The Dow Chemical Company
Michigan Operations
Midland , MI 48674

April 26, 2019

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NOTIFICATION OF COMPLIANCE STATUS REPORT /PERFORMANCE TEST RESULTS FOR RECIPROCATING INTERNAL COMBUSTION ENGINE (RICE) MACT, 40 CFR 63 SUBPART ZZZZ; DIVERSION DIESEL PUMP ENGINES A & B (D-200A/B)

In accordance with the requirement specified in §63.6645(h)(2) of RICE MACT, The Dow Chemical Company (Dow) is submitting a Notification of Compliance Status report (NOCS) on or before the 60th day following the completion of the performance test according to §63.10(d)(2). In addition, results from a performance test conducted on the Diversion Diesel pump engines A & B (D-200A/B) to demonstrate compliance with the RICE MACT are attached as required by §63.6630(c) of RICE MACT. Testing occurred on February 26th, 2019 at the Environmental Operations Waste Water Treatment Plant facility.

The following information is included:

- Notification of Compliance Status (NOCS) Report for 40 CFR 63 Subpart ZZZZ: National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
- Attachment 1: Reciprocating Internal Combustion Engines (RICE MACT) Performance Test Report
- Attachment 2: Continuous Parameter Monitoring System (CPMS) Calibration Documentation Sheet
- Attachment 3: Instrument Data Sheets for the RPM and Pressure Instruments

CERTIFICATION STATEMENT
I certify that, based on information and belief formed after reasonable inquiry, the statements and information in these reports and supporting enclosures are true, accurate, and complete.

Karen Mann
Responsible Care Leader
The Dow Chemical Company, Michigan Operations
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Section	Contents - NOCS Reports
1	Notification of Compliance Status Report - Reciprocating Internal Combustion Engine(RICE) MACT (Subpart ZZZZ)

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Notification of Compliance Status (NOCS) Report

40 CFR 63 Subpart ZZZZ:

National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Submittal Date: April 26, 2019

Section I: General Information

A. Identification of Applicable Subparts

40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. This NOCS is being submitted in accordance with §§63.6645(h).

B. Affected Sources

Identify each affected source covered in the submission:

Environmental Operations at Dow Michigan Operations in Midland, Michigan.

C. Facility Information

Print or type the following information for each facility for which you are making notification of compliance status:

Operating Permit Number		Facility I.D. Number	
MI-ROP-A4033-2017b		**N/A**	
Responsible Official Name / Title		Phone or Fax number of Owner	
Karen Mann / Responsible Care Leader		**989-633-2076**	
Street Address of Owner or Operator			
1790 Building			
City	State	ZIP Code	
Midland	**Michigan**	**48674**	
Facility Name			
The Dow Chemical Company			
Facility Local Contact Name	Title		Phone
Michael Gruber	**Environmental Specialist**		**989-496-5539**
City	State	ZIP Code	
Midland	**MI**	**48667**	

Section II: Notification of Compliance Status

Introduction

The Notification of Compliance Status is submitted within 60 days following the completion of the performance test ['63.6645(h)(2)]. The Notification of Compliance Status certifies that the stationary RICE is meeting the emission limitations and operating limitations; identifies the option(s) used to demonstrate initial compliance, summarizes the data and calculations supporting the compliance demonstration, and describes how continuous compliance will be demonstrated.

Report Content

The Notification of Compliance Status must contain the information ['63.9(h)(2)(i)]:

§63.9(h)(2)(i)(A) Method used to demonstrate initial compliance

A performance test is required to demonstrate initial compliance according to §63.6630(c) and §63.6645(h). This facility is subject to Table 5, condition 2(a)(i)-(iii) of Subpart ZZZZ.

§63.9(h)(2)(i)(B) Performance Test Results

The performance test results are summarized in the table below which is extracted from the Performance Test Report in Attachment 1.

The calibration results for the CPMS are in Attachment 2.

