UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

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EMERGENCY MANAGEMENT

Alan Iantosca
Vice President Engineering and Projects
Fiberight LLC
P.O. Box 21171
Catonsville, Maryland 21228

Dear Mr. Iantosca:

Thank you for the March 7, 2018, letter in which Fiberight LLC (Fiberight) requested from the U.S. Environmental Protection Agency (EPA) its determination as to whether the fuel product CelluRight, produced at the Coastal Resources of Maine (CRM), LLC Advanced Waste Processing Facility, is a non-waste fuel product under the Non-Hazardous Secondary Materials (NHSM) rule. In addition, Fiberight submitted to EPA several lab reports containing contaminant, moisture, and heating value data.[1] In the March 7, 2018, letter, Fiberight stated that CelluRight meets the legitimacy criteria of 40 CFR 241.3(b)(4) and should be considered a non-waste fuel when combusted in energy recovery units that would otherwise combust green wood chips or wet biomass.

To be designated as a non-waste fuel under 40 CFR 241.3(b)(4), the applicable regulations require that processing of the NHSM meet the definition of processing in 40 CFR 241.2. After processing, the NHSM must also meet the legitimacy criteria for fuels in 40 CFR 241.3(d)(1). Units that combust NHSM as fuels that do not meet these requirements are considered to be combusting solid waste and therefore must meet applicable emissions standards issued under section 129 of the Clean Air Act (CAA).

Based on the information provided in the March 7, 2018, letter and supplemental materials, as well as information provided during telephone discussions with EPA staff, we agree that CelluRight would be considered a non-waste fuel under the 40 CFR part 241 regulations when combusted in a unit designed to burn clean biomass provided the specifications identified in Fiberight's request are maintained. Those specifications include: an ash content of 15 percent or less; a moisture content of 45 percent or less; a chlorine content of less than 0.3 percent; and a sulfur content at or above a 1:1 stoichiometric ratio with chlorine, determined by daily composite sampling. The remainder of this letter provides the

[1] Supplemental information includes January 24, 2018, February 8, 2018, and February 9, 2018, lab reports. Previous, less complete iterations of these reports were also provided.

basis for our position, including the reasons for these conditions.[2] *If these conditions are not maintained, the Agency may reach a different conclusion.*

Background Information on CelluRight

Based on information provided to EPA, CelluRight is an engineered fuel product made from a dewatered, recycled mixed paper pulp. It was initially developed at a pilot plant in Lawrenceville, Virginia, and now Fiberight intends to produce the material at the Coastal Resources of Maine, LLC Advanced Waste Processing Facility, in Hampden, Maine, to be made commercially available as fuel to facilities currently using biomass-fired boilers. Fiberight's Hampden, Maine facility has been issued Solid Waste and Air Licenses by the Maine Department of Environmental Protection allowing it to receive delivery of and process approximately 175,000 tons per year of municipal solid waste (MSW). Full scale operations are planned to commence at the Hampden facility near the end of 2018.

According to the information provided, CelluRight will be marketed as fuel to facilities that currently combust green wood, green wood chips, or other biomass. The submitted letter and supporting information characterizes the CelluRight fuel as follows:

- Fuel/heat content ranging from 3,518 Btu/lb to 4,622 Btu/lb as received.
- Moisture content of 45 percent or less.[3]
- Chlorine content no greater than 0.3 percent.
- Ash content no greater than 15 percent.
- Sulfur content at or above a 1:1 stoichiometric ratio with chlorine.

Processing

Processing is defined in 40 CFR 241.2 as operations that transform discarded NHSM into a non-waste fuel or non-waste ingredient, including operations necessary to: remove or destroy contaminants; significantly improve the fuel characteristics (e.g., sizing or drying of the material, in combination with other operations); chemically improve the as-fired energy content; or improve the ingredient characteristics. Minimal operations that result only in modifying the size of the material by shredding do not constitute processing for the purposes of the definition.

