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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

Technical Contact at EPA
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Region 5 NHSM
312-886-1436

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.

2

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
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	1.80	0.29-2.77									
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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 petition of July 1, 2013. EPA requested that the company submit more current test data to confirm that the historical data was still comparable and applicable to this petition. The Company obtained and analyzed two more sets of data, in March 2014. The two data points are displayed in the range values. An average value was determined by summing the two (range) 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 (109 tests) and for F (14 tests) ; for elemental metals, based on FibroMinn test data, ranging from 3 to 8 tests, depending on the particular metal. FibroMinn historical elemental values only include the following metals: arsenic, chromium, lead, mercury and selenium.

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4. For the elemental metals As, Cr, Pb, Hg, 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 petition 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/l and 2870 ug/l. The laboratory sheets also reported the total moisture values and calculated a dry basis results. The unadjusted results, moisture percentage and dry basis results are as follows: 4010ug/l with a 45.45% moisture changes to 7350ug/l and 2870ug with a 45.16% moisture changes to 5230ug/l. More information about the test methods and the re analyzing the results can be found in the contaminant section of the technical document. The numbers have also been adjusted using a different moisture content. These laboratory sheets and discussion of the methods are from the May 5, 2014 petition.

7. The company has never tested for the pollutant parameter nickel (Ni). In the July 1, 2013 original submission (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 (5230 and 7350ug/l) and corresponding adjusted average (6290 ug/l,) 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 ASTM D7359 test had a confidence level of 1000 ppm, (well above the high range value) and the individual results that the company submitted 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.

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July 1, 2013

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Submitted Electronically to Ms. Hedman through Mr. Bharat Mathur, Deputy Regional Administrator at mathur.bharat@epa.gov

Subject: Fibrominn Biomass Power Plant, Benson, MN – Poultry Litter Fuel
(MPCA Air Permit No. 15100038)
Application for Non-Waste Determination Under 40 CFR Part 241.3(c)

Dear Ms. Hedman:

Fibrominn LLC owns and operates the 55-MW Fibrominn Biomass Power Plant ("Fibrominn Plant") in Benson, Minnesota, which has been in continuous operation since 2007. The Fibrominn Plant is fueled principally with poultry litter obtained from poultry producers who grow turkeys and chickens in Minnesota. Poultry litter is a material comprised of only two components: poultry droppings and poultry bedding material, typically, wood shavings. While the Fibrominn Plant combusts poultry litter as its principal fuel, it also co-combusts vegetative biomass (typically, wood chips) as a secondary biomass fuel. Historically, the majority fraction of the fuel mix has been poultry litter, a 50% to 75% fraction.

Under 40 CFR Part 241, U.S. EPA presently considers animal manure categorically to be a secondary non-hazardous material that is a solid waste material when combusted. This includes poultry manure. Pursuant to 40 CFR Part 241.3(c), Fibrominn LLC submits this letter to U.S. EPA as an application for a non-waste determination for the poultry litter (chicken litter and turkey litter) that Fibrominn burns as a fuel.

As documented below, Fibrominn can demonstrate that its poultry litter fuel meets all requirements for a non-waste determination, including, specifically, that the poultry litter has not been discarded, see 40 CFR § 241.3(c), and that it meets the fuel legitimacy criteria at 40 CFR § 241.3(d,) as well as the related criteria at 40 CFR § 241.3(c)(1).

1.0 REGULATORY BACKGROUND

Pursuant to Section 1004 of the Resource Conservation and Recovery Act (RCRA) and Section 129 of the Clean Air Act, U.S. EPA (EPA) sets out at 40 CFR Part 241 procedures for identifying non-hazardous secondary materials (NHSM) that are waste materials when used as fuels in a combustion unit. This Part 241 rule is commonly referred to as the Non-Hazardous Secondary Materials Rule (NHSM Rule). The combustion of any NHSM that is a solid waste material is regulated under Section 129 of the Clean Air Act, for example, under the Commercial-Industrial Solid Waste Incinerator (CISWI) Rule. Under the NHSM Rule, EPA presumptively considers all manures to be secondary materials that are a waste material when combusted. Because Fibrominn burns poultry litter as fuel, and poultry litter contains manure, the Fibrominn plant is presumptively subject to regulation under the CISIWI Rule. However, Fibrominn can apply to EPA for a case-specific non-waste determination under 40 CFR § 241.3(c) for its poultry litter fuel material, based on a demonstration that the material has not been discarded and does meet stated criteria at 40 CFR § 241.3(c)(1), as well as the fuel legitimacy criteria at 40 CFR § 241.3(d).

