Interpretive Quality Control Report - Analysis Holding Time

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the sample aliquot was taken. Elapsed time to analysis represents time from sampling where no extraction / digestion is involved or time from extraction / digestion where this is present. For composite samples, sampling date/time is taken as that of the oldest sample contributing to that composite. Sample date/time for laboratory produced leaches are taken from the completion date/time of the leaching process. Outliers for holding time are based on USEPA SW846, APHA, AS and NEPM (1999). Failed outliers, refer to the 'Summary of Outliers'.

Matrix Type: WATER

Analysis Holding Time and Preservation

Method / Container / Client Sample ID(s)	Date Sampled	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis	Pass?
ED093F: Major Cations - Filtered							
Clear Plastic Bottle - Natural MW41D	**3 Mar 2005**	----	----	----	**10 Mar 2005**	31 Mar 2005	Pass
EG020A-F: Dissolved Metals by ICP-MS - Suite A							
Clear Plastic Bottle - Nitric Acid; Filtered MW36S, MW35S, MW41D	**3 Mar 2005**	----	----	----	**15 Mar 2005**	30 Aug 2005	Pass
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered MW36S, MW35S, MW41D	**3 Mar 2005**	----	----	----	**14 Mar 2005**	31 Mar 2005	Pass
EK055G: Ammonia as N by Discreate analyser							
Clear Plastic Bottle - Sulphuric Acid MW35S, MW41D	**3 Mar 2005**	----	----	----	**9 Mar 2005**	31 Mar 2005	Pass
EK059G: Nitrite and Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulphuric Acid MW35S, MW41D	**3 Mar 2005**	----	----	----	**8 Mar 2005**	31 Mar 2005	Pass
EK061: Total Kjeldahl Nitrogen as N							
Clear Plastic Bottle - Sulphuric Acid MW35S, MW41D	**3 Mar 2005**	**8 Mar 2005**	31 Mar 2005	Pass	**8 Mar 2005**	31 Mar 2005	Pass
EP005: Total Organic Carbon							
Amber TOC Vial- Sulphuric Acid MW36S, MW35S, MW41D	**3 Mar 2005**	----	----	----	**8 Mar 2005**	31 Mar 2005	Pass
EP026: Chemical Oxygen Demand (COD)							
Clear Plastic Bottle - Sulphuric Acid MW35S, MW41D	**3 Mar 2005**	----	----	----	**11 Mar 2005**	31 Mar 2005	Pass
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural MW41D	**3 Mar 2005**	----	----	----	**8 Mar 2005**	5 Mar 2005	**Fail by 2 days**
EP071: TPH - Semivolatile Fraction							
Amber Glass Bottle - Unpreserved MW36S, MW35S, MW41D	**3 Mar 2005**	**9 Mar 2005**	10 Mar 2005	Pass	**10 Mar 2005**	18 Apr 2005	Pass
EP074: Volatile Organic Compounds							

Matrix Type: WATER

Analysis Holding Time and Preservation

Method / Container / Client Sample ID(s)		Date Sampled	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis	Pass?
EP074: Volatile Organic Compounds - **continued**								
Amber VOC Vial - HCl MW36S, MW41D	MW35S,	**3 Mar 2005**	----	----	----	**10 Mar 2005**	17 Mar 2005	Pass
EP075: Semivolatile Organic Compounds								
Amber Glass Bottle - Unpreserved MW36S, MW41D	MW35S,	**3 Mar 2005**	**9 Mar 2005**	10 Mar 2005	Pass	**10 Mar 2005**	18 Apr 2005	Pass
EP080: TPH Volatiles/BTEX								
Amber VOC Vial - HCl MW36S, MW41D	MW35S,	**3 Mar 2005**	----	----	----	**10 Mar 2005**	17 Mar 2005	Pass

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Interpretive Quality Control Report - Frequency of Quality Control Samples

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which this work order was processed. Actual rate should be greater than or equal to the expected rate.

