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AIR EMISSION TEST REPORT
FOR THE VERIFICATION OF
VOC CAPTURE AND DESTRUCTION EFFICIENCY
FOR SURFACE COATING LINES

Prepared for:

AAR MOBILITY SYSTEMS
SRN B4197

ICT Project No.: 2300076
August 8, 2023

IMPACT COMPLIANCE & TESTING

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Report Certification

AIR EMISSION TEST REPORT
FOR THE VERIFICATION OF
VOC CAPTURE AND DESTRUCTION
EFFICIENCY FOR SURFACE
COATING LINES

AAR MOBILITY SYSTEMS
Cadillac, Michigan

This report has been reviewed by AAR Mobility representatives and approved for submittal to the MDEQ-AQD. A Renewable Operating Permit Report Certification form signed by the AAR Mobility Responsible Official accompanies this report.

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

Prepared By:	Reviewed By:
Renee Fromwiller Environmental Consultant	Robert L. Harvey, P.E. Service Director

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1.0 Introduction

AAR Mobility Systems (AAR Mobility) owns and operates a facility located in Cadillac, Wexford County, Michigan (State Registration No. B4197) that manufactures products that support military logistics operations. The facility has been issued Renewable Operating Permit MI-ROP-B4197-2016c.

Light-weight transportation containers and mobile runway mats are coated in EUCONTAINERLINE, which is a manual surface coating line that consists of coating spray booths, flash-off area and bake curing oven. Volatile organic compound (VOC) emissions from EUCONTAINERLINE are combined with exhausts from other coating lines at the facility and directed to a regenerative thermal oxidizer (RTO) for emission reduction prior to exhaust to the atmosphere.

MI-ROP-B4197-2016c requires AAR Mobility to verify the capture efficiency of EUCONTAINERLINE and the destruction efficiency of the RTO every five years for flexible group FGCOATINGS. The testing was previously performed August 22, 2018.

This test report presents the results of VOC control efficiency testing that was performed June 14-15, 2023 to determine the VOC:

- Destruction efficiency associated with the RTO,
- Capture efficiency associated with EUCONTAINERLINE.

The control efficiency evaluation was performed using procedures specified in the test plan dated April 3, 2023 that was submitted to the Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) for review and approval.

Attachment 1 provides a copy of the MDEQ-AQD test plan approval letter.

Contact information for this project is presented below:

Testing Procedures	Robert L. Harvey, P.E. Services Director Impact Compliance & Testing 4180 Keller Rd, Ste B Holt MI 48842 517-4180-3170 Rob.Harvey@impactCandT.com
Facility Compliance Manager	Greg Shay Environmental Manager AAR Mobility Systems 201 Haynes St Cadillac MI 49601 231-779-6372 Greg.Shay@aarcorp.com

2.0 Summary of Test Results and Operating Conditions

2.1 Results for RTO Destruction Efficiency

RTO VOC destruction efficiency was determined for three (3) one-hour test periods by simultaneously measuring the mass flowrate of total hydrocarbons (THC) entering and exiting the RTO emission control device. The average measured VOC destruction efficiency for the three test periods is 96.3% by weight, which is greater than (in compliance with) the minimum required destruction efficiency of 95%.

The RTO combustion chamber temperature was recorded throughout each test period. The minimum recorded temperature was 1,487°F; the three-hour average combustion chamber for the test event was 1,503°F. The conditions of PTI 183-17 specify that the RTO temperature must be maintained at the minimum temperature determined from the most recent acceptable stack test. Provisions of the Surface Coating MACT (40 CFR Part 63 Subpart MMMM - National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts and Products), specify that the average thermal oxidizer combustion temperature for any 3-hour period must not fall below the average temperature limit established during the most recent compliance test.

The RTO VOC destruction efficiency test results are summarized in Table 2.1. Data and information for each test period are presented in Section 5.0 and Table 5.1.

2.2 Results for EUCONTAINERLINE Capture Efficiency

Operating parameters for EUCONTAINERLINE were monitored to verify that the VOC emission capture system satisfies the conditions of a non-fugitive enclosure.

Table 2.2 presents a summary of the monitored operating parameters; total volumetric exhaust rate from the enclosure, differential pressure (dP) between the spray booth and surrounding area, and verification of inward flow direction. The monitored parameters satisfy the MDEQ-AQD guidance for a non-fugitive enclosure such that the capture efficiency is assumed to be 100%.

