Knox EFO

wood.

February 25, 2020

Knox
AFW

MAR 05 2020

TN Dept. of Env. & Conservation
FEB 28 2020
Division of Water Resources

Ms. Jessica Murphy
Enforcement and Compliance Section
Tennessee Department of Environment and Conservation
Division of Water Pollution Control
6th Floor, L&C Annex, 401 Church Street
Nashville, TN 37243-1534

Subject: 2019 Annual Storm Water Discharge Monitoring Report
Aqua-Chem, Inc.
3001 E. Gov John Sevier Highway
Knoxville, Tennessee
TMSP Number: TNR050328
Wood Project No. 3031142002

Dear Ms. Murphy:

On behalf of Aqua-Chem, Inc. (Water Technology Division), Wood Environment & Infrastructure Solutions, Inc. (Wood), submits the attached 2019 Annual Stormwater Monitoring Reports for Outfalls SW-001 through SW-005 (SW-004 combines and comingles with SW-003 and has been deleted).

Aqua-Chem Inc. (Water Technology Division), located at 3001 East Governor John Sevier Highway, Knoxville, Tennessee is covered under Sector AA of the Tennessee Multi-Sector General Permit for industrial stormwater discharges (TNR 050000). Annual stormwater sampling was initially conducted on October 13, 2019.

At Outfall SWOF-001, the concentration of nitrate was 1.65 milligrams per liter (mg/L), exceeding the benchmark concentration of 0.68 mg/L. The stormwater run-off flow patterns and outfall locations are provided in Figure 1. Attachment A provides a copy of the analytical results.

In accordance with Section 5.1.2 of the Sector AA permit, Aqua-Chem, Inc. provided notification to the Tennessee Department of Environment and Conservation (TDEC), Knoxville Field Office that exceedance of the benchmark occurred in the annual sampling results on December 10, 2019. Outfalls 001 receives run-off from the southwest portion of the facility which is primarily a grassy area. A root cause investigation determined that the exceedance resulted from application of fertilizer for re-vegetation of an area that had been previously disturbed by a crane during construction activities shown in Figure 1.

Based on the investigation, Aqua-Chem will be implementing the following operational changes and Best Management Practices (BMPs):

- Reduce the application rate of fertilizer to establish grass and during seasonal fertilization activities.

As a result of the exceedances, the stormwater pollution protection plan (SWPPP) was revised and the outfalls were resampled after the revised BMPs were implemented. Resampling of the stormwater from each outfall was conducted on February 5 , 2020. The analytical report is provided in Attachment A. Analytical parameters were below detection limits at Outfall SWOF-SWOF-005. Zinc was detected at Outfall SWOF-002 and aluminum and iron were detected at Outfall SWOF-003, but were below their respective benchmarks. Aluminum, iron, and nitrate was detected at SWOF-001 but were below their respective benchmarks. Completed CN-1115 forms for both sampling events are provided in Attachment B.

If you have any questions or require any additional information, please contact me at (865) 218-1028 or william.teichert@woodplc.com in Knoxville.

Sincerely,
Wood Environment & Infrastructure Solutions, Inc.

W. Paul Teichert
Senior Environmental Principal

Jacob Parker, PE
Senior Engineer

MAR 05 2020

Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor, Nashville, Tennessee 37243

TN Dept. of Env. & Conservation
KNOX AFW
FEB 28 2020
Division of Water Resources

ANNUAL STORMWATER MONITORING REPORT

for Stormwater Discharges Associated with Industrial Activity under the
TENNESSEE MULTI-SECTOR GENERAL PERMIT (TMSP)

Facility Name: Aqua-Chem, Inc.	TMSP Number: TNR050328
Contact Person: Frank Keefer	Phone Number: 865-540-1933
This report is submitted for the following calendar year (e.g. 2015): 2019	Outfall Number: SW005
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 2/5/20
Low Concentration Waiver (Note 3): list all parameters for which the facility is certifying that there has not been a significant change in industrial activity or the pollution prevention measures in the area of the facility that drains to the outfall for which sampling was waived:	

DIRECTIONS: In the spaces below, provide the results of stormwater monitoring for the designated outfall. For each outfall, one Annual Stormwater Monitoring Report must be submitted. The parameters for which monitoring must be conducted depend on which industry sector(s) of the TMSP applies to the discharge. Look up your sector(s) in the TMSP and analyze for the parameters that apply. If parameter is not listed below, submit additional sheets. All samples should be grab.

