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

DEC 09 2013

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

Pietro Cella Mazzariol
Principal Officer
Entsorga WV LLC.
1979 Eastwood Rd.
Wilmington, NC 28403

Dear Mr. Cella Mazzariol:

In your letter of June 23, 2011, you requested clarification from the U.S. Environmental Protection Agency (EPA) that your engineered fuel, called Solid Refuse Fuel (SRF), is a non-waste fuel product under the Non-Hazardous Secondary Materials (NHSM) rule. You provided supplemental information regarding your process and quality assurance measures, as well as contaminant information. In your letters and supplemental information, you provided information regarding your position that SRF meets the legitimacy criteria (per 40 CFR 241.3(b)(4)) and, thus, should be considered a non-waste fuel.

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). Units that combust NHSM as fuels and do not meet these requirements must meet the applicable emissions standards issued under section 129 of the Clean Air Act (CAA).

Based on the information provided in your June 23, 2011, letter and supplemental materials[1], we believe that SRF would be considered a non-waste fuel under the 40 CFR part 241 regulations when combusted in cement kilns at a maximum 30% of the total fuel,[2] provided the specifications identified in your request are maintained. These specifications include, but are not limited to, the moisture and ash content remain at 15% or less, the chlorine remains less than 0.3%, the sulfur content remains at or above a 1:1 stoichiometric ratio with chlorine, determined by daily composite sampling.[3] The remainder of this letter provides the basis for our position, including the reasons for these conditions.[4] *If there is a discrepancy in the information provided to the Agency, it could result in a different conclusion.*

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[1] Letter from Pietro Cello Mazzariol to Jim Berlow, 7/29/2011; Emails from Jonathan Birdsong to EPA staff 12/7/2012, 2/13/2013, 2/19/2013, 3/8/2013, 3/15/2013, 8/2/2013, 10/9/2013, 11/14/2013, 11/24/2013; Email from Jonathan Birdsong to Barnes Johnson, 10/28/2013; Enstorga meetings with EPA staff 10/23/2012, 11/5/2013.

[2] In your letter and supplemental information, you indicated that your current plans are to use SRF at the Esssroc Cement Corporation (Essroc) cement plant located in Martinsburg, West Virginia. This letter, however, will address the use of SRF at any cement plant provided the specifications in the letter are met.

[3] The SRF produced is placed into a container which is then sent to Essroc. Each container received is sampled and analyzed to ensure that it meets specifications prior to use in the cement kiln system. If the specifications are not met, Entsorga will either re-process the SRF or send it to a landfill.

[4] Note that 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

Background Information on SRF

Entsorga has designed, constructed and currently operates four full-scale facilities across Europe that produce SRF, an engineered fuel produced from the processing of mixed municipal solid waste (MSW).[5] Based upon its experience overseas, Entsorga proposes to construct and operate a SRF manufacturing facility (or facility) in Martinsburg, WV. The facility is intended to provide the SRF to Essroc's cement plant to supplement the use of traditional fuels, which includes bituminous coal and petroleum coke, in their cement kiln system.[6]

According to the information provided, SRF can be engineered to meet the specific needs of the final user including heating value and homogeneity. Specifically, the information provided describes the product specifications for SRF as follows:[7]

- Fuel product consists of a homogenous organic material free from: ferrous and non-ferrous metals, PVC plastic, and fines and heavies generated from the undersize organic fraction and inerts.
- Fuel/heat content of the fuel product (as received – includes total moisture) to be equal to or greater than 5,256 Btu/lb, verified by the SFR quality management system and continuous process controls throughout the production process.
- Fuel product is produced as fluff which is sized via secondary shredder in the mechanical refinement process to customer specifications for both the kiln's precalciner (100mmx100mmx10mm) and main burner (10mmx10mmx10mm).
- Fuel product will offset use of traditional fuels by up to 30%.
- Fuel product moisture and ash content will not be more than 15%.
- Fuel product chlorine content will not be more than .3%.
- Fuel product sulfur content will not be more than 6%.
- Fuel product mercury content will not be more than 3 ppm.
- Additional contaminant specifications provided and discussed below.

