Churchill, Julie M

From: Keith Bowden <kebo01@msn.com>
Sent: Friday, April 29, 2016 5:25 PM
To: Churchill, Julie M; Muzzey, Lynn
Cc: Keith Bowden
Subject: Fiberight Project Failure to Demo PHS as Non Waste
Attachments: Final -ME-NHSM_BUDApril 29.docx

To Ms. Churchill and Ms. Muzzey,

Attached please find the forth in my series of critical technical reviews of various aspects of the Fiberight project in Hampden, Maine

The focus of this analysis is on the Fiberight projects failure to demonstrate that its Post Hydrolysis Solids is eligible for non-waste status.

I would appreciate you distributing this to the appropriate parties and follow-up with a request that the applicants respond promptly.

Thank you for your consideration of this and all matters associated with this project.

Keith Bowden

April 29, 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
Division of Air Resources
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

Re: Fiberight Projects Failure to Demonstrate Its Post Hydrolysis Solids is Eligible for Non-Waste Status at the Federal and State Level

This document is the fourth in the series of technical reviews of the information contained in the permit applications for the 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).

The focus of this critical analysis is on the Fiberight projects failure to demonstrate its Post Hydrolysis Solids (PHS) is eligible for non-waste status, at either the federal or state level. CES failed to adequately make that case in its original Air Emission License/Permit Application that was initially submitted on June 15, 2015. They attempted to demonstrate eligibility by referencing the Federal EPA Non-hazardous Secondary Materials (NHSM) rule in 40 CFR Part 241, which allows certain "solid wastes" that are Resource Recovery and Conservation Act (RCRA) non-hazardous materials to be managed as "fuels" under certain conditions (legitimacy criteria 40 CFR 241.3 et. seq.).

I have had first hand, technical experience in producing PHS via enzymatic hydrolysis in a laboratory environment and at a semi-production mill level at the former Old Town Fuel and Fiber (OTFF) hardwood pulp mill operation in Old Town, Maine. We used the very same enzyme (Novozymes Company C-Tec 3) on washed, clean cellulose fibers generated from hardwood trees (birch, maple, poplar, etc.) and produced sugars and a very, small particle sized, amorphous liquefied material/by-product of that operation. Fiberight utilizes the same enzyme for hydrolysis to sugars of their old, recovered, used, short paper fines recovered from municipal solid waste (MSW). The result is a highly contaminated (as their own test numbers show), very fine particle, amorphous, liquefied material/by-product they call Post Hydrolysis Solids. This material does not, in my understanding, satisy the NHSM requirements.

Applicant's Position: CES has, on behalf of the applicant repeatedly adhered to their position that:

1) "technical data" for a mothballed project in Iowa (EPA Region 7) as it pertains to whether "fermentate" fed to boilers

2) was the same as “wood”,

3) indicated PHS material is not deemed a “solid waste”, but simply a secondary material fuel derived from MSW,

4) that boilers combusting the PHS is therefore exempt from designation/consideration/regulation under the more stringent Commercial Industrial Solid Waste Incinerator (CISWI) facility rules,

5) that all the previously cited positions are not only accurate, but now also apply to a different project (no production of ethanol and no commercial sale of post hydrolysis solids as proposed in Iowa), in a different state (now in Maine) and under a different federal environmental permitting jurisdiction (EPA Region 1) and, finally,

6) that Fiberight is therefore not subject to any other Maine rules or regulations regarding their PHS material. In all my years of involvement in technical projects, I have never witnessed such a convoluted string of “if this, then this, than this”.

Technical Response: Just recently on February 8, 2016, the EPA issued its final NHSM rules. The EPA determined that “Paper recycling residuals (PRR) generated from the recycling of recovered paper, paperboard, and corrugated container and combusted by paper recycling mills whose boilers are designed to burn solid fuels” is not a solid waste under RCRA, and is not required to meet the Clean Air Act (CAA Section 129 emission standards for the incineration units. (Final Rule: Additions to List of Categorical Non-Waste Fuels Docket # EPA-HQ-RCRA-2013-0110). One would think Fiberight would want to embrace and offer as “proof” that their PHS fuel is not a “solid waste”. Of course, Fiberight is not a paper recycling mill, but a MSW processing facility and CES has not presented a valid argument that PHS in NOT a “solid waste”.

