Analytical Resources, Incorporated
Analytical Chemists and Consultants

11 May 2017

Romy Freier-Coppinger
Seattle Parks & Recreation
2911 2nd Avenue
Seattle, WA 98121

RE: MAG47-SUMP

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
17E0074	N/A

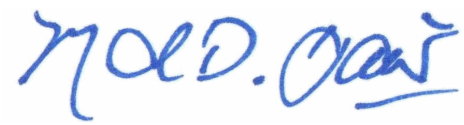
Mark Harris

Digitally signed by Mark Harris
DN: c=US, st=Washington, l=Tukwila, o=Analytical Resources, Inc., ou=Client Services, cn=Mark Harris, email=markh@arilabs.com
Date: 2017.05.11 14:49:52 -07'00'

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the reqirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

17E0074

Seattle Public Utilities

CHAIN OF CUSTODY RECORD

Chemistry Lab

SEATTLE PUBLIC UTILITIES

Water Quality Laboratory
800 S. Stacy St. Seattle, WA 98134

Page 1 of 1 DATE 8/21/2015
Phone: (206) 684-7834 FAX: (206) 684-4133

Freier R@Seattle.gov

Name: Romy Freier-Coppinger
Address: Seattle Parks
800 Maynard Ave S
Tel: Seattle 98134
Job/PO#: 206 615 0691

PWS ID # _____
Source # ___
Purpose: Repeat ☐
Routine ☐
Other ☐

Sampler(s): Signature(s):

Sample Date	Time Collected	Location	Sample Number	TCLP 8 metals	RCRA 8 Metals	Testing Parameters							Number of Containers	Rec'd Temp. ____ COMMENTS
5/3/17	1447	MA647-Sump	A MA647-Sump	X	X									If insufficient volume prioritize
			A											TCLP
			A											
			A											
			A											
			A											
			A											
			A											
			A											
			A											Total # of containers:

Relinquished by:			Received by:		
Romy Freier		5/4/17	Paul Mark	Paul Mark	5/4/2017
(signature)	(printed name)	Date	(signature)	(printed name)	Date
Seattle Parks		10:08	ARI		10:08
Company		Time	Company		Time
Relinquished by:			Received by:		
(signature)	(printed name)	Date	(signature)	(printed name)	Date
Company		Time	Company		Time

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: SPU

Project Name: _____

COC No(s): _____ NA

Delivered by: Fed-Ex UPS Courier (Hand Delivered) Other: _____

Assigned ARI Job No: 17E0074

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 11.9

Time: _____

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D002565

Cooler Accepted by: PM Date: 5/4/2017 Time: 10:08

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used? ...	Bubble Wrap (Wet Ice) Gel Packs (Baggies) Foam Block Paper Other: _____		
Was sufficient ice used (if appropriate)?	NA	YES	(NO)
Were all bottles sealed in individual plastic bags?		(YES)	NO
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)...	(NA)	YES	NO
Were all VOC vials free of air bubbles?	(NA)	YES	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)		

Was Sample Split by ARI : (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: PM Date: 5/4/2017 Time: _____

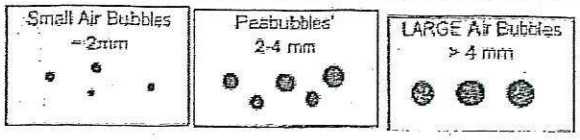
*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

Number of containers entry not filled out on COC.

By: Date:



Small → "sm"	(< 2 mm)
Peabubbles → "pb"	(2 to < 4 mm)
Large → "lg"	(4 to < 6 mm)
Headspace → "hs"	(> 6 mm)

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

Cooler#: 1	Temperature(°C): 11.9	
Sample ID	Bottle Count	Bottle Type
Samples received above 6°C		

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Cooler#:	Temperature(°C):	
Sample ID	Bottle Count	Bottle Type

Completed by: PM Date: 5/4/2017 Time: 10:15

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MAG47-SUMP	17E0074-01	Solid	03-May-2017 14:47	04-May-2017 10:08
Trip Blank	17E0074-02	Water	03-May-2017 14:50	04-May-2017 10:08

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

Case Narrative

Client: Seattle Parks & Recreation
Project: MAG47-SUMP
Workorder: 17E0074

Sample receipt

The sample listed on the preceding page was received 04-May-2017 10:08 under ARI work order 17E0074. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total/TCLP Metals - EPA Methods 1311/6010C/7470A/7471B

This sample was digested and analyzed within the recommended holding times.

All initial and continuing calibrations were within method requirements.

A small amount of barium was detected in the method blank associated with the TCLP metals analysis of this sample . Since the source of the contamination is known to be the filter used for this analysis, no corrective actions were taken. No other elements were detected in the method blanks above the LOQs.

The percent recoveries for all elements were within acceptable QC limits for the LCSs.

A matrix spike (MS) was prepard and analyzed for total metals in conjunction with this sample. The percent recoveries for all elements were within acceptable QC limits for the MS.

