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17 March 2022

Ms. Karen Kajiya-Mills
Michigan Department of Environment, Great Lakes, and Energy
Constitution Hall
525 West Allegan Street
Lansing, MI 48913



Re: Stack Testing Results for
American Chemical Solutions LLC (SRN B4302)
2406 Roberts St., Muskegon, MI

Dear Ms. Kajiya-Mills,

At the request of American Chemical Solutions LLC (ACS), Environmental Resources Management Michigan, Inc. (ERM) is providing results (attached) for the stack testing conducted on November 10, 2021 on EU-WWStripper for the above referenced facility. The testing was conducted in accordance with the requirements in PTI No.17-19, Special Condition V.1 for EU-WWStripper.

ACS is located in Muskegon, Michigan and is a chemical manufacturing operation. The facility consists of four process lines. The process lines will produce products or materials in semi-continuous batch operations and will utilize toluene and/or methanol. The lines will be equipped with heat exchangers to condense toluene or methanol vapors at the process vessels. Any residual vapors from the heat exchangers will be directed to the VOC condenser for further removal. The condensed toluene and methanol will be recycled back into the process.

Two air strippers were used to treat waste water from the facility to ensure that waste water discharges to the municipal sewer system comply with the federal discharge standards for the organic chemical, plastic, and synthetic (OPSF) industry discharge standards for waste water. The waste water will originate from the process but stormwater may also be processed. The process waste water is expected to contain toluene and methanol.

The attached testing report summarizes the results and presents the sampling and analytical procedures. Also attached are the operating data collected during the testing: scrubber water flow rate and tower air flow.

The purpose of the testing was to determine an emission rate for VOC, toluene and methanol. The previous stack test conducted February 6 and 7th, 2020 was not able to determine reliable emission rates of Methanol and Toluene due to frozen water in the wastewater storage tank, resulting in a higher concentration of Methanol and Toluene being sent to the strippers. The stack test was repeated November 10, 2021 to determine emission rates for VOC, toluene and methanol. The test results are summarized in the table below but please note that the results are still undergoing internal review.

Table 1 – Results Summary

Stack Testing Results Summary

	Pollutant	North Scrubber	South Scrubber	Total
Emissions, lbs/hr	Methanol	13.470	9.947	23.417
	Toluene	0.132	0.0009	0.133
	VOC	8.877	3.6240	12.501

Please contact me at (616) 283-7157 if you have any questions.

Sincerely,

Rob Adams, CSP
ERM Senior Consultant

Attachments:

1. Stack Testing Report
2. Operating Data

cc: ACS (electronic copy)
File

 **Stack Test Group, Inc.**
Air Compliance & Emissions Solutions

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Ottawa, IL 61350
Phone 815-433-0545
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**REPORT OF VOC, TOLUENE AND METHANOL EMISSIONS TESTING ON THE
NORTH AND SOUTH SCRUBBER EXHAUST STACKS AT THE AMERICAN
CHEMICAL SOLUTIONS FACILITY LOCATED IN MUSKEGON, MI**

Prepared for:

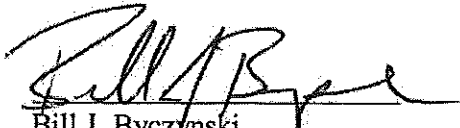
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3352 128th AVENUE
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Prepared by:

STACK TEST GROUP, INC.
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NOVEMBER 10, 2021
STACK TEST GROUP, INC. PROJECT NO. 21-3399

Report Prepared By:


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Attachment A

Stack Testing Report

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CALIBRATION GAS CERTIFICATION SHEETS

1.0 EXECUTIVE SUMMARY

On November 10, 2021, The Stack Test Group, Inc. performed volatile organic compound (VOC), toluene and methanol emission testing on the north and south scrubber exhaust stacks at the American Chemical Solutions facility located in Muskegon, MI. Three one-hour tests were conducted on each source in order to determine the VOC, toluene and methanol emission rates. Presented below are the average results of these tests.

North Scrubber Exhaust Stack:

Toluene Emissions:	0.132 lb/hr
Methanol Emissions:	13.47 lb/hr
Total VOC Emissions:	8.877 lb/hr

South Scrubber Exhaust Stack:

Toluene Emissions:	0.0009 lb/hr
Methanol Emissions:	9.947 lb/hr
Total VOC Emissions:	3.624 lb/hr

2.0 INTRODUCTION

On November 10, 2021, The Stack Test Group, Inc. performed VOC, toluene and methanol emission testing on the north and south scrubber exhaust stacks at the American Chemical Solutions facility located in Muskegon, MI. Testing was performed to determine the emission rates of the above mentioned compounds.

Testing was conducted while American Chemical Solutions personnel operated the process at normal rate and the scrubbers at normal conditions.

