

CLIENT DETAILS

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Project **Waste Water Sample**
 Order Number (Not specified)
 Samples 1

LABORATORY DETAILS

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SGS Reference **SE231470 R0**
 Date Received 29/4/2022
 Date Reported 6/5/2022

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Ion Chromatography - The Limit of Reporting (LOR) has been raised due to high conductivity of the sample requiring dilution.

SIGNATORIES



Kamrul AHSAN
 Senior Chemist



Shane MCDERMOTT
 Inorganic/Metals Chemist

Anions by Ion Chromatography in Water [AN245] Tested: 2/5/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|-------------------------|------|-------|---|
| PARAMETER | UOM | LOR | |
| Nitrate Nitrogen, NO3-N | mg/L | 0.005 | <0.025† |
| Chloride | mg/L | 1 | 220 |
| Sulfate, SO4 | mg/L | 1 | 46 |
| Fluoride | mg/L | 0.02 | 0.08 |

Nitrite in Water [AN277] Tested: 29/4/2022

| PARAMETER | UOM | LOR | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|--|------|-------|--|
| Nitrite Nitrogen, NO ₂ as N | mg/L | 0.005 | <0.005 |

TKN Kjeldahl Digestion by Discrete Analyser [AN292] Tested: 2/5/2022

| PARAMETER | UOM | LOR | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|-------------------------|------|------|--|
| Total Kjeldahl Nitrogen | mg/L | 0.05 | 890 |

Ammonia Nitrogen by Discrete Analyser [AN291] Tested: 29/4/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|--|------|------|---|
| PARAMETER | UOM | LOR | |
| Ammonia Nitrogen, NH ₃ as N | mg/L | 0.01 | 220 |

Filterable Reactive Phosphorus (FRP) [AN278] Tested: 29/4/2022

| PARAMETER | UOM | LOR | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|-------------------------------------|------|-------|---|
| Filterable Reactive Phosphorus as P | mg/L | 0.005 | 68 |

Total Phosphorus by Kjeldahl Digestion DA in Water [AN279/AN293(Sydney only)] Tested: 2/5/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|--|------|------|---|
| PARAMETER | UOM | LOR | |
| Total Phosphorus (Kjeldahl Digestion) as P | mg/L | 0.02 | 99 |

pH in water [AN101] Tested: 29/4/2022

| PARAMETER | UOM | LOR | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|-----------|---------|-----|---|
| pH** | No unit | - | 5.9 |

Conductivity and TDS by Calculation - Water [AN106] Tested: 29/4/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|---|-------|-----|---|
| PARAMETER | UOM | LOR | |
| Conductivity @ 25 C | µS/cm | 2 | 2800 |
| Total Dissolved Solids (by calculation) | mg/L | 2 | 1700 |

Total and Volatile Suspended Solids (TSS / VSS) [AN114] Tested: 3/5/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|---|------|-----|---|
| PARAMETER | UOM | LOR | |
| Total Suspended Solids Dried at 103-105°C | mg/L | 5 | 3400 |

BOD5 [AN183] Tested: 29/4/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|----------------------------------|------|-----|---|
| PARAMETER | UOM | LOR | |
| Biochemical Oxygen Demand (BOD5) | mg/L | 5 | 6000 |

Alkalinity [AN135] Tested: 2/5/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|---|------|-----|---|
| PARAMETER | UOM | LOR | |
| Bicarbonate Alkalinity as CaCO ₃ | mg/L | 5 | 630 |
| Carbonate Alkalinity as CaCO ₃ | mg/L | 1 | <1 |
| Hydroxide Alkalinity as CaCO ₃ | mg/L | 5 | <5 |
| Phenolphthalein Alkalinity as CaCO ₃ * | mg/L | 5 | <5 |
| Total Alkalinity as CaCO ₃ | mg/L | 5 | 630 |

