

February 1, 2016

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

Re: Fiberight, LLC & MRC Project – DEP# S-022458-WK-A-N

Dear Ms. Churchill,

I am submitting to the Maine Department of Environmental Protection (DEP) the second in the series of studies of the permit application of Fiberight, LLC and the Municipal Review Committee (MRC) for the proposed solid waste processing facility in Hampden (Project number DEP# S-022458-WK-A-N). This submittal consists of a partial analysis of the remainder of the 534 page solid waste processing and recycling facility permit application, as well as some of the “deliverables” from CES, Inc. that addressed some of the questions of the Maine DEP. (The first analysis released by the Town of Orrington on October 27, 2015 focused on the University of Maine’s Forest Bioproducts Research Institute (FBRI) team that was contracted to conduct a peer review of the Fiberight technology to convert MSW to ethanol (so-called Trashanol), a biogas (methane via Anaerobic Digestion) and other by-products. The FBRI report was prepared on January 30, 2015, and titled *Technology Review Fiberight Process for MSW* and included in Attachment 13 of that permit application). Thank you for including the Town of Orrington’s analysis on the DEP website.

My technical analysis of portions of the Solid Waste Permit application for the Fiberight facility is grounded in the fact that I have many years of experience as a chemical and environmental engineer in the pulp and paper industry. I also have pilot plant management and operating experience in converting wood pulp and paper fibers into sugars and other organic chemicals, and fully understand the challenges of taking a fledgling technology from the pilot plant or demonstration plant to commercial scale. Finally, I have first hand, real world operating experience at Old Town Fuel & Fiber (OTFF) in enzymatic hydrolysis processes for converting cellulose into clean, high quality industrial sugars. As you know, enzymatic hydrolysis is one of the fundamental unit operations of the Fiberight process.

My review of a portion of the Solid Waste permit application and/or supplemental information (deliverables) provided to the Maine DEP’s Bureau of Remediation & Waste Management by CES, Inc or prepared by Fiberight identifies a number of errors, omissions, unclear or contradictory statements. Some of the errors were relatively minor (typos, for example) and have **not** been highlighted in the following pages. The attached analysis touches on the more significant technical deficiencies. It is my belief

that correction of the deficiencies and clarification of the confusing statements is warranted by the applicants.

A deeper dive may be conducted to uncover additional, significant technical deficiencies. I would appreciate it if you could provide me with any and all comments or questions that you or your staff may have pertaining to this submittal. If you should receive responses from the involved parties to the Hampden project regarding this analysis, I would certainly appreciate the opportunity to respond. You can contact me at via email.

Sincerely,

Keith A. Bowden

Keith A. Bowden
Resident: Town of Orrington



Critical Analysis of Errors & Omissions found in MRC/ Fiberight Solid Waste Permit Application on Hampden Project and Recent Deliverables from CES, Inc.

1. The Maine DEP published a dozen Process Flow Diagrams (PFD's) of the Fiberight facility process design on their website on Dec. 21, 2015. In the Solid Waste Permit submitted in June 2015 there are nearly 2 dozen references to biomass fuel (industrial sugar), liquid sugar, sugar solutions, and cellulosic sugars. Nowhere in any of the permit applications is there a definition of "Industrial Sugars" or an indication of what concentrations of sugar that the facility will achieve/target, and basically what the technical specifications or requirements are for industrial applications. A careful reading of the permit application does indicate that sugar solutions may be 5 to 7% sugar and thus 93-95% water, salts, chemical inhibitors, and other components. But no viable market exists that I know of, for such shipments of water over any distance to another company.

The permit application states at the bottom of page 2 of Attachment 13 that "The exact disposition of the filtered hydrolysate is dependent on current contractual, market and operational conditions". The whole issue of sugar production is not one that is only a marketing one, but is technical and as such this reviewer believes that the contradictory statements in the permit application need to be clarified at this stage of the permit review process!

To produce marketable, industrial sugars for "disposition", a facility must have the **installed equipment to make it, clean it of contaminants, concentrated 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.

In Attachment 13, CES makes a number of seemingly contradictory statements about sugars. First, Page 1 - Products and Waste Generated: Lines 2-6, "The resultant products ...which **will** (emphasis added) be sold on the open commodities market ... and biomass fuel (sugar) which **will** (emphasis added) be sold on the open commodities market". On the very next page 2 under the heading **Methods Utilized to Store Products**, the subheading Biomass fuel (Industrial Sugar), (concentrated in membrane systems or evaporators?), will be stored ... to be shipped and sold as industrial sugar **or** (emphasis added) the filtered hydrolysate is fed to the anaerobic digestion plant for conversion to biogas".

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 the **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, here and also in Attachment 23 and the PFD # 6 that show only a Sugar Break tank, and no following Sugar Storage Tanks.

