



**Building 601 – DV5309
Methanol Emissions
Test Report**

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A4043

Prepared for:

Dow Corning Corporation

Dow Corning Corporation
3901 S. Saginaw Rd.
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Project No. 13-4426.03
December 20, 2013

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DEC 26 2013

EXECUTIVE SUMMARY

AIR QUALITY DIV.

BT Environmental Consulting, Inc. (BTEC) was retained by Dow Corning Corporation (Dow) to measure methanol emission rates at the inlet and outlet from the Building 601 EU601-01 (DV5309) scrubber at the Dow facility in Midland, Michigan. The emissions test program included triplicate 60-minute test runs. Field sampling for this emission test program was conducted on October 23, 2013. The purpose of this report is to document the results of the emissions compliance test program.

The purpose the emissions test program was to demonstrate compliance with the emission limitations for continuous process vents codified at Title 40, Part 63, Subpart FFFF of the Code of Federal Regulations. The results of the emissions test program are summarized by Table E-I.

Table E-I
Overall Test Results Summary

Source	Average Inlet Methanol Emission Rate (lb/hr)	Average Outlet Methanol Emission Rate (lb/hr)	Average Methanol Removal Efficiency (%)
Building 601 - DV5309	9.43	0.10	98.9%

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1. Introduction

BT Environmental Consulting, Inc. (BTEC) was retained by Dow Corning Corporation (Dow) to measure methanol emission rates at the inlet and outlet from the Building 601 EU601-01 (DV5309) scrubber at the Dow facility in Midland, Michigan. The emissions test program included triplicate 60-minute test runs. Field sampling for this emission test program was conducted on October 23, 2013. The purpose of this report is to document the results of the emissions compliance test program.

The Air Quality Division (AQD) of Michigan's Department of Natural Resources and Environment has published a guidance document entitled "Format for Submittal of Source Emission Test Plans and Reports" (February 2008, see Appendix A). The following is a summary of the emissions test program and results in the format outlined by the AQD document.

1.a Identification, Location, and Dates of Test

Field sampling for this emission test program was conducted on October 23, 2013 at the Dow facility in Midland, Michigan. The purpose of this report is to document the results of the emissions determined during compliance test program.

The emissions test program included the evaluation of methanol emission rates from the Building 601 DV5309 scrubber.

1.b Purpose of Testing

The purpose the emissions test program was to demonstrate compliance with the emission limitations codified at Title 40, Part 63, Subpart FFFF of the Code of Federal Regulations (40 CFR 63, Subpart FFFF).

1.c Source Description

601Building:

The equipment tested and the product(s) made during the test are listed as follows:

- 22580 Alkoxylation Column and 22600 Alcohol Distillation Column while making product Z-6697 and filling TEOS filling trailers
- 22570 Alkoxylation Column and 22590 Alcohol Distillation Column while making product Z-2306 and 2306 filling trailers
- Product Z-2376 transfer to trailers from rail car
- 5320 Batch Kettle: Quenching Z-6700 waste



- 5300 Alkoxylation Column will be making product Q1-2579 and filling Q1-2579 storage tank

Note: the above processes were running at maximum rates during Miscellaneous Organic NESHAP (MON) testing while operating the MACT group 1 scrubber 5309.

1.d Test Program Contact

The contact for the source and test report is:

Mr. Michael Gruber, II
Environmental Manager
Dow Corning Corporation
P.O. Box 995, Mail#065
Midland, Michigan 48686
(989) 496-5539

1.e Testing Personnel

Names and affiliations for personnel who were present during the test program are summarized by Table 1.

2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions compliance test program.

2.a Operating Data

Operating data for the emissions test program included scrubber inlet water flowrate. Operating data monitored during the emissions test program is summarized in Appendix B.

2.b Applicable Permit

The applicable permit for this emissions test program is MI-ROP-A4043-2008.

2.c Results

The overall results of the emissions compliance test program are summarized by Table 2.

2.d Emission Regulation Comparison

40 CFR 63, Subpart FFFF, requires that MON continuous process vents that do not have MACT level control equipment have a TRE greater than 1.9. This test was done to confirm that this source has a TRE greater than 1.9 and is therefore group 2 not requiring MACT level control.

3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

3.a Process Description

601 Building:

The equipment tested and the product(s) made during the test are listed as follows:

- 22580 Alkoxylation Column and 22600 Alcohol Distillation Column while making product Z-6697 and filling TEOS filling trailers
- 22570 Alkoxylation Column and 22590 Alcohol Distillation Column while making product Z-2306 and 2306 filling trailers
- Product Z-2376 transfer to trailers from rail car
- 5320 Batch Kettle: Quenching Z-6700 waste
- 5300 Alkoxylation Column will be making product Q1-2579 and filling Q1-2579 storage tank

Note: the above processes were running at maximum rates during Miscellaneous Organic NESHAP (MON) testing while operating the MACT group 1 scrubber 5309.

3.b Raw and Finished Materials

The raw and finished materials for the emissions test program were consistent with the process operating at its maximum production rate.

3.c Process Capacity

The process was operating at its maximum production rate during the emissions test program.

3.d Process Instrumentation

Process instrumentation includes scrubber inlet water flowrate.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used to verify inlet and outlet emission rates.

4.a Sampling Train and Field Procedures

Because of the small inside diameter pipe size at the sampling locations and variable flowrates, exhaust gas velocity pressure was measured and recorded at 10-second intervals throughout the emissions test program using small stationary, S-type pitot tubes located in the center of the pipe at the scrubber inlet and outlet sampling locations. Exhaust gas velocity pressure was measured using a 0 to 0.25" H₂O pressure transmitter and datalogger assembly at the scrubber outlet sampling location and a 0 to 1.00" H₂O pressure transmitter and datalogger assembly at the scrubber inlet sampling location. Exhaust gas temperatures were recorded at 5-minute intervals throughout the 60-minute test runs.

