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EMISSION TEST REPORT

Report Title: TEST REPORT FOR THE VERIFICATION OF HEXAVALENT CHROMIUM EMISSIONS

Test Dates: October 22-23, 2019

Facility Information	
Name: Street Address: City, County: SRN:	McGean-Rohco, Inc. 38521 Schoolcraft Rd. Livonia, Wayne B3316

Facility Permit Information	
Permit No.:	210-10D
Emission Units	FGMIXINGTANKS

Testing Contractor	
Company Mailing Address	Impact Compliance & Testing, Inc. 37660 Hills Tech Drive Farmington Hills, MI 48331
Phone	(734) 464-3880
Project No.	1900217

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

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FOR THE VERIFICATION OF
HEXAVALENT CHROMIUM EMISSIONS

MCGEAN-ROHCO, INC.
LIVONIA, WAYNE COUNTY, MICHIGAN

1.0 INTRODUCTION

McGean-Rohco, Inc. (McGean) operates a specialty chemical batch manufacturing process located in Livonia, Wayne County, Michigan (State Registration No. SRN B3316). The Michigan Department of Environment, Great Lakes, and Energy, Air Quality Division (EGLE-AQD) has issued Permit to Install (PTI) No. 210-10D to McGean for the operation of its chemical batch manufacturing process that consists primarily of six (6) mix tanks and a storage tank.

The Conditions of PTI No. 210-10D specify that:

> *Within 180 days after permit issuance, the permittee shall verify the hexavalent chromium emission rate from FGMIXINGTANKS by testing at the owner's expense, in accordance with Department requirements.*

The required emission testing was performed October 22-23, 2019 by Impact Compliance & Testing, Inc. (ICT) representatives Blake Beddow and Brad Thome. Mr. Mark Dziadosz from the EGLE-AQD was on-site to observe portions of the compliance testing. The project was coordinated by Ms. Darla Rivera and Mr. James Rector of McGean.

The sampling and analysis was performed using procedures specified in the test plan document dated September 18, 2019 and approved by the EGLE-AQD.

Appendix 1 provides a copy of the test plan approval letter.

Questions concerning the source and test report should be addressed to:

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Site Operations: Mr. James Rector
Plant Manager
McGean-Rohco, Inc.
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Livonia MI 48150
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Report Certification

This test report was prepared by Impact Compliance & Testing, Inc. based on field sampling data collected by ICT. Facility process data were collected and provided by McGean-Rohco, Inc. employees or representatives. This test report has been reviewed by McGean representatives and approved for submittal to the EGLE-AQD.

I certify that the testing was conducted in accordance approved methods unless otherwise specified in this report. I believe the information provided in this report and its attachments are true, accurate, and complete.

Report Prepared By:

Robert L. Harvey, P.E.
Services Director
Impact Compliance & Testing, Inc.

2.0 SUMMARY OF RESULTS

Exhaust gas from packed bed scrubber that is connected to FGMIXINGTANKS was sampled to determine the hexavalent chromium concentration. Three (3) four-hour test periods were performed to measure emissions over an entire batch cycle (dumping, mixing, and packing). Exhaust gas velocity measurements were performed during each test period to determine volumetric flowrate and pollutant mass emission rate. The average measured hexavalent chromium mass emission rate is less than the emission limit specified in PTI No. 210-10D.

Table No. 2.1 presents a summary of the measured hexavalent chromium emission test results.

The data presented in the table below are the average for three (3) four-hour test periods. Data and measurements for each test period are presented at the end of this report in Section 6.0

Table 2.1 Summary of FGMIXINGTANKS emission test results

Parameter	FGMIXINGTANKS Packed Bed Scrubber	
Scrubber liquid flowrate	102	gpm
Scrubber exhaust gas flowrate	5,001	dscfm
Hexavalent chromium concentration	4.5E-04	mg/dscm
Cr(VI) emission rate	8.2E-06	lb/hr
Permitted Cr(VI) emission rate	*1.6E-04*	*lb/hr*

3.0 SOURCE DESCRIPTION

3.1 General Process Description

McGean operates a specialty chemical batch manufacturing process that includes liquid and powder blending. The flexible group FGMIXINGTANKS consists of six (6) specialty chemical mix tanks and a storage tank. The tanks are constructed of either stainless steel or polyethylene and range in size from 1,000 gallons to 6,000 gallons.

3.2 Emission Control System Description

The six specialty chemical mix tanks are connected to a packed bed scrubber. The storage tank is equipped with a conservation vent.

