UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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CHICAGO, IL 60604-3590

Technical Review Document on FibroMinn's Petition[1] for a Non-Waste Determination Pursuant to 40 C.F.R. § 241.3(c)

Requirements under the Regulation

Under 40 C.F.R. § 241.3(c), EPA's Regional Administrator is authorized to grant a non-waste determination for a non-hazardous secondary material (NHSM) that has been managed outside of the control of the generator, provided that the applicant demonstrates and EPA finds that the NHSM meets the criteria as follows:

- It has not been discarded in the first instance;
- It meets the three legitimacy criteria set forth in 40 C.F.R. § 241.3(d), as follows:
  - the NHSM is managed as a valuable commodity;
  - the NHSM has a meaningful heating value and used as a fuel in a combustion unit that recovers energy and;
  - the NHSM must contain contaminants at levels comparable to traditional fuels.

- It meets the five factors identified in the rule as follows:
  - market participants treat NHSM as a product, not a waste;
  - chemical and physical identity of the NHSM is comparable to commercial fuels;
  - the NHSM is used in a reasonable timeframe;
  - whether the constituents in the NHSM that are released to air, water and land from point of generation up until combustion, are at levels comparable to traditional fuels and;
  - it meets other relevant factors.

Procedures under the Regulation

Once EPA has evaluated the application to determine if the material has been discarded in the first instance, as well as evaluated the legitimacy criteria and other factors specified by the regulation, EPA will engage in the following actions:

- Issue a draft notice tentatively granting or denying the application. Notification of the tentative decision will be published in a newspaper advertisement or a radio broadcast in the locality where the facility combusting the NHSM is located and be made available on EPA's Web site;
- Accept public comment for 30 days;
- May hold a public meeting upon request or at EPA's discretion and;
- Issue a final decision after receipt of comments and after a hearing (if any).

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[1] The terms petition and application are both used in 40 C.F.R. § 241.3 to indicate the document that is submitted to EPA by an entity seeking EPA's non-waste determination for NHSM that is combusted. The term application will be used from this point forward in this document.

Background

In a letter dated July 1, 2013, Mr. Shiv Srinivasan, manager of the FibroMinn BioMass Power Plant (Plant), submitted an application requesting that EPA make a determination, pursuant to 40 C.F.R. § 241.3(c)(3), that the poultry litter[2] received from poultry farmers under contract and burned as fuel at its Plant is not a solid waste. The poultry farmers or "growers" are the *generators* of the poultry litter for the purposes of FibroMinn's non-waste determination application. FibroMinn submitted additional information in support of its position in correspondence dated January 10, 2014, April 8, 2014, May 5, 2014, January 21, 2015, February 25, 2015 and April 2 and 17, 2015. EPA reviewed all of FibroMinn's information per the requirements of the Rule as set forth above. EPA's evaluation of FibroMinn's information is presented below.

Review

To demonstrate that a NHSM that is to be burned as a fuel has not been discarded in the first instance, the petitioner needs to show that it was not initially abandoned or thrown away by the generator of the non-hazardous secondary material. This threshold requirement is addressed in **Section 1** below.

In order to be considered a non-waste fuel, the petitioner must also demonstrate that the NHSM satisfies the legitimacy criteria in § 241.3(d)(1) and the five factors in § 241.3(c). A more in-depth analysis of the legitimacy criteria and five factors is found in **Sections 2a and 2b** below.

Section 1: Discarded in the first instance

In order to obtain a non-waste determination from EPA, FibroMinn must demonstrate, as a threshold matter, that the NHSM, poultry litter (litter) that it burns in its combustion units, has not been discarded in the first instance as that term is contemplated by the Resource Conversation and Recovery Act, 42 U.S.C. §§ 6901 to 6992k, (RCRA). Such demonstration is based upon and consistent with the primary case law that uses the ordinary, plain-English meaning of the term, "discard" for purposes of defining a solid waste. 76 Fed. Reg. 15456, 15463 (2011). See also American Mining Congress v. EPA, 824 F.2d 1177 (DC Cir. 1987), and Safe Food and Fertilizer v. EPA, 350 F.3d 1263, 1268 (DC Cir. 2003) (court rejected argument that material that is transferred to another firm or industry for subsequent recycling must always be solid waste and noted that EPA has the discretion to determine if the material is not a solid waste, even if it is transferred between industries). EPA further specified in the Preamble that "[t]o demonstrate that the non-hazardous secondary material that is to be burned as a fuel has not been *discarded in the first instance*, the petitioner would need to demonstrate that it was not

[2] Poultry litter is the term used to describe the bedding material and the poultry manure that is cleared from the barn between growing cycles. FibroMinn has provided expert opinion that the manure consists of digested grains, dietary grit, calcium, phosphorous, nutrients and salt. The bedding material that is used are materials that have been included in the definition of clean cellulosic biomass at 40 C.F.R §241.2.

initially abandoned or thrown away by the generator of the non-hazardous secondary material." 76 Fed. Reg. 15456, 15538 (2011). (Emphasis added).

It is FibroMinn's position that the manner in which it directs essential components of the growers' production of the poultry litter through long-term contract specifications for the growers, as well as the manner in which it harvests, transports, and manages the poultry litter that it uses as fuel for the boiler at its Plant, demonstrates that the litter has not been initially disposed of, abandoned or thrown away and therefore it has not been *discarded in the first instance*. FibroMinn's application indicates that its contracts with poultry growers require them to meet specifications to ensure that the poultry litter produced and provided to FibroMinn is of high quality, provides optimal fuel value and is consistent; these are characteristics of a valuable fuel product.

