



Analytica Group, LLC-Anchorage  
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5/21/2015

Kenai Watershed Forum  
44129 Sterling Highway  
Soldotna, AK 99669  
Attn: Branden Bornemann

Work Order #: A1505060  
Date: 5/21/2015  
Work ID: KWF Baseline Monitoring 2015  
Date Received: 5/5/2015  
Proj #: none

#### Sample Identification

Lab Sample Number	Client Description	Lab Sample Number	Client Description
A1505060-01	RM 30-Funny River	A1505060-02	RM 31-Morgan's Landing
A1505060-03	RM 36-Moose River		

Enclosed are the analytical results for the submitted sample(s). Please review the CASE NARRATIVE for a discussion of any data and/or quality control issues. Listings of data qualifiers, analytical codes, key dates, and QC relationships are provided at the end of the report.

Sincerely,

A handwritten signature in blue ink that reads 'Virgene Mulligan'.

Virgene Ideker-Mulligan  
Project Manager

*"The Science of Analysis, The Art of Service"*

## Case Narrative

*ARS Aleut Analytical*

*Work Order: A1505060*

Samples were prepared and analyzed according to EPA or equivalent methods outlined in the following references:

Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005.

Methods for the Determination of Metals in Environmental Samples, EPA/600/R-94/111, May 1994.

### SAMPLE RECEIPT:

There were 3 samples received on 5/5/2015 5:20:00 PM. Samples were received in good condition at a temperature of 5.7 deg. C.

### REVIEW FOR COMPLIANCE WITH ANALYTICA QA PLAN

A summary of our review is shown below.

All analytical results contained in this report have been reviewed under AAA's internal quality assurance and quality control program. Any deviations in quality control parameters for specific analyses are noted in the following text. A complete quality assurance report, including laboratory control, matrix spike, and sample duplicate recoveries, is kept on file in our office and is available upon request.

All method specifications were met for the following tests, unless otherwise noted:

Test Method: 200.8 - Metals by ICP/MS - 200.8 Metals - Aqueous

Test Method: SM4500-NO3E - Nitrogen (Nitrate), Cadmium Reduction Method - Nitrate+Nitrite pres - Aqueous

Test Method: SM4500-PE - Phos - Aqueous

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Client: Kenai Watershed Forum

Client Project Number: none

### Report Section: Client Sample Report

Client Sample Name: **RM 30-Funny River**

Matrix: Aqueous

Collection Date: 5/5/2015 9:00:00AM

The following test was conducted by: Analytica - Anchorage

Lab Sample Number: A1505060-01A

Analysis Date: 5/12/2015 7:45:00AM

Prep Date: 5/12/2015

Instrument: Thermospectr

Analytical Method ID: SM4500-NO3E - Nitrogen (Nitrate), Cadmium Reduction Method - N

File Name:

Prep Method ID:

Dilution Factor: 1

Prep Batch Number: A150513001

Report Basis: As Received

Analyst Initials: TR

Sample prep wt./vol: 25.00 ml

Prep Extract Vol: 25.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Nitrate-Nitrite as Nitrogen		ND		mg/L	0.10	0.015	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: A1505060-01C

Analysis Date: 5/11/2015 10:52:00AM

Prep Date: 5/9/2015

Instrument:

Analytical Method ID: SM4500-PE - Phos

File Name:

Prep Method ID: 4500-PB

Dilution Factor: 1

Prep Batch Number: R1505211104-16

Report Basis: As Received

Analyst Initials: SLC

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Phosphorous, Total		0.24		mg/L	0.010	0.0031	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: A1505060-01B

Analysis Date: 5/8/2015 2:26:00PM

Prep Date: 5/8/2015

Instrument:

Analytical Method ID: 200.8 - Metals by ICP/MS - 200.8 Metals

File Name:

Prep Method ID:

Dilution Factor: 1

Prep Batch Number: R1505211103-15

Report Basis: As Received

Analyst Initials: ACF

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Calcium	7440-70-2	8,100		ug/L	500	150	1
Iron	7439-89-6	2,800		ug/L	250	78	
Magnesium	7439-96-4	3,500		ug/L	50	15	