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

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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.

[5] In the supplemental information, you indicated that you are limiting the request to residential MSW, and that if Entsorga decides to also process commercial and industrial (C&I) waste in the future, that you would conduct an additional assessment.

[6] Entsorga has completed negotiations with the cement company to use the SRF as a supplemental fuel for their kiln.

[7] Steps to meet product specifications are described in the section on processing below.

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 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.

As described in your letter, the SRF production process entails the use of a sophisticated Mechanical Biological Treatment (MBT) process followed by mechanical refinement, including screens, air classifiers, magnetic and eddy current separators, a Near Infra Red (NIR) system, and additional shredding to remove contaminants, recover the valuable fuel feedstock and improve the physical and combustion attributes of the material such that it meets the unique customer specifications.

Specifically, the process begins when the incoming residential MSW is discharged from the collection vehicles into a dedicated reception pit through quick opening roller shutter doors.[8] A visual inspection is conducted of the mixed MSW so that any oversized, bulky or hazardous items, as well as diverse valuable wastes, can be removed via overhead crane prior to any mechanical pre-treatment. The remaining materials are then subjected to the following processing steps:

- The materials are moved by an automatically controlled bridge crane to the hopper of a mechanical bag-breaking and screening device—a fast rotary drum. This low energy consumption system removes up to 20% of the biologically inactive oversize material prior to the primary shredder, thus avoiding damage from large metal objects and allowing for more effective sorting post bio-oxidation.

- Two material streams are generated from the rotary drum based on size, an oversize or "overscreen" fraction and an undersize or "underscreen" fraction. The overscreen, which is typically between 10% and 20% of incoming waste, is transported via conveyor to a primary shredder (reduces material to <350 mm) and then to the refining section to be used in the production of SRF.[9] The underscreen material is conveyed to the pit of the bio-oxidation hall for stabilization and drying of the feedstock.

- The underscreen material is arranged into piles on specially designed, prefabricated concrete flooring of the bio-oxidation hall. The flooring contains rows of slots which allow for processed air (may be preheated to start bio-oxidation on cold days) to be drawn or blown into individual batches of material, which enables control over the moisture content and bio-degredation process (via moisture evaluation software) to produce a homogenous material customized to the final user specifications.[10]

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[8] All treatment/processing phases occur in enclosed buildings. Depending upon the process area, the buildings are equipped with biofilters, a baghouse, and/or leachate collection systems.

[9] Overscreen material consists of non-recyclable plastic films, logs, wood, cardboard, textiles and carpets. Removal of this material improves the efficiency and capacity of the bio-oxidation process for the organic underscreen material.

[10] Entsorga's Hebiot™ biological treatment system allows for air to be blown in or drawn out, producing a reverse-flow bioreactor, considered unique in the industry. The Hebiot™ system achieves a uniform moisture and organic carbon gradient through the cross-section of the material in comparison to other MBT technologies.

- The bio-stabilized underscreen material is then transferred, via crane, to the refinement section where it is mixed with the shredded overscreen material. The combined material then enters the secondary screening trammel which serves to remove fines--materials less than 20-50 mm in size—that will be sent to a landfill.

- The material is conveyed to a drum/air separator that mechanically separates the material by weight density into two streams: low/light and high/heavy. The low density stream contains mainly plastic, paper, card and organics, which is the source of the high quality SRF. The high density stream generates SRF or waste depending upon the SRF specification. This step can be calibrated by fine tuning the equipment efficiency in order to obtain the SRF under the required specification.

