Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 14, 2018

FEB 26 2019

Wood E&I Solutions Inc. - Knoxville, TN

Sample Delivery Group:	L1043082
Samples Received:	11/10/2018
Project Number:	3031142002.02
Description:	Aqua Chem

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 L1043082-01 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:35 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 11:02	11/10/18 11:02	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:42	TRB

SWOF-002 L1043082-02 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:15 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 11:17	11/10/18 11:17	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:45	RDS

SWOF-003 L1043082-03 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:05 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 11:34	11/10/18 11:34	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:47	TRB

SWOF-005 L1043082-04 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:25 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 12:23	11/10/18 12:23	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:50	TRB

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	11/10/2018 11:17	WG1194469

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/13/2018 10:45	WG1194715
Iron	ND		0.100	1	11/13/2018 10:45	WG1194715
Zinc	ND		0.0500	1	11/13/2018 10:45	WG1194715

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	11/10/2018 11:34	WG1194469

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/13/2018 10:47	WG1194715
Iron	ND		0.100	1	11/13/2018 10:47	WG1194715
Zinc	ND		0.0500	1	11/13/2018 10:47	WG1194715

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	11/10/2018 12:23	WG1194469

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/13/2018 10:50	WG1194715
Iron	ND		0.100	1	11/13/2018 10:50	WG1194715
Zinc	ND		0.0500	1	11/13/2018 10:50	WG1194715

Method Blank (MB)

(MB) R3359140-1 11/10/18 08:31

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

L1042884-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1042884-02 11/10/18 09:56 • (DUP) R3359140-3 11/10/18 10:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	0.664	0.673	1	1.32		20

Laboratory Control Sample (LCS)

(LCS) R3359140-2 11/10/18 08:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate	8.00	8.15	102	90.0-110	

L1042884-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1042884-02 11/10/18 09:56 • (MS) R3359140-4 11/10/18 10:29 • (MSD) R3359140-5 11/10/18 10:45

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	0.664	5.62	5.61	99.2	98.9	1	80.0-120			0.242	20

Method Blank (MB)

(MB) R3359346-1 11/13/18 09:53

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.0347	J	0.0273	0.200
Iron	U		0.0282	0.100
Zinc	U		0.00340	0.0500

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

(LCS) R3359346-2 11/13/18 09:55 • (LCSD) R3359346-3 11/13/18 09:58

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	9.85	9.83	98.5	98.3	85.0-115			0.181	20
Iron	10.0	9.91	9.94	99.1	99.4	85.0-115			0.236	20
Zinc	1.00	0.985	0.987	98.5	98.7	85.0-115			0.223	20

L1043084-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1043084-01 11/13/18 10:01 • (MS) R3359346-5 11/13/18 10:06 • (MSD) R3359346-6 11/13/18 10:09

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	10.3	10.3	101	101	1	70.0-130			0.370	20
Iron	10.0	ND	10.1	10.2	100	101	1	70.0-130			0.877	20
Zinc	1.00	ND	1.03	1.03	99.3	99.9	1	70.0-130			0.596	20

L1043170-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1043170-01 11/13/18 10:11 • (MS) R3359346-7 11/13/18 10:14 • (MSD) R3359346-8 11/13/18 10:17

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	23.2	32.3	31.2	90.6	80.4	1	70.0-130			3.22	20
Iron	10.0	31.9	39.0	38.2	70.9	63.2	1	70.0-130		J6	1.98	20
Zinc	1.00	1.62	2.47	2.47	85.0	85.5	1	70.0-130			0.213	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.

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.
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
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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
Alaska	17-026
Arizona	AZ0612
Arkansas	88-0469
California	2932
Colorado	TN00003
Connecticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1 6]	90010
Kentucky [2]	16
Louisiana	AI30792
Louisiana [1]	LA180010
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico [1]	n/a
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [3]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	LAO00356
South Carolina	84004
South Dakota	n/a
Tennessee [1 4]	2006
Texas	T 104704245-17-14
Texas [5]	LAB0152
Utah	TN00003
Vermont	VT2006
Virginia	460132
Washington	C847
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party Federal Accreditations

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

[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
Same

Report to: William Teichert, Jacob Parker

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 #: 3031142002.02

Lab Project #: MACTECKTN-AQUACHEM

Collected by (print): Jacob Parker

Site/Facility ID #: Aqua-Chem

P.O. #: 30311429020 02

Collected by (signature):

