



## Centurion Medical Products Corp. (N5109) Supplement Modeling Summary

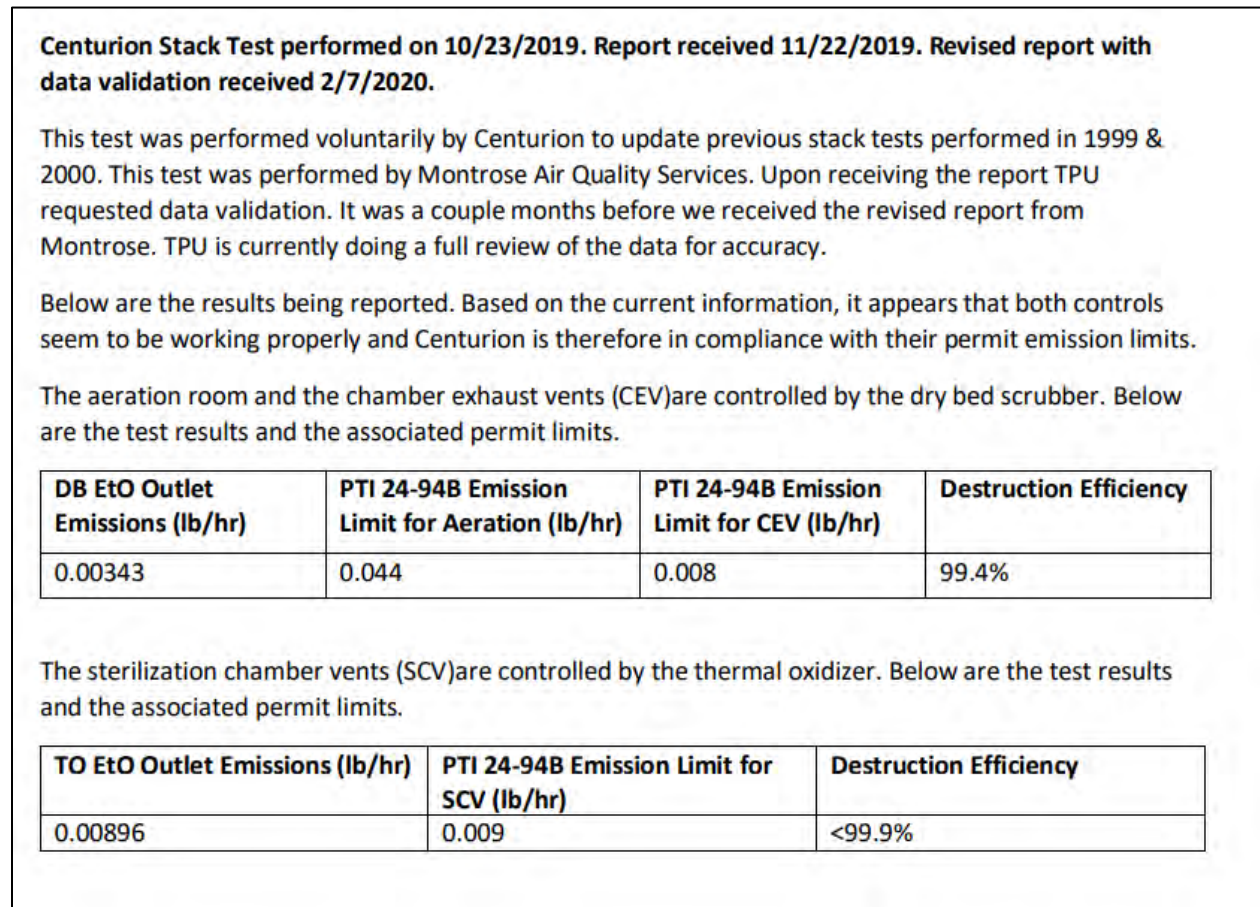
Prepared by the Michigan Department of Environment, Great Lakes and Energy  
Air Quality Division, April 23, 2021

Since the original modeling report, issued July 2, 2019, additional stack testing and ambient monitoring have occurred. This prompted the need to update the previous modeling results.