- Both the heavy and light material streams undergo iron and other iron-bearing metals removal with a separation efficiency of greater than 95%. The removal is carried out by permanent magnetic separators, which, depending on the need, can be arranged transversely or longitudinally above the conveyors. The heavy material is moved by conveyor under a high efficiency magnetic separator to remove ferrous metals which are collected for recycling, with any remaining heavy inerts to be sent to a landfill. The light material, which is primarily the organic fraction of the processed material, is also moved by conveyor under a high efficiency magnetic separator, leaving only plastics and non-ferrous metal content.

- The remaining material is conveyed to the NIR system for PVC plastic removal. The NIR separator is an optical sorting machine that uses high-precision particle detection sensors, which identify the objects at the correct positions, and once identified, precise ejection pulses from compressed air nozzles blow the recognized objects out of the material stream.

- After PVC removal, the material is sized via a secondary shredder according to final user specifications and then conveyed through an eddy current separator for non-ferrous metal removal with a separation efficiency greater than 95%.

- The final SRF is in the form of fluff, which is the preferred form since it is easily fed to dedicated burners by pneumatic conveying systems.[11]

Based on this description, we believe your operations meet the definition of processing in 40 CFR 241.2 and will transform the residential mixed MSW into a processed, non-waste fuel by significantly improving the fuel characteristics and removing contaminants. The Hebiot™ MBT system, that blows and draws processed air into the waste to control the natural aerobic fermentation process and promotes faster and uniform drying, combined with metals removal and the NIR system to remove unwanted PVC plastics, is clearly more than the "minimal operations" described in the Part 241 processing definition.

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

[11] The SRF can be pelletized if desired.

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

The SRF product fuel will be stored indoors and shipped to the customer via truck. The purchasing customer, Essroc, will store SRF in a dedicated indoor area within the existing Coal Storage Hall. Due to the fibrous consistency of SRF, as well as fire safety, you indicate that storage will be limited to 7 days or less. You indicate that because of the properties of SRF, it can be stored in a storage pile or bin similar to coal and petroleum coke. Also, since SRF will be stored indoors, there will be little to no storm water runoff and no fugitive emissions resulting from wind erosion. In addition, the truck loading and unloading areas at both the manufacturing plant and cement plant will be equipped with air pollution control devices to capture fugitive emissions. The SRF product fuel will be sold as an engineered fuel via a commercial contract agreement between Entsorga and Essroc.

Based on this information, we agree that SRF will be managed as a valuable commodity by Entsorga after it is produced, and we agree that storage—before and after delivery to the Essroc Plant—will also be managed as a valuable commodity and that such storage 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 SRF can be engineered to meet a wide range of heating values depending upon the design of the combustion unit. For this project, you provided the net calorific value specification for SRF as required by Essroc, which is a minimum of 12 GJ/T or 5,256 Btu/lb as received (at a maximum moisture content of 25%).[12]

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—different than moisture free—are considered to have a meaningful heating value.[13] According to the revised specification requirement to maintain a maximum moisture level of 15%, it is expected that the minimum as-fired heating value will be greater than 12GJ/T or 5,256 Btu/lb for the SRF. In addition, since the SRF product fuel will be replacing bituminous coal or petroleum coke used by Essroc by as much as 30 percent, it is being burned in a combustion unit that recovers energy. Thus, we believe that SRF meets the meaningful heating value criterion.

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[12] In your initial request, you indicated that the specifications for the SRF required by Essroc is that it have a maximum moisture content of 25 percent, resulting in an as-fired heating value of 12 GJ/T or 5,256 Btu/lb. However, Entsorga has subsequently determined that a maximum moisture content of 15 percent can be maintained, and therefore, is the revised specification for SRF. A reduction in moisture content will result in a higher as-fired heating value than originally submitted.

[13] See 76 FR 15541, March 21, 2011. Also see 76 FR 15482: "Except as otherwise noted, to satisfy the meaningful heating value criterion, the non-hazardous secondary material must have at least 5,000 Btu/lb, as fired (accounting for moisture), since the as-fired energy content is the relevant parameter that must be assessed to determine if it is being discarded rather than used as a fuel for energy recovery."