Quote #: NA

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: NA

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Metals 250mlHDPE-HNO3	NITRATE 125mlHDPE-NoPres	Pres Chk	Remarks	Sample # (lab only)
SWoF-0001	Grab	WW	NA	11/9/18	1195	2	X	X			-01
SWOF-0002	↓	WW	↓	↓	1115	2	X	X			02
SWOF-0003		WW			1105	2	X	X			03
SWOF-0005		WW			1125	2	X	X			04

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# L1043082

F053

Acctnum: MACTECKTN
Template: T135430
Prelogin: P663330
TSR: 633 - Pam Langford
PB: 7-18-18G
Shipped Via: FedEX Ground

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

Remarks: RAD SCREEN: <0.5 mR/hr

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__UPS ✓FedEx __Courier _____

Tracking # 4492 6217 3129

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

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Matthew Parker	11/9/18	1340	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: °C Bottles Received: 9
0.3-0.2=0.1

Date: 11/10/18 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Attachment B
Completed CN-1115 Forms

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

FEB 26 2019

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): 2018	Outfall Number: SW001
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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	0.388
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		2/22/19
Printed Name	Official Title	Signature	Date

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

FEB 26 2019

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): 2018	Outfall Number: SW001
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/10/18 (repeat)
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	0.301
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	0.249
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	0.117
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		2/22/19
Printed Name	Official Title	Signature	Date

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

FEB 26 2019

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): 2018	Outfall Number: SW002
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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	0.271
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	0.172
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	0.122
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	0.0547

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		2/22/19
Printed Name	Official Title	Signature	Date

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

FEB 26 2019

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): 2018	Outfall Number: SW002
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/9/18 (repeat)
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.)

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

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FEB 26 2019

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): 2018	Outfall Number: SW003
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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	0.143
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	0.414
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	0.705

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

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

FEB 26 2019

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): 2018	Outfall Number: SW003
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/9/18 (repeat)
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

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William (Paul) Teichert	Project Manager	W. R. Teichert	2/22/19
Printed Name	Official Title	Signature	Date

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

FEB 26 2019

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): 2018	Outfall Number: SW005
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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	0.926
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	0.373
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	0.350
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	1.33

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.)

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

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

FEB 26 2019

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): 2018	Outfall Number: SW005
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/9/18 (repeat)
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:	

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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.)

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

Knox 150 AEM

wood.

February 25, 2019

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: 2018 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 2018 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 June 27, 2018.

At Outfall SWOF-003, the concentration of zinc was 0.705 milligrams per liter (mg/L), exceeding the benchmark concentration of 0.395 mg/L. At Outfall SWOF-005, zinc (1.33 mg/L) and aluminum (0.926 mg/L) exceeded their benchmarks. 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 exceedances of the benchmarks occurred in the annual sampling results on July 23, 2018. Both Outfalls 003 and 005 receive run-off from the vicinity of the sandblast and paint booths. A root cause investigation determined that the exceedances potentially resulted from paint and sandblast tracking in the area and plugging of drain filters in the inverts in the area. Based on the investigation, Aqua-Chem implemented the following operational changes and Best Management Practices (BMPs):

- Drain filters, which have been changed out on a weekly basis, are now inspected daily and changed as needed. The current filter frame or housing was modified to simplify change outs.
- A single layer of fabric has been used on the floor and outside of the paint booth to prevent track out. The revised BMP now uses a double layer of fabric to further reduce the potential for track out.
- Fabric or paper was placed outside the sand blast area to capture disbursement or overspray of sand from sand blasting operations. The paper or fabric is inspected daily, and sand is vacuumed or swept up from the area periodically as needed but at a minimum on a daily/weekly basis.
- Although releases have not occurred from the paint shaker, it was provided with secondary containment.