Parameter	Cut-off Conc. (mg/L)	Annual Sample Result (mg/L)
Aluminum, Total	0.75	<0.200
Ammonia	4.0	
Arsenic, Total	0.16854	
BOD, 5-Day	30	
Cadmium, Total	0.0159	
COD	120	
Copper, Total	0.018	
Cyanide, Total	0.064	
Fluoride	1.8	
Iron, Total	5.0	<0.100
Lead, Total	0.15	

Parameter (continued)	Cut-off Conc. (mg/L)	Annual Sample Result (mg/L)
Magnesium, Total	0.0636	
Mercury, Total	0.0024	
Nickel, Total	0.875	
Nitrate + Nitrite Nitrogen	0.68	<0.100
Oil and Grease	15	
pH	5.0-9.0	
Phosphorus, Total (as P)	2.0	
Selenium, Total	0.2385	
Silver, Total	0.032	
Total Suspended Solids	150	
Zinc, Total	0.395	<0.0500

CERTIFICATION AND SIGNATURE: (Make all entries in ink, not with a pencil. This report must be signed by a responsible corporate officer for a corporation, a general partner for a partnership, the proprietor for a sole proprietorship, or a principal executive officer or ranking elected official for a public agency.)

I certify under penalty of law that this document and all of its attachments were prepared under my direction or my supervision in accordance with a system designed to assure qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

William (Paul) Teichert	Project Manager	W P Teichert	2/17/20
Printed Name	Official Title	Signature	Date

Figure

Attachment A
Analytical Results

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 07, 2019

Wood E&I Solutions Inc. - Knoxville, TN

Sample Delivery Group:	L1155572
Samples Received:	10/31/2019
Project Number:	3031142002.03
Description:	Aqua Chem

MAR 05 2020

Report To: William Teichert
2030 Falling Waters Road
Suite 300
Knoxville, TN 37922

