
April 19, 2016

Ms. Julie Churchill
Maine Department of Environmental Protection
Regulatory Assistance Small Business Ombudsman
17 State House Station
Augusta, Maine 04333-0017

Ms. Lynn Muzzey
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

Re: Fiberight Project in Apparent Violation of Part 115 Air Emission Levels for a “Minor” Source as Determined By Applicant’s Potential to Emit Calculations

Nearly one month ago, on March 23, 2016, I submitted to the Department a report titled “Part 3: Critical Technical Analysis of Errors, Omissions and Inconsistencies found in the MRC/Fiberight Air Emissions Permit Application and Air Permit Report and deliverables from CES on the Hampden, Maine Project.” For convenience, I have included that critique as Attachment 1 to this correspondence. I should also note that Ms. Churchill was able to get my report posted on the DEP website in a little over an hour after she received it and stated the following to me in her acknowledgement of that submittal:

“I also sent your comments to the co-applicants: MRC and Fiberight. I recommended they review your comments and provide a written response”

There is no indication in the ensuing weeks that CES has, on behalf of the applicants, responded to Ms. Churchill’s recommendation. All we have that remotely resembles a response to the air permitting issues I raised is another permutation to their previously submitted Potential to Emit (PTE) calculations dated April 8th, 2016. It should be noted that this is the 6th modification of the PTE calculations to the original application submitted on June 15, 2015. Thus, it appears NOT to be connected to my March 23 critical analysis, for which the DEP recommended the applicants respond to.

If the April 8th cover letter constitutes the sum total of what the DEP recommended the applicants respond to, then in a legal setting, any reasonable person would have no choice but to conclude that “the defendant is not responsive to the question”. It is obvious that the applicant can’t answer the rather technically simple questions that I asked. They now want to claim that all PTE calculations (revised) should be based on the AP- 42 Emissions Factors found in Section 1.6 Wood Residue Combustion in Boilers. The applicant says, and I quote: “Fiberight believes these emissions factors to be the most applicable published emission factors to predict emissions from the combustion of post hydrolysis solids (PHS)”.

In essence, Fiberight says: **ignore the actual analyses of PHS solids we have done in the past, as it is not representative of PHS**, and inexplicably says: **accept new actual analyses run on PHS** from their Lawrenceville, Virginia facility. So reject old data from Lawrenceville, Va samples produced by enzymatic hydrolysis in 2011 or 2012, and samples produced around Dec. of 2014 and accept the **one** new set of numbers analyzed for concentrations of chemical contaminants and ultimate fuel analysis generated in 2016. The applicant goes on to say, quote:

“The results of these analyses will be used to demonstrate that the unfired PHS material is similar to contaminant concentration and BTU content of biomass. Upon receipt and review of these laboratory analytical results, Fiberight will

submit the results to MDEP to validate the selection of biomass emission factors used to calculate the PTE for the facility”.

This seems disingenuous given that the conclusion precedes the proof and is directly contradicted by the current data that they asked the Department to consider!

How generous of the applicant to continue to pay to run tests until it gets the numbers it HOPES will keep them from turning their “Minor” project in Hampden into a Major Source of air emissions under Chapter 115 rules of the State of Maine. Actually, one should conclude that they are using the additional testing commitment as a temporary tactic in hopes that the DEP will issue a draft air permit before the numbers come in.

The applicant has mounted a wholly inadequate defense of its AEPA in light of my March 23rd, 2016 analysis of the data they submitted to the Department. Thus, the applicant has ignored the critique of their own report/data submittal that clearly shows the:

1. project exceeds the 100 ton per year air emissions limit for **Carbon Monoxide** for the Hurst Boilers
2. flue gas from the boilers will discharge the Hazardous Air Pollutant (HAP) **Chlorine** in excess of the 10 ton per year (tpy) limit for a single chemical compound and in fact exceeds the 25 ton per year limit for all HAPS, and that the Hampden project is a “Major Source” of Hazardous Air Pollutants.
3. Statutory limit for **Mercury** under 38 MRSA ¶ 585-B set at 25 pounds per year is exceeded, requires specific emissions controls under the Best Available Control Technology (BACT) requirements and places the project under “Major Source” requirements.