Matrix Type: WATER

Frequency of Quality Control Samples

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
ED093F: Major Cations - Filtered	2	20	10.0	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG020A-F: Dissolved Metals by ICP-MS - Suite A	2	20	10.0	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035F: Dissolved Mercury by FIMS	2	20	10.0	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK055G: Ammonia as N by Discreate analyser	2	20	10.0	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK059G: Nitrite and Nitrate as N (NOx) by Discrete Analyser	2	18	11.1	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK061: Total Kjeldahl Nitrogen as N	2	19	10.5	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP005: Total Organic Carbon	1	9	11.1	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP026: Chemical Oxygen Demand (COD)	1	9	11.1	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP030: Biochemical Oxygen Demand (BOD)	1	7	14.3	13.3	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP074: Volatile Organic Compounds	1	8	12.5	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP080: TPH Volatiles/BTEX	2	19	10.5	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
Laboratory Control Samples (LCS)					
ED093F: Major Cations - Filtered	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG020A-F: Dissolved Metals by ICP-MS - Suite A	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035F: Dissolved Mercury by FIMS	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK055G: Ammonia as N by Discreate analyser	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK059G: Nitrite and Nitrate as N (NOx) by Discrete Analyser	1	18	5.6	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK061: Total Kjeldahl Nitrogen as N	1	19	5.3	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP005: Total Organic Carbon	1	9	11.1	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP026: Chemical Oxygen Demand (COD)	2	9	22.2	10.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP030: Biochemical Oxygen Demand (BOD)	1	7	14.3	6.7	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP071: TPH - Semivolatile Fraction	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP074: Volatile Organic Compounds	1	8	12.5	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP075: Semivolatile Organic Compounds	1	11	9.1	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP080: TPH Volatiles/BTEX	1	19	5.3	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
Method Blanks (MB)					
ED093F: Major Cations - Filtered	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG020A-F: Dissolved Metals by ICP-MS - Suite A	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035F: Dissolved Mercury by FIMS	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK055G: Ammonia as N by Discreate analyser	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK059G: Nitrite and Nitrate as N (NOx) by Discrete Analyser	1	18	5.6	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK061: Total Kjeldahl Nitrogen as N	1	19	5.3	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP005: Total Organic Carbon	1	9	11.1	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP026: Chemical Oxygen Demand (COD)	1	9	11.1	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP030: Biochemical Oxygen Demand (BOD)	1	7	14.3	6.7	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP071: TPH - Semivolatile Fraction	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP074: Volatile Organic Compounds	1	8	12.5	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP075: Semivolatile Organic Compounds	1	11	9.1	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP080: TPH Volatiles/BTEX	1	19	5.3	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement

Frequency of Quality Control Samples

Matrix Type: WATER

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
EG020A-F: Dissolved Metals by ICP-MS - Suite A	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EG035F: Dissolved Mercury by FIMS	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK055G: Ammonia as N by Discreate analyser	1	20	5.0	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK059G: Nitrite and Nitrate as N (NOx) by Discrete Analyser	1	18	5.6	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EK061: Total Kjeldahl Nitrogen as N	1	19	5.3	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP005: Total Organic Carbon	1	9	11.1	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP026: Chemical Oxygen Demand (COD)	1	9	11.1	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP074: Volatile Organic Compounds	1	8	12.5	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement
EP080: TPH Volatiles/BTEX	1	19	5.3	5.0	NEPM 1999 Schedule B(3) and ALSE QCS3 requirement

Interpretive Quality Control Report - Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged on the 'Quality Control Report'. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). - Anonymous - Client Sample IDs refer to samples which are not specifically part of this work order but formed part of the QC process lot.

Non-surrogates

- **For all matrices, no RPD recovery outliers occur for the duplicate analysis.**
- **For all matrices, no method blank result outliers occur.**
- **For all matrices, no laboratory spike recoveries breaches occur.**
- **For all matrices, no matrix spike recoveries breaches occur.**

Surrogates

- **For all matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time

The following report highlights outliers within this 'Interpretive Quality Control Report - Analysis Holding Time'.

Matrix Type: WATER

Summary of Outliers - Analysis Holding times and Preservation

Method / Container / Client Sample ID(s)	Date Sampled	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Pass?	Date analysed	Due for analysis	Pass?
EP030: Biochemical Oxygen Demand (BOD)							
Clear Plastic Bottle - Natural							
MW41D	**3 Mar 2005**	----	----	----	**8 Mar 2005**	5 Mar 2005	**Fail by 2 days**

Outliers : Frequency of Quality Control Samples

The following report highlights outliers within this 'Interpretive Quality Control Report - Frequency of Quality Control Samples'.