The Company explained in its May 5, 2014 and April 2, 2015 submittals that its long-term contracts for poultry litter average ten years in duration and constitute seventy-five percent of the fuel supply with the remaining twenty-five percent of the fuel being procured through short "spot" purchases. Some of the contract terms that FibroMinn requires growers to meet to ensure that the litter has adequate fuel quality and is low in contaminants is as follows:

- Contracted growers must use good animal husbandry practices in rearing the birds to enhance the quality of the poultry litter, including, but not limited to:
    - Using feed ingredients that are composed of grains and nutrients, as suggested by the turkey nutrition experts[3], to ensure that contaminants are not present in the poultry litter at levels above traditional fuels.
    - Using heating and ventilation systems in the barns where the poultry are kept, which are continuously operated and monitored. This reduces the moisture content of the litter, which improves the fuel value.
- Limited amounts of layer bird litter are accepted, and no spot layer litter purchases are allowed that do not meet the fuel specifications. Layer bird litter is from egg-laying chickens and can have higher moisture levels than non-egg-laying chickens. The layer litter purchases will require an additional inspection, by the fuel hall manger, to ensure that the litter has acceptable moisture content and no contaminants, and thus, is acceptable for burning as fuel.
- Contracted growers can only use wood shavings for bedding material or seek permission from FibroMinn for other bedding materials. FibroMinn clarified in its April 2, 2015 supplemental information, that wood shavings are the predominant type of bedding material used, but that it gave the growers permission to use sun flower hulls as bedding and ground wheat straw on a seasonal basis. This requirement that limits the type of bedding used in the poultry litter helps to ensure that the growers use only locally grown cellulosic biomass and do not use other types of bedding material that would diminish the value of the litter as a fuel.
- Contracted growers may not add any plastics, metals or water to the litter. This helps to control the moisture content and contamination level for the litter.

[3] Expert opinion was provided to FibroMinn from Dale Lauer, DVM, Poultry Program Director, Minnesota Board of Animal Health, in a March 31, 2014 letter that FibroMinn submitted to EPA on April 8, 2014.

- Contracted growers inspect and maintain the floor of the barns to ensure that the litter will maintain the fuel specifications in the contract.

FibroMinn also sets limits on maximum moisture and ash content for the contracted litter and regularly samples and checks the litter supplied by the growers for compliance with the contract specifications.

The poultry litter generated by contracted growers is removed from the grower's barn immediately following the completion of the two- to three-month poultry growing cycle. The litter is in use up to the time it is harvested under the contract by FibroMinn. The litter is transferred directly from the grower's barn into a covered truck and delivered to FibroMinn's Plant on the same day. FibroMinn stressed it does not accept any litter that has been abandoned by a grower or held in long-term outdoor storage piles.

The manner in which FibroMinn directs essential components of the growers production of the poultry litter, through long term contracts with them for FibroMinn's purchase of the poultry litter in the future, as well as the manner in which it harvests and transports the material to its facility and manages the poultry litter at its facility, demonstrates that the litter has been treated as a valuable fuel that has not been initially disposed of, abandoned or thrown away. Therefore, FibroMinn has established that the poultry litter, the NHSM that is the subject matter of this non-waste determination, has not been *discarded in the first instance.*

Section 2a: Legitimacy Criteria

Meeting of the legitimacy criteria is a way in which EPA determines that the NHSM is truly a product fuel that is not discarded when combusted, and, thus, is not a solid waste. In general, when the NHSM is handled as a valuable commodity rather than as a non-valued waste, has significant fuel value and does not have contaminants that exceed those in traditional fuels, it suggests that the NHSM is a fuel product that is not a solid waste. In contrast, if the NHSM has low energy value and/or is highly-contaminated, EPA could conclude the material is not being legitimately burned for energy recovery, but rather, is being burned for purposes of disposal or discard. Such NHSM would be considered a solid waste.

In order to be considered a non-waste fuel, the poultry litter that FibroMinn burns as a fuel in its combustion units must meet the three legitimacy criteria under 40 C.F.R. § 241.3(d)(1) as follows:

1. the NHSM must be managed as a valuable commodity:
    a. the storage of the NHSM prior to use must not exceed reasonable time-frames
    b. the NHSM must be managed in a manner consistent with an analogous fuel
    c. if there is no analogous fuel, the NHSM must be adequately contained to prevent releases to the environment;
2. the NHSM must have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy; and
3. the NHSM must contain contaminants at levels comparable to or less than those in traditional fuels which the combustion unit is designed to burn.

Material Managed as a Valuable Commodity

In FibroMinn's correspondence, it detailed the Company's business practices with the growers to support its position that the poultry litter it combusts in its boiler is managed as a valuable commodity and thus, meets the first legitimacy criterion. As described above, FibroMinn's contract terms require that the growers supply poultry litter that meets specifications to ensure that the litter has adequate fuel quality and is low in contaminants. FibroMinn regularly samples and inspects the litter supplied under long-term contracts and spot purchases by growers for compliance with the contract specifications.

FibroMinn pays for the poultry litter that it procures as a fuel, similar to procurement of a traditional biomass fuel, such as woodchips. Further, FibroMinn has economic incentive language in its contracts with growers for delivery of litter that is lower in moisture content (i.e., higher in fuel value). Full price is paid if the moisture content is below twenty-five percent, and a sliding scale is applied for loads up to fifty percent moisture. Litter with a moisture content measuring above fifty percent is usually rejected. Special approval from a FibroMinn fuel hall manager is needed for any load of poultry litter that is above fifty percent moisture and is only allowed on a case-by-case basis.

