium chloride solutions.	Oil and grease	1 $\mu$ S/cm	NA
WC260.2 (4500-O G)	Dissolved Oxygen (Membrane Electrode)	Dissolved oxygen passes through the semi-permeable membrane of an oxygen electrode and is reduced at the cathode. The current produced is directly proportional to the concentration of dissolved oxygen present.	Hydrogen sulphide	0.1mg/L	NA
WP050 (2580-B)	Eh - Redox (probe)	A platinum electrode undergoes electron exchange and hence assumes the potential that corresponds to the redox potential.	Oil and grease	NA	NA
WP090 (4500-H <sup>+</sup> )	pH (electrode)	pH measurement is the determination of the activity of the hydrogen ions using a standard hydrogen electrode.	Nil	NA	NA
WP120 (AS3550.7 1993)	Secchi Disc	A Secchi Disc is lowered/raised slowly into water. The depth at which definition of the black and white quarters is lost is recorded.	Shadows	0.1m	NA

## INVESTIGATIVE TESTING

Method Code & Reference	Method Title	Scope	Interferences	Reporting Limits	
				Water	Soil
WP015 (ASTM D 2035 - 68)	Coagulation Testing	Coagulation consists of introducing into water a product that can: (i) discharge the generally electro-negative colloids present in the water; (ii) Give rise to a flocculent precipitate.	Turbidity, colour, total dissolved salts, pH, alkalinity and temperature	NA	NA
WP160.1 (2710-B)	Oxygen Consumption Rate	Used to determine the oxygen consumption rate of a sample of a biological suspension such as activated sludge by temperature and oxygen measurements.	Temperature variation Time lag between sampling and test initiation	NA	0.1 mg/g/h (sludge)
WP080.1 (American Society of Chemical Engineers, 1984)	Oxygen Transfer in Water	Oxygen transfer testing is generally carried out on new aeration equipment at STPs to test specification compliance. Oxygen is firstly removed. Increase in dissolved oxygen concentration over time is measured to 99% saturation. Simultaneously, the power draw of the aeration equipment is measured. Tests are repeated at different power draws or water depths as defined in the specification.	Any substances with the potential to interfere with dissolved oxygen test	NA	NA
WP080.2 (See Scope)	Oxygen Transfer in Activated Sludge	Refer to: - APHA SM 15 <sup>th</sup> ed - Section 208B - Water Pollution Control - Eckenfelder & Ford (1970) pp 91-94 - Proceedings - Workshop Towards an Oxygen Transfer Standard EPA-600/9-78-021, Section 21, 22 &23.	Refer to references	NA	Report
WP015.2 (ASTM D 2035 - 68)	Polyelectrolyte Dosing	Polyelectrolytes are used either separately or in conjunction with conventional coagulants to promote flocculation and/or to increase the rate of settling. The polyelectrolyte improves the floc size and rate of settling.	As per WP015.	NA	NA