



**NO SEND
WITNESSED**

REVIEW



ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

ID No.:	097190AFG	Test Date:	September 14 - 17, 2021
Source Name:	Medline Industries		
Location	1160 South Northpoint Boulevard, Waukegan, Illinois 60085		
Permit No.	19020013	TYPE OF TEST PROGRAM:	
<input type="checkbox"/> FESOP <input type="checkbox"/> Title V <input type="checkbox"/> Lifetime <input checked="" type="checkbox"/> Construction		<input type="checkbox"/> Initial Performance <input type="checkbox"/> CEMS Certification	<input checked="" type="checkbox"/> Annual/Periodic <input type="checkbox"/> Other: _____
Emission Unit(s):	Ten Commercial Sterilizers		
Control Equipment:	<ul style="list-style-type: none"> • Permanent Total Enclosure • Glygen™ Scrubbers • Three Packed Bed Scrubbers • One Catalytic Oxidizer • Multi-Bed Dry Bed Absorption (DBA) 		
APPLICABLE RULE:	<input checked="" type="checkbox"/> 415 ILCS 5-9.16 <input type="checkbox"/> 35 IAC PART ____ <input type="checkbox"/> 40 CFR PART 60, SUBPART ____ <input checked="" type="checkbox"/> 40 CFR PART 63, SUBPART O		
SOURCE	Contact	Jasper Titus	
	Phone Number	847-837-2784	
	Email	jtitus@medline.com	
TESTING COMPANY	Company Name	Montrose Air Quality Services, LLC (Montrose)	
	Contact	William Craig James	
	Phone Number	847-487-1580 Ext. 12419	
	Email	wjames@montrose-env.com	
	Report No.	MW024AS-009442-RT-1174	

Parameters	USEPA REFERENCE METHODS	Yes	No
<input type="checkbox"/> PM <input type="checkbox"/> PM ₁₀ <input type="checkbox"/> SO ₂ <input type="checkbox"/> NO _x <input type="checkbox"/> Opacity <input type="checkbox"/> CO <input type="checkbox"/> VOM <input type="checkbox"/> HCl <input checked="" type="checkbox"/> DE <input checked="" type="checkbox"/> CE <input type="checkbox"/> Metals <input checked="" type="checkbox"/> Ethylene Oxide	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3A <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 12 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 23 <input type="checkbox"/> 24 <input type="checkbox"/> 25 <input type="checkbox"/> 25_ <input type="checkbox"/> 26 <input type="checkbox"/> 29 <input type="checkbox"/> 201_ <input type="checkbox"/> 202 <input checked="" type="checkbox"/> 204 <input type="checkbox"/> 204_ <input checked="" type="checkbox"/> 205 <input checked="" type="checkbox"/> 320		
Alternative method(s)	MAX StarBoost™		
Did Permittee propose or use proper method(s)?		✓	

Process Information		Yes	No
Process rate allowed in permit or unit capacity:	PC 3.a.i. Ethylene Oxide emissions: 15 pounds/month and 150 pounds/year		
Process rate during stack test:	See Tables below.		
Was the process rate during stack test within 90 or 100% of allowable? (i.e. was stack test done under conditions representative of maximum emissions?)		✓	



COMPLIANCE DEMONSTRATION			Yes	No
Protocol	Submitted?	Date July 13, 2021	✓	
	Submitted timely?	45 days prior to test	✓	
	Approved?		✓	
Did testing follow the approved protocol?			✓	
Were raw field & laboratory sheets included with the final report?			✓	
Were three test runs performed?			✓	
Were runs performed for appropriate length of time?			✓	

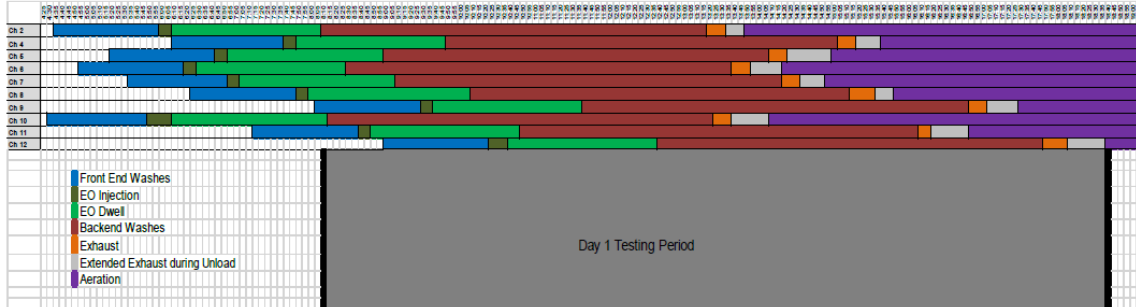
Emissions:	Pollutant	Emission	Limit	
	Capture Efficiency	100%	100%	415 ILCS 5-9.16
	Destruction Efficiency	99.991%	99.9%	
	Ethylene Oxide	14.4 ppbvd	200 ppb	