The growers that contract with FibroMinn must provide quality poultry litter that is produced in accordance with the contractual specifications. Once the poultry growing cycle has been completed, the litter is removed (either by FibroMinn or the grower), loaded into trucks, and transported on the same day to FibroMinn. The trucks are always covered, and off-loaded in FibroMinn's enclosed fuel hall to prevent wet weather moisture from entering the litter. Each truck carries litter from only one grower's farm; litter from more than one farm is not mixed in the trucks. Once inside the Plant, samples are obtained for analysis to verify that the litter meets the contractual specifications. After verification that the litter meets the contract specifications, the litter, during normal operations, is burned as fuel within three days of its delivery to the FibroMinn Plant.

FibroMinn's use of covered trucks for transporting the poultry litter and placement in the enclosed fuel hall at the Plant (which is maintained under negative air pressure prior to combustion) contains the litter to prevent releases to the environment.

Based on the information discussed above, EPA finds that FibroMinn manages its poultry litter as a valuable commodity, and does not exceed a "reasonable time frame" in storing its litter, as required by the NHSM final rule (40 C.F.R. § 241.3(d)(1)(i)(A)).[4] Further, EPA finds that the growers that contract with FibroMinn, to provide it with poultry litter for combustion in the Company's boiler, also manage the litter as a valuable commodity.

[4] The NHSM final rule does not define *reasonable time frame* as such a time frame can vary among the large number of non-hazardous secondary materials and industries involved. See 76 FR 15520 (March 21, 2011).

Meaningful Heating Value and Use as a Fuel to Recover Energy

The second legitimacy criterion under the regulation is that the NHSM must have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy. In the Preamble to the NHSM rule, dated February 7, 2013, EPA stated a heating value benchmark of 5,000 Btu/lb as fired (which includes moisture) to define a meaningful heating value. *See* 78 FR 9172 (February 7, 2013). If heating values are lower than 5,000 Btu/lb as fired, however, the petitioner is required to demonstrate to EPA that the energy recovery unit (ERU) can cost-effectively recover meaningful energy from the NHSM used as a fuel. Factors that may be considered by the Agency in determining whether a combustion unit cost-effectively recovers energy from NHSMs include, but are not limited to, whether the facility obtains a cost savings due to not having to purchase significant amounts of traditional fuels that it otherwise would need; whether the facility purchases the NHSM to use as a fuel; whether the NHSM can self-sustain combustion; and/or whether the facility's operation produces energy that is sold for profit. *See* 76 FR 15523 (March 21, 2011).

In its July 1, 2013 application, FibroMinn stated that the "individual" heating values of its poultry litter are between 3,400Btu/lb and 5,000Btu/lb. In supplemental information submitted to the EPA on April 8, 2014, FibroMinn showed that monthly heating value "averages" for the calendar year 2013 were between 3,550 Btu/lb and 4,100 Btu/lb. In the recent (2014) analytical results submitted by FibroMinn, the two heating values for the poultry litter samples, as received, were 3,600 and 4,630 Btu/lb. These values are consistent with the heating value range stated in the original application. Because the poultry litter that FibroMinn uses as a principal fuel has an "as fired" heating value that is equal to or less than the EPA benchmark of 5,000 Btu/lb. FibroMinn has presented documentation to show that its boiler cost-effectively recovers meaningful energy from the poultry litter that is used as a fuel.

FibroMinn's application explained that its Plant is the only large, grid-connected power plant in the U.S. that is specifically designed to burn poultry litter as the principal fuel. It uses a standard spreader-stoker boiler system that has been enhanced to enable the poultry litter to be efficiently burned autogenously (self-supported without supplemental fuels) as the principal fuel. FibroMinn indicated that since startup in 2007, it successfully burned poultry litter as the principal fuel, co-fired with green wood chips as the normal secondary biomass fuel. There is no need to add additional fossil fuel to keep the combustor burning; the only materials that the Plant currently burns are wood chips and the poultry litter.

According to the application and supplemental information provided by FibroMinn, the poultry litter fraction of the fuel versus the portion of wood chips is variable but has been as high as 75% poultry litter. According to FibroMinn, the poultry litter burns autogenously in its stoker boiler when comprising the majority fraction of the fuel mix of litter and wood chips. In addition, FibroMinn's analysis demonstrates that the heating value of its poultry litter, as received, is typically within the range of 3,400 to 5,000 Btu/lb, based on the Company's extensive testing. Green wood chips, a traditional cellulosic biomass fuel, have a heating value that is less than the benchmark of 5,000 Btu/lb. EPA indicates a typical heating value for wood chips, as received at 50% moisture, to be 4,500 Btu/lb. See US EPA, AP-42, Section 1.6.1. FibroMinn notes that while wood chips do not meet the heating value benchmark of 5,000 Btu/lb they are a traditional

type of biomass fuel utilized today for energy recovery and are well-recognized to burn autogenously in stoker boilers with meaningful energy recovery. Poultry litter similarly has a heating value of less of than 5,000 Btu/lb and burns autogenously in a stoker boiler with meaningful energy recovery.[5]

