April 24, 2020

By Electronic Mail to <mrupp@mdeq.ms.gov>
Megan Rupp
Mississippi Department of Environmental Quality
P.O. Box 2261
Jackson, MS 39225

RE: Public Comments on the Draft Air Pollution Control Permit No. 1980-00045 for Pinnacle Renewable Energy, Newton MS Facility.

Dear Ms. Rupp:

On behalf of the Healthy Gulf, the People's Justice Council, the Education, Economics, Environmental, Climate and Health Organization, Our Children's Earth, Dogwood Alliance, Partnership for Policy Integrity, the Rachel Carson Council and themselves, Environmental Integrity Project hereby submits these comments on draft Air Pollution Control Permit No. 1980-00045 for Pinnacle Renewable Energy, Inc. (hereafter, "Pinnacle" or "the facility"), a wood pellet manufacturing facility proposed to be constructed at 615 Coliseum Drive, Newton, MS 39345.

The draft permit purports to restrict potential volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) to below the relevant major source thresholds. The Pinnacle facility, however, will not operate VOC or HAP controls on its dry hammermills, storage silos, nor loadout operations. Because Pinnacle has underestimated emissions from these units, and because the permit fails to implement effective, enforceable operating and emission limits, the facility will be a major source of both VOCs and HAPs as currently proposed. Accordingly, MDEQ must revise the draft permit to fix these deficiencies prior to issuance. Otherwise, Pinnacle must undergo PSD major-source review and case-by-case MACT analysis.

I. Pinnacle's Potential HAP Emissions Exceed the Major Source MACT Threshold for Total HAPs.

Under Section 112 of the Clean Air Act, a facility is a major source of HAPs if it has the potential to emit (PTE) 10 tpy or more of any single HAP or 25 tpy or more of any combination

of HAPs. 42 U.S.C. § 7412(a)(1). Pinnacle has calculated its PTE for HAPs at only 14.4 tpy,[1] and the permit incorporates synthetic minor emission limits to avoid Section 112(g)'s case-by-case MACT requirements. Pinnacle, however, has drastically underestimated the facility's total HAP emissions. Specifically, Pinnacle only quantified four of the dozens of HAPs that will be emitted from the Newton facility. When these additional emissions are properly accounted for, the facility's PTE for HAPs exceeds the case-by-case MACT threshold. Further, the permit's synthetic minor emission limits are unenforceable because they lack adequate monitoring, reporting, and recordkeeping requirements, and therefore cannot be relied upon to restrict PTE to synthetic minor source levels.

Moreover, failure to consider and quantify the full scope of the facility's HAP emissions independently renders Pinnacle's permit defective. MDEQ must require Pinnacle to remedy these issues and include additional enforceable permit conditions, such as a production cap or installation of control technology, in order to limit the facility's PTE to below the MACT major-source threshold.

A. Including Acrolein, Phenol, and Propionaldehyde, Pinnacle's PTE for HAPs Exceeds the Major Source Case-by-Case MACT Threshold for Total HAP Emissions.

According to Pinnacle, the Newton facility will be a synthetic minor source of HAPs with a PTE of only 14.4 tpy of potential total HAPs emissions. Pinnacle's calculation, however, relies on emission factors published by the Georgia Environmental Protection Division (Georgia EPD), which only include four of the of the 187 HAPs regulated under the Clean Air Act—acetaldehyde, formaldehyde, HCL, and methanol.[2] On this limited basis, Pinnacle determined that the facility's maximum PTE for *all* HAPs was 14.4 tpy, ignoring any HAPs other than the four it quantified.[3] Without supplementing the Georgia EPD factors to account for other significant HAPs, Pinnacle has fundamentally underestimated its potential emissions.

While the facility may not emit many or even most of the 187 regulated HAPs at significant levels, if at all, the company's failure to at least quantify acrolein, phenol, and propionaldehyde was a substantial error. It is widely recognized that these three HAPs are emitted by wood pellet plants at significant rates.[4] Enviva, which is the largest wood pellet manufacturer in the world and operates seven pellet plants across the southern U.S., has developed emission factors for these HAPs based on stack tests at its facilities. Utilizing these emission factors for Pinnacle's dryer, dry hammermills, and pellet coolers demonstrates that these units will emit acrolein,

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[1] Pinnacle Renewable Energy, Air Permit Application for Newton Plant, at Appendix B, Table B-1 (Aug. 2019, rev. Nov. 2019) [hereinafter "Pinnacle Newton Application."].

[2] Memorandum from Manny Patel, Georgia EPD, to Eric Cornwell, Georgia EPD, entitled "Emission Factors for Wood Pellet Manufacturing" (Jan. 29, 2013) (Attachment A) [hereinafter "Georgia EPD Memo"].

[3] While Pinnacle did quantify several other HAPs for the RTO burners (i.e. emitted by natural gas combustion rather than the drying and manufacturing process) and the engines, these emissions are tiny and do not represent the many HAPs emitted from the wood drying and pellet manufacturing process itself.

[4] For instance, Enviva Pellets included all three in its recent Enviva Lucedale application, and frequently estimated these three HAPs were emitted at *higher* rates than some of the three Georgia EPD factors. *See, e.g.*, Enviva Pellets Epes, Application for Air Permit, at Appendix C, Table 19 (Apr. 2019) [hereinafter "Enviva Epes Application"] (Attachment B) (showing acrolein, phenol, and propionaldehyde emitted at higher rates than formaldehyde by the RCO controlling hammermills and pellet coolers).

phenol, and propionaldehyde at a combined rate of 10.3 tpy.[5] Added to the 14.4 tpy estimated for the four HAPs Pinnacle quantified, the facility has a PTE of 24.7 tpy. The table below sets out these emissions:

HAP Emissions Including Acrolein, Phenol, and Propionaldehyde								
	Acrolein		Phenol		Propionaldehyde		Pinnacle*	Total HAP
	lb/ODT	TPY	lb/ODT	TPY	lb/ODT	TPY	TPY (Total HAPs)	TPY
Dryer w/ RTO	3.20E-03	0.70	4.10E-03	0.90	1.40E-03	0.31	8.2	10.11
Dry Hammermills Uncontrolled	1.08E-02	2.38	4.10E-03	0.90	1.88E-02	4.14	3.52	10.94
Pelletizing w/ RTO**	2.52E-03	0.55	1.26E-03	0.28	5.40E-04	0.12	.044	0.99
All other units	-	-	-	-	-	-	2.66	2.66
Sum:		3.63		2.08		4.56	14.4	24.7

* Sum of the four HAPs quantified by Pinnacle: acetaldehyde, formaldehyde, HCL, and methanol.