Additional data and information for the capture efficiency demonstration are presented in Section 5.0 of this report.

Table 2.1 Summary of RTO VOC destruction efficiency test results

Control System Parameter	Test 1	Test 2	Test 3	Three- Hour Average
Avg. RTO Combustion Temp (°F)	1,497	1,507	1,505	1,503
Min. RTO Combustion Temp (°F)	1,487	1,493	1,493	
VOC Destruction Efficiency (% wt)	96.3%	96.2%	96.4%	96.3%
Permit Requirement	--	--	--	>95.0%

Table 2.2 Summary of EUCONTAINERLINE VOC capture efficiency test results

Control System Parameter	Test 1	Test 2	Test 3
Total exhaust rate from line (scfm)	16,643	16,384	16,105
dP within spray booth (in H_2O)	-0.060	-0.060	-0.065
Verified inward direction of flow	Yes	Yes	Yes
Capture efficiency	100%	100%	100%

3.0 Source and Sampling Location Description

3.1 Coating Line Processes

EUCONTAINERLINE is a manual surface coating line. Items to be coated (assembled containers or mobile runway mats) are equipped with casters or loaded onto carts for mobility. The items are rolled into the coating booth through an open overhead door that is closed prior to coating application. Coatings are sprayed onto the surfaces using HVLP hand-held applicators. The coated items are moved into the flash-off area within the booth for air drying, then rolled through another open overhead door into the bake cure oven.

The spray booth, flash-off area, and curing oven are exhausted to the RTO emission reduction system. The captured gas from EUCONTAINERLINE is combined with other coating lines (EU197LINE, EUBALSACORE, EUSKINONRAIL) prior to being introduced to the RTO.

3.2 Type of Raw Materials Used

The coating process is not automated; items to be coated are manually moved in and out of the enclosure and the coatings are applied using hand-held HVLP sprayers. The coatings used in the spray booth contain VOC and a very small amount of hazardous air pollutants (HAP). The coatings used in EUCONTAINERLINE satisfy the low-HAP "compliant material" criteria or the "emission rate without add-on control" criteria specified in 40 CFR §63.3940-3942 and §63.3950-3952.

3.3 Emission Control System Description

3.3.1 EUCONTAINERLINE VOC Capture

Make up air is draw into the EUCONTAINERLINE enclosure through openings that are covered with filter media. Two in-line fans draw solvent laden air from the coating booth and flash off area and one fan draws air from the oven area. These fans maintain a vacuum within the entire EUCONTAINERLINE enclosure and discharge to the RTO inlet duct.

Attachment 2 provides a diagram of the coating line enclosure.

3.3.2 Regenerative Thermal Oxidizer

Air collected from EUCONTAINERLINE is combined with other coating line exhausts and directed to the RTO for VOC (some of which are HAPs) emission reduction. In the RTO, hydrocarbons are oxidized (or destroyed) at high temperature to form carbon dioxide and water vapor.

The RTO consists of a variable frequency drive (VFD) fan, five energy recovery chambers, and a high-temperature combustion chamber containing natural gas-fired burners. Fan speed is controlled by the VFD controller to maintain an appropriate vacuum within the process air collection system and draw the collected air through the RTO unit. The collected solvent laden air enters the RTO unit through the inlet manifold into the base of one or more energy recovery columns where the process air is preheated as it travels through the heat exchange media. The temperature of the preheated air is increased in the combustion chamber to complete the oxidation of hydrocarbons in the process air stream. The heated air flows through the outlet energy recovery chamber and is cooled (which raises the temperature of the heat exchange media) prior to being discharged to the ambient air through the vertical exhaust stack. At predetermined intervals, the air flow through the unit is switched such that the heated heat exchange media (which was used to cool the exiting gas stream) becomes the preheating heat exchange media that is used to preheat the incoming solvent laden air.

The combustion chamber is designed to maintain an adequate operating temperature that results in a VOC destruction efficiency of 95% or greater.

4.0 Sampling and Analytical Procedures

A description of the sampling and analytical procedures is provided in the test plan dated April 3, 2023, which was reviewed and approved by the MDEQ-AQD. This section provides a summary of those procedures.