The determination of whether a particular operation or set of operations constitutes sufficient processing to meet the definition in 40 CFR 241.2 is necessarily a case-specific and fact-specific determination. This determination applies the regulatory definition of processing to the specific discarded material(s) being processed, as described in correspondence and supporting materials, taking into account the nature and content of the material, as well as the types and extent of the operations performed on it. Thus, the same operations may or may not constitute sufficient processing under the regulation in a particular circumstance, depending on the material being processed and the specific facts of the processing. In

[2] Note that a non-waste determination under 40 CFR Part 241 does not affect a state's authority to regulate a non-hazardous secondary material as a solid waste. Non-hazardous secondary materials may be regulated simultaneously as a solid waste by the state, but as a non-waste fuel under 40 CFR Part 241 for the purposes of determining the applicable emissions standards under the Clean Air Act for the combustion unit in which it is used.

[3] Moisture levels from October and November 2017 test results range from 40 to 53 percent, with an average of 43 percent. The intended market for CelluRight is combustors of green wood and biomass fuels, which are traditionally accepted to have a maximum moisture content of 45%. Fiberight will monitor to ensure moisture content of 45% by daily composite sampling.

some cases, certain operations will be sufficient to "transform discarded non-hazardous secondary material into a non-waste fuel," and in other cases, the same operations may not be sufficient to do so.

The following processing steps occurred at Fiberight's pilot plant in Lawrenceville, Virginia. Fiberight stated that the Maine facility will follow the exact same processing steps once the Maine facility completes construction and begins operation.[4]

1. Waste Evaluation.

Incoming MSW is deposited on the sorting floor, where it is visually inspected to identify any unacceptable waste such as construction and demolition waste (C&D), white goods (refrigerators, washers, etc.), and tires or other large bulky items that otherwise would not be able to physically pass through the conveyors and rotating drums. Fiberight is contractually not allowed to accept legally defined hazardous wastes. Based on the contract documents, Fiberight can reject loads containing the above materials and/or pull them out once it arrives on site and divert them to a landfill.

2. Mechanical Separation.

The rest of the acceptable waste is sent through the materials recovery facility (MRF), which uses the following manual and automated processes to recover dry recyclable materials:

- A quality control pre-sort conveyor feeds the waste to a trommel, which separates the material greater than 12 inches from material less than 12 inches in size.
    - Material greater than 12 inches is routed to a sort line, where recyclable material is removed such as bulky rigid plastics, small appliances and/or smaller furniture items.[5] The remaining materials are sent to an old corrugated cardboard (OCC) screen, where recoverable cardboard is extracted and routed to the OCC bunker to be batch baled and sold. The material that passes through the OCC screen is routed to the pulping system for further processing.
    - Material 12 inches or less passes over a splitter screen. Material 8 to 12-inches is diverted to a 2D-3D separator,[6] and material under 8 inches is routed to a fines screen.
        - Material under 2 inches (or "fines"), comprised primarily of food waste, grit, and glass, is sent to the fines processing system for further processing. The fines have their own pulper and do not come into contact with the pulped cellulose recovered in the 2 to 8-inch fraction.
        - The 2 to 8-inch material is routed to a second 2D-3D separator. 2D material is separated and sent to an optical sorting unit to remove recoverable mixed paper, which is recycled and sold separately. The remaining 2D material from

[4] Fiberight's submittal on March 7, 2018.
[5] Larger appliances and furniture items are removed in the preceding waste evaluation step.
[6] 2D materials are two-dimensional materials and is a term used in the recycling industry to designate flat objects such as sheets of paper, plastic lids or individual sections of cardboard. 3D materials are three-dimensional materials and is a term used in the recycling industry to designate objects like bottles or cans.

the second 2D-3D separator joins the 2D material from the first 2D-3D separator and the combined 2D material goes through another optical sorting unit where low density polyethylene (LDPE) is removed. The 3D material from both 2D-3D separators is routed to the container optical sorting line, where high density polyethylene (HDPE), polyethylene terephthalate (PET) and mixed 3-7 plastic containers are recovered and stored in individual bunkers to be batch baled and sold.