The packed bed scrubber consists of a fan, a packed bed section, a water reservoir, and a circulation pump. The fan draws process air from the mix tanks, through the packed bed section where the collected gas is contacted with water delivered via spray nozzles, and exhausts to a vertical stack on the building roof.

Water is supplied to the spray nozzles from the reservoir on the ground floor. In the scrubber, the water contacts and dissolves or condenses on the particles carried in the airflow and then drains back to the reservoir. Excess water overflows the reservoir to the waste treatment area.

Appendix 2 provides a sampling location drawing for the scrubber exhaust.

3.3 Process Operating Conditions During the Compliance Testing

As requested in the test plan approval letter, the testing was performed while McGean processed chromic acid containing products at maximum routine operating conditions.

The scrubber liquid flowrate was 102 gallons per minute throughout each test day.

Appendix 3 control device operating data recorded for the test periods.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

A test plan was prepared by ICT and submitted to EGLE-AQD prior to performing the compliance test. This section provides a summary of the sampling and analytical procedures that were used during the tests and presented in the test plan.

4.1 Exhaust Gas Velocity and Flowrate (USEPA Methods 1 and 2)

Exhaust gas sampling was performed in the 21-inch diameter scrubber exhaust stack using sampling ports that satisfied USEPA Method 1 criteria. A diagram and measurements for the exhaust gas sampling location is provided in Appendix 2.

To determine pollutant mass flow emission rates, the stack gas velocity was measured using procedures specified in USEPA Method 2 throughout each test period using an S-type Pitot tube connected to the isokinetic sampling probe. Gas velocity (pressure) measurements were performed at each traverse point using a red-oil manometer. Temperature was recorded at each traverse point using a K-type thermocouple and a calibrated digital thermometer.

Appendix 4 provides copies of exhaust gas velocity field data sheets and flowrate calculations.

4.2 Exhaust Gas Molecular Weight

The exhaust gas is primarily captured building air that has been drawn through the scrubber system. A dry molecular weight of 29.0 was used as specified in Section 8.6 of USEPA Method 2. The composition of the exhaust gas (oxygen and carbon dioxide content) was verified on-site with an instrumental analyzer.

4.3 Exhaust Gas Moisture Content (USEPA Method 4)

Moisture content of the scrubber exhaust gas was determined in using the USEPA Method 4 chilled impinger method as part of the isokinetic sampling procedures for chromium. The amount of moisture removed from the sample stream by the chilled impingers was determined gravimetrically by weighing the impinger contents before and after the test period to determine net weight gain.

Appendix 4 provides moisture train sampling data and calculations.

4.4 Chromium Emission Rate (USEPA Method 306)

USEPA Method 306, *Determination of Chromium Emissions from Decorative and Hard Chrome Electroplating and Chromium Anodizing Operations*, was used to determine hexavalent chromium concentration in the scrubber exhaust gas. Process gas was withdrawn from the scrubber exhaust stack at an isokinetic sampling rate using a glass

sampling nozzle, glass-lined probe and an impinger train containing 0.1N sodium hydroxide (NaOH) solution. Pursuant to USEPA Method 306, the sample probe was not heated, and the filter was omitted. Therefore, the glass probe liner was connected to a clean flexible Teflon line connected directly to the first impinger.

Stack gas temperature and velocity pressure at each traverse point were monitored and recorded throughout each four-hour test period to determine volumetric flowrate.

At the conclusion of each test period the final weight of each impinger was measured. The moisture gain was determined gravimetrically, and the stack gas total moisture was determined based on the total weight gain of the impingers and silica gel. The sample nozzle, probe liner, first three impingers and connective glassware were rinsed using 0.1N NaOH solution. The rinse and impinger solutions were combined and shipped to Element One, Inc. (Wilmington, North Carolina) for analysis. Prior to shipment, the pH of the recovered solutions was checked using litmus paper to verify that the pH exceeded 8.5.

The hexavalent chromium content in the recovered solutions was determined by Element One, Inc.

Appendix 5 contains a copy of the Element One laboratory report.