2. PFD 3A Secondary Sort Part A shows the hood, cyclone and blower system designed to remove thin plastic film from the 2D Fraction QC line in the solid waste processing room. The blower is shown directing the hood vapors to a filter and **vented to the atmosphere**. This emission point should be depicted as being directed to the odor control system. The neighborhood air quality in Hampden would be seriously impacted from these odor discharges as proposed/depicted discharging to the atmosphere.
3. The U Maine FBRI report in the Solid Waste permit- Attachment 13 - Appendix B notes the autoclave temperatures operated at the Virginia pilot plant facility can cause issues of melting of plastics and the facilities plan to lower operating temperatures in the autoclave. The autoclave or rotary drum pulping unit (based on the more recent PFD's issued) are thus guaranteed to be producing vapors from melting waxes/plastics or other Volatile Organic Compounds. Have these potential emissions been **quantified** anywhere in the various permit applications (even though they are in the initial Processing Room where such vapors will be picked up in the hood system for subsequent scrubbing)?
4. In Attachment 13, starting on page 9, CES presents 2011 data collected by the University of Maine School of Economics with projections of the sources of 20% of incoming residuals that will have to be landfilled in Maine. A table categorizes material 2" or less in size and states 1% will be household hazardous waste (HHW) materials. (HHW includes paint, batteries, CFL & other fluorescents, light ballasts; even small propane cylinders will be in that residue). On page 16, Tables 19 and 20 list the various HHW sources and restates the origin of the 1% residue figure. But CES deliverable #13, the "MSW Mass Balance – Hampden Maine" table that breaks down the 652 tons per day of MSW going to the Fiberight facility ignores 6.52 tons per day of HHW since the table shows 0.00% in the "Aggregate Total" column. Which is it? And where on the General Diagram is Fiberight going to safely store, manage these nearly 7 tons per day of HHW residues as implied by the DEP in Deliverable #12 – "storage location of waste residuals".
5. Solid Waste Permit Section 23 includes a "draft" Operations and Maintenance (O & M) manual. While we recognize it is still a draft, inconsistencies with other attachments need to be corrected. O & M page 6 says "Fiberight will not accept separated supplies of wood waste or process wood waste such that it will be marketed and sold as biomass wood fuel, mulch or alternative daily landfill cover." Is this different from the 1% (6.5 tons per day) of the "Construction and Demolition" that CES states will be in residential loads of bagged wastes from small household remodeling and construction projects? (See page 13 of Attachment 13).

Fiberight is no longer burning wood waste that originally was to be fed to the boilers with the Post Hydrolysis Solids as stated at the end of paragraph 1, page 2 of Section B – General Operations of the draft O & M manual (and also stated repeatedly in the Air Emissions Permit). The quantity of wood waste calculated from the Air Permit was projected to be 24 tons per day of material.

Since this is now rightfully considered a "waste" and not a fuel additive, CES needs to identify in all areas of all permit applications that this tonnage of wastes is going to the Norridgewock landfill. Alternatively, Fiberight needs to apply for a beneficial use for this

solid waste material and include it in the Solid Waste permit application process if it is somehow going to be marketed.

6. The Block Diagram – as Received Mass Balance deliverable that appeared on the DEP webpage on Dec. 14, 2015 shows the only effluent discharge occurring from the Anaerobic Digester Plant (Block 9, 10) and equals 1,098 gpm. Yet the Solid Waste Permit application, Attachment 26 indicates the combined sanitary and process wastewater is 1,500 gpm. On page 1 of Attachment 20 of the Solid Waste Permit Application submitted by CES, it indicates that the average daily flow of sanitary sewer discharges and process wastewater will be only 25 gpm (36,000 gallons per day). These various numbers do not reconcile.
7. What is the need for the cooling towers and air compressor units that suddenly appeared in the December “General Arrangement Diagram”. Their use is apparently somewhat in doubt since PFD 20 shows this equipment as a “Hold”. Have the need for cooling towers been thoroughly studied and are they being driven by the energy balance for the AD facility? The use of the cooling towers can have a significant visual impact on the neighborhood, and may have a safety impact on the trucks entering/leaving the Hampden facility. Given the project proximity to Interstate 95, it may have a safety impact given the fog, mist, freezing rain, etc that may emanate from cooling tower plumes? Is that the best location for the cooling tower?

What process stream is being cooled and what are the potential volatile organic chemical compounds that may be released if it is in direct contact with to process water? Will there be any chemical additives in this cooling water, such as biocides, water softeners, etc.?

8. PFD #10 shows the Anaerobic Digester (AD) system as a vendor package unit and does not provide any significant detail. Attachment 13 – Process Design – Maine Process Description section provides a total of 9 sentences on the most critical part of the Fiberight process. This is woefully inadequate.

Fiberight is also claiming it is using a “proprietary anaerobic digestion system”, when later in Attachment 13, the University of Maine FBRI team provides repeated references to the Voith digestion system at the Virginia Pilot Plant and subsequent plans to use the Hydrothane Expanded Granular Bed (EGB) systems at the now mothballed Marion, Iowa facility. Are the Fiberight plans for the AD system proprietary or are they now at a loss as to what will work in Maine for this vital operation. One can hardly find a reference to the EGS Anaerobic Digestion system promoted on the Hydrothane website, unless it is under a new/different name.