Testing was supervised by Mr. Bill J. Byczynski, Mr. Ryan Schueller and Mr. Gary Kohnke of the Stack Test Group, Inc. Testing was coordinated by Mr. Rob Adams of ERM. Testing was witnessed by Ms. Lindsey Wells from EGLE.

All testing followed the guidelines of U.S. EPA Reference Methods 1 through 4, 18 and 25A. This report contains a summary of results for the above mentioned tests and all the supporting field, process, and computer generated data.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 Exhaust Gas Parameters

3.1.1 *Traverse and Sampling Points*

Testing was conducted on the north and south scrubber exhaust stacks. The number of velocity traverse and sample measurement points for each stack was determined using EPA Method 1.

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The two exhaust stack inside diameters measured 23 inches. The test ports were located approximately 20 feet (greater than 2.0 diameters) downstream and 15 feet (greater than 0.5 equivalent diameters) upstream of the nearest flow disturbances. Velocity measurements were taken at each of 16 points, 8 points in each of the two ports set at 90 degrees to each other.

3.1.2 Velocity Traverse

Velocity measurements were performed during each emission test in accordance with EPA Method 2. An "S" type Pitot Tube with an attached type "K" thermocouple was used to conduct the velocity traverse.

3.1.3 Gas Composition

Gas composition for oxygen, carbon dioxide, and nitrogen was determined employing EPA Method 3. An integrated gas sample was collected during each emission test. Gas analysis was conducted using a calibrated Servomex Model 1440C O₂/CO₂ analyzer.

3.1.4 Moisture Content

The north and south scrubber exhaust gas moisture content was determined using the wet bulb/dry bulb technique. The temperatures for the wet bulb/dry bulb are included on the field data sheets.

3.2 TOLUENE & METHANOL EMISSION TESTING

3.2.1 Sample Collection

Testing on the north and south scrubber exhaust stacks for toluene and methanol was performed using U.S. EPA Reference Method 18. This method is titled:

U.S. EPA Reference Method 18 Measurement of Gaseous Organic Compound Emissions from Stationary Sources

A sample was transported to a set of charcoal and silica gel tubes through a Teflon line from the exhaust stack. The dry gas meter was calibrated prior to the test series. The pump was set at 0.50 liters per minute. Immediately following the test, the sample tubes were removed from the stack, capped-off, placed on ice and sent overnight to the laboratory for analysis.

Samples were collected in duplicate with one set of tubes pre-spiked with a known amount of toluene and methanol.

3.2.2 Sample Duration and Frequency

The Method 18 samples were collected in triplicate with each test lasting sixty minutes in duration. Testing on the north and south exhaust stacks were conducted simultaneously.

3.2.3 Calibrations

All sampling equipment was calibrated according to the procedures outlined in EPA Reference Method 18.

3.2.4 Analytical Procedures

The samples were analyzed per the specifications of U.S. EPA Reference Method 18. A recovery study following the guidelines of U.S. EPA Reference Method 18 was performed on the samples. The results of this recovery study is included in the laboratory Appendix of the report.

3.3 VOLATILE ORGANIC COMPOUND (VOC) TESTING

3.3.1 Sample Collection

Testing for total VOC's on the north and south scrubber exhaust stacks was performed using U.S. EPA Reference Method 25A. A J.U.M. Model 3-300 Flame Ionization Detector (FID) was used to determine the emission concentrations at each location. A sample was transported through a heated Teflon line from the exhaust stack and inlet duct to the FIDs which analyzed the samples continuously. The output signal from the FIDs were then recorded at one minute averages throughout the test. Copies of this data may be found in Appendix E.

At the beginning of the test series, the analyzers were calibrated and then checked for calibration error by introducing zero, low-range, mid-range and high-range calibration gases to the back of the analyzers. Before and after each individual test run, a system bias was performed by introducing a zero and mid-range propane calibration gas to the outlet of the probes. Calibration gases used were U.S. EPA Protocol 1 certified.

3.3.2 Sample Duration and Frequency

The Method 25A train samples were collected in triplicate with each test lasting sixty minutes in duration. Testing on the north and south scrubber exhaust stacks was conducted simultaneously.

3.3.3 Calibrations

All sampling equipment was calibrated according to the procedures outlined in EPA Reference Method 25A. Copies of the FID calibrations are included in Appendix D.

4.0 TEST RESULTS

Presented in this section are the results of this test series. Test results are reported in Tables 4.1 and 4.2. Table 4.1 reports the results for the north scrubber exhaust including stack gas temperature, percent carbon dioxide and oxygen, percent moisture, molecular weight of the stack gas dry and wet, and flow rate in actual cubic feet per minute (acfm), standard cubic feet per minute (scfm), and dry standard cubic feet per minute (dscfm).