Summary of Results for
RICE Diversion Diesel pump engines A & B (D-200A/B)
– Initial Compliance Test

Table 2.1- Test Summary

Engine	SAMPLE TYPE	TEST METHOD	*ACTUAL EMISSION RATE	ALLOWABLE EMISSION RATE
Diesel Engine A	CO Emissions (ppmv@15%O2)	EPA Method 10	9.3 ppmvd@15%O2	23 ppmvd@15%O2
Diesel Engine B	CO Emissions (ppmv@15%O2)	EPA Method 10	8.8 ppmvd@15%O2	23 ppmvd@15%O2

* Average over three one-hour runs.

Table 2.2- Test Run Data

PARAMETER	RUN 1	RUN 2	RUN 3	AVERAGE
Diesel Engine A				
Sample Date	02/26/19	02/26/19	02/26/19	n/a
Sample Times (start/end)	1418/1518	1528/1628	1636/1736	n/a
Outlet CO (ppmv)	12.1	10.7	9.6	10.8
Outlet O2 (%)	14.0	14.1	14.1	14.1
Outlet CO (ppmv@15%O2)	**10.4**	**9.2**	**8.3**	**9.3**
Diesel Engine B				
Sample Date	02/26/19	02/29/19	02/26/19	n/a
Sample Times (start/end)	1002/1102	1115/1215	1225/1325	n/a
Outlet CO (ppmv)	12.4	12.9	13.3	12.8
Outlet O2 (%)	12.2	12.3	12.2	12.2
Outlet CO (ppmv@15%O2)	**8.5**	**8.8**	**9.0**	**8.8**

Section II: Notification of Compliance Status, continued

Table 2.3- PROCESS DATA

PARAMETER	RUN 1	RUN 2	RUN 3	AVERAGE
Diesel Engine A				
Sample Date	02/26/19	02/26/19	02/26/19	n/a
Sample Times (start/end)	1418/1518	1528/1628	1636/1736	n/a
Engine RPM (RPM)	1788	1785	1785	1786
Pump Discharge Pressure (psig)	37.6	37.6	37.6	37.6
Amount Diesel Used (Gal)	15.99	23.31	29.49	22.93
HapGuard Temp (°F)	618	618	616	616
HapGuard Δp (inches water)	1.2	1.2	1.1	1.2
Diesel Engine B				
Sample Date	02/26/19	02/26/19	02/26/19	n/a
Sample Times (start/end)	1002/1102	1115/1215	1225/1325	n/a
Engine RPM (RPM)	1834	1835	1837	1836
Pump Discharge Pressure (psig)	44.4	45.8	47.0	45.7
Amount Diesel Used (Gal)	31.7	50	52.8	44.8
HapGuard Temp (°F)	706	709	709	708
HapGuard Δp (inches water)	1.1	1	1.0	1.0

§63.9(h)(2)(i)(C) Methods used to demonstrate continuous compliance

MACT Subpart ZZZZ and its referenced Table 6, condition (10) has the following requirements:

(i) conduct performance tests every 8,760 hours or 3 years, whichever comes first, for CO or formaldehyde, as appropriate, to demonstrate that the required CO or formaldehyde, as appropriate, percent reduction is achieved or that your emissions remain at or below the CO or formaldehyde concentration limit; and

(ii) collect the catalyst inlet temperature data according to §63.6625(b); and

(iii) reduce these data to 4-hour rolling averages; and

(iv) maintain the 4-hour rolling averages within the operating limitations for the catalyst inlet temperature; and

(v) measure the pressure drop across the catalyst once per month and demonstrate that the pressure drop across the catalyst is within the operating limitation established during the performance test.

