UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
CINCINNATI, OH 45268

OFFICE OF
RESEARCH AND DEVELOPMENT

April 29, 2010

Brian L. Fuchs
Gore Cover Systems - North America
W. L. Gore & Associates, Inc
105 Vieve's Way
Elkton, MD 21921

Re: GORE® Cover Composting Technology

Dear Mr. Fuchs:

We have reviewed the documentation provided by W.L. Gore Associates regarding the GORE® Cover Composting Technology as applied for producing compost from municipal wastewater sludge. This includes a recent study conducted by W.L. Gore Associates documenting process conditions for the full scale operation of the compost cover system applied at the Greater Moncton Sewerage Commission located in New Brunswick, Canada. The draft report for this work was distributed to members of the U.S. Environmental Protection Agency's Pathogen Equivalency Committee (PEC) and select individuals from the State of Washington's Department of Ecology. We also reviewed additional documentation developed by W.L. Gore Associates on GORE® Cover Composting Technology applied to a number of other full scale applications. This report was entitled: "Using GORE® Cover Composting Technology for Producing a Class A Biosolids Compost" dated February 9, 2010.

As described, the GORE® Cover Composting Technology uses a 3 layer laminate, which contains as a middle layer an expanded polytetrafluoroethylene (ePTFE) membrane to cover static aerated piles to produce compost from municipal sludge. The composting system is conducted in three distinct phases described as: Phase 1: High Rate Composting - 28 Days; Phase 2: Maturation - 14 Days; and Phase 3: Finishing - 14 Days. The cover is used for Phase 1 and Phase 2 operations and is optional for Phase 3.

To produce Class A biosolids, aerated static piles and in-vessel systems must be maintained at a minimum operating temperature of 55°C (131°F) for at least 3 days. Furthermore, to meet 40 CFR Part 503 vector attraction reduction requirements using the "aerobic process" alternative, composting operations must ensure that the process lasts for 14 days or longer at a temperature greater than 40°C. In addition, the average temperature must be higher than 45°C.

In your February 9, 2010 submission you state that you are: "…seeking a recommendation of national equivalency from the EPA Pathogen Equivalency Committee (PEC) that GORE® Cover is capable of meeting and/or exceeding criteria for achieving Class A Biosolids as described in Alternative 5: Use of PFRP [503.32(a) (7) and (B) (1) of Appendix B]. in a covered aerated static pile without the use of a insulating layer of material (such as finished compost). The PEC agrees that your process meets the definition of Alternative 5, Use of a PFRP process. This does not relieve operators/managers from monitoring process operations to demonstrate that the time and temperature requirements as stipulated above are achieved. Moreover, this acknowledgement must not be construed as an endorsement or an exemption from seeking appropriate permits or meeting requirements imposed by state or federal authorities.

If you have questions regarding this matter, please contact me at 513-569-7348.

Sincerely your,

Mark C. Meckes
Senior Microbiologist and
Chair, U.S. EPA Pathogen Equivalency Committee

cc: PEC members
Rick Stevens, Office of Science and Technology
Regional Biosolids Coordinators
Daniel Thompson, Washington Department of Ecology

European Commission

JRC SCIENCE FOR POLICY REPORT

Best Available Techniques (BAT) Reference Document for Waste Treatment

Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control)

Antoine Pinasseau, Benoit Zerger, Joze Roth, Michele Canova, Serge Roudier

2018

Summary OF BAT and VDI Standard

https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/best-available-techniques-bat-reference-document-waste-treatment-industrial-emissions

1. Chapter 4: Biological Treatments of Waste
    - 4.2 Aerobic Treatment (including composting)
        - 4.2.1 Applied Processes and Techniques (page 368)
        - 4.2.2 Current emission and consumption levels
            - 4.2.2.2 Indoor aerobic treatment
                - 4.2.2.2.1 Emissions to air (page 387; reference to plants 579; 580, no emission levels)
    - 4.5 Techniques to consider in the determination of BAT
        - 4.5.2 Techniques for aerobic treatment
            - 4.5.2.3 "Semipermeable Membrane Covers with forced positive aeration" (page 412 – 415)
              Reference made to all Input Streams (BS, SOW, MSW – Stabilization/Biodrying)
2. Chapter 6: **BEST AVAILABLE TECHNIQUES (BAT) CONCLUSIONS**

BAT 37 a « Use semipermeable membrane covers" (page 891)

Driving force for implementation

- Simple and robust technology.
- Significantly lower capital costs compared to conventional building technologies.
- Low maintenance and operational costs.
- No end-of-pipe technology necessary except for the design version 3a. However, this version allows a significantly smaller end-of-pipe treatment design due to the fact that only air from the connected feeding tunnel requires treatment. The process air from the biological treatment is handled by 'encapsulation with semipermeable membrane cover'.