### Stack Testing:

Stack testing on the Thermal Oxidizer and Dry Bed Scrubber was conducted on October 23, 2019. No tests were conducted for the modeled Containment Room Vent as there is no permit limit for that source. Test results were summarized as follows in Figure 1:

**Figure 1 - Stack Test Summary**



## Annual Modeling:

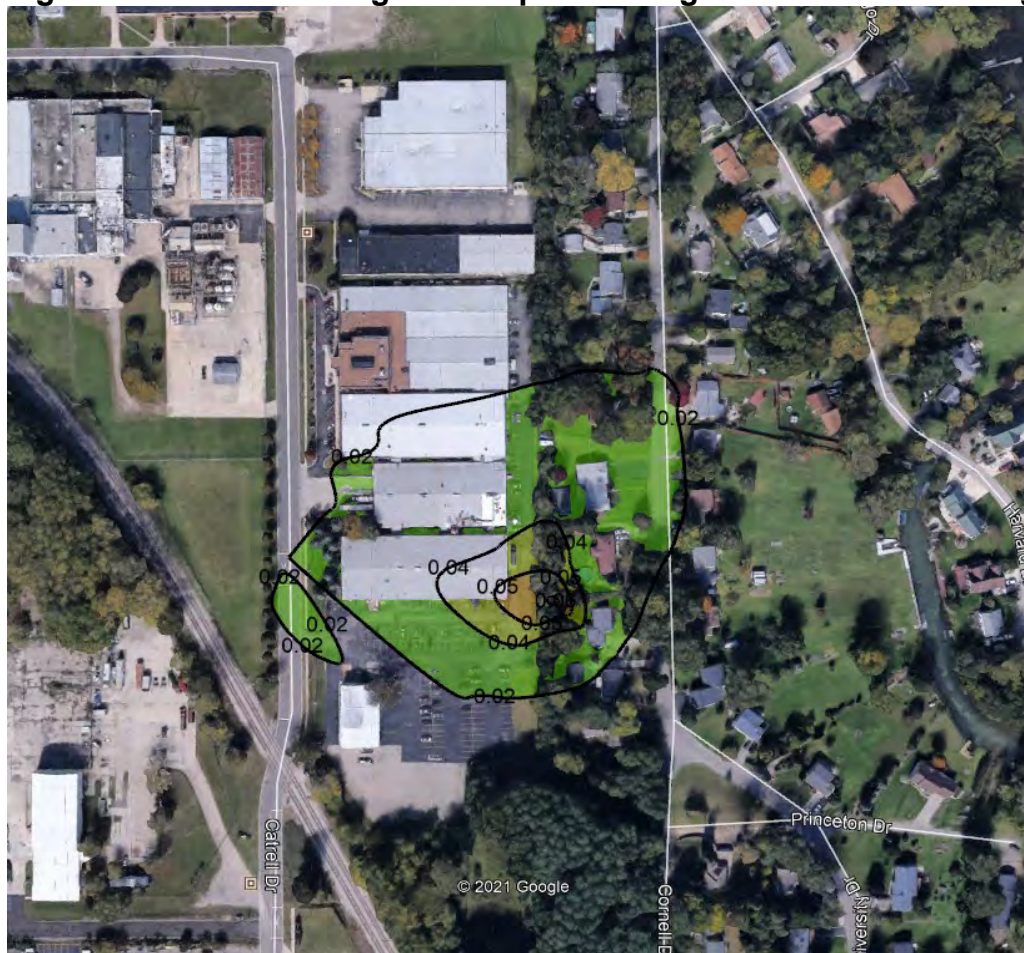
Computer modeling was addressed in two different approaches. Since the EtO health-based standard is based on an annual average, five years of the most recent meteorology data (2016-2020) was used with the latest stack test results for the Thermal Oxidizer and Dry Bed Scrubber. The Containment Room Vent emissions remained the same, as provided by the company in their 2018 emissions summary.

Centurion's air permit requires the stack for the Dry Bed Scrubber to be at least 40 feet tall. During a visit to the facility, EGLE staff determined the stack did not meet the 40-foot requirement specified in the permit. That stack has since been raised to comply with the permit.

