GREEN MOUNTAIN TECHNOLOGIES
COMMERCIAL COMPOSTING SOLUTIONS

Grimm's Fuel Bio-cover and O2 Monitoring Changes

July 31, 2022

To Will Ennis
Hila Ritter
WPES Compliance & Policy
600 N.E. Grand Avenue Portland, Oregon 97232-2736

From Jeff Gage
Green Mountain Technologies, Inc.
5850 Mc Donald Avenue | Bainbridge Island, WA 98110

Dear Will and Hila,

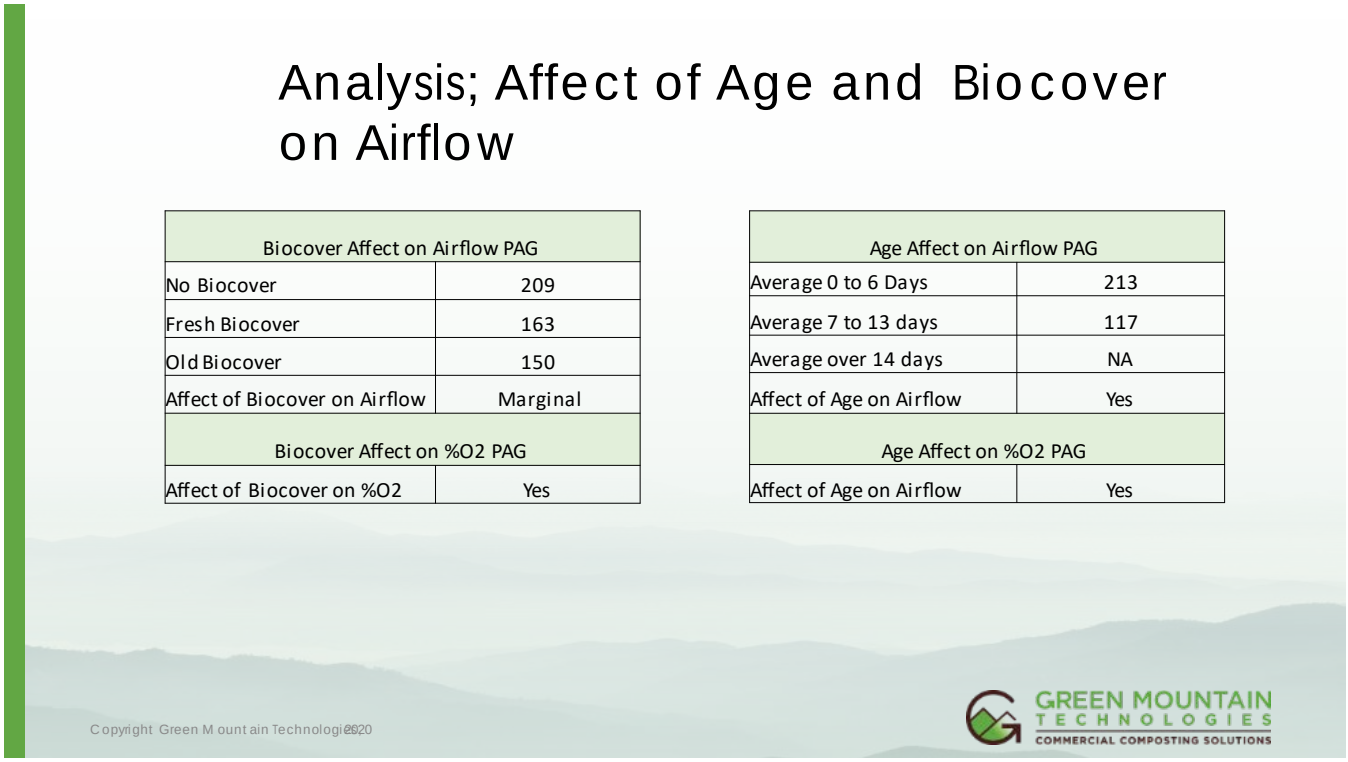
Jeff Grimm has asked me to offer comments on a future request he would like to submit to change the permit requirements for the aerated composting system at Grimm's fuel. It is my opinion now that the permit requirements for the twelve-inch bio-cover requirement is unnecessary and excessive.

The system is being operated as designed, with fresh materials being handled on-time and turning of piles 2 weeks old happening almost daily. This has resulted in a significant reduction in odor complaints in the past 2 ½ years. The regular turning of the piles has not created odor complaints and is a testimony to the aerobic static pile process. The experience at Grimm's Fuel is similar to other sites in the region that process green waste only with forced aeration systems.

The last 12 months of operation resulted in 18 odor complaints. Three of the complaints could be attributed to the compost site. Fifteen of these complaints were either up-wind of the compost site, chemical or manure odor and not attributable to the Grimm's. Of the fifteen, ten were from the same individual and there were no corroborating complaints.

In 2020 GMT ran a series of airflow trials at Grimm's Fuel to compare the dynamics of airflow and oxygen percentage in the pipe at grade aeration floor to the sparger floor. We ran a statistical analysis of the effect of biocover and age of pile on airflow rates. The greatest effect was the

settling of the pile over time effecting airflow rates, but there was also a marginal impact by the biocover on airflow. Adding a foot of biocover to a 13-foot-tall pile theoretically increases air friction losses by over 7%, however we measured the air flow changes with new biocover, old biocover, and without biofilter coverage on the piles and our data showed a likely 25% to 39% reduction in air flow reaching the surface using a biocover, and a reduction in oxygen levels in the piles below the surface. Our data was taken after a series of large rainfall events, and the top layer was soaked.



If there are no malodors being generated within the pile, the biocover is serving no odor reduction purpose, however it does reduce airflow which could, in extreme rainfall conditions, lower the pile oxygen levels.

In April 2022, during the peak grass clipping season, Jeff Grimm performed a trial using no bio-covers on the ASP zones. April is the time of year where poorly managed systems usually smell the worst. During that time, no off-site odors were observed, and no odor complaints were received. The trial was repeated in June with similar results. No odor complaints were received, and no offsite odors were found when biocovers were not being used. During the recent Metro site inspection, the inspectors found no significant odor emissions or odor problems for the piles without biocovers.

By all measures, the odor control at the facility has been outstanding. Based on the measured airflow reductions, and real time experience of neighbors, operators, and inspectors, I recommend that the requirement for the use of twelve-inch bio-covers be removed from the regular course of aerated static pile construction for green waste piles at Grimm's Fuel. I also recommend that enough bio-cover materials be readily available to apply if conditions change and a persistent offsite odor event occurs from the ASP system. If biocovers become necessary, then using only a 4 to 6-inch deep bio-cover is recommended.

Green Mountain Technologies has several clients that use a forced aeration system for residential and commercial green waste that do not use bio-covers and still manage odors effectively with a positive only aeration system.

Pierce County Compost Facility in Purdy, Washington
Allwood Recyclers in Troutdale, Oregon
Vision Recycling in Livermore, California

Finally, it is my opinion that the ongoing requirement for daily oxygen readings is excessive and unnecessary. Over the last 2 ½ years, Grimm's has conducted over 1,000 oxygen readings. Data shows an average oxygen reading of 18.2%, which is well above design parameters of a minimum of 13%. By controlling temperature, moisture and the minimum damper openings, the oxygen levels have stayed high consistently. I recommend that Grimm's be allowed to decrease their oxygen monitoring schedule from daily readings to weekly readings while continuing to monitor their temperature readings and air flow data.

If you have any questions or concerns that I can address, please contact me directly at:
(360) 957-0900 or jeff@compostingtechnology.com

Sincerely,

Jeff Gage, Senior Systems Designer