

May 19th, 2016

Mr. Peter Weatherbee-Planning Board Chairman
Mr. Dean Bennett – Community Development Director
Town of Hampden
106 Western Avenue
Hampden, Maine 04444

RE: Technical Review of Hampden Site Plan Application for the Fiberight Project

Dear Sirs:

I have been following the status of the proposed Fiberight project and spoke in general terms about the challenges of bringing a new, unproven technology to fruition at the public meeting at Hampden on November 19th, 2015. More recently, I have attended Hampden's Planning Board (PB) meetings of April 13, 2016, and May 11, 2016 held for the purpose of conducting the Site Plan Review Application for the MRC/Fiberight project. I would like to first compliment the Board for its thoughtful and deliberative process with which it has conducted those meetings. The focus has been on traffic and odor issues, both of which the PB has clear jurisdiction and oversight responsibilities for under the Hampden zoning ordinance.

But, if one studies the Site Plan Review (SPR) document submitted March 3, 2016 to the Planning Department, (218 pages) and the supplemental reports and memos to the PB, one can identify a number of discrepancies, technical errors, omissions, or the broad avoidance of some other very relevant issues that the Board needs to weigh in on.

One such issue of concern is the reason Fiberight has for such a high volume of cooling tower water usage and discharge to the Hampden sewers. Looking back at the second in my series of technical analyses of errors & omissions submitted to the Maine DEP on Feb 1, 2016 (see Attachment 1), I pointed out the problems with the Dec 14, 2015 block flow diagram that Fiberight presented, particularly with respect to the sewerage/discharge of wastewater from the Anaerobic Digestion (AD) block. I had questions (See Issues # 6 and #7 that are in bold in Attachment 1- page 3 of the critical analysis) around the need for the cooling towers, the volumes of water used, the visual, safety and emissions impact of these cooling towers, etc. From these inquiries, we learned that the cooling towers would evaporate 161,280 gallons per day into the atmosphere (yet CES claims there will be no significant vapor plume?) We also learned for the first time-publically, that the Fiberight project was in fact going to be discharging 150,000 gallons per day to the sewer (not the 36,000 gallons or so previously reported). The wastewater would be made up primarily of Cooling Tower blow down, process water and sanitary sewer system wastes.

Based on the new block diagram, (CES posting of 2-9-2016 on the Maine DEP website), we now know that 230 TONS per day of water is going to be seweraged from the AD system (230 tons equals about 55,123 gallons per day). The Cooling Tower blow down quantities are reported as 66% of 150,000 gallons of the wastewater discharge, which is 99,000 gallons. The cooling tower water is required mainly to "cool the re-circulating cooling water [I assume this is non-contact/clean water] used to condense the steam in surface condensers on the steam turbine generator exhausts." What is the estimated volume of sanitary wastes from the Fiberight facility? Using the numbers supplied by CES, it must be negative as the reported volumes of cooling tower blowdown and process water is already over 154,123 gallons per day (99,000 plus 55,123 gallons.). The PB should have the applicant reconcile all these numbers, from the volumes of water consumed and

released to the atmosphere and volumes discharged to the sewers. Also, the PB should determine if the applicant is trying to avoid installing, at its own expense, wastewater pre-treatment equipment by excessive dilution of the constituents in the waste stream with high cooling tower discharges? Maybe Fiberight thinks "the solution to pollution is dilution"!

In any case, realization of the volume of wastewater discharges from the Fiberight operation got the attention of the Bangor Public Works Department responsible for operation of their wastewater treatment plant (WWTP) and identifies another major issue for the PB to address. This sewer volume has lead the City of Bangor to require Fiberight to provide 2 days of on-site wastewater storage capacity in the event Bangor's WWTP has incidences of excessive stormwater runoff in their combined sewers. These wet weather conditions can result in overflows of raw, untreated wastes directly to the Penobscot River.

As of the May 13th PB meeting, the PB has not allowed any public discussion of the volume of wastewater coming from the Fiberight facility, only odor and traffic issues. The Hampden Planning Board clearly has jurisdiction in its zoning ordinance to require in Fiberight's Site Plan Application full public disclosure of aspects of the project that shall have an impact on surface, ground, and air quality. Specifically, page 31 – "Standards Governing Site Plan Review" of the Hampden Zoning Ordinance in Section 4.1.7.13 states:

The proposed use, buildings, and site development shall have no unreasonable adverse effect on surface water quality, ground water quality, ground water quantity, soil quality, or air quality.

In Woodard and Curran's "Preliminary Review Letter" dated March 30, 2016 regarding ordinance applicability, the Town's engineering firm noted additional information required of the applicant "to demonstrate conformance with Ordinance requirements". In the Town's Peer review staff report from Economic Development Director Dean Bennett to the Planning Board dated April 11, 2016, the director cites the very same section of the ordinance on page 6. But the only reference made to the issues of concern to Hampden that the Fiberight project can adversely effect the residents is "Odor", apparently as a possible "air quality" impact. (See [http://www.hampdenmaine.gov/vertical/sites/%7B1FCAF0C4-5C5E-476D-A92E-1BED5B1F9E05%7D/uploads/PB_4.13.16_Board_Meeting_Packet_w_MRCFiberight_Material\(2\).pdf](http://www.hampdenmaine.gov/vertical/sites/%7B1FCAF0C4-5C5E-476D-A92E-1BED5B1F9E05%7D/uploads/PB_4.13.16_Board_Meeting_Packet_w_MRCFiberight_Material(2).pdf)). Obviously, the impacts on surface and ground water quality need to be met by the applicant and these "standards" need to be addressed by the PB as it conducts its Site Plan Application Review.