Exhaust gas molecular weight was estimated based on the following Dow engineering estimates:

Akoxysilanes expected to be in the inlet stream:

Trimethoxyphenylsilane CAS#: 2996-92-1
Isobutyl trimethoxysilane CAS #: 18395-30-7
Tetraethyl orthosilicate CAS #: 78-10-4
Methyltrimethoxysilane CAS #: 1185-55-3
Chloropropyl triethoxysilane CAS #: 5089-70-3

Weight % of total flow (prior to scrubbers):

Methanol:	30.75%
Ethanol:	1.75%
Alkoxy silane:	4.00%
Nitrogen:	52.00%
Hydrogen:	11.5%

If 98% MeOH, EtOH, and Alkoxy silane are absorbed in the scrubbers, then the scrubber outlet concentration will be 18% H₂/81% N₂. See Appendix XX for the summary of estimated exhaust gas molecular weights.

FTIR data was collected using an MKS MultiGas 2030 FTIR spectrometer, serial # 016630515. A heated, 3 ft., 3/8 inch diameter, stainless steel probe, maintained at 191°C, will be used to direct effluent gas from the exhaust vent to the FTIR. A heated filter box (191°C) contains the connection from the probe to the filter assembly to a 100 ft., heated, 3/8 inch, Teflon transfer line. A 0.1µ glass filter was used for particulate matter removal.

The heated transfer line(s), held at 191°C, connect the probe/filter assembly to the FTIR. The FTIR was equipped with a temperature-controlled, 5.11 meter multipass gas cell maintained at 191°C. Gas flows and sampling system pressures were monitored using a rotometer and pressure transducer. All data was collected at 0.5cm⁻¹ resolution. Each spectrum was derived from the coaddition of 64 scans, with a new data point generated

approximately every one minute. A more detailed summary of the FTIR sampling train can be found in Prism's FTIR report included as Appendix E.

4.b Recovery and Analytical Procedures

Recovery and analytical procedures were described in Section 4.a.

4.c Sampling Ports

Because of the small diameter of the process pipes, single point sampling was used for flowrate measurements and for sample extraction with the sample extraction point downstream of the flowrate sampling port.

5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

5.a Results Tabulation

The results of the emissions test program are summarized by Table 2. Detailed emissions test results are summarized by Table 3.

5.b Discussion of Results

40 CFR 63, Subpart FFFF, requires that MON continuous process vents that do not have MACT level control equipment have a TRE greater than 1.9. This test was done to confirm that this source has a TRE greater than 1.9 and is therefore group 2 not requiring MACT level control.

5.c Sampling Procedure Variations

Exhaust gas velocity pressure data was measured using a stationary pitot tube, pressure transmitter, and datalogger assembly and monitoring velocity pressure values at 10-second intervals throughout the test program.

5.d Process or Control Device Upsets

No process or control device upset conditions occurred during the emissions test program.

5.e Control Device Maintenance

Control device maintenance is conducted in accordance with the standard plant preventive maintenance schedule.



5.f Audit Sample Analyses

No audit samples were collected as part of the test program.

5.g Calibration Sheets

All relevant equipment calibration documents are provided in Appendix C.

5.h Sample Calculations

Sample calculations are provided in Appendix D.

5.i Field Data Sheets

Field documents relevant to the emissions test program are presented in Appendix F.

5.j Laboratory Data

There are no laboratory results for this test program. Prism FTIR results are available in Appendix E.

TABLES

Table 1
Test Personnel

Name and Title	Affiliation	Telephone
Mr. Michael Gruber, II Environmental Manager	Dow Corning Corporation P.O. Box 995, Mail#065 Midland, Michigan 48686	(989) 496-5539
Mr. Jeffrey Peitzsch Project Manager	BTEC 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Ms. Lindsey A. Wells Chemist / FTIR Specialist	Prism Analytical Technologies 2625 Denison Drive Mount Pleasant, MI 48858	(989) 772-5088

Table 2
Overall Test Results Summary
Dow Coring
EU601-01

Source	Average Inlet Methanol Emission Rate (lb/hr)	Average Outlet Methanol Emission Rate (lb/hr)	Average Methanol Removal Efficiency (%)
Building 601 - DV5309	9.43	0.10	98.9%

Table 3
Detailed Methanol Removal Efficiency Test Results Summary
Dow Corning
EU601-01
Sampling Date: October 23, 2013

Inlet Duct Diameter (in): 3
 Outlet Duct Diameter (in): 6
 Inlet Gas M.W. 11.65
 Outlet Gas M.W. 8.45
 Barometric Pressure (in Hg): 29.86
 Inlet Pressure Transmitter Range (in. H₂O): 1
 Outlet Pressure Transmitter Range (in. H₂O): 0.25

Inlet or Outlet	Test Run	Average Sq. Rt. dP (" H ₂ O)	Average Stack Temperature (°F)	Average Exhaust Gas Flowrate (scfm)	Average MeOH Concentration (ppmv)	Average MeOH Emission Rate (lbs/hr)
Inlet	1	0.33	44	88.2	26,229	11.53
Outlet	1	0.06	57	72.4	288	0.10
Inlet	2	0.21	48	56.2	32,233	9.03
Outlet	2	0.05	60	60.9	344	0.10
Inlet	3	0.22	48	58.6	26,493	7.74
Outlet	3	0.05	58	61.9	287	0.09
					Inlet Avg.	9.43
					Outlet Avg.	0.10

MeOH Removal Efficiency

1	99.1%
2	98.8%
3	98.9%
Avg.	98.9%

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