September 3, 2024

Puget Sound Clean Air Agency
1904 3rd Avenue, Suite 105
Seattle, WA 98101

Attn: Tom Hudson

Transmitted via email to: *tomh@pscleanair.org*

Re: Third Quarter 2024 Biofilter Inspection Technical Memorandum and Smoke Test Report
Cedar Grove Composting – Maple Valley Facility
Maple Valley, Washington
Landau Project No. 1224005.110

Dear Mr. Hudson:

Cedar Grove's Everett facility received Notice of Violation (NOV) No. 3-010458 from the Puget Sound Clean Air Agency (PSCAA) on February 3, 2020, which cancels and replaces NOV No. 3-009155, issued March 18, 2019. NOV No. 3-010458 addresses testing, inspection, and reporting requirements for the Everett facility and incorporates Tables 4 and 5 of the attached technical memorandum to NOV No. 3-009155. Landau Associates, Inc. and Cedar Grove Composting understand that the topics discussed in these NOVs are subject to further evaluation and resolution before potentially affecting compliance requirements for either the Everett or the Maple Valley facility.

As Cedar Grove engages with PSCAA to address compliance issues, we request that PSCAA withhold issuance of further NOVs related to the same inspection and reporting topics identified in NOV No. 3-010458 until a mutual understanding of inspection and reporting requirements has been established between all parties involved. This will allow Cedar Grove and its representatives to work more effectively with PSCAA. We appreciate PSCAA's consideration of this request.

LANDAU ASSOCIATES, INC.

Amy Maule
Associate Scientist

Mark Brunner
Principal

AEM/MWB/ccy
P:\1224\005\R\Maple Valley\2024_3Q\3Q2024 Report-cvrltr.docx

cc: Ron Westmoreland, Gabe Morrelli, and Jay Blazey, Cedar Grove Composting

Attachments: Technical Memorandum: Biofilter Inspections, Third Quarter 2024
Smoke Test Report

LANDAU ASSOCIATES

TECHNICAL MEMORANDUM

TO: Ron Westmoreland and Gabe Morrelli, Cedar Grove Composting

FROM: Maddie Henry and Mark Brunner

DATE: September 3, 2024

RE: Biofilter Inspections, Third Quarter 2024
Cedar Grove Composting Facility
Maple Valley, Washington

INTRODUCTION

Cedar Grove Composting (Cedar Grove) operates a facility located at 17825 Cedar Grove Road SE in Maple Valley, Washington. This facility is subject to conditions set forth in the Order of Approval, Notice of Construction No. 10645 (permit) issued by the Puget Sound Clean Air Agency (PSCAA). Condition 9 of the permit requires an independent, third-party review and evaluation of Cedar Grove's operation of biofilters and ventilation on a quarterly basis. This technical memorandum summarizes the findings of the evaluation for third quarter 2024.

The purpose of the evaluation was to review the performance of emission capture systems for facility buildings and the operating conditions of their respective biofilters. Criteria for evaluation include, but are not limited to:

- Operational condition and integrity of the exhaust/capture system
- Operational condition and integrity of the biofiltration system
- Adequacy and effectiveness of the system maintenance program and practices
- Repair history and troubleshooting errors
- Recommendations for continuous improvement of the integrated system operation.

Cedar Grove requested that Landau Associates, Inc. (Landau) evaluate the building ventilation systems and biofilters for the third quarter 2024. Landau conducted the evaluation on August 7, 2024. Pursuant to permit Condition 15, smoke tests were also conducted on August 7, 2024, and the results are provided under separate cover.

PROCESS DESCRIPTION

Cedar Grove receives yard waste, wood waste, and food waste, which it processes into compost. At its Maple Valley facility, Cedar Grove has two main buildings that receive, handle, and sort incoming waste. The Tipping Building is used to receive and temporarily store incoming organic waste and feedstock. The Sorting/Grinding Building is adjacent to the Tipping Building and receives mixed waste from the Tipping

Building via loader. In the Sorting/Grinding Building, waste is ground, separated from large debris, and sorted to contain appropriate levels of green waste, food waste, and wood waste. The building encloses the grinding operation, collecting emissions from grinding operations as well as from the Tipping Building through a second ventilation intake in the Tipping Building.

Ground waste material is transferred out of the Sorting/Grinding Building via conveyor belt to a truck that transfers waste to one of seven primary compost piles, designated as "zones." Zones 1 through 6 are outdoor primary compost piles that use a negative-pressure air collection system to direct emissions from the piles to the Primary Biofilter for odor removal. The Primary Biofilter has two separate zones, the Upper Primary Biofilter and the Lower Primary Biofilter. The two are served by different ventilation ducts.

Zone 7 is an indoor primary compost pile that is stored in a separate building on the north end of the property. The building is equipped with a continuous exhaust ventilation system. Waste material is transferred from the Zone 7 primary compost pile to a secondary compost system via a combination of mobile conveyers and trucks. Emissions and exhaust from the Zone 7 Building and the secondary compost system are delivered to the Secondary Biofilter for odor removal. Exhaust from these systems feeds into a single distribution box that distributes the combined exhaust to two different ventilation ducts, creating two different zones in the Secondary Biofilter—the East and West Biofilters.

INSPECTION PROCEDURES AND PARAMETERS

The purpose of the quarterly evaluations is to review the operational condition and integrity of emission control systems, including ventilation systems and biofilter media. Buildings and biofilters that are inspected are as follows:

- Tipping Building ventilation system and biofilter
- Sorting/Grinding Building ventilation system and biofilter
- Upper and Lower Primary ventilation systems and biofilters
- Zone 7 Building, East and West Secondary ventilation systems and biofilters.

The ventilation system of each building was evaluated to assess achievement of the design air exchange rate. Air flow from the building to the biofilter was measured at a minimum of three points across the ventilation ducts using a hot wire anemometer, Type S Pitot tube, and digital manometer. Ventilation systems are visually inspected for the deterioration to the ducting or fan that could affect system performance and ventilation efficacy.

Biofilters are visually inspected for the presence of any hotspots, fissures, plant growth, and rodent infestations. Biofilter media samples are collected at least once every 6 months and analyzed for bed temperature, moisture content, bulk density, pH, and void space. Desirable properties include warm temperature, moderate moisture content, low bulk density, low pH, a high void space, and larger

particle size distribution. These properties contribute to an optimal microbial environment.[1] After these analyses are completed, residence time (described below) is calculated.

Bed Temperature

Bed temperature refers to the average temperature of the biofilter media, which are affected by the temperatures of the ambient air and inlet process air. Biofilters contain multiple microbial species, each with its own optimum temperature. Thus, optimal bed temperature is a compromise and has been identified to be between 86° and 104°F (30° and 40°C). Acceptable temperatures are between 57° and 104°F (14° and 40°C).

Moisture Content

Moisture content refers to the water content of the biofilter media. A sufficient moisture content is required to provide micro-organisms with enough water and facilitate the degradation of odorous compounds. Sufficiently moist media are also important to maintain the structural integrity of the biofilter. When too dry, biofilters are more susceptible to cracks and fissures and, therefore, the ineffective distribution of inlet gases. When too wet, a biofilter may be susceptible to the creation of anaerobic zones, gas channeling, and increased back-pressure. The optimal range for moisture content is between 20 and 60 percent and the acceptable range is between 20 and 70 percent.