Using the applicant’s own data, (not the new data that in the applicant’s mind, the Maine DEP should somehow embrace), the **Hampden project is a Major air pollutant source that requires a new round of air permit application submittals.** Unless the applicant can demonstrate that the data previously submitted is somehow not-representative (in clear violation of the disclosures by the signatories), and that the new analyses are conducted in a manner that now does produce a representative sample, then this accommodation by the Department is both unwarranted and contestable.

The complex positions/contortions/arguments by the applicants to deny that the Hampden project is a “Major” polluter are not credible and fly in the face of some interpretations of “Occam’s Razor”. “The simplest explanation for some phenomenon is more likely to be accurate than the more complicated explanations”. The simplest explanation of the Fiberight project in Hampden is as a MAJOR air pollution source, but that the applicant does not want this fact known until it recruits a sufficient number of communities financial gain.

Sincerely,

Keith A. Bowden

Keith A. Bowden
Resident – Town of Orrington

kab: attachment

Attachment 1

(March 23, 2106 Correspondence to Me DEP)

Part 3: Critical Technical Analysis of Errors, Omissions and Inconsistencies found in the MRC/Fiberight Air Emissions Permit Application and Air Permit Supplemental Reports & Deliverables from CES on Hampden. ME Project

What follows is a review of some of the errors, omissions, unclear and contradictory statements in the review of the June 15, 2015 Air Emissions Permit Application (AEPA) and the various supplementals over the ensuing months.

- 1. Applicant's Information:** In 2 separate permit application submittals (Original June 15, 2015 AEPA- Appendix 1) and Dec. 14, 2015 BACT Analysis rev. 2- Appendix 1), the applicant provides 20 pages of info titled Non-Waste Determination Application for Non-hazardous Secondary Material – Fermentate from a Cellulosic Ethanol Plant Pursuant to 40 CFR Section 241.3, Standards and Procedures for Identification of Non-Hazardous Secondary Materials (NHSM) and dated 6/7/2013.

But on page 2 of the June 15, 2015 “Attachment C BACT Analysis” and page 3 of text of the December 14, 2015 “BACT Analysis rev. 2” the applicant state:

“Fiberight has submitted a Non-waste Determination Application for Non-Hazardous Secondary Material (NHSM) to the United States Environmental Protection Agency (EPA) in reference to the **Post-Hydrolysis Solids (PHS) fuel**. (emphasis added) The application ... to demonstrate the **PHS fuel** (emphasis added) meets the legitimacy criteria and is not a solid waste”.

Technical Review: A review of all the information in the two appendices is clearly important to the applicant for the air emission application, but should certainly be confusing to the general public and this reviewer. The NHSM application referenced in this AEPA is for a project in Iowa for “fermentate” from a ethanol plant”. We know from submittals by the Town of Orrington (October 27, 2015 – Solid Waste Permit Application Review of the Fiberight Project, etc.) and reviews by me on February 1, 2016 and February 29, 2016) that ethanol is not part of the Hampden project. The applicant has yet to provide responses to the October 2015 or February 29, 2016 reviews nor have they answered questions that were contained therein. In addition, a response is clearly warranted to the following:

- 1.1. What is the basis for implying in the two BACT analysis appendices that “fermentate from a cellulosic ethanol plant” is the same as “Post Hydrolysis Solids”.
- 1.2. What is “fermentate” in relation to the Maine project?.
- 1.3. Does the information from Fiberight to the EPA and/or subsequent email exchanges state that fermentate is PHS? Can Fiberight provide all correspondence (up to the current month) associated with this NHSM application?