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Client: Kenai Watershed Forum

Client Project Number: none

### Report Section: Client Sample Report

Client Sample Name: **RM 31-Morgan's Landing**

Matrix: Aqueous

Collection Date: 5/5/2015 10:00:00AM

The following test was conducted by: Analytica - Anchorage

Lab Sample Number: A1505060-02A

Analysis Date: 5/12/2015 7:45:00AM

Prep Date: 5/12/2015

Instrument: Thermospectr

Analytical Method ID: SM4500-NO3E - Nitrogen (Nitrate), Cadmium Reduction Method - N

File Name:

Prep Method ID:

Dilution Factor: 2

Prep Batch Number: A150513001

Report Basis: As Received

Analyst Initials: TR

Sample prep wt./vol: 25.00 ml

Prep Extract Vol: 25.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Nitrate-Nitrite as Nitrogen		ND		mg/L	0.20	0.030	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: A1505060-02C

Analysis Date: 5/11/2015 10:44:00AM

Prep Date: 5/9/2015

Instrument:

Analytical Method ID: SM4500-PE - Phos

File Name:

Prep Method ID: 4500-PB

Dilution Factor: 1

Prep Batch Number: R1505211104-16

Report Basis: As Received

Analyst Initials: SLC

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Phosphorous, Total		0.025		mg/L	0.010	0.0031	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: A1505060-02B

Analysis Date: 5/8/2015 2:32:00PM

Prep Date: 5/8/2015

Instrument:

Analytical Method ID: 200.8 - Metals by ICP/MS - 200.8 Metals

File Name:

Prep Method ID:

Dilution Factor: 1

Prep Batch Number: R1505211103-15

Report Basis: As Received

Analyst Initials: ACF

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Calcium	7440-70-2	12,000		ug/L	500	150	1
Iron	7439-89-6	1,100		ug/L	250	78	
Magnesium	7439-96-4	1,700		ug/L	50	15	

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Client: Kenai Watershed Forum

Client Project Number: none

### Report Section: Client Sample Report

Client Sample Name: **RM 36-Moose River**

Matrix: Aqueous

Collection Date: 5/5/2015 10:40:00AM

The following test was conducted by: Analytica - Anchorage

Lab Sample Number: A1505060-03A

Analysis Date: 5/12/2015 7:45:00AM

Prep Date: 5/12/2015

Instrument: Thermospectr

Analytical Method ID: SM4500-NO3E - Nitrogen (Nitrate), Cadmium Reduction Method - N

File Name:

Prep Method ID:

Dilution Factor: 1

Prep Batch Number: A150513001

Report Basis: As Received

Analyst Initials: TR

Sample prep wt./vol: 25.00 ml

Prep Extract Vol: 25.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Nitrate-Nitrite as Nitrogen		ND		mg/L	0.10	0.015	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: A1505060-03C

Analysis Date: 5/11/2015 10:48:00AM

Prep Date: 5/9/2015

Instrument:

Analytical Method ID: SM4500-PE - Phos

File Name:

Prep Method ID: 4500-PB

Dilution Factor: 1

Prep Batch Number: R1505211104-16

Report Basis: As Received

Analyst Initials: SLC

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Phosphorous, Total		0.076		mg/L	0.010	0.0031	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: A1505060-03B

Analysis Date: 5/8/2015 2:40:00PM

Prep Date: 5/8/2015

Instrument:

Analytical Method ID: 200.8 - Metals by ICP/MS - 200.8 Metals

File Name:

Prep Method ID:

Dilution Factor: 1

Prep Batch Number: R1505211103-15

Report Basis: As Received

Analyst Initials: ACF

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Calcium	7440-70-2	17,000		ug/L	500	150	1
Iron	7439-89-6	1,500		ug/L	250	78	
Magnesium	7439-96-4	3,100		ug/L	50	15	

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Client: Kenai Watershed Forum

