100 Jefferson Boulevard
Suite 220
Warwick, RI 02888
401.732.7600
Fax 401.732.7670

June 22, 2016

Mr. Graham L. Waters
Town Manager
Town of Coventry
1670 Flat River Road
Coventry, Rhode Island 02816

Sent Via Email: gwaters@coventryri.org

RE: Tiogue Lake
Surface Water Sampling Report
Coventry, Rhode Island
AEG Project # 1832-02

Dear Mr. Waters:

Alliance Environmental Group, Inc. (AEG) is pleased to submit this surface water sampling report for the subject property referenced above and hereinafter referred to as the "Site".

BACKGROUND

As you are aware, the Town of Coventry (Town) is a Potentially Responsible Party (PRP) for the former Town of Coventry Landfill (CLF) project. The Town, and the rest of the PRPs for the project, have agreed to revise the Materials Management Plan (MMP) for the CLF. The MMP was revised to allow CLF to include an impermeable final cap in the closure design thereby allowing the facility to accept higher concentrations of total lead in soils as well as some construction and demolition products.

During public meetings held in support of the CLF project, a concern was raised that the increased in total lead concentrations could potentially have a deleterious impact on the surface water quality of Tiogue Lake since the lake is located downgradient of the CLF.

The Town agreed to sample Tiogue Lake on a quarterly basis during the project implementation up to the placement of the impermeable final cap, which is estimated to be completed in 2020/2021.

INTRODUCTION

On June 9, 2016, an AEG representative collected three background surface water samples at Lake Tiogue. The AEG scientist was accompanied by Ms. Abby Pimentel of the Coventry Parks and Recreation. The sampling locations are shown in Figure 1 below.

