METHOD STATEMENT

Determinand:
Determination of pH and electrical conductivity (EC)

Matrix:
Sample Type: Final effluent, trade discharge and crude sewage and compost (conductivity) samples.

Principle of Method:
The pH of a solution is equal to Log10 1/[H+] and is measured directly by a pH probe, which has been previously calibrated using solutions of a known pH.
The electrical conductivity of a solution depends upon the concentration of dissociated ions in solution and the temperature of that solution. The concentration of these ions will affect the current flow between two electrodes. The magnitude of this effect is directly proportional to the concentration of ions present, assuming a constant temperature. Consequently, after calibration with suitable standards and with the use of a temperature probe to correct for temperature differences between standards and samples, the EC of a solution may be measured.

Sampling and Sample Preparation:
Samples are received in 1L pet bottles
No preservation is required for wastewater pH and EC samples. See Appendix II for RRKR conductivity sample preparation.
Storage at room temperature is best as this reduces the possibility of changing either the pH or EC values due to altering chemical solubility with temperature. Samples should be kept in tightly sealed and preferably full containers with no air space in order to minimise the possibility of gas exchange with the atmosphere e.g. ammonia and carbon dioxide.
Samples should be measured as soon as possible in order to minimise possible effects from the above problems.

Samples are stable for:	pH -	2 days (In-House Data – Coventry)
	Conductivity -	16 days (In-House Data – Coventry)

Interferences
Gross suspended matter, oil or grease may cause interference by masking part of the electrode surface. As both pH and EC deal only with ions in solution, filtering of the samples to remove interferences is acceptable.
Above a pH of 12 the electrode response may not be linear for pH values. Also, if high sodium concentrations are present, the response for pH may not be perfectly linear above pH 10.
The EC measurement is temperature corrected by the instrument. However, large deviations between sample temperature and standard temperature (more than 5°C) may lead to inaccuracies during the compensation. Whenever possible, ensure that the samples and standards are at room temperature during measurement.

Performance of Method:

Range of Application:
The range of application for pH is 4-10. However, due to the linear response of the pH probe within a larger range, results may be reported for pH values in the range pH 1-13 provided additional checks at these pH values are carried out.
The range of application for conductivity is 5 - 11,670µS /cm.
Measurement should be made at 20°C.

Limit of Detection:

LOD pH = N/A
LOD EC = 16µS/cm

Recoveries of Compounds, Bias and Uncertainty of measurement:

pH	Low Standard	High Standard	Liquid AQC	Final Effluent	Crude Sewage	Trade Discharge
Value, pH units	4.01	10.07	7.07	7.33	6.92	8.68
Total Standard Deviation, pH units	0.02	0.02	0.02	0.11	0.09	0.09
Bias %	0.01	0.07	0.07	-	-	-

EC	Low Standard	High Standard	Very High Standard	Final Effluent		Crude Sewage		Trade Discharge	
Spike	-	-	-	1278	6024	1278	6024	1278	6024
Concentration, µS/cm	650	6024	11670	-	-	-	-	-	-
RSD %	0.81	0.34	0.53	0.73	3.04	0.79	0.39	072	0.62
Bias / Recovery %	0.25	-0.11	0.01	92.77	97.29	94.81	97.45	103.9	92.90

References:

The Measurement of Electrical Conductivity and the Laboratory Determination of the pH Value of Natural, Treated and Waste Waters 1978 HMSO. Methods for the Examination of Waters and Associated Materials. ISBN: 011 7514284.
Standard Methods for the Examination of Water and Wastewater, 20th Edition, APHA, Washington DC, ISBN 0-87553-235-7.
Soil quality: Determination of specific electrical conductivity. BS 7755 section 3.4: 1995 ISO 11265: 1195