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EMISSION TEST REPORT

Report Title	RESULTS OF BUILDING ENCLOSURE VOC CAPTURE EFFICIENCY DETERMINATION
Report Date	September 19, 2014
Test Dates	July 29, 2014

Facility Information	
Name	Depor Industries, Inc.
Street Address	1902 Northwood Dr.
City, County	Troy, Oakland
Phone	(248) 362-3900

Facility Permit Information			
State Registration No.	N0917	Permit to Install	489-99E

Testing Contractor	
Company	Derenzo and Associates, Inc.
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RESULTS OF BUILDING ENCLOSURE VOC CAPTURE EFFICIENCY DETERMINATION

DEPOR INDUSTRIES, INC. TROY, MICHIGAN

1.0 INTRODUCTION

Depor Industries, Inc. (Depor) operates surface coating and finishing operations at its facility in Troy, Oakland County, Michigan. Depor has recently installed an eighth dip-spin coating line and was issued Permit to Install No. 489-99E (dated January 31, 2014) by the Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD).

Volatilized solvents from the dip-spin parts coating processes are captured using a process ventilation system and directed to a regenerative thermal oxidizer (RTO) for the destruction of hydrocarbons (VOC). Permit 489-99E, Condition V.2 for the emission group FG-DipCoatingLns requires Depor to verify the capture efficiency of the air collection system within 180 days of permit issuance.

The VOC capture efficiency determination testing was performed July 29, 2014 by Derenzo and Associates, Inc. representatives Robert Harvey, Andrew Rusnak, Tyler Wilson, Robert Bingham and Anthony Brogowski. The project was coordinated by Depor representatives Messrs. Ted Howard and Don Guigar.

Mr. Tom Maza and Ms. Joyce Zhu of the Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) were on-site to observe portions of the compliance testing. The exhaust gas sampling and analysis was performed using procedures specified in the Test Plan submitted to MDEQ-AQD dated June 2, 2014 and approved by the regulatory agency.

Appendix 1 provides a copy of the test plan approval letter issued by the MDEQ-AQD.

Questions regarding this emission test report should be directed to:

Robert Harvey, P.E.	Mr. Ted Howard
General Manager	General Manager
Derenzo and Associates, Inc.	Depor Industries, Inc.
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Report Certification

This test report was prepared by Derenzo, Associates, Inc. based on field sampling data collected by Derenzo and Associates, Inc. Facility process data were collected and provided by Depor employees or representatives. This test report has been reviewed by Depor representatives and approved for submittal to the Michigan Department of Environmental Quality (MDEQ).

I certify that the testing was conducted in accordance with the approved test plan 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.
General Manager
Derenzo and Associates, Inc.

Reviewed By:

Andy Rusnak, QSTI
Sr. Environmental Engineer
Derenzo and Associates, Inc.

Based on information and belief formed after reasonable inquiry, I believe the statements and information in this report are true, accurate and complete. The testing was performed in accordance with the approved test plan and the facility was operated in compliance with the permit conditions, at or near maximum routine operating conditions, during the test periods.

Facility Certification By:

Ted Howard
General Manager
Depor Industries, Inc.

2.0 SUMMARY OF RESULTS

The captured process exhaust gas stream (combined dip-spin process exhaust to the RTO) and uncaptured facility exhausts were monitored simultaneously during three (3) test periods to determine the VOC capture efficiency (CE). The calculated VOC CE for the process air collection system averaged 89.2% by weight.

VOC destruction efficiency testing performed in February 2013 measured an average VOC destruction efficiency of 99.6% for the thermal oxidizer. The average overall VOC reduction efficiency for the dip-spin coating process based on the most recent test results (the product of the measured capture efficiency and destruction efficiency) is 88.8% by weight.

Table 2.1 Summary of VOC control efficiency test results

Operating Parameter / Test Measurement	Test No.1 Results	Test No.2 Results	Test No.3 Results	Average
Avg. Fan Speed (Hz)	56	56	56	56
Minimum RTO Temp (°F)	1,501	1,501	1,501	1,501
Capture Efficiency[1] (%wt)	88.9%	89.0%	89.5%	89.2%
Destruction Efficiency[2] (%wt)	--	--	--	99.6%
Overall Reduction (%wt)	--	--	--	88.8%

1. Performed July 29, 2014
2. Result from February 2013 test event

3.0 SOURCE DESCRIPTION

3.1 Metal Parts Coating Line

Depor operates eight (8) dip-spin coating lines to apply high performance corrosion-resistant coatings to miscellaneous metal parts.

