

Report

Emissions Testing for Particulate Matter FlakeDBulk Test Dates: August 14-15, 2013

B1846

Occidental Chemical Corporation
1600 S. Madison Street
Ludington, MI 49431

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1.0 INTRODUCTION

NTH Consultants, Ltd. (NTH) was retained by Occidental Chemical Corporation (OxyChem) to conduct emissions testing on the exhaust of Flake D Bulk S-50 Scrubber (EUFLAKEDBULK). The testing was performed to measure emissions of filterable particulate matter (PM) at the OxyChem facility in Ludington, Michigan.

1.1 Purpose of Test

Testing was performed to demonstrate compliance with the PM emission limits as described in the Michigan Department of Environmental Quality (MDEQ) Renewable Operating Permit (ROP) No. MI-ROP-B1846-2008b.

1.2 Project Contact Information

Responsibilities	Address	Contact
Test Facility	Occidental Chemical Corporation 1600 S. Madison Street Ludington, Michigan 49431	Ms. Kathryn Nixon 231-845-4368 Kathryn_Nixon@oxy.com
Test Company Representative	NTH Consultants, Ltd. 1430 Monroe Avenue NW, Suite 180 Grand Rapids, Michigan 49505	Mr. Graziano Gozzi 616-451-6262 ggozzi@nthconsultants.com
State Representative	MDEQ 120 W. Chapin Street Cadillac, Michigan 49601	Mr. Robert Dickman 231-876-4412 dickmanr@michigan.gov

This test program was performed by Messers. Kyle Daneff and Tyler Hanna of NTH. Ms. Kathryn Nixon of OxyChem provided project coordination for the testing. Mr. Robert Dickman of the MDEQ observed the testing event.

1.3 Summary of Results

The emissions test results are summarized in Table 1-1. Detailed results are presented in Table 1 appended at the end of this report.



Table 1-1. Summary of Filterable PM Emissions

Location	Emission Rate (lb/1,000 lbs exhaust – dry basis)	ROP Limit (lb/1,000 lbs exhaust – dry basis)
Flake D Bulk S-50 Scrubber	0.002	0.1

2.0 PROCESS DESCRIPTION

EUFLAKEDBULK unit consists of three (3) product hoppers, truck and railcar load stations, a reclaim system to transfer calcium chloride from rail car to product hopper, and a pneumatic transport system to convey calcium chloride to the feed hopper for the dry calcium chloride process, identified as emission unit EUDGDCCFIBC.

A slight negative pressure is maintained on the material handling equipment to induce a draft in order to collect the dust generated during handling operations.

The exhaust air from EUFLAKEDBULK process is controlled by a venturi scrubber, S-50, followed by a liquid-air separator to remove contaminants before being vented. The venturi pressure drop and flow rate are monitored and controlled above the preset minimum. The liquid-air separator portion of the scrubber removes excess droplets by gravity due to lower air velocity. The air passes through a mist elimination section before being exhausted through the vent. The venturi pressure drop and the scrubbing fluid flow rate are monitored and controlled.

3.0 REFERENCE METHODS AND PROCEDURES

The following U.S. EPA Reference Test Methods were performed for the emissions testing:

- **Method 1:** Sample and Velocity Traverses for Stationary Sources
- **Method 2:** Determination of Stack Gas Velocity and Volumetric flow rate (Type S Pitot tube)
- **Method 3:** Gas Analysis for the Determination of Dry Molecular Weight (Fyrite)



- **Method 4:** Determination of Moisture Content in Stack Gases
- **Method 5:** Determination of Particulate Emissions from Stationary Sources

3.1 Traverse Points

Twelve (12) traverse points were utilized to measure the volumetric flow in accordance with U.S. EPA Method 1 for the Flake D Bulk S-50 scrubber stack. Two (2) sample ports were utilized for the performance test, which resulted in the use of six (6) traverse points per sample port.

Figure 1 contains a schematic of the exhaust stack sample ports for the source.

3.2 Velocity and Temperature

The exhaust stack gas velocity and temperature measurements were conducted in accordance with U.S. EPA Method 2. The exhaust stack pressure differential (ΔP) was measured at each traverse point using a calibrated S-type Pitot tube connected to an appropriately sized inclined water column manometer. Temperatures were recorded in conjunction with ΔP determinations using a calibrated Type "K" thermocouple attached directly to the pitot tube.

3.3 Molecular Weight

A Fyrite gas analyzer was used to measure CO_2 and O_2 and to determine molecular weight of the exhaust gas in accordance with U.S. EPA Method 3.

3.4 Moisture

The exhaust gas moisture content was determined in accordance with U.S. EPA Reference Method 4 in conjunction with the U.S. EPA Method 5 sampling apparatus. The sample was passed through a series of impingers that contained method appropriate liquid reagents. All impingers were weighed before and after each test to determine moisture content of the stack gas.



