NORTH CAROLINA DIVISION OF AIR QUALITY

Application Review

Issue Date: TBD

Region: Mooresville Regional Office
County: Catawba
NC Facility ID: 1800267
Inspector's Name: Ashley McCreary
Date of Last Inspection: 02/23/2024
Compliance Code: 3 / Compliance - inspection

Facility Data

Applicant (Facility's Name): Terra-Mulch Products, LLC

Facility Address:
Terra-Mulch Products, LLC
219 Simpson Street
Conover, NC 28613

SIC: 2499 / Wood Products, Nec
NAICS: 321999 / All Other Miscellaneous Wood Product Manufacturing

Facility Classification: Before: Title V **After:** Title V
Fee Classification: Before: Title V **After:** Title V

Permit Applicability (this application only)

SIP: 02D: .0515, .0516, .0521, .0524, .1100, .1111
02Q: .0317, .0711
NSPS: Subpart Dc
NESHAP: n/a
PSD: n/a
PSD Avoidance: VOC
NC Toxics: 02D .1100, 02Q .0711
112(r): no RMP required
Other: n/a

Contact Data

Facility Contact	Authorized Contact	Technical Contact
David Frederick Site Safety Manager (828) 539-4290 219 Simpson Street Conover, NC 28613	Brian Moran Plant Manager (828) 327-4165 219 Simpson Street Conover, NC 28613	David Frederick Site Safety Manager (828) 539-4290 219 Simpson Street Conover, NC 28613

Application Data

Application Number: 1800267.23A
Date Received: 09/15/2023
Application Type: Modification
Application Schedule: TV-1st Time

Existing Permit Data
Existing Permit Number: 04248/R18
Existing Permit Issue Date: 09/14/2022
Existing Permit Expiration Date: 01/31/2025

Total Actual emissions in TONS/YEAR:

CY	SO2	NOX	VOC	CO	PM10	Total HAP	Largest HAP
2022	0.1700	27.81	114.47	23.35	21.85	8.76	4.01 [Methanol (methyl alcohol)]

Review Engineer: Russell Braswell

Review Engineer's Signature: **Date:**

Comments / Recommendations:
Issue 04248/T19
Permit Issue Date: TBD
Permit Expiration Date: TBD+ 5 years

1. Purpose of Application

Terra-Mulch Products, LLC (Terra-Mulch; the facility) operates a factory in Catawba County under Air Quality Permit No. 04248R18 (the existing permit). The existing permit includes Specific Condition A.15, which requires Terra-Mulch to submit an application for an initial Title V permit. Terra-Mulch submitted this application in order to satisfy that condition.

2. Application Chronology

Date	Event
September 15, 2023	Application received.
September 22, 2023	Request for additional information was sent to applicant via email: 1a. Does the facility use water spray on the wood handling conveyors? 1b. Does the facility grind or mill any off-spec material? 2a. What is the approximate moisture of the dried wood fiber? 2b. Does the facility apply dyes to the fiber? 2c. Has the facility ever conducted testing on the dryers? 3. Has the facility ever conducted testing on the baggers? 4a. Is the material used in the wood mat line the same as the wood dryers? 4b. Are any glues or binders used in the wood mats? 4c. Are any inks or dyes applied to the wood mats? 5a. The site layout indicates a "horticulture section." What products are made there? 5b. Are there any air emission sources in that area?
September 22, 2023	Response received to the September 22 request for information: 1a. No 1b. Yes. Grinding is done in a self-contained chamber. 2a. Plant 1: 14-17%. Plant 2: 18-28%. 2b. A green dye is applied during the refining (grinding) process to some products. 2c. No testing has been done on the dryers, only the associated cyclone. 3. Testing was done in 2020 (dust survey), 2018 (dust study), and 2017 (industrial hygiene exposure assessment report). The processes haven't had significant changes in a very long time. 4a. Yes. 4b. No. 4c. No. 5a. They use bags of the same material. 5b. Only vent fans for temperature control.
September 22, 2023	Based on the above response, a new request for additional information was sent to the applicant via email: 1. Do the dyes contain VOC? 2. Please supply the data sheets for the dyes. 3. Approximately how much dye is used per year? 4. DAQ prepared a draft process flow diagram for the wood receiving portion of the facility.
September 22, 2023	Response received regarding the above request for information: 4. The applicant agreed with the proposed diagram.
September 25, 2023	Response received regarding the above request for information: 2. The applicant provided one SDS for the dyes and planned to look into the use of other dyes.

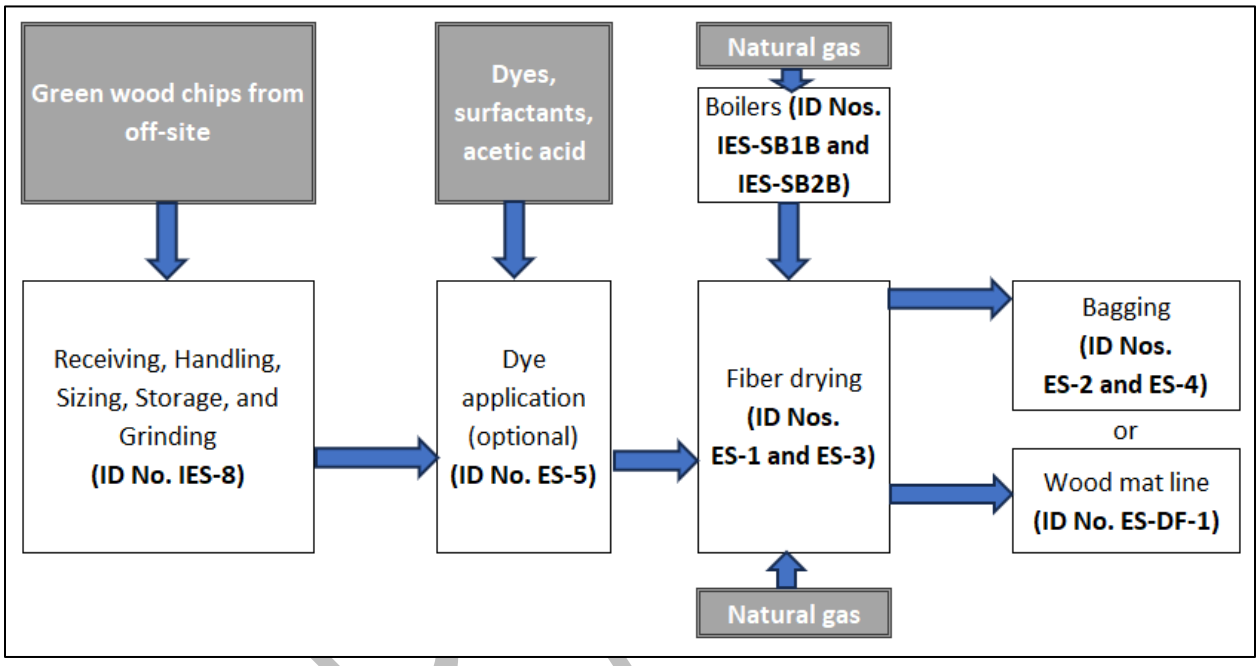
Date	Event
October 5, 2023	Request for additional information sent to applicant via email: 1. The proposed PM emission factors for the dryers is not acceptable, and DAQ will require a one-time test unless other data is provided. 2. Is there any additional data for emission testing on ES-2? 3. What is the basis for the 20 pounds of fiber estimate for the wood mat line? 4. Are there any additional SDSs for the dyes?
October 6, 2023	Response received to the October 5 request for information: 1. A test was performed on Plant 1 in 2008. 2. Test data for ES-2 is not available. 3. Terra-Mulch will perform site-specific analysis to back up the 20 pound estimate for the wood mat line. 4. Terra-Mulch included an accounting of dye usage.
November 15, 2023	Additional response received to the October 5 request for information: 1. Terra-Mulch verified the 20 pound estimate for the wood mat line. 2. Terra-Mulch planned to perform emission calculations and complete application forms for dye usage.
December 12, 2023	Reminder sent to Terra-Mulch regarding the November 15 response. Terra-Mulch had planned to perform emission calculations and complete application forms for dye usage, but that had not yet been received.
March 12, 2024	Terra-Mulch submitted an application addendum that included: 1. the requested emission calculations for the dye usage. 2. application forms for a new emission source (ES-5) to address dye usage. 3. a modeling demonstration for TAPs emitted from dye usage.
May 8, 2024	DAQ AQAB approved the modeling demonstration.
May 9, 2024	An initial draft of the Title V permit and this application review were sent to DAQ Permits staff.
May 16, 2024	Response received (in-person) to the May 9 draft.
May 16, 2024	Request for additional information sent to applicant via email: 1. Does the facility emit 1-BP? 2. How is the wood mat line heated?
May 17, 2024	Response received to the May 16 request for information: 1. “the site does not use products containing that chemical that we are aware of.” 2. Electrically heated.
May 17, 2024	A revised draft of the Title V permit and this application review were sent to DAQ SSCB staff, DAQ MRO staff, and Terra-Mulch staff.
May 31, 2024	Based on comments from MRO, DAQ proposed modeling emissions of phenol and acrolein from the dryers. Terra-Mulch agreed with the proposal.
June 3, 2024	Emission rates of phenol and acrolein sent to DAQ AQAB so that the previous model could be updated.
June 11, 2024	DAQ AQAB approved the updated modeling demonstration.
XXXX	Public notice / EPA Review
XXXX	Permit issued.

3. Facility Description

This facility produces landscaping and agricultural products, such as much and wood fiber mats. The facility broadly consists of wood fiber receiving and storage, dye application, fiber drying, fiber bagging, and a wood fiber processing line.

See Attachment for specific emission calculations from the activities at this facility.

Figure 1: Overall plant diagram[1]



3.1 Wood fiber receiving, sorting, and conveying (IES-8)

Process description: According to the application:

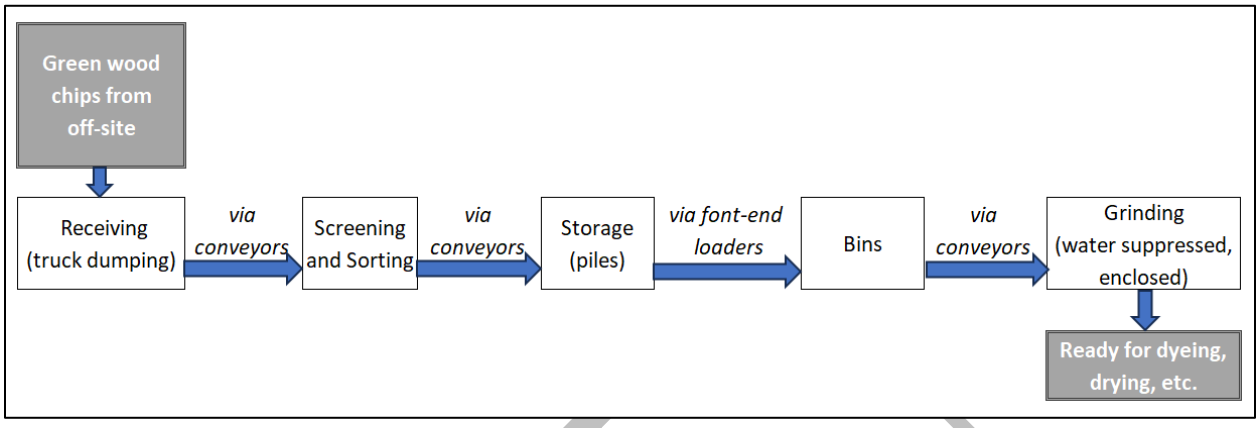
> "Chipped wood scrap and bark pieces are brought in by truck and unloaded at the truck dump area. This material is 'green' wood with a moisture content of approximately 45 to 55 percent…The material is sent through a shaker screen and conveyed to the appropriate wood chip pile (poplar/pine/bark). A front-end loader is used to scoop up wood chips into bins to be brought to the dryer for processing."[2]

In correspondence received after the application, Terra-Mulch stated:

[1] This diagram was prepared by DAQ after discussion with Terra-Mulch staff.
[2] Application at 4.