- 2. Applicant's Information:** Pending response to questions raised in Technical Review - section 1 above, let's accept the idea put forth by the applicant that “fermentate” is the same as PHS. Now look at the Fiberight data submitted to the EPA in the application, and accept the criteria Fiberight put forth that PHS fuel is something that various customers would use in their combustion units. On “page 34-Summary” of the NHSM application, Fiberight states that their fermentate/PHS material:

“is similar in content to more widely used fuels, and emissions from its burning should be similar as well. Tables are included in this document that compares both constituents with other fuels, and likely air emissions. Emission factors for criteria pollutants are likely to be similar to the burning of wood or bagasse. Metals emissions were calculated directly from analyses of the NHSN for metals content. Neither the criteria nor hazardous waste pollutants

are much different from those emitted from wood, bagasse, coal, TDF, and so on. The material has a significant heating value, similar to bagasse and wood and as such, should be harvested to produce renewable energy. With its fuel made from what would otherwise be waste, Fiberight is at the forefront of cellulosic ethanol production technology.”

Later on page 38 in the document, Fiberight presents Table 1 titled “Comparison of Fermentate to Common Fuels”. The NHSM heading in the table has a notation/superscript “o” next to it, but has no explanation as to the meaning of the note. It appears that the data in this column is an actual analytical test result run on “fermentate”. Fiberight then declares:

“As the table shows, the fermentate has similar composition to the other commonly used fuels. Moisture is comparable with wood or bagasse, and the carbon and hydrogen components are similar to wood. In fact, the composition of the residuals is most similar to wood. ... Therefore, to estimate emissions from burning the material we have used EPA’s AP 42 criteria pollutant emission factors for wood. There is robust data for the emission factors for wood, which is not the case for biomass or paper mill sludge.”

Technical Review: Accepting Fiberight’s declaration that “fermentate/PHS” is the same as wood and that the Maine DEP should accept using the emission data it provides them, let us look at such data in Table 2, titled Emission Factors for Criteria Pollutants for Coal and Wood, found on page 41 of the Fiberight NHSM Non-Waste application. In all cases (except for sulfur dioxide/oxides of sulfur – SO_x), we see Fiberight using the same emission factor value for its fermentate/PHS/NHSM as the data listed for wood. Thus, using Fiberight’s own argument it made to the EPA and Maine DEP, the appropriate emission factors to use, for example, for carbon monoxide is from wood. The value which is listed is 0.60 pounds of CO/mm Btu of heat input from the combustion unit. So, in the case of the Hampden project, Fiberight should apply that factor to the Hurst Boilers combusting PHS. Yet, CES ignores the very data it has submitted on Fiberight’s behalf and instead uses a factor of 0.22 pounds of CO/mm Btu of heat input in the Boiler Performance Summaries.

As you know, for regulatory permitting purposes, potential new source facilities are categorized as “minor sources” if they have the potential to emit (PTE) less than 50 tons per year (TPY) of volatile organic compounds (VOC), 10 TPY of a single Hazardous Air Pollutant (HAP), or 25 TPY of all HAPS combined or under 100 TPY of any other regulated pollutant, like carbon monoxide. Sources with the PTE in excess of these thresholds are regulated as “major sources”

- 2.1. Why isn’t CES/Fiberight being consistent in its argument the fermentate/PHS/NHSM is wood and thus using the 0.6 factor for PHS that the NHSM application presents?
- 2.2. Applying the 0.6 factor would increase the CO emissions by 2.73 times and puts the CO annual emissions for just one of the Hurst boilers from the Dec. 14, 2015 value of 44.78 TPY to over 122.25 TPY.
- 2.3. Using CES/Fiberight’s own argument’s and data it supplied to the DEP, why isn’t the Hampden project considered a Major Source of air emissions for CO under Chapter 115 rules for its’ AEPA.
- 2.4. What is the meaning of the NHSM heading in the table that has a notation/superscript “o”. Is this an actual test result conducted on “fermentate” prior to 2013?
- 2.5. What justification does the applicant have for cherry picking data it has submitted for regulatory review? Even if the applicant averages the CO emission factor from the manufacturer’s (Hurst) and the figure from the NHSM application, the Hampden project will exceed the 100 TPY limit as it applies to Maine DEP Chapter 115 and is therefore a “Major Source”.