Entire Report Reviewed By: Pamela A. Langford

Pam Langford
Project Manager

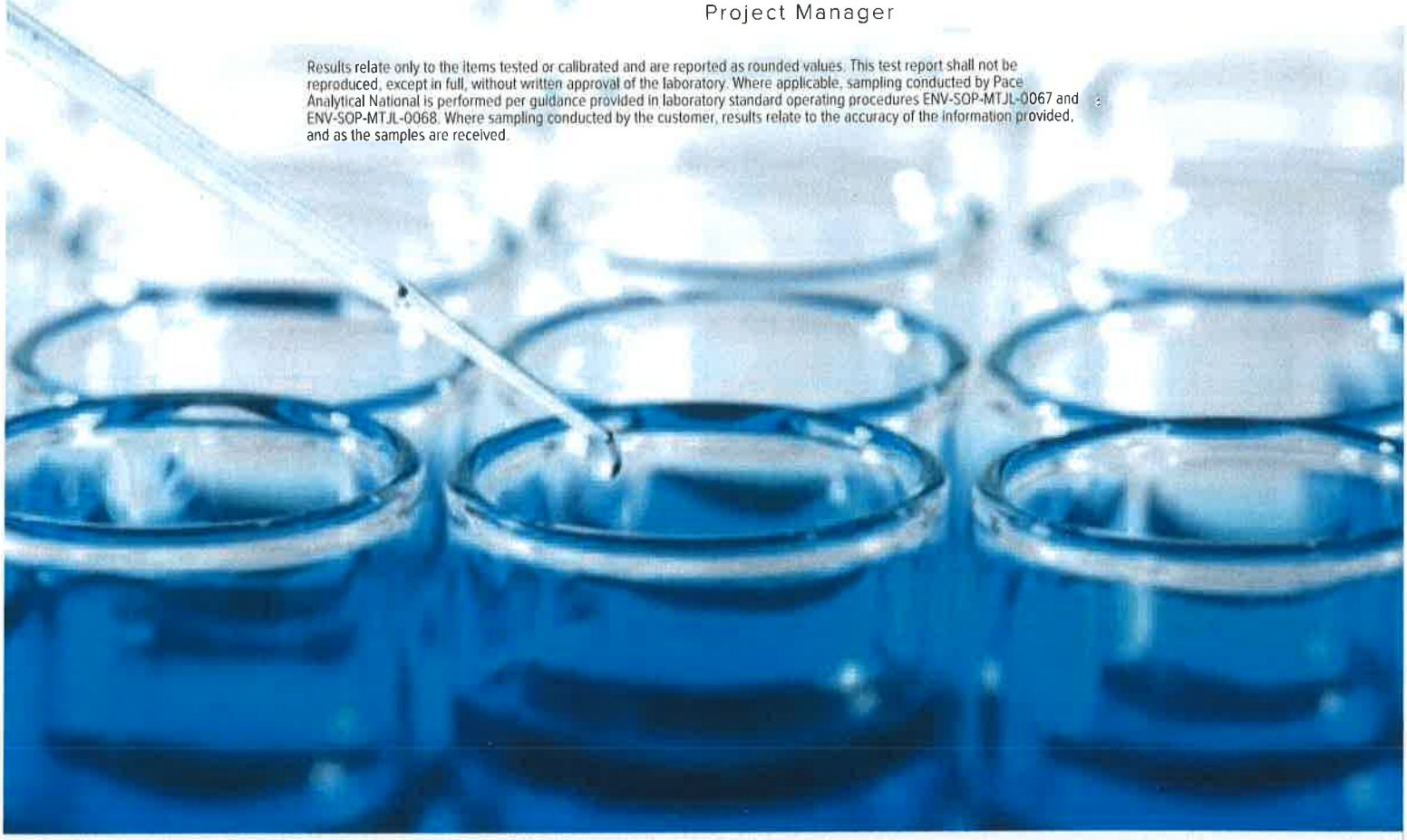


TABLE OF CONTENTS

SWOF-001 L1155572-01 WW

Collected by: Noel Garland | Collected date/time: 10/30/19 14:45 | Received date/time: 10/31/19 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1372794	1	10/31/19 13:58	10/31/19 13:58	LDC	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1372821	1	11/03/19 06:44	11/03/19 16:16	CCE	Mt. Juliet, TN

SWOF-002 L1155572-02 WW

Collected by: Noel Garland | Collected date/time: 10/30/19 14:35 | Received date/time: 10/31/19 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1372794	1	10/31/19 14:50	10/31/19 14:50	LDC	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1372821	1	11/03/19 06:44	11/03/19 16:18	CCE	Mt. Juliet, TN

SWOF-003 L1155572-03 WW

Collected by: Noel Garland | Collected date/time: 10/30/19 14:30 | Received date/time: 10/31/19 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1372794	1	10/31/19 15:08	10/31/19 15:08	LDC	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1372821	1	11/03/19 06:44	11/03/19 16:21	CCE	Mt. Juliet, TN

SWOF-005 L1155572-04 WW

Collected by: Noel Garland | Collected date/time: 10/30/19 14:50 | Received date/time: 10/31/19 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1372794	1	10/31/19 15:26	10/31/19 15:26	LDC	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1372821	1	11/03/19 06:44	11/03/19 16:29	CCE	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Pamela A. Langford

Pam Langford
Project Manager

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	1.65		0.100	1	10/31/2019 13:58	WG1372794

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/03/2019 16:16	WG1372821
Iron	ND		0.100	1	11/03/2019 16:16	WG1372821
Zinc	ND		0.0500	1	11/03/2019 16:16	WG1372821

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	ND		0.100	1	10/31/2019 14:50	WG1372794

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/03/2019 16:18	WG1372821
Iron	ND		0.100	1	11/03/2019 16:18	WG1372821
Zinc	0.117		0.0500	1	11/03/2019 16:18	WG1372821

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	ND		0.100	1	10/31/2019 15:08	WG1372794

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/03/2019 16:21	WG1372821
Iron	0.113		0.100	1	11/03/2019 16:21	WG1372821
Zinc	0.0639		0.0500	1	11/03/2019 16:21	WG1372821

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	0.454		0.100	1	10/31/2019 15:26	WG1372794

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/03/2019 16:29	WG1372821
Iron	ND		0.100	1	11/03/2019 16:29	WG1372821
Zinc	0.386		0.0500	1	11/03/2019 16:29	WG1372821

Method Blank (MB)

(MB) R3467343-1 10/31/19 08:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate	U		0.0227	0.100

L1155658-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1155658-01 10/31/19 21:01 • (DUP) R3467343-6 10/31/19 21:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	U	0.000	1	0.000		20

L1154639-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1154639-02 10/31/19 22:11 • (DUP) R3467343-8 10/31/19 22:29