** Enviva's pelletizer emission factor represents uncontrolled emissions, for our calculations we therefore reduced the emission factor by 95% to reflect Pinnacle's estimated RTO efficiency.

Yet this PTE for total HAPs, 24.7 tpy, is an underestimate of total HAP emissions for several reasons. First, these calculations do not include emissions of acrolein, phenol, or propionaldehyde from units other than the dryer, dry hammermills, and pelletizing, emissions which are likely to be significant, ignoring, for instance, the storage silo and loadout operations.[6] Using the ratio between acrolein, phenol, and propionaldehyde and acetaldehyde, formaldehyde, and methanol emissions from Enviva's emission factors, we calculate that these "other" units emit 1.05 tons of acrolein, phenol, and propionaldehyde.[7] Second, wood pellet plants emit many more HAPs than the seven HAPs included here, even if each individual HAP is emitted in relatively small quantities. For instance, Enviva's most recent permit application, for its Epes, Alabama facility accounted for a total of 48 HAPs; the 41 HAPs not included above account for

[5] Enviva Pellets Sampson, Application for PSD Permit Modification for Softwood Expansion Project, at Appendix. C: Potential Emissions Calculations (Mar. 18, 2018) [hereinafter "Enviva Sampson Application"] (Attachment C). Note: Although Enviva used similar emission factors in its recent Lucedale, Mississippi and Epes, Alabama applications, we chose Sampson's emission factors because the Lucedale and Epes facilities will combine dry hammermill and pellet cooler emissions into mixed streams, therefore Enviva did not include emission factors for hammermills and pellet coolers separately in these two application.

[6] Considering Pinnacle estimates 2.66 tons of acetaldehyde, methanol, and formaldehyde from these other units, such as the storage silo and truck loadout, it is reasonable to assume acrolein, phenol, and propionaldehyde emissions also occur at comparable rates.

[7] Calculated as follows: acrolein, phenol, and propionaldehyde accounted for 41.3 tons at Enviva Sampson, while acetaldehyde, formaldehyde, and methanol accounted for 104.2 tons, for a ratio of 0.396 tons of acrolein, phenol, and propionaldehyde for every ton of acetaldehyde, formaldehyde, and methanol. Applying the ratio of 0.396 to the 2.66 tons of HAP emissions quantified by pinnacle for all other units results in 1.05 tons of acrolein, phenol, and propionaldehyde per year.

12.25% of that facility's total projected HAP emissions.[8] Applying that same ratio here equates to 27.4 tpy of total HAPs.[9] Combined with the 1.05 tpy of acrolein, phenol, and propionaldehyde for other units such as storage and loadout results in a total PTE of 28.45 tpy. Based on this PTE, if Pinnacle wishes to avoid major source MACT, Pinnacle must accept a production limit of no more than 386,000 tpy or install additional HAP controls.[10]

B. Case-by-Case MACT Requires Pinnacle to Install an RTO or RCO on the Dry Hammermills.

Unless Pinnacle accepts a lower production rate to restrict its PTE for HAPs, the Pinnacle facility must be subject to case-by-case MACT as a major source. Under federal and state regulations, "[t]he MACT emission limitation . . . shall not be less stringent than the emission control which is achieved in practice by the best controlled similar source."[11] In other words, under case-by-case MACT, if any similar source has achieved a certain destruction efficiency in practice, then that same degree of control is required for any new major source. While the planned RTOs for the dryer and pelletizers arguably qualify as MACT for those units (except that the 95% VOC destruction rate required is almost certainly lower than destruction rates actually achieved in practice), the uncontrolled dry hammermills certainly do not meet MACT requirements.[12] Numerous pellet mills control dry hammermills with RTOs or RCOs that achieve at least 95% organic HAP destruction. In fact, such controls are now industry-standard; of the 15 wood pellet plants in the U.S. with a production capacity greater than 400,000 tpy, 11 either operate such controls currently (five plants[13]) or are in the construction process to add them (six plants[14]).

Further, a facility in Georgia, Georgia Biomass, achieved greater than 95% control in practice as long ago as 2013. The uncontrolled dry hammermills at that plant had a PTE of 1031 tons of VOCs[15] per year prior to the installation of controls.[16] Stack tests conducted after the installation of an RCO showed at least 97.7% destruction of VOCs (the equivalent of 1031 tpy versus 23.03 tpy).[17] Based on this demonstration, the MACT "floor," i.e. the maximum possible emission limit for the dry hammermills, is a limit of 3.11 tpy of VOCs (i.e. 97.7% destruction of the 135.24 tpy Pinnacle estimates its dry hammermills will emit).

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[8] Enviva Epes Application, *supra* note 4, at App. C, Table 3. Enviva estimated facility-wide HAP emissions would be 34.7 tpy, with the seven HAPs discussed herein accounting for 30.45 tpy, meaning all other HAPs accounted for 4.25 tpy.

[9] The total HAPs calculated by Enviva were 13.96% higher than the seven HAPs discussed here, therefore we calculate Pinnacle's total HAPs by multiplying the emission rate of 24.7 tpy by 1.1396.

[10] At this production rate, we calculate PTE for total HAPs to be 24.9 tpy.

[11] 40 C.F.R. § 63.43(d)(1).

[12] While the dry hammermills will be controlled by a baghouse for particulates, essentially all of the HAPs emitted by these units are VOCs that are not controlled by baghouses in any significant manner.

[13] Enviva Hamlet (NC), Hazlehurst Wood Pellets (GA), Georgia Biomass (GA), Enviva Cottondale (FL), and Highland Pellets (AR).

[14] Enviva Southampton (VA), Enviva Northampton (NC), Enviva Sampson (NC), Drax Morehouse (LA), Drax LaSalle (LA), and Woodville Pellets (formerly German Pellets Texas).