Table 2.4- Summary of Continuous Compliance Parameters:

	Temperature	Catalyst Pressure Drop
Diesel Engine A	Exhaust (catalyst inlet temperature) maintained such that 450°F ≤ catalyst inlet temperature ≤ 1350°F.	1.2" H_2O** +/- 2" H_2O
Diesel Engine B		1.0" H_2O** +/- 2" H_2O

**Established during performance test, reference Table 2.3 above

Section II: Notification of Compliance Status, continued

§63.9(h)(2)(i)(D) Type and Quantity of HAP (or Surrogate)	Less than 11ppmv CO @15%O_2 per engine. CO is measured as a surrogate for Formaldehyde as allowed for in the RICE MACT.
§63.9(h)(2)(i)(E) Source Type	The affected source is located at a major source of HAPs.
§63.9(h)(2)(i)(F) Air Pollution Control Equipment	The two Diversion Diesel pump engines A & B (D-200A/B) each use a diesel particulate filter and non-selective catalytic reduction (NSCR) to control CO emissions. Johnson Matthey supplied two Industrial Diesel Oxidation catalysts with internal silencers designed to meet RICE emission limits. Catalyst body is constructed of stainless steel with carbon steel flanges. Johnson Matthey also provided two Hapguard monitoring systems for continuous parametric monitoring.
§63.9(h)(2)(i)(G) Compliance Statement	Apart from any deviations reported on the semiannual compliance report, the two Diversion Diesel pump engines A & B (D-200A/B) are operating in compliance with 40 CFR 63 Subpart ZZZZ.

Section III: Additional Performance Test Information

§63.6620(i) Engine Operation Information

The following information must be determined during the performance test and submitted with the NOCS. See attached performance test report.

Engine Description

The following information applies to Diversion Diesel pump engines A & B (D-200A/B):

the engine model number;	KTA-38P
the year of purchase;	1986
the manufacturer's site-rated brake horsepower;	1,050
the total displacement;	37.8 Liters (12 cylinders)
the engine manufacturer;	Cummins

Table 3.1 Ambient Test Conditions

The following information includes the average ambient conditions at the Jack Barstow Airport in Midland, Michigan.

PARAMETER	RUN 1	RUN 2	RUN 3	AVERAGE
Diesel Engine A				
Ambient Temperature (deg F)	20	20	19	20
Ambient Pressure (in)	29.82	29.82	29.82	29.82
Ambient Humidity (%)	53	54	55	54
Diesel Engine B				
Ambient Temperature (deg F)	16	17	19	17
Ambient Pressure (in)	29.86	28.85	29.84	29.51
Ambient Humidity (%)	62.4	53	49	54.8

Section III: Additional Performance Test Information, continued

§63.6620(i)

Average Percent Load Determination

Based on EPA's April 2013 Implementation Q&A document, Subpart ZZZZ does not specify that performance testing must be conducted at 100% load ±10% for existing non-emergency CI engines above 500 HP at major sources of HAP. Instead testing must be conducted according to 40 CFR 63.7(e). Performance testing was conducted based on representative performance (i.e. performance based on normal operating conditions) of the affected source.

The Diversion Diesel pump engines A & B (D-200A/B) rotations per minute (rpm) values during the three runs were recorded via process control data collection from a field mounted tachometer for each engine. The readings were taken once per minute for the duration of each run. The per-run average of these readings is presented above in Table 2.3. The percent load calculated for each engine is included in Table 3.2. To calculate percent load, the engine RPM during the test are divided by the engine design max RPM. RPMs for each engine are measured when the engine is operating under near constant output. The output of each engine is quantified by measuring the discharge pressure of the pump as each engine turns.

Table 3.2 Average Percent Load

Parameter	Design Max. RPM	Actual Max. RPM	Normal RPM	Actual RPM During Test	Percent Load*
Engine A RPM	**2100**	**2100**	**1000-1800**	**Avg. 1786**	**85 %**

- The pump discharge pressure during the test averaged 28.7 PSIG

Parameter	Design Max. RPM	Actual Max. RPM	Normal RPM	Actual RPM During Test	Percent Load*
Engine B RPM	**2100**	**2100**	**1000-1800**	**Avg. 1836**	**87 %**

- The pump discharge pressure during the test averaged 42.8 PSIG

Section IV: CPMS Evaluation

Introduction	A continuous parameter monitoring system (CPMS) is required in accordance with §63.6625(b) Table 5. The parameter that is required to be monitored using a CPMS is the inlet temperature of the catalyst bed. The inlet temperature is measured by a thermocouple. Engines A and B each have their own thermocouple and catalyst bed. The calibration records for the two thermocouples can be found in Attachment #1.
§63.6600(d) Standard	Existing non-emergency stationary CI RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions must comply with the emission limitations in Table 2c to this subpart and the operating limitations in Table 2b to this subpart which apply.