Comparability of Contaminant Levels

Regarding the third legitimacy criterion, you indicated that SRF is a precisely engineered material and, thus, its contaminant levels do not vary appreciably within a single batch or across multiple batches produced on different dates. Overall, you have indicated in the supplemental information provided to the Agency that the operations employed to manufacture SRF ensure a homogenous product. This is further evidenced by the sampling data you provided for SRF produced at an existing plant in Europe.[14] Thus, you would expect the contaminant comparison to be representative of all SRF produced for Essroc, regardless of when it is manufactured.

A direct contaminant-to-contaminant comparison utilizing the data you provided taken during May 2011 and October and November 2012, at your Celje, Slovenia plant is attached in Tables 1A and 1B, respectively.[15] Based on this contaminant-to-contaminant comparison, we have concluded that all contaminants in SRF are comparable to or lower than those contaminants in coal. Further, because the SRF to be produced for Essroc will be of higher quality (i.e., fewer contaminants due to exclusion of C&I waste, as well as additional processing steps to remove plastics) than the Celje plant, the contaminants are expected to be even lower than the levels presented in the attached table.[16, 17]

The conclusion that SRF meets the contaminant legitimacy criterion for units designed to burn bituminous coal and petroleum coke assumes that SRF was tested for any contaminant expected to be present. Additional contaminants for which SRF 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 SRF, as described in your letter and supplemental information, meets both the processing definition and the legitimacy criteria outlined above provided the specifications in your request are maintained, including, but not limited to, the moisture and ash content are maintained at 15% or less, the chlorine remains less than 0.3% and the sulfur content remains at or above a 1:1 stoichiometric ratio with chlorine, determined by daily composite sampling. Since our assessment is based on information you provided showing that SRF meets certain

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[14] Although this data was not used in the contaminant comparison (since it is not entirely representative of the SRF that will be produced for Essroc), it does demonstrate that there is little variability over a period of time.

[15] Data from 2011 and 2012 are included to show that the differences (i.e., higher contaminant concentrations in 2012) are specific to how the plant was calibrated for individual customer specifications.

[16] As noted previously, Entsorga has indicated that C&I waste may be utilized in the production of SRF for Essroc in the future. At such time, Entsorga has indicated they would conduct further assessments to determine if the contaminants continue to be comparable to those in coal.

[17] In your submission of December 7, 2012, you stated that antimony concentration in SRF (shown in Table 1B) can be occasionally slightly higher than coal, but is below the acceptance limit imposed by the cement manufacturer to ensure complete compliance with burner emission limits. In comparing contaminant levels to the traditional fuel for the purposes of meeting legitimacy criteria, comparisons must be made to the product material itself and not to burner acceptance criteria or emission limits. EPA previously stated that the upper prediction limit (UPL) at a 90% confidence level for each contaminant or group of contaminants in NHSMs to the maximum value in the traditional fuel can be an appropriate approach for contaminant comparison (78 FR 9153). Based on the analytical data supplied by Entsorga, the 90% UPL (i.e., the anticipated maximum value for a future observation) for antimony is approximately 8.8 ppm, which is within the reported literature range for coal as shown in Table 1B.

specifications/conditions, our decision is based on the maintenance of the specifications/conditions in the SRF product. These specifications/conditions ensure that the fuel will not contain waste materials for combustion, including 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 cement kilns at a maximum 30% of the total fuel,

If you have any other questions regarding the applicability of Clean Air Act emission standards to SRF, please contact David Cozzie at (919) 541-5356. For questions regarding processing and legitimacy criteria, please contact Sasha Gerhard of my staff at (703) 347-8964.

