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

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MAY - 8 2013

Patrick Oberth
Facility, Technical and Compliance Manager
VEXOR Technology
955 West Smith Road
Medina, OH 44256

Dear Mr. Oberth:

In your letter of March 14, 2013,[1] you requested confirmation from the U.S. Environmental Protection Agency (EPA) that VEXOR Engineered Fuel® (VEF), which you produce by processing specific non-hazardous secondary materials (NHSM), will be considered a non-waste fuel when burned for energy recovery in combustion units in accordance with the requirements of 40 CFR 241.3(b)(4).

To be designated as a non-waste fuel under that section (40 CFR 241.3(b)(4)), the regulations require that the following conditions are met:

A. Processing
The discarded NHSM undergoes processing as defined in 40 CFR 241.2 to transform the material into a product fuel.

B. Legitimacy criteria
The processed NHSM must meet the legitimacy criteria for fuels in 40 CFR 241.3(d)(1). The legitimacy criteria are meant to show that the material is indeed a useful product and is not being burned to destroy or dispose of the NHSM (or the contaminants) as a waste.

Based on the information provided in your March 14, 2013, letter (and a supporting statement), we believe the VEF—which you produce from processing of industrial and commercial NHSMs, and ReEngineered Feedstock[2]—is a non-waste fuel when burned in combustion units as

[1] This request for a letter from EPA regarding the regulatory status of the engineered fuel produced by VEXOR Technology supersedes your previous request (as discussed in your October 2011 letter to EPA and other supporting information).

[2] ReEngineered Feedstock is a product fuel developed by ReCommunity Inc. and made from non-recyclable materials from commercial, industrial, and institutional waste streams. The Agency previously determined that ReEngineered Feedstock is a non-waste fuel. See http://www.epa.gov/osw/nonhaz/define/pdfs/ReCommunityLetterAugust24.pdf. VEXOR Technology includes the ReCommunity product in its process along with other material.

described in your letter.[3] The remainder of this letter provides the basis for our position. *If there is a discrepancy in the information provided to us, it could result in a different interpretation.*

We understand that VEXOR Technology currently operates several facilities that develop VEF product fuel for use as an alternative to coal. VEXOR Technology takes specific NHSMs from industrial and commercial sources, and ReEngineered Feedstock, then processes the materials into combustor-specific fuel products (as described in Section A below). The manufactured product fuels are understood to have commercial applications in coal-burning combustion units, such as cement kilns, lime kilns, and utility boilers.

A. 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 your March 14, 2013 letter (and supporting statement) taking into account the nature and content of the discarded 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.

In general, we understand that your process includes source control for specific requested components that have certain fuel characteristics (for example, companies provide you with clean diaper tailings from the manufacture of diapers, for addition as an adsorbent), characterization of each component's combustion properties, contaminant removal, fuel amendments, blending based on combustor-specific recipes, and analysis to ensure it meets combustor-specific requirements. In your letter, you state that the processing of NHSMs into VEF product fuel involves the following steps and operations:

---

[3] A non-waste determination under 40 CFR part 241 does not preempt 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.

1. Selection of Suitable Feedstock Components

You indicate that the source controls employed at commercial/industrial sites are central to the VEF processing operation, selecting components with desirable fuel characteristics and prohibiting components with unacceptable fuel characteristics (i.e., low Btu and/or contaminant-bearing components).

Specifically, you explain that the NHSMs you process into VEF are select components from commercial and industrial sources, blended with ReEngineered Feedstock.

The commercial and industrial NHSMs[4] that you process to produce VEF are segregated at the source before shipment to your processing facility. These materials include paper bags, oily or waxy cardboard, coated plastics (halogen free), carbon-black (e.g., from the production of tire rubber), oils,[5] resins, soy-based inks, polyols, waxes, and absorbents (sawdust, paper, cardboard, and diaper tailings). Each of these NHSMs either enhances the Btu value or improves the fuel characteristics, and each batch of VEF is produced to meet an end user's (combustor's) specifications.