In each coating line parts are loaded into a steel basket that is submerged in a coating reservoir. The basket is removed from the liquid coating and the basket is spun to remove excess coating from the surface of the coated parts. The excess coating is collected and reused. The coated parts are then transported through a curing oven and a cool down zone.

The newest coating line (EU-DipCoating-08) has a slightly different configuration as compared to the existing seven coating lines. The dip-spin basket is horizontal and the coating takes place in an enclosed booth. The coated parts are dropped onto a stacked conveyor that contains bins for transporting the parts through the oven. However, the process steps and emission control configuration is the same as the existing coating lines.

3.2 Type of Raw Materials Used

The high performance coatings are either solvent-based or waterborne formulations. Coatings are received from the manufacturer and diluted (reduced) with either organic solvents or distilled water as appropriate prior to their application.

3.3 Emission Control System Description

Solvent laden process air exhausted from the dip-spin coating booth, conveyor hood, and the two-zone coating oven is combined and exhausted to the VOC emissions control system. Process air exhausted from the final cooldown section contains low concentrations of VOC (less than 5 parts per million measured as propane) and is exhausted directly to the atmosphere through vertical exhaust stacks.

A variable frequency drive (VFD) fan maintains an appropriate vacuum within the process air collection system and directs the collected air to the Dürr rotary RTO unit. The solvent laden air enters the RTO unit through the inlet manifold into the base of the rotary energy recovery column where it is preheated as it travels through the heat exchange media. The temperature of the preheated process 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 chambers 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.

The RTO has a nominal design capacity of 55,000 standard cubic feet per minute (scfm). The combustion chamber is designed to maintain an adequate operating temperature and residence time that results in a VOC DE of greater than 99%.

Testing performed in February 2013 demonstrated an average destruction efficiency of 99.6% by weight at a minimum chamber temperature of 1545°F.

3.4 Process Operating Conditions During the Compliance Testing

All eight (8) coating lines were operated during the compliance test periods and applied mostly solvent-based coatings. Individual line operation is interrupted periodically for paint checks, viscosity adjustments, paint changes, basket changes, and lot separation, which is typical of normal operations. These process interruptions were kept to a minimum during the compliance test periods. Process information was recorded on production log sheets with other critical operating data (start time, number of parts containers, coating applied, oven temperatures, etc.). None of the coating lines experienced excessive or unusual downtime during the test periods.

Parts were loaded into the dip-spin basket at normal intervals and the conveyor belt speed was set to approximately one foot per minute, which is typical of normal operations.

The RTO maintained a minimum combustion chamber temperature of 1,501°F throughout the destruction efficiency test periods. The VFD fan operated at an average of 56 Hertz (Hz, approximately 93% of maximum).

Appendix 2 provides RTO temperature records and production log sheets for each coating line.

During the capture efficiency testing, one general ventilation roof exhaust fan located above the coating lines along the southern side of the building was operated. All other powered roof exhausts (other than those serving the storage rooms, which are isolated from the building enclosure) were in the off position. In addition to the cooldown exhausts and roof exhaust, the acid dip tank and its associated exhaust system were in operation during the test periods. The acid line exhaust system consists of air capture plenums positioned at the acid dip tanks that are connected to a water scrubber. This system has the potential to capture fugitive VOC emissions from within the facility and was included in the test program as an uncontrolled building enclosure exhaust.

Appendix 3 provides a building drawing depicting the process air collection and control system.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

The compliance testing consisted of the determination of total hydrocarbon (THC) concentration and air flowrate for the captured and uncaptured gas streams exiting the building enclosure.

4.1 Summary of USEPA Test Methods

Derenzo and Associates, Inc. performed the exhaust gas and pollutant measurements in accordance with the following USEPA reference test methods:

Method 1	Velocity and sampling locations based on physical stack measurements.
Method 2	Gas flowrate determined using a type S Pitot tube.
Method 3	RTO inlet and building enclosure exhaust O_2 and CO_2 content determined by Fyrite® combustion gas analyzers.
Method 4	Gas moisture based on the water weight gain in chilled impingers for the RTO inlet gas stream. Moisture for all other sampling locations determined by wet bulb/dry bulb temperature measurements.
Method 25A	Total hydrocarbon concentration using a flame ionization analyzer (FIA) compared to a propane standard.
Method 204B	Determination of VOC emissions in captured vapor streams
Method 204E	Determination of VOC emissions from uncaptured vapor streams from a building enclosure (BE)

4.2 VOC Capture Efficiency Determination

The Depor structure operates as a non-fugitive building enclosure (a permanent total enclosure with uncontrolled atmospheric exhausts). Therefore, VOC capture efficiency across the eight (8) coating lines was determined by a gas/gas capture efficiency protocol using the facility as a building enclosure. A total of four (4) flame ionization detectors (FID) instruments were used simultaneously to measure the THC concentration in the captured and uncaptured gas streams according to USEPA Method 25A as described in Section 4.4 of this document.