A matrix duplicate (MD) was prepared and analyzed for total metals in conjunction with this sample. The RPD for cadmium was high following the analysis of the MD. Since the percent recovery for cadmium was within acceptable QC limits for the corresponding LCS, it was concluded that a lack of sample homogeneity was the cause of the high RPD. No corrective actions were taken. The RPDs for all remaining elements were within acceptable QC limits for the MD.

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

MAG47-SUMP

17E0074-01 (Solid)

Metals and Metallic Compounds

Method: EPA 6010C — Sampled: 05/03/2017 14:47
Instrument: ICP2 — Analyzed: 10-May-2017 12:44

Sample Preparation: Preparation Method: SWC EPA 3050B
Preparation Batch: BFE0201 — Sample Size: 1.054 g (wet) — Dry Weight:0.51 g
Prepared: 08-May-2017 — Final Volume: 50 mL — % Solids: 48.28

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic	7440-38-2	20	98.3	**1020**	mg/kg	D
Barium	7440-39-3	20	5.90	**458**	mg/kg	D
Cadmium	7440-43-9	20	3.93	**23.8**	mg/kg	D
Chromium	7440-47-3	20	9.83	**50.8**	mg/kg	D
Lead	7439-92-1	20	39.3	**222**	mg/kg	D
Selenium	7782-49-2	20	98.3	ND	mg/kg	U
Silver	7440-22-4	20	5.90	ND	mg/kg	U

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

MAG47-SUMP

17E0074-01 (Solid)

Metals and Metallic Compounds

Method: EPA 7471B — Sampled: 05/03/2017 14:47
Instrument: CETAC — Analyzed: 11-May-2017 13:55

Sample Preparation: Preparation Method: SMM EPA 7471B
Preparation Batch: BFE0169 — Sample Size: 0.273 g (wet) — Dry Weight:0.13 g
Prepared: 05-May-2017 — Final Volume: 50 mL — % Solids: 48.28

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	10	0.3794	**6.790**	mg/kg	D

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

MAG47-SUMP

17E0074-01 (Solid)

Metals and Metallic Compounds

Method: SM 2540 G-97
Instrument: N/A

Sampled: 05/03/2017 14:47
Analyzed: 09-May-2017 10:12

Sample Preparation:
Preparation Method: No Prep-Metals
Preparation Batch: BFE0202
Prepared: 08-May-2017
Sample Size: 10 g (wet)
Final Volume: 10 g

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	**48.28**	%	

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

MAG47-SUMP

17E0074-01 (Solid)

TCLP Metals and Metallic Compounds

Method: EPA 6010C — Sampled: 05/03/2017 14:47
Instrument: ICP2 — Analyzed: 10-May-2017 15:12

Sample Preparation: Preparation Method: LEN Digestion of EPA 1311 Elutriate
Preparation Batch: BFE0238 — Sample Size: 25 mL (wet)
Prepared: 09-May-2017 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Arsenic	7440-38-2	5	0.250	ND	mg/L	U
Barium	7440-39-3	5	0.0150	**0.575**	mg/L	B
Cadmium	7440-43-9	5	0.0100	**0.0341**	mg/L	
Chromium	7440-47-3	5	0.0250	ND	mg/L	U
Lead	7439-92-1	5	0.100	ND	mg/L	U
Selenium	7782-49-2	5	0.250	ND	mg/L	U
Silver	7440-22-4	5	0.0150	ND	mg/L	U

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

MAG47-SUMP

17E0074-01 (Solid)

TCLP Metals and Metallic Compounds

Method: EPA 7470A — Sampled: 05/03/2017 14:47
Instrument: CETAC — Analyzed: 10-May-2017 14:04

Sample Preparation: Preparation Method: LEM 7470A Digestion of EPA 1311 Elutriate for Hg
Preparation Batch: BFE0240 — Sample Size: 20 mL
Prepared: 09-May-2017 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Mercury	7439-97-6	1	0.000007	0.000100	**0.000050**	mg/L	J

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

Metals and Metallic Compounds - Quality Control

Batch BFE0169 - SMM EPA 7471B

Instrument: CETAC Analyst: MCB

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0169-BLK1)				Prepared: 05-May-2017 Analyzed: 11-May-2017 11:56						
Mercury	ND	0.02500	mg/kg							U
LCS (BFE0169-BS1)				Prepared: 05-May-2017 Analyzed: 11-May-2017 11:57						
Mercury	0.5275	0.02500	mg/kg	0.5000		106	80-120			