Finally, FibroMinn sells the electric energy that it produces to an electric utility company, Xcel Energy, at a profit. The application included the Company's operation data for the years 2010 through 2012 which showed that when FibroMinn used poultry litter as the principal fuel (~350,000 to 450,000 tons per year), the Company recovered highly reliable, meaningful and cost-effective[6] fuel energy that enabled it to make a profit on the sale of the energy. In addition, while FibroMinn asserts that it is the only large grid-connected power plant in the U.S. which is fueled principally with poultry litter, it has supplied the names of five other power plants in Europe that have successfully generated electricity for sale using poultry litter as the predominant fuel. This further supports the position that burning poultry litter as fuel can yield meaningful energy recovery.[7]

EPA finds that the data provided by FibroMinn, its description of the combustion process and the information on its use of the poultry litter as the principal fuel, demonstrate that FibroMinn's boiler can cost-effectively recover energy and therefore, EPA finds that the poultry litter that burns in its boiler satisfies the second legitimacy criterion under the Rule of being a material with a meaningful heating value that is used as a fuel to recover energy.

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[5] In assessing whether the combustion unit cost-effectively recovers energy from the NHSM, the Preamble to the NHSM rule, FR 76 15523 (March 21, 2011), suggests that EPA consider whether the petitioner encounters a cost savings due to not having to purchase significant amounts of traditional fuels that they otherwise would need. Here, FibroMinn explained in its July 1, 2013 application that it procures about 75% of its poultry litter under long-term contracts and the costs it pays to the growers under such contracts is significantly less than the price it would have to pay to suppliers of green wood chips, the presumptive replacement traditional fuel. Thus, FibroMinn's use of a majority of poultry litter (rather than green wood chips) as the fuel source for the stoker boiler at its Plant, enhances the cost-effectiveness of the meaningful recovery of energy which is important when heating values are lower than the presumptive meaningful heating value benchmark of 5,000 Btu/lb.

[6] FibroMinn stated that the capacity factor of the Plant was between 85 and 91.6% and the availability factor was between 88.1 to 92.3%. The annual capacity percentage is the ratio of the electric energy produced by the Plant in a given year, divided by the electric energy that could have been produced at continuous full power operation during that year. The annual availability percentage is the number of hours in a given year when the Plant was able to produce electric power, divided by the number of hours in the year.

[7] As stated in the FR 76, 15541 (March 21, 2011), "Factors that are important in determining whether an energy recovery unit can cost effectively recover energy from the NHSM include, but are not limited to, whether the facility encounters a cost savings due to not having to purchase significant amounts of traditional fuels they otherwise would need, whether they are purchasing the NHSM to use as a fuel, whether the NHSM they are burning can self-sustain combustion, and whether their operation produces energy that is sold for a profit (e.g. a utility boiler that is dedicated to burning specific type of NHSM that is below 5,000Btu/lb but can show that their operation produces electricity that is sold for a profit)."

Comparability of Contaminant Levels

Regarding the third legitimacy criterion, FibroMinn indicated in its application that its poultry litter contains contaminants or groups of contaminants at levels that are comparable to or lower than those in traditional fuel(s) that the unit is designed to burn, based on data submitted to the Agency. As stated in 40 C.F.R. § 241.3(d)(iii), "in determining which traditional fuel(s) a unit is designed to burn, a person may choose a traditional fuel that can be or is burned in the particular boiler, whether or not the combustion unit is permitted to burn that traditional fuel." FibroMinn presented information that its boiler operates on fuel that is composed of green wood and poultry litter, and in its original application compared the NHSM against several materials that have been used as fuel, including coal, wood, distilled dried grains in soluble solution (DDGS), corn stover and alfalfa. EPA compared more than 100 historical sample results of FibroMinn's analysis of its poultry litter and two recent (2014) sample results against the contaminant values for the traditional fuels and developed the contaminant comparison table (contaminant table) that is attached to this document. *See* Attachment A.

The results in the contaminant table of FibroMinn's new and historic sampling were adjusted to a dry weight basis. On February 25, 2015, FibroMinn submitted the monthly average moisture values for thirty-two months (from June 2012 to January 2015). FibroMinn's long term data on moisture content of its poultry litter indicate an average moisture content of 34.1%. FibroMinn's data from the January 10, April 8 and May 5, 2014 tables were multiplied by 1.52 (100/(100-34.1)) to obtain the parts per million(ppm) dry basis value. This calculation was done to allow the comparison of FibroMinn's results against the EPA values in the wood and coal contaminant tables which are based on an "as fired" dry basis. These changes and calculations are also discussed in the note section of the contaminant table.

In the original application, the Company compared literature values and individual samples of FibroMinn's data. Pursuant to later conversations with EPA, FibroMinn provided new comparison tables that included only FibroMinn data and agreed to perform additional sampling, including semi-volatile (SVOCs) and volatile (VOCs) compounds, to demonstrate that its historical data, from 1999 through 2002, was comparable to the new data. On January 10, April 8 and May 5, 2014 and April 17, 2015, FibroMinn submitted supplemental data and new tables. It is FibroMinn's position that, based on expert opinion,[8] there is no technical basis for expecting either component of the poultry litter (the digested feed or the bedding material) to contain semi-volatile (SVOCs) and volatile (VOCs) compounds at levels exceeding those in traditional fuels and that the historical data is consistent with expert opinion and is representative of current litter-contaminant levels.

The narrative results of the new and historical data, adjusted for moisture content compared to the traditional fuel tables is discussed below. The numerical results can be found in the attached contaminant table.