"We do grind oversized material in a refiner. The grinding is done in a self contained chamber that is not released to the atmosphere and water is applied during this process," and "dye is applied to the fiber in the refiner as mentioned earlier."[3]

Figure 2: IES-8 Wood fiber receiving and storage process diagram[4]



Terra-Mulch provided calculations that demonstrate the wood fiber receiving, conveying, and storage meet the definition of "insignificant" under 15A NCAC 02Q .0503(8).

Emissions: Emissions from this process are expected to be particulate (PM, PM_{10}, and $PM_{2.5}$) created as the wood is dumped from the trucks and conveyors. Note that because the grinder is enclosed and equipped with water suppression, no particulate is expected from the grinder.

PM emissions: In order to calculate PM emissions from the wood fiber receiving and storage process, Terra-Mulch used emission factors based on a permit application submitted by Georgia-Pacific Wood Products Warrenton Lumber Facility to the Georgia Environmental Protection Division.[5] These factors appear to be very conservative compared to DAQ's other facilities; Enviva Pellets, LLC – Ahoskie Plant (facility ID 4600107; "Enviva") is a facility in North Carolina that operates a similar wood receiving operation. At Enviva, green wood chips are received at the facility via truck, and the chips are sorted and moved using conveyors. When calculating potential emissions from green wood handling at Enviva, DAQ approved the use of the emission factor formula found in AP-42 Section 13.2.4.[6]

Pollutant Emission Factors	Application (lb/ton wood throughput)	Enviva Ahoskie (See review of 10121T06) (lb/ton per drop point)	Enviva Ahoskie (See review of 10121T06) (lb/ton assuming five drop points)	Difference
PM	4.8 E-3	3.74 E-5	1.87 E-4	2,567%
PM_{10}	2.3 E-3	1.77 E-5	8.85 E-5	2,599%
$PM_{2.5}$	4.0 E-4	2.68 E-6	1.34 E-5	2,985%

[3] Email from David Frederick (Site Safety Manager, Profile Products) to Russell Braswell (Environmental Engineer, DAQ), received September 22, 2023.
[4] This diagram was prepared by DAQ after discussion with Terra-Mulch staff. See note 1.
[5] Application at Appendix D.
[6] See DAQ's Application Review associated with Title V permit 10121T06, issued February 2, 2023.

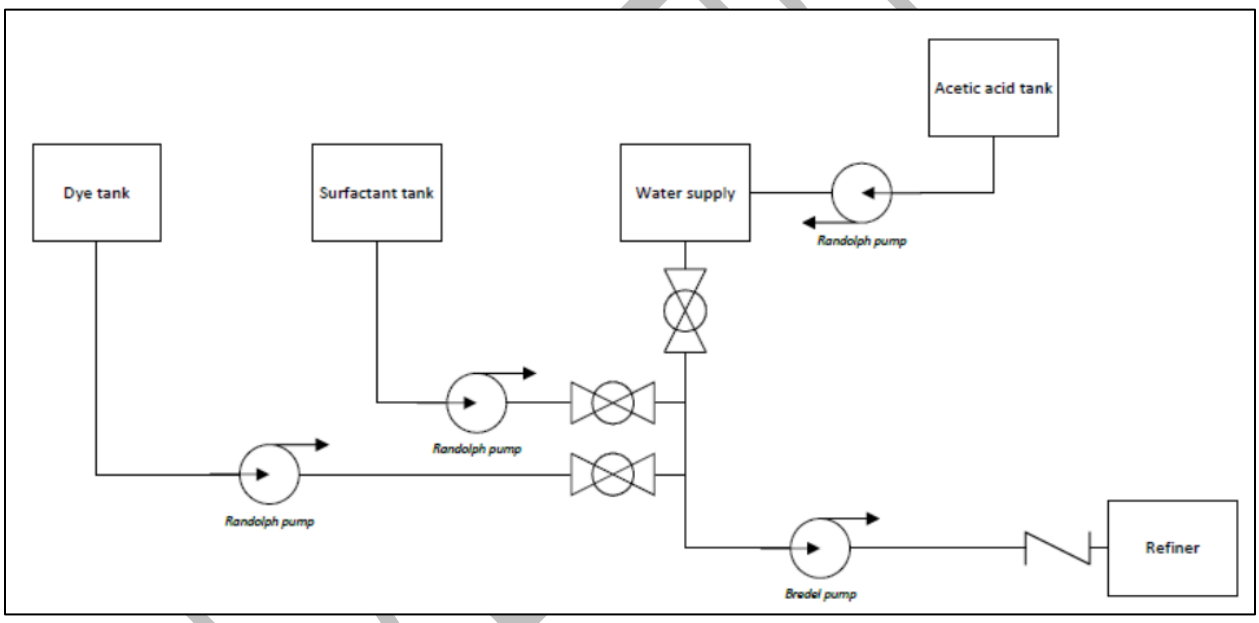
The emission factors used in the application are approximately 25 times larger than the factors DAQ has previously accepted for a similar operation, making this an extremely conservative approach.

3.2 Dye application (ID Nos. ES-5)

Process description: Terra-Mulch did not initially include emissions from the use of dyes in the application. Based subsequent correspondence, the dye application step cannot be considered insignificant. The use of dyes will be a separate emission source (ID No. ES-5), discussed below. Terra-Mulch submitted an addendum to the application in order to address the use of dyes. According to that submittal:

> "Prior to entering the Plant 1 Refiner (ID No. ES-1), a dye is applied to the fiber to impart the desired color characteristics…Dyes are diluted with water and the dye solution is applied at a ratio of approximately 2.2 pounds per ton of fiber into the dryer…Emissions from the dyeing process are exhausted through the wood fiber dryer stacks (refiners)."[7]

Figure 3: ES-5 Dye application process diagram[8]



Emissions: Emissions from the dye application process are expected to be 100% of the volatile components of the dyes applied (i.e., VOC content, volatile HAP/TAP content). Emissions from the use of dyes will pass through the stacks of the fiber dryers.

VOC emissions: The dyes used in the process contain VOC. A conservative approach is to assume that 100% of VOC in the dye will be emitted. Terra-Mulch provided the safety data sheets (SDS) and material usage the dyes used at the facility, and VOC emissions were calculated based on the reported VOC content.

HAP/TAP emissions: As with VOC, a conservative approach is to assume that 100% of HAP/TAP in the dye will be emitted. Terra-Mulch provided the safety data sheets (SDS) for the dyes used at the facility, and HAP/TAP emissions were calculated based on the reported HAP/TAP content.

[7] Application addendum at 2.
[8] This diagram was included in the application addendum.

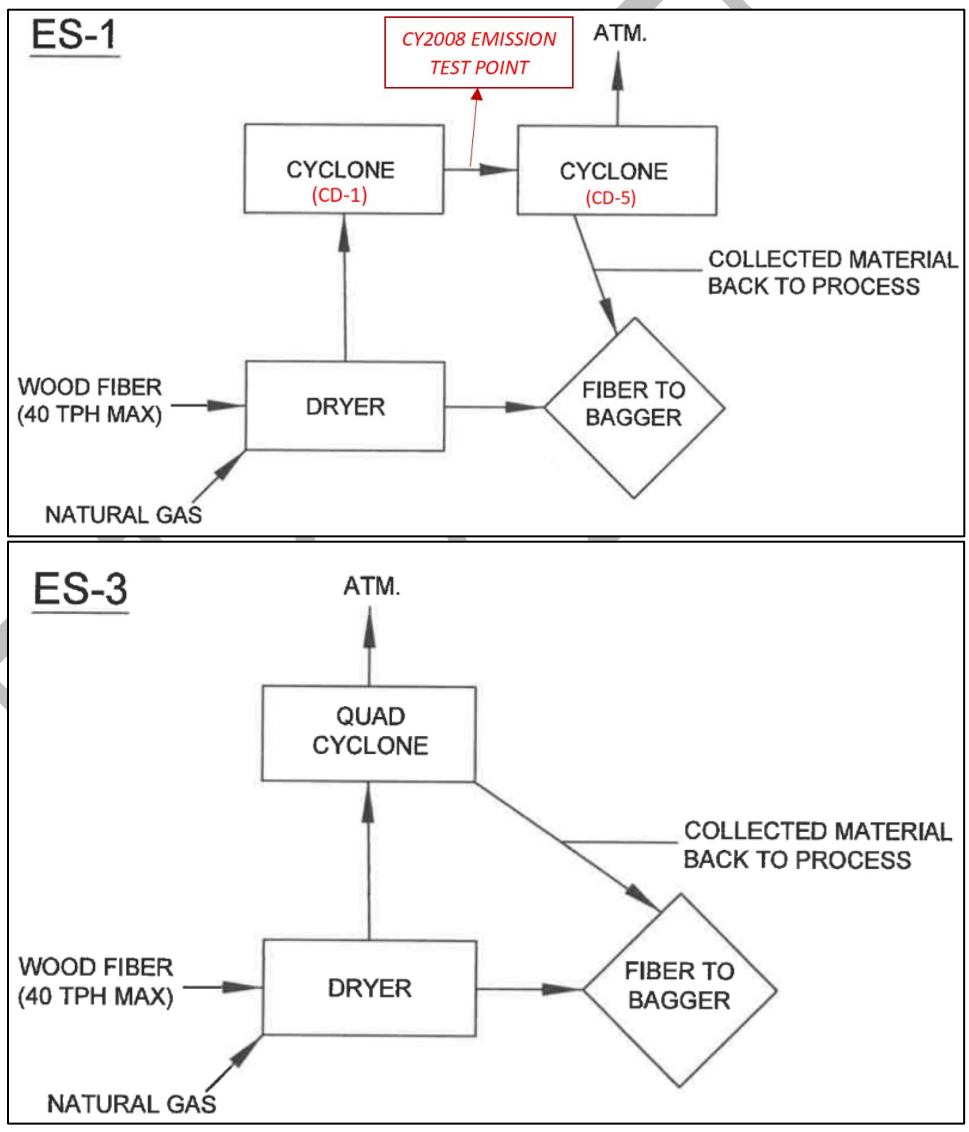
3.3 Wood fiber drying (ID Nos. ES-1 and ES-3)

Process description: According to the application:

> "Wood fiber is steam blown into the dryer and exit the other end of the dryer into the cyclone system. Dried material drops down to a closed auger system which feeds the bagging system. ES-1 has two cyclones installed in series and ES-3 has a quad cyclone system installed in parallel."[9]

Heat for the dryers comes from a 35 million Btu per hour natural gas-fired burner (one per dryer).

Figure 4: Wood fiber drying process diagrams[10]



[9] Application at 3.
[10] These diagrams were included in the application. Their format has been changed slightly to fit this document. Notes indicating control device designation and CY2008 test point were added by DAQ for clarity.

Emissions: Emissions from this process are expected to be particulate (PM, PM_{10}, and $PM_{2.5}$) created as the wood fiber is blown through the dryers and cyclones and VOC emitted as the volatile content of the wood evaporate in the high temperature environment of the dryers. Hazardous air pollutants (HAP) are also expected from this process. Emissions produced by the two dryer systems are expected to be similar, but the control efficiency of the two separate systems (two cyclones in series versus four cyclones in parallel) may be different.

In addition, the usual combustion pollutants are expected from the natural gas-fired burners.

VOC emissions: The application calculates VOC emissions using the emission factors provided by DAQ for kiln-dried lumber in a natural gas-fired lumber kiln.[11] A lumber kiln is a different process from this wood fiber dryer, but their principal is the same: both processes are heating wood in order to evaporate water and reduce moisture content, and VOC is forced out of the wood in the high-heat environment. Terra-Mulch's dried fibers have a moisture content of between 14 and 28%;[12] kiln-dried lumber typically has a moisture content of about 15%. Given the similarity in moisture content of the final products, the use of VOC emission factors for kiln-dried lumber is reasonable.