Process Data			Run 1	Run 2	Run 3	Average
EtO Used	lbs.		592.80	604.80	621.70	606.43
Chamber 2	Capacity 3 Pallets	Pallets Sterilized	3	3	3	3
Chamber 4	Capacity 6 Pallets	Pallets Sterilized	6	6	6	6
Chamber 5	Capacity 6 Pallets	Pallets Sterilized	6	6	6	6
Chamber 6	Capacity 13 Pallets	Pallets Sterilized	13	13	13	13
Chamber 7	Capacity 13 Pallets	Pallets Sterilized	13	13	13	13
Chamber 8	Capacity 13 Pallets	Pallets Sterilized	13	13	13	13
Chamber 9	Capacity 13 Pallets	Pallets Sterilized	13	13	13	13
Chamber 10	Capacity 26 Pallets	Pallets Sterilized	26	26	26	26
Chamber 11	Capacity 26 Pallets	Pallets Sterilized	26	26	26	26
Chamber 12	Capacity 26 Pallets	Pallets Sterilized	26	26	26	26



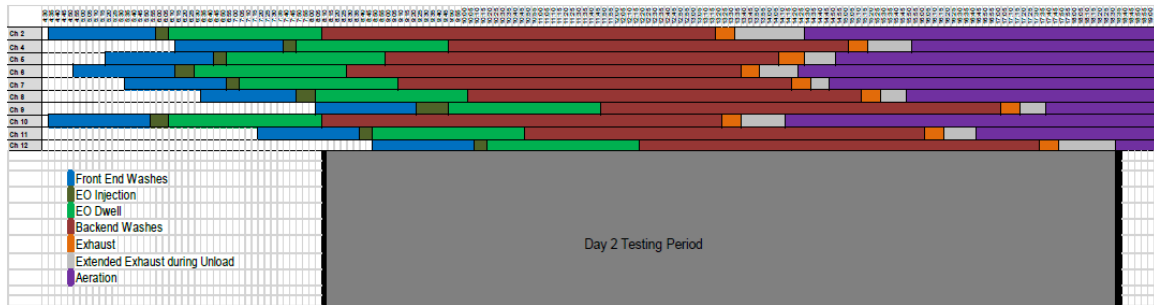
PRODUCTION DATA DIAGRAM

DAY 1 (9/15/21) CHAMBER SCHEDULE



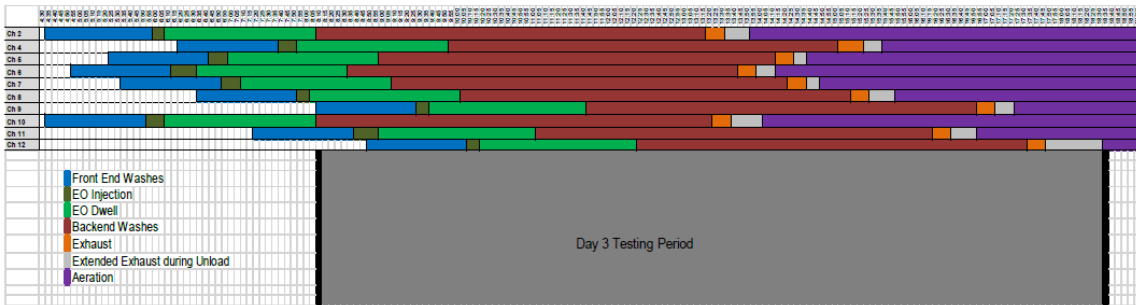
The testing spanned an approximate 10-hour period to include the backend vacuum/N2 washes of all chambers where EO is evacuated as well as all chambers venting and being unloaded into aeration. During Day 1 of testing there were over 75 sterilized pallets in the shipping warehouse. To allow room for product to be unloaded from the chambers during the tests, aeration began partially full and ended at 61.88% full based on pallet capacity once chambers were unloaded. 592.8 lbs of EO were used during processing of the 10 chambers included in the testing window for Day 1.

DAY 2 (9/16/21) CHAMBER SCHEDULE



The testing spanned an approximate 10-hour period to include the backend vacuum/N2 washes of all chambers where EO is evacuated as well as all chambers venting and being unloaded into aeration. During Day 2 of testing there were over 75 sterilized pallets in the shipping warehouse. To allow room for product to be unloaded from the chambers during the tests, aeration began partially full and ended at 70.94% full based on pallet capacity once chambers were unloaded. 604.8 lbs of EO were used during processing of the 10 chambers included in the testing window for Day 2.