Late in March, CES revealed that they are putting 2 tanks outside for storing effluent water before discharge to Hampden's sewers (See attachment 2 -March 30th, 2016 memo from CES Travis Noyes to the Files" regarding "Wastewater Storage Requirements – Fiberight Facility" that went to the Maine DEP's - Lou Pizzuti). This memo was after the submittal of the Site Plan to the Hampden PB on March 3, 2016. It is interesting that these wastewater tanks have not been mentioned at the PB meetings of April 13, 2016 or May 11th, nor, I believe have they been depicted in C-103 (Site Plan Diagram) and shown to the public in the applicant's power point presentations. Has the PB:

1. Been informed of Fiberight's plans to put in storage tanks for the purpose of holding back wastewater during wet weather conditions?
2. When were the PB and Hampden's engineers informed of the plans to install a 100,000 gallon process sewer wastewater storage tank outside and UNDERGROUND (below the Parking Lot) and to also install an above ground tank of 150,000 gallon capacity next to it?
3. Does the PB have an updated/revised Site Plan diagram showing these wastewater tanks?
4. have the Site Plan diagrams on C-103 depicting the tanks been shown to the public in the applicant's power point presentations?

Clearly, with both an above and below ground wastewater storage tank outside the building envelope, Fiberight and the MRC are opening themselves up a host of issues for the Town of Hampden to review given the potential for discharges of untreated wastewater from both to groundwater and surface waters. The peer review teams have been silent on these environmental issues to date with their focus on odor and traffic. But the presence of these outside, below ground and above ground tanks, the impact of such tanks clearly are relevant and pertain to the Zoning Ordinance standards.

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 PB should required of the applicant 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 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 ANEEROBIC 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 in C-103 near an outlet pipe directed 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 PB confident that there are no potential releases to the stormwater collection basin adjacent to this cluster of tanks?

The Hampden Planning Board and Hampden's engineers should also have concerns about "odor releases" from emergency venting from all these AD tanks that are all outside. There are numerous examples of AD tank explosions throughout the world. Fiberight should be asked to provide to the PB some level of detail on the safety record of the vendor supplying the AD system, and the potential for explosions and odor releases.

Submitted by: Keith Bowden
May 19th, 2016

cc: Bill Lippincott

Attachment 1

Maine Department of Environmental Protection

February 1, 2016

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 was 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 via email.

Sincerely,

Keith A. Bowden

Keith A. Bowden

Resident: Town of Orrington

1. The Maine DEP published a dozen Process Flow Diagrams (PFD's) of the Fiberright 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, 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.

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 110 tons per day. Yet the Solid Waste Permit application indicates the combined sanitary and process wastewater is 150 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 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.

Attachment 2



Engineers • Environmental Scientists • Surveyors

MEMO

To: JN 11293.001 FILE
From: Travis Noyes, P.E.
Re: Wastewater Storage Requirements – Fiberlight Facility
Date: March 30, 2016

As noted in the information provided by the City of Bangor, they have the capacity during dry weather conditions to accept the estimated average daily flow of 150,000 gallons per day. During a meeting with the City in December 2015, it was mentioned that storage or some other alternate means of handling wastewater would be required during wet weather conditions to alleviate issues with the City's Combined Sewer Overflows (CSOs). Given that discussions with the City are on-going, for purposes of this permit application, we have assumed the need to provide alternate means for handling wastewater during wet weather conditions for 300,000 gallons or two times the estimated average daily flow.

The operational team of the proposed facility will manage the discharge of wastewater during wet weather conditions with the use of on-site storage tanks. The tanks will consist of the following:

- Use 50,000 gallon buffer in 150,000 gallon process water storage tank (internal to facility)
- Install 150,000 gallon above ground sewer hold tank (external to facility)
- Install 100,000 gallon below ground tank (external to facility)

Materials of construction for the tanks are still being evaluated and will be determined during final design.

The preliminary proposed location of the below ground tank has been selected to be beneath the employee parking area and the above ground external holding tank is located next to the parking area (as shown on the attached Site Plan C101). Wastewater would enter the tanks for storage during wet weather events and would be conveyed to the gravity sewer system serving the facility once the wet weather event was over.

The external below ground tank dimensions are anticipated to be approximately 40 feet long by 40 feet wide by 10 feet deep. If a circular tank is chosen, the dimensions would be approximately 45 feet in diameter and 10 feet in depth. The 150,000 gallon above ground storage tank is circular and is proposed to be located adjacent to the below ground tank. Again, as final design calculations are performed, the materials of construction and tank dimensions will be finalized.

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Six Locations in Maine | www.ces-maine.com

457 South Main Street
PO Box 532
BIDDEFORD, MAINE 04412
T 207-933-4024
F 207-933-4801