Without getting too deep into the technical weeds, **let me provide the technical basis for why PHS is not the same as wood as Fiberight has previously claimed, and should therefore be treated as solid waste unless and until emission factors are provided that support their position that this is a fuel.** The main components of tree wood and higher plants, grasses, straw, grains, etc. are cellulose, hemicelluloses, lignin and extractives. The carbohydrate polymers of cellulose and hemicelluloses are polysaccharides that can be hydrolyzed into sugars. Lignin can be considered as the “glue” that helps hold the (hemi) cellulous fibers together in the original plant/tree. Cellulose is a long chain of many molecules and can be expressed by the chemical formula $(C_6H_{10}O_5)_n$, where n can up to 10,000 units that are linked together. Chemical pulping, like OTFF used to do, removes the vast majority of hemicelluloses, lignin and the extractives leaving relatively long wood fibers of cellulose that can end up make a fairly strong sheet of finished paper. Newspaper fibers are made with cellulose fibers by a different pulp grinding process that can leave in a lot more of the lignin, hemicelluloses in the pulp used to make the newsprint, and the cellulose fibers are shorter/weaker.

The MSW that Fiberight will process into a wet pulp for enzymatic hydrolysis is going to have a mixture of the short and long cellulose fibers of various diameters and lengths. Whether long fibers like OTFF’s or short fragments/fibers like Fiberight’s pulp, the Novozymes enzyme breaks the cellulose chains into many individual, unstable, cellulose molecules. The exposed, molecular

bonds are now available to link to the water molecule (H_2O), which makes a single glucose/sugar molecule with the formula $C_6H_{12}O_6$ (thus the term enzymatic hydrolysis). Even starting with OTFF's long, individual hardwood cellulose pulp, once the Novozymes enzyme sees the cellulose chains, a very small particle sized, amorphous liquefied material/by-product is produced that has no similarity to the long woody cellulose pulp fibers before hydrolysis takes place.

Again, speaking from experience, one can hardly get a pinch of this PHS-like material that was produced at OTFF. We had great difficulty in screening, straining the PHS material. Even with centrifuging the PHS equivalent material, it was still 70-75% water and amorphous/hard to consolidate. Fiberight is using the enzyme for hydrolysis on old, recovered, used, short paper fines recovered from MSW and the PHS particle size is likely to be even smaller, amorphous and harder to consolidate than Old Town's.

PHS is clearly not at all like wood with its combination of cellulose, hemicelluloses, lignin and various extractives. It is of a completely different composition, chemical make-up, texture, filterability, handling capability, BTU content, particle size, etc. Unlike the OTFF woody hardwood cellulose pulp, the MSW derived cellulose pulp starts out highly contaminated with soluble and insoluble chemicals/compounds. These constituents in Fiberight's PHS will produce boiler stack emissions of various Hazardous Air Pollutants like Mercury, Hydrogen Chlorine, etc. (as found and reported by me in prior submittals on March 23 and April 19, 2016 using Fiberight's own test numbers). **What about the other potential chemical compounds such as Dioxins/Furans that have been detected in MSW in the past? Is Fiberight going to include a full complement of test results, including dioxin and furans, a full Toxic Characteristic Leaching Potential (TCLP) analysis of the dried solids or PHS ash from the Pilot Plant in Lawrenceville, Virginia?**

Applicant's Position: Fiberight initiated the EPA Region 1's NHSM process back in 2012 to obtain acknowledgement, approval or some sort of a "comfort letter" that would allow them to proclaim their PHS is a "non-waste". I have confirmed that they have taken the same approach for their other, comparable project, and according to EPA staff in Region 7 (Ms. Deborah Bredhoft) and EPA headquarters in Washington, DC (Mr. Jesse Miller), Fiberight has failed repeatedly to respond to their requests for additional information to satisfy the criteria that the PHS material achieve "non waste" fuel status. Despite this chronic failure to affirmatively demonstrate satisfaction of the NHSM standard, CES seems to be holding out hope that a retest, (based on their recent April 8th, 2016 PTE report) of the PHS sample material from the pilot plant in Virginia to analyze for concentrations of chemical contaminants and BTU content of biomass will help them. This entirely new basis will effectively invalidate their existing NHSM determination (probably moot given Fiberight's failure to respond to the EPA). It remains to be seen whether their new NHSM self-determination will provide sufficient information to allow that DEP Air Bureau to regulate the material as a fuel. This puts Fiberight back to square one for its Air Permit application and a portion of the Solid Waste Permit application.

