



Best Practices in Wood Waste Recycling

Quality Specifications for Biofilter Media

Material: Wood Waste

Issue: *Odor control is one of the most significant problems facing composting facilities because it is critical to the long-term approval and acceptance of the facility by the public. Odors are emitted from the surfaces of open piles, windrows, curing piles, storage piles, and stockpiles of organic materials. Odorous compounds of concern include ammonia, hydrogen sulfide, mercaptans, alkyl sulfides and terpenes. These compounds are formed during aerobic or anaerobic decomposition.*

Biofiltration is an air pollution control technology that uses a solid media to absorb and adsorb compounds in the air stream and retains them for subsequent biological oxidation. Biofilters are used mainly for the treatment of odors and VOC compounds. The trend has been toward the use of more organic materials, like soils, composts, wood mulch, or processed wood wastes to improve performance by increasing removal rates. Biofilters have been recognized by several states as Best Available Control Technology (BACT) for the treatment of VOCs and odor.

Best Practice: Moisture laden air from composting facilities is usually pumped from the facility and may be treated in an odor scrubbing biofilter. A biofilter consists of a series of perforated pipes laid in a bed of gravel and covered with an organic media. As the air stream flows up through the media, the odorous compounds are removed by a combination of physical, chemical and biological processes. However, depending upon the air flow from the composting plant and the design and material selection for the biofilter, the organic matter could quickly deteriorate. The lifespan and moisture content of the material are concerns for effective design and cost of the medium.

Biofilters have been designed to utilize a mix of materials consisting of bark mulch, wood waste, leaf compost, and other organic matter. Since the filter materials tend to pack over time, reducing air flow and filter effectiveness, the ability to occasionally fluff the filters and control the quantity of fines introduced in the construction is important. Therefore, the processing of wood waste and the effective screening of the fines fraction is important in the original installation effort and follow-up replacement sales.

To maintain a biofilter in optimum operating conditions, the biological micro-organisms require food, water and air. The size of the biofilter is, in part, determined by the pollutant loading and the pollutant concentration in the air/odor emissions from the composting area. The media must be able to oxidize any pollutant. Since removal efficiency is primarily determined by the gas residence time within the filter bed, ranges of 30 to 60 seconds are considered reasonable for most applications. For a typical three-foot bed, the equivalent loading or 6 and 3 cubic feet per minute / square foot of surface area have been calculated.

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Implementation: There are a limited number of biofilter market applications around the country. Therefore, a wood waste processor should contact regional municipal solid waste composting and wastewater treatment plant sludge composting facilities to establish the specifications and possible demand for ground wood waste products. Each operator and facility engineer typically has their own recipe for the biofilter medium and the pricing structure under which they operate. A thorough review of their needs, and a discussion of past problems with this type of material, if any, is essential.

Certain states have established odor emission limits at the surface of the biofilter. For example, Massachusetts DEP has a surface limit of 50 dilution to threshold (D/T). Their maximum off-site odor impact level is set at 5 D/T. A major MSW composting operation in Georgia has an odor performance standard of 10 D/T at the facility property line. These odor policies have typically led to design parameters for biofilters approximately ranging from 2.5-5.5 cubic feet per minute / square foot with all biofilter cells operating.

As state regulatory agencies move to develop composting odor policies and technical guidance memorandums, the opportunity to have access to the statewide plants that may have biofilter wood requirements due to their technology selection may become publicly available.

Benefits: In addition to the initial need for material, the continued replacement and degradation of the filter media materials provide the potential for a sustainable, albeit batch purchase, long term market for a portion of a processor's waste wood material. While the design of the biofilter is, in part, subject to the projected VOC emission loading and local air regulations, a nominal 40,000 square feet biofilter surface area utilized at one MSW composting facility utilized an estimated 6,000 cubic yards of wood chips as part of the filter media. A consultant's report on the use of a biofilter at a MSW composting facility operating in Tennessee reported that the average removal rate of total non-methane VOCs was 93.5 percent.

Application Site: This Best Practice applies to wood-waste processing facilities.

Contact: For more information about this Best Practice, contact CWC, (206) 443-7746, e-mail info@cw.org.

References:

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2. Haug, Robert T. Robert T. Haug Engineers, Inc., Torrance, CA. *The Practical Handbook of Compost Engineering*, Lewis Publishers, 1993.
3. Spencer, Robert. Bedminister Bioconversion Corporation, Marietta, GA.

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