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[8] In the April 8, 2014 supplement to the application, FibroMinn submitted three letters from third-party experts about the components of the poultry litter and possible contaminants. These experts indicated that the composition of the poultry feed used in Minnesota has not changed significantly since 2000, and as a result, no new or additional contaminants would be added to the litter that is delivered to the FibroMinn plant.

On April 8, 2014, FibroMinn submitted additional test results for levels of SVOC and VOC contaminants along with letters from third party experts to EPA, to ensure that all contaminants regarding its poultry litter were evaluated. The test results showed all forty-nine VOC compounds below detection levels, except for formaldehyde, acetone and methyl ethyl ketone (MEK). Acetone and MEK are compounds not regulated under the NHSM rule. The new test results on eighty two SVOC compounds showed all to be below detection limits, including the sixteen polycyclic aromatic hydrocarbon (PAH) compounds regulated under the traditional coal fuel table. These results were discussed in FibroMinn's April 8, 2014 letter.

EPA's traditional fuel contaminant table for wood includes a literature value range of 1.6-27 ppm for formaldehyde. FibroMinn's two new test results for formaldehyde were, less than 2 ppm and 3 ppm, lower than the upper range of the traditional fuel contaminant table for wood. There are no listed formaldehyde levels for the other biomass (DDGS, alfalfa and stover) fuels. FibroMinn investigated the potential for formaldehyde to be present at elevated levels in the poultry litter, and found that some poultry growers add small amounts of formaldehyde to poultry feed to combat Salmonella disease which suggests that residual formaldehyde may be present in the digested feed portion of the litter and any detection results are expected to be small. This was confirmed by the sampling results.

The historical and new test data results for the metal elements were all lower or comparable to the traditional fuel data, except for Nickel which was not tested. FibroMinn did not include Nickel results in its historical or new test data of its own poultry litter. For this reason, literature values were used for Nickel in the contaminant table. The literature values for Nickel were lower or comparable to traditional fuel data.

FibroMinn's historical and new tests results for the non-metal elements of nitrogen and sulfur are lower than and comparable to traditional fuels. Comparing the historical and new tests results for chlorine and fluorine, EPA found that some of the historical and the new data were above the high range and required further investigation. FibroMinn's February 2014 samples for chlorine were higher than previous average results for FibroMinn's litter. FibroMinn stated in its May 5, 2014 supplement letter that it thought it unlikely that the tested chlorine levels in the litter, from two different growers, would both be above-average and also indicated that the laboratory test that produced the higher-than-average results is less accurate than other laboratory tests which are specifically used to test fuel materials. As a result, FibroMinn had both litter samples reanalyzed by another laboratory that specializes in analyzing fuel materials, using the more accurate test method. The original test method was the E776/9250 Titrimetric Silver Nitrate Method versus the new ASTM D6721 test method used by the second laboratory. The new method allows for the analysis directly on the litter sample itself and enables a more accurate measurement at lower concentrations. The new and more sensitive laboratory tests showed lower chlorine levels present in both of the FibroMinn's litter (unadjusted for moisture content) sample results (2,870 ppm and 4,010 ppm),[9] which were consistent with the average levels

[9] The company testing results included the total moisture levels and calculated dry basis results by using the individual litter sample moisture levels. These adjusted new sampling results (5230ug/g and 7350ug/g) and

historically found in FibroMinn's poultry litter (3,800ppm). These new numerical results for chlorine, were adjusted for moisture levels, and are reflected in the attached contaminant table. The results are lower than the levels found in coal, stover and alfalfa.
As stated above, some of the historical test data reported for chlorine was above the range for all of the traditional fuels. On April 17, 2015, FibroMinn submitted additional information on the chlorine historical numbers. The information included the individual data points, calculations of the upper confidence level (UCL) values and a rank order distribution graph. The individual results showed that there were only five results (out of 112) that were above the high range. The two highest results (8900ppm and 8100ppm) were taken on the same day, from the same brood, and were at least 20% higher than the next three results (6800ppm, 6700ppm, and 6100ppm). The next value 5800ppm (adjusted to 8816ppm, dry basis) represented the 95th percent upper confidence value for the rest of the historical results. As a result of its statistical analysis the company found that the chlorine results were comparable to traditional fuel.

In the Preamble to the Rule, 78 FR 9112, 9153 (February 7, 2013), EPA stated "To be clear, the EPA does not object to the use of the confidence limits, or to the use of the UCL, of the mean, on their own grounds." "And with specific approaches suggested by the commenters, the EPA agrees with the approach of comparing the upper prediction limit (UPL) at a 90 percent confidence level for each contaminant or group of contaminants in the appropriate traditional fuel." EPA had enough information to calculate the UPL, so EPA used the test results of the adjusted chlorine values on a dry weight basis and calculated a UPL of 9156 ppm, or 91.6%, which meant that the FibroMinn historical results are comparable to levels found in coal.

FibroMinn's additional analysis, for the fluorine test data, as compared to traditional fuels is similar to its approach on the analysis of the chlorine test data. The Company submitted information including the individual data points and the calculations of the upper confidence level. The Company submitted 42 individual sample results of which 27 results were non-detect and only 15 had a measurable value. Of the 15 samples with measurable levels, only two results adjusted for moisture content (760ppm and 680 ppm) were above the high end of the wood range. In this case, EPA could not calculate a UPL on the fluorine samples because of the large number of non-detection values, therefore, another statistical approach needed to be used. The two highest results (760ppm and 608ppm) were taken on the same day, from the same brood, and were at least 25% higher than the next three results (456ppm) and 50% percent higher than the rest of the results. The next value (200ppm, adjusted to 304ppm, dry basis) represented the 93th percent upper confidence value for the rest of the historical results. The two new sampling results were lower or comparable to wood. As a result of its statistical analysis, of the UCL, and the results of the new sampling data, the company found that the fluorine results were comparable to traditional fuel. For these reasons, EPA also concluded that levels of fluorine in the NHSM were comparable to those in traditional fuels.

