

CERTIFICATE OF ANALYSIS

Work Order	: WP2308155	Page	: 1 of 3
Client	: Gull Lake Basin Management Board	Laboratory	: Winnipeg - Environmental
Contact	: David Cairns	Account Manager	:
Address	: Box 31, Grp 327, RR3 Beausejour MB Canada R0E 0C0	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 799 1554	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 16-May-2023 09:02
PO	: ----	Date Analysis Commenced	: 16-May-2023
C-O-C number	: ----	Issue Date	: 23-May-2023 13:20
Sampler	: ----		
Site	: GYLL LAKE, MB		
Quote number	: Analytical Testing		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Brennan Dugas	Analyst	Microbiology, Winnipeg, Manitoba
Jeremy Byrnes	Senior Analyst	Limnology, Winnipeg, Manitoba
Oleksandr Busel		Inorganics, Winnipeg, Manitoba



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	Description
ct/sample	counts per sample
mg/L	milligrams per litre
MPN/100mL	most probable number per hundred millilitres

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Sample Comments

Sample	Client Id	Comment
WP2308155-001	6LBMB	No Zebra Mussel veligers observed.



Analytical Results

Sub-Matrix: Water				Client sample ID	6LBMB	----	----	----	----
(Matrix: Water)									
Client sampling date / time					16-May-2023 07:00	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	WP2308155-001	-----	-----	-----	-----
					Result	----	----	----	----
Anions and Nutrients									
Kjeldahl nitrogen, total [TKN]	----	E319/WP	0.15	mg/L	1.69	----	----	----	----
Nitrate (as N)	14797-55-8	E235.NO3/WP	0.020	mg/L	<0.020	----	----	----	----
Nitrate + Nitrite (as N)	----	EC235.N+N/W P	0.0050	mg/L	<0.0224	----	----	----	----
Nitrite (as N)	14797-65-0	E235.NO2/WP	0.010	mg/L	<0.010	----	----	----	----
Nitrogen, total	7727-37-9	EC368/WP	0.050	mg/L	1.69	----	----	----	----
Phosphorus, total	7723-14-0	E372/WP	0.020	mg/L	<0.020	----	----	----	----
Microbiological Tests									
Coliforms, total	----	E010/WP	1	MPN/100mL	31	----	----	----	----
Coliforms, Escherichia coli [E. coli]	----	E010/WP	1	MPN/100mL	1	----	----	----	----
Taxonomy									
Zebra mussel veliger	----	E920A/WP	1	ct/sample	<1	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: WP2308155	Page	: 1 of 6
Client	: Gull Lake Basin Management Board	Laboratory	: Winnipeg - Environmental
Contact	: David Cairns	Account Manager	:
Address	: Box 31, Grp 327, RR3 Beausejour MB Canada R0E 0C0	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 799 1554	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 16-May-2023 09:02
PO	: ----	Issue Date	: 23-May-2023 14:22
C-O-C number	: ----		
Sampler	: ----		
Site	: GYLL LAKE, MB		
Quote number	: Analytical Testing		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Anions and Nutrients : Nitrate in Water by IC										
HDPE 6LBMB	E235.NO3	16-May-2023	16-May-2023	----	----		16-May-2023	3 days	0 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE 6LBMB	E235.NO2	16-May-2023	16-May-2023	----	----		16-May-2023	3 days	0 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
Amber glass total (sulfuric acid) 6LBMB	E319	16-May-2023	18-May-2023	----	----		19-May-2023	28 days	3 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.02 mg/L)										
Amber glass total (sulfuric acid) 6LBMB	E372	16-May-2023	17-May-2023	----	----		18-May-2023	28 days	2 days	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate)										
Sterile HDPE (Sodium thiosulphate) 6LBMB	E010	16-May-2023	----	----	----		16-May-2023	30 hrs	6 hrs	✓
Taxonomy : Zebra Mussel veliger										
HDPE (70% ethanol) 6LBMB	E920A	16-May-2023	----	----	----		17-May-2023	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Nitrate in Water by IC	E235.NO3	940436	0	8	0.0	5.0	✖
Nitrite in Water by IC	E235.NO2	940435	0	8	0.0	5.0	✖
Total Coliforms and E. coli (Enzyme Substrate)	E010	940190	0	8	0.0	5.0	✖
Total Kjeldahl Nitrogen by Colourimetry	E319	944061	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	942744	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Nitrate in Water by IC	E235.NO3	940436	1	8	12.5	5.0	✔
Nitrite in Water by IC	E235.NO2	940435	1	8	12.5	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	944061	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	942744	1	20	5.0	5.0	✔
Method Blanks (MB)							
Nitrate in Water by IC	E235.NO3	940436	1	8	12.5	5.0	✔
Nitrite in Water by IC	E235.NO2	940435	1	8	12.5	5.0	✔
Total Coliforms and E. coli (Enzyme Substrate)	E010	940190	1	8	12.5	5.0	✔
Total Kjeldahl Nitrogen by Colourimetry	E319	944061	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	942744	1	20	5.0	5.0	✔
Matrix Spikes (MS)							
Nitrate in Water by IC	E235.NO3	940436	0	8	0.0	5.0	✖
Nitrite in Water by IC	E235.NO2	940435	0	8	0.0	5.0	✖
Total Kjeldahl Nitrogen by Colourimetry	E319	944061	1	20	5.0	5.0	✔
Total Phosphorus by Colourimetry (0.02 mg/L)	E372	942744	1	20	5.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms and E. coli (Enzyme Substrate)	E010 Winnipeg - Environmental	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used).
Nitrite in Water by IC	E235.NO2 Winnipeg - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 Winnipeg - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Colourimetry	E319 Winnipeg - Environmental	Water	APHA 4500-Norg D (mod)	Total Kjeldahl Nitrogen is determined using block digestion followed by colourimetric analysis.
Total Phosphorus by Colourimetry (0.02 mg/L)	E372 Winnipeg - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Zebra Mussel veliger	E920A Winnipeg - Environmental	Water	APHA 10500 (mod)	Microscopic techniques are used to identify and enumerate the target organisms. A result of <1 indicates that no target organisms were observed.
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N Winnipeg - Environmental	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Total Nitrogen (calculation)	EC368 Winnipeg - Environmental	Water	BC MOE LABORATORY MANUAL (2005)	Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)].
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Winnipeg - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.