Bulk Density

Bulk density refers to the mass per unit volume of biofilter media. A lower bulk density is desirable because it indicates a higher void space and greater surface area for contact between air and micro-organisms. Bulk density is reported in grams per cubic centimeter or pounds per yard.

pH

The acidity and alkalinity of the media are indicated by pH value. The acceptable pH range for normal operation is between 5 and 8; optimal operation occurs at a pH between 6 and 7.5. Organic acids that may cause the acidification of media are by-products of microbial degradation; therefore, lower pH values indicate an aged microbial environment and may indicate the need for biofilter media replacement. A pH value lower than 8 is desirable because ammonia is converted into nitrate in these conditions, avoiding the alkalization of the media. A significant increase of ammonia, or absence of nitrates, can be an indication that media replacement is required.

[1] In Notice of Violation (NOV) No. 3-009155 issued for Cedar Grove's Everett facility, PSCAA stated that it had determined "the acceptable ranges of a few parameters." The acceptable ranges for biofilter performance identified in NOV No. 3-009155 do not have a regulatory basis and have not been established as facility-applicable criteria in any of Cedar Grove's permit documents. Furthermore, NOV No. 3-009155 is subject to further discussion and resolution following two meetings between Cedar Grove and PSCAA in 2019 and subsequent replacement of NOV No. 3-009155 by NOV No. 3-010458. With that context, the optimal and acceptable ranges presented in Table 1 of this report have not been modified to reflect the ranges in NOV No. 3-009155—the ranges presented herein are consistent with past reports for the Maple Valley facility.

Empty Bed Residence Time

Empty bed residence time (EBRT) is the amount of time microbes are in contact with the contaminated air stream. Residence time is calculated by dividing the empty bed volume by volumetric flow rate. Longer residence times produce higher efficiencies; however, a design air flow rate must minimize residence time to accommodate larger flow rates. An acceptable EBRT is any amount of time greater than 25 seconds and an optimal EBRT is between 60 and 120 seconds.

Void Space

Biofilter samples are measured for total void space. Total void space consists of both the void space that is unoccupied by water, called free air space, and the void space that is occupied by water. Void space is an indicator of available media surface area. Adequate void space is required for minimal air flow resistance, pressure drop, and blower power requirements. Greater void space is desirable for both contaminant absorption and microbial growth. The desired optimum porosity or void space for the media is in the 30 to 60 percent range. A void space less than 30 percent is undesirable because it increases the pressure drop across the biofilter. It also indicates that the media are breaking down and need to be replaced. There is no upper limit of acceptable void space. It should be noted that the act of collecting a sample to analyze void space actually alters the void space of the media. Therefore, bulk density and particle size distribution are also monitored as an indicator of media porosity and useful life. Void space is reported as a percentage.

A summary of biofilter operational parameters is provided in Table 1. The repair history is described in Table 2.

INSPECTION FINDINGS AND RECOMMENDATIONS

Tipping Building Biofilter

Ventilation System

The Tipping Building exhaust ventilation system was visually inspected for any indication of malfunction. The ventilation system appeared to be structurally sound, and no visual indicators of inoperability or malfunction (e.g., duct leaks or vent cracks) were observed. Measured air flow through the Tipping Building exhaust ventilation system was approximately 16,641 standard cubic feet per minute (scfm). The resulting EBRT was 55 seconds, which is within the acceptable range, indicating that the ventilation system continues to operate effectively with respect to biofilter performance.

Biofilter Media

The Tipping Biofilter media were observed to have an average depth of approximately 8 feet. The media appear to have settled evenly. The surface media were observed to be moist across the surface and to a depth of at least 1.5 feet. Observed temperatures were between 63° and 68°F. The average bed temperature was 65.6°F, which is within the acceptable range for biofilter performance. A few rodent

holes and sparse plant growth were observed throughout the surface of the biofilter. No indicators of hotspot formation, cracks, or fissures were observed.

No composite sample of the biofilter media was collected.

Data for the Tipping Building Biofilter, including biofilter media temperatures and air flows, are provided in Attachment 1 and a photograph is provided in Attachment 6.

Recommendations

Visually-observed operating parameters indicated that the biofilter is operating effectively, except for sparse plant growth and a few rodent holes. Raking and weeding of the biofilter surface were recommended to disturb plant growth and rodent holes. Sprinkling is recommended to maintain biofilter moisture.

Sorting/Grinding Building and Biofilter

Ventilation System

The Sorting/Grinding Building exhaust ventilation system was visually inspected for any indication of malfunction. All seals appeared to be in good working order. Overall, the ventilation system appeared to be structurally sound, and no visual indicators of inoperability were observed. Measured air flow through the Sorting/Grinding Building fan was approximately 28,283 scfm. The resulting EBRT was 71 seconds, which is within the optimal range, indicating that the biofilter continues to operate effectively with respect to biofilter performance. A photograph of the ventilation system is provided in Attachment 6.

Biofilter Media

The Sorting/Grinding Building Biofilter media were observed to have an average depth of approximately 8 feet. The material has settled evenly. The surface media were observed to be moist across the surface and to a depth of at least 2 feet throughout the biofilter. Observed temperatures were between 54° and 78°F. The average bed temperature was 61.5°F, which is within the acceptable operating range. Several rodent holes and very sparse plant growth were observed throughout the surface of the biofilter. No indicators of hotspot formation, cracks, or fissures were observed.

A composite sample of the biofilter media was collected. Laboratory analysis indicates that the media are aging as expected.

- The moisture content of the biofilter was 60.2 percent, which is within the acceptable operating range.
- The void space of the biofilter was 41 percent, which is within the optimal operating range. Particle size degradation resulting in an increased bulk density and decreased void space is normal and expected in the biofilter aging process.
- The pH was 7.8, which is within the acceptable operating range. Additionally, ammonia concentrations were within the typical range of historical data. These laboratory-reported

chemical characteristics support the conclusion that the biofilter continues to perform acceptably and effectively.

Data for the Sorting/Grinding Building Biofilter, including biofilter media temperatures and air flows, are provided in Attachment 2. Laboratory analytical reports are provided in Attachment 5, and a photograph is provided in Attachment 6.

Recommendations

Visually-observed and laboratory-reported operating parameters indicated that the biofilter is operating effectively, except for several rodent holes and sparse plant growth. Raking and weeding of the biofilter surface were recommended to disturb rodent holes and plant growth. Sprinkling is recommended to maintain biofilter moisture.

Upper Primary Biofilter

Ventilation System

The Upper Primary Biofilter ventilation system was visually inspected for any indication of malfunction. The ventilation system appeared to be structurally sound, and no visual indicators of inoperability or malfunction (e.g., duct leaks or vent cracks) were observed. Air flow through the Upper Primary ventilation system was approximately 19,166 scfm. The resulting EBRT was 185 seconds, which is within the acceptable operating range. A photograph of the ventilation system is provided in Attachment 6.