The:

- RTO inlet (captured gas stream) was monitored continuously using a Thermo Environment Instruments (TEI) Model 51 FID analyzer and the captured VOC mass flowrate was determined using USEPA Method 204B.

- General facility roof exhaust fan was monitored continuously using a California Analytical Instruments (CAI) 300-Series heated FID analyzer.

- Eight (8) cooldown zone exhausts and acid tank exhaust were monitored periodically during each test period using either a TEI Model 51 or CAI 600 FID analyzer.

The total uncaptured VOC mass emission rate (sum of the nine uncaptured exhausts) was determined using USEPA Method 204E.

The CO_2/O_2 content for each gas stream was comparable to ambient air and verified using Fyrite® gas scrubbers. Moisture content of the RTO inlet gas stream (captured gas stream) was determined using the chilled impinger method; moisture content for all other gas streams was determined based on wet bulb-dry bulb temperature measurements. Air velocity measurements were performed for each gas stream at least once during each capture efficiency test period using a type S Pitot tube in accordance with USEPA Method 2.

During each capture efficiency test period, the direction of airflow into the building enclosure through all open natural draft openings (primarily manway doors or overhead doors) were verified using chemical airflow indicator tubes (smoke tubes).

4.3 Sampling Locations and Velocity Measurements

The sampling location for the:

- RTO inlet (captured gas stream) was in the 40-inch diameter duct (common header) exterior to the facility, prior to RTO system fan.

- Coating line cooldown zone exhaust was in the vertical exhaust stack for each line.

- Acid tank was in the 34.5-inch diameter horizontal duct section on the roof prior to the exhaust fan.

- General facility roof exhaust was in a temporary rectangular inlet chute connected to the underside of the fan.

Velocity traverse locations for each sampling point were determined in accordance with USEPA Method 1. Exhaust gas velocity pressure and temperature were measured at each sampling location in accordance with USEPA Method 2 using an S-type Pitot tube connected to a red-oil manometer. A K-type thermocouple mounted to the Pitot tube was used for temperature measurements. The Pitot tube and connective tubing were periodically leak-checked to verify the integrity of the measurement system.

Appendix 3 provides diagrams of the test sampling locations.

4.4 Instrumental Analyzer Operating Procedures

THC concentration in the exhaust gas streams identified in the previous section was determined by USEPA Method 25A, *Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer*. Throughout each test period, a gas sample from each measurement location was delivered to the instrument rack using a heated Teflon sample line and extractive gas sampling system. Hydrocarbon concentrations were determined using a TEI Model 51, CAI 300 or CAI600 FID instrument. The sampled gas stream was not dried prior to being introduced to the FID instruments; THC concentration measurements correspond to standard conditions with no moisture correction.

At the conclusion of each test period, instrument calibration was verified against a mid-range (or representative) calibration gas and zero gas. The FID instruments were calibrated with certified concentrations of propane in air and zeroed using hydrocarbon-free air. Concentrations measured with the instrumental analyzers were adjusted for calibration error and zero drift using the procedures in Method 7E.

The TEI Model 51 THC FID analyzers were rack-mounted in a mobile sampling trailer. 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. A STEC Model SGD-710C ten-step gas divider was used to obtain intermediate calibration gas concentrations as needed.

The CAI Model 300 and 600 THC FID analyzers were mounted in a mobile rack that was operated within the Depor facility. Instrument response for each instrumental analyzer was recorded on a Yokogawa MW100 data acquisition unit that monitored the analog output of the instrumental analyzers and logged data at 5-second intervals. A STEC Model SGD-SC-5L five-step gas divider was used to obtain intermediate calibration gas concentrations as needed.