Note that VOC emission factors are different based on the type of wood being dried (softwood versus hardwood). Softwood is the worst-case scenario for VOC emissions. Furthermore, the emission factors provided by DAQ are in units of pounds per thousand board-feet. In the application, Terra-Mulch assumes that one "board-foot" weighs 5.6 pounds.

HAP emissions: Like VOC, the application calculates HAP emissions using the emission factors provided by DAQ for kiln-dried lumber. As discussed above, DAQ agrees with the use of these emission factors.

Note that DAQ's kiln-dried lumber emission factors do not have any information regarding HAP from the drying of hardwood.

PM emissions: Like VOC, the application calculates PM emissions using the emission factors provided by DAQ for kiln-dried lumber. As the application points out, DAQ has previously approved the use of these factors.[13] After additional review, DAQ does not believe this is a reasonable approach. Although both lumber kilns and Terra-Mulch's wood fiber dryer ultimately produce dried wood, their manner of operation is very different:

- Generally, in a lumber kiln, green rough-sawn lumber is held stationary in the kiln while high-temperature air is circulated around the lumber. PM emissions are primarily from fuel combustion.

- Terra-Mulch's wood fiber dryers circulate pre-ground wood fibers pneumatically through the dryer and associated cyclones, and convey the dried fibers via an augur.

More PM emissions should be expected from this system due to the nature of the material (wood fibers and chips versus whole lumber) and the nature of the system (pneumatically conveyed particles versus stationary lumber).

[11] "Woodwork (Lumber Kilns)," available on DAQ's website: https://www.deq.nc.gov/about/divisions/air-quality/air-quality-permitting/emission-estimation-spreadsheets. Factors used are for softwood and direct-fired suspension burner.
[12] See note 3.
[13] See DAQ's Application Review for the 04248R16 permit, issued July 13, 2017.

In 2008, Terra-Mulch submitted a test report for PM gathered between the two cyclones associated with ES-1 (see Figure 4). This emission test gathered data for filterable and condensable PM, but did not measure the size of the particulate (*i.e.*, PM_{10} and $PM_{2.5}$ data was not gathered). When DAQ reviewed the test results, it stated:

> "In conclusion, the June 5, 2008 tests are acceptable to determine the total PM emissions from cyclone CD-1. The particle size analysis and efficiency curves are not acceptable to establish the PM emissions rate from cyclone CD-5."[14]

Note that the submitted test results indicated 1.0 pounds of condensable PM per hour, which is greater than the 0.03 pounds per hour of total PM calculated by Terra-Mulch (see Attachment Section A.1). Generally, cyclones have little or no impact on condensable PM, so the fact that 1.0 pounds of PM per hour of condensable PM was detected between cyclones CD-1 and CD-5 indicates that actual PM emissions are likely much higher than Terra-Mulch estimated in the application.

Because DAQ has previously determined that this emission test is not acceptable to establish PM emissions from CD-5 (i.e., actual emissions), and in order to accurately calculate actual PM emissions from the dryers, DAQ will require site-specific emission testing for PM. Because there are two distinct control devices in use for the dryers, DAQ will require testing for both dryers.

Combustion emissions: Emissions from natural gas combustion will be calculated using DAQ's natural gas combustion spreadsheet. Note that, where emission factors are available for lumber kilns (such as VOC) or are determined by site-specific testing (such as PM), those factors will be used instead.

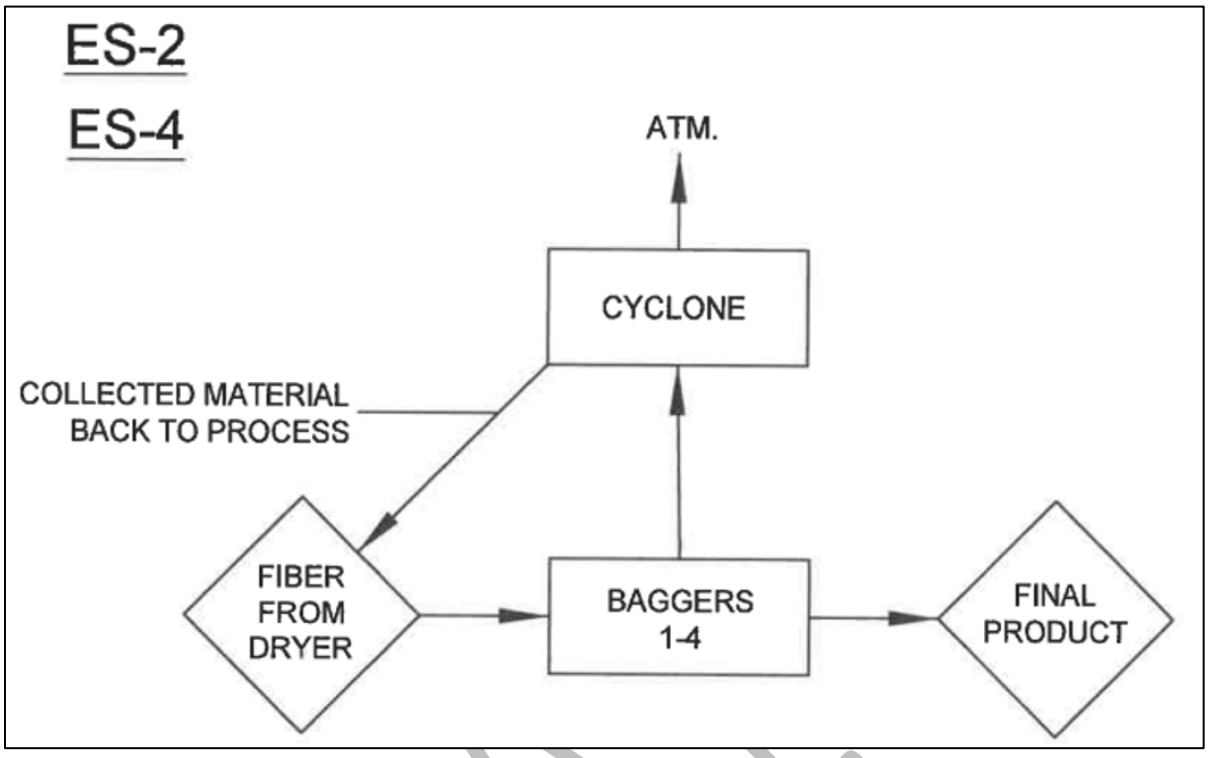
3.4 Fiber bagging processes (ID Nos. ES-2 and ES-4)

Process description: According to the application:

> "The fiber bagging operations each have a maximum process rate of 16 tons per hour and will be controlled by a 48-inch diameter single cyclone. ES-2 is associated with Dryer ES-1 and ES-4 is associated with Dryer ES-3."[15]

[14] See DAQ's memo *Terra-Mulch Products LLC (Profile Products)* issued October 3, 2008.
[15] Application at 3.

Figure 5: Fiber bagging process diagram[16]



Emissions: Emissions from this process are expected to be particulate (PM, PM_{10}, and $PM_{2.5}$) created as the wood fiber is blown into the bags. Note that no VOC or HAP is expected from this process as it is assumed that all VOC and HAP was driven out of the wood fibers during the drying process.

PM emissions: The application calculates PM emissions based on an emission test performed in 2007 and an analysis of material collected by the cyclones. However, Terra-Mulch does not possess actual documentation of the 2007 test.[17]

Because there is no additional data available for the 2007 test, and in order to accurately calculate PM emissions from the bagging operations, DAQ will require site-specific emission testing for PM from the bagging operations. Because the two baggers and their associated control devices are the same, testing will only be necessary for one of the baggers.

3.5 Wood fiber mat processing line (ID No. ES-DF-1)

According to the application:

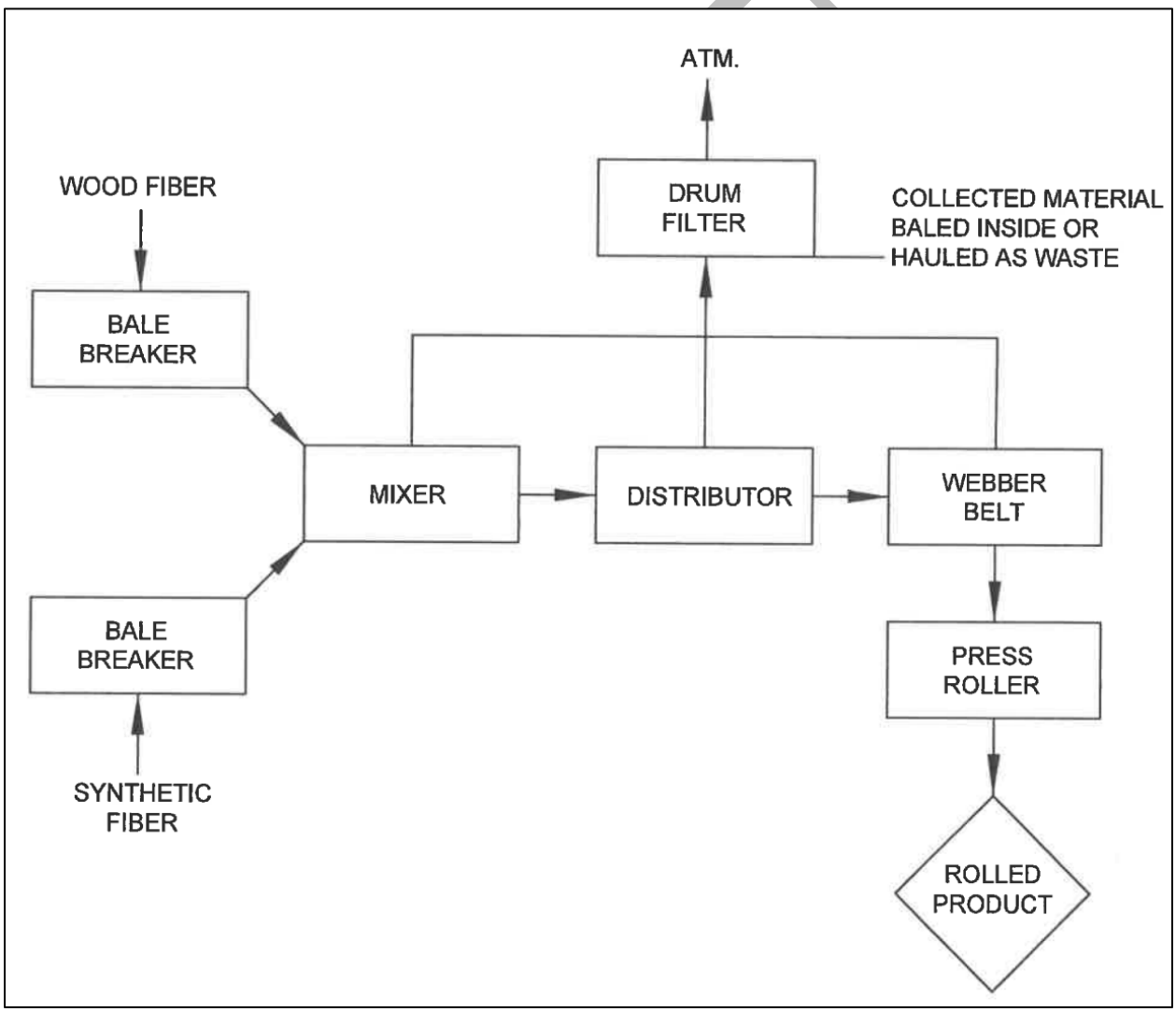
> "The wood fiber mat processing line presses wood and synthetic fibers into mats/rollers in a continuous process. The maximum process rate is 1800 pounds of fiber per hour. Wood and synthetic fibers are mixed then distributed to the Webber belt where the fibers are

[16] This diagram was included in the application. The format has been changed slightly to fit this document.
[17] Email from Kim Melvin (Project Engineer for Project Integration, Inc., a firm representing Terra-Mulch) to Russell Braswell (Environmental Engineer, DAQ), received October 6, 2023.