Biofilter Media

The Upper Primary Biofilter media were observed to have an average depth of approximately 5 feet. The material has settled evenly. The media were observed to be dry across the surface and moist starting at a depth of 0.5 feet to at least 2 feet. Observed temperatures were between 95° and 100°F. The average bed temperature was 97.0°F, which is within the optimal operating range. No indicators of rodent holes, hotspots, cracks, or fissures were observed. Heavy plant growth was observed throughout the surface of the biofilter.

A composite sample of the biofilter media was collected. Laboratory analysis indicates that the media are aging as expected.

- The moisture content of the biofilter was 48.5 percent, which is within the optimal operating range.
- The void space of the biofilter was 11 percent, which is below the acceptable operating range. Since EBRT is within the acceptable range, low void space is not an immediate concern, but will be monitored. Particle size degradation resulting in an increased bulk density and decreased void space is normal and expected in the biofilter aging process.
- The pH was 7.0, which is within the optimal operating range. Additionally, ammonia concentrations were within the typical range of historical data. These laboratory-reported chemical characteristics support the conclusion that the biofilter continues to perform acceptably and effectively.

Data for the Upper Primary Biofilter, including biofilter media temperatures and air flows, are provided in Attachment 3. Laboratory analytical reports are provided in Attachment 5, and a photograph is provided in Attachment 6.

Recommendations

Visually-observed and laboratory-reported operating parameters indicated that the biofilter is operating effectively, except for heavy plant growth throughout the biofilter and low void space. Raking and weeding of the biofilter surface were recommended to disturb plant growth. Sprinkling is recommended to maintain biofilter moisture. Void space will be monitored.

Lower Primary Biofilter

Ventilation System

The Lower Primary Biofilter exhaust ventilation system was visually inspected for any indication of malfunction. All seals appeared to be in good working order. Overall, the ventilation system appeared to be structurally sound, and no visual indicators of inoperability were observed. Measured air flow through the Lower Primary fan was approximately 14,669 scfm. EBRT was not calculated due to the maintenance occurring at the time of the inspection, as described below. A photograph of the ventilation system is provided in Attachment 6.

Biofilter Media

The Lower Primary Biofilter was undergoing maintenance at the time of inspection, including a complete replacement of biofilter media and inspection of the header and lateral pipes. During maintenance, all airflow is directed to the operating biofilter (in this case, the Upper Primary Biofilter). A photograph is provided in Attachment 6. Reconstruction of the biofilter is ongoing as Cedar Grove is experiencing setbacks regarding delivery of critical parts; it will be inspected again in the fourth quarter of 2024.

Recommendations

No recommendations are made, due to the maintenance in progress.

Zone 7 Building

Ventilation System

The Zone 7 Biofilter exhaust ventilation system was visually inspected for any indication of malfunction. The ventilation system appeared to be structurally sound, and no visual indicators of inoperability were observed. Measured air flow through the Zone 7 ventilation system was approximately 42,545 scfm. A photograph of the ventilation system is provided in Attachment 6.

West Secondary Biofilter

Ventilation System

The West Secondary Biofilter ventilation system was visually inspected for any indication of malfunction. Most of the ventilation system is buried; the observable extent of the duct was visually inspected. No visual indicators of inoperability were observed. Measured air flow through the West Secondary ventilation system was approximately 31,835 scfm. The resulting EBRT was 96 seconds, which is within the optimal range, indicating that the ventilation system continues to operate effectively.

Biofilter Media

Media were observed to have a depth of approximately 4 feet. The material has settled evenly. The media were observed to be dry across the surface and to a depth of at least 2 feet. Observed temperatures were between 59° and 78°F. The average bed temperature was 64.7°F, which is within the acceptable operating range. No fissures or hotspots were observed. A few rodent holes and moderate plant growth were observed throughout the surface of the biofilter.

A composite sample of the biofilter media was collected. Laboratory analysis indicates that the media are aging as expected.

- The moisture content of the biofilter was 63.0 percent, which is within the acceptable operating range.
- The void space of the biofilter was 6 percent, which is below the acceptable operating range. Since EBRT is within the optimal operating range, low void space is not an immediate concern, but based on decreasing void space over the past two sampling periods, addition or replacement of media will be scheduled. Particle size degradation resulting in an increased bulk density and decreased void space is normal and expected in the biofilter aging process.
- The pH was 7.3, which is within the optimal operating range. Additionally, ammonia concentrations were within the typical range of historical data. These laboratory-reported chemical characteristics support the conclusion that the biofilter continues to perform acceptably and effectively.

Data for the West Secondary Biofilter, including biofilter media temperatures and air flows, are provided in Attachment 4. Laboratory analytical reports are provided in Attachment 5, and a photograph is provided in Attachment 6.

Recommendations

Visually-observed and laboratory-reported operating parameters indicated that the biofilter is operating effectively, except for moderate plant growth, a few rodent holes, and low void space. Raking and weeding of the biofilter surface were recommended to disturb plant growth and rodent holes. Sprinkling is recommended as needed to maintain biofilter moisture. Addition or replacement of media will be scheduled.

East Secondary Biofilter

Ventilation System

The East Secondary Biofilter ventilation system was visually inspected for any indication of malfunction. Most of the ventilation system is buried and the observable extent of the duct was visually inspected. From the observable extent, no visual indicators of inoperability or malfunction were observed. Measured air flow through the East Secondary ventilation system was approximately 37,576 scfm. The resulting EBRT was 111 seconds, which is within the optimal range, indicating that the ventilation system continues to operate effectively. A photograph of the ventilation system is provided in Attachment 6.

Biofilter Media

The East Secondary Biofilter media were observed to have an average depth of approximately 4 feet. The material has settled evenly. The media were observed to be dry across the surface and to a depth of at least 2 feet. Observed temperatures were between 69° and 73°F. The average bed temperature was 71.1°F. These temperatures were within the acceptable range for biofilter performance. Heavy plant growth was observed across the biofilter. No indicators of hotspots, rodent holes, or fissures were observed.

A composite sample of the biofilter media was collected. Laboratory analysis indicates that the media are aging as expected.

- The moisture content of the biofilter was 55 percent, which is within the optimal operating range.
- The void space of the biofilter was 7 percent, which is below the acceptable operating range. Since EBRT is within the optimal operating range, low void space is not an immediate concern, but based on decreasing void space over the past two sampling periods, addition or replacement of media will be scheduled. Particle size degradation resulting in an increased bulk density and decreased void space is normal and expected in the biofilter aging process.
- The pH was 6.9, which is within the optimal operating range. Additionally, ammonia concentrations were within the typical range of historical data. These laboratory-reported chemical characteristics support the conclusion that the biofilter continues to perform acceptably and effectively.

Data for the East Secondary Biofilter, including biofilter media temperatures and air flows, are provided in Attachment 4. Laboratory analytical reports are provided in Attachment 5, and a photograph is provided in Attachment 6.

Recommendations

Visually-observed and laboratory-reported operating values indicate that the East Secondary Biofilter is operating effectively, except for heavy plant growth and low void space. Raking and weeding of the biofilter surface were recommended to disturb plant growth. Sprinkling is recommended to maintain biofilter moisture. Addition or replacement of media will be scheduled.