EPA finds that the data provided by FibroMinn, and that is presented in EPA's attached contaminant table, finds that FibroMinn's poultry litter meets the third legitimacy criterion, as it contains contaminants or groups of contaminants at levels comparable in concentration to or

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corresponding adjusted average (6290 ug/g), are reflected in the attached contaminant table. [1ug/g is equal to 1ppm]

lower than those contained in wood, coal, DDGS, alfalfa and stover, all traditional fuels that FibroMinn's boiler is designed to burn.

Section 2b: Criteria found in 40 C.F.R. § 241.3(c)(1)(i) through (v)

As outlined above, in the review section, the Agency must also evaluate FibroMinn's non-waste application against the applicable factors in 40 C.F.R. § 241.3(c)(1)(i) through (v). The remainder of this document will address the factors found in 40 C.F.R. § 241.3(c)(1)(i) through (v).

Market Participants treat NHSM as a Product, not a Waste

As noted above in the discussion of the first legitimacy criterion, FibroMinn established that the poultry growers produce the poultry litter in compliance with contract specifications to ensure high fuel quality and limited contamination. The Company has monetary incentives for its growers that provide it with litter containing a lower moisture content which helps ensure that the high quality of the poultry litter is maintained and the material is recognized as a valuable commodity. FibroMinn's shipment and storage procedures, prior to combustion, are additional measures which add value to the poultry litter by reducing additional moisture content to the NHSM and ultimately increase the heating value. Based on the information discussed above, the Agency finds that FibroMinn's market participants treat its NHSM as a product, thus satisfying the requirements in 40 C.F.R. § 241.3(c)(1)(i).

Chemical and Physical Identity of the NHSM is Comparable to Commercial Fuels

As noted above in the discussion of the third legitimacy criterion, FibroMinn presented historical data and additional sampling results to establish that all levels of elemental metals and non-metals, including chlorine, fluorine, nitrogen and sulfur, were below or comparable to the levels of traditional fuels that could be burned in the Company's stoker boiler. *See* Attachment A. FibroMinn did additional testing on the poultry litter for volatile and semi-volatile compounds. The results were at detection limits, with one exception. The result for formaldehyde was just above detection limits, but lower than levels found in wood, the traditional fuel used for comparison. The FibroMinn Plant uses a stoker boiler which has the capability to combust a variety of solid fuels as long as the fuel particle size is less than approximately two inches. As delivered, the size of the poultry litter, the principle fuel, is normally at the required particle size, but is mixed with a secondary biomass[10] by hydraulic cranes at the Plant to ensure that all clumps of the mixture meet the fuel particle size. The crane places the blended fuel mix on a belt conveyor system, where it proceeds through a machine with a pair of toothed rollers that rotate in opposite directions (with the roller teeth intermeshed) to break up any fuel clumps that are larger than the required particle size. The Agency believes that based on this information and the attached contaminant table, the chemical and physical identity of its NHSM is comparable to that in commercial fuels, and, thus, satisfies the requirements in 40 C.F.R. § 241.3(c)(1)(ii).

[10] In the April 8, 2014 letter, FibroMinn states that the secondary biomass fuels presently being blended with the poultry litter are wood chips; however the same cranes would be used to blend other solid fuels (coal, stover, alfalfa, oat stems or DDGS) if needed.

The NHSM is used in a Reasonable Timeframe

As noted above in the discussions of *discarded in the first instance* and the first legitimacy criterion, FibroMinn established that under normal operations, the litter is transported the same day from a poultry grower's barn to the Plant. During normal operations, the litter is burned within three days of its delivery to the FibroMinn Plant. FibroMinn also has short-term staging procedures in place if the Plant is subject to a temporary power outage. FibroMinn has stated that it will not accept any NHSM from growers' legacy or long-term storage piles. The Agency believes that based on this information, and information further described above, the NHSM is used in a reasonable time frame, thus satisfying the requirements in 40 C.F.R. § 241.3(c)(1)(iii).

Whether the Constituents in the NHSM that are released to the Air, Water and Land, from Point of Generation up until Combustion, are at Levels Comparable to Traditional Fuels

As noted above in the discussions of *discarded in the first instance* and the first legitimacy criterion, FibroMinn established that the poultry litter is transported to the FibroMinn Plant in fully covered trucks and upon delivery, is received, off-loaded and stored in a fully-enclosed fuel hall, prior to combustion. These measures are specifically intended to prevent contact between the litter and the environment, which reduces the potential for impacts to the air, water (from storm water runoff) and land (from spillage). These measures lessen the potential for environmental contamination, to a level that is less than that which would exist with standard handling and storage of traditional biomass fuels, like wood chips. Based on this information, and that described above, the constituents in its NHSM that are released to air, water and land from point of generation up to combustion are at levels comparable to those in traditional fuels, and thus, satisfy the requirements in 40 C.F.R. § 241.3(c)(1)(iiii).

