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

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE
NOW THE
OFFICE OF LAND AND
EMERGENCY MANAGEMENT

FEB 19 2019

Dave Robau
CEO and Chief Scientist
National Energy USA
13 S. Palafox Street, 2nd Floor
Pensacola, Florida 32502

Dear Mr. Robau:

In your March 30, 2018, letter on behalf of WastAway, LLC (WastAway), National Energy USA requested from the U.S. Environmental Protection Agency (EPA or Agency) its determination as to whether WastAway's processed engineered fuel product, called "Fluff," is a non-waste fuel product under the Non-Hazardous Secondary Materials (NHSM) rule. Your letter included supplemental information and analyses including contaminant, moisture, and heating value data. In the letter, National Energy USA stated its position that Fluff should be considered a non-waste fuel in accordance with 40 CFR 241.3(b)(4) when combusted in energy recovery units that combust coal or wood/biomass. You also submitted a letter to EPA on September 24, 2018, with additional information in response to EPA's follow-up questions, along with associated lab results submitted to EPA on October 11, 2018.

To be designated as a non-waste fuel under 40 CFR 241.3(b)(4), the 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). Where NHSM do not meet these requirements as non-waste fuel, the units in which they are burned must meet applicable emissions standards for solid waste issued under section 129 of the Clean Air Act (CAA).

Based on all the information provided in the March 30th and September 24th letters and supplemental materials, as well as information provided during phone discussions with EPA staff, we believe that Fluff would be considered a non-waste fuel under the 40 CFR part 241 regulations when combusted in a unit designed to burn coal or wood/biomass (as described in the discussion under Comparability of Contaminant Levels), provided the specifications and conditions identified in your request are maintained. Those specifications include: the ash content remains at 10.5 percent or less; the moisture content remains at 4.7 percent or less; the chlorine content 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. The remainder of this letter provides the basis

for our position, including the reasons for these conditions.[1] *If these conditions are not maintained, the Agency may reach a different conclusion.*

Background Information on WastAway Fluff

WastAway, LLC has operated a full-scale production facility since 2003 in Morrison, Tennessee and has developed a non-hazardous, waste-derived engineered fuel that has been tested multiple times in a co-fired boiler. The technology was co-developed under a Cooperative Research and Development Agreement (CRADA) with the U.S. Army Corps of Engineers. The process yields an engineered fuel product referred to as "Fluff." National Energy and WastAway are developing projects for use of Fluff throughout North America.

According to the information provided to EPA by National Energy, WastAway's fuel is intended for use as a substitute for both coal and wood/biomass in stoker boilers. The March 30th letter to EPA, as well as supporting information, characterize the fuel as follows:

- Plastic: 25 percent (PVC is removed)
- Paper and cardboard: 40 percent
- Organic: 20 percent
- Polystyrene: 5 percent
- Residual waste: 5 percent
- Fuel/heat content: ranging from 8,500 Btu/lb to 9,100 Btu/lb as fired
- Moisture content: 4.7 percent or less.[2]
- Ash content: 10.5 percent or less.[3]
- Chlorine content: less than 0.3 percent[4]
- Sulfur content: equal or above a 1:1 stoichiometric ratio with chlorine

The letter states that the fuel is hydrophobic, non-leachable, pathogen-free, and odorless. It can be pelletized with a typical size of 2 inches and formed by heat and compression with no binding agent. Your September 24, 2018, letter notes that WastAway's current in-house testing has demonstrated that up to 73 percent of the targeted plastics in the mixed process stream (e.g., PVC) can be captured, adding a significant quality control on the chlorine content of the produced fuel.

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: (1) remove or destroy contaminants; (2) significantly improve the fuel characteristics (e.g., sizing or drying of

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[1] 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.

[2] Analysis report from October 2017 lists moisture content at 4.7 percent.

[3] Analysis report from October 2017 lists ash content at 10.5 percent.

[4] Chlorine levels from March 2014 test results range from 0.298 to 0.319 percent, with an average of 0.308 percent.

the material, in combination with other operations); (3) chemically improve the as-fired energy content; or (4) 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 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.

As described in your March 30th letter to EPA, the steps in the Fluff production process are discussed in detail below:

1. Pre-Production/Waste Stream Segregation – Primary raw materials, composed of municipal solid waste (MSW), are brought to the facility and deposited on the tipping floor, where they undergo inspection to ensure no undesirable material remains in the feedstock. Bulky items and other questionable material are removed by hand at the tipping floor. From the floor, materials are moved to a pre-shredding process to reduce material size, extract metals, and remove inert materials. Over-belt magnets remove ferrous metals, and Near-Infrared Spectroscopy (NIRS) equipment allows for identification and removal of contaminated materials, such as PVC. Air separators separate the material into light and heavy fractions. Subsequent material is inspected via an eddy current analyzer, while an optical sorter identifies and removes materials not meeting WastAway's fuel specification. The unwanted materials proceed to be further recycled.