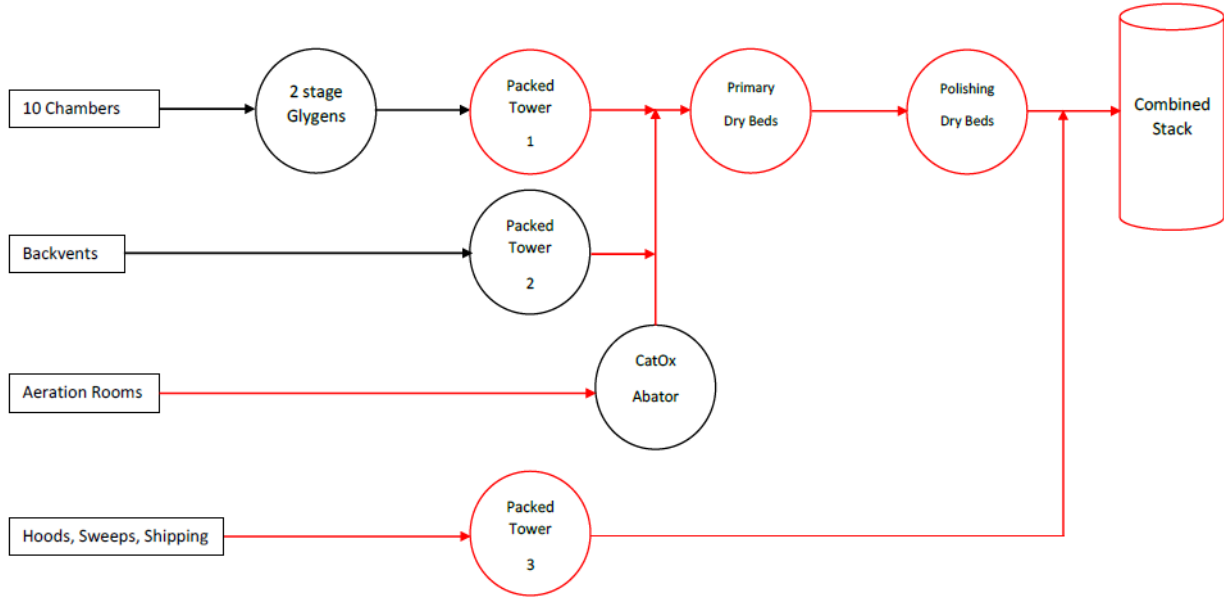
DAY 3 (9/17/21) CHAMBER SCHEDULE



The testing spanned an approximate 10-hour period to include the backend vacuum/N2 washes of all chambers where EO is evacuated as well as all chambers venting and being unloaded into aeration. During Day 3 of testing there were over 75 sterilized pallets in the shipping warehouse. To allow room for product to be unloaded from the chambers during the tests, aeration began partially full and ended at 87.69% full based on pallet capacity once chambers were unloaded. 621.7 lbs of EO were used during processing of the 10 chambers included in the testing window for Day 3.



Control Device Data		Run 1	Run 2	Run 3	Average
Permanent Total Enclosure	ΔP (“WC)	-0.026	-0.025	-0.028	-0.026
Pack Tower 1	Scrubbant Flow Rate (gal/min)	530.1	523.6	521.8	525.2
	pH of the Scrubbant	0.6	0.6	0.6	0.6
	Temperature (°F)	99.7	99.4	102.5	100.5
Pack Tower 2	Scrubbant Flow Rate (gal/min)	524.8	518.5	516.3	519.9
	pH of the Scrubbant	0.6	0.6	0.6	0.6
	Temperature (°F)	81.7	82.0	85.3	83.0
Pack Tower 3	Scrubbant Flow Rate – Average of Pump 1-2 (gal/min)	713.2	713.4	713.2	713.2
	Scrubbant Flow Rate – 3Hr Avg of Pump 1-2 (gal/min)	713.2	713.4	713.4	713.4
	pH of the Scrubbant – Average and 3Hr Avg	1.9	1.9	1.9	1.9
	Inlet Temperature (°F)	80.5	83.0	87.3	83.6
Catalytic Oxidizer	Inlet Temperature - Average & 3Hr Avg (°F)	348	348	348	348
	Outlet Temperature - Average & 3Hr Avg (°F)	349	349	349	349
DBA	Temperature (°F)	102.1	102.1	102.2	102.1
	Relative Humidity	27.6	28.0	33.3	29.6
CEMS	Ethylene Oxide 3 Hour Ave (ppb)	10.9	7.1	6.2	8.0