- Paper and cellulose products, separated from the 3D materials, non-fiber 2D materials,[7] and fines, proceed to the pulper for further processing; they are not of sufficient quality for commodity markets. 3D materials and fines undergo specific additional mechanical treatments that allow for value recovery for each of these particular streams.

3. Pulping.

After separation via the above processes, the following materials are conveyed to a pulping drum:

- Fibers not removed as 2D mixed paper by the fiber optical sorting system
- Materials remaining from the container optical sorting system
- Materials remaining from the OCC screen

The drum agitates and shears the materials with hot water, separating biomass from inorganic materials and producing a "biomass pulp." Material such as rigid plastics, bones, and cans cannot be pulped, and they get filtered away. The biomass exiting the system contains the cellulose that will make up CelluRight.

4. Washing and Screening.

After exiting the pulping drum, the organic "biomass pulp" passes through a gritbuster screening step to separate overly heavy and overly light materials from the pulp. The pulp is then fed to counter-flow washing tunnels, which are specifically designed to reduce organic contamination in the pulped fiber and biomass. The internal configuration of the tunnel allows the fiber to advance through the tunnel and the solubilized organics to flow in the opposite direction. The soluble organic liquor is fed to an anaerobic digester system, and the fiber exits the tunnel with a final screen that removes any non-cellulose that has made it through the process. Most of the non-cellulose is removed in prior steps but this final screen removes any remaining fragments that got to this stage. The anaerobic digestion step only receives soluble organics.

The clean cellulose is then extracted from the wash tunnel, thickened in side hill screens and further dewatered in a screw press. The screw press is a mechanical dewatering device where a cake is built up inside the machine and is continuously operated, squeezing out moisture. The average moisture content of the finished product is 43 percent.[8] The resulting product, CelluRight, is then ready for sale either as cellulose market pulp, cellulose product (such as insulation) feedstock, or as an engineered fuel.

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[7] Non-fiber 2D materials are films, lids, and tops and they all are comprised of various polymer types.

[8] Fiberight must keep the moisture content below 45% to be considered an NHSM.

Based on this description and evaluation of the processing, we believe Fiberight's operations meet the definition of processing in 40 CFR 241.2 and will transform waste materials into a processed, non-waste fuel appropriate for use in certain types of biomass combustors.[9] Specifically, incoming materials undergo inspection, several levels of manual and automated separation (including screens and optical sorting equipment), and then the final fibrous/cellulosic portion is pulped with hot water, washed, and screened once more to yield CelluRight.

Legitimacy Criteria

Under 40 CFR 241.3(d)(1), the legitimacy criteria for fuels include: 1) management of the material as a valuable commodity based on the following factors—storage prior to use must not exceed reasonable time frames, and management of the material must be in a manner consistent with an analogous fuel, or where there is no analogous fuel, adequately contained to prevent releases to the environment; 2) the material must have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy; and 3) the material must contain contaminants at levels comparable to or less than those in traditional fuels which the combustion unit is designed to burn.

Manage as a Valuable Commodity

Information submitted indicates that approximately 190 tons per day of CelluRight will be produced at the CRM facility and stored on tarped walking floor or dump trailers. CRM anticipates that 8 to 12 trailers per day of CelluRight will be transported to outside customers 5 days per week, with the duration of onsite storage expected to be limited to approximately 2 days.

Fiberight indicates that CelluRight is a close equivalent to the wood-based fuel source used at most green biomass combusting facilities and is provided to most facilities on an ongoing basis. Once received at the combustion facility, CelluRight will be unloaded at the wood fuel stockpile area, mixed as homogenously as possible with the biomass fuel, and be processed and combusted concurrently with the traditional green wood and biomass feedstock. The CelluRight, therefore, will be treated in an identical manner as the analogous fuel, with no additional considerations, storage times, or operational steps necessary to receive, blend, prepare or feed the CelluRight into the combustion equipment.