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	22.1	22.0	5	0.504		20

Laboratory Control Sample (LCS)

(LCS) R3467343-2 10/31/19 09:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate	8.00	8.16	102	90.0-110	

L1155572-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1155572-01 10/31/19 13:58 • (MS) R3467343-4 10/31/19 14:15 • (MSD) R3467343-5 10/31/19 14:33

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate	5.00	1.65	6.73	6.77	102	102	1	80.0-120			0.554	20

L1155658-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1155658-02 10/31/19 21:36 • (MS) R3467343-7 10/31/19 21:53

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate	5.00	U	4.99	99.8	1	80.0-120	

Method Blank (MB)

(MB) R3468003-1 11/03/19 15:26

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	U		0.0273	0.200
Iron	U		0.0282	0.100
Zinc	0.00521	J	0.00340	0.0500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3468003-2 11/03/19 15:29 • (LCSD) R3468003-3 11/03/19 15:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	10.0	10.4	10.4	104	104	85.0-115			0.347	20
Iron	10.0	9.84	9.81	98.4	98.1	85.0-115			0.255	20
Zinc	1.00	0.991	1.00	99.1	100	85.0-115			1.04	20

L1154639-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1154639-02 11/03/19 15:34 • (MS) R3468003-5 11/03/19 15:39 • (MSD) R3468003-6 11/03/19 15:41

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	10.0	ND	10.6	10.6	106	106	1	70.0-130			0.0992	20
Iron	10.0	ND	9.96	9.91	99.3	98.8	1	70.0-130			0.435	20
Zinc	1.00	0.134	1.15	1.14	101	101	1	70.0-130			0.295	20

L1155415-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1155415-03 11/03/19 15:44 • (MS) R3468003-7 11/03/19 15:46 • (MSD) R3468003-8 11/03/19 15:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	10.0	0.0408	10.4	10.8	103	107	1	70.0-130			3.77	20
Iron	10.0	0.262	9.98	10.3	97.1	101	1	70.0-130			3.61	20
Zinc	1.00	0.0143	1.00	1.04	98.6	103	1	70.0-130			4.19	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

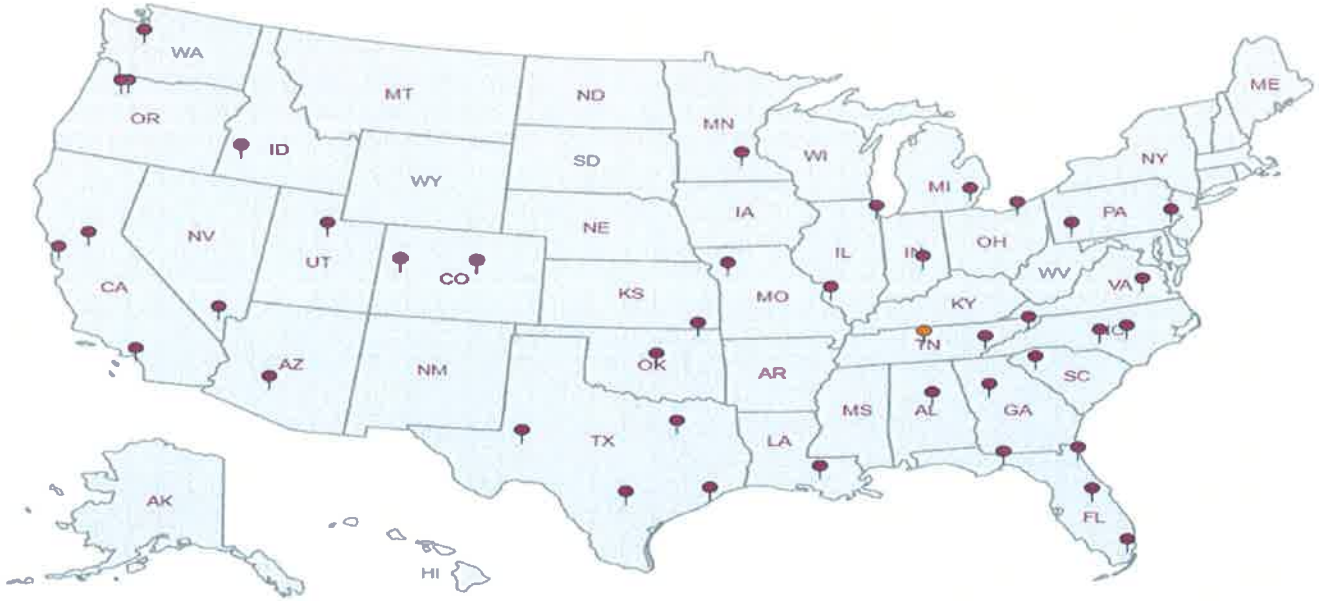
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Wood E&I Solutions Inc. - Knoxville, TN

