METHOD STATEMENT

Determinand:
Monohydric Phenols

Matrix:
Leachates, effluents and waste waters

Principle of Method:
The phenol is determined colorimetrically using automated segmented flow analysis.
In aqueous solutions, an acidified sample is distilled to separate the ortho and meta substituted phenol from most other interferences. The distillate containing the phenol reacts with alkaline hexacyanoferrate (III) and 4-aminoantipyrine to form a red-coloured complex. The intensity of the colour measured at a wavelength of 505nm is directly proportional to the concentration of monohydric phenols present. Quantification is by comparison with standard phenol solutions.

Sampling and Sample Preparation:
Samples should be preserved by acidification as soon after sampling as possible. Clients are supplied with 60ml pots, with 3 or 4 drops of hydrochloric acid added.

Samples are stable for 28 days (Standard Methods: -ISBN 0-87553-161-X) from sampling.

Interferences:
Most interferences are eliminated by the distillation step. Where the phenol is distilled from an alkaline sample (e.g. insufficient acid preservative is added), poor chromatography with misshapen peaks may be observed. Where this is suspected, the pH of the sample should be checked and adjusted if necessary. However, if a sample has not been made sufficiently acidic at the point of sampling, then phenol-decomposing bacteria and oxidising or reducing agents within the sample may already have degraded some or all of the phenol. This is a major source of error in phenol analysis, leading to a low assessment of the phenol concentration.

Performance of Method:

Range of Application:	0.10 to 10 mg/l
Limit of Detection:	0.0604 mg/l
Normal Reporting Limit:	0.10 mg/l

Determinand	MCERTS Accreditation	Low standard		High standard	
		Tot. RSD %	Bias %	Tot. RSD %	Bias %
Monohydric Phenols	✓	1.45	4.47	1.36	-0.41

Determinand		Nuneaton FE		Wolston FE		YWS Stanley FE	
		Low	High	Low	High	Low	High
Monohydric Phenols	% RSD	1.77	1.23	1.62	1.18	1.52	1.11
	% Rec.	99.50	98.50	103.03	99.61	102.88	99.40

Determinand		Trade Effluent	Groundwater	Landfill Leachate	Soil Leachate
		High	High	High	High
Monohydric Phenols	% RSD	1.30	0.89	0.72	1.55
	% Rec.	99.73	92.42	96.17	99.43

Uncertainty of Measurement:

The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2, which gives a level of confidence of approximately 95%.

Determinand	Uncertainty of Measurement %
Monohydric Phenols	10.08

References:

Methods for the Examination of Waters and Waste Water, 14th edition, page 574 – 581, method 510 through 510C, 1975.

ISBN 0-87553-161-X, Standard Methods for the Examination of Water and Wastewater.