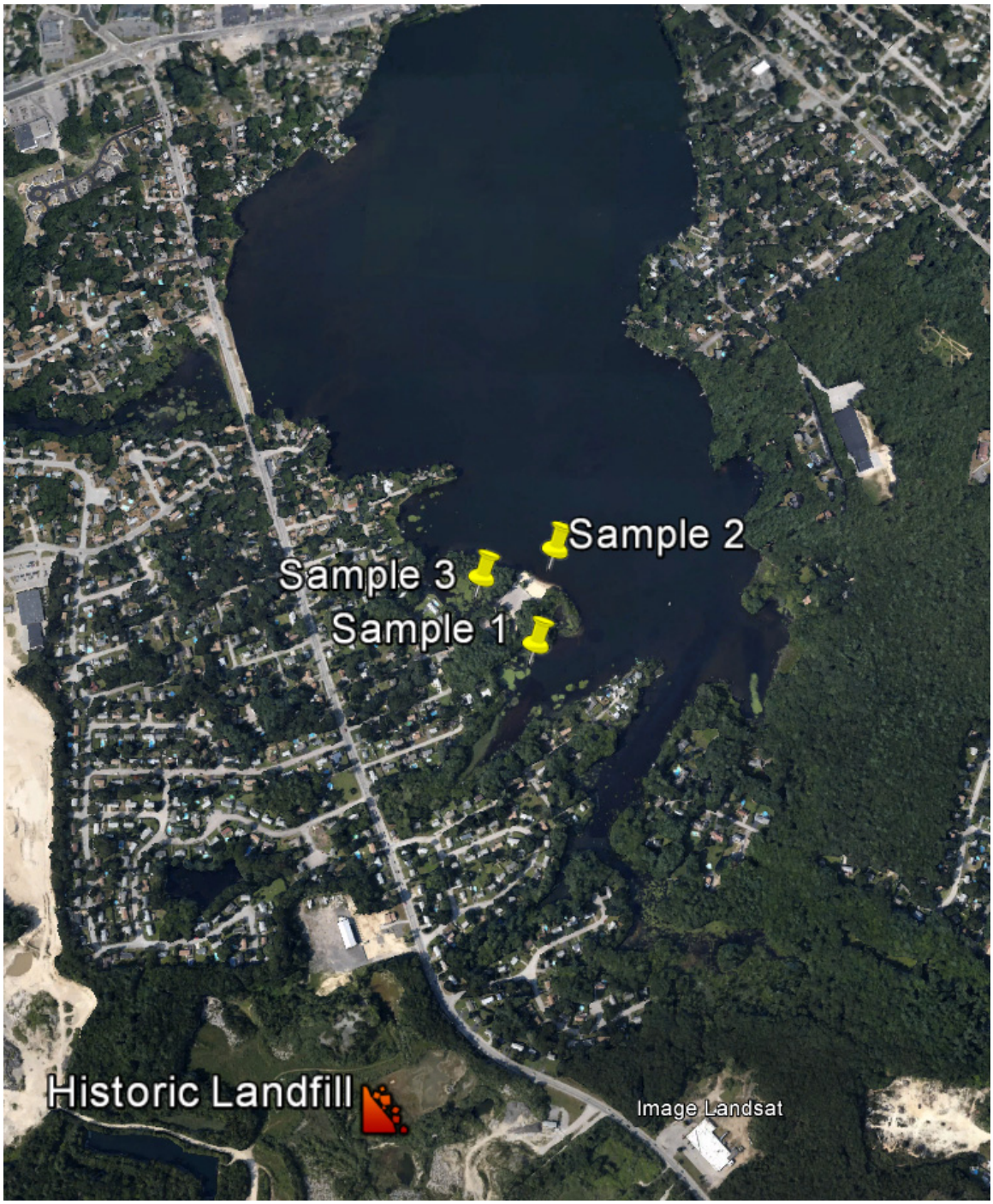

Figure 1 – Surface Water Sampling Locations (Map Data ©Google 2016)

The surface water samples were collected using a dipper cup. The cup was cleaned/rinsed between sampling locations. The samples were transferred to plastic bottles and submitted to a Rhode Island-certified laboratory (Rhode Island Analytical Laboratory) for the analysis of total and dissolved lead referencing EPA Method 200.8 on a standard turnaround.

The surface water sampling results are summarized in Table 1 below. The laboratory analytical report is included as Attachment 1.

SURFACE WATER SAMPLING RESULTS

According to the Rhode Island Department of Environmental Management (RIDEM), Tiogue Lake (water body identification number RI0006014L-02) is classified as surface water B (partial use designation) and a warmwater fishery.

The RIDEM *Water Quality Regulations*, amended May 2009, contain the equations and criteria to calculate the Aquatic Life Fresh Water Acute and Chronic exposure concentrations. There are no criteria recommendations for human health regarding the consumption of aquatic organisms impacted with lead.

In order to utilize the equations and criteria promulgated in the *Water Quality Regulations*, AEG first obtained the alkalinity hardness value of 22.7 mg/L (i.e., the mean yearly concentration of calcium carbonate ($CaCO_3$) for Lake Tiogue[1]). The Conversion Factor (CF) used to derive the aquatic life freshwater acute and chronic exposure included: CF = 1.46203 - [(ln H) x 0.145712]; where [ln H] = natural log of hardness as measured as $CaCO_3$. In accordance with the Water Quality Regulations, when an ambient hardness of less than 25 mg/L is used to establish criteria for lead, the hardness dependent Conversion Factor (CF) should not exceed one. Since the calculated CF was 1.0071, a CF of 1.0 was used for the calculation.

For an alternative comparison, AEG compared the dissolved lead concentrations against the United States Environmental Protection Agency (USEPA) lowest National Ambient Water Quality Criteria (NAWQC). USEPA's compilation of national recommended water quality criteria contains the recommended water quality criteria for the protection of aquatic life and human health in surface water for approximately 150 pollutants. These criteria are published pursuant to Section 304(a) of the Clean Water Act (CWA).