3. **Applicant’s Information:** In Table 1 of the Appendix 1 NHSM titled “Comparison of Fermentate to Common Fuels” on page 38 we find that it lists Chlorine at 0.2% by weight as a component in their “fermentate” /NHSM/ PHS material. (Until the applicant answers the question 2.5 above, one does not know for sure if this result is for an actual fermentate sample.)

Technical Review: Since no chlorine values are listed for wood, let us accept the chlorine number provided by the applicant as an actual test result for chlorine levels in Fiberight's PHS. The implication is that the Hurst gasifying boilers in Hampden would have emissions of hydrogen chloride in its stack gasses. Municipal Solid Waste (MSW) is known to contain chlorine from a wide variety of sources as this element is ubiquitous. If Fiberight responds to Question 2.5 above and we find that the data listed in the table is for actual fermentate/PHS, the Maine DEP must conclude that the HAP hydrogen chloride will be released untreated to the atmosphere. Conservative calculations presented below of this HAP indicate that uncontrolled emissions of HCl will exceed the 10 TPY limit for this compound and the 25 TPY limit for all HAPS. As with the carbon monoxide emission calculations presented above, one must conclude that the Hampden project is a Major Source of air pollutants and requires a more extensive review, including additional opportunities for input from the public and the EPA. The hydrogen chloride calculations, using the Fiberight data presented in the two BACT submittals are as follows:

For the two Hurst boilers, using CES supplied estimates found in the BPS are 6.57 tons/hr of 50% PHS solids fed per boiler. Assuming the Chlorine value in Table 1 is on a dry weight basis, hydrogen chloride, the calculation is as follows: $0.2 \text{ \# Cl}/100 \text{ \# dry PHS} \times (36.45 \text{ \# HCl}/35.35 \text{ \# Cl}) \times (6.57 \text{ tons wet PHS}/\text{boiler-hr}) \times (0.5 \text{ \# dry PHS}/1.0 \text{ \# wet PHS}) \times 2 \text{ Boilers} \times 8760 \text{ hr/year} = 118.35 \text{ ton HCl per year in flue gas.}$

Even if only 1/3 of the available Chlorine is converted to HCl, the Hampden project is over the 10 TPY limit for a single HAP and over the 25 TPY limit for all HAPS. CES/Fiberight calculated only 7.1 TPY of all HAPS, but did so by NOT including Chlorine, in spite of data supplied by the applicant in both BACT submittals. To insure that the PTE is limited to less than 10 TPY from all HAPS, they will need some sort of injection system in the gasifiers to control HCl. A limestone injection system would convert the HCl to a particulate salt depending upon the sorbent used. It is unknown whether the Hurst gasifier boilers for the Hampden can accommodate an in-duct sorbent injection system. The bag house currently planned would have to be sized to handle the added particle loading of the HCl control measures.

- 3.1. Will the applicant provide clear and compelling data refuting the presence of HAPS chlorine from past analytical test data submitted in the two Maine BACT applications for the AEPA for Hampden?
- 3.2. Will the Maine DEP reject the AEPA submitted by the applicant as not meeting the criteria of a Minor Source of air emissions nor complying with the regulator requirements of Chapter 115 for Best Available Control Technology or Maximum Available Control Technologies (MACT), as appropriate with respect to HAPS?
- 3.3. Will Fiberight be required to demonstrate compliance by the DEP with any HCl limits with something like a FTIR spectrometry system for Continuous Emission Monitoring (CEM) of HCl on each boiler?
- 3.4. Given the technical analysis provided above, is not the Fiberight project in Hampden a "Major Source of HAP" subject to EPA Region 1 permitting and oversight?

4. **Applicant's Information:** In Table 1 of the Appendix 1 NHSM titled "Comparison of Fermentate to Common Fuels" on page 38, the applicant provides what appears to be an actual emission factor for the element mercury, (chemical symbol Hg) in their "PHS" material. The emission factor provided for mercury is 3.96 E-05 pounds per million BTU of heat input for the boiler.