Technical Response: It is disturbing that Fiberight has failed to respond to the Federal EPA. It is, perhaps, more disturbing to contemplate that their failure to respond is based on the fact that their data does not support their self-determination. There are criteria/requirements for

qualifying their PHS under the NHSM regulations – these requirements are intendedto protect the public health and the environment. Why is Fiberight not required to justify its self determination when it has been asked to do so by the EPA? It is apparent to me, based on the data and my experience, that their PHS does not qualify for "non-waste" status. Given the data, and the fact that Fiberight has not yet submitted anything justifying the treatment of the PHS as fuel, the default position simply must be that the PHS should be deemed a solid waste for the purpose of federal air regulations. Further, an NHSM determination does not absolve Fiberight from compliance with the State of Maine requirements for solid waste – treatment of the PHS as fuel under the air statutes does not change the status of the material as solid waste under state laws. Therefore, regardless of the NHSM issue, Fiberight is required to obtain a determination that the PHS is being beneficially used as a fuel. Maine does have in its solid waste permitting program a Beneficial Use Determination (BUD) process. Why or how can the State somehow exempt Fiberight from those requirements?

I have some specific expertise in the area of what constitutes a beneficial use of paper mill residuals, predominately from recycled paper mills. In the fall of 1995, I completed a study of 56 paper mills for the New York State Energy Research and Development Authority (NYSERDA) and the New York State Department of Economic Development (NYDED). The title of the report was "Beneficial Uses of the Paper Mill Residuals for New York State's Recycled-Paper Mills." An excerpt of the abstract follows:

> This report evaluates the New York paper mill industry in terms of the productive management and treatment of solid wastes. It identifies current efforts by recycling mills to beneficially use paper mill residuals (often called sludge) and suggests additional options that should be considered by the industry in general and individual mills in particular. It also examines the regulations and economics affecting the mills and suggests actions that could improve the industry's ability to convert wastes to value-added products… State agencies are urged to support these efforts, encourage the development and commercialization of new beneficial use technologies, and reduce regulatory barriers whenever possible".

That report played a role in the 56 paper mills in New York State receiving a more favorable reception when individual companies approached the Department of Environmental Conservation (the New York equivalent to the Maine Department of Environmental Protection) with requests that their residuals be considered as a beneficially reused material and <u>not</u> deemed a solid waste subject to more stringent regulation. A recent review on the DEP website shows 16 paper mills locations/facilities were granted BUD's for their residuals (short-paper fibers & sludges) and an additional 16 facilities are beneficially using those materials. Uses include topsoil, landfill cover, mulch, land application, insulation, soil conditioning, animal bedding, cat litter, worm bedding, a cement additive, building blocks and panels, and fuel. The single BUD for the dried papermill residuals used as a fuel is for a corrugated boxboard facility recovering energy directly from combusting the cellulose fiber, (not as a post hydrolysis solids as Fiberight is proposing).

It is interesting to note that the Federal NHSM Program recently (February 8, 2016) shifted towards a categorical approach with respect to recognition of recycled paper mill residuals being declared a non-hazardous, non-waste secondary material. I was recommending that the NYSDEC take that approach 21 years earlier with respect to the category of recycled paper mill residuals and the need for the regulators to support/utilize their existing beneficial use programs.

To reiterate what I stated earlier, Fiberight is NOT a paper recycling mill, but a MSW processing facility and I conclude that CES and Fiberight have not presented a valid argument or sufficient data that their PHS is not a "solid waste". I also believe that Fiberight is not exempt from Maine's BUD program. Even if the NHSM self-determination were to stand without justification, the applicant must go through the state administered process of having a beneficial use determination made on the PHS solids that it proposes to burn as a fuel.

As with my March 23 & April 19, 2016 correspondence to the Department on the apparent violation of the Part 115 Air Permit submittals, and the complex positions/contortions/arguments to deny that the Hampden project is a "Major" polluter, the applicant continues to tell the public that their PHS is not a "solid waste" being incinerated in a boiler and that they have made the appropriate permit submittals. This is simply not true, and I have a real concern that the applicant is dodging its responsibility to provide data and otherwise appropriately respond to the regulators with the information they require to make their permitting decisions, so that the weaknesses in their proposal are not generally known until it recruits a sufficient number of communities to the detriment of those communities and the larger community of Maine.

Sincerely,

Keith A. Bowden

Keith A. Bowden