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

Metals and Metallic Compounds - Quality Control

Batch BFE0201 - SWC EPA 3050B

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0201-BLK1)				Prepared: 08-May-2017 Analyzed: 10-May-2017 10:20						
Arsenic	ND	5.00	mg/kg							U
Barium	ND	0.300	mg/kg							U
Cadmium	ND	0.200	mg/kg							U
Chromium	ND	0.500	mg/kg							U
Lead	ND	2.00	mg/kg							U
Selenium	ND	5.00	mg/kg							U
Silver	ND	0.300	mg/kg							U
LCS (BFE0201-BS1)				Prepared: 08-May-2017 Analyzed: 10-May-2017 11:04						
Arsenic	207	5.00	mg/kg	200		103	80-120			
Barium	207	0.300	mg/kg	200		104	80-120			
Cadmium	52.2	0.200	mg/kg	50.0		104	80-120			
Chromium	52.4	0.500	mg/kg	50.0		105	80-120			
Lead	213	2.00	mg/kg	200		107	80-120			
Selenium	210	5.00	mg/kg	200		105	80-120			
Silver	55.1	0.300	mg/kg	50.0		110	80-120			
Duplicate (BFE0201-DUP1)	**Source: 17E0074-01**			Prepared: 08-May-2017 Analyzed: 10-May-2017 12:40						
Arsenic	991	98.5	mg/kg		1020			2.95	20	D
Barium	465	5.91	mg/kg		458			1.63	20	D
Cadmium	18.7	3.94	mg/kg		23.8			24.10	20	*, D
Chromium	54.8	9.85	mg/kg		50.8			7.50	20	D
Lead	258	39.4	mg/kg		222			14.80	20	D
Selenium	ND	98.5	mg/kg		ND					U
Silver	1.73	5.91	mg/kg		2.03			15.80	20	U, D
Matrix Spike (BFE0201-MS1)	**Source: 17E0074-01**			Prepared: 08-May-2017 Analyzed: 10-May-2017 12:48						
Arsenic	1410	98.1	mg/kg	392	1020	100	75-125			D
Barium	848	5.88	mg/kg	392	458	99.4	75-125			D
Cadmium	126	3.92	mg/kg	98.1	23.8	104	75-125			D
Chromium	146	9.81	mg/kg	98.1	50.8	96.9	75-125			D
Lead	654	39.2	mg/kg	392	222	110	75-125			D
Selenium	426	98.1	mg/kg	392	ND	109	75-125			D
Silver	109	5.88	mg/kg	98.1	2.03	109	75-125			D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

TCLP Metals and Metallic Compounds - Quality Control

Batch BFE0238 - LEN Digestion of EPA 1311 Elutriate

Instrument: ICP2 Analyst: TCH

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0238-BLK1)			Prepared: 09-May-2017 Analyzed: 10-May-2017 14:08							
Arsenic	ND	0.250	mg/L							U
Barium	0.0375	0.0150	mg/L							
Cadmium	ND	0.0100	mg/L							U
Chromium	ND	0.0250	mg/L							U
Lead	ND	0.100	mg/L							U
Selenium	ND	0.250	mg/L							U
Silver	ND	0.0150	mg/L							U

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

TCLP Metals and Metallic Compounds - Quality Control

Batch BFE0240 - LEM 7470A Digestion of EPA 1311 Elutriate for Hg

Instrument: CETAC Analyst: MCB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BFE0240-BLK1)				Prepared: 09-May-2017 Analyzed: 10-May-2017 14:02							
Mercury	0.000020	0.000007	0.000100	mg/L							J

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

Certified Analyses included in this Report

Analyte	Certifications
EPA 6010C in Solid	
Silver	NELAP,WADOE,DoD-ELAP
Arsenic	NELAP,WADOE,DoD-ELAP,ADEC
Barium	NELAP,WADOE,ADEC,DoD-ELAP
Cadmium	NELAP,WADOE,DoD-ELAP,ADEC
Chromium	NELAP,WADOE,DoD-ELAP,ADEC
Lead	NELAP,WADOE,DoD-ELAP,ADEC
Selenium	NELAP,WADOE,DoD-ELAP
Silver	NELAP,WADOE,DoD-ELAP
Arsenic	CALAP,NELAP,WADOE
Barium	CALAP,NELAP,WADOE
Cadmium	NELAP,WADOE,DoD-ELAP
Chromium	NELAP,WADOE,DoD-ELAP
Lead	NELAP,WADOE,DoD-ELAP
Selenium	NELAP,WADOE,DoD-ELAP
EPA 7470A in Water	
Mercury	WADOE,NELAP
EPA 7471B in Solid	
Mercury	WADOE,NELAP,DoD-ELAP,CALAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	UST-033	05/06/2017
CALAP	California Department of Public Health CAELAP	2748	02/28/2018
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	03/30/2017
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006	05/11/2017
WADOE	WA Dept of Ecology	C558	06/30/2017
WA-DW	Ecology - Drinking Water	C558	06/30/2017

Seattle Parks & Recreation	Project: MAG47-SUMP	
2911 2nd Avenue	Project Number: [none]	**Reported:**
Seattle WA, 98121	Project Manager: Romy Freier-Coppinger	11-May-2017 14:48

Notes and Definitions

U	This analyte is not detected above the applicable reporting or detection limit.
J	Estimated concentration value detected below the reporting limit.
D	The reported value is from a dilution
B	This analyte was detected in the method blank.
*	Flagged value is not within established control limits.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.