[15] MDEQ's recent MACT determination for Enviva Epes utilized VOCs as a surrogate for HAPs, which we agree is appropriate.

[16] Testing at Georgia Biomass produced an emission factor for the dry hammermills of 2.5 lb/ODT, and the facility has a maximum production rate of 825,000 tpy, for a total PTE of 1,031 tpy. Georgia EPD Memo, *supra* note 2.

[17] Georgia EPD, Compliance Monitoring Report for Georgia Biomass, at Attachment: Performance Tests (Feb. 7, 2017) (Attachment D). This report shows EPD's calculation that, based on testing conducted October 30, 2013 on RCO1 (the RCO controlling the dry hammermills), annual emissions are 23.03 tpy.

Finally, in addition to the MACT "floor," MDEQ must also conduct a "beyond the floor" analysis to determine whether a stricter emission limit "can be achieved . . . taking into consideration the costs of achieving such emission reduction and any non-air quality health and environmental impacts and energy requirements."[18] We note that many RTO and RCO vendors who have sold RTOs to the wood pellet industry advertise destruction efficiencies up to 99%.[19]

C. Pinnacle's Failure to Quantify HAP Emissions is an Independent Defect Barring Issuance of the Permit.

Under Mississippi's rules governing issuance of air permits, "no permit shall be issued unless the applicant has complied with applicable requirements of . . . [the] Permit Regulations for the Construction and/or Operation of Air Emissions Equipment."[20] One such regulation is found at Miss. Admin. Code, Title 11, Part 2, Chapter 2, Rule 2.2(B)(8), which requires that "Applicants for all permits to construct or operate . . . shall specify in their application the air emission rate for each air pollutant subject to regulation under the Federal Act that can be reasonably expected to be emitted into the air as a result of operations from the source."

In short, MDEQ shall not issue any permit where the applicant has not quantified emissions of all pollutants subject to regulation under the Clean Air Act that the facility will emit. Here, HAPs like acrolein, phenol, and propionaldehyde are plainly subject to regulation under the Clean Air Act. Further, as shown above, it is certain that Pinnacle will emit these HAPs, along with most or all of the 41 other HAPs identified by Enviva as pollutants emitted in the pellet manufacturing process. Because Pinnacle failed to "specify the emission rate" for these air pollutants, *Id.*, MDEQ cannot issue the permit until Pinnacle quantifies these emissions in an appropriate manner.

D. The Draft Permit's Monitoring, Recordkeeping, and Reporting Requirements for Total HAPs Are Inadequate and Render the PTE Limits Unenforceable.

While the permit does set forth how Pinnacle must monitor, record, and report its HAP emissions, prior to stack testing, the permit requires that Pinnacle utilize the emission factors from Pinnacle's construction application.[21] This is problematic, because, as addressed above, Pinnacle's application only quantified four HAPs out of the more than 180 HAPs regulated under the Clean Air Act. The permit therefore guarantees that Pinnacle will undercount and underreport its total HAP emissions. As such, this monitoring fails to ensure Pinnacle will comply with the permit's PTE limits, rendering the PTE limits unenforceable as a practical matter.

EPA has explained the underlying principle behind the monitoring required to ensure that emission limits are practically enforceable:

> In order to be considered practically enforceable, an emission limit must be accompanied by terms and conditions that require a source to effectively constrain its operations so as to not exceed the relevant emissions threshold. **These terms**

[18] 40 C.F.R. § 63.43(d)(2).
[19] *See, e.g.*, A.H. Lundberg Systems, *Products: Regenerative Thermal Oxidizer and Regenerative Catalytic Oxidizer*, http://www.ahlundberg.com/products/air-pollution-control/thermal-oxidizer-rto-rco-dfo/ (last visited Feb. 1, 2020).
[20] Miss. Admin. Code, Title 11, Part 2, Chapter 2, Rule 2.2(A).
[21] Draft Permit Condition 5.3(a).

> **and conditions must also be sufficient to enable regulators and citizens to determine whether the limit has been exceeded** and, if so, to take appropriate enforcement action.[22]

Without requiring Pinnacle to account for all of the HAPs it emits, the "terms and conditions" of the draft permit fail to allow Pinnacle, MDEQ, and the public to "determine whether the limit has been exceeded." *Id.* The emission limits are therefore unenforceable as a practical and legal matter and cannot be relied upon to restrict Pinnacle's PTE. As discussed above, without enforceable and effective PTE limits, the facility's PTE for HAPs readily exceeds the major source threshold. Additionally, even after testing, the draft permit as currently proposed would not require Pinnacle to include emissions of HAPs from sources that won't be tested (such as acrolein, phenol, and propionaldehyde from the silos and loadout).

MDEQ must require Pinnacle to monitor, record, and report all of the HAPs emitted by the facility; these include not just methanol, formaldehyde, acetaldehyde and HCL (the HAPs currently subject to monitoring, reporting and recordkeeping), but also acrolein, phenol, and propionaldehyde, as well as the other 41 HAPs identified by Pinnacle's competitor, Enviva, as significant HAPs emitted by this type of facility.

II. Pinnacle's PTE for VOCs Likewise Exceeds the Major Source Threshold.

The Pinnacle facility is also classified as a synthetic minor source of VOCs for purposes of the Clean Air Act's PSD provisions. In its application, Pinnacle calculates its potential VOC emissions at 229.1 tpy, while MDEQ states in the draft permit review that the facility's PTE for VOCs is instead slightly higher at 234.7 tpy. While the reason for this discrepancy is unclear, as shown below, Pinnacle erred in several significant ways in calculating its potential VOC emissions each of which independently leads to an exceedance of the major source threshold. To avoid major source PSD review, Pinnacle must agree to an enforceable production cap or installation of additional pollution control technology in order to sufficiently limit the facility's PTE for VOCs.

A. Pinnacle has Substantially Underestimated Emissions From its Wood Pellet Storage Silo and Truck Loadout Operations.

As permitted, the Pinnacle facility will include a storage silo with the capacity to hold 440,000 tons of pellets per year, along with truck loading operations. According to Pinnacle, these units will only emit 6.1 tpy of VOCs each, for a total of 12.2 tpy.[23] While we appreciate that Pinnacle has at least recognized that these units will emit VOCs, Pinnacle has miscalculated and substantially underestimated these emissions.