Technical Review: There is a statutory limit for the HAP mercury under 38 MRSA ¶ 585-B at 25 pounds per year (ppy). Applying the emission factor supplied by the applicant in 2 separate permit application submittals (June 15, 2015 AEPA- Appendix 1 and Dec. 14, 2015 BACT Analysis rev. 2- Appendix 1), we find that the Hampden project exceeds the statutory limit by nearly 36%. The calculation is as follows:

Boiler Heat input of $48.87 \text{ mm Btu}/\text{hour}/\text{boiler} \times 2 \text{ boilers} \times 0.0000396 \text{ \# Hg}/\text{mm Btu}/\text{hr} \times 8,760 \text{ hrs per year} = 33.91 \text{ pounds Hg per year}$ or 35.6 % above the 25 #pound/year limit.

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- 4.1 Given the technical analysis provided above, is not the Fiberight project in Hampden in violation of statutory limit for the HAP mercury under 38 MRSA ¶ 585-B set at 25 pounds per year (ppy).
 - 4.2. Can the applicant provide clear and compelling data refuting the presence of HAPS Mercury from past analytical test data submitted in the two Maine BACT applications for the AEPA for Hampden?
 - 4.3. Will Fiberight be required by the DEP to demonstrate compliance to Maine statues by providing a 90% reduction in Mercury emissions through the use of BACT or Maximum Achievable Control Technology (MACT) using such technologies as carbon injection in each boiler stack gases?

5. **Applicant's Information:** Again, In Table 1 of the Appendix 1 on page 38 the element Sulfur is listed at 0.05% by weight as a component in their "fermentate" /NHSM/ PHS material. Once again, one does not know for sure if this result is for an actual sample that Fiberight provided at the time of the NHSM application.

Technical Review: As with the carbon monoxide emission calculations, the hydrogen chloride HAPS emissions, and the Mercury emissions presented above, one must conclude that the Hampden project is a Major Source of air pollutants requiring a more extensive permit review. As with the above calculation methods, no adjustments for "operational hours" less than 8,760 hours in a year are made in the calculations. (A discussion of the confusing aspects of the applicant's use of "operational hours" for the PTE and BPS calculations in the AEPA and the supplements are discussed in the following section - #7.)

Based on the data provided by the applicant, one can calculate the "potential" tons per year of sulfur dioxide emitted each year. The resultant value equates to 57.6 TPY of SO₂ emitted from the two. The calculations are 0.05 # S/100 # dry PHS x (2 # SO₂ per # Sulfur) x (6.57 tons wet PHS/boiler-hr) x (0.5 # dry PHS/1.0 # wet PHS) x 2 Boilers x 8760 hr/year = 57.6 TPY SO₂). While well below the 100 TPY regulatory limit, the control equipment determined above for HCl would likely provide control of SO₂.

- 5.1. CES cites 10.16 TPY of SO₂ using the manufacturers' emission factors and provides no specific control of SO₂ or HCl, for that matter. Does the DEP concur with the information provided by the applicant or by this technical review of the AEPA and the supplemental information on the DEP's website?
- 5.2. Does the Maine DEP concur that no CEMS are required for either boiler?
- 5.3. Does the Maine DEP concur with the applicants' claim that they are under the emission threshold for HAPS and other regulated pollutants? If the applicants' conclusions and calculations are not valid, then the Maine DEP must conclude that they are a "Major Source" of air pollutants and need to be regulated as such.

6 **Applicant's Information:** The applicant discusses the hazardous air pollutants (HAPs) in the NHSM application includes values for emission factors In Table 3 of Appendix 1 on pages 42 – 43 titled "Emission Factors for Coal and Wood – Metals Concentration of Fermentate.". The following section is excerpted from page 39:

"For metals, we have conservatively assumed that metals in the washed pulp would not participate in the fermentation process, and would be 100% contained in the residual material. The volatility of each of the metals was then determined, and the destination (fly ash, bottom ash) was determined from research paper authored by Leslie Sloss..."