CONCLUSIONS AND RECOMMENDATIONS

An evaluation of Cedar Grove's Maple Valley facility was conducted on August 7, 2024, by Landau to assess the operability and efficacy of the exhaust/capture systems and biofilter systems. All ventilation systems appeared to be effectively maintaining the biofilter residence times intended to achieve odor control objectives.

Biofilters were visually inspected to evaluate moisture content, plant growth, rodent holes, and media settlement. The moisture content for all biofilters appeared to be within the effective operating range. Rodent holes were observed in the Tipping Building, Sorting/Grinding Building, and West Secondary Biofilters. Plant growth was observed in the Tipping Building, Sorting/Grinding Building, Upper Primary, West Secondary, and East Secondary Biofilters. Regular raking and weeding of media are recommended for all biofilters to continue to prevent vegetation growth and rodent holes.

Laboratory analyses of biofilter media evaluated void space, bulk density, particle size distribution, pH, and ammonia content. Laboratory analytical results indicate that the biofilters continue to operate effectively, except for low void space in the Upper Primary, West Secondary, and East Secondary Biofilters. Monitoring void space of the Upper Primary Biofilter is recommended. Addition or replacement of media in the West and East Secondary Biofilters is recommended. Table 3 summarizes visual inspections of the ventilation systems. Table 4 summarizes visual inspections of the biofilters. Table 5 summarizes overall biofilter performance.

LANDAU ASSOCIATES, INC.

Maddie Henry
Senior Staff Scientist

Mark Brunner
Principal

MPH/AEM/MWB/ccy
P:\1224\005\R\Maple Valley\2024_3Q\Landau_MV_3Q2024_Biofilter Inspection_tm - 09-03-24.docx

Attachments

Table 1: Summary of Biofilter Operational Parameters
Table 2: Corrective Action, Maintenance, and Repair History
Table 3: Ventilation System Assessment Summary
Table 4: Biofilter Visual Inspection Summary
Table 5: Biofilter Performance Summary
Attachment 1: Tipping Building Ventilation System and Biofilter Evaluation
Attachment 2: Sorting/Grinding Building Ventilation System and Biofilter Evaluation
Attachment 3: Primary Compost Pile Ventilation System and Biofilter Evaluation
Attachment 4: Secondary Compost Pile Ventilation System and Biofilter Evaluation
Attachment 5: Laboratory Analytical Data
Attachment 6: Selected Site Photographs
Attachment 7: Corrective Action Log

Table 1
Summary of Biofilter Operational Parameters
Cedar Grove Composting
Maple Valley, Washington

Parameter	Acceptable Range	Optimal Range
Bed Temperature	14-40°C (57-104°F)	30-40°C (86-104°F)
Moisture Content	20 - 70 percent	20 - 60 percent
pH	5 to 8	6 to 7.5
Residence Time	> 25 seconds	60 seconds to 2 minutes
Void Space	> 30 percent	30 to 60 percent

Abbreviations:

°C = degrees Celsius

°F = degrees Fahrenheit

Table 2
Corrective Action, Maintenance, and Repair History
Cedar Grove Composting
Maple Valley, Washington

Date	Activity
May 2009	Retractable doors were installed on the Tipping Building.
February 2010	A sprinkler system was installed on the Tipping Building Biofilter.
March 2011	The Tipping Building Biofilter media were replaced.
October 2011	A new belt and bearings were installed for the Zone 7 Building fan.
June 2014	The Tipping Building Biofilter was redesigned and new media were added.
March 2015	The Sorting/Grinding Building Biofilter was redesigned and went into operation.
November 2015	The East Secondary Biofilter media were replaced.
September 2017	The West Secondary Biofilter media were replaced.
November 2017	The Lower Primary Biofilter media were replaced.
February 2018	New media were added to the top of the Tipping Building Biofilter.
March 2018	Biofilters were sprayed and raked in response to the first quarter inspection.
April 2019	The Tipping Building Biofilter block wall seams were sealed with foam. The Grinding Building Biofilter header pipe was sealed with foam, new media were added to the top. New media were added to the top of the Lower Primary Biofilter.
November 2019	The Grinding Building Biofilter was rebuilt.
February/March 2020	The Upper Primary Biofilter was rebuilt.
April 2020	Media were added to the top of the Tipping Building Biofilter.
May 2020	The East Secondary Biofilter media were replaced.
August 2020	The Upper Primary Biofilter media were replaced.
February 2022	West Secondary Biofilter media were replaced.
October 2023	Media were added to the top of the Tipping Building and Grinding Building Biofilters.
August 2024	Lower primary Biofilter construction in progress

Table 3
Ventilation System Assessment Summary
Cedar Grove Composting
Maple Valley, Washington

Ventilation System	Flow Rate (scfm)	Empty Bed Residence Time (s)	Visual Observations	Corrective Action Recommended
Tipping Building	16,641	55	No structural deficiencies observed	None
Sorting/Grinding Building	28,283	71	No structural deficiencies observed	None
Upper Primary	19,166	185	No structural deficiencies observed	None
Lower Primary	14,669	N/A	No structural deficiencies observed	None
Zone 7	42,545	N/A	No structural deficiencies observed	None
West Secondary	31,835	96	No structural deficiencies observed	None
East Secondary	37,576	111	No structural deficiencies observed	None

Abbreviations and Acronyms:

scfm = standard cubic feet per minute
N/A = not applicable
s = seconds

Table 4
Biofilter Visual Inspection Summary
Cedar Grove Composting
Maple Valley, Washington

Biofilter	Visual Inspection Parameter					Corrective Action Recommended
	Rodent Holes	Plant Growth	Cracks or Fissures	Uneven Settling	Hotspots	
Tipping Building	Few	Sparse	--	--	--	Raking and Weeding; Sprinkling (*completed daily*)
Sorting/ Grinding Building	Several	Very Sparse	--	--	--	Raking and Weeding; Sprinkling (*completed daily*)
Upper Primary	--	Heavy	--	--	--	Raking and Weeding; Sprinkling (*completed daily*)
Lower Primary	N/A	N/A	N/A	N/A	N/A	N/A
West Secondary	Few	Moderate	--	--	--	Raking and Weeding; Sprinkling (*completed daily*)
East Secondary	--	Heavy	--	--	--	Raking and Weeding; Sprinkling (*completed daily*)

Abbreviations and Acronyms:
N/A = not applicable

Table 5
Biofilter Performance Summary
Cedar Grove Composting
Maple Valley, Washington

Biofilter	Performance Parameter					Corrective Action Recommended
	Average Bed Temperature (^{o}F)	Moisture Content (% or field observation)	pH	Empty Bed Residence Time (s)	Void Space (%)	
Tipping Building	65.6	Moist	NA	55	NA	None
Sorting/ Grinding Building	61.5	60.2	7.8	71	41	None
Upper Primary	97.0	48.5	7	185	11	Monitor Void Space
Lower Primary	N/A	N/A	N/A	N/A	N/A	None
West Secondary	64.7	63	7.3	96	6	Schedule Media Addition or Replacement
East Secondary	71.1	55	6.9	111	7	Schedule Media Addition or Replacement

Note:

Biofilter composite samples are collected semiannually.