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 November 9, 2018. The analytical report is provided in Attachment A. Analytical parameters were below detection limits at Outfall SWOF-002, SWOF-003, and SWOF-005. Aluminum, iron, and nitrate was detected at SWOF-001 but were below their respective benchmarks. Completed CN-1115 forms for both sampling events are provide 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

Attachment A
Analytical Results

ANALYTICAL REPORT

July 03, 2018

Wood E&I Solutions Inc. - Knoxville, TN

Sample Delivery Group:	L1005109
Samples Received:	06/28/2018
Project Number:	3031142002.02
Description:	Aqua Chem
Site:	AQUA CHEM
Report To:	William Teichert 2030 Falling Waters Road Suite 300 Knoxville, TN 37922

Entire Report Reviewed By: Pamela A. Langford

Pam Langford
Technical Service Representative

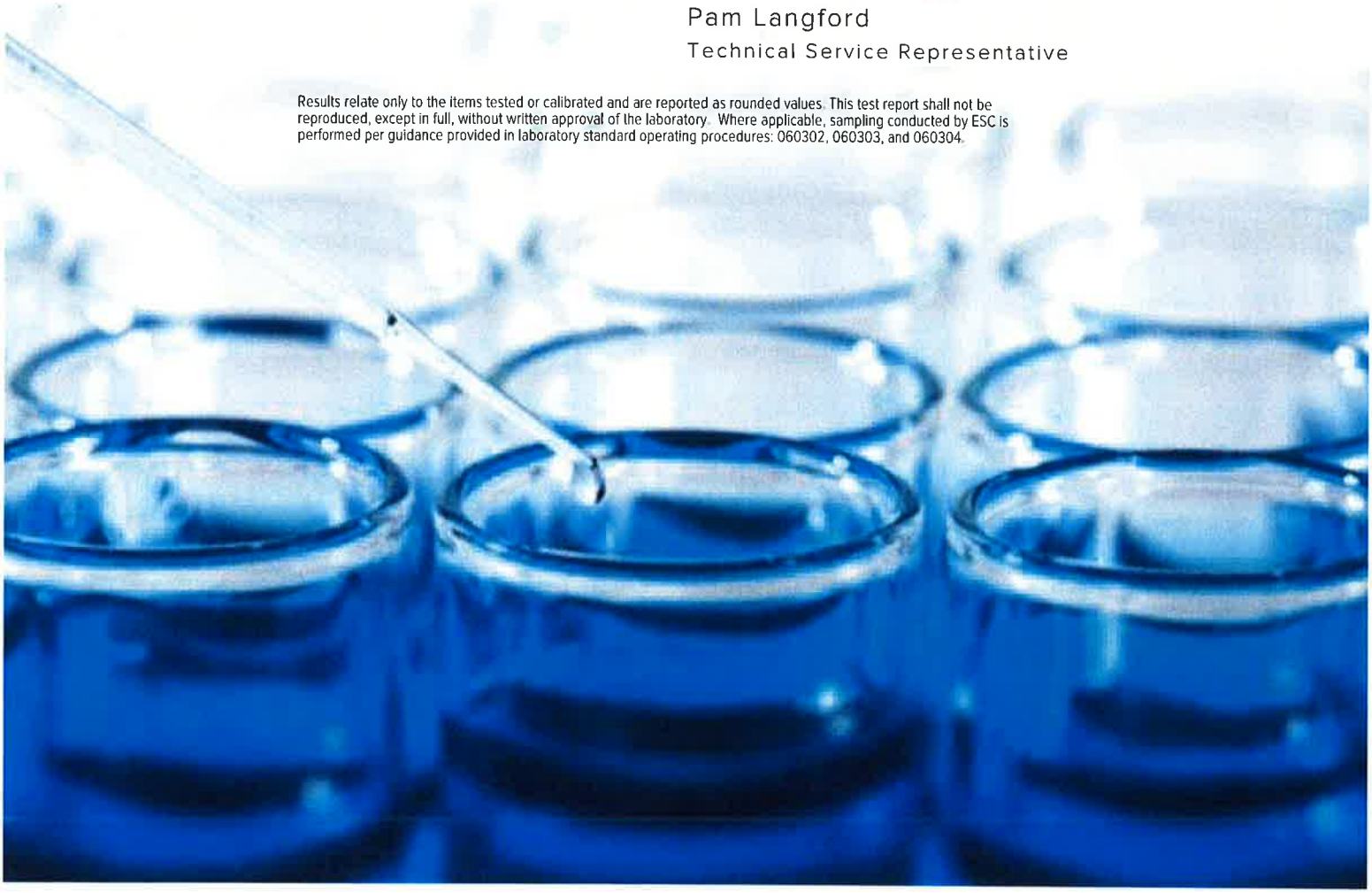

TABLE OF CONTENTS

SWOF-001 L1005109-01 WW

Collected by: Noel Garland | Collected date/time: 06/27/18 15:15 | Received date/time: 06/28/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1131111	1	06/28/18 20:45	06/28/18 20:45	MAJ
Metals (ICP) by Method 200.7	WG1130993	1	06/30/18 06:48	07/02/18 13:13	TRB