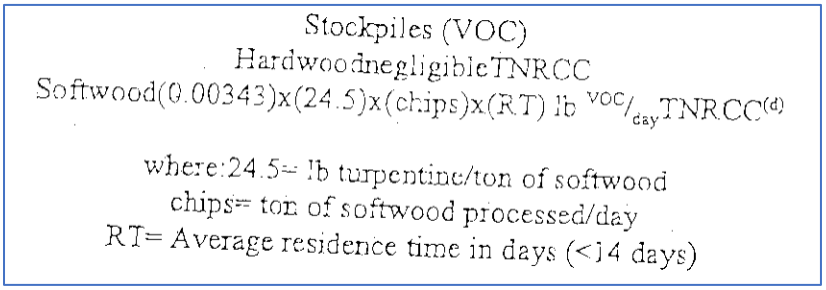
1. Pinnacle's Storage Silo Emission Factor is Deeply Flawed.

To estimate VOC emissions from the pellet storage silo, Pinnacle relies on an emission factor it derived from an equation published by the Texas Natural Resource Conservation Commission

[22] *In the Matter of Orange Recycling & Ethanol Prod. Facility, Pencor-Masada Oxynol, LLC*, Order on Petition No. II-2001-05, at 7 (E.P.A. Apr. 8, 2002) (emphasis added), https://www.epa.gov/sites/production/files/2015-08/documents/masada-2_decision2001.pdf.; *see also In re Piedmont Green Power, LLC*, Order on Petition No. IV-2015-2, at 14 (Dec. 13, 2016), https://www.epa.gov/sites/production/files/2016-12/documents/piedmont_response2015.pdf.

[23] Pinnacle Newton Application, *supra* note 1, at Appendix B, Table B-14.

(TNRCC).[24] Pinnacle, however, appears to have significantly erred in calculating the TNRCC emission factor. The underlying TNRCC equation is as follows:



In short, an emission rate can be produced from this equation by inputting the estimated tonnage of wood throughput per day (here, an average of 1,205 tons per day[25]) and the residence time of the wood in storage. The only way for this equation to produce an emission factor of 0.0277 lb/ton (the emission factor Pinnacle utilizes) is to assume a residence time of about 16 hours (i.e. 0.68 days).[26] This essentially means Pinnacle must unload the silo and load all of the pellets into trucks at least every 16 hours, which we believe to be highly unrealistic. For instance, a residence time of two days—on par with operations at Enviva Epes, a relatively comparable plant—equates to an emission factor of 0.085 lb/ODT, or 37 tpy of VOC emissions from the storage silos. This results in a facility-wide PTE of 271 tpy. Alternatively, the silos at Pinnacle's Aliceville facility in Alabama were calculated on the basis of a 34-day residence time (shown below), which applied to the Newton facility would result in hundreds of tons of VOCs from the silo per year.

Another major flaw in Pinnacle's calculations is that it appears that Pinnacle is relying on a substantial and unjustified modification of the TNRCC equation. Pinnacle writes in an email to Alabama Department of Environmental Management in relation to the recently-permitted sister facility in Demopolis, Alabama that the TNRCC emission factor "is from the initial TV application submitted for Aliceville in March 2014. Thus, these are historically accepted factors."[27] With regard to the "historically accepted" factors, they actually date to Aliceville's 2011 initial construction application. In both the 2011 and 2014 applications—and once again here—however, the Aliceville facility modified the TNRCC equation to include an "encapsulation factor," as shown below: [28]

[24] *Id.*

[25] The pellet storage silo will have an annual capacity of 880,000 tpy since it will also handle an additional 440,000 tpy from Pinnacle's planned Mississippi mill.

[26] In order to produce an emission factor in terms of lbs/ODT, we use one ton as the "chip" multiplier, which outputs the pounds of VOC emissions per ton of wood stored, i.e. lb/ODT (0.00343*24.5*1 ton*0.34 days = 0.0286 lb/ODT).

[27] Email from Jeremiah Redman, Trinity Consultants, to Rachael Broadway, ADEM (Jan. 24, 2020) (Attachment E)

[28] Westervelt Pellets 1, Air Permit Application for Construction of a New Pellet Mill, at Chapter VII, § (E)(I)(D) (Nov. 2011) (Attachment F).

VOC (Source: TNRCC)

1. Storage Silos (Total)

   a. lbs/hr

   lbs/hr = (0.00343)(24.5)(167.4 tons/day)(34 days)(0.01 – encapsulation factor)(6 silos)/(24 hrs/day)

   = 1.20

This encapsulation factor has the drastic effect of reducing emissions by 99%, yet neither the 2011 nor 2014 applications contain any explanation for what, exactly, an encapsulation factor is, nor how it was formulated. Considering the extreme reduction in emissions attributed to this factor, the lack of support for it is highly problematic. Further, Pinnacle has apparently adopted this factor without fully understanding its origin, calling it "historically accepted," and again without providing any explanation for its basis or applicability (and in fact, the encapsulation factor appears nowhere in the permit record for this permit).

The failure to explain and justify the radical modification to the TNRCC equation alone is reason to reject Pinnacle's emission factor. More troubling is the fact that even tiny variations in the encapsulation factor result in significantly different emission estimates. Rather than assuming a 99% reduction in emissions, if one assumes instead a 95% reduction (i.e. using an encapsulation factor of 0.05 rather than 0.01), the Newton silos will emit 30.5 tpy rather than 6.1 tpy, resulting in a facility-wide PTE of 265 tpy. In other words, this encapsulation factor, which is totally unsupported in the permit record, is at the heart of whether the facility will comply with the PTE limits and avoid PSD applicability.

Ultimately, if the unsupported encapsulation factor is removed from the equation, we calculate that VOC emissions exceed the major source threshold if the residence time is 9.6 hours or greater, which is unrealistic and not incorporated into the permit as an enforceable operating limit. On the other hand, if the encapsulation factor is included, compliance with PTE limits and PSD avoidance is dependent upon extremely tiny variations in the hundredth's decimal point of a mysterious factor unsupported by the record. Either way, there is absolutely no justification for MDEQ to accept Pinnacle's PTE calculations, nor is there any enforceable restrictions on PTE sufficient to render the Newton facility a valid synthetic minor source.