Abbreviations and Acronyms:

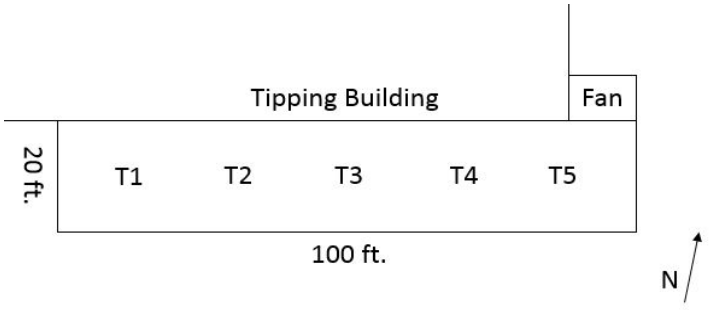
s = seconds

N/A = not applicable

ATTACHMENT 1

Tipping Building Ventilation System and Biofilter Evaluation

Attachment 1
Tipping Building Ventilation System and Biofilter Evaluation
Cedar Grove Composting
Maple Valley, Washington



Tipping Building		
Feedstock Stockpile Width =	100	ft
Feedstock Stockpile Depth =	40	ft
Feedstock Stockpile Height =	20	ft
Volume of Feedstock in Building =	80,000	ft^3
Building Capacity =	120,000	ft^3
Feedstock Percentage of Building Capacity =	67	%

Ventilation System				
Building Fan Diameter =	36	in.		
Duct Area =	7	ft^2		
Temperature =	96.0	^oF		
Velocity Pressure =	0.50	in. H_2O		
Static Pressure =	13.95	in. H_2O		
Stack Velocity =	2,479	ft/min	41	ft/s
Airflow =	17,524	ft^3/min	16,641	scfm

Biofilter		
T1 =	65	^oF
T2 =	66	^oF
T3 =	63	^oF
T4 =	66	^oF
T5 =	68	^oF
Average Bed Temperature =	65.6	^oF
Area =	2,000	ft^2
Height =	8	ft
Volume =	16,000	ft^3
Residence Time =	0.91	min (55 s)

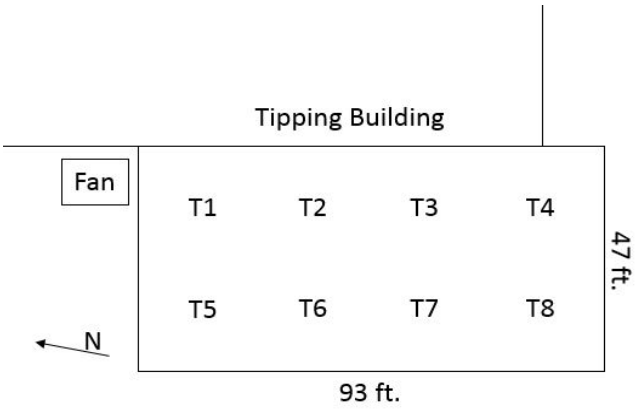
Abbreviations and Acronyms:

ft = foot/feet	in = inches
ft^2 = square feet	min = minute
ft^3 = cubic feet	scfm = standard cubic feet per minute
H_2O = water	s = second

ATTACHMENT 2

Sorting/Grinding Building Ventilation System and Biofilter Evaluation

Attachment 2
Sorting/Grinding Building Ventilation System and Biofilter Evaluation
Cedar Grove Composting
Maple Valley, Washington



Ventilation System			
Building Fan Diameter =	48	in.	
Duct Area =	13	ft^2	
Temperature =	89.7	^oF	
Velocity Pressure =	0.44	in. H_2O	
Static Pressure =	7.35	in. H_2O	
Stack Velocity =	2,343	ft/min	39 ft/s
Airflow =	29,447	ft^3/min	28,283 scfm

Biofilter			
T1 =	57 ^oF	T5 =	54 ^oF
T2 =	55 ^oF	T6 =	60 ^oF
T3 =	60 ^oF	T7 =	57 ^oF
T4 =	71 ^oF	T8 =	78 ^oF

Average Bed Temperature =	61.5	^oF	
Area =	4,371	ft^2	
Height =	8.0	ft	
Volume =	34,968	ft^3	
Residence Time =	1.19	min	71 s

Abbreviations and Acronyms:

ft = foot/feet	in = inches
ft^2 = square feet	min = minute
ft^3 = cubic feet	scfm = standard cubic feet per minute
H_2O = water	s = second

ATTACHMENT 3

Primary Compost Pile Ventilation System and Biofilter Evaluation

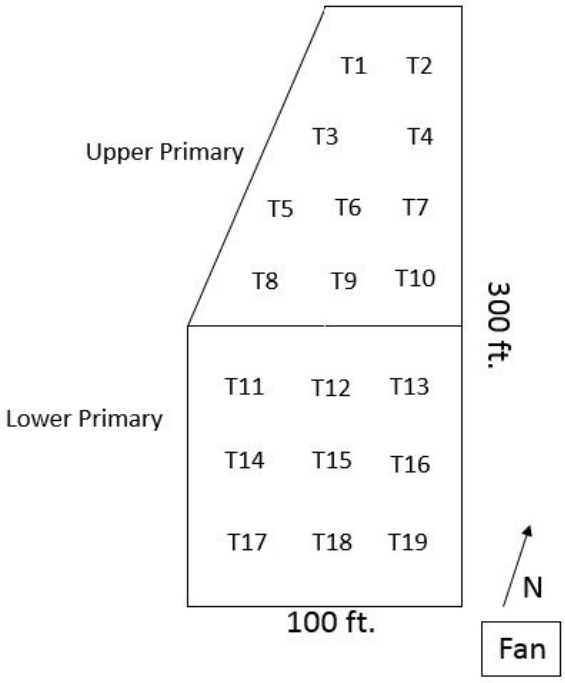
Attachment 3
Primary Compost Pile Ventilation System and Biofilter Evaluation
Cedar Grove Composting
Maple Valley, Washington

Upper Primary Ventilation System			
Building Fan Diameter =	48	in.	
Duct Area =	13	ft^2	
Temperature =	88	^oF	
Velocity Pressure =	0.33	in. H_2O	
Static Pressure =	14.56	psia	
Stack Velocity =	1,597	ft/min	27 ft/s
Airflow =	20,071	ft^3/min	19,166 scfm

Upper Primary Biofilter			
T1 =	96 ^oF	T6 =	96 ^oF
T2 =	97 ^oF	T7 =	96 ^oF
T3 =	96 ^oF	T8 =	95 ^oF
T4 =	97 ^oF	T9 =	100 ^oF
T5 =	100 ^oF	T10 =	97 ^oF
Average Bed Temperature =	97.0	^oF	
Area =	12,400	ft^2	
Height =	5	ft	
Volume =	62,000	ft^3	
Residence Time =	3.09	min	185 s