> layered onto a nylon mesh substrate and sent into a heated press. The final product is rolled onto long cardboard tubes for shipping.
>
> Fiber dust generated in the mixers, distributors and belt are routed to the outdoor drum filter (baghouse), which has an estimated control efficiency of 99.9%"[18]

In correspondence received after the application, Terra-Mulch clarified that the wood fiber referred to in the diagram below is the same wood fiber produced by the dryers. Also, Terra-Mulch does not add any glues, binders, inks, or dyes with the wood mat process.[19] Furthermore, Terra-Mulch has stated that the heat for this line comes from electric heaters within the system.[20]

Figure 6: Wood mat processing line process diagram[21]



[18] Application at 4.
[19] See note 3.
[20] Email from Kim Melvin to Russell Braswell, received May 17, 2024.
[21] This diagram was included in the application. The format has been changed slightly to fit this document.

Emissions: Emissions from this process are expected to be particulate (PM, PM_{10}, and $PM_{2.5}$) as the fibers are conveyed, mixed, and placed onto the nylon web. Note that no VOC or HAP is expected from this process as it is assumed that all VOC and HAP were driven out of the wood fibers during the drying process, and no binders, glues, or other common sources of VOC are used in this process.

PM emissions: Terra-Mulch estimates that 20 pounds of material is collected in the bagfilter per ton of material used (i.e., 1%). Terra-Mulch performed an analysis of total material used, total product produced, and total amount of material collected by the bagfilter confirm this estimate.[22] Terra-Mulch analyzed the material collected by the bagfilter to determine the particle size and calculate emissions of PM, PM_{10}, and $PM_{2.5}$. The analysis showed that the majority of material collected is larger than 100 microns (and therefore, not considered PM).

Based on the effectiveness of fabric filters to control large PM, and the relatively low charging rate of PM to the bagfilter as determined by Terra-Mulch, DAQ agrees with the proposed PM emission calculations.

3.6 Boilers (ID Nos. IES-SB1B and IES-SB2B)

The facility operates two natural gas-fired boilers with heat input capacity 16.74 million Btu per hour (each).

Emissions: These are standard boilers. Emissions from these sources will be calculated using DAQ's natural gas combustion spreadsheet.

[22] Email from Kim Melvin to Russell Braswell, received November 15, 2023.

4. Rules Review

4.1 Regulatory Summary

Applicable rules: Terra-Mulch is subject to the following State Implementation Plan (SIP) rules, in addition to the General Conditions:

- 15A NCAC 02D .0515 "Particulates from Miscellaneous Industrial Processes"
- 15A NCAC 02D .0516 "Sulfur Dioxide from Combustion Sources"
- 15A NCAC 02D .0521 "Control of Visible Emissions"
- 15A NCAC 02D .0524 "New Source Performance Standards"
- 15A NCAC 02D .1100 "Control of Toxic Air Pollutants" [State-enforceable only]
- 15A NCAC 02Q .0317 "Avoidance Conditions" (PSD Avoidance, 112(g) Avoidance)
- 15A NCAC 02Q .0711 "Emission Rates Requiring a Permit" [State-enforceable only]

Terra-Mulch's requirements under each of these rules is discussed in detail below.

Rules covered by the General Conditions: Note that the existing permit includes specific conditions for several rules that are covered under the General Conditions of a Title V permit. These rules will be included by reference in the General Conditions, and will not appear in the specific conditions of the new permit.

- 15A NCAC 02D .0207 "Annual Emissions Reporting" (General Condition X)
- 15A NCAC 02D .0535 "Excess Emissions Reporting and Malfunctions" (General Condition I)
- 15A NCAC 02D .0540 "Particulates from Fugitive Dust Emission Sources" (General Condition MM)

Rules no longer applicable: As discussed below, 15A NCAC 02Q .0504 "Option for Obtaining Construction and Operation Permit" is no longer applicable to this facility.

Rules not applicable: As discussed below, the rules under 15A NCAC 02 .0900 and 02D .1400 do not apply to this facility.

4.2 15A NCAC 02D .0515 "Particulates from Miscellaneous Industrial Processes"

Applicability: This rule applies to emission sources that exhaust through a stack and are not subject to another particulate matter (PM) emission limit. Each dryer, bagger, and wood mat line are subject to this rule. The dye application process (ES-5) is not expected to produce PM.

Emission limit: The emission limit for this rule is calculated by the equations $E = 4.10 \times P^{0.67}$ (for $P \leq 30$) or $E = 55(P)^{0.11} - 40$, where E is the emission limit in pounds per hour and P is the process rate of the emission source measured in tons per hour. The equation is listed in the permit as the emission limit. Based on the maximum process rates, the emission limits for these sources are:

Table 1: Compliance with 02D .0515

Source	Maximum Process Rate *P* (ton/hr)	Emission Limit *E* (lb/hr)
ES-1, ES-3 (dryers)	40	42.53

Source	Maximum Process Rate *P* (ton/hr)	Emission Limit *E* (lb/hr)
ES-2, ES-4 (baggers)	16	26.28
ES-DF-1 (wood mat line)	0.9	3.82

Based on Terra-Mulch's emission calculation (see Attachment), each subject source at this facility complies with these PM emission limits. However, DAQ will require testing to verify that the cyclones controlling ES-1, ES-2, ES-3, and ES-4 are sufficient to comply with these limits.

Emission testing: DAQ will require Terra-Mulch to perform emission testing for PM emissions from each dryer and one of the bagging operations.

Monitoring: Terra-Mulch operates PM control devices on each of the subject emission sources. Terra-Mulch will perform regular inspections and maintenance of the control devices.

Recordkeeping and reporting: Terra-Mulch will keep records of control device maintenance and submit a semiannual summary report.

Compliance: Based on the most recent inspection report, Terra-Mulch appears to be in compliance with this rule. Continued compliance will be determined with emission testing and subsequent inspections.

4.3 15A NCAC 02D .0516 "Sulfur Dioxide from Combustion Sources"

Applicability: This rule applies to combustion sources that are not subject to an SO_2 emission limit under NSPS or MACT. The burners associated with the wood fiber dryers are subject to this rule.

Emission limit: In all cases, the emission limit is 2.3 pounds of SO_2 per million Btu of heat input. In general, SO_2 emitted by combustion sources is a function of the amount of sulfur present in the fuel. Fuel burning sources at this facility can only burn natural gas. In order to calculate SO_2 emissions from the combustion of natural gas, the emission factors published by EPA in AP-42 can be applied. The published emission factors are not in units of pounds per million Btu, so the emission factor must be converted:

SO_2 from natural gas (AP-42 Chapter 1.4, Table 1.4-2; SO_2):

$$\frac{0.6\ \text{lb}}{\text{million scf}} \times \frac{1\ \text{scf}}{1{,}020\ \text{Btu}} = \frac{\mathbf{0.001\ lb}}{\mathbf{million\ Btu}}$$

Therefore, natural gas combustion sources are expected to comply with the SO_2 limit by a wide margin.

Monitoring, Recordkeeping, and Reporting: Based on the wide margin of compliance for natural gas, DAQ has determined that no monitoring, recordkeeping, or reporting is required to demonstrate compliance with 15A NCAC 02D .0516.

Compliance: Terra-Mulch is expected to remain in compliance with this rule.

4.4 15A NCAC 02D .0521 "Control of Visible Emissions"

Applicability: This rule applies to sources of visible emissions (VE) that are not subject to another VE standard under 02D .0500. Generally, this rule is not applied to sources that are not expected to produce any VE (*e.g.*, from a storage tank). Each source at this facility is subject to this rule.

Emission limits: The VE limit for this rule depends on the construction date of the individual source in question. At this facility, the VE limit is 20% for each source subject to this rule. The rule allows for one exceedance of the specific limit per hour, and four exceedances per 24-hour period.

Monitoring: Terra-Mulch will be required to determine "normal" VE from each subject source. Thereafter, Terra-Mulch will perform monthly observations of the emission sources to determine if VE is above normal. Terra-Mulch will be required to take corrective actions if above-normal VE is observed.

Recordkeeping and reporting: Terra-Mulch will keep records of VE observations and submit a semiannual summary report.

Compliance: Based on the most recent inspection report, Terra-Mulch is in compliance with this rule. DAQ expects that Terra-Mulch will continue to comply with this rule because Terra-Mulch uses PM control devices, and those devices serve to reduce VE as well.

4.5 15A NCAC 02D .0524 "New Source Performance Standards" (NSPS)

This rule incorporates the NSPS rules (40 CFR Part 60) into North Carolina's SIP. See Section 5.1 for a discussion of NSPS rules that apply to this facility.

Note that this rule only applies to insignificant activities. In general, insignificant activities are not covered in the body of the Title V permit. Therefore, the new permit will not include a specific condition for this rule.

4.6 15A NCAC 02D .0900 "Volatile Organic Compounds" [not applicable]

Applicability: In general, the rules under 02D .0900 only apply to facilities located in an area specifically listed in 02D .0902(f). Terra-Mulch is located in Catawba County, which is not listed in 02D .0902(f), and therefore no rules under 02D .0900 apply to this facility.

4.7 15A NCAC 02D .1100 "Control of Toxic Air Pollutants" [State-enforceable Only]

Applicability: Facilities that emit toxic air pollutants (TAP) at rates greater than the limits in 15A NCAC 02Q .0711 may be required to perform air dispersion modeling. Terra-Mulch has previously performed air dispersion modeling for formaldehyde. As part of this application, Terra-Mulch performed air dispersion modeling for acetic acid and hydrochloric acid. The emission rates used in those models are included in the permit as emission limits.

See Section 6 for further discussion of Terra-Mulch's requirements with regards to TAP emissions.

Monitoring, recordkeeping, and reporting: DAQ has determined that no monitoring, recordkeeping, or reporting is required to demonstrate compliance with the modeled TAP emission rates.

4.8 15A NCAC 02D .1111 "Maximum Achievable Control Technology" (MACT) [not applicable]

This rule incorporates the MACT rules (40 CFR Part 63) into North Carolina's SIP. There are no rules under 40 CFR Part 63 that apply to this facility. Therefore, this rule does not apply to this facility.

4.9 15A NCAC 02D .1400 "Nitrogen Oxides" [not applicable]

Applicability: In general, the rules under 02D .1400 only apply to facilities located in an area specifically listed in 02D .01402(d). Terra-Mulch is located in Catawba County, which is not listed in 02D .01402(d), and therefore no rules under 02D .1400 apply to this facility.

4.10 15A NCAC 02Q .0317 "Avoidance Conditions"

A facility may accept an enforceable emission limit or operating limit in order to avoid the applicability of specific rules (see 02Q .0317(a)).

4.10.1 Avoidance of 15A NCAC 02D .0530 "Prevention of Significant Deterioration"

Applicability: Terra-Mulch has previously accepted a facility-wide emission limit in order to avoid the applicability of 15A NCAC 02D .0530 "Prevention of Significant Deterioration," i.e., Terra-Mulch has requested a PSD Avoidance limit.

Emission limit: Because Terra-Mulch is not an industry specifically listed under 40 CFR 51.166(b)(1)(i)(*a*), the PSD avoidance limit for any pollutant is 250 tons per consecutive 12-month period. Based on the facility-wide potential emissions, Terra-Mulch has the potential to emit more than 250 tons per year of VOC.

Note that, based on the results of PM emission testing (see Sections 3.3 and 4.2), Terra-Mulch may also have the potential to emit more than 250 tons per year of PM_{10} and $PM_{2.5}$. An additional PSD avoidance condition may be required in the future based on the results of that testing.

