July 5, 2016 VIA ELECTRONIC MAIL

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

Re: Technical Comments and Critical Analysis of Errors, Omissions and Inconsistencies Found in the Fiberight Projects' Draft Solid Waste Licenses Issued by the Maine DEP and in the Supplemental Application Information

Dear Ms. Churchill,

This document represents the second technical analysis during the "Comment Period" that ends July 5, 2016 of Fiberight, LLC, the Municipal Review Committee (MRC) and the consultants CES, Inc. Draft Solid Waste (SW) License # S-022458-WK-A-N that the Maine Department of Environmental Protection (DEP) issued on June 13, 2016. It deals with a variety of technical errors, omissions, and references very specific sections of the "Findings of Fact". As I noted in the first technical analysis, which focused on the Post Hydrolysis Solids material for the project proposed for Hampden, Maine, I believe the information contained herein looking at the draft licenses issued by the Maine DEP support my position the licenses do not comply with state or federal law. The Maine DEP should deny final approval of both the Air Emissions License and the Solid Waste License applications. A public hearing on all of the Fiberight applications is requested to address the technical issues presented in this analysis.

The issues addressed in this review are associated with the errors that exist within the current draft of the Solid Waste License, and focus primarily on the "Findings of Fact" which begins on Page 19 for Section 17. PROCESS DESIGN. The specific subsections involved are C. Renewable Fuel Production:, D. Renewable Energy Production, and E. Industrial Co-products. These errors are as continuation of the misunderstandings/misinterpretations of the basic Fiberight process, and the misunderstandings by the DEP of unit operations involved in two of the four different processing stages that the DEP lists in section A. General. The unit operations in the renewable fuel production stage are sugars and solids produced by the enzymatic hydrolysis (EH) process. The unit operations in the renewable energy production stage are for methane production by the Anaerobic Digestion (AD) process. Perhaps the DEP's confusion has been created by the many changes in the project by Fiberight and the applicants consulting firm CES, Inc., and by the lack of detail that they have provided the DEP on the Anaerobic Digestion process itself. I pointed out these issues omissions in my technical review of February 1, 2016 (http://www.maine.gov/dep/ftp/MRC/comments%20received/Analysis%20Comments-February2016.pdf). I accepted in my technical response to CES on February 29, 2016 that I had misunderstood that a new continuous pulp washer was to be used and not a batch autoclave like that at Lawrenceville, VA. (http://www.maine.gov/dep/ftp/MRC/comments%20received/Feb%2029%20Response%20to%20CES-MRC-Fiberight.pdf). But the DEP has remained confused by what goes on in the two stages and has, as a result blended the terminology between EH and AD stages in their "Findings in Fact".

The first two issues are contained within the very first sentence in the second paragraph of Part C, on Page 20 that states:

> "Temperature and pH are controlled to achieve an optimum mixture which is left in the digester where the low-temperature biological process is complete":

The errors are with the terms "digester" and "biological". The enzymatic hydrolysis process is a **chemical, not a biological process and the cellulose in the process is not digested, it is strictly a "hydrolysis" step,** which basically means to "add water". So water added to cellulose chains with the chemical reaction between the enzyme and the cellulose is what makes sugar! I have previously described this chemical conversion step on page 2 and 3 of my April 29, 2016 technical review (http://www.maine.gov/dep/ftp/MRC/comments%20received/KeithBowdenPHStechnicalreview4-29-16.pdf). Cellulose (chemical formula $C_6H_{10}O_5$) becomes sugar (chemical formula $C_6H_{12}O_6$) with the addition of water H_2O (thus chemical hydrolysis not biological digestion).

The very next sentence in that section C is erroneous in describing the "digester" for the same reason that is referenced above. As we continue to look at the errors, the next one that follows was touched on in the first technical analysis submitted during this draft comment period that ends July 5, 2016. In that more generalized technical review, I pointed out in the DEP "Findings of Fact" how the sugar solution refers to being separated from the "undigested" solids. They are not "undigested" solids produced by an AD that are separated. The solids are produced in the enzymatic hydrolysis stage, which is why it is called Post Hydrolysis Solids (or PHS). The very next sentence is completely wrong in stating"

> "The undigested solids are slurried and passed to the water treatment plant."