This table includes the emissions factors (EF) for HAPs elements arsenic (As), cadmium (Cd), lead (Pb) as well as, mercury (Hg), again. Table 3 provides the emission factors for the stated fuels but also includes values for Municipal Solid Wastes (MSW) combusted in boilers before pollution controls (noted as "uncontr.")

Technical Review: One of the HAPS metals (mercury) has already been discussed in Section 4 above as its emission factor (3.96 E-05 lb/mm Btu) was listed in the final row of Table 1, but a different emission factor for mercury (7.97 E-05 lb/mm Btu/hr) is listed in Table 3 for the metal found in the NHSM. If this emission factor is used to calculate the boiler's releases, the Mercury releases would be higher than determined in the above Section 4 and found to be 67.8 pounds per year or 171% above the statutory limit for Maine of 25 pounds per year.

If we calculate the other HAPs using the values provided in the Table 3 and (in the format boiler heat input x number of boilers x EF x 8,760 hours x 1 Ton/2000 # = TPY), focusing only on the data in the NHSM column, the following results were determined:

Arsenic: 0.29 tons per year (48.86 x 2 x 6.87 E-04 x 8,760 x 1/2000)
Cadmium: 0.079 tons per year (48.86 x 2 x 1.85 E-04 x 8,760 x 1/2000)
Lead: 2.49 tons per year (48.86 x 2 x 5.81 E-03 x 8,760 x 1/2000)

While the data presented by the applicant is confusing/not consistent between the 2 tables in the same application (example Mercury), the calculations in both cases show that the Hampden project has the potential to emit 171% over the Maine State limit of 25 pounds per year.

- 6.1. Given the technical analysis provided above, will the DEP conclude that the Fiberight project in Hampden, without controls to reduce pollutant levels by 90%, is in violation of the statutory limit for the HAP mercury under 38 MRSA ¶ 585-B set at 25 pounds per year (ppy)?
 - 6.2. Can the applicant explain the confusing/inconsistent data presented in the various tables submitted in the original AEPA and the various supplements that have been provided to the Maine DEP?
 - 6.3. Can the applicant provide a comparative table explaining the differences between the emission factors presented in the various NHSM tables and the emission factors used in the HAPS calculation tables submitted in BACT tables in the original AEPA and the supplemental?
7. The focus in this section of the technical analysis of the CES/MRC/Fiberight air emissions permit application is on the various values used for "operational hours of the boilers" by the applicant. This phrase seem to be different from the "hours that the facility" may be operating. This section also identifies variations in the reported "heat input" figures for the boilers (mm Btu/hr), different manufacturer emission factors (AP – 42 1.4) used at various times, the continued reference in the latest BACT analysis text (46 page supplement of Dec 14, 2015) of the boilers being fed Post Hydrolysis Solids (PHS) and "shredded wood fines" and the continued reference to "A summary of expected emissions included in **Attachment B** of the license application." If they are referencing the June 15, 2015 Attachment B, we all know that has undergone repeated modification. (After one has completed their review of the discrepancies highlighted below, and the technical analysis and arguments/issues identified above by this reviewer, a completely new/final AEPA should be submitted to the public to correct the record by the applicant.)

Applicant's Information: In the June 15, 2015 AEPA, CES/the applicant's use numerous operational hours for the Hurst boilers in order to calculate the Potential to Emit (PTE) estimates that should also be consistent with and reflected in the Boiler Performance Summary (BPS) calculation pages for the boilers.