4.5 Quality Assurance Procedures

Accuracy of the instrumental analyzers used to measure THC concentration was verified prior to and at the conclusion of each test period using the calibration procedures in Methods 25A. Prior to the first test period of each day, appropriate high-range, mid-range and low-range span gases (USEPA protocol 1 certified calibration gases) followed by a zero gas (hydrocarbon free air) were introduced into each sampling system to verify instrument response and sampling system integrity. In addition, the analyzers used for the cooldown exhausts were challenged with an additional low-level calibration gas (approximately 10 ppm propane) as requested by the MDEQ-AQD in the test plan approval letter. The calibration gas was delivered to the sampling system through a spring-loaded check valve and a stainless steel "Tee" installed at the base of the sample probe.

The gas dividers used to obtain intermediate calibration gas concentrations had each been NIST-certified within the previous 12 months with a primary flow standard in accordance with USEPA Method 205 and were verified in the field according the procedures in Method 205, Section 3.2.

The Pitot tubes used for velocity pressure measurements were inspected for mechanical integrity and physical design prior to the field measurements. The gas velocity measurement trains (Pitot tube, connecting tubing and incline manometer) were leak-checked prior to the field measurements and periodically throughout the testing period.

The Nutech® Model 2010 sampling console and dry gas meter, which was used to extract a metered amount of exhaust gas from the RTO inlet for moisture determination, were calibrated prior to and after the test event using the critical orifice calibration technique specified in USEPA Method 5. The digital pyrometer in the Nutech metering console was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

Appendix 4 provides information and quality assurance data for the equipment and instrumental analyzers used for the destruction and capture efficiency test periods (diagrams of the instrumental analyzer sample trains, calibration data, copies of calibration gas certificates, gas divider certification, Pitot tube integrity inspection sheets, and meter box critical orifice calibration records).

5.0 TEST RESULTS AND DISCUSSION

5.1 Building Enclosure VOC Capture Efficiency

A total of ten (10) uncaptured building exhausts (eight cooldown zone exhausts, the acid tank exhaust and facility roof exhaust) and one captured gas stream (RTO inlet) were measured to determine VOC capture efficiency. Three capture efficiency test periods were performed. Each test period was approximately 140 minutes in length, with the exception of Test No. 3, which was extended due to a lightning delay.

The general roof exhaust and RTO inlet gas streams were monitored continuously throughout each capture efficiency test period. The cooldown zone exhausts and acid tank exhaust were monitored periodically throughout each capture efficiency test period. The sample probe was moved from one exhaust to the next every 25 to 35 minutes, which resulted in a minimum of 20 minutes of data collection for each exhaust during each test period. Concentration data collected while the sample probe was moved between measurement locations was discarded from the data set. The measured concentration data for each uncaptured exhaust were determined to be representative of the entire test period.

The captured VOC mass flowrate (M_{VOC}) was calculated using the equation presented in the previous section, which is consistent with procedures presented in USEPA Method 204B, *Volatile Organic Compound Emissions in Captured Stream.* The uncaptured VOC mass flowrate for each building exhaust was calculated using the same equation and the procedures presented in Method 204E, *Volatile Organic Compound Emissions in Uncaptured Stream from Building Enclosure.* VOC capture efficiency was determined by the ratio of the captured VOC mass flow to total measured VOC mass flow using the following equation:

$$CE_{VOC} = \frac{M_{VOC,\,Cap}}{M_{VOC,\,Cap} + \Sigma\, M_{VOC,Uncap}} \quad (100\,\%)$$

Where:

CE_{VOC} = VOC capture efficiency (% weight)
$M_{VOC,\,Cap}$ = VOC mass flowrate for captured stream (lb/hr)
$\Sigma\, M_{VOC,\,Uncap}$ = Total VOC mass flowrate in uncaptured building exhausts (lb/hr)

The average measured VOC mass flowrate for the captured gas stream was 38.1 lb/hr compared to an average measured uncaptured VOC mass emission rate of 4.64 lb/hr. This results in a calculated average capture efficiency of 89.2% by weight.

Table 5.1 presents measured captured and uncaptured building exhaust gas conditions and results for the VOC capture efficiency test periods.

Appendix 5 provides instrument response data (measured THC concentrations) for each test period.

Appendix 6 provides calculations and field data sheets used to determine VOC mass flow rate and capture efficiency for each test period.

5.2 Non-Fugitive Building Enclosure Verification

Several natural draft openings (NDOs) in the building enclosure were identified:

- Entrance doors that are intermittently opened during operation.
- Shipping dock overhead doors that are intermittently opened during operation.
- Six (6) 34-inch by 34-inch louvered openings on the upper south wall

Not all of these NDOs were open throughout the test periods. However, at least once during each capture efficiency test period each NDO was opened and the direction of airflow through the NDO was verified using chemical smoke tubes. Observations of airflow direction performed during the test periods verified that the direction of airflow at each facility NDO is inward relative to the building enclosure. At times, the airflow through the man door in the southeast corner of the building exhibited stagnant inward flow. This door is located at the end of a hallway near electrical gear and is removed from the process area.