SWOF-002 L1005109-02 WW

Collected by: Noel Garland | Collected date/time: 06/27/18 14:25 | Received date/time: 06/28/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1131111	1	06/28/18 21:01	06/28/18 21:01	MAJ
Metals (ICP) by Method 200.7	WG1130993	1	06/30/18 06:48	07/02/18 12:27	TRB

SWOF-003 L1005109-03 WW

Collected by: Noel Garland | Collected date/time: 06/27/18 14:35 | Received date/time: 06/28/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1131111	1	06/28/18 21:16	06/28/18 21:16	MAJ
Metals (ICP) by Method 200.7	WG1130993	1	06/30/18 06:48	07/02/18 13:15	TRB

SWOF-005 L1005109-04 WW

Collected by: Noel Garland | Collected date/time: 06/27/18 15:10 | Received date/time: 06/28/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1131111	1	06/28/18 21:31	06/28/18 21:31	MAJ
Metals (ICP) by Method 200.7	WG1130993	1	06/30/18 06:48	07/02/18 13:23	TRB

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 radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. 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
Technical Service Representative

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	0.388		0.100	1	06/28/2018 20:45	WG1131111

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	07/02/2018 13:13	WG1130993
Iron	ND		0.100	1	07/02/2018 13:13	WG1130993
Zinc	ND		0.0500	1	07/02/2018 13:13	WG1130993

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	0.122		0.100	1	06/28/2018 21:01	WG1131111

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.271		0.200	1	07/02/2018 12:27	WG1130993
Iron	0.172		0.100	1	07/02/2018 12:27	WG1130993
Zinc	0.0547	B	0.0500	1	07/02/2018 12:27	WG1130993

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	0.414		0.100	1	06/28/2018 21:16	WG1131111

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	07/02/2018 13:15	WG1130993
Iron	0.143		0.100	1	07/02/2018 13:15	WG1130993
Zinc	0.705		0.0500	1	07/02/2018 13:15	WG1130993

Wet Chemistry by Method 300.0

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Nitrate as (N)	0.350		0.100	1	06/28/2018 21:31	WG1131111

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.926		0.200	1	07/02/2018 13:23	WG1130993
Iron	0.373		0.100	1	07/02/2018 13:23	WG1130993
Zinc	1.33		0.0500	1	07/02/2018 13:23	WG1130993

Method Blank (MB)

(MB) R3321929-1 06/28/18 11:34

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

L1005110-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1005110-02 06/28/18 21:47 • (DUP) R3321929-4 06/28/18 22:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	1.36	1.40	1	3.05		20

L1005126-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1005126-03 06/29/18 00:36 • (DUP) R3321929-7 06/29/18 00:52

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	1.34	1.40	1	4.49		20

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

(LCS) R3321929-2 06/28/18 11:49 • (LCSD) R3321929-3 06/28/18 12:04

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 %
Nitrate	8.00	8.03	8.11	100	101	90.0-110			0.890	20

L1005110-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1005110-02 06/28/18 21:47 • (MS) R3321929-5 06/28/18 22:18 • (MSD) R3321929-6 06/28/18 22:33

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	1.36	6.41	6.50	101	103	1	80.0-120			1.46	20

Method Blank (MB)

(MB) R3322620-1 07/02/18 12:20

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	0.00693	J	0.00340	0.0500

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

(LCS) R3322620-2 07/02/18 12:22 • (LCSD) R3322620-3 07/02/18 12:25

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	10.6	10.6	106	106	85.0-115			0.0447	20
Iron	10.0	11.0	10.9	110	109	85.0-115			0.893	20
Zinc	1.00	0.991	0.998	99.1	99.8	85.0-115			0.730	20

L1005109-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1005109-02 07/02/18 12:27 • (MS) R3322620-5 07/02/18 12:32 • (MSD) R3322620-6 07/02/18 12:35

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	0.271	10.9	10.9	106	106	1	70.0-130			0.375	20
Iron	10.0	0.172	11.1	11.2	109	110	1	70.0-130			0.721	20
Zinc	1.00	0.0547	1.05	1.05	99.1	99.5	1	70.0-130			0.395	20

L1005188-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1005188-01 07/02/18 12:37 • (MS) R3322620-7 07/02/18 12:40 • (MSD) R3322620-8 07/02/18 12:43

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	10.8	105	107	1	70.0-130			1.95	20
Iron	10.0	ND	10.8	11.0	108	110	1	70.0-130			1.90	20
Zinc	1.00	ND	1.01	1.04	98.5	101	1	70.0-130			2.19	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.