2030 Falling Waters Road

AMEC
9725 Cogdill Road
Knoxville, TN 37932

Report to: William Teichert

Email To: jacob.parker@amecfw.com; william.teichert@amecfw.com

Project Description: Aqua Chem

City/State Collected: Knoxville TN

Phone: 865-671-6774
Fax:

Client Project # 3031142002.03

Lab Project # MACTECKTN-AQUACHEM

Collected by (print): Noel Gorley

Site/Facility ID #

P.O. # 3031142002.03

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed: STANDARD

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	AL, Fe, ZN ICP 250mlHDPE-HNO3	NITRATE 125mlHDPE-NoPres	Pres Chk ≥2	Remarks	Sample # (lab only)
SWOF-001	Grab	WW	—	10-30-19	14:45	2	X	X			01
SWOF-002		WW	—		14:35	2	X	X			02
SWOF-003		WW	—		14:30	2	X	X			03
SWOF-005		WW	—		14:50	2	X	X			04
		WW				2	X	X			

Pace Analytical® National Center for Testing & Innovation
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 1155512
Table # J116
Acctnum: MACTECKTN
Template: T149592
Prelogin: P705759
TSR: 633 - Pam Langford
PB: 4/26/19
Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking # 4876 1094 5570

Sample Receipt Checklist
COC Seal Present/Intact: __NP ✓Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: ✓Y __N
RAD SCREEN: <0.5 mR/hr

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / (No) HCL / MeoH TBR	If preservation required by Login: Date/Time
Noel Gorley	10-30-19	16:35			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C 0.5-2=0.3 AV	Bottles Received: 8	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Bonnie Bailey	Date: 10-31-19	Time: 9:00	Hold:	Condition: NCF / (OK)

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

February 11, 2020

Wood E&I Solutions Inc. - Knoxville, TN

Sample Delivery Group:	L1186431
Samples Received:	02/06/2020
Project Number:	3031142002.03
Description:	Aqua Chem
Site:	AQUACHEM
Report To:	William Teichert
	2030 Falling Waters Road
	Suite 300
	Knoxville, TN 37922

Entire Report Reviewed By: Pamela A. Langford

Pam Langford
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

SWOF-005 L1186431-01 WW

Collected by: Jacob Parker | Collected date/time: 02/05/20 09:30 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1423430	1	02/06/20 22:46	02/06/20 22:46	ELN	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1423543	1	02/06/20 17:55	02/07/20 09:13	TRB	Mt. Juliet, TN

SWOF-003 L1186431-02 WW

Collected by: Jacob Parker | Collected date/time: 02/05/20 09:35 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1423430	1	02/06/20 23:22	02/06/20 23:22	ELN	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1423543	1	02/06/20 17:55	02/07/20 09:21	TRB	Mt. Juliet, TN

SWOF-002 L1186431-03 WW

Collected by: Jacob Parker | Collected date/time: 02/05/20 09:40 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1423430	1	02/06/20 23:57	02/06/20 23:57	ELN	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1423543	1	02/06/20 17:55	02/07/20 09:24	TRB	Mt. Juliet, TN

SWOF-001 L1186431-04 WW

Collected by: Jacob Parker | Collected date/time: 02/05/20 09:20 | Received date/time: 02/06/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1423430	1	02/07/20 00:15	02/07/20 00:15	ELN	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG1423543	1	02/06/20 17:55	02/07/20 09:26	TRB	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Pamela A. Langford

Pam Langford
Project Manager

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	ND		0.100	1	02/06/2020 22:46	WG1423430

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	02/07/2020 09:13	WG1423543
Iron	ND		0.100	1	02/07/2020 09:13	WG1423543
Zinc	ND		0.0500	1	02/07/2020 09:13	WG1423543

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	ND		0.100	1	02/06/2020 23:22	WG1423430

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.277		0.200	1	02/07/2020 09:21	WG1423543
Iron	0.299		0.100	1	02/07/2020 09:21	WG1423543
Zinc	ND		0.0500	1	02/07/2020 09:21	WG1423543