Attachment #1
Stack Test Results for Diversion Diesels A&B at EVO

40 CFR 63 Subpart ZZZZ
Reciprocating Internal Combustion Engines (RICE MACT)
Sampling Report

Diversion Diesel Pump Engines A & B (D-200A/B)

The Dow Chemical Company
Michigan Operations
Midland, Michigan

Sampling Dates: February 26, 2019

** Please note the process unit is the final copy holder and owner of this document. A temporary electronic copy will be retained by test team for a short period of time.*

RICE MACT Compliance Report

Environmental Operations Business
Water Well Engines

I certify that I have personally examined and am familiar with the information submitted herein, and based on my inquiries of those individuals immediately responsible for obtaining the information; I believe the submitted information is true, accurate, and complete.

Chuck Glenn
Dow U.S.A. Texas Operations
Dow Stack Testing Team

Judith LaBrada
Dow U.S.A Michigan Operations
Process Focal Point

Spencer Hurley
Dow U.S.A. Texas Operations
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Mike Gruber
Dow U.S.A Michigan Operations
Environmental Focal Point

Michael Abel
Dow U.S.A. Texas Operations
EAC Chemist

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1.0 INTRODUCTION

1.1 Summary of Test Program

The Dow Chemical Company (Dow) in Midland, Michigan, is a large complex with manufacturing and utility plants. Dow's Michigan Operations (MiOps) is a major source of Hazardous Air Pollutants (HAPS).

To demonstrate compliance with the RICE MACT, 40CFR63, Subpart ZZZZ, Dow's internal stack testing team conducted compliance sampling on two 1050 horsepower non-emergency diesel engines. The engines are operated to divert influent wastewater and storm water away from the on-site wastewater treatment plant (WWTP) to wastewater storage tanks for a variety of reasons. The testing was conducted to demonstrate compliance with emissions and operating limits found in 63.6600(d), Table 2c of the RICE MACT, 40CFR63, Subpart ZZZZ.

The following table summarizes the pertinent data for this compliance test:

Responsible Groups	• The Dow Chemical Company • Michigan Department of Environmental Quality (MDEQ) • Environmental Protection Agency (EPA)
Applicable Regulations	• ROP-MI-A4033-2017b • 40 CFR 63 Subpart ZZZZ (RICE MACT)
Industry / Plant	• Environmental Operations Plant (EVO)
Plant Location	• The Dow Chemical Company Midland, Michigan, 48667
Unit Initial Start-up	• Engines installed prior to December 19, 2002
Date of Last Test	• March 29, 2016 Engine A • March 30, 2016 Engine B
Air Pollution Control Equipment	• Engines are equipped with a single stage catalytic reduction and closed crankcase ventilation system
Emission Points	• Diversion Diesel pump engines A & B (D-200A/B)
Pollutants/Diluent Measured	• Carbon Monoxide (CO) • Oxygen (O_2)
Test Dates	• February 26, 2019 Engine A • February 26, 2019 Engine B

1.2 Key Personnel

The key personnel who coordinated the test program are:

- Judith LaBrada is the Process Focal Point. The Process Focal Point is responsible for coordinating the plant operation during the test and ensuring the unit was operating at the agreed upon conditions in the test plan. They also serve as the key contact for collecting any process data required and providing all technical support related to process operation

- Mike Gruber is the Environmental Focal Point for this unit. The Environmental Focal Point is responsible for ensuring that all regulatory requirements and citations are reviewed and considered for the testing. All agency communication is completed through his role. Contact information is 989-496-5539.