Client Project Number: none

### Report Section: Method Blank Report

Client Sample Name: MB

Matrix: Aqueous

Collection Date: 5/12/2015 7:45:00AM

The following test was conducted by: Analytica - Anchorage

Lab Sample Number: A150513001-MB

Analysis Date: 5/12/2015 7:45:00AM

Prep Date: 5/12/2015

Instrument: Thermospectr

Analytical Method ID: SM4500-NO3E - Nitrogen (Nitrate), Cadmium Reduction Method - N

File Name:

Prep Method ID:

Dilution Factor: 1

Prep Batch Number: A150513001

Report Basis: As Received

Analyst Initials: TR

Sample prep wt./vol: 25.00 ml

Prep Extract Vol: 25.00 ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Nitrate-Nitrite as Nitrogen		ND		mg/L	0.10	0.015	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: 1263619

Analysis Date: 5/11/2015 10:19:00AM

Prep Date: 5/9/2015

Instrument:

Analytical Method ID: SM4500-PE - Phos

File Name:

Prep Method ID: 4500-PB

Dilution Factor: 1

Prep Batch Number: R1505211104-16

Report Basis: As Received

Analyst Initials: SLC

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Phosphorous, Total		ND		mg/L	0.010	0.0031	1

The following test was conducted by: SGS Environmental Services Inc.

Lab Sample Number: 1262879

Analysis Date: 5/8/2015 1:38:00PM

Prep Date: 5/8/2015

Instrument:

Analytical Method ID: 200.8 - Metals by ICP/MS - 200.8 Metals

File Name:

Prep Method ID:

Dilution Factor: 1

Prep Batch Number: R1505211103-15

Report Basis: As Received

Analyst Initials: ACF

Sample prep wt./vol:

Prep Extract Vol: ml

<u>Analyte</u>	<u>CASNo</u>	<u>Result</u>	<u>Flags</u>	<u>Units</u>	<u>PQL</u>	<u>MDL</u>	<u>run #:</u>
Calcium	7440-70-2	ND		ug/L	500	150	1
Iron	7439-89-6	ND		ug/L	250	78	
Magnesium	7439-96-4	ND		ug/L	50	15	

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Client: Kenai Watershed Forum

Client Project Number: none

Tests Run at: Analytica Environmental Laboratories - Anchorage, Alaska

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Project Number:

Prep Batch: A150513001

### QUALITY CONTROL REPORT

#### LCS REPORT

Analysis: SM4500-NO3E - Nitrogen (Nitrate), Cadmium Reduction Method - MB: A150513001-MB

Prep Date: 5/12/2015

MB Anal. Date: 5/12/2015 7:45:00AM

Units: mg/L

LCS Anal. Date: 5/12/2015 7:45:00AM

Matrix: Aqueous

<u>Analyte Name</u>	<u>SampResult</u>	<u>LCSRes.</u>	<u>SPLev</u>	<u>Recov.</u>	<u>Recov Lim</u>	<u>RPDLim</u>	<u>Flag</u>
Nitrate-Nitrite as Nitrogen	ND	0.380	0.406	93.7	90 - 110		

#### FOOTNOTES TO QC REPORT

Note 1: Results are shown to three significant figures to avoid rounding errors in calculations.

Note 2: If the sample concentration is greater than 4 times the spike level, a recovery is not meaningful, and the result should be used as a replicate. In such cases the spike is not as high as expected random measurement variability of the sample result itself.

Note 3: For sample duplicates, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample and duplicate results are not five times the PQL or greater, then the RPD is not expected to fall within the window shown and the comparison should be made on the basis of the absolute difference. Analytica uses the criterion that the absolute difference should be less than the PQL for water or less than 2XPQL for other matrices.

Note 4: For serial dilutions, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample result is not 50 times the MDL or greater, then the fact that the RPD does not meet the 10% criterion has little significance. Otherwise it indicates that a matrix bias may exist at the analytical step.

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Client: Kenai Watershed Forum

Client Project Number: none

Tests Run at: SGS Environmental Services Inc.