2. Management and Evaluation of Selected Feedstocks

You indicate that VEXOR Technology only accepts industrial and commercial NHSMs that have been pre-approved in accordance with analysis plans approved by state authorities. Under the analysis plans, each potential NHSM is characterized and evaluated to determine if it can be used as input in producing VEF. The evaluation of contaminant levels, heating value, and other requirements are tailored to individual product specifications. While some VEF product formulations have different limits based on customer specifications, all limits are within acceptable ranges as described in the Comparability of Contaminant discussion below. VEXOR Technology does not accept any hazardous wastes.

All inbound containers are sampled and tested, following an approved process for fingerprint analysis (identification of presence and source of contaminants) to ensure the incoming NHSM matches the pre-approved material. Materials not acceptable are disposed of by VEXOR Technology or returned to the generator for proper processing or disposal. For example, materials found to have high levels of chlorine, sulfur, fluorine, or metals are rejected and sent back to the generator.

---

[4] You stated that you do not consider any of the NHSMs that you get from the industrial/commercial sites as a municipal solid waste. In addition, you have stated that the select feedstocks [NHSMs] are not part of the industrial/commercial sites' regular trash.

[5] The March 14 letter stated "Oils are tested to ensure they are not mixed with halogenated solvents via the initial approval, test kits and outside lab analysis. If halogens are detected and a rebuttal is not offered, these are rejected back to the generator or to an alternate facility for proper disposal. Oils with high levels of rebuttable halogens are not included in the VEF due to the low halogen specification of the fuel." Such procedures are used to ensure the oil is not a hazardous waste in accordance with the 40 CFR Part 279 standards for management of used oil.

3. Development of Recipe to Meet Combustor-Specific Requirements

In addition to pre-approval procedures and testing of all incoming NHSMs, you emphasized that you employ rigorous procedures for the selection of specific components to achieve the specifications for the end user kiln (or other combustor) based on parameter testing, including heating value, ash content, sulfur, and mercury among others necessary for specific kiln operations and air emissions. VEXOR Technology also explained, and provided information on the rigorous proprietary procedures used when selecting and tracking the components it uses to meet these requirements.

The components that are selected for the recipe are further examined. Contaminants that were not identified in the initial assessment are removed, including metals,[6] inorganic materials, and other contaminants not able to support combustion or, if used in a cement or lime kiln, are not beneficial to the product being produced. For example, a batch of NHSM is assessed and if a component of the material is found that is not acceptable (e.g., a brake pad), it is mechanically separated from the remainder of the NHSM using a track hoe and removed by an operator.

Based on your description, we understand that this process results in recipes that are tailored to the individual specifications contractually agreed to by VEXOR Technology and its customers (regarding heating value and other specifications). For example, you indicate that a utility boiler would have different specifications than cement or lime kilns since the cement or lime kiln may need certain compounds or chemicals that may be deficient in their raw material or coal that is vital to the chemical makeup of the product they are producing, i.e., cement or lime.

4. Blending and Processing Selected Feedstocks to the Desired Recipe

Mixing and processing recipes are followed to achieve a specification-driven fuel with reduced particle size that ensures complete combustion in the firing zone. The evaluation of contaminant levels, heating value, and other requirements are tailored to the specifications contractually agreed to by individual customers of VEXOR Technology.

Prior to final processing, addition of specific materials for the desired recipe can include NHSMs to enhance combustion based on QA/QC testing. For example, carbon black and non-halogenated oils are added, if needed, to increase the heating value. Absorbents are also added, if needed, at this stage or earlier in the process. The absorbents used include paper, cardboard, diaper tailings, and sawdust.

Once the selected NHSMs are mixed and blended, the blended material is then processed via an operation utilizing shredders fed by conveyor systems with head magnets and

[6] Ferrous metals are removed at three stages in the process with large magnets.

overhead magnets used to remove metal contamination. Large pieces of NHSMs that do not have heating value are removed prior to mixing and during the conveyor feeding process via a visual sorting and hand removal process. The initial shredder reduces the particle size to assist in proper mixing and blending and the associated conveyor with head magnet removes coarse metals. The second shredder further reduces particle size and feeds to the final shredder via conveyors with overhead magnets and head magnets. These remove any metals that remain. The final shredder takes the blended material to a two dimensional particle size of less than 30mm.