The hexavalent chromium [Cr(VI)] concentration was determined using the sample train data and laboratory reported Cr(VI) mass with the following equation:

$C_{Cr} = M_{Cr} / V_m / (1{,}000\ \mu g/mg)$

C_{Cr} = Cr(VI) concentration (mg/dscm)
M_{Cr} = Mass Cr(VI) in recovered solutions (µg)
V_m = Sample gas volume for test period (dscm)

The Cr(VI) mass emission rate was determined using the information above and the measured volumetric flowrate with the following equation:

$E_{Cr} = M_{Cr} / V_m * Q_d * (60\ min/hr) / (454E\text{-}06\ \mu g/lb)$

E_{Cr} = Cr(VI) emission rate (lb/hr)
Q_d = Exhaust gas volumetric flowrate (dscfm)

5.0 QA/QC ACTIVITIES

5.1 Exhaust Gas Flow Measurement

Prior to arriving onsite, the instruments used during the source test to measure exhaust gas properties and velocity (barometer, pyrometer, and Pitot tube) were calibrated to specifications in the sampling methods.

The absence of cyclonic flow for each sampling location was verified using an S-type Pitot tube and oil manometer. The Pitot tube was positioned at each of the velocity traverse points with the planes of the face openings of the Pitot tube perpendicular to the stack cross-sectional plane. The Pitot tube was then rotated to determine the null angle (rotational angle as measured from the perpendicular, or reference, position at which the differential pressure is equal to zero).

5.2 Meter Box and Isokinetic Rate

The dry gas metering console, which was used for the isokinetic sampling, was calibrated prior to and after the testing program. This calibration uses the critical orifice calibration technique presented in USEPA Method 5. The metering console calibration exhibited no data outside the acceptable ranges presented in USEPA Method 5.

The digital pyrometer in the metering console was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

The sampling nozzle diameter was determined using the three-point calibration technique.

The sampling rate for all test periods was within 10% of the calculated isokinetic sampling rate required by USEPA Methods 306 and 5.

5.3 Hexavalent Chromium Recovery and Analysis

All recovered samples were stored and shipped in pre-rinsed polyethylene sample bottles with Teflon® lined caps. The liquid level on each bottle was marked with a permanent marker prior to shipment and the caps were secured closed with tape. Samples of the reagent used in the test event (500 milliliters of 0.1N sodium hydroxide) was sent to the laboratory for analysis to verify that the reagent used to recover the samples has low chromium content.

The glassware and Teflon line used in the sample train was washed and rinsed prior to use in accordance with the procedures of USEPA Method 306. The glass sample nozzle and probe liner were washed, rinsed and soaked in acid prior to use in accordance with USEPA Method 306.

5.4 Laboratory QA/QC Procedures

The laboratory chromium analyses were conducted by a qualified third-party laboratory according to the appropriate QA/QC procedures specified in the associated USEPA test methods and are included in the final report provided by Element One (Wilmington, NC).

Appendix 6 presents test equipment quality assurance data (instrument calibration records, meter box calibration records, cyclonic flow determinations sheets, Pitot tube, nozzle and probe assembly calibration records).

6.0 TEST RESULTS

6.1 Test Results and Allowable Emission Limits

Air pollutant emission measurement results for each four-hour test period are presented in Table 6.1.

The average measured hexavalent chromium emission rate for FGMIXINGTANKS is 8.2E-06 pounds per hour (lb/hr), which is less than (in compliance with) the permitted hexavalent chromium emission rate of 1.6E-04 lb/hr.

6.2 Variations from Normal Sampling Procedures or Operating Conditions

There were no variations from normal sampling procedures or operating conditions during the testing project.

Table 6.1 Measured exhaust gas conditions and hexavalent chromium emission rates for FGMIXINGTANKS

Test No	1	2	3	
Date	10/22/19	10/22/19	10/23/19	Three Test
Time	0520-0924	0950-1356	0502-0905	Average
Scrubber Exhaust				
Exhaust gas flowrate (dscfm)	4,969	4,853	5,181	5,001
Exhaust gas flowrate (dscmm)	141	137	147	142
Temperature (°F)	70	66	63	66
Moisture (%)	2.3	2.0	1.8	2.0
Sample Train Data				
Sample volume (dscf)	216	213	224	218
Sample volume (dscm)	6.1	6.0	6.4	6.2
Cr(VI) catch weight (µg)	0.81	6.62	0.71	2.71
Emission Rate				
Cr(VI) concentration (mg/dscm)	1.33E-04	1.10E-03	1.11E-04	4.48E-04
Cr(VI) emission rate (lb/hr)	2.47E-06	2.00E-05	2.15E-06	8.20E-06
Permitted emission rate (lb/hr)				*1.6E-04*

Abbreviations
dscfm = dry standard cubic feet of air per minute
dscmm = dry standard cubic meters of air per minute
µg = micrograms (1E-06 grams)
mg/dscm = milligrams per dry standard cubic meter of air
lb/hr = pounds per hour