- Chuck Glenn is the Test Plan Coordinator. The Test Plan Coordinator is responsible for the overall leadership of the sampling program. They also develop the overall testing plan and determined the correct sample methods.

- Spencer Hurley is the Test Plan Coordinator Back-up. The Test Plan Coordinator Back-up is assists with leadership of the sampling plan is needed. They also serve as the technical review role of the test data.

- Michael Abel is a PhD chemist who serves in many roles for Environmental Analytical Chemistry (EAC). One of the roles he performs is as a technical contact for air sampling. Michael serves as a quality assurance and technical reviewer of the final test report.

- James Edmister is the Sample Team Leader. The Sample Team Leader is responsible for ensuring that the data generated met the quality assurance objectives of the plan. Kyle Kennedy was the local sampling field leader that performed the testing.

2.0 PLANT AND SAMPLING LOCATION DESCRIPTION

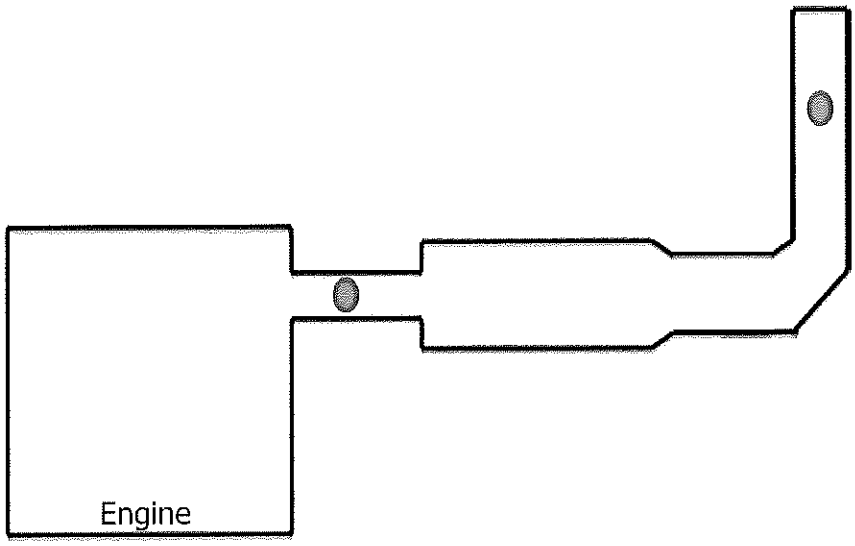
2.1 Facility Description

Dow owns and operates two diesel powered engines subject to the RICE MACT. These engines are located at the Environmental Operations Plant (EVO) at Dow's Michigan Operations facility (MiOps). The engines were all installed and operated before December 19, 2002; therefore, these engines are considered "*existing*" affected sources according to the RICE MACT. These engines are operated in non-emergency situations to manage waste water and storm water at the MiOps site.

These units are direct injection compression ignition 12 cylinder engines with a horsepower rating of > 500 HP and direct burn low sulfur diesel. The engines are equipped with a single stage catalytic reduction and a closed crankcase ventilation system.

2.2 Flue Gas Sampling Locations

Sampling was conducted on the engines after the single stage catalytic reduction. The flue gas sample location met the minimum guidelines for carbon monoxide (CO) and oxygen (O_2) sampling.



3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 Objectives and Test Matrix

Dow conducted compliance testing of two diesel Model KTA-2300-P engines that were installed in 1986 and that meet the definition of a CI RICE. These engines are non-emergency compression ignition engines each with a horsepower of 1050 HP. The testing was conducted to demonstrate compliance with emissions and operating limits found in 63.6600(d), Table 2b 2. a. & b., and Table 2c 5. a. & b. of the RICE MACT, 40CFR63, Subpart ZZZZ. The specific objectives of this test were to:

- Demonstrate concentration of CO emissions in the exhaust <23 ppmvd corrected to 15% O_2 or;
- Demonstrate CO emissions are reduced by 70% or more;
- Establishing the differential pressure across the catalyst that will be used to demonstrate ongoing compliance;
- Maintain catalyst inlet temperature such that 450°F ≤ catalyst inlet temperature ≤ 1350°F as required by the rule.