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Client : Gull Lake Basin Management Board
Project : ----



Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Total Phosphorus in water	EP372 Winnipeg - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.

QUALITY CONTROL REPORT

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Sampler	: ---- 204 799 1554		
Site	: GYLL LAKE, MB		
Quote number	: Analytical Testing		
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No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Brennan Dugas	Analyst	Winnipeg Microbiology, Winnipeg, Manitoba
Jeremy Byrnes	Senior Analyst	Winnipeg Limnology, Winnipeg, Manitoba
Oleksandr Busel		Winnipeg Inorganics, Winnipeg, Manitoba



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

- Key :
- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
 - CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
 - DQO = Data Quality Objective.
 - LOR = Limit of Reporting (detection limit).
 - RPD = Relative Percent Difference
 - # = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Water					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Anions and Nutrients (QC Lot: 942744)											
WP2308155-001	6LBMB	Phosphorus, total	7723-14-0	E372	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 944061)											
WP2308125-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	0.15	mg/L	1.42	1.44	0.02	Diff <2x LOR	----



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Water

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 940435)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 940436)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 942744)						
Phosphorus, total	7723-14-0	E372	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 944061)						
Kjeldahl nitrogen, total [TKN]	----	E319	0.15	mg/L	<0.20	----
Microbiological Tests (QCLot: 940190)						
Coliforms, Escherichia coli [E. coli]	----	E010	1	MPN/100mL	<1	----
Coliforms, total	----	E010	1	MPN/100mL	<1	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Water

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Anions and Nutrients (QCLot: 940435)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 940436)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 942744)									
Phosphorus, total	7723-14-0	E372	0.02	mg/L	0.5 mg/L	95.2	80.0	120	----
Anions and Nutrients (QCLot: 944061)									
Kjeldahl nitrogen, total [TKN]	----	E319	0.15	mg/L	4 mg/L	91.0	75.0	125	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Water					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 942744)										
WP2308293-001	Anonymous	Phosphorus, total	7723-14-0	E372	ND mg/L	0.25 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 944061)										
WP2308125-002	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	5.31 mg/L	5 mg/L	106	70.0	130	----

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