For such petitions, EPA states at 40 CFR § 241.3(c)(1) the factors it considers in weighing whether to grant a non-waste determination for a given NHSM:

- Whether market participants treat the NHSM as a fuel rather than as a waste;
- Whether the chemical and physical identity of the NHSM is comparable to commercial fuel;
- Whether the capacity of the market would use the NHSM within a reasonable timeframe;
- Whether the constituents in the NHSM are released to the air, water, or land from the point of generation to just prior to the point of combustion, at levels comparable to what would otherwise be released from traditional fuels; and
- Other relevant factors.

Specifically in these regards, EPA has developed fuel legitimacy criteria that a NHSM must meet to enable a non-waste determination. Listed at 40 CFR § 241.3(d(1)) are the three fuel legitimacy criteria:

1. The NHSM must be managed as a valuable commodity.
2. The NHSM must have a meaningful heating value and be burned in units that recover energy.

3. The NHSM must contain contaminants that are comparable to or lower than in traditional fuel products.

In the sections that follow, Fibrominn demonstrates that it meets, in turn, each requirement for EPA to grant a non-waste determination for Fibrominn's poultry litter fuel. The applicable non-waste criteria at 40 CFR § 241.3(c)(1) overlap very closely with the specific fuel legitimacy criteria at 40 CFR § 241.3(d). Accordingly, rather than addressing compliance with the two sets of criteria separately (and redundantly), Fibrominn has ensured that in addressing compliance with the fuel legitimacy criteria, 40 CFR § 241.3(d), below, it has also explicitly addressed the criteria at 40 CFR § 241.3(c)(1).

2.0 MANAGED AS A VALUABLE COMMODITY - 40 CFR § 241.3(d)(1)(i).

One of the fuel legitimacy criteria that must be met is that the NHSM be managed as a valuable commodity, based on the following factors :

- Storage prior to use must not exceed reasonable time frames.
- If there is an analogous fuel material, the NHSM must be managed in a manner consistent with the analogous fuel or otherwise be adequately contained to prevent releases to the environment.
- If there is no analogous fuel, the NHSM must be adequately contained so as to prevent releases to the environment.

The management by Fibrominn of poultry litter as a valuable commodity is documented below.

Managed as a Valuable Commodity, in a Manner Consistent with Analogous Traditional Fuels

Poultry litter fuel is procured via contract. As a baseload power generation facility, Fibrominn is reliant upon a consistent supply of poultry litter fuel, sourced principally from poultry growers in Minnesota. To ensure a consistent fuel supply, Fibrominn procures poultry litter fuel through both long-term contracts and short-term "spot" purchases, as is done with traditional biomass fuels such as wood chips. Long-term contracts are 10 years in duration. Approximately 75% of Fibrominn's poultry-litter fuel supply is under long-term contracts, with 25% procured through spot purchases. The fuel supply contracts are directly between Fibrominn and the poultry producer generating the poultry litter fuel. Both the long-term and spot purchase contracts contain a fuel specification that is clearly intended to ensure that the litter has adequate fuel quality and is low in contaminants. The contract specifies: wood shavings as the only permissible bedding material without prior approval from Fibrominn for substitution, maximum moisture and ash contents, no plastics or metal present, no water added, and poultry rearing in accordance with good animal husbandry practices.

Poultry litter has a purchase price. Fibrominn has always paid a price for the poultry litter it procures for use as a fuel. The specific pricing information is proprietary. That Fibrominn always pays for its poultry litter fuel, and via both long-term contracts and spot-market procurements, is directly analogous to how traditional biomass fuel (wood chips) is procured.

Physical management of the poultry litter as a valuable fuel product. Poultry litter fuel handling begins with removal of the litter from the poultry grower's barn, following the completion of a poultry growing cycle. The litter is removed by the grower, or by a Fibrominn contractor, using a front-end loader or loader conveyor system. The litter removed from the barn is loaded directly into trucks, and under normal conditions, is transported the same day to Fibrominn. Fibrominn contracts with the trucking companies to transport the litter from grower to Fibrominn. Ownership of the litter transfers from the grower to Fibrominn when the litter is loaded into the truck at the poultry farm. The trucks transporting the litter to Fibrominn are always covered. When trucks delivering poultry litter to Fibrominn enter the plant, the delivered fuel is weighed on a truck scale, then the truck drives into the fully-enclosed fuel hall of the power plant, where the poultry litter is off-loaded and stored prior to combustion. The fact that the poultry litter is transported in covered trucks and off-loaded and stored in the enclosed fuel hall preserves fuel quality by prohibiting weather-related moisture uptake. Before trucks dump the poultry litter into the fuel storage pits within the enclosed fuel hall, fuel samples are obtained for subsequent analysis to verify that the litter meets contractual fuel specifications. Handling of poultry litter so as to preserve fuel quality and regular sampling to verify fuel quality are clear indications that the poultry litter is being managed as a valuable fuel product.