Finally, we note that the draft permit does not currently require any emissions testing from the storage and loadout operations for VOCs. At a minimum, MDEQ must require emissions testing from these units to establish source-specific emission factors. We note that, in response to similar comments, Alabama and Georgia have required such testing, including at Pinnacle's sister facility in Demopolis, Alabama.[29]

[29] ADEM, Air Permit Nos. 105-0020-X001 through X006 for Pinnacle Renewable Energy, Demopolis Mill (Feb. 25, 2020).

2. Pinnacle Failed to Explain Why the Georgia EPD Emission Factor Should Not Apply to the Storage Silo and Truck Loadout Operations.

We are aware of two other VOC emission factors that have been applied to wood pellet storage and loadout, both of which are substantially higher than Pinnacle's proposed (and likely flawed) TNRCC emission factor of 0.0286 lb/ODT: Georgia EPD's "storage/handling" emission factor from testing at the Georgia Biomass pellet plant (0.4 lb/ODT), and National Council for Air and Stream Improvement's (NCASI) emission factor for "wood handling operations at an OSB mill" (0.12 lb/ODT). Notably, these emission factors are generally in-line with those calculated above assuming residence times between two and five days (and omitting the unsupported encapsulating factor), further indicating that Pinnacle has erred in developing its emission factor.

Pinnacle has not explained why it believes the TNRCC emission factor, which is not based on wood pellet manufacturing, is more accurate than the Georgia Biomass emission factor, which is specific to the pellet industry. This is especially perplexing because Pinnacle *does* rely on the Georgia EPD emission factors for many other emission calculations, including HAP emissions from these very same units.[30] Using either the NCASI or Georgia EPD emission factors results in significant exceedances of the major source threshold:

Source	VOC Emission Factor (lb/ODT)	Storage Silo (tpy)	Truck Loadout (tpy)	Facility Wide (tpy)
Pinnacle	0.0286	6.29	6.29	234.7
NCASI	0.12	26.4	26.4	286.8
Georgia EPD	0.4	88	88	410.7

We believe the Georgia EPD emission factor is the best basis to calculate Pinnacle's storage and loadout emissions because it is industry-specific and promulgated by a state agency rather than an industry group such as NCASI. Regardless, both emission factor show that Pinnacle's PTE far exceeds the major source threshold. Because Pinnacle's failure to support its use of the modified TNRCC emission factor rather than the Georgia EPD emission factor is arbitrary and unsupported by the record, MDEQ must either utilize a higher emission factor or require that Pinnacle provide additional support for the TNRCC emission factor by, at a minimum, justifying the 99% reduction in emissions due to the encapsulation factor.

B. Pinnacle Also Underestimates Dry Hammermill Emissions.

Pinnacle estimates that its dry hammermills will be the largest source of VOC emissions, at 135 tpy. Pinnacle's emission factor for the dry hammermills is 0.61 lb/ODT, which is based on "the average value from 2013/2014 engineering testing performed on the dry ClassiSizer units at the Pinnacle Aliceville facility."[31] Even with the added 25% safety margin, Pinnacle's emission factor is almost certainly not representative of potential dry hammermill VOC emissions at the Newton plant. While Pinnacle may be correct that the dry ClassiSizers at Aliceville operate generally in the same manner as will the dry hammermills at Newton, there is a more

[30] Pinnacle Newton Application, *supra* note 1, at App. B, tbl. B-14.
[31] Pinnacle Newton Application, *supra* note 1, at App. B, tbl. B-10.

fundamental difference between operations at these two facilities that will impact VOC emissions: the Aliceville plant utilizes wet (i.e., green) milling, in the form of wet ClassiSizers, prior to drying, while Newton will not use any sort of wet or green milling (i.e. neither hammermills nor ClassiSizers).

The wet milling at Aliceville emits massive amounts of VOCs—the same 2014 testing relied upon by Pinnacle for the dry hammermills showed the wet mills emitting VOCs at a rate of 94.76 lb/hr, which equates to 415 tpy of VOCs.[32] That means that by the time the wood chips reached the dry ClassiSizers during the 2013/2014 testing, the wood had already been milled once and emitted a substantial amount of their VOCs during that initial green milling. Because the primary milling (in fact, the *only* milling) at Newton will be in the dry hammermills, and there will be no green milling, VOC emissions from the dry hammermills are likely to be much higher, both because the wood will retain more VOCs and because the dry hammermills will need to do more milling to reduce the wood chips in size, imparting more energy and generating more heat and emissions.

Stack tests from other facilities support this analysis. While several tests have produced emission factors relatively in line with Pinnacle's emission factor (although even those indicate Pinnacle has underestimated emissions), to our knowledge all of these tests occurred at facilities that operate green hammermills.[33] On the other hand, at Georgia Biomass, which does not operate green hammermills, testing showed a VOC emission factor for the dry hammermills of 2.5 lb/ODT (equating to 550 tpy of VOCs from Pinnacle's dry hammermills).[34] Testing at Green Circle Bio Energy (now Enviva Cottondale), which likewise does not use green hammermills, was also far higher than Pinnacle's emission factor, in the range of 1.4 lb/ODT (equating to 308 tpy of VOCs from Pinnacle's dry hammermills).[35]

As discussed above, Pinnacle's application frequently relies on Georgia EPD emission factors (which are based on the Georgia Biomass testing). This includes HAP emissions from the dry hammermills. Given the distinct operating difference between Aliceville and Newton, Pinnacle's decision to rely on that testing rather than the Georgia EPD emission factor is arbitrary and results in a significant underestimation of potential VOC emissions.

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[32] Environmental Monitoring Laboratories, Inc., Stack Test Report for testing conducted June 18 and 20, 2014 at Westervelt Pellets I, at 1 (July 15, 2014). (Attachment G).