3.5 Filterable Particulate Matter (PM)

Filterable particulate matter (PM) concentrations were determined following the guidelines of U.S. EPA Method 5. The sample apparatus consisted of a nickel-plated stainless steel nozzle, a heated glass lined probe, a heated glass fiber filter, four (4) chilled impingers and a metering console. The PM sample was collected in the nozzle, probe and filter. At the conclusion of each test run, the filter was removed from the filter holder, visually inspected and placed into a petri dish. The front half of the filter holder was rinsed with acetone into a separate sample bottle.

At the laboratory, Method 5 analytical procedures were used to analyze the samples for PM. The acetone rinses were evaporated and desiccated to dryness and the residue weighed to determine the amount of PM collected. The filters were also desiccated to remove uncombined water and then weighed. A diagram of the PM sampling apparatus (Figure 2) is appended.

4.0 QUALITY ASSURANCE

Each promulgated U.S. EPA reference method described above is accompanied by a statement indicating that to obtain reliable results, persons using these methods should have a thorough knowledge of the techniques associated with each. To that end, NTH attempts to minimize any factors in the field that could increase error by implementing our quality assurance program into every testing activity segment.

The pitot tubes and thermocouples used to measure the exhaust gas during this test program were calibrated according to the procedures outlined in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods, Method 2, Type S Pitot Tube Inspection, and Calibration Procedure 2E Temperature Sensor.



5.0 SUMMARY OF RESULTS

No problems were encountered with the test equipment during this test program, and operations at the Flake D Bulk S-50 Scrubber appeared normal with no apparent problems during the test runs. Test results show compliance with the ROP limit. Results are tabulated and can be found in Table 1 at the end of this report. The report was revised on December 4, 2013 to correct a clerical error in the Appendix A and B data sheets. The stack diameter was incorrectly listed as 24 inches. The correct diameter is 30 inches.



TABLES



Table 1

OxyChem

S-50

Summary of Particulate Emissions

August 14 - 15, 2013

Run No.	1	2	3	Average
Run Time	825-930	753-857	1313-1504	
Volumetric Flow Rates				
Actual Cubic Feet Minute	10,295	9,171	8,072	9,179
Standard Cubic Feet Minute	9,546	8,651	7,555	8,584
Dry Standard Cubic Feet Minute	9,362	8,450	7,363	8,391
Fixed Gases				
Oxygen, % by volume, dry	20.90	20.90	20.90	20.90
Carbon dioxide, % by volume, dry	0.00	0.00	0.00	0.00
Moisture, % by volume	1.93	2.33	2.54	2.27
Run No.	1	2	3	Average
Emission Rate:				
Lbs/1000 Lbs Gas, Dry:	0.002	0.002	0.003	0.002
ROP Limit:				0.1



FIGURES



FIGURE 1

S-50	Flake D Bulk
96"	A Distance from port to top of stack or next downstream flow disturbance (> 2 Duct Diameters)
224"	B Distance from port to next upstream flow disturbance (> 8 Duct Diameters)
5'-0"	C Distance from center of port to top of platform grating
28'-6"	D Distance from ground to port
36'-6"	E Distance from ground to top of stack
2'-6"	F Stack diameter
4" Nom.	G Port diameter (I.D.)
8"	H Port Extension
12"	J Distance from stack reduction to top of stack
24"	K Stack outlet diameter

