

## Technical Guidance Note

### Current Method Statements – Analytical Services

**The following list is not exhaustive but covers the main types of analysis undertaken by the laboratory.**

**AME0003 – Alpha Spectrometry analysis** is performed using silicon surface barrier detectors to an in-house method.

**AME0044 – Gamma spectrometry analysis** is carried out using low-level HPGE detectors to an in-house method.

Uncertainties quoted at 95% confidence level on counting statistics only.

Uranium-238 activity is inferred from its daughter product Thorium-234.

Thorium-228 is inferred from Pb-212 assuming natural equilibrium has been reached.

**AME0050 – Liquid Scintillation analysis** is suitable for the determination of beta emitting nuclides, including those present on source swabs which are derived as part of an assessment of radioactivity leakage on or around an installed nucleonic device.

**AME0055 – LSA Produced water analysis.** Radium-226 and Radium-228 are determined indirectly by gamma ray spectrometry after allowing appropriate time for the 'grow in' of equilibrium daughter products Lead-214, Bismuth-214 and Actinium-228. An initial measurement of insoluble particulate for radium isotopes is made following the filtration of production water via a 0.45-micron filter. To achieve a sensitive measurement for soluble Radium in production water, it is necessary to isolate and pre-concentrate these isotopes from a 5-litre sample volume prior to analysis by gamma ray spectrometry.

Polonium-210 is isolated electrochemically from the production water (initial untreated sample) and independently measured using alpha spectrometry. A worst-case assessment of Lead-210 is based on an assumed equilibrium with Polonium-210.

**AME0064 – Hydrocarbon analysis (Oil on sand)** is performed using the BEIS approved FTIR method (revision 3.0). Calibration has been performed using site/installation specific oils, where available. Less than (<) values are reported when the measured result is below the limit of quantification. This is typically 300 mg/kg.

**AME0065 – Anion analysis** is performed using Ion Chromatography to an in-house method based on EPA 300.1.

**AME0070 – Loss on ignition** is performed using an in-house method. Values are reported in % w/w based on the dry weight of the sample.

**AME0071 – Loss on solvent washing** is performed using an in-house method. Values are reported in % w/w based on the dry weight of the sample.

**AME0073 – Particle Size analysis** is performed using an in-house method. Values are reported in % w/w based on the dry weight of the sample.

**AME0077 – Hydrocarbon analysis (Total Petroleum Hydrocarbon)** is performed to an in-house method based on EPA 413.2 and 418.1 approved FTIR methods and complies with BEIS regulations. Calibration has been performed using appropriate reference oils. Less than (<) values are reported when the measured result is below the limit of quantification. This is typically 300 mg/kg.

**AME0078 – Heavy Metals Extractable by Reverse Aqua Regia Digest** is performed using an in-house method based on EPA methods 3051A for Microwave Digestion and 6020A Metals by ICP-MS. Linear Calibration over the range of interest is performed using certified environmental standards which are produced in accordance with the ISO 17034 standard. Performance of the method is verified by analysis of Certified Reference Materials alongside samples, produced in accordance with the ISO 17034 standard. Less than (<) values are reported when the factored result is below the limit of quantification for the specified element, determined by method validation. Values marked with an asterisk '\*' fall outside of our ISO 17025 accreditation scope.

**AME0081 – Determination of dry residue or water content** was conducted by Loss on Drying in a heating oven at 105°C as detailed in BS EN 15934:2012 Method A. Results are reported as a '% (w/w)' to 2 decimal places. Performance of the method is verified by analysis of Certified Reference Materials alongside samples, produced in accordance with the ISO 17034 standard. LOQ for the method is 1% Dry Matter or 1% Water Content.

**AME0081 – Determination of dry residue or water content** was conducted by Volumetric Karl-Fischer Titration as detailed in BS EN 15934:2012 Method B. Results are reported as a '% (w/w)' to 2 decimal places. Performance of the method is verified by analysis of Certified Reference Materials alongside samples, produced in accordance with the ISO 17034 standard. LOQ for the method is 1% Dry Matter or 1% Water Content.

**AME0083 – Hydrocarbon analysis (Triband Total Petroleum Hydrocarbon)** is performed based on British standard method BS EN 14039:2004 via GC-FID. Calibration has been performed using certified matrix oils which are traceable to NIST standard.

**AME0084 – Qualitative determination of carbonate** is performed using an in-house method. Values are reported as positive/negative.

**AME0085 – Magnetic properties of solid samples** is performed using an in-house method. Values are reported as positive/negative.

**AME0086 – Qualitative determination of sulfides** is performed using an in-house method. Values are reported as positive/negative.

**AME0087 – Acid insolubles** is performed using an in-house method. Values are reported in % w/w based on the dry weight of the sample.

**AME0089 – Density/ Specific Gravity Analysis** is performed using an in-house method. Density results are reported in g/ml, specific gravity is unitless.

**AME0091 – Determination of Flash point (Flash test, Flammability)** is performed using the British Standard Method BS EN ISO 3679:2015. The instrument is externally calibrated, and verification is performed with a Certified Reference Material produced under the ISO 17034 standard. Test interval is 1°C. The limit of quantification is ambient temperature +5°C, typically 25 °C. Atmospheric pressure is corrected for and the result stated is at 101.3 kPa.

**AME0094 – Solids in Suspension** is performed using an in-house method. Values are reported in mg/L.

**AME0098 - Analysis of Volatile Organic Compounds (VOC's) in solid and liquid samples using HS-GC-MS** is performed using an in-house method based on standard EPA methods 8260, and 5021. Calibration has been performed using certified reference standards. Less than values are reported when the measured result is below the limit of quantification for the specific analyte. This is typically below 0.1 mg/kg for solids and 0.1 mg/L for liquids.

**AME0099 - Polycyclic aromatic hydrocarbon analysis by GC-MS** is performed using an in-house method based on standard EPA methods 8270, 3550 and 8310. Calibration has been performed using certified reference standards. Less than values are reported when the measured result is below the limit of quantification for the specific analyte. This is typically below 0.1 mg/kg for solids and 0.1 mg/L for liquids.

**AME0106: Waste Acceptance Criteria Testing** has been performed to BS EN 12457- 4:2002, sample matrix compliance with this method is at the sole discretion of the customer. Any deviations from the standard method are noted and referenced to the relevant clause of the standard. Waste Acceptance Criteria Limits provided are for guidance only. Tracerco does not take responsibility for any omissions. Data correct as per Council Decision 2003/33/EC.