Acidity and Free CO₂ [AN140] Tested: 29/4/2022

| PARAMETER | UOM | LOR | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|-------------------|-------------------------|-----|---|
| Acidity to pH 8.3 | mg CaCO ₃ /L | 5 | 600 |

Oil and Grease in Water [AN185] Tested: 4/5/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|----------------|------|-----|---|
| PARAMETER | UOM | LOR | |
| Oil and Grease | mg/L | 5 | 2000 |

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 4/5/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|---------------|------|-----|---|
| PARAMETER | UOM | LOR | |
| Calcium, Ca | mg/L | 0.1 | 32 |
| Magnesium, Mg | mg/L | 0.1 | 15 |
| Sodium, Na | mg/L | 0.1 | 210 |
| Potassium, K | mg/L | 0.2 | 220 |

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 3/5/2022

| | | | 6639 Waste Water Sample WATER - 27/4/2022 SE231470.001 |
|---------------|------|-----|---|
| PARAMETER | UOM | LOR | |
| Aluminium, Al | µg/L | 5 | 9 |
| Iron, Fe | µg/L | 5 | 1900 |

METHOD

METHODOLOGY SUMMARY

- AN020** Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
- AN101** pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
- AN106** Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
- AN106** Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
- AN114** Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
- AN135** Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
- AN140** Acidity by Titration: The water sample is titrated with sodium hydroxide to designated pH end point. In a sample containing only carbon dioxide, bicarbonates and carbonates, titration to pH 8.3 at 25°C corresponds to stoichiometric neutralisation of carbonic acid to bicarbonate. Method reference APHA 2310 B.
- AN183** BOD: Serial dilutions of the sample are firstly combined with various reagents to aid bacterial growth and the sample is incubated for 5 days at 20°C. The difference between the initial and final oxygen contents of the sample is the amount of oxygen consumed by the bacteria. This is related to the organic loading of the sample therefore cBOD is the measure of the digestibility or bioavailability of organic matter in the sample. Reference APHA 5210 B. Internal Reference AN183
- AN185** Gravimetric Oil & Grease and Hydrocarbons: A known volume of sample is extracted using an organic solvent and the solvent layer with dissolved oils and greases is transferred to a pre-weighed beaker. The solvent is evaporated over low heating and the beaker reweighed. The concentration of oil and grease is determined by the increase in mass of the collection beaker per volume of sample extracted. O&G is suitable for lubricating oils and other high boiling point products but is not suitable for volatiles. Reference to APHA 5520 B and USEPA 1664 Revision B.. Internal Reference AN185
- AN245** Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO₂, NO₃ and SO₄ are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
- AN277** Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
- AN278** Filterable Reactive Phosphorus by DA (determined on filtered sample): Orthophosphate reacts with ammonium molybdate (Mo VI) and potassium antimonyl tartrate (Sb III) in acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue colour and the absorbance is read at 880 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-P F
- AN279/AN293(Sydney)** The sample is digested with Sulphuric acid, K₂SO₄ and CuSO₄. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
- AN281** An unfiltered water or soil sample is first digested in a block digester with sulfuric acid, K₂SO₄ and CuSO₄. The ammonia produced following digestion is then measured colourimetrically using the Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.

| | |
|--------------------|--|
| AN291 | Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser. |
| AN318 | Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4). |
| AN320 | Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components . |
| AN320 | Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements . Reference APHA 3120 B. |
| Calculation | Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported . APHA4500CO2 D. |

FOOTNOTES

| | | | | | |
|-----|--|-----|-----------------------------------|-----|------------------------------------|
| * | NATA accreditation does not cover the performance of this service. | - | Not analysed. | UOM | Unit of Measure. |
| ** | Indicative data, theoretical holding time exceeded. | NVL | Not validated. | LOR | Limit of Reporting. |
| | | IS | Insufficient sample for analysis. | ↑↓ | Raised/limited Limit of Reporting. |
| *** | Indicates that both * and ** apply. | LNR | Sample listed, but not received. | | |

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received. Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

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