- **No frequency outliers occur.**

Method Reference Summary

The analytical procedures used by ALS Environmental are based on established internationally-recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house procedure are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported herein. Reference methods from which ALSE methods are based are provided in parenthesis.

Matrix Type: WATER

Preparation Methods

EK061/EK067 : TKN/TP Digestion - APHA 20th ed., 4500 Norg - D; APHA 20th ed., 4500 P - H. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

ORG14 : Separatory Funnel Extraction of Liquids - USEPA SW 846 - 3510B 500 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2). ALS default excludes sediment which may be resident in the container.

Analytical Methods

EA065 : Hardness as CaCO3 - APHA 20th ed., 2340. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

ED093F : Major Cations - Filtered - APHA 20th ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EG020A-F : Dissolved Metals by ICP-MS - Suite A - (APHA 20th ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

EG035F : Dissolved Mercury by FIMS - AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EK055G : Ammonia as N by Discreate analyser - APHA 20th ed., 4500 NH3+-H Ammonia is determined by direct colorimetry by Seal. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EK059G : Nitrite and Nitrate as N (NOx) by Discrete Analyser - APHA 20th ed., 4500 NO3- I. SEAL Method 2-018-1-L February 2003. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by SEAL. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EK061 : Total Kjeldahl Nitrogen as N - APHA 20th ed., 4500-Norg-D 100mL water samples are digested using a traditional Kjeldahl digestion followed by determination by FIA. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EK062-SYD : Total Nitrogen as N (TKN + Nox) - APHA 20th ed., 4500 N org / NO3. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EP005 : Total Organic Carbon - APHA 20th ed., 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EP026 : Chemical Oxygen Demand (COD) - APHA 20th ed., 5220 B. Samples are digested with a known excess of acidic potassium dichromate solution using silver sulphate as a catalyst. The chromium is reduced from Cr (VI) to Cr (III) by oxygen. The unreacted Cr (VI) can then be titrated with ferrous ammonium sulfate to determine the amount of Cr (VI) consumed. The oxidisable organic matter can be calculated in terms of oxygen equivalents. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EP030 : Biochemical Oxygen Demand (BOD) - APHA 20th ed., 5210 B The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

Method Reference Summary

Matrix Type: WATER

Analytical Methods

EP071 : TPH - Semivolatile Fraction - USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EP074 : Volatile Organic Compounds - USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EP075 : Semivolatile Organic Compounds - USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

EP080 : TPH Volatiles/BTEX - USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Appdx. 2)

ALS Environmental

CERTIFICATE OF ANALYSIS

Client	:	**SINCLAIR KNIGHT MERZ**	**Laboratory**	:	ALS Environmental Sydney	**Page**	: 1 of 10
Contact	:	MS LOUSIE MACDONALD	**Contact**	:	Greg Vogel		
Address	:	P O BOX 164 ST LEONARDS NSW AUSTRALIA 2065	**Address**	:	277-289 Woodpark Road Smithfield NSW Australia 2164	**Work order**	: **ES0501695**
Project	:	EN01669	**Quote number**	:	----	**Date received**	: 7 Mar 2005
Order number	:	- Not provided -				**Date issued**	: 17 Mar 2005
C-O-C number	:	- Not provided -					
Site	:	- Not provided -					
E-mail	:	lmacdonald@skm.com.au	**E-mail**	:	Greg.Vogel@alsenviro.com	**No. of samples**	
Telephone	:	(02) 9928-2100	**Telephone**	:	61-2-87848555	**Received**	: 4
Facsimile	:	(02) 9928-2272	**Facsimile**	:	61-2-87848500	**Analysed**	: 4

This final report for the ALSE work order reference ES0501695 supersedes any previous reports with this reference.
Results apply to the samples as submitted. All pages of this report have been checked and approved for release.
This report contains the following information:

- Analytical results for samples submitted
- Surrogate control limits

ALSE - QUALITY, SERVICE and TECHNOLOGY provided GLOBALLY

NATA Accredited Laboratory - 825

The Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its scope of accreditation. This document shall not be reproduced except in full.

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatory	Department
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