Storage prior to use must not exceed a reasonable time frame.

Storage of the poultry litter fuel used by Fibrominn does not exceed reasonable time frames. As noted above, under normal operations, the litter is transported same-day from the poultry grower's barn to Fibrominn, with no intermediate staging or storage. The delivered litter is off-loaded and stored within Fibrominn's totally enclosed fuel hall. During normal operations, the litter is burned as a fuel within three days of its delivery to Fibrominn, which is notably shorter than with almost all traditional solid and liquid fuels.

During Fibrominn plant outages, which are infrequent, the poultry litter removed from the grower's barn may have a staged delivery to Fibrominn. That is, the litter removed from a poultry grower's barn is temporarily stored at the transporter's facility, either within a shed or on a pad outdoors, then re-loaded and delivered to Fibrominn as soon as the plant comes back on line. The duration of such staging is restricted to a maximum of one to two months, specifically to ensure that the quality of the poultry litter fuel does not significantly degrade and in order to minimize the potential for runoff-related environmental impacts that could occur

with longer-term storage. The potential for fuel-quality degradation similarly limits the normal duration of outside storage for some common, traditional fuels such as wood chips. In addition, with the common practice of outside storage of traditional fuels such as coal and wood chips, there is also the potential for environmental impacts resulting from storm water runoff.

Importantly, Fibrominn does not accept any poultry litter that had been abandoned by the poultry grower, transporters, or others to long-term outdoor storage piles. Such long-term outdoor stockpiling of poultry litter would constitute discarding, in a manner analogous to used tires that have been abandoned long term in "legacy piles," rather than having been managed in an established tire collection program.

The Material Must Be Adequately Contained so as to Prevent Releases to the Environment.

As previously stated, the poultry litter is always transported to Fibrominn in fully-covered trucks and upon delivery to Fibrominn, is received, off-loaded, and stored in the fully-enclosed fuel hall prior to combustion. These measures are specifically intended to prevent contact between litter and the environment, hence, reducing the potential for impacts to the air, water (from storm water runoff), or land (from spillage). With this practice there is less potential for environmental contamination associated with storm water runoff with Fibrominn's handling and storage of poultry litter fuel indoors, than would exist with standard outdoor storage of traditional biomass fuels like wood chips. While not likely related to "contaminants" as defined by the NHSM Rule, the potential for litter-related odor impacts is effectively reduced by Fibrominn's use of covered trucks, as well as by having a totally-enclosed fuel receiving/storage hall that is maintained under negative air pressure, as part of the original plant design.

3.0 MEANINGFUL HEATING VALUE AND ENERGY RECOVERY – 40 CFR 241.3(d)(1)(ii).

Another fuel legitimacy criterion required to be met 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 amendments EPA made to the Final NHSM Rule on February 7, 2013, see 78 FR 26, p.9172, EPA reiterated its use of a heating value benchmark of 5,000 Btu/lb *as fired* (which includes moisture), to define a presumptively meaningful heating value. There, EPA specifically stated that to meet ". . . the meaningful heating value legitimacy criterion, the material would need to meet an "as fired" heating value of 5,000 Btu/lb, or if lower than 5,000 Btu/lb, as fired, a person would need to demonstrate that the [energy recovery unit] can cost-effectively recover meaningful energy from the NHSM used as a fuel." A material's heating value inclusive of moisture, as fired, is normally referred to as the material's Higher Heating Value (HHV).