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Project Number:

Prep Batch: R1505211103-15

### QUALITY CONTROL REPORT

#### LCS REPORT

Analysis: 200.8 - Metals by ICP/MS - 200.8 Metals

MB: 1262879

Prep Date: 5/8/2015

MB Anal. Date: 5/8/2015 1:38:00PM

Units: ug/L

LCS Anal. Date: 5/8/2015 1:40:00PM

Matrix:

Analyte Name	SampResult	LCSRes.	SPLev	Recov.	Recov Lim	RPDLim	Flag
Calcium	ND	10,300	10,000	103	85 - 115		
Iron	ND	5,010	5,000	100	85 - 115		
Magnesium	ND	10,400	10,000	104	85 - 115		

Prep Batch: R1505211104-16

#### LCS/LCSD REPORT

Analysis: SM4500-PE - Phos

MB: 1263619

Prep Date: 5/9/2015

MB Anal. Date: 5/11/2015 10:19:00AM

Units: mg/L

LCS Anal. Date: 5/11/2015 10:20:00AM

LCSD Anal. Date: 5/11/2015 10:22:00AM

Analyte Name	SampResult	LCSRes.	SDRes.	SPLev	SPDLev	Recov.	SD Recov	RPD	Recov Lim	RPDLim	Flag
Phosphorous, Total	ND	0.207	0.207	0.200	0.200	104	103	0.19	75 - 125	25.00	

#### FOOTNOTES TO QC REPORT

Note 1: Results are shown to three significant figures to avoid rounding errors in calculations.

Note 2: If the sample concentration is greater than 4 times the spike level, a recovery is not meaningful, and the result should be used as a replicate. In such cases the spike is not as high as expected random measurement variability of the sample result itself.

Note 3: For sample duplicates, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample and duplicate results are not five times the PQL or greater, then the RPD is not expected to fall within the window shown and the comparison should be made on the basis of the absolute difference. Analytica uses the criterion that the absolute difference should be less than the PQL for water or less than 2XPQL for other matrices.

Note 4: For serial dilutions, if the result is less than the PQL, the duplicate RPD is not applicable. If the sample result is not 50 times the MDL or greater, then the fact that the RPD does not meet the 10% criterion has little significance. Otherwise it indicates that a matrix bias may exist at the analytical step.



## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

**Project:** KWF Baseline Monitoring 2015

**Client:** Kenai Watershed Forum

**Client Project Number:** none

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

Project: KWF Baseline Monitoring 2015

Client: Kenai Watershed Forum

Client Project Number: none

### QC BATCH ASSOCIATIONS - BY METHOD BLANK

**Lab Project ID: 170,453      Lab Project Number: A1505060**

Prep Date: 5/12/2015

Lab Method Blank Id: A150513001-MB

Prep Batch ID: A150513001

Method: SM4500-NO3E - Nitrogen (Nitrate), Cadmium Reduction Method -

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
A1505060-01A	RM 30-Funny River		5/12/2015 7:45:00AM
A1505060-02A	RM 31-Morgan's Landing		5/12/2015 7:45:00AM
A1505060-03A	RM 36-Moose River		5/12/2015 7:45:00AM
A1505061-01A	Batch QC		5/12/2015 7:45:00AM
A150513001-LCS	LCS		5/12/2015 7:45:00AM
A1505061-01A-DUP	DUP		5/12/2015 7:45:00AM
A1505061-01A-MS	MS		5/12/2015 7:45:00AM

Prep Date: 5/8/2015

Lab Method Blank Id: 1262879

Prep Batch ID: R1505211103-15

Method: 200.8 - Metals by ICP/MS - 200.8 Metals

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
A1505060-01B	RM 30-Funny River		5/8/2015 2:26:00PM
A1505060-02B	RM 31-Morgan's Landing		5/8/2015 2:32:00PM
A1505060-03B	RM 36-Moose River		5/8/2015 2:40:00PM
1262880	LCS for HBN 1708260 [MXX/28610		5/8/2015 1:40:00PM
1263135	1263134 MS FOR [MXX28610]		5/8/2015 2:16:00PM