Monitoring and recordkeeping: In order to demonstrate compliance with the VOC limit, Terra-Mulch will calculate monthly VOC emissions from the facility using the following equations:

$$E_{FW} = E_D + E_B + E_C$$

Where:

E_{FW} = Facility-wide VOC emissions (ton/month)
E_D = VOC emissions from the wood fiber dryers, see below (ton/month)
E_B = VOC emissions from the boilers, calculated using the applicable emission factors in AP-42, or an alternative method approved by DAQ (ton/month)
E_C = VOC emissions from the use of coatings, dyes, etc. Equal to 100% of the VOC content of all such materials used in that month (ton/month)

$$E_D = {[(W_S \times EF_S) + (W_H \times EF_H)]} \Big/ \left(2{,}000\,{}^{\text{lb}}/_{\text{ton}}\right)$$

Where:

W_S = Monthly softwood wood fiber throughput for both dryers (ton/month)
EF_S = VOC emission factor for softwood. Equal to 1.55 pounds of VOC per ton of softwood
W_H = Monthly hardwood and bark wood fiber throughput for both dryers (ton/month)
EF_S = VOC emission factor for hardwood. Equal to 0.155 pounds of VOC per ton of hardwood and bark

Reporting: Terra-Mulch will calculate the facility-wide VOC emissions on a monthly basis and submit a semiannual summary report.

Compliance: Compliance will be determined with future inspections and reports.

4.10.2 Avoidance of 15A NCAC 02D .1112 "112(g) Case By Case Maximum Achievable Control Technology"

Applicability: In general, 02D .1112 applies to facilities that construct major sources of HAP and are not subject to a MACT rule under 40 CFR Part 63. As stated in the application, the facility is not subject to any MACT rules, and "this process does not fall under the categories/definitions of plywood and composite wood products manufacturing *[i.e., 40 CFR Part 63 Subpart DDDD]*."[23]

Construct a major source: 02D .1112 defines "construct a major source" to mean either the construction of a greenfield facility that has the potential to emit more than the HAP major source limit, or the construction at an existing facility of an individual process that in and of itself has the potential to emit more than the HAP major source limit. Based on the emission calculations included in the application, each of the two dryers has the potential to emit an individual HAP greater than 10 tpy. Therefore, without any other limit, Terra-Mulch would have constructed a major source of HAP and would therefore be subject to this rule.

Avoidance limit: As stated above, facilities are allowed to accept enforceable terms and conditions in order to avoid the applicability of other rules. In order to be an "area source" of HAP, Terra-Mulch must avoid emitting HAP at rates greater than the definition of "major source" in 40 CFR 63.2. A facility is a major source of HAP if it has potential emissions of HAP greater than 10 tpy for any individual HAP or greater than 25 tpy of total combined HAP.

Monitoring and recordkeeping: In order to demonstrate compliance with the HAP limits, Terra-Mulch will calculate monthly HAP emissions from the facility using the following equations:

$$E_{FW} = E_D + E_B + E_C$$

Where:

E_{FW} = For each HAP, the facility-wide emissions of that HAP (ton/month)
E_D = For each HAP, the emissions of that HAP from the wood fiber dryers, see below (ton/month)
E_B = For each HAP, the emissions of that HAP from the boilers calculated using the applicable emission factors in AP-42, or an alternative method approved by DAQ (ton/month)
E_C = For each HAP, the emissions of that HAP from the use of coatings, dyes, etc., throughout the facility. Equal to 100% of the HAP content of all such materials used in that month (ton/month)

$$E_D = \left[(W_S \times EF_S) + (W_H \times EF_H)\right] \Big/ \left(2{,}000\,{}^{\text{lb}}/_{\text{ton}}\right)$$

Where:

W_S = Monthly softwood wood fiber throughput for both dryers (ton/month)
EF_S = HAP emission factor for softwood. Equal to:

HAP	EF_S (pounds of HAP per ton softwood dried)
Acetaldehyde	0.0186
Acrolein	0.0027

[23] Application at 6.

HAP	EFs (pounds of HAP per ton softwood dried)
Formaldehyde	0.0042
Hexane	0.0015
Methanol	0.0575
Phenol	0.0036

W_H = Monthly hardwood and bark wood fiber throughput for both dryers (ton/month)
EF_H = HAP emission factor for hardwood. Equal to zero.

Note that these emission factors are calculated by Terra-Mulch using DAQ's publicly available spreadsheet for lumber kilns. See Attachment Section A.1 for details.

Reporting: Terra-Mulch will calculate the facility-wide HAP emissions on a monthly basis and submit a semiannual summary report.

Compliance: Compliance will be determined with future inspections and reports.

4.11 15A NCAC 02Q .0504 "Option for Obtaining Construction and Operation Permit" [not applicable]

Background: As allowed by 15A NCAC 02Q .0315(c), a facility that is avoiding the requirements of Title V and 15A NCAC 02Q .0500 (a.k.a. a "synthetic minor" facility) may submit an application to remove those avoidance requirements. That permit application may be submitted pursuant to 15A NCAC 02Q .0300. If a facility uses this option, the facility must submit an additional application pursuant to 15A NCAC 02Q .0500 within 12 months.

Terra-Mulch submitted application 1800267.22A pursuant to 15A NCAC 02Q .0315(c). DAQ then issued permit 04248R17, which included a requirement to submit an application no later than September 14, 2023. This application requirement was incorporated under 15A NCAC 02Q .0504. Terra-Mulch submitted this application to comply with that requirement.

Applicability: Now that Terra-Mulch has complied with the application requirement, Terra-Mulch has no additional requirements under this rule. The new Title V permit will not include a specific condition for this rule.

4.12 15A NCAC 02Q .0711 "Emission Rates Requiring a Permit" [State-enforceable only]

Applicability: In general, this rule applies to sources that construct a new facility (see 02Q .0704) or make a modification (see 02Q .0706) that cause an increase in TAP emission rates, and the TAP emission rates are less than the TAP permitting emission rates (TPER) listed in 02Q .0711. The existing permit includes a specific condition for this rule.

Monitoring, recordkeeping, and reporting: Terra-Mulch must keep records that demonstrate the listed TPERs are not exceeded. No reporting is required.

Compliance: Based on the most recent inspection report, Terra Mulch appears to be in compliance with this rule. Continued compliance will be determined with subsequent inspections and reports. See Section 6 for further discussion of Terra-Mulch's requirements with regards to TAP emissions.

5. NSPS (40 CFR Part 60), MACT (40 CFR Part 63), CAM (40 CFR Part 64), PSD (15A NCAC 02D .0530), and §112(r)

5.1 New Source Performance Standards (NSPS; 40 CFR Part 60)

5.1.1 NSPS Subpart Dc "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units"

Applicability: This rule applies to "steam generating units" (defined by the rule) that were constructed/modified/reconstructed after June 9, 1989 and have a heat input capacity between 10 and 100 million Btu per hour, except as provided in §60.40c(e)-(i). The boilers IES-SB1B and IES-SB2B are subject to this rule.

Requirements: The requirements of this rule differ based on the size, fuel types, and construction date of the boiler in question. For the purposes of this rule, both boilers at this facility are gas-fired.

The rule includes emission limits for SO_2, PM, and VE depending on the boiler. The rule also includes monitoring and recordkeeping.

SO_2 emission limit: There is no SO_2 emission limit for gas-fired boilers (see 40 CFR 60.42c).

PM emission limit: There is no PM emission limit for gas-fired boilers (see 40 CFR 60.43c).

VE emission limit: There is no opacity limit for gas-fired boilers (see 40 CFR 60.43c(c)).

Monitoring, recordkeeping, and reporting: The rule requires Terra-Mulch to keep records of the amount of fuel burned in the boilers (see 40 CFR 60.48c(g)(2)).

Compliance: Based on the most recent inspection report, Terra-Mulch appears to be in compliance with this rule. Continued compliance will be determined with subsequent inspections and reports.

Insignificant activities: This rule only applies to emission sources on the list of insignificant activities. The permit will note that these sources are subject to NSPS Subpart Dc, but the body of the Title V permit will not include a specific condition for this rule.

5.2 Maximum Achievable Control Technology (MACT; 40 CFR Part 63)

Note that because Terra-Mulch will comply with a facility-wide limit on HAP emissions, this facility is an "area source" of HAP per 40 CFR 63.2. Therefore, rules that apply exclusively to major sources of HAP (*e.g.*, Subpart DDDD) do not apply to this facility.

5.2.1 MACT Subpart JJJJJJ "National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources" [not applicable]

Applicability: This rule applies to boilers located at area sources of HAP. However, this rule explicitly does not apply to gas-fired boilers (see §63.11195(e)). Each boiler at this facility is gas-fired. Therefore, this rule does not apply to any source at this facility.

5.3 Prevention of Significant Deterioration (PSD)

Background: In general, a facility is a major stationary source for PSD if it emits a regulated NSR pollutant at a rate greater than the threshold listed in 40 CFR 51.166(b)(1)(i). Terra-Mulch is a wood products facility, which is not one of the categories listed in 40 CFR 51.166(b)(1)(i)(*a*). Therefore, the threshold is 250 tons per year, in accordance with 40 CFR 51.166(b)(1)(i)(*b*).

Applicability: Terra-Mulch has accepted facility-wide emission limits in order to avoid being designated a major stationary source (see Section 4.10.1, above). Therefore, Terra-Mulch has no specific requirements under PSD.

5.4 Section 112(r) of the Clean Air Act (and 15A NCAC 02D .2100 "Risk Management Program")

This rule requires facilities that store materials above the threshold quantities in 40 CFR 68.130 above their respective thresholds to prepare and submit a risk management plan (RMP).

In the application on Form A3, Terra-Mulch indicates that an RMP is not required for this facility. Therefore, Terra-Mulch does not have any increased requirements under §112(r). Note that other parts of that rule, such as the General Duty clause, may still apply to this facility; those portions of §112(r) are beyond the scope of the Title V permit.

5.5 Compliance Assurance Monitoring (CAM; 40 CFR Part 64)

Applicability: The compliance assurance monitoring (CAM) rule requires owners and operators to conduct monitoring to provide a reasonable assurance of compliance with applicable requirements under the act. Per 02D .0614(a), this rule potentially applies to any facility required to obtain a permit under 02Q .0500 (i.e., a Title V permit). This facility is required to obtain a permit under 02Q .0500. Therefore, CAM applicability must be examined.

Plan submittal: CAM plans must be submitted according to the schedule in §64.(5):

- For large pollutant-specific emissions units ("large PSEU;" *i.e.,* units that have the potential to emit more than the major source threshold *after* controls are applied), a CAM plan is due when the first application for a Title V permit is submitted (see §64.5(a)).

- For all other PSEUs, a CAM plan (if required) is due when a facility applies to renew a Title V permit.

The only control devices used by Terra-Mulch are used to control particulate matter. Based on the emission calculations provided by Terra-Mulch (see Attachment), no emission source is expected to have post-control potential emissions greater than the major source threshold for PM (*i.e.,* they are not large PSEUs). Therefore, if any CAM plan is required, Terra-Mulch must submit that plan with the first Title V permit renewal.

6. North Carolina Toxic Air Pollutants

Applicability: The rules for toxic air pollutants under 15A NCAC 02D .1100 and 02Q .0700 apply to facilities that emit toxic air pollutants. In general, if a facility would emit a TAP at rates greater than the TAP permitting emission rates (TPER) listed in 02Q .0711, the facility must first conduct an air dispersion modeling demonstration under 15A NCAC 02D .1104 and .1106. Several types of sources are exempt from TAP requirements; exempt sources are listed in 02Q .0702.

Background: Terra-Mulch has previously been reviewed for TAP emission rates. Terra-Mulch performed air dispersion modeling for formaldehyde, and the existing permit includes TPERs for several TAPs which Terra-Mulch did not perform modeling.