Overall, a homogenous material is ensured by pre-approval of the NHSMs used to produce the VEF product fuel, analyses performed on the incoming NHSMs, and strict adherence to the recipe to produce a product fuel that meets the customers specifications. Mixing and shredding of the NHSMs helps ensure a product fuel with a uniform chemical makeup and combustion characterization.

5. Analysis of the VEF Product

Testing is conducted during and after mixing, as well as after particle size reduction, to ensure the VEF product fuel adheres to strict specifications for combustion and performance in the combustion unit (including testing for contaminants). The testing is done on a composite sample of the process batch. The quality controlled products meeting individual specifications are then delivered to the customer. You state that the specifications vary by customer; however, you have indicated that the contaminant specifications provided by VEXOR Technology are the maximum levels that will be in any VEF product fuel.

Based on this description and evaluation of your processing activities, we believe your operations meet the definition of processing in 40 CFR 241.2, and the NHSMs from the commercial and industrial sources are transformed into a product fuel. In particular, this determination is based on the following operations employed by VEXOR Technology: (1) The prevention/removal of contaminants is achieved by limiting contaminants via source control, removing the ferrous metals in three stages, and isolating and removing other materials/components that would contribute to contaminants, and tesing of the final VEF fuel product; (2) The improvement of the fuel characteristics is achieved by source control, particle size reduction through shredding, precise blending to meet the customer's combustion criteria and by creation of a fuel product that is homogenous within each batch promoting even and controlled combustion; and (3) The chemical improvement to the as-fired energy content is achieved, as required, by adding absorbents and other inputs with high energy content, such as non-halogenated oils and carbon black.

The agency notes that the processing operations, as described, help ensure the creation of fuel products with predictable fuel qualities, regardless of the varied inputs into the process. Furthermore, testing of the final VEF product fuel helps ensure that it meets both VEXOR's specifications and the contaminant legitimacy criteria.

B. 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 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.

1. *Managed as a Valuable Commodity*

Regarding the first criterion, your letter states that the VEF product fuel is managed as a valuable commodity by both VEXOR Technology and by the end user. In general, you state that "VEF is a commodity, purchased as a fuel for use as a fuel in a manufacturing process." You also provided specific details. Specifically, VEF product fuel is stored at VEXOR Technology's processing site in covered storage areas, until the amount accumulated is sufficient for a week of burn time when delivered to the customer. Customers purchase VEF product fuel as a supplement to coal and typically have a working storage capacity of 3-7 days of burn time. Your letter also states that the storage time is shorter than for traditional coal pile storage at a combustion unit, where coal is said to be stored on-site for months prior to use. The use of the VEF product fuel requires additional capital and equipment for the combustor to properly store in a covered area, convey, and burn the VEF product fuel. Covered storage prevents releases to the environment and helps ensure the fuel stays dry and continues to meet product specifications.

Based on this information, we agree that the VEF product fuel is "managed as a valuable commodity," per 40 CFR 241.3(d)(1)(i)(A) and as discussed in the NHSM final rule.[7] Please note that the facilities receiving the material must also manage it as a valuable commodity for the material to remain a non-waste fuel when combusted.

[7] In the NHSM final rule (76 FR 15520) ''reasonable time frame'' is not specifically defined as such time frames vary among the large number of non-hazardous secondary materials and industry involved.

2. Meaningful Heating Value and Used as a Fuel to Recover Energy

Regarding the second legitimacy criterion, you state that the heating value for the VEF product fuel ranges an as-fired heating value between 6,000 and 13,000 Btu/pound. The specification of heating value is modified for each customer based on the product fuel being produced. As an example, you indicated that VEF product fuel destined for the hot zone of a lime kiln would be engineered to have a heating value of roughly 10,000 Btu/lb, whereas VEF product fuel destined for a pre-calciner cement kiln could be engineered to have a heating value as low as 6,000 Btu/lb. As the Agency stated in the preamble to the NHSM final rule, NHSMs with an energy value greater than 5,000 Btu/lb, as fired, is considered to have a meaningful heating value (see 76 FR 15541, March 21, 2011). Thus, since the VEF product fuel has a heating value greater than the 5,000 Btu/lb, the VEF product fuel meets the second legitimacy criterion.