3.2 Facility Operations

The plant must operate the engines equipped with a closed crankcase ventilation system as follows:

- Minimize idle time at startup to <30 minutes (Table 2c)
- Install oxidation catalyst:
  - Maintain your catalyst so that the pressure drop across the catalyst does not change by more than 2 inches of water from the pressure drop across the catalyst that was measured during the most recent performance test; AND
  - Exhaust maintained such that 450°F ≥ catalyst inlet temperature ≤ 1350°F (Table 2b)

3.3 Comments/Exceptions

- Kathy Brewer and Jeremy Howe of the Michigan Department of Environmental Quality were present during the compliance sampling.

3.4 Process Operating Rates

The operation of each engine is not directly related to any production rate since this is not a process that actually produces a product. During this testing the facility operated the engines at normal operating rates, as follows:

- at a load (as determined by engine RPM and pump discharge pressure) representative of normal operating conditions as required by 40 CFR 63.7(e); AND
- Exhaust maintained such that 450°F ≤ catalyst inlet temperature ≤ 1350°F.

There are field mounted instruments for each of the two engines that were used to measure engine RPM (RPM), inlet temperature of the catalyst (°F) and catalyst differential pressure (DeltaP). A field mounted pump discharge pressure instrument is located on the discharge line common to both pumps.

Three test runs of 1-hour each were completed for the test. The average of the DeltaP readings collected during each test run was used to establish the DeltaP operating parameter limit to be used for demonstrating on-going compliance with the rule. Measurements of RPM and pump discharge pressure are an indication that the engines are operating normally. The inlet temperatures for the catalyst show the exhaust temperature is being maintained within the required range specified by the rule.

CO and O_2 measurements were collected during the three, one-hour test runs and the average of these results for each test run was used to show that CO emissions in the exhaust are less than 23 ppmv on a dry basis as required by the rule; OR a 70% reduction in CO emissions will be demonstrated by using the catalyst inlet and outlet CO concentrations to calculate the reduction (see Catalyst Reduction Efficiency in Calculations Section 5.0 for details).

TABLE 3.1: Test Summary

Engine	SAMPLE TYPE	TEST METHOD	*ACTUAL EMISSION RATE	ALLOWABLE EMISSION RATE
Diesel Engine A	CO Emissions (ppmvd@15%O2)	EPA Method 10	9.3 ppmvd@15%O2	23 ppmvd@15%O2
Diesel Engine B	CO Emissions (ppmvd@15%O2)	EPA Method 10	8.8 ppmvd@15%O2	23 ppmvd@15%O2

* Average over three one-hour runs.

TABLE 3.2: Test Run Data

PARAMETER	RUN 1	RUN 2	RUN 3	AVERAGE
Diesel Engine A				
Sample Date	02/26/19	02/26/19	02/26/19	n/a
Sample Times (start/end)	1418/1518	1528/1628	1636/1736	n/a
Outlet CO (ppmv)	12.1	10.7	9.6	10.8
Outlet O2 (%)	14.0	14.1	14.1	14.1
Outlet CO (ppmv@15%O2)	**10.4**	**9.2**	**8.3**	**9.3**
Diesel Engine B				
Sample Date	02/26/19	02/26/19	02/26/19	n/a
Sample Times (start/end)	1002/1102	1115/1215	1225/1325	n/a
Outlet CO (ppmv)	12.4	12.9	13.3	12.8
Outlet O2 (%)	12.2	12.3	12.2	12.2
Outlet CO (ppmv@15%O2)	**8.5**	**8.8**	**9.0**	**8.8**