4.1 Reference Test Methods

The following USEPA reference test methods were used as part of this project:

Parameter / Analyte	Sampling Methodology	Analytical Methodology
Velocity Traverses	USEPA Method 1	Selection of velocity traverse and sample locations based on physical measurements.
Volumetric Flowrate	USEPA Method 2	Measurement of velocity head using a Type-S Pitot tube and inclined manometer
Molecular Weight[1] (RTO inlet)	USEPA Method 2	Captured building air was determined to have the properties of ambient air. Dry molecular weight for ambient air (29.0)
Molecular Weight (RTO outlet)	USEPA Method 3A	Exhaust gas O_2 and CO_2 content determined using instrumental analyzers.
Moisture	USEPA Method 4	RTO exhaust gas moisture content determined based on the water weight gain in chilled impingers. All other sampling locations determined by wet bulb/dry bulb temperature measurements.
THC Concentration (inlet and outlet)	USEPA Method 25A	Determination of gaseous total hydrocarbon (THC) concentration using a flame ionization analyzer (FIA) compared to a propane standard.

1. The RTO inlet is composed of captured gas from the coating line and is predominantly ambient air. A dry molecular weight of 29.0 was used for this gas stream according to Method 2 Section 8.6.

4.2 RTO Destruction Efficiency Test Procedures

USEPA Method 25A, *Determination of Total Gaseous Organic Concentration Using A Flame Ionization Detector*, was used to measure the THC concentration, relative to a propane standard, for the RTO inlet and exhaust gas streams. Throughout each test period, a sample of the gas from the RTO inlet and exhaust measurement locations was delivered to the instrument trailer using independent heated Teflon® sample lines to maintain the temperature of the gas sample to 250 to 300°F.

The RTO inlet gas sample was introduced directly to a Thermo Environmental Instruments, Inc. (TEI) Model 51c THC flame ionization analyzer (FIA).

The RTO exhaust gas sample was divided between a:

1. TEI 51c THC FIA (direct injection with no moisture removal), and

2. Instrumental analyzer containing a Non-Dispersive Infrared (NDIR) cell to measure carbon dioxide (CO_2) and zirconia ion sensor to measure oxygen (O_2) content in accordance with USEPA Method 3A. The CO_2 / O_2 instrument was preceded by a refrigerant-based condenser that removes moisture prior to analysis (dry gas sample).

The instruments were calibrated as described in Section 6.0 of this report. Instrument response for each analyzer was recorded on an ESC Model 8816 data logging system that monitored the analog output of the instrumental analyzers continuously and logged data as one-minute averages.

Air flowrate measurements were performed during each one-hour test period in accordance with USEPA Method 2. An S-type Pitot tube connected to a red-oil manometer was used to determine velocity pressure and a K-type thermocouple mounted to the Pitot tube was used for temperature measurements. Velocity traverse locations were determined in accordance with USEPA Method 1 based on the stack diameter and distance to upstream and downstream flow disturbances.

The RTO exhaust volumetric flowrate was measured in the vertical 65-inch diameter exhaust stack. The RTO inlet volumetric flowrate was measured in two inlet ducts on the facility roof. The flowrate measured in the two inlet ducts was combined to determine the total RTO inlet flowrate (a suitable velocity measurement location does not exist for the combined RTO inlet gas stream).

Attachment 3 provides diagrams of the sampling locations.

Moisture content for the RTO exhaust gas was determined using a chilled impinger train and the procedures of USEPA Method 4; moisture for the RTO inlet gas streams (which is primarily building air captured by the coating line air collection systems) was determined by wet bulb / dry bulb temperature measurements.

The measured THC concentration was used with the measured volumetric air flowrate to calculate THC mass flow rate (pounds per hour as propane) for each gas stream using the following equation:

$M_{THC} = Q\ [C_{THC}]\ (MW_{C3})\ (60\ min/hr)\ /\ V_M\ /\ 1E+06$

Where:
- M_{THC} = Mass flowrate VOC (lb/hr)
- Q = Volumetric flowrate (scfm)
- C_{THC} = THC concentration (ppmv C_3)
- MW_{C3} = Molecular weight of propane (44.1 lb/lb-mol)
- V_M = Molar volume of ideal gas at standard condition (385 scf/lb-mol)

The THC destruction efficiency of the RTO emission control system was determined for each test period using the following equation:

$DE = [1 - (M_{VOC\ in}\ /\ M_{VOC\ out}\ )]^*\ 100\%$

Where:
- DE = Destruction efficiency (%wt)
- $M_{THC\ in}$ = THC mass flowrate into the RTO (lb/hr)
- $M_{THC\ out}$ = THC mass flowrate exhausted from the RTO (lb/hr)

4.3 EUCONTAINERLINE Capture Efficiency Test Procedures

VOC capture efficiency for the EUCONTAINERLINE enclosure was verified during each test period by:

1. Measuring the differential pressure between the interior of the coating booth and the surrounding area.

2. Observing the direction of airflow at the filter-covered enclosure openings at the front end and back end of the coating booth (between the flash off area and oven).