2. Processing of Segregated Waste Streams – Remaining materials are further shredded and then sent to WastAway's patented hydrolyzer for sterilization. After sterilization, materials are dried, yielding a highly-consistent fuel product in a "Fluff" format.

3. Final Engineered Fuel Processing – For customer preference, ease of transportation and storage, the Fluff materials are then pelletized and cooled to make the final fuel product, referred to as Fluff pellets. Fluff and Fluff pellets have the same composition, with the exception of form and density. The finished product is stored in the WastAway facility. It is an entirely enclosed facility, which limits the introduction of unwanted moisture or contaminants to the clean fuel product.

Based on this description and EPA's evaluation of the processing, we believe your operations at the Tennessee plant 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 units designed to

combust coal or wood and biomass. Specifically, unwanted contaminated materials are removed through manual inspection, and several levels of manual and automated separation (including screens and optical sorting equipment). The as-fired energy content of product is improved through further shredding and drying to yield Fluff pellets. These operations are more than the "minimal operations" described in the Part 241 processing definition.[5]

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. These criteria are explained in more detail below.

Managed as a Valuable Commodity

Information submitted to EPA indicates that the finished fuel is moved to a holding area for truck load-out delivery to the customer. The Tennessee facility has a storage capacity of 1,200 tons, but the system is designed for daily deliveries of the plant's output. Two trucks will be used for transporting the fuel to customers by trailers with "walking floors" or 30-yard roll-off containers. A walking floor is a hydraulically-driven moving floor conveyance system for transporting bulk material or pelletized product. It eliminates the need for a forklift for the fuel to enter the trailer. The fuel is covered the entire transport time. The fuel is then unloaded and conveyed directly into dry bins at the fuel user's location. It is expected that the fuel will be transported six days per week, based on the volumes indicated in WastAway's fuel contracts. Your March 30th letter states that it does not anticipate any on-site fuel storage for any prolonged period of time. A letter dated March 19, 2018, from Lehigh Cement was also provided in materials submitted to EPA claiming that the engineered fuel has a market value for end users interested in reducing air emissions by using a cleaner fuel.

Based on this information, we believe that WastAway Fluff will be managed as a valuable commodity 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, you indicate that WastAway's equipment has the ability to screen out PVC plastics and inert materials from the incoming waste stream to meet specific end user's needs. You state that the average heating value is typically 9,000 Btu/lb, and that the fuel will be used as a fuel in a combustion unit that recovers energy. The Agency considers heating values over 5000 Btu/lb to be meaningful.

[5] Prior to completion of the processing of the waste, these materials are considered solid waste and are subject to appropriate federal, state, and local regulations.

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" generally refers to constituents in the NHSM that will result in emissions of air pollutants under Clean Air Act section 112(b) or 129(a)(4).[6]

Regarding the third legitimacy criterion, National Energy included with its letter an attachment which provided a summary table comparing contaminant levels in traditional fuels (specifically, wood/biomass and coal) with concentrations found in the Fluff fuel product. For each Fluff contaminant, a 90 percent upper prediction limit (UPL) was calculated based on the results of seven daily composite samples. A direct contaminant-to-contaminant comparison of these results is attached as Table 1. .

Table 1 shows that antimony and fluorine exceed contaminant concentrations in coal and wood/biomass. In addition, bis (2-ethylhexyl) phthalate (DEHP), a common semi-volatile organic compound (SVOC) which is frequent in waste streams as a plasticizer, was reported to be present in Fluff. For antimony, a comparison of a low volatile metals (LVM) grouping[7] was carried out. The LVM contaminant group used in this analysis included antimony, arsenic, beryllium, chromium, cobalt, nickel and manganese. The resulting LVM value is lower than the lowest maximum LVM group value for the traditional fuels. Likewise, a grouping of the halogens (chloride and fluorine) results in a lower total halogen content than either wood or coal.

Regarding the comparability of the SVOC/DEHP levels in Fluff, a grouping analysis of SVOCs indicated the presence of DEHP at a concentration of 577 parts per million (ppm) in the Fluff (the only detected SVOC). The grouping analysis of coal yielded a total SVOC concentration of 2,243 ppm, while the grouping analysis of wood/and biomass yielded a total concentration of 922 ppm. Therefore, WastAway Fluff meets the legitimacy criterion for a combustion unit designed to burn coal or wood/and biomass.

Table 1 also indicates the presence of formaldehyde, a volatile organic compound (VOC) in Fluff. Although contaminant data presented did not show the presence of formaldehyde in coal, studies[8] have shown that formaldehyde is one of the ambient temperature oxidation products of coal. At the level indicated for Fluff (4.97 ppm), we would consider the formaldehyde content to be comparable to or less than that of coal.

Overall, based on this contaminant-to-contaminant comparison, all contaminants in Fluff are comparable to or lower than those contaminants in coal or wood/biomass.

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[6] See 40 CFR 241.2. DEHP, a common SVOC compound discussed in the following paragraphs, is currently listed as a pollutant under Clean Air Act section 112(b). The compound is listed as a possible carcinogen in the state of California.