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	ND		0.100	1	02/06/2020 23:57	WG1423430

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	02/07/2020 09:24	WG1423543
Iron	ND		0.100	1	02/07/2020 09:24	WG1423543
Zinc	0.117		0.0500	1	02/07/2020 09:24	WG1423543

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	0.110		0.100	1	02/07/2020 00:15	WG1423430

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.276		0.200	1	02/07/2020 09:26	WG1423543
Iron	0.336		0.100	1	02/07/2020 09:26	WG1423543
Zinc	ND		0.0500	1	02/07/2020 09:26	WG1423543

Method Blank (MB)

(MB) R3497754-1 02/06/20 10:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nitrate	U		0.0227	0.100

L1185936-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1185936-01 02/06/20 12:37 • (DUP) R3497754-3 02/06/20 12:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	0.355	0.319	1	10.9		20

L1186431-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1186431-01 02/06/20 22:46 • (DUP) R3497754-6 02/06/20 23:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	ND	0.0675	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3497754-2 02/06/20 10:19

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate	8.00	8.17	102	90.0-110	

L1186420-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1186420-05 02/06/20 16:48 • (MS) R3497754-4 02/06/20 17:05 • (MSD) R3497754-5 02/06/20 17:23

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate	5.00	0.988	5.82	6.10	96.7	102	1	80.0-120			4.62	20

L1186431-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1186431-02 02/06/20 23:22 • (MS) R3497754-7 02/06/20 23:39

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Nitrate	5.00	ND	5.25	104	1	80.0-120	

Method Blank (MB)

(MB) R3497944-1 02/07/20 08:17

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	U		0.0273	0.200
Iron	U		0.0282	0.100
Zinc	U		0.00340	0.0500

Laboratory Control Sample (LCS)

(LCS) R3497944-2 02/07/20 08:19

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Aluminum	10.0	9.80	98.0	85.0-115	
Iron	10.0	9.61	96.1	85.0-115	
Zinc	1.00	0.994	99.4	85.0-115	

L1186157-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1186157-01 02/07/20 08:22 • (MS) R3497944-4 02/07/20 08:27 • (MSD) R3497944-5 02/07/20 08:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	10.0	0.282	9.81	9.94	95.3	96.6	1	70.0-130			1.35	20
Iron	10.0	0.349	9.57	9.72	92.2	93.8	1	70.0-130			1.63	20
Zinc	1.00	ND	0.951	0.969	94.7	96.4	1	70.0-130			1.84	20

L1186169-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1186169-01 02/07/20 08:32 • (MS) R3497944-6 02/07/20 08:35 • (MSD) R3497944-7 02/07/20 08:37

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	10.0	ND	9.47	9.70	94.7	97.0	1	70.0-130			2.38	20
Iron	10.0	1.10	10.4	10.7	93.1	95.5	1	70.0-130			2.32	20
Zinc	1.00	ND	0.972	0.993	96.8	98.9	1	70.0-130			2.11	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

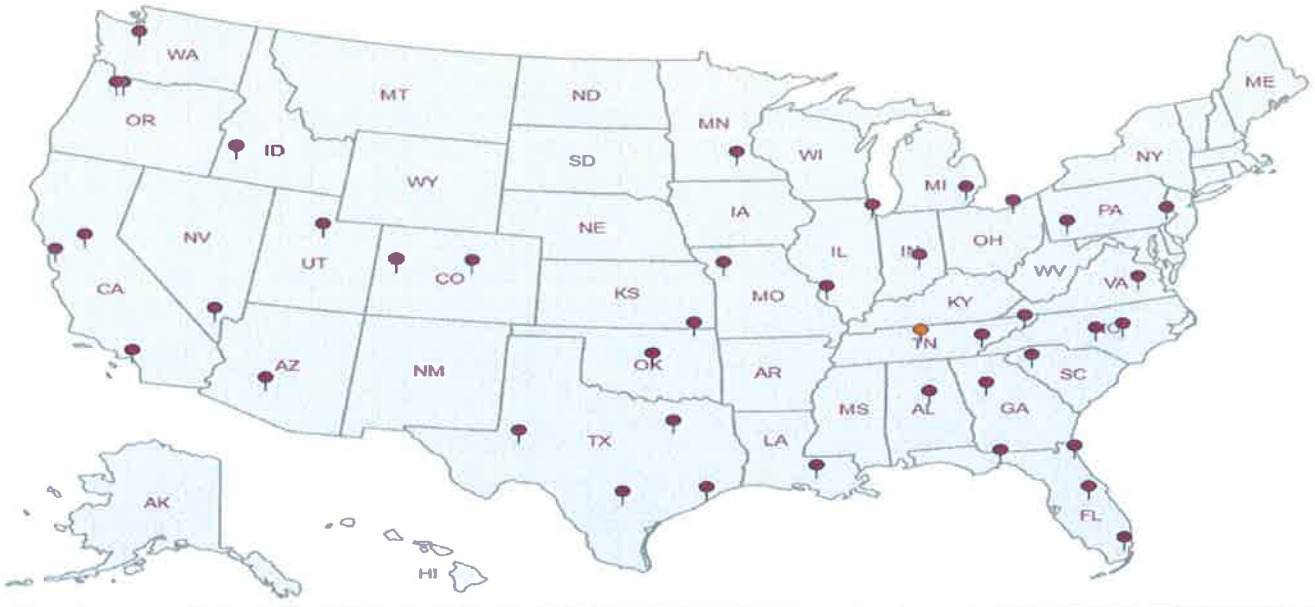
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