The analytical results are shown in Table 1 below:

Table 1
Surface Water Sampling Results
Tiogue Lake - Coventry RI

Sampling Date: 6/9/2016	Surface Water Sample 1	Surface Water Sample 2	Surface Water Sample 3	Units	Aquatic Life Criteria Freshwater Acute	Aquatic Life Criteria Freshwater Chronic	Human Health Criteria Consumption of Aquatic Organisms	Lowest NAWQC*
Total and Dissolved Lead (EPA Method 200.8)								
Total Lead	1.2	<1.0	3.5	µg/L	NS	NS	NS	NS
Dissolved Lead	<0.48	<0.48	1.2	µg/L	12.36	0.48	NS	0.54

Notes:
NS = No Criteria Established.
NAWQC = National Ambient Water Quality Criteria

The results indicated that the dissolved lead concentration exceeded the RIDEM Aquatic Life Freshwater Chronic Criterion of 0.48 µg/L and the lowest NAWQC benchmark in the Surface Water Sample 3. The dissolved lead concentrations in the Surface Water Samples 1 and 2 were below the RIDEM Aquatic Life Freshwater Chronic Criterion and the lowest NAWQC benchmark.

[1] http://cels.uri.edu/docslink/ww/14WebFiles/14Alkalinity.pdf

CONCLUSIONS

The lead sampling at Tiogue Lake will continue on a quarterly sampling schedule until the impermeable final cap is constructed. The next sampling event is scheduled for August 2016.

If you have any questions, please contact us at 401-732-7600.

Very truly yours,
Alliance Environmental Group, Inc.

Richard Hittinger
Digitally signed by Richard Hittinger
DN: cn=Richard Hittinger, o=Alliance Environmental Group, Inc., ou, email=rhittinger@allianceenvironmentalgroup.com, c=US
Date: 2016.06.22 14:52:09 -04'00'

Richard Hittinger
President

Felix A. Perriello
Digitally signed by Felix A. Perriello
DN: cn=Felix A. Perriello, o=Alliance Environmental Group, Inc., ou, email=FPerriello@AllianceEGI.com, c=US
Date: 2016.06.22 14:48:21 -04'00'

Felix A. Perriello, CHMM, CPG, LSP, LEP
Vice President / Principal Scientist

cc: Mr. Kevin McGee, Director of Public Works
Ms. Abby Pimentel, Coventry Parks and Recreation
Mr. Ed Summerly, PG, GZA

ATTACHMENT 1

Laboratory Analytical Report

Alliance Environmental

CERTIFICATE OF ANALYSIS

Alliance Environmental
Attn: Neal Brown
100 Jefferson Boulevard
Suite 220
Warwick, RI 02888

Date Received: 6/9/2016
Date Reported: 6/16/2016
Date Revised: 6/21/2016
P.O. #:
Work Order #: 1606-13362 REV A

DESCRIPTION: PROJECT #1832 - COVENTRY - TIOGUE LAKE

Subject sample(s) has/have been analyzed by our Warwick, RI laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.
The Certificate of Analysis shall not be reproduced except in full, without written approval of R.I. Analytical.
Results relate only to samples submitted to the laboratory for analysis.
Test results are not blank corrected.

Certification #: RI LAI00033, MA M-RI015, CT PH-0508, ME RI00015
NH 2070, NY 11726

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Melma A Marar for

Sharon Baker
MIS / Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

Alliance Environmental
Date Received: 6/9/2016
Work Order #: 1606-13362

Sample # 001
SAMPLE DESCRIPTION: SURFACE WATER 1 (TIOGUE)
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/09/2016 @ 09:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE/TIME ANALYZED	ANALYST
Total Metals						
Lead	1.2	1.0	ug/l	EPA 200.8	6/15/2016 13:35	PJC
Dissolved Metals Analyzed by ICPMS						
Lead	<0.48	0.48	ug/l	EPA 200.8	6/16/2016 10:27	PJC
ICPMS Digestion				EPA 200.8	6/14/2016 18:25	CRC
ICPMS Digestion (Dissolved)				EPA 200.8	6/15/2016 8:49	JRW

Sample # 002
SAMPLE DESCRIPTION: SURFACE WATER 2 (TIOGUE)
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/09/2016 @ 09:20