Differential pressure measurements were made by connecting one side of an incline manometer to a tube fitting on the wall of the spray booth that was connected to the interior of the booth. The other side of the manometer was open to the room surrounding the coating line.

An MSA air current smoke tube kit (hand-held aspirator bulb and smoke tubes) was used to generate an adequate amount of smoke near the filter-covered openings at the front end of the coating booth and the filter-covered openings in the section between the coating booth and the oven. The direction of airflow (e.g., into the enclosure) was visually observed and recorded on a data sheet.

In addition, volumetric airflow measurements for the EUCONTAINERLINE booth exhaust and oven exhaust were performed for each test period. These measurements were performed in the ducts located on the roof of the facility before being combined with exhaust ducts for other coating lines.

5.0 Test Results and Discussion

5.1 Control Device and Process Operating Data

Control device and coating process operating data were recorded during each test period including:

- RTO combustion chamber temperature,
- RTO fan VFD controller output (hertz),
- Number and type of parts coated in each coating line,
- Coating(s) used in each coating line.

Attachment 4 provides RTO and coating process operating records for the test event.

5.2 RTO VOC Destruction Efficiency

Table 5.1 presents measured gas conditions and results for each destruction efficiency test period.

RTO VOC destruction efficiency was determined for three (3) one-hour test periods by simultaneously measuring the THC mass flowrate entering and exiting the RTO emission control device. The average measured VOC destruction efficiency for the three test periods is 96.3% by weight, which is greater than (in compliance with) the minimum required destruction efficiency of 95%.

The RTO combustion chamber temperature was recorded throughout each test period. The three-hour average combustion chamber for the test event is 1,503°F; the lowest recorded temperature during any of the test periods was 1,487°F. The conditions of MI-ROP-B4197-2016c specify that the RTO temperature must be maintained at the minimum temperature determined from the most recent acceptable stack test. Provisions of the Surface Coating MACT specify that the average combustion temperature for any 3-hour period must not fall below the average combustion temperature established during the most recent compliance test.

Attachment 5 provides test data for the RTO VOC destruction efficiency testing performed June 14-15, 2023, including inlet/outlet concentration graphs, field data sheets, and calculations.

Table 5.1 Measured RTO gas conditions and destruction efficiency test results
AAR Mobility Systems

Test No. Test date	1 6/14/23	2 6/15/23	3 6/15/23	Three Test Average
Avg. Combustion Temp (˚F)	1,497	1,507	1,505	1,503
Min. Combustion Temp[1] (˚F)	1,487	1,493	1,493	
Fan Speed (Hz)	36.0	35.7	36.3	36.0
RTO Inlet				
Inlet Flowrate 1 (scfm)	31,959	32,758	33,597	32,771
Inlet Flowrate 2 (scfm)	6,926	6,391	6,616	6,644
Total Inlet Flowrate (scfm)	38,885	39,149	40,213	39,416
Average THC Conc. (ppmv C_3)	230	259	259	249
Average THC Conc. (ppmv C_1)	690	777	778	748
THC Mass Flow (lb/hr)	61.4	69.7	71.67	67.6
RTO Exhaust				
Flowrate (scfm)	45,446	45,045	43,627	44,706
Average THC Conc. (ppmv C_3)	7.3	8.6	8.5	8.1
Avergae THC Conc. (ppmv C_1)	21.9	25.9	25.5	24.4
THC Mass Flow (lb/hr)	2.28	2.67	2.55	2.50
Destruction Efficiency[2](%wt)	96.3%	96.2%	96.4%	96.3%

1. Minimum RTO combustion chamber temperature recorded during the one-hour test period
2. VOC Destruction Efficiency = 1 - [VOC out / VOC in] x 100%

5.3 EUCONTAINERLINE CAPTURE EFFICIENCY

5.3.1 Test Data

Table 5.2 presents a summary of the monitoring data collected for the EUCONTAINERLINE enclosure.