[33] Testing at MRE Crossville produced an emission factor of 0.68 lb/ODT, which is higher than Pinnacle's emission factor of 0.61 lb/ODT; notably, this testing occurred at 80% softwood, meaning it significantly underestimates PTE for 100% softwood, which is permitted at Pinnacle. Likewise, testing at Enviva Greenwood, in South Carolina, produced an emission factor of 0.55 lb/ODT, however that testing occurred at just 75% softwood, 25% hardwood. Had the testing occurred at 100% softwood, emissions would certainly be higher than the 0.61 lb/ODT factor utilized by Pinnacle. Alliance Source Testing, Source Test Report for testing conducted July 30 to August 1, 2019 at MRE Crossville (Sept. 2019) (Attachment H); Air Control Techniques, Air Emission Test Report for testing conducted December 4, 2018 through March 7, 2019 at Enviva Greenwood (Apr. 4, 2019) (Attachment I).

[34] Georgia EPD Memo, *supra* note 2.

[35] Ambient Air Services, Engineering Test Report for testing conducted April 23-25, 2013 at Green Circle Bio Energy (2013) (Attachment J). While this test report did not include a production rate, the test produced an emission rate of 47.4 lbs/hr from the Line 2 hammermills, which process roughly a third of the facility's 825,000 tpy throughput (i.e. ~31 tons per hour), and we therefore calculate an emission factor conservatively assuming a higher production rate of 35 tph as 47.4 lb/35 tons = 1.35 lb/ODT.

III. Pinnacle Must Quantify CO Emissions from Wood Pellet Storage Silos and MDEQ must Require Emissions Testing on the Silos for CO.

According to Pinnacle's permit application, the facility's pellet storage silo will not emit any carbon monoxide (CO).[36] This conclusion, however, is contradicted by numerous studies conducted over the past decade demonstrating that bulk storage of wood pellets is a significant source of CO emissions.[37] Tragically, numerous real-world incidents have confirmed this, with at least 14 fatal accidents due to carbon monoxide poisoning from bulk wood pellet storage since 2002.[38] The danger is so high that the New York State Department of Health has recommended that "signs should be posted at [wood pellet] storage areas to warn everyone about potential carbon monoxide hazards."[39]

The scientific studies we reviewed made several conclusions:

- Wood pellets emit more carbon monoxide than wood chips and other types of biomass;[40]
- Fresh pellets emit more carbon monoxide than pellets that have been stored for longer periods of time;[41]
- Softwood emits more carbon monoxide than hardwood;[42]
- Temperature is a key component of carbon monoxide emissions, and 30° C (86° F) appears to be an important threshold above which emissions increase exponentially;[43]
- Increased headspace above the pellets as well as increased humidity also correlate to increased emissions;[44]

[36] Pinnacle Newton Application, *supra* note 1, at tbl. B-1.
[37] Urban R.A. Svedberg, et al., *Emissions of Hexanal and Carbon Monoxide from Storage of Wood Pellets, a Potential Occupational and Domestic Health Hazard*, 48 Ann. Occup. Hyg., No. 4, 339 (2004) (Attachment K); Lydia Soto-Garcia, et al., *Exposures to Carbon Monoxide from Off-Gassing of Bulk Stored Wood Pellets*, Center for Air Resources Engineering and Science, Clarkson University (2014) (Attachment L); Mohama Arifur Rahman, et al., *Carbon Monoxide Off-Gassing from Bags of Wood Pellets*, 62 Annals of Work Exposures and Health, Issue 2, 248 (2017) (Attachment M); Jaya Shankar Tumuluru, et al., *Analysis on Storage of Off-Gassing Emissions from Woody, Herbaceous, and Torrefied Biomass*, 8 Energies 1745, 1751 (Mar. 2, 2015) (Attachment N); Xingya Kuange, et al., *Rate and Peak Concentrations of Off-Gassing Emissions in Stored Wood Pellets—Sensitivities to Temperature, Relative Humidity, and Headspace*, 53 Ann. Occup. Hyg., No. 8, 789 (2009) (Attachment O); Wolfgang Stelte, Danish Technological Institute, *Guideline: Storage and Handling of Wood Pellets*, at 6 (Dec. 2012) (Attachment P).
[38] Rahman, et al., *supra* note 42, at 1.
[39] New York State Department of Health, *Carbon Monoxide (CO) Hazards from Wood Pellet Storage*, https://www.health.ny.gov/environmental/emergency/weather/carbon_monoxide/docs/pellets.pdf.
[40] Tumuluru, et al., *supra* note 42, at 1751.
[41] Rahman, et al., *supra* note 42, at 3; Soto-Garcia, et al., *supra* note 42, at 223-24.
[42] Rahman, et al., *supra* note 42, at 2.
[43] Tumuluru, et al., *supra* note 42, at 1746.
[44] Kuang, et al., *supra* note 42, at 791-93.

- Concentrations of carbon monoxide in one pellet storage warehouse exceeded 100 ppm on an 8 hour basis (the OSHA standard is 50 ppm on an 8 hour basis; the NAAQS standard, meanwhile, is 9 ppm on an 8 hour basis).[45]

Most critically, in terms of an emission factor, one study found that softwood pellets stored at 35° C (95° F) for two days had an emission factor of approximately 0.7 g/kg of stored wood, which converts to 1.4 lb/ton.[46] This emission factor produces an emission rate at Pinnacle Newton of 616 tons of CO per year, well over the PSD major-source threshold. Wood pellet stored in silos frequently reach and maintain temperatures well above 35° C even when ambient temperatures are much lower,[47] meaning this emission factor is likely applicable nearly year-round.