Previous modeling: Terra-Mulch has previously performed air dispersion modeling for formaldehyde emissions from the two wood fiber dryers. The modeling assumed a formaldehyde emission rate of 1.5 pounds per hour per dryer (3 lb/hr facility-wide) and resulted in a maximum impact of 3.4% of the AAL.[24]

Using the DAQ emission factor for formaldehyde emitted from a lumber kiln (as discussed in Section 3.3), the hourly emission rate of formaldehyde from the dryers can be calculated:

$$\left[\left(0.103\frac{\text{lb}_{\text{form}}}{1{,}000\text{ bd-ft}}\right)/\left(5.6\frac{\text{lb}_{\text{wood}}}{\text{bd-ft}}\right)\right]\times\left(40\frac{\text{ton}_{\text{wood}}}{\text{hr}}\right)\times\left(2{,}000\frac{\text{lb}_{\text{wood}}}{\text{ton}_{\text{wood}}}\right)\times(2\text{ dryers})=2.94\frac{\text{lb}_{\text{form}}}{\text{hr}}$$

DAQ has previously determined that this emission rate is in compliance with the AAL and 02D .1100.[25] Given that this facility is not increasing the hourly throughput, the hourly emission rate of formaldehyde will not increase, and compliance with the AAL will not be impacted.

Current modeling: While reviewing this application, DAQ requested that Terra-Mulch quantify emissions of VOC, HAP, and TAP that result from the application of dyes to the fiber prior to drying. When Terra-Mulch did so, it was determined that emissions of acetic acid and hydrochloric acid (HCl) from the dyes exceeded the TPER, and therefore new modeling was required for those pollutants.

Separately, DAQ determined that the previous modeling demonstration should have also included phenol and acrolein. The only sources of these pollutants are from the dryers, and based on the emission calculations in Table 2, phenol and acrolein are emitted from the dryers in excess of their TPERs. It appears that DAQ used the incorrect emission factors for these pollutants as part of the R16 permit revision (issued July 13, 2017).

[24] Information taken from DAQ AQAB's memo *Review of Toxics Air Dispersion Modeling – Terra Mulch Products, LLC*, issued June 8, 2017.
[25] See note 13.

Table 2: TAP emissions from dryers

Pollutant	Emission Factor* (lb/1,000 bd-ft)	Computed factor** (lb/ton$_W$)	Hourly emission rate (lb/hr)	TPER**** (lb/hr)	TPER**** (lb/dy)
acetaldehyde	0.052	1.86E-02	1.49	6.8	
acrolein	0.0075	2.68E-03	0.21	0.02	
formaldehyde†	0.103	3.68E-02	2.94	0.04	
phenol	0.01	3.57E-03	0.29		0.24

Constants	
5.6	lb$_W$/bd-ft to convert board-feet to pounds***
80	ton$_W$/hr, dryer throughput combined

Notes
* This is the highest emission factor from DAQ's kiln spreadsheet (lb/1,000bd-ft, *NOT* lb/1,000bd-ft/hr)
** (EF / 1,000) / (Conversion factor × 2,000), which simplifies to: (EF × 2) / (Conversion factor)
*** estimated conversion factor submitted by Terra-Mulch. DAQ agrees with this estimation.
**** See 15A NCAC 02Q .0711
† Previously modeled, no change required.

Terra-Mulch modeled emissions of acetic acid and HCl from the dryers using maximum potential emission rates. DAQ then included the emission rates of acrolein and phenol (calculated in Table 2) in the modeling demonstration. Note that emissions that result from dye application will exhaust through the cyclones of the dryers (see Figure 1). The modeling showed no exceedance of an AAL.

Table 3: Modeling results[26]

Pollutant	Rate (per dryer)*	% of AAL
Acetic acid	31.07 pounds per hour	3
HCl	5.48 pounds per hour	3
Acrolein	0.11 pounds per hour	1
Phenol	0.14 pounds per hour	<1

* ES-3 has four release points (a "quad-cyclone" with four individual cyclones). This value is divided by four and assigned to each of the four release points.

TPERs and other TAP emission increases: Terra-Mulch is only increasing the annual throughput through the facility; the per-hour or per-day throughput of the facility is not changing. Therefore, only TAPs with an annual TPER need to be examined (excluding the TAPs discussed above, as discussed above) because hourly and daily potential emission rates will not be affected. The only annual TPERs included in the existing permit are benzene and benzo(a)pyrene.

[26] Information taken from DAQ AQAB's memos *Review of Toxics Dispersion Modeling Analysis for Terra Mulch Products, LLC*, issued May 8, 2024 and *Toxics Dispersion Modeling of Additional TAPs for Terra Mulch Products, LLC,* issued June 11, 2024 .

At this facility, those pollutants are only emitted by the combustion of natural gas. This facility has a facility-wide maximum natural gas heat input of 35 + 35 + 16.74 + 16.74 = 103.48 million Btu per hour. Using the emission factors included in DAQ's calculation spreadsheet for natural gas combustion, annual emissions of these pollutants can be calculated:

Table 4: TPER analysis

Pollutant	Emission Factor (lb/MMBtu)	Annual Emission Rate, assuming 8,760 hours of full-load operation (lb/yr)	TPER (lb/yr)
Benzene	2.06E-6	1.87	8.1
Benzo(a)pyrene	1.18E-9	1.07E-3	2.2

Because the TPERs will not be exceeded, no new modeling is required for these pollutants.

7. Compliance Status and Other Regulatory Concerns

Compliance status:

- This facility was most recently inspected on February 23, 2024 by Ashley McCreary. Terra-Mulch appeared to be in compliance with the existing permit at the time of that inspection.

- In the application, Terra-Mulch included Form E5 "Title V Compliance Certification" signed by Brian Moran (Plant Manager). On this form, Terra-Mulch indicated the facility was "not currently in compliance with all applicable requirements."

- Terra-Mulch also included Form E4 "Emission Source Compliance Schedule." On this form, Terra-Mulch indicated each emission source at the facility would "be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements."

- The Title V permit was most recently renewed on July 13, 2017. Since that date, Terra-Mulch was issued an NOV for failing to submit an emission inventory as required by Specific Condition A.3 of the existing permit. DAQ considers this matter resolved as of November 3, 2023.

Application fee: Application for significant modification requires an application fee. Terra-Mulch paid the appropriate fee by ePay on September 21, 2023.

PE Seal: Pursuant to 15A NCAC 02Q .0112 "Application requiring a Professional Engineering Seal," a professional engineer's seal (PE Seal) is required to seal technical portions of air permit applications for new sources and modifications of existing sources as defined in 15A NCAC 02Q .0103 that involve the criteria in 02Q .0112(a)(1)-(3). This application includes Form D5 "Technical Analysis to Support Permit Application" which was sealed by Kim Melvin (#025853). According to the North Carolina Board of Examiners for Engineers and Surveyors online lookup tool, this PE license is current through December 31, 2024.

Zoning: A Zoning Consistency Determination per 15A NCAC 02Q .0507(d) was not required for this modification because there is no expansion of the existing facility.

Addition of 1-bromopropane to §112(b): On December 22, 2021, the US EPA added 1-bromopropane (1-BP) to the list of HAP.[27] Terra-Mulch has not previously quantified emissions of 1-BP. As part of processing this application, DAQ asked Terra-Mulch to quantify 1-BP emissions from the facility. Terra-Mulch responded: "the site does not use products containing that chemical that we are aware of."

[27] See 87 FR 393 (published January 5, 2022).

8. Facility Emissions Review

Title V: Terra-Mulch is a major source for Title V (as defined in 40 CFR 70.2) because it has potential emissions of VOC greater than 100 tpy.

HAP: Terra-Mulch is an area source of HAP because the facility will comply with a facility-wide HAP emission limit.

PSD: Terra-Mulch is not a major stationary source for PSD because the facility will comply with a facility-wide emission limit to avoid emitting regulated NSR pollutants (specifically, VOC) above the thresholds listed in 40 CFR 51.166(b)(1)(i)(*b*).

PSD Increment Tracking: The Catawba County airshed has been triggered for PSD Increment Tracking for PM_{10}. Given that there are no new emission sources at this facility, and the hourly production rate of the facility is not increasing, the proposed modification is not expected to consume or expand any hourly increment for PM_{10}.

9. Pre-Public Notice Drafts, Public Notice, and EPA Review

Initial draft: An initial draft of the Title V permit and this application review were sent to DAQ Permits staff on May 9, 2024. Comments were received in-person on May 16, 2024. These comments are summarized below:

- Terra-Mulch should quantify emissions of 1-BP (if any).
- How is the fiber mat line heated?
- Various typos and corrections to the draft permit and application review.

These comments were addressed and a revised draft was prepared.

Revised draft: A revised draft of the Title V permit and this application review were sent to DAQ SSCB staff, DAQ MRO staff, and Terra-Mulch staff on May 17, 2024.

- DAQ SSCB staff did not have any comments.
- DAQ MRO staff had the following comments (May 31, 2024):

  MRO Comment 1: The diameter of the cyclones in the quad cyclone should be 96 inches, not 32 inches.

  Response: Terra-Mulch confirmed that the diameter should be 96 inches. The draft will be corrected.

  MRO Comment 2: Emission rates of acrolein and phenol appear to be over the TPER.

  Response: It appears that when DAQ originally calculated potential emissions of acrolein and phenol from the dryers, the incorrect emission factors were used. DAQ should have requested modeling for those pollutants previously. The corrected emission rates will be included in the modeling data submitted by Terra-Mulch as part of this application.

- Terra-Mulch staff had the following comments (May 31, 2024):

  TM Comment 1: We understand the need and benefits of site-specific emissions data from stack testing; however with the high cost associated with running these, we wanted to discuss the regulatory goals to see if other conservative assumptions might be available that would demonstrate compliance without testing. It looks like this discussion falls under the 2D .0515 discussion.

  Response: As noted, it is important to accurately quantify emissions from these sources, both for compliance with emission limits and the Title V tonnage fees. Note that, based on the results of testing, there may be a need to examine CAM and/or PSD avoidance for PM as well.

Given that the two dryers have different control types, it seems intuitive that we would need test results for both dryers so that compliance with 02D .0515 is demonstrated and actual emissions are accurately reported.

Because the two baggers are the same, it also seems intuitive that testing only one of the baggers would be needed.

As part of reviewing this application, DAQ looked at other NC facilities, but could not find any sources directly comparable to the dryers or baggers and controlled in the same manner at Terra-Mulch. If Terra-Mulch is able to find comparable test results from similar operations, DAQ may be able to review those results in place of some site-specific testing for this facility.

TM Comment 2: For the weekly monitoring requirements under 2D .0521, is that a standard Title V requirement on cyclones? Is there a possibility of reduced frequency?

Response: Weekly monitoring is generally the default (although both daily and monthly can be used where appropriate). Therefore, the draft permit included weekly VE monitoring.

Given the history of compliance with this facility, MRO stated that monthly VE monitoring would be acceptable. Therefore, the draft permit will be updated to include monthly VE monitoring instead of weekly.

Public notice and EPA review: A notice of the draft Title V Permit shall be made pursuant to 15A NCAC 02Q .0521. Pursuant to 02Q .0521(b), because this draft Title V permit is for a "new" facility (an initial Title V permit), a public notice will also be published in a local newspaper (the Hickory Daily Reporter). The notice will provide for a 30-day comment period, with an opportunity for a public hearing. Consistent with 15A NCAC 02Q .0518(b), the EPA will have a 45-day review period. Based on an agreement between DAQ and EPA, this period will generally coincide with the 30-day public notice period. Copies of the public notice shall be sent to persons on the Title V mailing list and EPA. Pursuant to 15A NCAC 02Q .0522, a copy of each permit application, each proposed permit and each final permit shall be provided to EPA. Also, pursuant to 02Q .0522, a notice of the draft Title V Permit shall be provided to each affected State at or before the time notice is provided to the public under 02Q .0521 above. DAQ voluntarily provides notice to each bordering State (Virginia, Tennessee, Georgia, and South Carolina).

- The Public Notice and EPA Review periods began on XXXX. The Public Notice was also published in the Hickory Daily Reporter.
- The Public Notice period ended on XXXX
- The EPA Review period ended on XXXX

10. Recommendations

This permit application has been reviewed by DAQ to determine compliance with all procedures and requirements. DAQ has determined that this facility appears to be complying with all applicable requirements.

DAQ recommends issuance of Permit No. 04248T19. MRO, SSCB, and Terra-Mulch have received a copy of this permit and submitted comments that were incorporated as described in Section 9.