If this is how the DEP understands the Fiberight process from sitting in meetings with the applicants personnel, or how Fiberight has described the process, or if Fiberight has already provided the DEP with their comments on this Draft Solid Waste License, then the experts have failed to present this in all of the Supplemental Application information during the past year.

Another error of import is the one that I noted in my other technical analysis during this comment period ending July 5th, 2016, which pointed out the lack of consistency or "harmony" as it pertains to the reference to the sugar solution being pumped to an "**evaporator"** (emphasis added) where it is concentrated for storage to be shipped and sold as industrial sugar" in the Solid Waste License, but no reference to this evaporator in the Air License.

The next sentence points out a significant "miss" by the DEP, that being the condensate recovered from this "evaporator" if in fact an evaporator is present. What foul chemical contaminants are being removed from this evaporation step and will it be recirculated in the water reuse plan and subsequently released in the process area served by the odor scrubbers in the other section of the building. (This foul condensate water contains many Volatile Organic Compounds that will be released, if the Solid Waste reviewers have the evaporator installation correct)!

Let me move on to the errors in the "Findings of Fact" in the "renewable energy production" stage discussion of the Fiberight process. The problems appear on Page 21, when in the third sentence, the DEP Solid Waste Permit drafters refer back to the "solids from the water treatment

plant" when I have previously pointed out that the solids are really the PHS from the sugar separation step.

The next paragraph contains an error at the end of the second sentence in connection with plant water management, by referring to "stillage from distillation". There is no such thing as stillage coming from distillation as these unit operations were part of the ethanol from trash project that Fiberight first presented to the Maine DEP in November of 2014. In that same sentence it also refers to "diluted solids from the sugar recovery" being blended with the, in my technical opinion, non-existent "stillage" and blended together.. The end of the next sentence references "The solids are removed using a belt press and any residual fine suspended material is removed using a dissolved air flotation system". Given my extensive experience for over 30 years in the pulp and paper industry, I am familiar with DAF (dissolved air flotation) systems, and that it generates solids that are typically recycled with other process solids.

The final sentence in the Renewable Energy Production subsection states the "the solids, in the form of cake, are sent to the biomass boiler." One way of reading these "Finding of Fact" is to imply that the DAF solids material, are sent to the biomass boiler. My understanding of the Fiberight permit application would determine otherwise, so this current language is confusing, is subject to misinterpretation, and should be clarified.

The "Findings of Fact" for Section "E. Industrial Co-products" continues the litany of errors, misinterpretations, and omission discussed in the prior pages of this analysis and in my first technical analysis of the Draft Air and Solid Waste Licenses. Let's look at the end of the first sentence, quote:

> "and biomass fuel (industrial sugar) which may be sold on the open commodities market depending on contractual, market, and operational conditions."

To be factually accurate, the DEP needs to have made some "Findings in Fact" or at the very least made a /determination that the unit operations, i.e. equipment needed to produce industrial sugars are **in fact** part of the original Fiberight permit application, the supplemental information, the process flow diagrams, or can be found some other documents that are available to the public. Based on my technical experience noted in the other technical submittal, at a minimum, an evaporator is needed to concentrate the very dilute, fouled sugars produced from pulp derived originally from Municipal Solid Wastes (MSW.

Fiberight is expecting to produce a sugar solution from MSW using an enzyme added to old, recovered, fouled, short paper fibers to produce a weak sugar solution (5-7% sugar and 93-95% equivalent water) that has PHS mixed in (equivalent to 135 dry tons per day). But in no "Findings of Fact" and the draft Licenses, is there a supportable fact that says Fiberight has the installed capability to produce marketable "industrial sugars". Quoting from my February 1, 2016 technical review:

> "To produce marketable, industrial sugars for "disposition", a facility must have the **installed equipment to make it, clean it of contaminants, concentrate the sugars to remove the significant amounts of water, and then store the sugars for sale**. There are a couple of occasions in the solid waste permit that mentions ways to concentrate sugars using either a membrane system or evaporation methods. There are also a couple times where it is noted

that sugars not converted to natural gas via anaerobic digestion **will** be stored in multiple tanks. There are **no occasions** in the permit application that I have reviewed where the sugars are cleaned of salts, inhibiting organic acids are removed and a viable industrial/commercial sugar product is produced".