Other Relevant Factors

In considering other relevant factors, EPA recognizes that the FibroMinn Plant was designed to burn poultry litter, as well as other sustainable biomass material, in its boiler. By operating such a specialized Plant, FibroMinn avoids burning fossil fuels (coal) to produce electricity. Thus, the Agency believes that FibroMinn has met the final criterion under 40 C.F.R. § 241.3(c)(1)(v). As stated in the Preamble to the Rule, FR 76, 15542 (March 21, 2011), "We (the Agency) believe NHSMs that have meaningful heating values that are used as non-waste fuels, in a combustion units, provide a useful contribution and are valuable products, since they are replacing traditional fuels that otherwise would be burned."

Contact

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ATTACHMENT A

(To the Technical Review on FibroMinn's Petition for a
Non-Waste Determination Pursuant to 40 C.F.R. § 241.3(c))

Contaminant Concentrations in Wood, Coal and Select Non-woody Biomass Materials
All values reported in parts per million

Contaminant	FibroMinn Poultry Litter[1]		Wood / Biomass:	Coal	DDGS		Stover		Alfalfa		Results of Comparison[8]
	Average (new)[2,3]	Range (new)[2,3]	Range	Range	Avg[a]	Range	Avg[a]	Range	Avg[a]	Range	
	Average[2] (Historical)	Range[2] (Historical)									
Metal Elements – dry weight basis											
Antimony (Sb)[3]	<.05	<.05-<.05	ND – 26	ND – 10							**Lower than** Coal and Wood
	No Data	No Data									
Arsenic (As)[4]	.03	<.01-03	ND-298	ND – 174	<3.2		2.50				**Lower than** Coal, Wood , DDGS and stover
	1.72	<.01.-4.8									
Beryllium (Be)[3]	<.05	<.05-<.05	ND-10	ND – 206	<0.093		<0.089				**Lower** than Coal, Wood, DDGS and stover
	No Data	No data									
Cadmium (Cd)	0.11	0.09-0.12	ND-17	ND – 19	<0.046		<0.45				**Lower** than Coal, Wood and Stover
	No Data	No Data									
Chromium (Cr)[4]	1.01	0.46-0.91	ND-340	ND – 168	<0.50		<0.45				**Lower** than Wood and Coal
	1.80	0.29-2.77									
Cobalt (Co)	0.34	0.26-0.43	ND-213	ND – 25.2							**Lower** than Wood and Coal,
	No Data	No Data									
Lead (Pb)[4]	0.41	0.38-0.44	ND-229	ND – 148	<0.046		0.46				**Lower** than Wood, Coal and stover.
	0.84	0.1-1.63									
Manganese (Mn)	239	225-253	ND-15,800	ND – 512	15.82	15.42-17.10[b]	23.4				**Lower** than wood and coal
	No data	No data									
Mercury (Hg)[4]	<.01	<.01-<.01	ND-1.1	ND – 3.1	<0.010		<0.010				**Lower** than Wood, Coal, DDGS and Stover.
	<.05	<.05-<.05									
Nickel (Ni)[7]	45ppm	1.68-185	ND-540	ND – 730	0.87		<0.45				**Lower** than Wood and Coal
Selenium (Se)[4]	0.9	0.8-1.0	ND-9.0	ND – 74.3	1.80		<1.30				**Lower** than Wood, Coal, DDGS, Stover
	1.15	0.32-1.5									
Non-metal elements - dry basis											
Chlorine (Cl)[5,6]	6290[8]	5230-7350[8,9]	ND-5400	ND – 9,080	1,900	1,200-3,600	3,600	500-7,600[b]	3,600	300-7,800[b]	**Comparable** to Coal[10]
	5776	1520-13528									
Fluorine (F)[5]	<200	200-<200	ND-300	ND – 178							**Comparable** to Wood[11]
	303	152-759									
Nitrogen (N)[5]	26,144	23,712-28,576	200-39500	13,600 – 54,000	47,000	45,000-54,000	5,100	5,900-7,400	17,300	19,800 - 21,400	**Lower** than DDGS
	39,976	15,504-66,272									
Sulfur (S)[5]	3,800	3,648-3,952	ND-8700	740 – 61,300	6,700	3,100-10,500	470	600-1,000	780	200-2,000[b]	**Lower** than Wood, Coal, DDDS
	5776	2,432-10,640									

Notes:

This table was created by the U.S. Environmental Protection Agency, Region 5 Office, Chicago, IL on June 11, 2015.

DDGS (Distillers Dried Grains with Solubles), corn stover, and alfalfa stems are all defined by EPA to be "clean cellulosic biomass."

a. Average values were drawn from different literature sources and from limited testing performed in the past by FibroMinn. Where multiple averages were obtained for a given material and contaminant, a weighted average was calculated based on quality factors assigned to each data source. Data, sources, and calculations are presented in the supporting documentation spreadsheet. Quality factors were assigned as follows:
   - Data from peer reviewed, journal published sources were assigned a QF of 3.
   - Data from sources having limited scope or sources for which we were uncertain of peer review were assigned a QF of 2.
   - Data from stakeholders, unpublished data, and data summaries for which original sources could not be located were assigned a QF of 1.

In these cases, no ranges were provided in data sources. The lowest reported data point was used as the lower bound, and the 90% UPL (upper prediction limit) was calculated for the upper bound.