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE/TIME ANALYZED	ANALYST
Total Metals						
Lead	<1.0	1.0	ug/l	EPA 200.8	6/15/2016 13:41	PJC
Dissolved Metals Analyzed by ICPMS						
Lead	<0.48	0.48	ug/l	EPA 200.8	6/16/2016 10:49	PJC
ICPMS Digestion				EPA 200.8	6/14/2016 18:25	CRC
ICPMS Digestion (Dissolved)				EPA 200.8	6/15/2016 8:49	JRW

Sample # 003
SAMPLE DESCRIPTION: SURFACE WATER 3 (TIOGUE)
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/09/2016 @ 09:38

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE/TIME ANALYZED	ANALYST
Total Metals						
Lead	3.5	1.0	ug/l	EPA 200.8	6/15/2016 13:46	PJC
Dissolved Metals Analyzed by ICPMS						
Lead	1.2	1.0	ug/l	EPA 200.8	6/16/2016 11:05	PJC
ICPMS Digestion				EPA 200.8	6/14/2016 18:25	CRC
ICPMS Digestion (Dissolved)				EPA 200.8	6/15/2016 8:49	JRW

R.I. Analytical Laboratories, Inc.

CERTIFICATE OF ANALYSIS

Alliance Environmental
Date Received: 6/9/2016
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Revisions include detection limit reduction from 1.0 ug/L to 0.48 ug/L per client request on 6/20/2016 (samples -001 and -002). The reported results are below the calibration range, above method detection limit. The associated Low Level Initial Calibration Verification at 0.10 ug/L recovered above acceptable limits indicating potential high bias.

R.I. ANALYTICAL
Specialists in Environmental Services

Alliance Environmental
1606-13362
6/16/16

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Dissolved Metals by ICP Mass Spec			
Lead	ug/l	<1.0	6/16/2016
Metals by ICPMS (Aqueous)			
Lead	ug/l	<1.0	6/15/2016

-LCS/LCS Duplicate Data Results-

Parameter	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Dissolved Metals by ICP Mass Spec							
Lead	50	50	100	50	100	0	6/16/2016
Metals by ICPMS (Aqueous)							
Lead	50	44	88	42	84	5	6/15/2016

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type C	Preservation Code P	Matrix Code M	ICP/MS Total Lead	~~ICP/MS Diss. Lead~~	ICP/MS Diss. Lead
6-9-16	9:30	Surface Water 1 (Tiogue)	G	2	nitric acid	SW	✓		✓
6-9-16	9:20	Surface Water 2 (Tiogue)	G	2	nitric acid	SW	✓		✓
6-9-16	9:38	Surface Water 3 (Tiogue)	G	2	nitric acid	SW	✓		✓

Client Information

Company Name: ~~AEG~~ NB ALLIANCE ENVIRONMENTAL GROUP, INC.
Address: 100 JEFFERSON BLVD. STE. 220
City / State / Zip: WARWICK, RI 02888
Telephone: Fax:
Contact Person: NEAL BROWN

Project Information

Project Name: COVENTRY - TIOGUE LAKE
P.O. Number: ~~1832~~ NB Project Number: 1832
Report To: NEAL BROWN Phone: 401-732-7600 Fax 401-732-7670
Sampled By: NEAL BROWN
Quote No:
Email report to these addresses: PBrown@allianceenvironmentalgroup.com

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
Neal Brown	6-9-16	10:38	L Dave	6-9-16	10:38

Turn Around Time

✓ Normal | EMAIL Report
5 Business days. Possible surcharge
Rush – Date Due: ___/___/___

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, S-1, S-2, S-3 MCP Data Enhancement QC Package? Yes No

Please lab filter for dissolved lead.
Reference Quote RIA1606025

Temp. Upon Receipt 4.8°C

Lab Use Only

Sample Pick-Up Only
RIAL sampled; attach field hours
✓ Shipped on ice
Workorder No: 1606-13362

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____