Based on this information, we believe that CelluRight will be managed as a valuable commodity by Fiberight and its customers after it is produced, and that storage—before and after delivery to customers—will not exceed reasonable time frames.

Meaningful Heating Value and Used as a Fuel to Recover Energy

Regarding the second legitimacy criterion, Fiberight indicated that pulp is dewatered using a screw press to approximately 40-53 percent moisture, and that as-fired heating values of sampled CelluRight averaged about 4,315 Btu/lb. Fiberight states that these moisture and heating values are comparable to those of the green wood and/or biomass fuel currently being combusted by the units intended for CelluRight. Furthermore, Fiberight noted that:

- The commercial nature of the transaction shows that the receiving facilities have an economic incentive to reduce the amount of traditional (comparable) fuels purchased.

[9] Prior to completing waste processing, these materials are considered solid waste and are subject to appropriate federal, state, and local regulations.

- CelluRight is specifically purchased as fuel and, once introduced into the unit, self-sustains combustion along with the green wood chips or biomass with which it is combusted.
- Many of the receiving facilities combusting CelluRight produce energy that is intended to be sold for a profit.

As the Agency stated in the preamble to the NHSM final rule, facilities with energy recovery units that use a non-hazardous secondary material as a fuel with an energy content lower than 5,000 Btu/lb, as-fired, may be able to satisfy this criterion by demonstrating that the energy recovery unit can cost-effectively recover meaningful energy from the non-hazardous secondary material used as a fuel.[10] Although CelluRight's average heating value falls below 5,000 Btu/lb, we believe Fiberight has adequately demonstrated that the receiving facilities can cost-effectively recover meaningful energy from CelluRight. The three points listed above reflect the factors EPA relies upon for determining whether meaningful heating value is derived from NHSM with energy values below 5,000 Btu/lb (see 76 FR 15541). Thus, we believe that CelluRight meets the meaningful heating value criterion.

Comparability of Contaminant Levels

The third legitimacy criterion states that the NHSM must contain contaminants at levels comparable in concentration to or lower than traditional fuels that the combustion unit is designed to burn. The term "contaminants" refers to constituents in the NHSM that will result in emissions of air pollutants under Clean Air Act section 112(b) or the nine pollutants listed under Clean Air Act section 129, including those constituents that could generate products of incomplete combustion.[11]

The samples which have been analyzed as part of Fiberight's data submittal represent a CelluRight product produced from a combination of MSW from Long Island, New York and Lawrenceville, Virginia. Due to multiple factors, including limited supply capacity to the pilot plant, the nature of the receiving floor and the continuous process, it is impossible to discern which samples are derived from which source. If Fiberight were to attempt to completely process one "batch" or load of MSW through the system at a time, the material properties of the streams exiting the process would not be representative of an integrated and continuous operation. Fiberight also noted that the pilot plant has served as the source of product samples and information gathering conducted by third party investors and independent engineers seeking to validate the Fiberight process as suitable for investment and operational success in Hampden, Maine. Although on a smaller scale, the pilot plant in Lawrenceville has been designed and operated to exacting conditions and parameters representative of the facility being built in Maine.

Regarding the third legitimacy criterion, Fiberight submitted a summary table comparing contaminant levels in traditional fuels (specifically, wood and biomass) with concentrations found in the CelluRight. Concentration data included results from independent laboratory analyses of 14 samples from two separate production batches at the pilot plant.

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[10] See 76 FR 15512, March 21, 2011. "However, for facilities with energy recovery units that use non-hazardous secondary materials as fuels with an energy content lower than 5,000 Btu/lb, as-fired, we believe it is also appropriate to allow a person to demonstrate that a meaningful heating value is derived from the non-hazardous secondary material if the energy recovery unit can cost-effectively recover meaningful energy from the non-hazardous secondary material used as fuels."

[11] See 40 CFR 241.2.

A direct contaminant-to-contaminant comparison of these updated results are attached as Table 1. Based on the comparison, all contaminants in CelluRight are comparable to or lower than those contaminants in wood and biomass.