The enclosure is exhausted by two fans mounted on either side of the coating booth area and one in the steam-heated bake cure oven. The total measured exhaust for the enclosure is 16,727 scfm (average for the three test periods).

The minimum measured vacuum within the enclosure during operation (differential pressure between the interior of the coating booth and surrounding room) was 0.060 inches H_2O as measured by the test crew using an incline manometer. The permanently-installed Magnehelic gauge generally agreed with the differential pressure measured with the inclined manometer and also indicated a reading of 0.060 inches H_2O or higher. Either value is significantly greater than the minimum vacuum specified in USEPA Method 204, which is 0.007 inches H_2O.

During each test period smoke tubes were used to verify that the direction of airflow was into the enclosure as observed at the:

1. Panel filters mounted to the inlet door (i.e., the overhead door that is opened to allow items to enter the spray booth).

2. Panel filters in the connection between the coating/flash-off booth and bake oven.

Attachment 6 provides field data sheets for the EUCONTAINERLINE enclosure parameter monitoring.

5.3.2 PTE Performance Criteria and Non-Fugitive Enclosure

USEPA Method 204 specifies the following criteria for a permanent total enclosure (PTE):

1. Any natural draft opening (NDO) shall be at least four equivalent opening diameters from each VOC emitting point.

2. The total area of all NDO's shall not exceed 5 percent of the surface area of the enclosure's four walls, floor and ceiling.

3. The average facial velocity (FV) of air through all NDO's shall be at least 3,600 m/hr (200 fpm) and the direction of airflow through all NDO's shall be into the enclosure.

   Alternatively, measure the pressure the pressure differential across the enclosure. A pressure drop of 0.013 mm Hg (0.007 inches H_2O) corresponds to a FV of 3,600 m/hr (200 fpm).

4. All access doors and windows whose areas are not included in the NDO area and NDO FV determinations shall be closed during routine operation of the process.

5. All VOC emissions must be captured and contained for discharge through the control device.

Attachment 2 provides a diagram of the enclosure and includes a worksheet that presents calculations for the total area of the EUCONTAINERLINE enclosure and the NDO-to-enclosure area ratio (NEAR).

There are twelve (12) filter panels installed on the inlet overhead door and six (6) on each side of the connection between the coating/flash-off booth and bake oven. The total area of the twenty four (24) filter-covered openings is 116 square feet. There is no clear guidance in regards to NDOs that are covered with filter media. Air is drawn into the enclosure through the filter-covered opening similar to an NDO; however, when covered with a filter, the open or free area is reduced (sometimes called the filter porosity).

There is no clear guidance on the use of filter material to reduce the calculate NDO opening. As presented in the 2018 test report for this enclosure, if the calculated NDO openings are not reduced by the filter porosity, a significant redesign of the unit would be required to move the VOC emitting point (in this case the spray gun) at least four (4) equivalent diameters from the NDO's in the front door.

Currently, EUCONTAINERLINE uses coatings that satisfy the low-HAP "compliant material" criteria or the "emission rate without add-on control" criteria specified in 40 CFR §63.3940-3942 and §63.3950-3952. Since the EUCONTAINERLINE enclosure satisfies all other PTE criteria, and can demonstrate compliance with the Surface Coating MACT using an operation other than the capture and control emission reduction (which would require use of a USEPA reference test method to determine capture efficiency), AAR Mobility requested that MDEQ-AQD approve the use of the non-fugitive enclosure criteria for the capture efficiency determination.

If the coating formulations in EUCONTAINERLINE were to change such that compliance with the Surface Coating MACT must be achieved by using the capture and control emission reduction option, then AAR Mobility would be required to redesign the enclosure to meet all PTE criteria, use another combination of reference test methods from the USEPA Method 204 series, or seek approval for an alternate method from the Administrator.