Attachment to Review of Application 1800267.23A

Emission Calculations

The following calculations (except for ES-5) were prepared by Terra-Mulch and included in the application. The calculations for ES-5 were prepared by Terra-Mulch and submitted separately.

A.1 Dryers (ES-1 and ES-3)

Terra-Mulch Products, LLC
Conover, NC, Catawba County
ID 1800267
September 2023

Emission Factors for Wood Fiber Dryers - VOC and TAP emissions based on DAQ Lumber Kiln Spreadsheet

Assumptions
5.6 lbs wood/BF wood
VOC from poplar 1/10 of pine

	VOC (pine)	VOC (poplar)	PM	CO	Nox	SO2	Acetaldeh	Acrolein	Formaldeh	Hexane	Methanol	Phenol
EF lb/1000 BF	4.34	0.434	0.4				0.052	0.0075	0.01185		0.161	0.01
EF lb/ton wood	1.55	0.155	0.143	0.072	0.086	0.0005	0.0186	0.0027	0.0042	0.0015	0.0575	0.0036

Notes: Hexane EF converted from 0.00176 lb/mmBtu
CO, Nox, SO2 EF calculated relative to PTE listed on 2012 permit review at 350,400 tons wood processed

DAQ Note: DAQ disagrees with the use of the PM emission factor above and will require site-specific emission testing to determine an appropriate PM emission factor.

ES-1 and ES-3, continued

Terra-Mulch Products, LLC
Conover, NC, Catawba County
ID 1800267
September 2023

Profile™
Your Trusted Partner In Soil Solutions

ES-1 and ES-3 Wood Fiber Dryer
Identical processes with the same maximum capacity and same PM control efficiency

OS-1 Pine and Pine Bark

40 tph	max wood fiber input
35 mmBtu/hr	max heat input - natural gas only
99.50% control eff	PM, PM-10, PM-2.5
150,000 tons per year actual (combined both dryers)	

PTE After Controls includes PSD limit to 124 tons VOC/year each dryer

Form B Data	CAS	EF Source	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PM		DAQ Kiln	0.03	0.05	5.71	25.03	0.03	0.06
PM10		DAQ Kiln	0.03	0.05	5.71	25.03	0.03	0.06
PM2.5		DAQ Kiln	0.03	0.05	5.71	25.03	0.03	0.06
SO2		AP-42	0.02	0.04	0.02	0.09	0.02	0.04
NOx		AP-42	3.43	6.43	3.43	15.03	3.43	6.86
CO		AP-42	2.88	5.40	2.88	12.62	2.88	5.76
VOC	(pine)	DAQ Kiln	62.00	116.25	62.00	271.56	62.00	124.00
Lead								
Total HAP			4.83	9.05	4.83	21.14	4.83	9.65
Acetaldehyde	75070	DAQ Kiln	0.74	1.39	0.74	3.25	0.74	1.49
Acrolein	107028	DAQ Kiln	0.11	0.20	0.11	0.47	0.11	0.21
Formaldehyde	50000	DAQ Kiln	1.47	2.76	1.47	6.44	1.47	2.94
Hexane	110543	DAQ Kiln	0.06	0.12	0.06	0.27	0.06	0.12
Methanol	67561	DAQ Kiln	2.30	4.31	2.30	10.07	2.30	4.60
Phenol	108952	DAQ Kiln	0.14	0.27	0.14	0.63	0.14	0.29

ES-1 and ES-3, continued

Terra-Mulch Products, LLC
Conover, NC, Catawba County
ID 1800267
September 2023

Profile™
Your Trusted Partner In Soil Solutions™

ES-1 and ES-3 Wood Fiber Dryer
Identical processes with the same maximum capacity and same PM control efficiency

OS-2 Poplar (no HAPs/TAPs from hardwood)
40 tph max wood fiber input
35 mmBtu/hr max heat input - natural gas only
99.50% control eff PM, PM-10, PM-2.5
70,000 tons per year actual (combined both dryers)

PSD Limit on PTE not shown on this OS since poplar generates much less VOC

Form B Data	CAS	EF Source	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PM		DAQ Kiln	0.03	0.03	5.71	25.03	0.03	0.13
PM10		DAQ Kiln	0.03	0.03	5.71	25.03	0.03	0.13
PM2.5		DAQ Kiln	0.03	0.03	5.71	25.03	0.03	0.13
SO2		AP-42	0.02	0.02	0.02	0.09	0.02	0.00
NOx		AP-42	3.43	3.00	3.43	15.03	3.43	0.08
CO		AP-42	2.88	2.52	2.88	12.62	2.88	0.06
VOC	(polplar)	DAQ Kiln	6.20	5.43	6.20	27.16	6.20	27.16
Lead								
Total HAP		AP-42	4.08	3.57	4.08	17.88	4.08	17.88
Acetaldehyde	75070	DAQ Kiln	0.00	0.00	0.00	-	0.00	0.00
Acrolein	107028	DAQ Kiln	0.11	0.09	0.11	0.47	0.11	0.47
Formaldehyde	50000	DAQ Kiln	1.47	1.29	1.47	6.44	1.47	6.44
Hexane	110543	DAQ Kiln	0.06	0.05	0.06	0.27	0.06	0.27
Methanol	67561	DAQ Kiln	2.30	2.01	2.30	10.07	2.30	10.07
Phenol	108952	DAQ Kiln	0.14	0.13	0.14	0.63	0.14	0.63

A.2 Baggers (ES-2 and ES-4)

Terra-Mulch Products, LLC
Conover, NC, Catawba County
ID 1800267
September 2023

Profile™
Your Trusted Partner In Soil Solutions

ES-2 and ES-4 Fiber Bagging Operation
Identical systems with the same process capacity and control systems

OS-1

16 tph maximum process rate (each)
1.71 lb PM/ton EF from stack test
85.00% control eff
150,000 tons per year actual (combined both systems)

Particle Size for PM-10
0.64 lb PM-10/ton
(Sieve <150 microns = 37.5%)

Form B Data	CAS	EF Source	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PM		Site Test	4.10	19.24	27.36	119.84	4.10	17.98
PM10		Site Test	1.54	7.21	10.26	44.94	1.54	6.74
PM2.5		Site Test	1.54	7.21	10.26	44.94	1.54	6.74

DAQ note: DAQ will require additional site-specific testing to verify the PM emission factors.

A.3 Wood fiber mats (ES-DF-1)

Terra-Mulch Products, LLC
Conover, NC, Catawba County
ID 1800267
September 2023

Profile™
Your Trusted Partner In Soil Solutions

ES-DF-1 Wood Fiber Mat Line
Identical systems with the same process capacity and control systems

OS-1

0.9 tph maximum process rate (each) Particle Size for PM-10
3.04 lb PM/ton 0.54 lb PM-10/ton
99.9% control eff
933 tons per year actual (combined both dryers)

Form B Data	CAS	EF Source	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PM		Terra Mulch	0.003	0.001	2.74	11.98	0.003	0.01
PM10		Terra Mulch	0.000	0.000	0.49	2.13	0.000	0.00
PM2.5		Terra Mulch	0.000	0.000	0.49	2.13	0.000	0.00

Emission Factor Calculation:

0.9 tph maximum process rate (each)
1 percent becomes airborne
20 lb fiber enters dust collection/ton fiber processed
15.2% Sieve analysis for PM
3.04 lb PM/ton fiber
2.7% Sieve analysis for PM-10
0.54 lb PM-10/ton fiber

A.4 Wood unloading, sorting, conveying (IES-8)

Terra-Mulch Products, LLC
Conover, NC, Catawba County
ID 1800267
September 2023

Profile™
Your Trusted Partner In Soil Solutions

IES-8 Woodwaste Unloading, Sorting, Conveying

OS-1 Green wood with moisture content of 45 - 50 %

150 tph max	1800 tons/day max
0.0048 lb PM/ton	233,076 tpy actual 2022
0.0023 lb PM-10/ton	EF extracted from Georgia Pacitic air permit
0.0004 lb PM-2.5/ton	application, Warrenton Lumber Site

Form B Data	CAS	EF Source	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
PM		GP	0.72	0.56	0.72	1.58	0.72	1.57
PM10		GP	0.35	0.27	0.35	0.76	0.35	0.75
PM2.5		GP	0.06	0.05	0.06	0.13	0.06	0.13

GP - See attached excerpt from Georgia Pacific permit review documentation for EF calculation

Maximum Unloading Rate:

25	tons per truck
3	trucks per hour
2	dump stations
150	tons per hour
12	max daylight hours
1800	tons per day

A.5 Boilers (IES-SB1B and IES-SB2B)

NATURAL GAS COMBUSTION EMISSIONS CALCULATOR REVISION K 06/19/2012 - OUTPUT SCREEN

ICDENR

Instructions: Enter emission source / facility data on the "INPUT" tab/screen. The air emission results and summary of input data are viewed / printed on the "OUTPUT" tab/screen. The different tabs are on the bottom of this screen.

This spreadsheet is for your use only and should be used with caution. DENR does not guarantee the accuracy of the information contained. This spreadsheet is subject to continual revision and updating. It is your responsibility to be aware of the most current information available. DENR is not responsible for errors or omissions that may be contained herein.

SOURCE / FACILITY / USER INPUT SUMMARY (FROM INPUT) SCREEN

COMPANY:	Profile Products - Terra Mulch LLC			FACILITY ID NO.:	01/19/00267
EMISSION SOURCE DESCRIPTION:	35 MMBTU/HR NATURAL GAS-FIRED BOILER			PERMIT NUMBER:	04248R18
EMISSION SOURCE ID NO.:	ES-1 and ES-3			FACILITY CITY:	Conover
CONTROL DEVICE:	NO CONTROL			FACILITY COUNTY:	Catawba
SPREADSHEET PREPARED BY:	Kim Melvin			POLLUTANT	CONTROL EFF.
ACTUAL FUEL THROUGHPUT:	408.80	10^6 SCF/YR	FUEL HEAT VALUE: 1,020 BTU/SCF	NOX	CALC'D AS 0%
POTENTIAL FUEL THROUGHPUT:	300.59	10^6 SCF/YR	BOILER TYPE: SMALL BOILER (<100 mmBTU/HR)		
REQUESTED MAX. FUEL THRPT:	300.59	10^6 SCF/YR	HOURS OF OPERATIONS: 24	NO SNCR APPLIED	

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION

AIR POLLUTANT EMITTED	ACTUAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	ACTUAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) tons/yr	EMISSION FACTOR lb/mmBtu uncontrolled	EMISSION FACTOR lb/mmBtu controlled
PARTICULATE MATTER (Total)	0.26	1.55	0.26	1.14	0.26	1.14	0.007	0.007
PARTICULATE MATTER (Condensable)	0.20	1.17	0.20	0.86	0.20	0.86	0.006	0.006
PARTICULATE MATTER (Filterable)	0.07	0.39	0.07	0.29	0.07	0.29	0.002	0.002
SULFUR DIOXIDE (SO2)	0.02	0.12	0.02	0.09	0.02	0.09	0.001	0.001
NITROGEN OXIDES (NOx)	3.43	20.44	3.43	15.03	3.43	15.03	0.098	0.098
CARBON MONOXIDE (CO)	2.88	17.17	2.88	12.62	2.88	12.62	0.082	0.082
VOLATILE ORGANIC COMPOUNDS (VOC)	0.19	1.12	0.19	0.83	0.19	0.83	0.005	0.005