Based on these observations, all fugitive emissions within the building are either captured within the process air collection system and directed to the RTO or exhausted to the atmosphere through the identified uncaptured exhausts, which were measured during the tests.

Measurements were performed to determine the size of each NDO and its distance to the nearest VOC emitting point to demonstrate that the building enclosure and NDOs satisfy the USEPA Method 204 enclosure requirements for:

- Maximum NDO to enclosure area ratio (NEAR)
- Minimum NDO to emission point spacing
- Minimum NDO face velocity for inward flow

Each NDO satisfies the spacing criteria with the exception of the man door near Line 7. This NDO is spaced slightly less than four equivalent diameters from the nearest dip-spin coating section on Line 7. However, the door is only open intermittently during operation and exhibits a very strong inward airflow.

Table 5.2 presents the identified building enclosure NDOs and calculated average face velocity.

Appendix 7 provides measurements and observations for the building NDOs.

5.3 Results Compared to Previous Test Event

This most recent capture efficiency testing was performed following the issuance of Permit to Install No. 489-99E for coating line No. 8. The results from the capture efficiency testing are similar to the results for previous testing performed in February 2013 when the facility was operating seven coating lines; 89.2% measured in July 2014 compared to 88.1% measured in February 2013.

Operation of the eighth coating line contributes a relatively small amount of uncaptured VOC to the overall building enclosure VOC exhaust rate (an average of 0.18 lb/hr was measured in the cooldown exhaust stack for line 8). The measured THC concentration in the captured gas stream was slightly higher for this test event, ranging from 174 to 214 ppmv (34 to 42 lb/hr), which resulted in slightly higher calculated capture efficiency as compared to the February 2013 test result.

The measured VOC capture efficiency has proven to be relatively repeatable. All six test periods from the February 2013 and July 2014 test events resulted in measured capture efficiencies between 85.9% and 89.5% by weight.

5.4 Variations from Normal Sampling Procedures or Operating Conditions

The testing was performed in accordance with the Test Plan submitted to MDEQ-AQD and the MDEQ-AQD Test Plan approval letter dated June 27, 2014.

Velocity traverse locations for each sampling point were determined in accordance with USEPA Method 1. A cyclonic flow check was performed for each measurement location to verify acceptability of the flow profile. The test crew reported relatively high cyclonic null angles for Cooldown exhaust #7, which indicates there may be cyclonic flow in this exhaust stack. The measured exhaust rate for Cooldown exhaust #7 was 18,190 scfm, which is comparable to the flowrate measure for the other cooldown exhaust stacks. The Cooldown #7 exhaust gas contains a minimal amount of THC concentration (1.5 ppmv or less). Therefore, any apparent cyclonic flow within this exhaust stack would have a minimal impact on the overall capture efficiency measurements.

Table 5.1 Measured gas conditions and results for the VOC capture efficiency test

Date	7/29/14	7/29/14	7/29/14	
Test Times	10:52-13:15	13:40-16:00	16:26-19:08	
RTO Operating Data	Test 1	Test 2	Test 3	Avg
Average fan speed (Hz)	56	56	56	56
Minimum Temperature (°F)	1,501	1,501	1,501	1,501
RTO Inlet Gas (Captured)				
Flowrate (scfm)	28,364	28,262	28,124	28,250
Average THC Conc.[1] (ppmv C_3)	213.7	199.6	174.6	196.0
Calculated VOC Mass Flow[2] (lb/hr)	41.7	38.8	33.7	38.1
Cooldown #1				
Flowrate (scfm)	15,114	16,280	15,837	15,744
Average THC Conc.[1] (ppmv C_3)	2.4	4.5	2.1	3.0
Calculated VOC Mass Flow[2] (lb/hr)	0.25	0.51	0.23	0.33
Cooldown #2				
Flowrate (scfm)	15,391	15,169	15,372	15,311
Average THC Conc.[1] (ppmv C_3)	3.3	3.2	2.3	2.9
Calculated VOC Mass Flow[2] (lb/hr)	0.35	0.33	0.24	0.31
Cooldown #3				
Flowrate (scfm)	14,350	14,183	14,244	14,259
Average THC Conc.[1] (ppmv C_3)	5.2	4.3	3.8	4.4
Calculated VOC Mass Flow[2] (lb/hr)	0.51	0.42	0.37	0.43
Cooldown #4				
Flowrate (scfm)	15,492	15,228	15,350	15,357
Average THC Conc.[1] (ppmv C_3)	2.6	2.9	3.5	3.0
Calculated VOC Mass Flow[2] (lb/hr)	0.28	0.31	0.36	0.32
Cooldown #5				
Flowrate (scfm)	12,119	12,530	12,686	12,445
Average THC Conc.[1] (ppmv C_3)	2.3	1.8	1.7	1.9
Calculated VOC Mass Flow[2] (lb/hr)	0.19	0.15	0.14	0.16