No fugitive emissions have been quantitatively identified or included in this modeling study.

The annual impacts, compared to 0.02 ug/m<sup>3</sup> (the effective Secondary Risk Screening Level threshold for EtO) showed a slightly larger footprint than the original study.

**Figure 2 – Annual Average EtO Impacts Using 2016-2020 Meteorology Data**



## 24-Hour Summa Cannister Monitoring Results:

Five summa cannisters were placed around the facility at the Figure 3 locations and run from 12pm March 29 to 11am March 30, 2021. One upwind background monitor was also utilized at a distant rural location south of the facility.

**Figure 3 – Facility Summa Cannister Locations**



Modeled stack locations are as depicted in Figure 4:

**Figure 4 – Modeled Stack Locations**



Summa cannister results were determined as follows in Table 1:

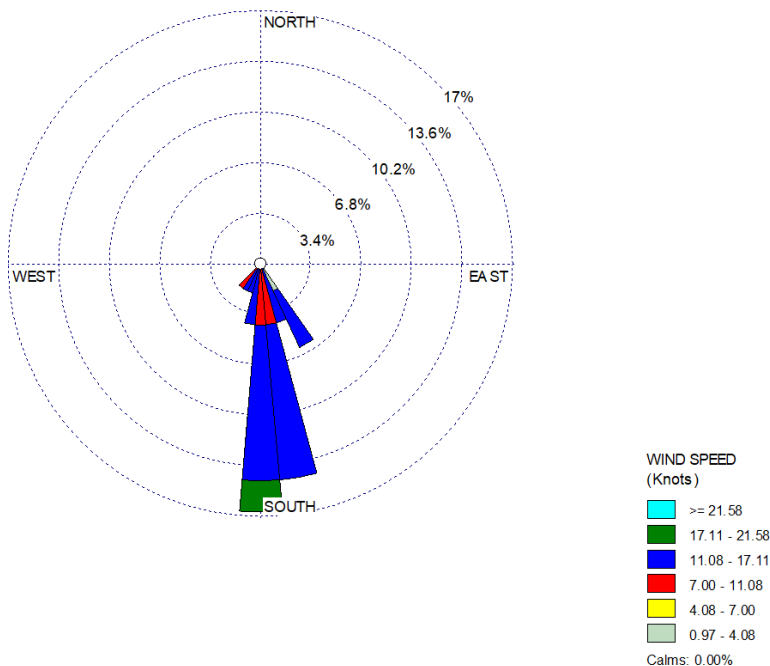
**Table 1 – 24-Hour Summa Cannister Results**

Site ID	EtO (ppbv)	Rep analysis (ppbv)	EtO (ug/m3)	Rep Analysis (ug/m3)
Centurion #1 3/29/21	0.0723		0.130	
Centurion #2 3/29/21	0.390		0.703	
Centurion #3 3/29/21	1.69		3.04	
Centurion #4a 3/29/21	0.173	0.174	0.312	0.313
Centurion #4b 3/29/21	0.194	0.195	0.350	0.351
Centurion #5 3/29/21	1.27		2.29	
Centurion #6 3/29/21	0.0395		0.0712	

## Modeling vs. Monitoring:

The second modeling approach was to compare AERMOD impacts to the 24-hour summa cannister locations, paired in time. Meteorological conditions during the sampling period showed persistent southerly winds with sustained speeds ranging from 8 to 25 mph.

**Figure 5 – Wind Rose During Summa Cannister Sampling Period**



The 24-hour modeling results, paired in time with the sampling results, showed extremely low impacts at the five summa cannister locations. This is likely due to the cannisters not being directly downwind of the modeled stacks during any of sampling hours and high wind speeds which could cause the taller stack emissions to by-pass or overshoot the close monitors.

The summa concentrations, *minus the background concentration of 0.0712 ug/m3*, ranged approximately 60 to 6,000 times higher than the modeling results. The background concentration was subtracted to approximate “company only” impacts to the summa cannisters as shown in Table 2. This indicates additional sources of EtO are not accounted for in the model.