3. Comparability of Contaminant Levels

Regarding the third legitimacy criterion, we have prepared the enclosed table "Comparison of VEXOR Engineered Fuel® to Coal" to compare the specifications and analytical data you submitted for your VEF product fuel to data for coal from our "Contaminant Concentrations in Traditional Fuels: Tables for Comparison" document.[8] For all contaminants, VEF specifications are within the range of contaminant levels found in coal. Additionally, the tests provided demonstrate that the VEF product fuel can be produced within the VEF product fuel specifications. Accordingly, VEF meets the contaminant legitimacy criterion when compared to coal (we understand that VEF is designed as a replacement to coal and would be sold to units that are also designed to burn coal).

This conclusion assumes that the product was tested for any contaminant that would be expected to be present. Additional contaminants for which VEF product fuel was not tested must, as is the case for those tested, be present at levels comparable to or lower than those in coal, based on your knowledge of the material. Since VEXOR Technology plans to use different mixes of approved components to meet customer product specifications for different fuel products, our determination is contingent upon VEXOR Technology's plan to continue to meet the contaminant specifications listed in the enclosed chart "Comparison of VEXOR Engineered Fuel® to Coal." The analysis comparing product specifications to traditional fuel contaminant levels demonstrates that the VEF product fuel can be produced within those specifications.

---

[8] *Contaminant Concentrations in Traditional Fuels: Tables for Comparison, November 29, 2011* can be found at www.epa.gov/epawaste/nonhaz/define/index.htm.

C. Conclusion

Overall, based on the information provided, we believe that VEXOR Technology's VEF product fuel, as described in your letter and supporting statement, meets both the processing definition and the legitimacy criteria outlined above. Accordingly, we would consider this material a non-waste fuel.

If you have any other questions, please contact Tab Tesnau of my staff at 703-605-0636.

Sincerely,

Betsy Devlin

Betsy Devlin, Director
Materials Recovery and Waste Management Division

Enclosure

Enclosure

Comparison of VEXOR Engineered Fuel® to Coal

Contaminant	Units[a]	VEXOR Engineered Fuel® (VEF) Specifications[b] (and test results for Mn and Se)	Coal[c]	Result of Comparison to Specifications and to Analytical Test Results
Metal elements - Dry basis				
Antimony (Sb)	ppm	< 6.8	ND - 10	Within the range of coal
Arsenic (As)	ppm	< 5	ND - 174	Within the range of coal
Beryllium (Be)	ppm	< 5	ND - 206	Within the range of coal
Cadmium (Cd)	ppm	< 2	ND - 19	Within the range of coal
Chromium (Cr)	ppm	< 20	ND - 168	Within the range of coal
Cobalt (Co)	ppm	< 20	ND - 30	Within the range of coal
Lead (Pb)	ppm	< 25	ND - 148	Within the range of coal
Manganese (Mn)	ppm	Test Result 1.01-17.13[e]	ND - 512	Tests results are within the range of coal
Mercury (Hg)	ppm	< 2	ND - 3.1	Within the range of coal
Nickel (Ni)	ppm	< 100	ND - 730	Within the range of coal
Selenium (Se)	ppm	Test Result 0.00-2.67[e]	ND - 74.3	Tests results are within the range of coal
Non-metal elements - dry basis				
Chlorine (Cl)	ppm	< 5,000 (0.5%)	ND - 9,080	Within the range of coal
Fluorine (F)[d]	ppm	0	ND - 178	Within the range of coal
Nitrogen (N)	ppm	< 35,000 (3.5%)	13,600 - 54,000	Within the range of coal
Sulfur (S)	ppm	< 10,000 (1.0%)	740 - 61,300	Within the range of coal

Notes:

[a] All contaminant analyses—VEF and coal—are on a dry weight basis.

[b] Contaminant data sent from Vexor Technology 3-4-13.

[c] Coal data taken from EPA document *Contaminant Concentrations in Traditional Fuels: Tables for Comparison, November 29, 2011*, available at www.epa.gov/epawaste/nonhaz/define/index.htm. Refer to that document for the footnotes and sources of the data.

[d] The specification value for fluorine is listed as "0."

[f] Specifications for Manganese and Selenium were not provided, but the levels in test results provided were well within the range in coal.