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.
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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.
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Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.

ESC Lab Sciences 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 ESC Lab Sciences.

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	T 104704245-17-14
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

ESC Lab Sciences 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. ESC Lab Sciences performs all testing at our central laboratory.

AMEC - Knoxville, TN

2030 Falling Waters Road
Suite 300
Knoxville TN 37922

Billing Information:
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 #: 3031142002.02

Lab Project #: MACTECKTN-AQUACHEM

Collected by (print): Noel Garland

Site/Facility ID #: Aqua Chem

P.O. #: 3031142002.02

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 #

Date Results Needed: NA

Immediately Packed on Ice N ___ Y ✓

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Metals 250mlHDPE-HNO3	NITRATE 125mlHDPE-NoPres	Remarks	Sample # (lab only)
SWOF-001	Grab	WW		6-27-18	15:15	2	X	X		01
SWOF-002		WW			14:25	2	X	X		02
SWOF-003		WW			14:35	2	X	X		03
SWOF-005		WW			15:10	2	X	X		04

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
a subsidiary of Pace Analytical

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

L# 605105

Table #

Acctnum: MACTECKTN

Template: T135430

Prelogin: P649786

TSR: 633 - Pam Langford

PB: 4.24.18 CM

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 # 4380 6865 2634

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

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	6-27-18	16:30		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.1 °C Bottles Received: 6
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 6/28/18 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 14, 2018

Wood E&I Solutions Inc. - Knoxville, TN

Sample Delivery Group:	L1043082
Samples Received:	11/10/2018
Project Number:	3031142002.02
Description:	Aqua Chem

Report To:

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

Entire Report Reviewed By: Pamela A. Langford

Pam Langford
Project Manager

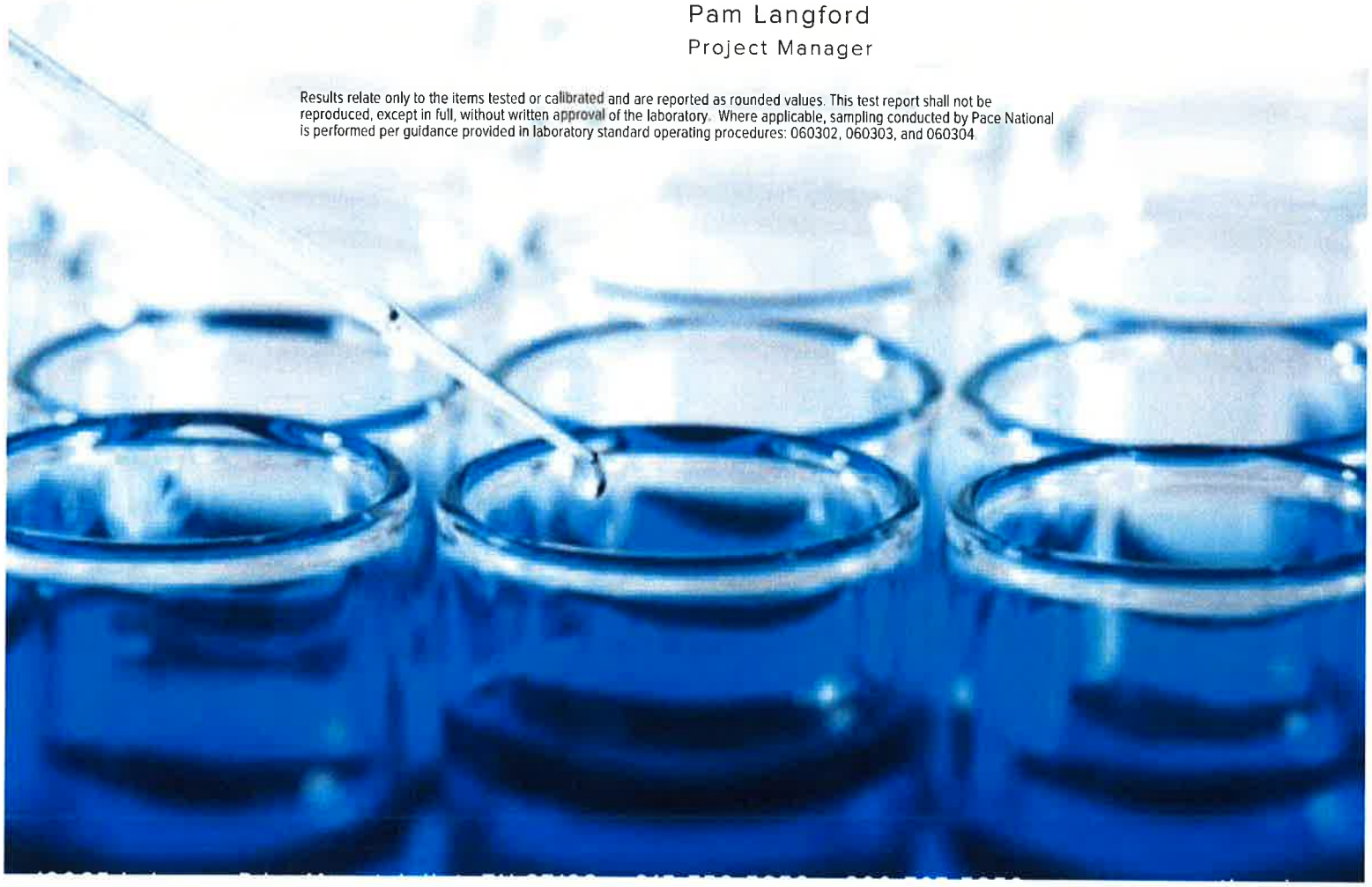

TABLE OF CONTENTS

SWOF-001 L1043082-01 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:35 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 11:02	11/10/18 11:02	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:42	TRB

SWOF-002 L1043082-02 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:15 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 11:17	11/10/18 11:17	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:45	RDS

SWOF-003 L1043082-03 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:05 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 11:34	11/10/18 11:34	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:47	TRB

SWOF-005 L1043082-04 WW

Collected by: Jacob Parker | Collected date/time: 11/09/18 11:25 | Received date/time: 11/10/18 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 300.0	WG1194469	1	11/10/18 12:23	11/10/18 12:23	MAJ
Metals (ICP) by Method 200.7	WG1194715	1	11/12/18 07:59	11/13/18 10:50	TRB

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)	0.117		0.100	1	11/10/2018 11:02	WG1194469

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.301	B	0.200	1	11/13/2018 10:42	WG1194715
Iron	0.249		0.100	1	11/13/2018 10:42	WG1194715
Zinc	ND		0.0500	1	11/13/2018 10:42	WG1194715

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	11/10/2018 11:17	WG1194469

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/13/2018 10:45	WG1194715
Iron	ND		0.100	1	11/13/2018 10:45	WG1194715
Zinc	ND		0.0500	1	11/13/2018 10:45	WG1194715

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	11/10/2018 11:34	WG1194469

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/13/2018 10:47	WG1194715
Iron	ND		0.100	1	11/13/2018 10:47	WG1194715
Zinc	ND		0.0500	1	11/13/2018 10:47	WG1194715

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	11/10/2018 12:23	WG1194469

Metals (ICP) by Method 200.7

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.200	1	11/13/2018 10:50	WG1194715
Iron	ND		0.100	1	11/13/2018 10:50	WG1194715
Zinc	ND		0.0500	1	11/13/2018 10:50	WG1194715

Method Blank (MB)

(MB) R3359140-1 11/10/18 08:31

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

L1042884-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1042884-02 11/10/18 09:56 • (DUP) R3359140-3 11/10/18 10:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Nitrate	0.664	0.673	1	1.32		20

Laboratory Control Sample (LCS)

(LCS) R3359140-2 11/10/18 08:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Nitrate	8.00	8.15	102	90.0-110	

L1042884-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1042884-02 11/10/18 09:56 • (MS) R3359140-4 11/10/18 10:29 • (MSD) R3359140-5 11/10/18 10:45

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	0.664	5.62	5.61	99.2	98.9	1	80.0-120			0.242	20

Method Blank (MB)

(MB) R3359346-1 11/13/18 09:53

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.0347	J	0.0273	0.200
Iron	U		0.0282	0.100
Zinc	U		0.00340	0.0500