[7] See 78 FR 9146-47 (2013) for discussion of grouping as an appropriate methodology for contaminant comparison.

[8] Zhang, Xing, *Gaseous Emissions from Coal Stockpiles*, CCC/213 ISBN 978-92-9029-533-4, January 2013; Cohen, Haim, and Green, Uri. Biological Chemistry Department, Ariel University Center in Samaria, Israel and Chemistry Department, Ben-Gurion University of the Negev, Israel.

The conclusion that Fluff meets the contaminant legitimacy criterion for units designed to burn coal or wood/biomass assumes that Fluff was tested for any contaminant expected to be present. Additional contaminants for which Fluff was not tested must be present at levels comparable to or lower than those in the appropriate traditional fuel, based on your knowledge of the material.

Conclusion

Overall, based on the information provided, we believe that Fluff, as described in your letter and supplemental information, meets both the processing definition and the legitimacy criteria outlined above as long as the specifications and conditions in your request are maintained; including, but not limited to: (1) the ash content is maintained at 10.5 percent or less; (2) the moisture content is maintained at 4.7 percent or less; (3) the chlorine remains less than 0.3 percent; and (4) 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 comparable to those typically found in traditional fuels. Accordingly, we would consider this NHSM a non-waste fuel (as described in this letter) under the 40 Part 241 regulations when combusted in units designed to burn coal or wood/biomass.

If you have 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	WastAway Fluff[1]	Wood / Biomass: Range[2]	Coal[2]	Results of Comparison
Metal Elements – dry basis					
Antimony (Sb)	ppm	49.6	ND – 26	ND – 6.9	Higher than wood/biomass and coal
Arsenic (As)	ppm	2.1	ND – 298	ND – 174	Lower than wood/biomass and coal
Beryllium (Be)	ppm	0.10	ND – 10	ND – 206	Lower than wood/biomass and coal
Cadmium (Cd)	ppm	1.1	ND – 17	ND – 19	Lower than wood/biomass and coal
Chromium (Cr)	ppm	45.8	ND – 340	ND – 168	Lower than wood/biomass and coal
Cobalt (Co)	ppm	8.3	ND – 213	ND – 25.2	Lower than wood/biomass and coal
Lead (Pb)	ppm	112	ND – 229	ND – 148	Lower than wood/biomass and coal
Manganese (Mn)	ppm	212	ND – 15,800	ND – 512	Lower than wood/biomass and coal
Mercury (Hg)	ppm	0.13	ND – 1.1	ND – 3.1	Lower than wood/biomass and coal
Nickel (Ni)	ppm	19.5	ND – 540	ND – 730	Lower than wood/biomass and coal
Selenium (Se)	ppm	0.5	ND – 9.0	ND – 74.3	Lower than wood/biomass and coal
Total SVM	**ppm**	**113**	**ND - 255**	**ND - 241**	**Lower than wood/biomass and coal**
Total LVM	**ppm**	**104**	**ND – 17,227**	**ND - 1822**	**Lower than wood/biomass and coal**
Non-metal elements – dry basis					
Chlorine (Cl)	ppm	3,230	ND – 5,400	ND - 9,080	Lower than wood/biomass and coal
Fluorine (F)	ppm	1,220	ND – 300	ND – 178	Higher than wood/biomass and coal
Total Halogens	**ppm**	**4,450**	**ND - 5,700**	**ND – 9,258**	**Lower than wood/biomass and coal**
Nitrogen (N)	ppm	10,000	200 - 39,500	13,600 - 54,000	Lower than wood/biomass and coal
Sulfur (S)	ppm	2,200	ND - 8,700	740 – 61,300	Lower than wood/biomass and coal
Volatile Organic Compounds (VOC)					
Total VOCs[3]	**ppm**	**4.97**	**1.6 – 27**	**--[6]**	**Lower than wood/biomass and coal**
Semi Volatile Organic Compounds (SVOCs)					
Total SVOCs	**ppm**	**577[4]**	**5 - 922[5]**	**28.3 - 2,243**	**Lower than wood/biomass and coal**

Notes:

1. Fluff values represent 90 precent upper prediction limit (UPL) of 7 daily composite samples taken from 3/17/2014 to 3/27/2014, on a dry basis.
2. Unless otherwise indicated, ranges for Wood & 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. Formaldehyde is the only expected VOC (see also Comparability of Contaminant Levels discussion on formaldehyde above).
4. The only SVOC detected in WastAway Fluff is bis(2-ethylhexl)phthalate (DEHP).
5. Total SVOC data for wood/biomass is based on analyses for 16-PAHs (see 83 FR 5326 "iii Contaminants Comparable to or Lower Than Traditional Fuels;" additional SVOCs may be present but no studies to that effect are currently available.
6. See discussion in the Comparability of Contaminant Levels section on formaldehyde as a temperature oxidation product of coal.