It would be beneficial to the general public and the reviewing agency to understand the operational aspects of the two close-coupled gasifier/boilers manufactured by Hurst Boilers, Inc. that "will be used to produce steam for process and building heat and for power generation by steam turbines". (page 3 – Dec. 14, 2015 Boiler BAT Analysis Rev. 4). It appears that the applicant does not plan on providing all the energy demand for the plant, all the time from these two boilers. Fiberight has previously reported to the Maine DEP that "The amount of electricity and heat energy generated by the biomass combustion is sufficient to provide the energy demand for the plant" (See Appendix A page 7 – of "Fiberight Process

Description”, Memo to Karen Knuuti, Maine DEP Regional Office, from Municipal Review Committee, September 26, 2014) and previously reviewed and highlighted included in the Town of Orrington report of October 27, 2015 on the University of Maine Forest Bioproducts Research Institute (FBRI) report on Fiberight.

Technical Review: Without a clear statement from the applicant or a specific permit condition from the Maine DEP limiting the boilers operating hours, the basis for the calculating the Potential to Emit various air pollutants should be based on the total hours available to operate the boilers in a year (8,760). Looking at the information provided in the June 2015 AEPA, CES starts with boiler operational projections for the Post Hydrolysis Solids and wood (initially) fed into the 2 Hurst gasifier boilers, with 35 days of downtime. It is not known what provisions they have, if any for steam/power/heating etc. for those down days, since no electrical supply/energy balance data has been provided by the applicants despite many requests for such data from this technical reviewer and other parties.

If we again look at the critical air pollutant, carbon monoxide that was first discussed in section 2 above and completely ignores the technical arguments that were presented to justify use of an emission factor 2.73 higher than CES used, we left with a PTE level in June starting at 41.91 TPY per boiler. The other quantity from the remaining source of CO was listed as 0.19 TPY from the Flare unit for a total of 84 TPY of CO. As the DEP review process continued, the applicant was required to better define its emission sources/quantities under upset conditions, or to upgrade the Best Available Control Technology (BACT) to address regulatory concerns. A thermal oxidizer hybrid system (TOx) was added and the applicant stated that it would no longer be burning wood waste with the Post Hydrolysis Solids in the gasifier (presumably since it would make the boiler subject to Commercial and Industrial Solid Waste Incineration (CISWI) regulations.

Each new supplemental report published on the DEP website included revisions to the PTE and BPS calculations and resulted in increased annual total CO levels, increasing to 92.9 Tons Per Year (TPY) after the shredded waste wood component fed to the gasifier was dropped in mid-November. By the time the December 1, 2015 supplement was posted on the DEP website, CES had increased the boiler uptime to the maximum of 8,760 hours, as listed in the PTE calculation sheets for each boiler (See Deliverable 4, 2015), which, in my view is consistent with the intent of calculating the maximum potential to emit. The applicant had to again adjust emissions from the gas flares/TOx hybrid for the Anaerobic Digester operation between Dec 1, 2015 and Dec 14, 2015. The projected Flare emissions of CO shot up from 0.09 TPY to 6.91 TPY, and the Total CO emissions would have exceeded 100 TPY if the Boiler operational hours remained at the total number of available hours in a year. As a result, it appear that CES was forced to change/cut each boiler operational period from the maximum available hours in a year by 5%, and to switch fuels to natural gas only to keep the annual CO emission limit under 100 tons.

Summary tables of the various “operational hour” figures used from the original AELA submittal through to the numerous revisions that were presented on the DEP website supplements follow:

Table 1.1: Boiler Operational Hours in PTE vs. BPS Calculation Sheets

| | |
|-------------------------------|---|
| June 15, 2015 – Attach. B | PTE Boilers 7,920 hours (330 days) (No BPS provided) |
| Sept. 21, 2015 – Rev. 1 | PTE Boilers: 7,920 hrs vs. BPS: 7,884 hours (328.5 days) |
| Nov. 11, 2015 – Rev. 2* | PTE Boilers: 8,760 hrs vs. BPS: 7,920 hours (330 days) |
| Dec 1, 2015 Deliverable 4 & 5 | PTE Boilers: 8,760 hrs vs. BPS: 7,920 hours (“ “) |
| Dec 14, 2015 – PTE Boiler 4: | 8,322 hrs (346.8 days) (5% reduction in Boiler operational hours) |
| Dec.14, 2015 – BACT Rev 2 | Implied 8,322 hrs, but no BPS calculation page provided. |

The impact on the CO emission levels for the PTE and BPS calculation sheets are as follows, as best as one can determine with the numbers supplied (includes the variations in boiler energy input heat and manufacturers emission factors, referenced above and in the text that follows Table 1.2).