**Table 2 – Summa Cannister Results Compared with the Model Paired in Time**

Summa Site	Summa minus Background	AERMOD Model Results Mar 29 (12pm) -March 30 (11am)
1	0.059 ug/m3	0.00096 ug/m3
2	0.632 ug/m3	0.00011 ug/m3
3	2.969 ug/m3	0.00525 ug/m3
4	0.124 ug/m3	0.00194 ug/m3
5	1.199 ug/m3	0.00367 ug/m3

Figure 6 depicts the summa cannister locations in relationship to the three stacks utilized in the model and the persistent wind direction. With the persistent brisk southerly winds, it is reasonable to assume that most emissions from the 40-foot Thermal Oxidizer and the Dry Bed Scrubber stacks would likely not be captured by any of the summa cannisters. The shorter 22-foot Containment Room vent on the edge of the building, however, is more in line with summa locations 3 and 5 and could reasonably be assumed to have some impact at those sampling locations.

**Figure 6 – Summa Cannister Locations Relative to Stack Locations and Wind Direction**



Since the persistent brisk southerly winds were not ideal for computer modeling of the summa cannister locations (i.e. south, west, east, and northeast of the stacks) during the



sampling period, all 24-hour averaging times from the beginning of 2021 to mid-April were modeled. This allows many different meteorological scenarios to be tested and provides a better sample of potential impacts at the cannister locations. The worst-case 24-hour impacts, over this longer modeled period, were compared to the 24-hour sampling results, as shown in Table 3:

**Table 3 – Summa Cannister Results Compared with Longer Term Model Results**

<b>Summa Site</b>	<b>Summa minus Background</b>	<b>AERMOD Model Results Year-to-Date 24-Hour Maximum Jan 1 - Apr 13 2021</b>
1	0.059 ug/m3	0.13176 ug/m3
2	0.632 ug/m3	0.34071 ug/m3
3	2.969 ug/m3	0.09913 ug/m3
4	0.124 ug/m3	0.21189 ug/m3
5	1.199 ug/m3	0.23158 ug/m3

Over the longer modeling period, the model does a reasonable job measuring the potential 24-hour impacts caused by Thermal Oxidizer, Dry Bed Scrubber, and Containment Room Vent emissions at summa locations 1, 2 and 4. The severe under-prediction of the model at summa locations 3 and 5 indicates at least two possibilities:

- 1) Sources of fugitive emissions not currently accounted for in the model exist; and
- 2) The Containment Room vent is emitting significantly more than assumed. The Containment Room vent is an ambient temperature roof-top vent on the eastern edge of the building and could directly impact summa locations 3 and 5 during a southerly wind event.

The Containment Room vent is a 22-foot, roof-top vent on the eastern edge of the building as shown in Figure 7 and has not been tested for actual emissions. Company supplied emissions from their 2018 emissions inventory were used. Containment Room vent emissions could reach the ground level locations of summa locations 3 and 5 during the sampling event.

**Figure 7 – Containment Room Vent**

## Summary

Using revised EtO emission rates for the Thermal Oxidizer and Dry Bed Scrubber, the annual EtO impact footprint is larger than indicated in the previous modeling summary. The revised emission rates were derived from the most recent stack testing which did not include the Containment Roof vent. Previous estimates by the company were used for the Containment Room vent emissions. The 0.02 ug/m<sup>3</sup> footprint is expanded to areas just east of the facility.

Modeling performance during the 24-hour summa cannister sampling period was poor due to the summa cannisters not aligning with the stacks during a persistent southerly wind event. As such, emissions from at least two of the three modeled stacks were likely not captured at the summa locations. The shorter Containment Room vent was better aligned with the wind direction and could have impacted some of the cannisters. Modeling a larger sample of 24-hour periods (i.e. Jan 1 – April 13, 2021) showed better correlation at some summa locations but still showed a severe under-prediction at summa locations 3 and 5. There may also be fugitive emissions escaping the facility which could account for the large nearby ground-level concentrations.

The conclusion is that more study needs to be done to determine the source and magnitude of EtO emissions which have not been accounted for in the modeling studies.





EGLE plans additional sampling, which may lead to changes and/or additions to the modeling study.