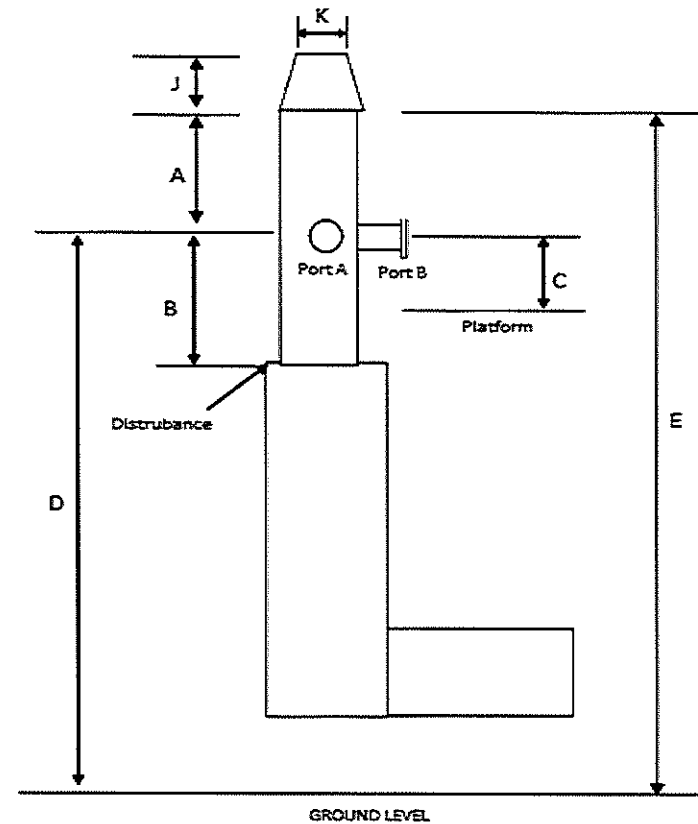
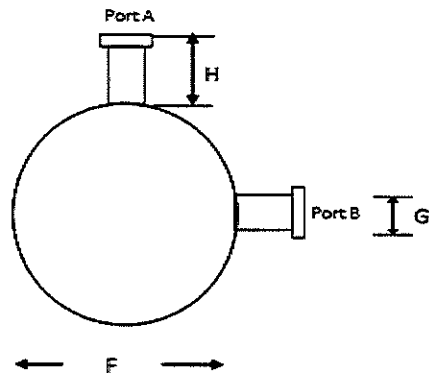
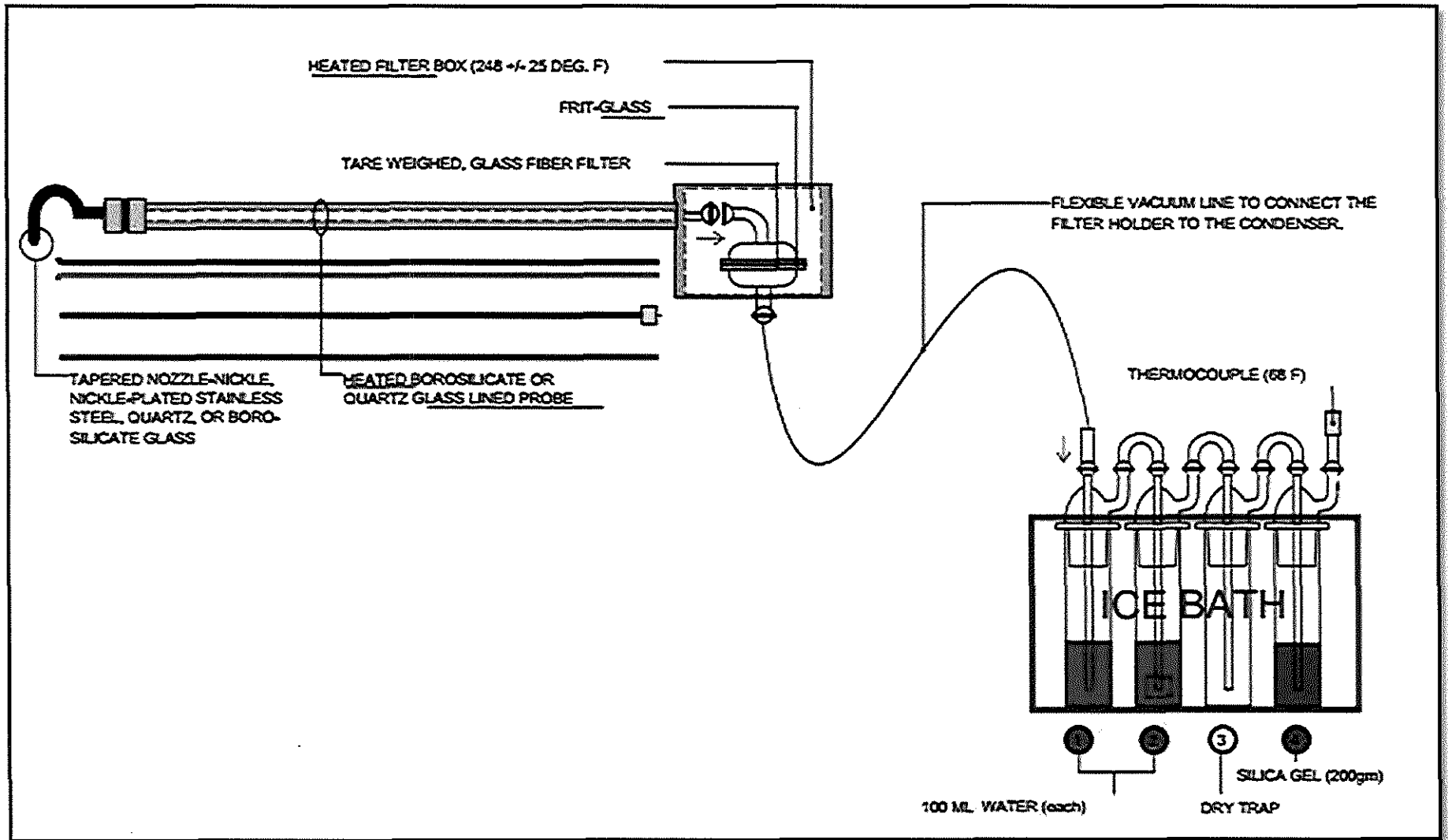


FIGURE 2



U.S. EPA Method 5
(Modified)