TABLE 3.3: PROCESS DATA

PARAMETER	RUN 1	RUN 2	RUN 3	AVERAGE
Diesel Engine A				
Sample Date	02/26/19	02/26/19	02/26/19	n/a
Sample Times (start/end)	1418/1518	1528/1628	1636/1736	n/a
Engine RPM (RPM)	1788	1785	1785	1786
Amount Diesel Used (Gal)	15.99	23.31	29.49	22.93
HapGuard Temp (°F)	618	618	616	616
HapGuard Δp (inches water)	1.2	1.2	1.1	1.2
Pump Discharge Pressure (psig)	28.82	28.66	28.49	28.66
Diesel Engine B				
Sample Date	02/26/19	02/26/19	02/26/19	n/a
Sample Times (start/end)	1002/1102	1115/1215	1225/1325	n/a
Engine RPM (RPM)	1834	1835	1837	1836
Amount Diesel Used (Gal)	31.7	50.0	52.8	44.8
HapGuard Temp (°F)	706	709	709	708
HapGuard Δp (inches water)	1.1	1.0	1.0	1.0
Pump Discharge Pressure (psig)	46.2	41.6	40.5	42.8

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Test Methods

The relative accuracies of Dow's CEMS determined by comparison to EPA methods for measurement of each component gas. The performance specifications (PS) required the use of the following methods:

- PS 2 – Method 7E for NOx;
- PS 3 – Method 3A for O2; and
- PS 4B – Method 10 for CO.

4.2 Procedures

The above methods are performed using mobile continuous emission monitors. Gases were withdrawn from the stack and transported to monitors located at ground level. A stainless-steel probe is inserted into the stack and used to collect sample gas. A Teflon sample line heated to 250°F transported sample gas from the probe to the analyzers. The analyzers are kept at a constant temperature inside the mobile laboratory.

Sample gas is collected continuously from the stack for a period of 21 minutes per run at the three traverse points of 16.7%, 50% and 83.3% of the measurement line that passes through the centroidal area of the stack or duct cross section. At the mobile laboratory, the stack gas is routed to a condenser and then transported to the analyzers for analysis.

The Relative Accuracy Tests are conducted by comparison of the CEMS response to a value measured by a Performance Test Method (PTM) which, in this case, is Method 7E for Nitrogen Oxides, Method 10 for Carbon Monoxide and Method 3A for O_2.

EPA Method 3A (Gas Analysis for the Determination of Dry Molecular Weight)

EPA Method 3A (Instrumental Method) is utilized to determine the diluent during each run on the outlet.

An analyzer measures O_2 content on the basis of the strong paramagnetic properties of O_2 relative to other compounds present in combustion gases. In the presence of a magnetic field, O_2 molecules become temporary magnets. The analyzer determines the sample gas O_2 concentration by detecting the displacement torque of the sample test body in the presence of a magnetic field.

EPA Method 7E (Determination of Nitrogen Oxides)
EPA Method 7E is utilized to determine nitrogen oxide concentrations during each run on the outlet.

A NOx analyzer is used to monitor the concentration of NOx during each run. A sample of the effluent gas was continuously sampled and conveyed to an analyzer for measuring the concentration of NOx. The gas stream is directed through a NO_2 convertor to convert NO_2 to NO concentration. The analyzer yielded results of a total result of NOx.

EPA Method 10 (Determination of Carbon Monoxide)
EPA Method 10 is utilized to determine carbon monoxide concentrations during each run on the outlet.

An analyzer measures CO based on its absorption of infrared radiation. The infrared unit uses a single beam, single wavelength technique, with wavelength selection being achieved by a carefully specified narrow band optical filter making it highly selective for CO measurement in the presence of other infrared-absorbing gases.

4.3 List of Sampling Equipment

Stack Reference Instruments

REFERENCE METHOD	EQUIPMENT	ID #	RANGE	SPAN
Method 3A (O_2)	Teledyne 300EM Paramagnetic Analyzer	(S/N:376)	25 %	19.7%
Method 10 (CO)	Teledyne 300 EM IR Analyzer	(S/N:376)	500 ppm	8 ppm

FIGURE 4.1: SAMPLING TRAIN USED FOR CO & O_2 (M10 & M3A)