Prep Date: 5/9/2015

Lab Method Blank Id: 1263619

Prep Batch ID: R1505211104-16

Method: SM4500-PE - Phos

This Method blank and sample preparation batch are associated with the following samples, spikes, and duplicates:

<u>SampleNum</u>	<u>ClientSampleName</u>	<u>DataFile</u>	<u>AnalysisDate</u>
A1505060-01C	RM 30-Funny River		5/11/2015 10:52:00AM
A1505060-02C	RM 31-Morgan's Landing		5/11/2015 10:44:00AM
A1505060-03C	RM 36-Moose River		5/11/2015 10:48:00AM
1263620	LCS for HBN 1708523 [WXX/11020		5/11/2015 10:20:00AM
1263621	LCSD for HBN 1708523 [WXX/1102		5/11/2015 10:22:00AM
1263622	1151876001 MS FOR [WXX11020]		5/11/2015 11:24:00AM
1263623	1151876001 MSD FOR [WXX11020]		5/11/2015 11:25:00AM

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

**Project:** KWF Baseline Monitoring 2015

**Client:** Kenai Watershed Forum

**Client Project Number:** none

### DATA FLAGS AND DEFINITIONS

The PQL is the Method Quantitation Limit as defined by USACE.

Reporting Limit: Limit below which results are shown as "ND". This may be the PQL, MDL, or a value between. See the report conventions below.

#### Result Field:

ND = Not Detected at or above the Reporting Limit

NA = Analyte not applicable (see Case Narrative for discussion)

#### Qualifier Fields:

LOW = Recovery is below Lower Control Limit

HIGH = Recovery, RPD, or other parameter is above Upper Control Limit

E = Reported concentration is above the instrument calibration upper range

#### Organic Analysis Flags:

B = Analyte was detected in the laboratory method blank

J = Analyte was detected above MDL or Reporting Limit but below the Quant Limit (PQL)

#### Inorganic Analysis Flags:

J = Analyte was detected above the Reporting Limit but below the Quant Limit (PQL)

W = Post digestion spike did not meet criteria

S = Reported value determined by the Method of Standard Additions (MSA)

Several ways of defining the limit of detection and quantitation are prevalent in the laboratory industry and may appear in Analytica reports. These include the following:

MRL = "minimum reporting level", from the EPA Safe Drinking Water program (SDW)

PQL = "practical quantitation limit", from SW-846

EQL = "estimated quantitation limit", from SW-846

LOQ = "limit of quantitation", from a number of authoritative sources

In Analytica's work, all of these terms have the same meaning, equivalent to the EPA definition of the MRL. This reporting level is supported by a satisfactory calibration data point which is at that level or lower, and also is supported by a method detection limit (MDL) determined by the procedure in 40CFR. The MDL is lower than the MRL and represents an estimate of the level where positive detections have a 99% probability of being real, but where quantitation accuracy is unknown.

The MRL as defined by Analytica is the lowest demonstrated point of known quantitation accuracy.

The MRL should not be confused with the MCL, which is the EPA-defined "maximum contaminant level" allowed for certain regulated targets under specific regulations, such as the National Primary Drinking Water Regulations. Normally, the MRL is set at a level which is much lower than the MCL in order to ensure that levels are well below those limits. Not all target analytes have MCL levels established.

Other Flags may be applied. See Case Narrative for Description

## Detailed Analytical Report

ARS Aleut Analytical

Workorder (SDG): A1505060

**Project:** KWF Baseline Monitoring 2015

**Client:** Kenai Watershed Forum

**Client Project Number:** none

### REPORTING CONVENTIONS FOR THIS REPORT

A1505060

<u>TestPkgName</u>	<u>Basis</u>	<u># Sig Figs</u>	<u>Reporting Limit</u>
200.8 (Aqueous) - 200.8 Metals	As Received	2	Report to PQL
4500-NO3E (Aqueous) - Nitrate+Nitrite pres	As Received	3	Report to PQL
4500-PE/4500-PB (Aqueous) - Phos	As Received	2	Report to PQL