The conclusion that CelluRight meets the contaminant legitimacy criterion for units designed to burn clean biomass (the only traditional fuel under comparison) assumes that CelluRight was tested for any contaminant expected to be present. Additional contaminants for which CelluRight was not tested must be present at levels comparable to or lower than those in the appropriate traditional fuel, based on Fiberight's knowledge of the material.

Conclusion

Overall, based on the information provided, we believe that CelluRight, as described in Fiberight's letter and supplemental information, meets both the processing definition and the legitimacy criteria outlined above if the specifications in Fiberight's request are maintained, including, but not limited to: the ash content is maintained at 15 percent or less; the moisture content is maintained at 45 percent or less; the chlorine remains less than 0.3 percent; and the sulfur content remains at or above a 1:1 stoichiometric ratio with chlorine, determined by daily composite sampling. These specifications/conditions will ensure the consistency and homogeneity of the material, and that it will not contain waste materials for combustion or contaminant levels that exceed those typically found in traditional fuels. Accordingly, we would consider CelluRight a non-waste fuel (as described in this letter) under the 40 Part 241 regulations when combusted in units designed to burn clean biomass.

If Fiberight has any other questions, please contact Jesse Miller of my staff at (703) 308-1180.

Sincerely,

Barnes Johnson

Barnes Johnson, Director
Office of Resource Conservation and Recovery

Enclosure

Enclosure

Table 1: Contaminant-by-Contaminant Comparison

Contaminant	Units	CelluRight[1]	Wood / Biomass: Range[2]	Results of Comparison
Metal Elements – dry basis				
Antimony (Sb)[3]	ppm	<3.0	ND – 26	Lower than wood and biomass
Arsenic (As)[3]	ppm	<3.0	ND – 298	Lower than wood and biomass
Beryllium (Be)[3]	ppm	<1.2	ND – 10	Lower than wood and biomass
Cadmium (Cd)[3]	ppm	<1.5	ND – 17	Lower than wood and biomass
Chromium (Cr)	ppm	8.1 - 28	ND – 340	Lower than wood and biomass
Cobalt (Co)[3]	ppm	<3.0	ND – 213	Lower than wood and biomass
Lead (Pb)	ppm	7.2 - 24.6	ND – 229	Lower than wood and biomass
Manganese (Mn)	ppm	18.6 - 34.8	ND – 15,800	Lower than wood and biomass
Mercury (Hg)	ppm	0.047 - 0.114	ND – 1.1	Lower than wood and biomass
Nickel (Ni)	ppm	4.3 - 16	ND – 540	Lower than wood and biomass
Selenium (Se)[3]	ppm	<3.0	ND – 9.0	Lower than wood and biomass
Non-metal Elements – dry basis				
Chlorine (Cl)	ppm	204 - 1,229	ND – 5,400	Lower than wood and biomass
Fluorine (F)[3]	ppm	<41.5	ND – 300	Lower than wood and biomass
Nitrogen (N)	ppm	1,400 - 2,600	200 - 39,500	Lower than wood and biomass
Sulfur (S)	ppm	700 - 1,230	ND - 8,700	Lower than wood and biomass
Volatile Organic Compounds (VOC)				
Formaldehyde	ppm	3 - 19	1.6 – 27	Lower than wood and biomass

ND = not detected

Notes:

1. CelluRight range represents fourteen samples taken on different days in October and November 2017 and tested by ALS Environmental.
2. Ranges for wood and biomass materials and coal come from a combination of EPA data and literature sources, as presented in EPA document Contaminant Concentrations in Traditional Fuels: Tables for Comparison, November 29, 2011, available at https://www.epa.gov/rcra/contaminant-concentrations-traditional-fuels-tables-comparison.
3. Antimony, arsenic, beryllium, cadmium, cobalt, selenium, and fluorine were not detected. In these cases, values presented in this table are the method detection levels (as the method reporting limit) for each contaminant.