Lower Primary Ventilation System			
Building Fan Diameter =	48	in.	
Duct Area =	13	ft^2	
Temperature =	85	^oF	
Velocity Pressure =	0.2	in. H_2O	
Static Pressure =	14.40	psia	
Stack Velocity =	1229	ft/min	20 ft/s
Airflow =	15,447	ft^3/min	14,669 scfm

Lower Primary Biofilter			
T11 =	-- ^oF	T16 =	-- ^oF
T12 =	-- ^oF	T17 =	-- ^oF
T13 =	-- ^oF	T18 =	-- ^oF
T14 =	-- ^oF	T19 =	-- ^oF
T15 =	-- ^oF		
Average Bed Temperature =	--	^oF	
Area =	10,000	ft^2	
Height =	--	ft	
Volume =	--	ft^3	
Residence Time =	--	min	-- s



Total Primary Ventilation System and Biofilter		
Total Airflow =	35,519	ft^3/min
	33,835	scfm
Total Area =	22,400	ft^2
Total Height =	5	ft
Total Volume =	112,000	ft^3
Residence Time =	3.15	min
	189	s

Notes:

NS = not sampled

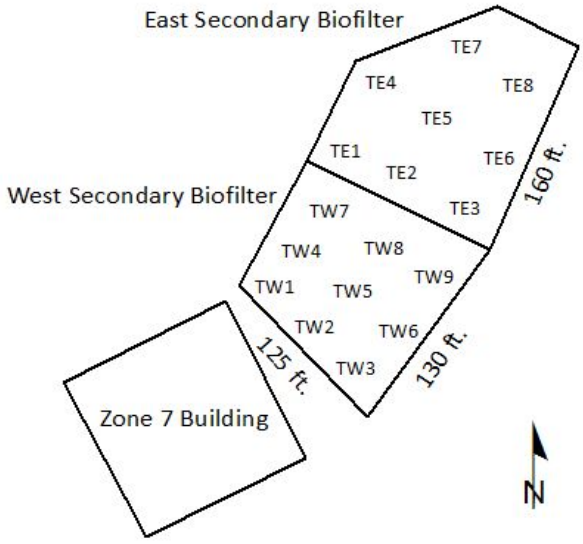
Abbreviations and Acronyms:

ft = foot/feet
ft^2 = square feet
ft^3 = cubic feet
H_2O = water
in = inches
min = minute
scfm = standard cubic feet per minute
s = second

ATTACHMENT 4

Secondary Compost Pile Ventilation System and Biofilter Evaluation

Attachment 4
Secondary Compost Pile Ventilation System and Biofilter Evaluation
Cedar Grove Composting
Maple Valley, Washington



Zone 7 Building Fan				
Building Fan Diameter =	42	in.		
Duct Area =	10	ft^2		
Temperature =	76.25	^oF		
Velocity Pressure =	1.18	in. H_2O		
Static Pressure =	1.44	in. H_2O		
Stack Velocity =	4,491	ft/min	75	ft/s
Airflow =	43,210	ft^3/min	42,545	scfm

Inlet 2 - West Biofilter Ventilation System				
Fan Diameter =	60	in.		
Duct Area =	20	ft^2		
Temperature =	80.8	^oF		
Velocity Pressure =	0.16	in. H_2O		
Static Pressure =	0.67	in. H_2O		
Stack Velocity =	1,661	ft/min	28	ft/s
Airflow =	32,605	ft^3/min	31,835	scfm

Inlet 1 - East Biofilter Ventilation System				
Fan Diameter =	60	in.		
Duct Area =	20	ft^2		
Temperature =	85.7	^oF		
Velocity Pressure =	0.23	in. H_2O		
Static Pressure =	0.76	in. H_2O		
Stack Velocity =	1,978	ft/min	33	ft/s
Airflow =	38,836	ft^3/min	37,576	scfm

Attachment 4
Secondary Compost Pile Ventilation System and Biofilter Evaluation
Cedar Grove Composting
Maple Valley, Washington

West Secondary Biofilter					
TW1 =	65	°F	TW6 =	59	°F
TW2 =	78	°F	TW7 =	65	°F
TW3 =	66	°F	TW8 =	61	°F
TW4 =	62	°F	TW9 =	62	°F
TW5 =	64	°F			
Average Bed Temperature =	64.7	°F			
Area =	13,000	ft^2			
Height =	4	ft			
Volume =	52,000	ft^3			
Residence Time =	1.59	min		96	s

East Secondary Biofilter					
TE1 =	72	°F	TE5 =	69	°F
TE2 =	72	°F	TE6 =	71	°F
TE3 =	72	°F	TE7 =	73	°F
TE4 =	71	°F	TE8 =	69	°F
Average Bed Temperature =	71.1	°F			
Area =	17,900	ft^2			
Height =	4	ft			
Volume =	71,600	ft^3			
Residence Time =	1.84	min		111	s

Total Secondary Biofilter			
Total Airflow =	71,441	ft^3/min	
Area =	30,900	ft^2	
Height =	4	ft	
Volume =	123,600	ft^3	
Residence Time =	1.73	min	104 s

Abbreviations and Acronyms:

ft = foot/feet	in = inches
ft^2 = square feet	min = minute
ft^3 = cubic feet	scfm = standard cubic feet per minute
H_2O = water	s = second

ATTACHMENT 5

Laboratory Analytical Data

US Composting Council ® STA Certified Lab

soiltest farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Client: **Cedar Grove Composting**
Attn: Ron Westmoreland
17825 Cedar Grove RD SE
Maple Valley, WA 98038
206-832-3225

Product: **SORTING-GRINDING BUILDING BIOFILTER**
Date Sampled: 08/07/24
Date Received: 08/08/24
Laboratory # C24-948

Date Reported: 8/19/2024
PO# CGV-60782
Invoice #: C24-948 **Amount: $220.00**
Reveiwed by Emmalee Slack

	Method	As Rcvd.	Dry Wt.	Units
Moisture	70 C	**60.2**		%
Solids	70 C	**39.8**		%
pH	1:5	**7.8**	**NA**	SU
E.C	1:5	**0.18**	**0.45**	mmhos/cm
Total N	TMECC 04.02D	**0.52**	**1.30**	%
Organic C	TMECC 04.01A	**10.7**	**26.8**	%
Ammonium -N	TMECC 05.02C	**9**	**22**	mg/Kg
Phosphorous	TMECC 04.12B/04.14A	**0.12**	**0.30**	%
P2O5		**0.27**	**0.69**	%
Potassium	TMECC 04.12B/04.14A	**0.05**	**0.12**	%
K2O		**0.06**	**0.15**	%
C/N ratio			**21**	ratio
Bulk Density	TMECC 03.10A		**1122**	Lb/Yard
Free Air Space	TMECC 03.10A		**41**	%
Pore Space	TMECC 03.10A		**87**	%
WHCvol	TMECC 03.10A		**46**	%v/v
WHCwt	TMECC 03.10A		**172**	%w/w

Particle Size Distribution TMECC 2.02 B & C

inches	mm	% Passing
3	**76.2**	**100.0**
2	**50**	**100.0**
1	**25**	**96.7**
3/4	**19.1**	**88.8**
5/8	**16**	**75.7**
1/2	**12.5**	**62.8**
3/8	**9.5**	**40.7**
1/4	**6.3**	**21.5**

