METHOD STATEMENT

Determinand:
Hexavalent Chromium

Matrix:
Effluents, leachates, surface waters, groundwaters and waste waters.

Principle of Method:
Hexavalent chromium reacts with 1,5-diphenylcarbazide in acidic conditions to produce a red violet colour of unknown composition in acid solution, which is determined colorimetrically at 540nm. The intensity of the colour is directly proportional to the concentration of hexavalent chromium present within the sample. The colorimetric end-point is determined using a Konelab discrete analyser, by comparing the colour of the unknown with the colour produced using a range of standards with known hexavalent chromium concentrations.

Sampling and Sample Preparation:
There is no sample preservative used. Samples should be analysed as soon after receipt as possible. Samples are stable for 3 days (In-House Data) from sampling.

Interferences:
The reaction with diphenylcarbazide is nearly specific for chromium. Molybdenum, mercury, vanadium, iron and copper can react to form colour with the reagent, but the intensities are much lower than that for chromium at the specified pH.

Turbid samples will give false readings, but the automated Konelab measures the background colour and turbidity of the sample prior to analysis and subtracts these from the final result to compensate.

Colour development is pH dependant. The Konelab instrument adds a specific volume of acid to each sample, which should bring the majority of samples to the correct pH. However, for some samples which are highly alkaline, this fixed volume of acid will not be sufficient to attain the correct pH and colour development will be incomplete, leading to low results.

As found with the Aquacheck sample colorimetric interference from blue samples will result in lower sample results.

Performance of Method:

Range of Application:	0.003 to 2.0mg/l for a 50ml sample volume
Limit of Detection:	0.0024mg/l
Normal Reporting Level:	0.003mg/l

Determinand	Low standard		High standard	
	% RSD	% Bias	% RSD	% Bias
Hexavalent Chromium	2.34	1.81	1.88	1.32

Determinand	Final Effluent		Trade Effluent		Groundwater		Landfill Leachate		Surface Water	
	% RSD	% Rec	% RSD	% Rec	% RSD	% Rec	% RSD	% Rec	% RSD	% Rec
Hexavalent Chromium	1.72	100.74	2.38	100.90	1.77	100.82	2.42	97.74	1.86	100.72

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 (%)
Hexavalent Chromium	9.73

References:

Standard Methods for the Examination of Water and Waste Water, 20th Edition 1998. ISBN 0-87553-235-7