Sincerely,

Barnes Johnson, Director
Office of Resource Conservation and Recovery

Enclosure

cc: Peter Tsirigotis
EPA Office of Air Quality Planning and Standards

John Armstead
EPA Region III, Land and Chemicals Division

Alan Farmer
EPA Region IV, RCRA Division

Enclosure

Table 1A: Contaminant-by-Contaminant Comparison (2011)

Contaminant	Units	SRF[1]	Coal: Range[2]	Results of Comparison
Metal Elements - dry basis				
Antimony (Sb)	ppm	0.21	ND - 10	Lower than coal
Arsenic (As)	ppm	0.11	ND - 174	Lower than coal
Beryllium (Be)	ppm	0.36	ND - 206	Lower than coal
Cadmium (Cd)	ppm	0.23	ND - 19	Lower than coal
Chromium (Cr)	ppm	50.61	ND - 168	Lower than coal
Cobalt (Co)	ppm	2.01	ND - 25.2	Lower than coal
Lead (Pb)	ppm	28.35	ND - 148	Lower than coal
Manganese (Mn)	ppm	11.61	ND - 512	Lower than coal
Mercury (Hg)	ppm	1.51	ND - 3.1	Lower than coal
Nickel (Ni)	ppm	4.70	ND - 730	Lower than coal
Selenium (Se)	ppm	1.82	ND - 74.3	Lower than coal
Non-metal Elements - dry basis				
Chlorine (Cl)	ppm	1807	ND - 9080	Lower than coal
Fluorine (F)	ppm	41.00	ND - 178	Lower than coal
Nitrogen (N)	ppm	7300	13600 - 54000	Lower than coal
Sulfur (S)	ppm	1800	740 - 61300	Lower than coal
Volatile Organic Compounds				
Benzene	ppm	<0.02	ND-38[3]	Lower than coal
Toluene	ppm	<0.02	8.6-56[3]	Lower than coal

Notes:

1. SRF value represents one sample analyzed during May 2011.
2. Range for Coal is 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 www.epa.gov/epawaste/nonhaz/define/index.htm.
3. Fernandez-Martinez (2000).

Table 1B: Contaminant-by-Contaminant Comparison (2012)

Contaminant	Units	SRF Average ± Std Dev[1]	Coal: Range[2]	Results of Comparison
Metal Elements - dry basis				
Antimony (Sb)[3]	ppm	5.81 ± 2.00	ND - 10	Lower than coal
Arsenic (As)	ppm	1.36 ± 0.28	ND - 174	Lower than coal
Beryllium (Be)	ppm	<1.0	ND - 206	Lower than coal
Cadmium (Cd)	ppm	.70	ND - 19	Lower than coal
Chromium (Cr)	ppm	56.19 ± 28.08	ND - 168	Lower than coal
Cobalt (Co)	ppm	1.53 ± 0.44	ND - 25.2	Lower than coal
Lead (Pb)	ppm	27.41 ± 17.20	ND - 148	Lower than coal
Manganese (Mn)	ppm	137.21 ± 34.09	ND - 512	Lower than coal
Mercury (Hg)	ppm	0.37 ± 0.09	ND - 3.1	Lower than coal
Nickel (Ni)	ppm	14.18 ± 5.50	ND - 730	Lower than coal
Selenium (Se)	ppm	<2.1	ND - 74.3	Lower than coal
Non-metal Elements - dry basis				
Chlorine (Cl)	ppm	3750 ± 2232.87	ND - 9080	Lower than coal
Fluorine (F)	ppm	62.50 ± 15.81	ND - 178	Lower than coal
Nitrogen (N)	ppm	10212.50 ± 3110.09	13600 - 54000	Lower than coal
Sulfur (S)	ppm	1382.75 ± 502.18	740 - 61300	Lower than coal
Volatile Organic Compounds				
Benzene	ppm	Not sampled	ND-38[4]	Lower than coal
Toluene	ppm	Not sampled	8.6-56[4]	Lower than coal

Notes:

1. SRF value represents the average of eight samples analyzed October and November 2012.
2. Range for Coal is 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 www.epa.gov/epawaste/nonhaz/define/index.htm.
3. See footnote 16.
4. Fernandez-Martinez (2000).