I go on to point out in the February 1, 2016 analysis that:

> "Later in Attachment 13, in the section titled "05-Maine Process Description 15" on page 4-5 there are references now made to PDF 6: Enzyme Hydrolysis. Fiberight discusses how the enzyme converts the Activated Cellulose Substrate to clean sugars that are sent to the: "TK-6500 Sugar Break Tank. The filtered hydrolysate stored in TK-6500 is then either further concentrated in a membrane system and stored in a series of Sugar Storage Tanks to be shipped and sold as industrial sugar…" and adds **or** sent to AD for conversion to gas. So the text cites an ability to concentrate sugars and store it in multiple tanks, yet PDF 6 and the General Arrangement Diagram (website supplemental of Dec. 10, 2015) does **not** show any membrane system or evaporation capability needed to concentrate sugars or any place to store concentrated sugars in multiple tanks. There is a clear contradiction between the written narrative in the permit application, … also in Attachment 23 and the PFD # 6 that show only a Sugar Break tank, and no following Sugar Storage Tanks".

It is clear to me that Fiberight does not have the capability to remove the organic acids and other contaminants/salts produced in the EH process. Based on my technical expertise, the evaporation step is known to remove various VOCs that would pose a **major** concern to a potential consumer of "industrial sugars". But the salts would remain with the concentrated industrial sugars and still pose a concern. So the confusion in the "Findings of Fact" between two different DEP professional staff divisions (Air and Solid Waste) are compounded on whether an industrial sugar can even be produced.

Fiberight has somehow convinced themselves and the DEP that biomass fuel (industrial sugar) may be sold on the open commodities market depending on contractual, market, and operational conditions when there is no capability to concentrate, remove chemical contaminants and impurities, store the clean sugars in tanks that will prevent spoilage, before being shipped to who knows where. Should the public take solace in the statement from Fiberight that industrial sugars "may be" sold and give the DEP a pass on holding the applicant accountable for the statements (or lack thereof) in the permit application and all the supplemental informationin the public domain?

Does the DEP believe that they do not require an applicant to have presented valid, credible information that they have the technical and operational capability to produce "industrial sugars" and that such capability also does not need to be presented in the DEP "Findings of Fact" in a section of a Draft SW permit on Industrial Co-products? If not, then all my technical comments are perhaps moot.

In spite of that possibility, I with proceed with a few, final, technical comments for some of the earlier "Findings of Fact" provided by the Department in the Draft SW License, specifically with section 13. Surface Water Quality and Flooding (beginning on page 15) and section 16, Ground Water Quality and Flooding (beginning on page 18). Since these both deal will water quality, I look at these issues as somewhat tied together, in that problems that are not prevented and/or

have not been addressed regarding surface waters can then produce groundwater issues. Let me begin with my concerns with the potential ground water issues that I don't see being addressed by the applicant. The DEP takes a very limited view of the implications posed by the Fiberight Solid Waste Processing facility by only considering the impact of the MSW or residues being exposed outside the building to the groundwater. Impacts on surface and ground water quality need to be met by the applicant and "best engineering practices and standards" need to be addressed by the DEP before it considers the SW License complete.

What of the potential exposure of the process wastewaters and the process liquids and solids contained in the AD tanks outside? The DEP entered on their website June 28, 2016 significant information regarding potential releases of wastewater to the groundwater and surface waters. (http://www.maine.gov/dep/ftp/MRC/applications/supplemental%20application%20submittals/SolidWasteApplicationCESSupplemental3-30-16.pdf link) The information was actually released late in March, by CES and revealed that Fiberight was installing two tanks outside for storing effluent water before discharge to Hampden's sewers (See in link March 30th, 2016 memo from CES Travis Noyes to the Files" regarding "Wastewater Storage Requirements – Fiberight Facility" that went to the DEP's- Lou Pizzuti). The plan is to install a 100,000 gallon process sewer wastewater storage tank outside, but underground (below the facilities parking lot) and to install an above ground tank of 150,000 gallon capacity next to it.

The memo with this information was submitted to the Hampden Planning Board (PB) after the Site Plan submittal on March 3, 2016. It is interesting that these wastewater tanks had not been mentioned at the PB meetings of April 13, 2016 or May 11th, nor, I believe had they been depicted in Site Plan diagram and shown to the attendees to the applicant's power point presentations to the Planning Board. Given the late release of the information on the DEP website (June 28th), very few people in the general public knew about these tanks. Obviously, DEP staff were made aware of these tanks sooner than June 28th as the tanks are referenced on page 18 in the "Findings of Fact" of the Draft SW License. I find the lack of commitment by Fiberight to employ "Best Engineering Practices" to the outside process tanks or for the DEP to include some permit conditions to mitigate potential releases of wastewater to the groundwater to be short sighted.