TOXIC / HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION

TOXIC / HAZARDOUS AIR POLLUTANT	CAS NUMBER	ACTUAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	ACTUAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITS) lb/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/hr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITS) lb/yr	EMISSION FACTOR lb/mmBtu uncontrolled	EMISSION FACTOR lb/mmBtu controlled
Acetaldehyde (TH)	75070	5.22E-07	6.21E-03	5.22E-07	4.57E-03	5.22E-07	4.57E-03	1.49E-08	1.49E-08
Acrolein (TH)	107028	6.18E-07	7.36E-03	6.18E-07	5.41E-03	6.18E-07	5.41E-03	1.76E-08	1.76E-08
Ammonia (T)	7664417	1.10E-01	1.31E+03	1.10E-01	9.62E+02	1.10E-01	9.62E+02	3.14E-03	3.14E-03
Arsenic unlisted compounds (TH)	ASC-other	6.86E-06	8.18E-02	6.86E-06	6.01E-02	6.86E-06	6.01E-02	1.96E-07	1.96E-07
Benzene (TH)	71432	7.21E-05	8.58E-01	7.21E-05	6.31E-01	7.21E-05	6.31E-01	2.06E-06	2.06E-06
Benzo(a)pyrene (TH)	50328	4.12E-08	4.91E-04	4.12E-08	3.61E-04	4.12E-08	3.61E-04	1.18E-09	1.18E-09
Beryllium metal (unreacted) (TH)	7440417	4.12E-07	4.91E-03	4.12E-07	3.61E-03	4.12E-07	3.61E-03	1.18E-08	1.18E-08
Cadmium metal (elemental unreacted) (TH)	7440439	3.77E-05	4.50E-01	3.77E-05	3.31E-01	3.77E-05	3.31E-01	1.08E-06	1.08E-06
Chromic acid (VI) (TH)	7738945	4.80E-05	5.72E-01	4.80E-05	4.21E-01	4.80E-05	4.21E-01	1.37E-06	1.37E-06
Cobalt unlisted compounds (H)	COC-other	2.88E-06	3.43E-02	2.88E-06	2.52E-02	2.88E-06	2.52E-02	8.24E-08	8.24E-08
Formaldehyde (TH)	50000	2.57E-03	3.07E+01	2.57E-03	2.25E+01	2.57E-03	2.25E+01	7.35E-05	7.35E-05
Hexane, n- (TH)	110543	6.18E-02	7.36E+02	6.18E-02	5.41E+02	6.18E-02	5.41E+02	1.76E-03	1.76E-03
[illegible]nd unlisted compounds (H)	PBC-other	1.72E-05	2.04E-01	1.72E-05	1.50E-01	1.72E-05	1.50E-01	4.90E-07	4.90E-07
[illegible]ganese unlisted compounds (TH)	MNC-other	1.30E-05	1.55E-01	1.30E-05	1.14E-01	1.30E-05	1.14E-01	3.73E-07	3.73E-07
[illegible]cury vapor (TH)	7439976	8.92E-06	1.06E-01	8.92E-06	7.82E-02	8.92E-06	7.82E-02	2.55E-07	2.55E-07
Naphthalene (H)	91203	2.09E-05	2.48E-01	2.09E-05	1.83E-01	2.09E-05	1.83E-01	5.98E-07	5.98E-07
Nickel metal (TH)	7440020	7.21E-05	8.58E-01	7.21E-05	6.31E-01	7.21E-05	6.31E-01	2.06E-06	2.06E-06
Selenium compounds (H)	SEC	8.24E-07	9.81E-03	8.24E-07	7.21E-03	8.24E-07	7.21E-03	2.35E-08	2.35E-08
Toluene (TH)	108883	1.17E-04	1.39E+00	1.17E-04	1.02E+00	1.17E-04	1.02E+00	3.33E-06	3.33E-06
Total HAPs		6.48E-02	7.71E+02	6.48E-02	5.67E+02	6.48E-02	5.67E+02	1.85E-03	1.85E-03
Highest HAP	Hexane	6.18E-02	7.36E+02	6.18E-02	5.41E+02	6.18E-02	5.41E+02	1.76E-03	1.76E-03

TOXIC AIR POLLUTANT EMISSIONS INFORMATION (FOR PERMITTING PURPOSES)

TOXIC AIR POLLUTANT	CAS Num.	EXPECTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS lb/hr	lb/day	lb/yr	EMISSION FACTOR lb/mmBtu uncontrolled	EMISSION FACTOR lb/mmBtu controlled
Acetaldehyde (TH)	75070	5.22E-07	1.25E-05	6.21E-03	1.49E-08	1.49E-08
Acrolein (TH)	107028	6.18E-07	1.48E-05	7.36E-03	1.76E-08	1.76E-08
Ammonia (T)	7664417	1.10E-01	2.64E+00	1.31E+03	3.14E-03	3.14E-03
Arsenic unlisted compounds (TH)	ASC-other	6.86E-06	1.65E-04	8.18E-02	1.96E-07	1.96E-07
Benzene (TH)	71432	7.21E-05	1.73E-03	8.58E-01	2.06E-06	2.06E-06
Benzo(a)pyrene (TH)	50328	4.12E-08	9.88E-07	4.91E-04	1.18E-09	1.18E-09
Beryllium metal (unreacted) (TH)	7440417	4.12E-07	9.88E-06	4.91E-03	1.18E-08	1.18E-08
Cadmium metal (elemental unreacted) (TH)	7440439	3.77E-05	9.06E-04	4.50E-01	1.08E-06	1.08E-06
Soluble chromate compounds, as chromium (VI) equivalent	SolCR6	4.80E-05	1.15E-03	5.72E-01	1.37E-06	1.37E-06
Formaldehyde (TH)	50000	2.57E-03	6.18E-02	3.07E+01	7.35E-05	7.35E-05
Hexane, n- (TH)	110543	6.18E-02	1.48E+00	7.36E+02	1.76E-03	1.76E-03
Manganese unlisted compounds (TH)	MNC-other	1.30E-05	3.13E-04	1.55E-01	3.73E-07	3.73E-07
Mercury vapor (TH)	7439976	8.92E-06	2.14E-04	1.06E-01	2.55E-07	2.55E-07
Nickel metal (TH)	7440020	7.21E-05	1.73E-03	8.58E-01	2.06E-06	2.06E-06
Toluene (TH)	108883	1.17E-04	2.80E-03	1.39E+00	3.33E-06	3.33E-06

GREENHOUSE GAS EMISSIONS INFORMATION (FOR EMISSIONS INVENTORY PURPOSES) - CONSISTENT WITH EPA MANDATORY REPORTING RULE (MRR) METHOD

GREENHOUSE GAS POLLUTANT	ACTUAL EMISSIONS EPA MRR CALCULATION METHOD: TIER 1 metric tons/yr	metric tons/yr, CO2e	short tons/yr	GHG - POTENTIAL TO EMIT NOT BASED ON EPA MRR METHOD POTENTIAL EMISSIONS short tons/yr	short tons/yr, CO2e
CARBON DIOXIDE (CO_2)	22281.59	22,281.59	24,561.22	17,919.06	17919.06
METHANE (CH_4)	4.20E-01	8.83E+00	4.63E-01	3.38E-01	7.10E+00
NITROUS OXIDE (N_2O)	4.20E-02	1.30E+01	4.63E-02	3.38E-02	1.05E+01
	TOTAL CO2e (metric tons)	22,303.45			TOTAL CO2e (short tons) 17,936.65

NOTE: CO2e means CO2 equivalent
NOTE: The DAQ Air Emissions Reporting Online (AERO) system requires short tons be reported. The EPA MRR requires metric tons be reported.
NOTE: Do not use greenhouse gas emission estimates from this spreadsheet for PSD (Prevention of Significant Deterioration) purposes.

A.6 Dye application (ES-5)

Terra-Mulch Products, LLC
Conover, NC, Catawba County
ID 1800267
March 2024

Profile™
Your Trusted Partner In Soil Solutions

ES-5 **Fiber Dyeing Process**

OS-1

	Ex.Conc Green	Green	Blue	Acetic Acid		Hours of Operation	
usage lb/yr	171007	35874	7504	10719		6240	hrs/yr
usage lb/hr	27.4	5.7	1.2	1.7	TPER		
VOC	43.0%	24.8%	50.4%	100.0%	lb/hr		
acetic acid	43.0%	24.8%	50.4%	100.0%	3.90		
HCl	10.0%	0.0%	0.0%		0.74		

Form B Data	CAS	EF Source	EXPECTED ACTUAL (AFTER CONTROLS / LIMITS)		POTENTIAL EMSSIONS (BEFORE CONTROLS / LIMITS)		(AFTER CONTROLS / LIMITS)	
			lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
VOC		SDS	15.53	48.47	15.53	68.04	15.53	68.04
acetic acid	64-19-7	SDS	15.53	48.47	15.53	68.04	15.53	68.04
hydrogen chloride	7647-01-0	SDS	2.74	8.55	2.74	12.00	2.74	12.00

A.7 Facility-wide

FORM D1

FACILITY-WIDE EMISSIONS SUMMARY

REVISED 09/22/16 — NCDEQ/Division of Air Quality - Application for Air Permit to Construct/Operate — D1

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

AIR POLLUTANT EMITTED	EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITATIONS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITATIONS) tons/yr	
PARTICULATE MATTER (PM)	19.85	303.29	37.70	
PARTICULATE MATTER < 10 MICRONS (PM_{10})	7.54	142.82	14.40	
PARTICULATE MATTER < 2.5 MICRONS ($PM_{2.5}$)	7.31	142.19	13.78	
SULFUR DIOXIDE (SO_2)	0.04	0.18	0.12	
NITROGEN OXIDES (NOx)	6.43	30.06	19.26	
CARBON MONOXIDE (CO)	5.40	25.24	16.17	
VOLATILE ORGANIC COMPOUNDS (VOC)	164.72	611.16	250.00	(PSD Limit)
LEAD	0	0	0	
GREENHOUSE GASES (GHG) (SHORT TONS)				
OTHER				

HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

HAZARDOUS AIR POLLUTANT EMITTED	CAS NO.	EXPECTED ACTUAL EMISSIONS (AFTER CONTROLS / LIMITATIONS) tons/yr	POTENTIAL EMISSIONS (BEFORE CONTROLS / LIMITATIONS) tons/yr	POTENTIAL EMISSIONS (AFTER CONTROLS / LIMITATIONS) tons/yr
Total HAP		9.05	42.27	27.09
Acetaldehyde	75070	1.39	6.51	4.17
Acrolein	107028	0.20	0.94	0.60
Formaldehyde	50000	2.76	12.89	8.26
Hexane	110543	0.12	0.54	0.35
Methanol	67561	4.31	20.15	12.91
Phenol	108952	0.27	1.25	0.80
hydrogen chloride	7647-01-0	8.55	12.00	12.00

TOXIC AIR POLLUTANT EMISSIONS INFORMATION - FACILITY-WIDE

INDICATE REQUESTED ACTUAL EMISSIONS AFTER CONTROLS / LIMITATIONS. EMISSIONS ABOVE THE TOXIC PERMIT EMISSION RATE (TPER) IN 15A NCAC 2Q .0711 MAY REQUIRE AIR DISPERSION MODELING. USE NETTING FORM D2 IF NECESSARY.

TOXIC AIR POLLUTANT EMITTED	CAS NO.	lb/hr	lb/day	lb/year	Modeling Required ? Yes	Modeling Required ? No	
Acetaldehyde	75070	1.49	17.83	3342.86			
Acrolein	107028	0.21	2.57	482.14			See
Formaldehyde	50000	2.94	35.31	6621.43	x		Prior
Hexane	110543	0.12	1.48	277.20			Model
Methanol	67561	4.60	55.20	10350.00			
Phenol	108952	0.29	3.43	642.86			
acetic acid	64-19-7	15.53	372.72	96907.20	x		Current
hydrochloric acid	7647-01-0	2.74	65.76	17097.60	x		Project Model

DAQ Notes:

1. *DAQ does not agree with the PM calculations due to the emission factor used for the dryers (as discussed in Section A.1 above). Site-specific emission testing will be required.*
2. *The above D1 form was submitted after Terra-Mulch included calculations for ES-5 (submitted March 8, 2024). Note that Terra-Mulch will comply with facility-wide emission limits for VOC and HAP.*
3. *The value for Expected Actual Emissions and Total HAP should be 17.6, instead of 9.05 as indicated on the form.*