Inerts	% by wt.
Total Plastic	**0.00**
Film Plastic	**0.39**
Glass	**0.00**
Metal	**0.00**
Sharps	**0.00**
Total Inerts	**0.39**

Sample was received, handled and tested in accordance with TMECC procedures

US Composting Council STA Certified Lab

soiltest farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Client: **Cedar Grove Composting**
Attn: Ron Westmoreland
17825 Cedar Grove RD SE
Maple Valley, WA 98038
206-832-3225

Product: **UPPER PRIMARY BIOFILTER**
Date Reported: 8/19/2024
Date Sampled: 08/07/24
Date Received: 08/08/24
PO# CGV-60782
Laboratory # C24-949 **Invoice #: C24-949** **Amount: $220.00**
Reveiwed by Emmalee Slack

	Method	As Rcvd.	Dry Wt.	Units
Moisture	70 C	**48.5**		%
Solids	70 C	**51.5**		%
pH	1:5	**7.0**	**NA**	SU
E.C	1:5	**0.21**	**0.41**	mmhos/cm
Total N	TMECC 04.02D	**0.59**	**1.14**	%
Organic C	TMECC 04.01A	**11.9**	**23.1**	%
Ammonium -N	TMECC 05.02C	**24**	**46**	mg/Kg
Phosphorous	TMECC 04.12B/04.14A	**0.09**	**0.18**	%
P2O5		**0.21**	**0.41**	%
Potassium	TMECC 04.12B/04.14A	**0.05**	**0.09**	%
K2O		**0.06**	**0.11**	%
C/N ratio			**20**	ratio
Bulk Density	TMECC 03.10A		**1226**	Lb/Yard
Free Air Space	TMECC 03.10A		**11**	%
Pore Space	TMECC 03.10A		**70**	%
WHCvol	TMECC 03.10A		**59**	%v/v
WHCwt	TMECC 03.10A		**157**	%w/w

Particle Size Distribution TMECC 2.02 B & C

inches	mm	% Passing	Inerts	% by wt.
3	**76.2**	**100.0**		
2	**50**	**100.0**	Total Plastic	**0.00**
1	**25**	**100.0**	Film Plastic	**0.07**
3/4	**19.1**	**98.2**	Glass	**0.00**
5/8	**16**	**96.0**	Metal	**0.00**
1/2	**12.5**	**87.6**	Sharps	**0.00**
3/8	**9.5**	**77.3**	Total Inerts	**0.07**
1/4	**6.3**	**61.4**		

Sample was received, handled and tested in accordance with TMECC procedures

US Composting Council
STA Certified Lab

soiltest
farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Client: **Cedar Grove Composting**
Attn: Ron Westmoreland
17825 Cedar Grove RD SE
Maple Valley, WA 98038
206-832-3225

Product: **WEST SECONDARY BIOFILTER**
Date Sampled: 08/07/24
Date Received: 08/08/24
Laboratory # C24-950

Date Reported: 8/23/2024
PO# CGV-60782
nvoice #: C24-950 **Amount: $220.00**
Reveiwed by Emmalee Slack

	Method	As Rcvd.	Dry Wt.	Units
Moisture	70 C	**63.0**		%
Solids	70 C	**37.0**		%
pH	1:5	**7.3**	**NA**	SU
E.C	1:5	**0.18**	**0.47**	mmhos/cm
Total N	TMECC 04.02D	**0.41**	**1.11**	%
Organic C	TMECC 04.01A	**10.8**	**29.1**	%
Ammonium -N	TMECC 05.02C	**16**	**44**	mg/Kg
Phosphorous	TMECC 04.12B/04.14A	**0.05**	**0.13**	%
P2O5		**0.11**	**0.30**	%
Potassium	TMECC 04.12B/04.14A	**0.05**	**0.15**	%
K2O		**0.06**	**0.18**	%
C/N ratio			**26**	ratio
Bulk Density	TMECC 03.10A		**1432**	Lb/Yard
Free Air Space	TMECC 03.10A		**6**	%
Pore Space	TMECC 03.10A		**80**	%
WHCvol	TMECC 03.10A		**74**	%v/v
WHCwt	TMECC 03.10A		**235**	%w/w

Particle Size Distribution TMECC 2.02 B & C

inches	mm	% Passing	Inerts	% by wt.
3	**76.2**	**100.0**		
2	**50**	**100.0**	Total Plastic	**0.00**
1	**25**	**95.8**	Film Plastic	**0.02**
3/4	**19.1**	**93.6**	Glass	**0.00**
5/8	**16**	**87.8**	Metal	**0.00**
1/2	**12.5**	**78.6**	Sharps	**0.00**
3/8	**9.5**	**67.9**	Total Inerts	**0.02**
1/4	**6.3**	**58.0**		

Sample was received, handled and tested in accordance with TMECC procedures

US Composting Council
STA Certified Lab

soiltest
farm consultants, inc.
2925 Driggs Dr., Moses Lake, Wa 98837 - www.soiltestlab.com
Office: (509)765-1622 - Fax:(509)765-0314 - (800)764-1622

Client: **Cedar Grove Composting**
Attn: Ron Westmoreland
17825 Cedar Grove RD SE
Maple Valley, WA 98038
206-832-3225

Product: **EAST SECONDARY BIOFILTER** Date Reported: 8/23/2024
Date Sampled: 08/07/24
Date Received: 08/08/24 **PO# CGV-60782**
Laboratory # C24-951 **Invoice #: C24-951** **Amount: $220.00**
Reveiwed by Emmalee Slack

	Method	As Rcvd.	Dry Wt.	Units
Moisture	70 C	**55.0**		%
Solids	70 C	**45.0**		%
pH	1:5	**6.9**	**NA**	SU
E.C	1:5	**0.31**	**0.68**	mmhos/cm
Total N	TMECC 04.02D	**0.51**	**1.14**	%
Organic C	TMECC 04.01A	**11.2**	**24.9**	%
Ammonium -N	TMECC 05.02C	**7**	**15**	mg/Kg
Phosphorous	TMECC 04.12B/04.14A	**0.07**	**0.15**	%
P2O5		**0.16**	**0.35**	%
Potassium	TMECC 04.12B/04.14A	**0.06**	**0.14**	%
K2O		**0.08**	**0.17**	%
C/N ratio			**22**	ratio
Bulk Density	TMECC 03.10A		**1337**	Lb/Yard
Free Air Space	TMECC 03.10A		**7**	%
Pore Space	TMECC 03.10A		**73**	%
WHCvol	TMECC 03.10A		**66**	%v/v
WHCwt	TMECC 03.10A		**185**	%w/w

Particle Size Distribution TMECC 2.02 B & C

inches	mm	% Passing
3	**76.2**	**100.0**
2	**50**	**100.0**
1	**25**	**98.8**
3/4	**19.1**	**96.5**
5/8	**16**	**94.8**
1/2	**12.5**	**90.9**
3/8	**9.5**	**84.9**
1/4	**6.3**	**72.0**