1. FibroMinn's data is from two different time frames. The bottom value ranges are documented FibroMinn data from 1999-2002, and the results of 118 litter tests. Further information is found in footnote 2. This information was received in the original application dated July 1, 2013. EPA requested that the company submit current test data to confirm that the historical data was still comparable and applicable to the application. The Company sampled (February 2014) and analyzed (march 2014) two more sets of data. The two individual data points are displayed as the "new" range values. The average value was calculated by summing the two individual data values and dividing by two.

2. The historical average and range values for poultry litter are based on poultry litter test data; for N (111 tests), S (109 tests), Cl (112 tests) and for F (42 tests) ; for elemental metals, based on FibroMinn test data, ranging from 3 to 8 tests, depending on the particular metal. FibroMinn's historical values only include results from the following elemental metals: arsenic, chromium, lead, mercury and selenium.

   Specific references follow for the poultry litter test data (except antimony and beryllium; see Note 5 below), both FibroMinn test data and literature values:

- *FibroMinn poultry litter, As Received, Two Litter Samples-Test Data Summary for all the contaminants listed in Table 1A (March 2014)*
- *FibroMinn Poultry Litter, As Received - Test Data Summary for N, S, Cl, and HHV (1999 to 2002)*
- *FibroMinn LLC, 2001. "FibroMinn Fuel Sampling and Testing Program - Metals Analysis on the As-Received Samples," April 1, 2001 and Galbraith Laboratories, "Laboratory Report" to Fibrowatt LLC on Tested Mercury in Poultry Litter Samples (05/23/2001)*

3. As stated in note 1, the new values were a direct result of an EPA, Region 5 (Ms. Carol Staniec) and a FibroMinn representative (Mr. Dave Minott) telephone conversation about the age of the historical data. In February 2014, FibroMinn took multiple grab samples and aggregated them to yield two samples for laboratory analysis. The test results were submitted to EPA in the April 8, 2014 supplement to the application. The new test data results are from two samples of turkey litter, from two different poultry growers, delivered to FibroMinn 's Plant in February 2014. The samples were analyzed by a third party laboratory in March 2014. FibroMinn's data, except for Sb and Be, are on as-received basis. FibroMinn's long term data on moisture content of poultry litter indicated an average moisture content of 34.1%. To adjust the data from an as-received ppm concentration data to the dry basis, the values were multiplied by (100/(100-34.1)) or 1.52. These adjusted values allowed for direct comparisons to the traditional fuel data. Sb and Be were not adjusted, as the sampling results were recorded as a dry basis.

4. For the elemental metals: As, Cr, Pb, Hg and Se, the historical values are based on FibroMinn samples. Number of samples that the average value was calculated is between three and eight samples. See note two above.

5. The results of nitrogen, sulfur, chlorine and fluorine have been converted from the original application value of percentage basis to parts per million by using the following calculation: by multiplying the value by 10,000 equals parts per million.

6. On April 8, 2014 the company submitted additional information to corroborate that the historical database of FibroMinn's sampling results was still representative of current poultry litter operations. The information consisted of an opinion letter (third party expert), a letter from a poultry grower, a letter from a feed mill operator, and the results of recent testing performed on two random samples of FibroMinn's poultry litter fuel. The two new samples were obtained in February 2014 and analyzed in March of 2014; the initial reported results for chlorine were 5000 and 8000 ppm (wet basis). Since both these results were higher than FibroMinn's historical results, the company had the samples reanalyzed. The results reported in the table are those obtained using a more accurate test method for analyzing fuel materials. The results were 4010ug/g and 2870 ug/g. The laboratory sheets also reported the total moisture values and calculated a dry basis result. EPA used the unadjusted results and actual moisture levels to calculate the dry weight basis, and compare that with the laboratory numbers. The unadjusted results, moisture percentage and dry basis results are as follows: 4010ug/g with a 45.45% moisture changes to 7350 ug/g and 2870 ug/g with a 45.16% moisture changes to 5230 ug/g. More information about the test methods and these calculations can be found in the contaminant section of the technical document. The laboratory sheets and discussion of the test methods are from the May 5, 2014 supplemental information.

7. The company has never tested for the pollutant parameter nickel (Ni). In the July 1, 2013 application (Tables 1 to 4) and the January 10, 2014 supplement (Table 1A) the values for nickel were based entirely on literature values: i.e. the average value (45 ppm) and the range of values (1.68 to 185 ppm). Since there was no FibroMinn data, these literature values were used to compare against the traditional fuel values.

8. The new and the historical data of the NHSM, i.e. poultry litter, was compared to the traditional fuel values. The result was that the NHSM was lower or comparable to traditional fuel values for all of the parameters.

9. FibroMinn testing results included the total moisture levels and a calculated dry basis result using the individual moisture levels. These adjusted numbers (5230ug/g and 7350ug/l) and corresponding adjusted average (6290 ug/g,) are reflected here.

10. EPA used the test results of the adjusted chlorine values on a dry weight basis and calculated a UPL of 9156 ppm, comparable to coal. More information about the statistical method and comparison can be found in the technical document.

11. The company submitted information including the individual data points and the calculations of the upper confidence level. The company submitted individual results from 42 samples, 27 results which were non-detect and 15 had a measurable value. A UPL could not be calculated due to the large number of non-detection values, therefore another statistical approach needed to be used. The two highest results (760 and 608) were taken on the same day, from the same brood, and at least 25% higher than the next three results (456) and 50% percent higher than the rest of the results which are comparable to wood. The next values (200) (adjusted to 304 dry basis) represented the 93th percent upper confidence value for the rest of the historical results. The new test sample results were lower or comparable to wood. More information can be found in the technical document.