Tables 4.1 also presents the VOC, toluene and methanol results for the north scrubber exhaust stack. The toluene and methanol results are presented in terms of pounds per dry standard cubic feet (lb/DSCF) and pounds per hour (lb/hr). The total VOC results are presented in terms of ppm as propane, lb/DSCF and lb/hr.

Table 4.2 presents the results for the south scrubber exhaust stack in the same manner and format as Table 4.1.

Copies of the calculations used to determine these emission rates may be found in Appendix A. Copies of the field data sheets are presented in Appendix B. Copies of the laboratory report are presented in Appendix E.

Table 4.1

VOC, Toluene & Methanol Results
American Chemical Solutions
Muskegon, MI
11/10/21
North Scrubber Exhaust Stack

Test No:	T1	T2	T3	Avg.
Start Time:	10:30 AM	01:46 PM	04:07 PM	
Finish Time:	11:30 AM	02:46 PM	05:07 PM	
Stack Gas Temperature, oF:	98.3	99.4	108.3	102.0
% Carbon Dioxide:	0.1	0.1	0.1	0.1
% Oxygen:	20.90	20.90	20.90	20.90
% Moisture:	2.90	2.80	2.80	2.83
Molecular Weight dry, lb/lb-Mole:	28.85	28.85	28.85	28.85
Molecular Weight wet, lb/lb-Mole:	28.54	28.55	28.55	28.54
Velocity and Flow Results:				
Average Stack Gas Velocity FPS:	13.76	14.22	14.61	14.20
Stack Gas Flow Rate, ACFM:	2,386	2,466	2,533	2,462
Stack Gas Flow Rate, SCFM:	2,229	2,299	2,325	2,285
Stack Gas Flow Rate, DSCF/HR:	129,881	134,097	135,618	133,199
Stack Gas Flow Rate, DSCFM:	2,165	2,235	2,260	2,220
VOC Results:				
PPM as Propane:	412.5	482.7	798.7	564.6
LBS/DSCF:	4.71E-05	5.51E-05	9.12E-05	6.45E-05
LBS/HR:	6.301	7.605	12.726	8.877
Toluene Results:				
Grains Per DSCF:	7.38E-03	6.12E-03	7.38E-03	6.96E-03
LBS/DSCF:	1.06E-06	8.75E-07	1.06E-06	9.95E-07
LBS/HR:	0.137	0.117	0.143	0.132
Methanol Results:				
Grains Per DSCF:	1.77E+04	2.24E+04	3.06E+04	2.35E+04
LBS/DSCF:	5.17E-01	6.03E-01	8.97E-01	6.72E-01
LBS/HR:	0.000	0.000	0.000	0.000
	10.19	12.23	17.99	13.47

Table 4.2

VOC, Toluene & Methanol Results
American Chemical Solutions
Muskegon, MI
11/10/21
South Scrubber Exhaust Stack

Test No:	<u>T1</u>	<u>T2</u>	<u>T3</u>	<u>Avg.</u>
Start Time:	10:30 AM	01:46 PM	04:07 PM	
Finish Time:	11:30 AM	02:46 PM	05:07 PM	
Stack Gas Temperature, oF:	88.3	99.0	97.1	94.8
% Carbon Dioxide:	0.1	0.1	0.1	0.1
% Oxygen:	20.90	20.90	20.90	20.90
% Moisture:	2.90	2.80	2.80	2.83
Molecular Weight dry, lb/lb-Mole:	28.85	28.85	28.85	28.85
Molecular Weight wet, lb/lb-Mole:	28.54	28.55	28.55	28.54
Velocity and Flow Results:				
Average Stack Gas Velocity FPS:	13.76	14.22	14.61	14.20
Stack Gas Flow Rate, ACFM:	2,386	2,466	2,533	2,462
Stack Gas Flow Rate, SCFM:	2,229	2,299	2,325	2,285
Stack Gas Flow Rate, DSCF/HR:	129,881	134,097	135,618	133,199
Stack Gas Flow Rate, DSCFM:	2,165	2,235	2,260	2,220
VOC Results:				
PPM as Propane:	196.8	176.3	287.2	220.1
LBS/DSCF:	2.25E-05	2.01E-05	3.28E-05	2.51E-05
LBS/HR:	3.197	2.938	4.738	3.624
Toluene Results:				
Grains Per DSCF:	4.82E-05	4.32E-05	4.41E-05	4.52E-05
LBS/DSCF:	6.89E-09	6.18E-09	6.30E-09	6.46E-09
LBS/HR:	0.0010	0.0009	0.0009	0.0009
Methanol Results:				
Grains Per DSCF:	3.45E-01	4.32E-01	7.11E-01	4.96E-01
LBS/DSCF:	4.93E-05	6.18E-05	1.02E-04	7.09E-05
LBS/HR:	6.811	8.765	14.266	9.947