VDI Standard 3475 – Part 6 (German/English version):

https://www.vdi.de/fileadmin/pages/vdi_de/redakteure/richtlinien/inhaltsverzeichnisse/3031018.pdf

This standard describes and ranks the treatment technique under Paragraph 8.4.

"Containment using semi-permeable Covers as <u>equivalent</u> in its emission abatement performance to:
- Enclosed Systems and Equipment (8.5),
- Exhaust gas treatment (8.6) and thus specifically to Biofilter (8.6.2)"
Meeting the specific emission requirements of the German TA Luft 2002 (German Clean Act Ordinance) under 5.4.8.5

CE Schmidt, PhD
Environmental Consultant

Technical Memorandum

Date: August 1, 2023

RE: Statement of Performance of the GORE® Cover manufactured by WL Gore Associates

To: To Whom it May Concern

From: Dr. CE Schmidt and Mr. TR Card

As senior, environmental consultants specializing in assessing air emissions from a variety of industrial, agricultural, and municipal sites, our team of Schmidt and Card have over the past three decades conducted numerous air emission assessments including compost sites with 'area' sources. We perform these assessments using the South Coast Air Quality Management District (SCAQMD) modified (Rule 1133.3, Attachment A) US EPA Surface Emission Isolation Flux Chamber Technology. Our resumes are available on your request.

A significant portion of our program work involves measuring and reporting site air emissions for odor, fixed gases (methane, carbon dioxide) total non-methane organic compounds, ammonia, and individual hydrocarbon compounds from compost sites and the various technologies used to control air emissions. Air emissions are measured and reported for various purposes, mostly for county, State, and Federal compliance requirements. The common compost technologies we test include common windrow and curing sites, positive aeriation static pile technologies using micropore membranes or biofilter layers, negative aeration static pile technologies using biofiltration of the exhaust and building enclosure technologies utilizing biofiltration control. Common solid waste feedstock materials include green waste, animal manure, biosolids from municipal wastewater treatment, municipal solid waste (MSW), and sorted food waste.

We have been testing the GORE® Cover technology for many decades used for controlling air emissions from compost sites. Copies of these various emission source tests are available from California air quality districts. Below in Table 1 please find a list (not comprehensive) of locations and applications using the GORE® compost technology along with the volatile organic compound control data for these listed sites expressed as percent control which is determined by regulatory baseline emissions data for these sited and measured air emissions. The percent control for ammonia, odor and individual hydrocarbon species is typically equal to or better than these listed control data for VOCs and for a variety of compost site feedstock solid wastes. Each site typically has site-specific emission control requirements, and these sites using the GORE® Cover compost technology consistently meet or exceed the regulatory standards set in California for our compost clients. As independent scientists conducting the air emission assessment work, it is our observation that the GORE® compost control technology consistently out-performs other air emission control technologies with regard to controlling air emissions from compost operations, regardless of feedstock.

If you have any questions or comments, please feel free to contact us directly.

CE Schmidt s 9(2)(a) s 9(2)(a)

TR Card s 9(2)(a) s 9(2)(a)

Table 1

Facility	Input Materials	VOC Control	Year	Air District
Fontana, CA	Food/ Green Organics	89%	2016	Rule 1133.3 SCAQMD
Tulare, CA	Biosolids/ Green Organics	87%	2016	Rule 4565 SJVAPCD
Tulare, CA	Biosolids/ Green Organics	96%	2018	Rule 4565 SJVAPCD
Kerman, CA	Food/ Green Organics	95%	2018	Rule 4566 SJVAPCD
Tulare, CA	Biosolids/ Green Organics	98%	2019	Rule 4565 SJVAPCD
Fontana, CA	Food/ Green Organics	97%	2019	Rule 1133.3 SCAQMD
Kerman, CA	Food/ Green Organics	95%	2019	Rule 4566 SJVAPCD
Kerman, CA	Food/ Green Organics	96%	2022	Rule 4566 SJVAPCD
Tulare, CA	Biosolids/ Green Organics	99%	2023	Rule 4565 SJVAPCD
Goleta, CA	AD Digestate Residuals	98%	2023	SBAPCD (Rule 1133.3 SCAQMD)

South Coast Air Quality Management District (SCAQMD)
San Joaquin Valley Air Pollution Control District (SJVAPCD)