Additionally, we are not alone in our concerns about CO emissions from wood pellets. Florida's Department of Environmental Protection recently required CO testing based on off-gassing emissions at Enviva's Florida plant, explaining:[48]

> **6.3. CO Emissions**
>
> The applicant did not consider possible emissions of CO from the pellet coolers in the application, since there is no combustion that occurs as part of this emissions unit. However, while the situation is not entirely analogous to pellet coolers, there have been many documented cases of wood pellets in storage off-gassing appreciable amounts of CO. For example, the State of New York offers guidance to homeowners storing wood pellets indoors[9]. Gauthier et al. (2012)[10] summarized several studies suggesting that higher temperatures lead to greater CO off-gassing from stored pellets, that new pellets off-gas more than old pellets, and that pellets made from pine off-gas more than pellets made from spruce. While this is primarily a concern for storage of wood pellets in confined spaces, the Department was unable to locate any emissions factors of CO from pellet coolers at pellet production facilities. It is not yet known whether CO emissions from pellet coolers are negligible or appreciable.
>
> Therefore, the Department will require a one-time initial test of CO emissions from each of the pellet coolers. This initial test is necessary in order to confirm the applicant's reasonable assurance that the facility's emissions of CO are below the significant emissions rate. If the emissions factor is high enough to affect the PSD applicability calculation, then the Department will issue a revised PSD applicability analysis

In light of this evidence, Alabama recently required two new pellet mills, including Pinnacle's sister facility, Pinnacle Demopolis, to test for CO emissions from pellet storage silo during the facility's initial and periodic compliance testing.[49] Given the potential for such storage silos to

[45] Rahman, et al., *supra* note 42.
[46] Kuang, et al., *supra* note 42, at 791-93.
[47] Storing large amounts of fresh wood pellets self-generates significant heat. Sylvia H. Larsson, et al., *Temperature Patterns in Large Scale Wood Pellet Silo Storage*, 92 Applied Energy 322 (Apr. 1, 2012) (Attachment Q). For instance, one researcher published a study showing that "freshly produced pellets are considered to be more prone to self-heating . . . [observing] an initial temperature increase to approximately 55° C [131° F] in large piles of freshly produced pine wood pellets." *Id.* at 322 (page 1 of PDF). In that study, pellets loaded into large, ventilated pellet silos in British Columbia immediately began self-heating, and less than three days later had increased from an initial temperature of 42 to 48° C (107 to 118° F) to 55°C (131° F). *Id.* at 323-24 (page 2-4 of PDF). Eight days later, the pellets had reached a temperature of 65° C (149° F). All of these pellet temperatures were significantly higher than ambient temperatures at the time, which averaged between 20 and 25° C (68 and 77° F). *Id.* at 324 (page 3 of PDF).
[48] Florida Department of Environmental Protection, Technical Evaluation & Preliminary Determination for Draft Permit No. 0630058-024-AC for Enviva Pellets Cottondale, at 21 (Feb. 8, 2019) (Attachment R).
[49] MDEQ, Permit No. 412-0017-X006 for Enviva Pellets Epes, LLC, at Conditions 9-10 (Nov. 25, 2019) (requiring Enviva to conduct stack testing for CO and VOC emissions from at least one of the facility's wood pellet storage

emit high levels of CO, MDEQ should require similar testing for CO emissions from Pinnacle Newton' storage silo.

V. MDEQ Should Implement Source-Specific Fugitive Dust Requirements.

Wood pellet plants generate a lot of fugitive dust, i.e., airborne particulate matter. In fact, one of the most comment air pollution complaints raised by residents of communities where wood pellet plants are located is the large amount of fugitive dust that escapes into surrounding neighborhoods.[50] For example, in 2017, MDEQ issued a Notice of Violation to the Enviva Pellets plant in Amory, describing "multiple complaints over the past year pertaining to sawdust and smoke leaving the [Enviva Amory] facility impacting neighboring properties and vehicles."[51] A local alderman described the impacts of residents of his ward, who he said "are wheezing, coughing and constantly washing dust off their vehicles generated by the Enviva pellet plant."[52] More recently, residents living near another Enviva plant—Enviva Northampton in North Carolina—expressed frustration over dust from the plant, with one resident who lives across the street from the plant complaining about dust coating his car and house: "I have to wash [my house] every two to three months, my vehicle every two to three days."[53] Pinnacle Newton is no exception.

Major sources of fugitive dust at wood pellet plants include wood handling, wood storage piles, conveyor transfer points, yard dust, haul road dust, and engine exhaust.[54] Health problems associated with exposure to particulate matter pollution primarily involve damage to the lungs and respiratory system due to inhalation. Specifically, the inhalation of dust particles can irritate the eyes, nose, and throat; cause respiratory distress, including coughing, difficulty breathing, and chest tightness; increase the severity of bronchitis, asthma, and emphysema; cause heart attacks and aggravate heart disease; and lead to premature death in individuals with serious lung

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silos); *see* MDEQ, Response to Comments: Air Permit Nos. 712-0017-X001-X009 for Enviva Pellets Epes, LLC, at 2 (Nov. 25, 2019) ("Possible emissions of CO from confined pellet storage in which there are no combustion emissions is information new to MDEQ. In consideration of this comment, MDEQ will require an initial test for VOC and CO emissions from one of the pellet storage silos, followed by five-year periodic testing to verify the emission information in the Air Permit application.") [hereinafter "MDEQ Response to Comments"].

[50] For example, in 2014, residents of West Monroe, Louisiana publicized their ongoing concerns regarding large amounts of fugitive dust released from the Bayou Wood Pellet Plant. *See* Zach Parker, *Homeowners Seek EPA's Help with Pollution Complaints*, The Ouachita Citizen (Nov. 5, 2014), http://www.hannapub.com/ouachitacitizen/news/local_state_headlines/homeowners-seek-eps-s-help-with-pollution-complaints/article_5d11a19e-650b-11e4-8331-001a4bcf6878.html; *see also Residents are Having Concerns with Saw Dust Particles in the Air Coming from Bayou Wood Pellet Plant* (Jan. 21, 2015), https://www.knoe.com/home/headlines/Residents-are-having-concern-with-dust-particles-in-the-air-coming-from--289388501.html.

[51] Mississippi Department of Environmental Quality, Notice of Violation for Enviva Pellets Amory (May 23, 2017)

[52] Monroe Journal, *Amory Board of Alderman Discusses Deficit, Dust Complaints and a Tank* (Oct. 13, 2016) (Attachment S).