Are test results in compliance with applicable requirements, permit special conditions, and Agency averaging policy/rule?	Yes	No
	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>Comments:</p> <p>Medline Industries contracted Montrose Air Quality Services, LLC (Montrose) to perform emissions testing on the affected facility to demonstrate compliance with the requirements of Condition 3(c)(ii). The annual emissions tests required by this condition shall take place at least 6 months apart, in accordance with construction permit condition 8-2.a.ii.</p> <p>Montrose utilized USEPA Methods 1, 2, 3A, 204, 205 and 320.</p> <p>Due to the ambient nature of the inlet test locations, the CO₂ and O₂ concentrations were not measured and the molecular weight was assumed to be 29.0 as allowed by USEPA Method 2, Section 8.6, and approved by Illinois EPA.</p> <p>USEPA Method 320 was used to measure the moisture at each test location per Section 16.3 of USEPA Method 4.</p> <p>Due to the exceptionally high concentrations of EtO emanating from the sterilization chamber backvents, no direct interface sampling will be performed for determination of EtO concentrations and control device inlet loadings (lb/hr). EtO loading was determined utilizing gravimetric methods outlined in CARB Method 431, Appendix B, Condition 2, which allows for determination of EtO system input to the associated control devices by weight of EtO utilization (mass basis) before and after charging each sterilization chamber.</p>		



MODIFICATIONS TO THE METHODS

- EtO cylinders may only be available in $\pm 5\%$ certifications without an alternative (ALT) testing procedure ALT-114 and ALT-118; “Alternative Approaches to NIST-Traceable Reference Gases”.
 - https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRML&dirEntryId=336073
 - Ryan, J. ALT-114 and ALT-118 Alternative Approaches to NIST-Traceable Reference Gases. Presented at “The 41st Stationary Source Sampling and Analysis for Air Pollutants Conference, Tucson, AZ, April 9 - 14, 2017.”
- Montrose could not find a calibration gas manufacturer that would blend an EtO cylinder in the ppm range at the required EPA protocol gas accuracy certification of $\pm 2\%$. The best that currently available gas vendors could certify their EtO gas cylinders to was $\pm 5\%$. Montrose also could not find a vendor who would perform Alt 114 procedures for certification of the EtO gas concentrations. Therefore, it was requested that the EtO cylinders accuracy of $\pm 5\%$ be accepted in lieu of the protocol requirement of $\pm 2\%$. It should be noted that calibration cylinders of many organic compounds are not commercially available at $\pm 2\%$ accuracy due to stability, vapor pressure, or reactivity issues of the specific compound.
- Additionally, because of Montrose’s experience with EtO and discussions with EPA Office of Air Quality Planning and Standards (OAQPS) who also indicated instability of EtO in cylinders below 2 ppmv, a 50 ppmv cylinder was used to determine calibration stability as per Performance Specification 15, “*Performance Specification for Extractive FTIR Continuous Emissions Monitor Systems in Stationary Sources*”, Section 10 and 11. Another 2 ppmv cylinder of EtO with a tracer gas of 500 ppm ethane was used to determine the dynamic spike dilution factor (Method 320) and was transported directly to the FTIR sample cell initially to provide an accurate cylinder tag value for the cylinder used for the dynamic spiking.
- The Calibration Transfer Standard (CTS) used for the path length and associated quality control measurements in Method 320 was 50 to 500 ppm methane. This was not a modification to the method, but is placed in this section to point out the difference between CTS and the tracer gas used. It should be noted the CTS for the inlet locations was ~ 100 ppm ethylene.
- Because of the variable EtO concentrations and potential for high EtO concentrations at the inlet test locations, dynamic spiking as required by Method 320 was conducted into ambient air and not into the sample stream. Because the sample streams are essentially ambient air, the sample streams have similar potential interferences.
- Because of the variable nature of the flow rate from the sterilization process, the gas velocity at all applicable test locations was continually monitored using a permanently mounted pitot tube and digital pressure transducer. A preliminary flow traverse was conducted at the start of each test day following EPA Methods 1 and 2. The pitot tube was then placed at the point of average velocity. Gas velocity readings were recorded every minute during each test run using an electronic Data Acquisition System (DAS). A preliminary flow traverse was conducted prior to the test program (not at the start of each test day) following EPA Methods 1 and 2.
- The NDO for the overhead doors in the shipping area, which the sterilized material is moved through during loadout, need not be at least 4 equivalent opening diameters from the product per Section 3.b.ii. of the permit.



A check of the instrument calibrations and calculations was performed; no issues were noted.

A review of the the PTE test report revealed there were no modification to the PTE since the original PTE certification and that all the criteria of USEPA Method 204 were met.

It is recommended that the Illinois EPA accept the test report, which indicates the entire control system is in compliance.

Please contact the undersigned if you have any questions.

			Yes	No	
<i>Kevin J. Mattison</i>		December 16, 2021	Test Report Approved	✓	
REVIEWED BY:	Kevin J. Mattison	Date	Compliance Demonstrated? (See comments above)	✓	