Wood E&I Solutions Inc. - Knoxville, TN

2030 Falling Waters Road

Billing Information:
AMEC
9725 Cogdill Road
Knoxville, TN 37932

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

Pace Analytical
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

Report to: William Teichert

Email To: jacob.parker@amecfw.com; william.teichert@amecfw.com

Project Description: Aqua Chem

City/State Collected: Knoxville, TN

Please Circle: PT MT CT ET

Phone: 865-671-6774

Client Project # 3031142002.03

Lab Project # MACTECKTN-AQUACHEM

SDG # L1186431

Fax:

Collected by (print): Jacob Parker

Site/Facility ID # AquaChem

P.O. # 3031142002.03

Acctnum: C071

Template: T149592

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote # N/A

Date Results Needed N/A

Prelogin: P745989

PM: 633 - Pam Langford

PB: JK 12-10-19

Immediately Packed on Ice N ___ Y ✓

Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**NITRATE** 125mlHDPE-NoPres	AL, Fe, ZN ICP 250mlHDPE-HNO3	Remarks	Sample # (lab only)
SWOF-005	Grab	WW	NA	2/5/20	0930	2	X	X		-01
SWOF-003	↓	WW	↓	↓	0935	2	X	X		02
SWOF-002	↓	WW	↓	↓	0940	2	X	X		03
SWOF-001	↓	WW	↓	↓	0920	2	X	X		04

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other ___

Remarks: **Nitrate-48hr Holding time**

pH ___ Temp ___

Flow ___ Other ___

Samples returned via: ___ UPS ✓ FedEx ___ Courier ___

Tracking # 1382 4807 2500

Sample Receipt Checklist
COC Seal Present/Intact: NP ___Y ___N
COC Signed/Accurate: ✓Y ___N
Bottles arrive intact: ✓Y ___N
Correct bottles used: ✓Y ___N
Sufficient volume sent: ✓Y ___N
If Applicable
VOA Zero Headspace: ___Y ___N
Preservation Correct/Checked: ✓Y ___N
RAD Screen <0.5 mR/hr: ✓Y ___N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes (No) HCL / MeoH TBR
	2/5/20	11:00		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C 1.3 / 3.2 / 0.6 #13 Bottles Received: 8
				If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 2-6-20 Time: 845
				Hold: Condition: NCF / (OK)

Attachment B
Completed CN-1115 Forms

AQUA CHEM

March 14, 2017

Aqua-Chem, Inc.
3001 East Governor John Sevier Highway
Knoxville, TN 37914

RE: CERTIFICATE OF DELEGATION

I hereby authorize William (Paul) Teichert of Amec Foster Wheeler Environment & Infrastructure, Inc. on behalf of the Aqua-Chem, Inc., with signatory authority and to execute all necessary certifications for permit applications, environmental reports and information request responses to Federal, state, and local governmental agencies, in accordance with the relevant environmental rules as necessary and appropriate to support Plant operations and affairs.

Signed

03/14/2017
Date

Frank Keefer
Operations Manager

Signed

03/14/2017
Date

Gary Edwards
Chief Executive Officer