[53] North Carolina DEQ, Enviva Northampton Public Hearing Audio, at 29:04 (Aug. 20, 2019), https://deq.nc.gov/about/divisions/air-quality/air-quality-permitting/wood-pellet-industry-permitting-actions-and (dust complaint by Anthony Robinson); *see id.* at 2:0219 (dust complaint by Sybaleen Auston) (discussing her family's history of COPD, asthma, and allergies, and stating that "[w]e deal with enough—the air we're breathing, the traffic from the trucks, the grit, dirt on the cars, homes"), 2:35:23 (dust complaint by Richard Harding) (discussing his health issues and stating, "I cannot deal with the dust [from the plant]").

[54] British Columbia, Ministry of the Environment, Air Emissions Fact Sheet: Wood Pellet Manufacturing Facilities (July 2011) (Attachment T).

or heart disease.[55] When exposed repeatedly over a longer time period, fugitive dust exposure can lead to severe illness such as cancer.[56] In addition to affecting human health, fugitive dust reduces visibility, affects surface water, reduces plant growth, and can be a nuisance.

The draft permit includes a general provision requiring Pinnacle to prepare and submit a "Dust Management Plant" to MDEQ upon notification of startup, and grants MDEQ authority to comment on the plan and request modifications. These conditions, however, do not resolve the fugitive dust issues that come from operation of a wood pellet plant. To address these concerns and provide for the protection of nearby communities, MDEQ should either develop its own set of permit conditions related to dust that is tailored to wood pellet operations in order to prevent fugitive dust emissions from becoming a nuisance, or require that Pinnacle submit its dust management plan now to be incorporated in a revised draft that is available for public comment. Ultimately, what is key is that the facility is subject to enforceable (i.e. included in the permit) and source-specific conditions that will address the unique sources of dust at pellet plants. These include requiring windbreaks or enclosed structures for storage piles, minimizing drop heights and transfer points, and watering or coverings where necessary.

The need for these heightened and enforceable fugitive dust requirements for this facility is especially acute because the facility will be located near residential and commercial buildings that are already subject to fugitive dust emissions from the neighboring lumber mill.

VI. The Draft Permit' Opacity Monitoring is Not Effective to Detect and Remedy Excess Emissions.

The draft permit requires Pinnacle to conduct weekly visible emissions monitoring using Method 22 to detect any visible emissions; if visible emissions are detected, the facility must then conduct a Method 9 reading.[57] The permit contains no other requirements related to visible emissions. For instance, the permit is silent on what steps Pinnacle must take if and when it does observe opacity that exceeds the applicable limits. The permit does not dictate Pinnacle to take any corrective action to fix the source of the excess opacity, nor even to identify the issue causing the excess emissions. Additionally, nothing in the permit required Pinnacle to record, let alone report, excess opacity events. In short, nothing in the draft permit require this facility to take real action to address excess opacity, nor is there any accountability in the form of recording and reporting.

MDEQ must require visible emissions monitoring that at least requires prompt action to remedy excess emissions, and MDEQ should join other states in requiring daily monitoring. In particular, we encourage MDEQ to follow the method established by Georgia in the permit condition for a wood pellet mill set out below:[58]

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[55] New Hampshire Department of Environmental Services, Environmental Fact Sheet, Fugitive Dust (2014), https://www.des.nh.gov/organization/commissioner/pip/factsheets/ard/documents/ard-42.pdf; *see also* Wolfgang, *supra* note 42, at 6.
[56] Wolfgang, *supra* note 42, at 6.
[57] Draft Permit X002, at Condition 36(g); Draft Permit X004, at Condition 33(d).
[58] Georgia EPD, Draft Part 70 Operating Permit No. 2499-161-0023-V-02-4 for Hazlehurst Wood Pellets, at Condition 5.2.8 (Sept. 2019).

5.2.8 The Permittee shall perform daily checks of visible emissions from Log Storage/Handling, Debarking/Screening, Chipper, and Chip Piles (WOOD); Green Hammermills (GHM1&2); Furnace/Dryer RTO stack (S1), and the Dry Hammermill/Press/Cooler RCO stack (S2) while the underlying process equipment is operating at the normal, expected operating rate using the procedures below, except when atmospheric conditions or sun positioning prevent any opportunity to perform a VE check. The Permittee shall retain a record in a daily visible emissions (VE) log suitable for inspection or submittal.
[391-3-1-.02(6)(b)1]

a. Determine, in accordance with the procedures specified in paragraph d of this condition, if visible emissions are present at the discharge point to the atmosphere and record the results in the daily VE log. For sources that exhibit visible emissions, the Permittee shall comply with paragraph b of this condition.

b. For each check where a stack is determined to be emitting visible emissions, a qualified observer shall determine whether the emissions equal or exceed a 20% opacity action level, using the procedure specified in paragraph d of this condition. For the purposes of this condition a qualified observer is one that has met the certification requirements of EPA Method 9 – *Visual Determination of the Opacity of Emissions from Stationary Sources*. Also, this determination shall cover a period of six minutes. The results shall be recorded in the daily VE log. For sources that exhibit visible emissions of greater than or equal to the opacity action level of 20%, the Permittee shall comply with paragraph c of this condition.

c. For each occurrence that requires action in accordance with paragraph b of this condition, the Permittee shall determine the cause of the visible emissions and correct the problem in the most expedient manner possible. The Permittee shall note the cause of the visible emissions, raw material feed rate, and any other pertinent operating parameters as well as the corrective action taken, in the maintenance log.

d. The person performing the determination shall stand at a distance of at least three stack heights, which is sufficient to provide a clear view of the plume against a contrasting background with the sun in the 140 degree sector at his/her back. Consistent with this requirement, the determination shall be made from a position such that the line of vision is approximately perpendicular to the plume direction. Only one plume shall be in the line of sight at any time when multiple stacks are in proximity to each other.

Conclusion

For the reasons set out above, the draft permit for the proposed Pinnacle facility is legally deficient and must be denied or, in the alternative, must be revised prior to issuance to address the issues raised by these comments. Most significantly, MDEQ must ensure the plant will not exceed the major source PSD and Section 112 MACT thresholds without an appropriate permit by restricting production significantly.

Respectfully submitted,

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On behalf of Healthy Gulf, the People's Justice Council, the Education, Economics, Environmental, Climate and Health Organization, Our Children's Earth, Dogwood Alliance, Partnership for Policy Integrity, the Rachel Carson Council

Attachments: Comment Attachments A through T.