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

(LCS) R3359346-2 11/13/18 09:55 • (LCSD) R3359346-3 11/13/18 09:58

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	9.85	9.83	98.5	98.3	85.0-115			0.181	20
Iron	10.0	9.91	9.94	99.1	99.4	85.0-115			0.236	20
Zinc	1.00	0.985	0.987	98.5	98.7	85.0-115			0.223	20

L1043084-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1043084-01 11/13/18 10:01 • (MS) R3359346-5 11/13/18 10:06 • (MSD) R3359346-6 11/13/18 10:09

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	10.3	10.3	101	101	1	70.0-130			0.370	20
Iron	10.0	ND	10.1	10.2	100	101	1	70.0-130			0.877	20
Zinc	1.00	ND	1.03	1.03	99.3	99.9	1	70.0-130			0.596	20

L1043170-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1043170-01 11/13/18 10:11 • (MS) R3359346-7 11/13/18 10:14 • (MSD) R3359346-8 11/13/18 10:17

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	23.2	32.3	31.2	90.6	80.4	1	70.0-130			3.22	20
Iron	10.0	31.9	39.0	38.2	70.9	63.2	1	70.0-130		J6	1.98	20
Zinc	1.00	1.62	2.47	2.47	85.0	85.5	1	70.0-130			0.213	20

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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.
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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
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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.
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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	T 104704245-17-14
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
Same

Report to: **William Teichert, Jacob Parker**

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 # **3031142002.02**

Lab Project # **MACTECKTN-AQUACHEM**

Collected by (print): **Jacob Parker**

Site/Facility ID # **Aqua-Chem**

P.O. # **303114 2002.02**

Collected by (signature):

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

Quote # **NA**

Date Results Needed **NA**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Metals 250mlHDPE-HNO3	NITRATE 125mlHDPE-NoPres	Pres Chk	Remarks	Sample # (lab only)
SWOF-001	Grab	WW	NA	11/9/18	1135	2	X	X			-01
SWOF-002		WW			1115	2	X	X			02
SWOF-003		WW			1105	2	X	X			03
SWOF-005	↓	WW	↓	↓	1125	2	X	X			04

Analysis / Container / Preservative

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

Lab # L1043082

F053

Acctnum: **MACTECKTN**
Template: **T135430**
Prelogin: **P663330**
TSR: **633 - Pam Langford**
PB: **7-18-18G**
Shipped Via: **FedEX Ground**

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

Remarks: RAD SCREEN: <0.5 mR/hr

pH ___ Temp ___
Flow ___ Other ___

Samples returned via:
__ UPS ✓ FedEx __ Courier __ ___

Tracking # **4492 6217 3129**

Sample Receipt Checklist:
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: ✓ N
Bottles arrive intact: ✓ N
Correct bottles used: ✓ N
Sufficient volume sent: ✓ N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: ✓ N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Matthew Parker	11/9/18	1340	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: °C Bottles Received: 9
0.5-0.2=0.3

Date: 11/10/18 Time: 845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Attachment B
Completed CN-1115 Forms

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

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): 2018	Outfall Number: SW001
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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	0.388
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		2/22/19
Printed Name	Official Title	Signature	Date

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

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): 2018	Outfall Number: SW001
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/10/18 (repeat)
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:	

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Parameter	Cut-off Conc. (mg/L)	Annual Sample Result (mg/L)
Aluminum, Total	0.75	0.301
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	0.249
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	0.117
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

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

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Division of Water Resources
William R. Snodgrass Tennessee Tower
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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): 2018	Outfall Number: SW002
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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	0.271
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	0.172
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	0.122
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	0.0547

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Printed Name	Official Title	Signature	Date

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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): 2018	Outfall Number: SW002
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/9/18 (repeat)
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:	

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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 P 7/30
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

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Printed Name	Official Title	Signature	Date

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Division of Water Resources
William R. Snodgrass Tennessee Tower
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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): 2018	Outfall Number: SW003
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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:	

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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	0.143
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	0.414
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	0.705

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

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

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): 2018	Outfall Number: SW003
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/9/18 (repeat)
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:	

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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

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

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

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): 2018	Outfall Number: SW005
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 6/27/18
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	0.926
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	0.373
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	0.350
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	1.33

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William (Paul) Teichert	Project Manager		2/22/19
Printed Name	Official Title	Signature	Date

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

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): 2018	Outfall Number: SW005
List all TMSP sectors which apply to discharge from this outfall: AA	Sample Date: 11/9/18 (repeat)
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		2/22/19
Printed Name	Official Title	Signature	Date