Table 5.2 Capture efficiency test results for EUCONTAINERLINE
AAR Mobility Systems

Test No. Test date	1 6/14/23	2 6/15/23	3 6/15/23	Three Test Average
Exhaust Flowrates				
Coating booth exhaust (scfm)	16,164	16,384	16,105	16,271
Oven Exhaust (scfm)	479	536	512	509
Total Coating line exhaust (scfm)	16,643	16,920	16,617	16,727
Coating Booth dP				
Magnehelic reading (in H_2O)	-0.060	-0.065	-0.070	
Manometer reading (in. H_2O)	-0.063	-0.060	-0.065	
Inward Flow				
Verified at front door filter [1]	Yes	Yes	Yes	
Verified at oven inlet filter [2]	Yes	Yes	Yes	

1. Panel filters mounted to the inlet door (i.e., the overhead door that is opened to allow items to enter the spray booth).
2. Panel filters in the connection between the coating/flash-off booth and bake oven.

5.4 VARIATIONS FROM NORMAL SAMPLING PROCEDURES

The testing was performed as described in this report and in accordance with the reference test methods, test plan dated April 3, 2023, and the MDEQ-AQD test plan approval unless otherwise noted in this report. There are no test method deviations to report.

6.0 Quality Assurance Procedures

Attachment 7 provides quality assurance and calibration records for the sampling equipment used during the test periods, including gas divider and instrumental analyzer calibration records, calibration gas certificates, and calibration information for the dry gas meter, barometer, pyrometers, and weigh scale.

6.1 Exhaust Gas Flow Measurements (Methods 1 and 2)

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

The physical design and condition of the Pitot tubes used for velocity pressure measurements satisfied USEPA Method 2 criteria. The gas velocity measurement train (Pitot tube, connecting tubing and manometer) was leak-checked prior to the field measurements and periodically throughout the test event.

The absence of cyclonic flow for each sampling location was verified using the gas velocity measurement train (S-type Pitot tube connected to an oil manometer). The Pitot tube was positioned at each velocity traverse point 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). The measured null angle for each traverse location was recorded on a data sheet. Cyclonic flow at each sampling location is minimal.

6.2 Instrument Calibration and System Bias Checks (Methods 3A and 25a)

Accuracy of the instrumental analyzers used to measure THC, O_2, and CO_2 concentration was verified prior to and at the conclusion of each test period using the calibration procedures in Methods 25A, 3A and 7E.

At the beginning of each day, initial three-point instrument calibrations were performed for the CO_2 and O_2 analyzers by injecting calibration gas directly into the inlet sample port for each instrument. System bias checks were performed prior to and at the conclusion of each sampling period by introducing the upscale calibration gas and zero gas into the sampling system (at the base of the stainless steel sampling probe prior to the particulate filter and Teflon® heated sample line) and determining the instrument response against the initial instrument calibration readings.

At the beginning of each test day, appropriate high-range, mid-range, and low-range span gases followed by a zero gas were introduced to the THC analyzers, in series at a tee connection, which is installed between the sample probe and the particulate filter, through a poppet check valve. After each one-hour test period, mid-range and zero gases were re-introduced in series at the tee connection in the sampling system to check against the method's performance specifications for calibration drift and zero drift error.

The instruments were calibrated with USEPA Protocol 1 certified concentrations of CO_2 and O_2 in nitrogen and zeroed using hydrocarbon free nitrogen. The THC instruments were calibrated with USEPA Protocol 1 certified concentrations of propane in air and zeroed using hydrocarbon-free air. A STEC Model SGD-710C ten-step gas divider was used to obtain intermediate calibration gas concentrations as needed.

The response time of each sampling system was determined prior to beginning the first test period by introducing upscale gas and zero gas, in series, into the sampling system using a tee connection at the base of the sample probe. The elapsed time for the analyzer to display a reading of 95% of the expected concentration was determined using a stopwatch. Results of the response time determinations were recorded on field data sheets. For each test period, test data were collected once the sample probe was in position for at least twice the maximum system response time.

6.3 Dry Gas Meter Calibration (Method 4)

The dry gas metering console, which was used for exhaust gas moisture content 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.

6.4 Gas Divider Certification (USEPA Method 205)

A STEC Model SGD-710C 10-step gas divider was used to obtain appropriate calibration span gases. The STEC gas dividers were NIST certified (within the last 12 months) with a primary flow standard in accordance with Method 205. When cut with an appropriate zero gas, the STEC gas dividers deliver calibration gas values ranging from 0% to 100% of the USEPA Protocol 1 calibration gas that was introduced into the system. The field evaluation procedures presented in Section 3.2 of Method 205 were followed prior to use of gas dividers. The field evaluation yielded no errors greater than 2% of the triplicate measured average and no errors greater than 2% from the expected values.