Table 5.1 Measured gas conditions and results for the VOC capture efficiency test (continued)

Date	7/29/14	7/29/14	7/29/14	
Test Times	10:52-13:15	13:40-16:00	16:26-19:08	
Cooldown #6	Test 1	Test 2	Test 3	Avg
Flowrate (scfm)	20,355	20,163	20,267	20,262
Average THC Conc.[1] (ppmv C_3)	2.7	3.1	3.2	3.0
Calculated VOC Mass Flow[2] (lb/hr)	0.38	0.43	0.44	0.42
Cooldown #7				
Flowrate (scfm)	18,146	17,853	18,572	18,190
Average THC Conc.[1] (ppmv C_3)	1.2	1.5	1.0	1.3
Calculated VOC Mass Flow[2] (lb/hr)	0.15	0.19	0.13	0.16
Cooldown #8				
Flowrate (scfm)	8,881	8,354	8,388	8,541
Average THC Conc.[1] (ppmv C_3)	5.4	2.1	1.6	3.02
Calculated VOC Mass Flow[2] (lb/hr)	0.33	0.12	0.09	0.18
Acid Tank				
Flowrate (scfm)	18,777	17,523	17,584	17,961
Average THC Conc.[1] (ppmv C_3)	4.8	2.1	4.8	3.9
Calculated VOC Mass Flow[2] (lb/hr)	0.62	0.25	0.58	0.49
General Roof Vent				
Flowrate (scfm)	13,318	13,403	11,719	12,813
Average THC Conc.[1] (ppmv C_3)	23.4	23.8	17.9	21.7
Calculated VOC Mass Flow[2] (lb/hr)	2.14	2.19	1.44	1.92
Calculated Capture Efficiency				
Total captured mass flow (lb/hr)	41.7	38.8	33.7	38.1
Total uncaptured mass flow (lb/hr)	5.2	4.8	3.9	4.6
Capture efficiency[3]	88.9%	89.0%	89.5%	89.2%

Table 5.1 Notes

1. Total hydrocarbon concentration as propane measured using a FID analyzer by USEPA Method 25A.
2. THC mass flowrate calculated as propane:
   (Gas Flowrate, scfm) (Concentration, ppmv) (44.1 lb/lbmol) (60 min/hr) / (385 scf/lbmol) / 1E+06
3. Capture efficiency determined by the ratio of the captured VOC mass flow to total measured VOC mass flow: (VOC captured) / (VOC captured + VOC uncaptured).

Table 5.2 Building enclosure natural draft openings and calculated average face velocity

Natural draft opening	Dim.	Test 1	Test 2	Test 3
SW door by Line 1 (sq. ft)	3' x 7'	21	21	21
NW door by WWTP (sq. ft)	3' x 7'	21	21	21
Shipping entrance door (sq. ft)	3' x 7'	21	21	21
SE door by Line 7 (sq. ft)	3' x 7'	21	21	21
SE door by RTO (sq. ft)	3' x 7'	21	21	21
Overhead dock door #2 (sq. ft)	[Note 1]	[closed]	26	[closed]
Overhead dock door #3 (sq. ft)	[Note 1]	[closed]	[closed]	26
Wall louvers, 6 ea. (sq. ft)	34" x 34"	48	48	48
Total NDO area (sq. ft)	[Note 2]	153	179	179
Total exhaust rate (scfm)	[Note 3]	60,459	59,188	57,427
Calculated face velocity (ft/min)		395	330	321

Table 5.2 Notes

1. The overhead dock door opening is 8-ft wide by 10-ft tall. With the truck in place there is no more than 1-ft opening along the sides and top.
2. Sum of all NDO's above.
3. Sum of enclosure exhausts (captured gas stream and general roof exhaust). The cooldown zone exhausts are assumed to be in balance with the cooldown zone supply air.