Inerts	% by wt.
Total Plastic	**0.00**
Film Plastic	**0.03**
Glass	**0.00**
Metal	**0.00**
Sharps	**0.00**
Total Inerts	**0.03**

Sample was received, handled and tested in accordance with TMECC procedures

ATTACHMENT 6

Selected Site Photographs

1. Tipping Building Biofilter.

2. Grinding Building Biofilter.

LANDAU ASSOCIATES

Cedar Grove
Composting Facility
Maple Valley, Washington

Selected Site Photographs

Figure
6-1

3. Upper Primary Biofilter and Ventilation System.

4. Lower Primary Biofilter and Ventilation System.

LANDAU ASSOCIATES

Cedar Grove Composting Facility Maple Valley, Washington	**Selected Site Photographs**	Figure 6-2

5. West Secondary Biofilter.

6. East Secondary Biofilter.

LANDAU ASSOCIATES

Cedar Grove
Composting Facility
Maple Valley, Washington

Selected Site Photographs

Figure
6-3

ATTACHMENT 7

Corrective Action Log

Attachment 7
Corrective Action Log
Biofilter Inspections and Ventilation System Assessments – 2nd Quarter 2024
Cedar Grove Composting – Maple Valley Facility

Date	Affected Equipment	Issue Description	Corrective Action Recommended	Date of Corrective Action	Corrective Action Performed By
8/8/2024	Tipping Building Biofilter	Few rodent holes; sparse plant growth	Raking and weeding to disturb rodent holes and plant growth; sprinkling to maintain biofilter moisture	Raking and weeding completed daily. Sprinkling completed daily.	Cedar Grove Facility Staff
8/8/2024	Grinding Building Biofilter	Several rodent holes; very sparse plant growth	Raking and weeding to disturb rodent holes and plant growth; sprinkling to maintain biofilter moisture	Raking and weeding completed daily. Sprinkling completed daily.	Cedar Grove Facility Staff
8/8/2024	Upper Primary Biofilter	Heavy plant growth; dry biofilter surface	Raking and weeding to disturb plant growth; sprinkling to maintain biofilter moisture	Raking and weeding completed daily. Sprinkling completed daily.	Cedar Grove Facility Staff
8/8/2024	Lower Primary Biofilter	None	None	N/A	N/A
8/8/2024	West Secondary Biofilter	Few rodent holes; moderate plant growth; dry biofilter surface	Raking and weeding to disturb rodent holes and plant growth; sprinkling to maintain biofilter moisture	Raking and weeding completed daily. Sprinkling completed daily.	Cedar Grove Facility Staff
8/8/2024	East Secondary Biofilter	Heavy plant growth; dry biofilter surface	Raking and weeding to disturb rodent holes and plant growth; sprinkling to maintain biofilter moisture	Raking and weeding completed daily. Sprinkling completed daily.	Cedar Grove Facility Staff

Smoke Test Report
Cedar Grove Composting – Maple Valley, Washington

Location: **Tipping Building and Biofilter**

Date: August 7, 2024

Start Time of Smoke Test: 7:32

End Time of Smoke Test: 7:36

Meteorological Data

Average Wind Speed (mph)	0.0
Wind Direction	N/A
Ambient Temperature (°F)	55
Precipitation	0.00

Building and Biofilter Parameters

Volume of Feedstock in Building (ft^3, %)[1]	80,000, 67
Distance from door to smoke bomb (ft)	30
Biofilter Media Depth (ft)	8

Process Activity

Prior to Test	Trucks unloading food waste, grass, and tree clippings
During Test	Grinder loading
After Test	Trucks unloading food waste, grass, and tree clippings

Ventilation System Data

Tipping Building Airflow (scfm)	16,641
Temperature (°F)	96
Static Pressure (in H_2O)	13.95
Velocity Pressure (in H_2O)	0.50

Abbreviations and Acronyms:

°F = degrees Fahrenheit
ft = foot/feet
ft^3 = cubic feet
H_2O = water
in = inches
mph = miles per hour
N/A = not applicable
scfm = standard cubic feet per minute

[1] Based on a total volumetric capacity of 120,000 ft^3.

Pass/Fail: Fail

Summary

A smoke test was conducted on the Tipping Building on August 7, 2024 between 7:32 a.m. and 7:36 a.m. The building was approximately 67 percent full of feedstock. The total tonnage of waste received by the Tipping Building on that day was 1,036.97. The Tipping Building door was closed during testing.

For the control of odors, the Tipping Building has the following operational and maintenance criteria:

1. The building needs to be under negative ventilation.
2. The building shall have an air exchange rate of up to four air exchanges per hour.
3. The buildings/enclosures shall be closed to the maximum extent possible during normal operations.

The smoke test was conducted using two Superior Smoke W3C candles attached in series. The two smoke candles were placed approximately 30 feet from the closed Tipping Building bay door and in the centerline of the door. Each candle typically produces 40,000 cubic feet of white smoke over a 3- to 4-minute period resulting in 6 to 7 minutes of smoke. During this test, the smoke maintained visibility for the duration of the test.

One minute into the test, smoke began to move toward the door. Two minutes into the test, smoke was observed approaching the point of compliance at the front of the building. Four minutes into the test, smoke was observed leaving the front door of the building. Because smoke was observed leaving the building, the test is considered a fail.

Videos of the smoke tests are available for review upon request.

Smoke Test Record

Location: **Sorting/Grinding Building and Biofilter**

Date: August 7, 2024

Start Time of Smoke Test: 7:46

End Time of Smoke Test: 7:52

Meteorological Data

Average Wind Speed (mph)	0.0
Wind Direction	N/A
Ambient Temperature (°F)	55.0
Precipitation	0.00

Process Activity

Prior to Test	Grinding of feedstock
During Test	Grinding of feedstock
After Test	Grinding of feedstock

Building and Biofilter Parameters

Distance from door to smoke bomb (ft)	60
Biofilter Media Depth (ft)	8.0

Ventilation System Data

Grinding Building Airflow (scfm)	28,283
Temperature (°F)	89.7
Static Pressure (in H_2O)	7.35
Velocity Pressure (in H_2O)	0.44

Abbreviations and Acronyms:

°F = degrees Fahrenheit
ft = foot/feet
ft^3 = cubic feet
H_2O = water
in = inches
mph = miles per hour
N/A = not applicable
scfm = standard cubic feet per minute

Pass/Fail: Fail

Summary

A smoke test was conducted on the Sorting/Grinding Building on August 7, 2024 between 7:46 and 7:52 a.m. Grinding operations were ongoing, and the main door was closed. The Sorting/Grinding Building was empty of material at the time of the test.

The smoke test was conducted using two Superior Smoke W3C candles attached in series. The two smoke candles were placed approximately 60 feet from the door. Each candle typically produces 40,000 cubic feet of white smoke over a 3- to 4-minute period for a total of 6 to 7 minutes. During this test, the smoke maintained visibility throughout the entirety of the test.

One minute into the test, smoke spread across the building. Two minutes into the test, smoke began moving toward the point of compliance. Six minutes into the test, smoke reached the door and was leaving the point of compliance. Because smoke was observed leaving the building, the test is considered a fail.

Videos of the smoke tests are available for review upon request.