It is difficult if not nearly impossible to keep track of what operational hour figures are being used to calculate the potential to emit (PTE) values based on the various hours presented in boiler performance summaries that are the basis for the maximum PTE tables. There are no BPS calculation pages that support the 44.75 TPY CO limit for the Hurst boilers; simply a few pages in the supplemental information contained in PTE Boiler 4.pdf posted on the Maine DEP website of December 14, 2015.

There are even variations in the heat input figures for the boilers themselves (variously reported as 48.86 mm BTU/hr in the BPS pages and 48.11 mm BTU/hr in the PTE sheets of original AELA, Deliverable 4, Supplement , PTE Boiler 4 (Dec. 14, 2015). There are also examples in the permit application and the supplemental where different manufacturer emission factors are used! (See discussion that follows).

Table 1.2: Carbon Monoxide Levels in PTE vs. BPS Calculations

| Date | Boiler -each PTE CO (TPY each) | PTE - Flare CO (TPY) | PTE CO Total (TPY) | Boiler-each BPS CO |
|--------------------------------------|--------------------------------------|----------------------------|-------------------------|-----------------------|
| June 15, 2015 | 41.91 | 0.19 | 84.0 | NA |
| Sept. 21, 2015 | Not Avail.(NA) | NI | NI | 42.40 |
| Nov. 11, 2015 | NA | NI | NI | 42.56 |
| Dec 1, 2015 | 46.40 | 0.09 | 92.9 | 42.56 |
| Dec 14, 2015 | 44.78 | 6.91 | 99.4* | 44.75+ |
| PTE at max. annual hours | 47.13 | 6.91 | 104.07* | NA |
| Key: * with TOx emission of 2.90 TPY | | | + = can't verify origin | |

As well as varying the hours, CES has also varied the Carbon Monoxide “emission factor provided by the manufacturer (AP-42 1.6)” between 10.58 lb/hr, 10.75 lb/hr on the PTE tables and 10.76 lb/hr in the BPS forms. This is important given how close the applicant is to exceeding their own calculated annual maximums.

The bottom section of Table 1.2 shows the total CO emissions if one uses the full year operating hours of 8,760 and the highest reported CO emission factor (10.76 TPY). For a single gasifier burning PHS, one gets 47.13 TPY per boiler or 94.26 TPY for both. Along with the latest values for the flare (6.91 TPY) and for the Thermal Oxidation Hybrid unit (2.90 TPY), the total PTE would be **104.07 TPY** for carbon monoxide. This exceeds the 100 TPY limit by 4.07 TPY and thus the Hampden facility, using the numbers supplied by the applicant, but CORRECTED to reflect the proper numbers, again becomes a Major Source project under Maine’s Part 115 regulations for new sources.

There are even variations in the heat input figures for the boilers themselves (variously reported as 48.86 mm BTU/hr in the BPS pages and 48.11 mm BTU/hr in the PTE sheets of original AELA, Deliverable 4, Supplement, PTE Boiler 4 (Dec. 14, 2015). There are also examples in the permit application and the supplemental where different manufacturer emission factors are used! (See earlier discussion).

7.1 Does the Maine DEP recognize all of the various errors and confusing figures that are in the public domain?

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- 7.2** Given the technical review above, will the DEP require the applicant to resubmit a completely new/final AEPA with the accurate calculation sheets submitted, with the correct heat input numbers, the correct emission factors, and a clear statement of boiler operational hours so that a correct/understandable record is available to the public?
- 7.3** While one may conclude that these differences seem small and insignificant, they are not insignificant. Using the applicant's own figures, it is apparent that the potential to emit limit of 100 or more tons of CO will bring the project into the category of a Major Source of air pollutants. Does the Maine DEP conclude the same?