In my technical opinion, with both an above and below ground wastewater storage tank outside the solid waste storage/processing building envelope, Fiberight and the MRC are opening themselves up to a host of environmental issues for the Town of Hampden and for the DEP, charged with helping protect the environment. There is a real potential for discharges of untreated wastewater from the 100,000 gallon below ground tank to the groundwater and the above ground tank from discharges to the surface waters.

If such releases were to occur, there would be SIGNIFICANT liabilities for the applicants and for the Town that would be VERY EXPENSIVE to mitigate. What the DEP should place as conditions for Fiberight in the Draft SW License to protect the environment, at a minimum are:

1) double walled pipes to and from the double walled underground wastewater storage tank with perhaps extensive compacted clay soils around the tank to prevent leak migration into the groundwater aquifers. A leak detection system in the interstitial spaces of the pipes and tank should also be required, and the development of operational controls. All this

needs to be documented in a Chemical and Process Spill Prevention, Control and Countermeasure Plan (SPCC).

2) the above-ground tank wastewater holding tank will either need to be a double walled and complete with a leak detection system between the 2 walls and an integrated alarm system, or the above ground tank will need secondary containment dikes, or walls sized to hold 110% of the maximum volume of the tank, with a conductivity detector and an alarm system to indicate that a leak or overflow has occurred (due to operator error, overflow thru vents, tank breaches, etc). There will also be a need for sampling/monitor of rainwater trapped in the containment area. (The above ground tank could be double walled, but one would still have to monitor the space between walls to detect leaks).

The DEPs "Findings of Fact" on page 18 only notes that:

> "the tank construction materials are still being evaluated and will be determined during final design"

I will make two points here, first that capital costs are high associated with purchasing, and installing these tanks with the aforementioned double walled features, or high corrosion resistance materials of construction, and the alarms and these associated cost tie in with the financial capacity of the applicants to successfully design ,build and operate the facility. DEP needs to provide clear direction to Fiberight as to what will have to done to secure the license with respect to the tank installation.

Secondly, the DEP and the Hampden Town officials should not only be worrying about leaks from those two wastewater storage tanks (even if they will not be utilized all the time). There are vulnerabilities with all of the other Anaerobic Digestion Tanks that are outside, as they contain foul process waters that must not be released into the environment. All of the outside tanks (whether used only occasionally or regularly) require some form of secondary containment/alarms/etc. These tanks are depicted as adjacent to an outlet pipe that connect (by design) directly to the stormwater collection basin. Are all these tanks in a concrete containment area with a volume sufficient to hold 110% of just one of these large AD tanks and is the DEP confident that there are no potential releases to the stormwater collection basin adjacent to this cluster of tanks?

There are numerous examples of AD tank explosions throughout the world. Fiberight should be asked to provide to the DEP some level of detail on the safety record of the vendor supplying the AD system to be built at Hampden and the potential for explosions and significant releases to the surface and ground waters around the site..

I have highlighted some, but not all of the technical errors, omissions, misstatements, and problems I have encountered with the Draft SW licenses prepared by the Maine DEP for the Fiberight project in Hampden. All these issues have, in my technical opinion had a cumulative effect on the validity of the application and the draft license as currently drafted. The DEP, in its "Findings of Fact" for the Solid Waste License are referencing unit operations that are not present in the Fiberight project, adding unit operations in one permit, and not the other, and ignoring unit

operations that Fiberight needs to ensure that are present in order to produce a viable operation that starts up and functions as designed. Given these failings, further consideration of the the draft Solid waste and Air permits should be suspended. I call for a public hearing to be held on all of the Draft permits to determine the “true facts” on the Fiberight project. To do otherwise would be a travesty to the reputation of the Maine DEP and the regulatory review process as a whole in the eyes of the public.

Sincerely,

Keith A. Bowden

Keith A. Bowden

cc: Ms. Jessica Young – US EPA Washington, DC

Mr. Jesse Miller – US EPA Washington, DC

Ms. Elizabeth McCarthy- EPA Region 1

Mr. Patrick Bird - EPA Region 1