Factors that can be considered in demonstrating cost-effective and meaningful energy recovery were outlined by EPA in the rulemaking it promulgated on March 11, 2011, see 76 FR p.15,523:

- Whether the facility can realize a cost savings by not having to purchase significant amounts of traditional fuels they would otherwise need to use
- Whether they are purchasing the NHSM to use as a fuel
- Whether the NHSM the facility is using as a fuel can burn autogenously
- Whether the energy produced is sold for a profit

The poultry litter that Fibrominn uses as a principal fuel has an "as fired" heating value (measured as the HHV) that is less than the EPA benchmark of 5,000 Btu/lb. However, Fibrominn has a strong commercial operating record demonstrating that, with its stoker boiler system, it can combust poultry litter as the principal fuel autogenously (i.e., without using supplemental fuel), in turn, recovering meaningful energy cost-effectively and with high reliability, thus resulting in profitable sale of the energy. Poultry litter fuel is analogous to traditional, green wood chips as a fuel in this regard. Both poultry litter and green wood chips, as fired, have high moisture content. The higher moisture content of poultry litter and green wood chips reduces the heating value of the material, compared with the same materials if dried. Even though green wood chips and poultry litter have significant moisture content, one can achieve meaningful heat recovery and profitable energy sales using either fuel material, despite both fuel materials having heating values that are below the 5,000 Btu/lb benchmark.

The bases for establishing that Fibrominn's poultry litter fuel has a meaningful heating value and is combusted to achieve cost-effective, meaningful energy recovery are documented in further detail below.

Poultry litter is more cost-effective.

As discussed above under "managed as a valuable commodity," Fibrominn procures its principal fuel, poultry litter, under contract from the poultry producers who generate it. About 75% of Fibrominn's poultry litter fuel supply is procured under long-term contracts. Currently, the typical long-term contract price for the poultry litter fuel (which is proprietary) is significantly less than for green wood chips, the presumptive replacement traditional fuel. Hence, poultry litter is a more cost-effective fuel for this particular biomass power plant location than are wood chips.

Poultry litter is purchased as a fuel material.

As discussed above, Fibrominn procures all its principal fuel, poultry litter, under contract, and all the litter supply contracts include a fuel specification. Deliveries of poultry litter fuel to Fibrominn are regularly sampled and tested for conformance with the fuel specification.

Hence, the poultry litter is procured under contract specifically as fuel material and the material is regularly tested to ensure adequate fuel quality.

Poultry litter burns autogenously. / Energy produced is sold for a profit.

The Fibrominn Biomass Power Plant is the only large, grid-connected power plant in the U.S. that is specifically designed to use poultry litter as the principal fuel. The Fibrominn facility uses a standard spreader-stoker grate boiler system, with design enhancements to enable efficient firing of poultry litter as the principal fuel. The Fibrominn facility was both designed and permitted to fire up to 100% poultry litter autogenously (self-supported combustion, without supplemental fuels). Propane is used as a fuel at Fibrominn, but only during boiler startup and shutdown, as is normal practice with similar boiler systems fueled with traditional biomass fuels such as wood chips. Spreader-stoker boiler systems in general, including Fibrominn's, are also capable of energy recovery using a wide variety of traditional solid fuels and also other solid fuel materials that are classified as NHSMs. While the Fibrominn facility is designed to burn up to 100% poultry litter, the intent in practice was to use poultry litter as the principal fuel, and use vegetative biomass as the secondary fuel. When the Fibrominn facility was being designed, a number of different vegetative biomass materials were specifically evaluated for design purposes to serve as the secondary fuel materials, including wood chips, corn stover, oat hulls, alfalfa stems, distillers dried grain (DDG), and switchgrass.

Historically since startup in 2007, Fibrominn has successfully fired poultry litter as the principal fuel, co-fired with green wood chips as the normal secondary biomass fuel. Again, propane supplemental fueling does not take place, except for boiler startup and shutdown. Typically, the poultry litter fraction versus wood chips exceeds 50%, has often exceeded 60% historically, and has been as high as 75% poultry litter. The specific fuel mix of poultry litter and secondary vegetative biomass at any given time is determined by market factors, for example, the current availability and prices of poultry litter versus wood chips. The heating value for Fibrominn's poultry litter, as received, is typically within the range of 3,400 to 5,000 Btu/lb, based on extensive testing. While the heating value for poultry litter, as received, is less than EPA's presumptive benchmark of 5,000 Btu/lb for meaningful heat recovery, poultry litter burns autogenously in stoker boilers, and particularly at Fibrominn, when comprising the *majority* fraction of the fuel mix of litter and wood chips. Green wood chips, a traditional fuel, similarly has an HHV 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. While wood chips don't meet the heating value benchmark, they are the dominant type of biomass fuel utilized today for energy recovery. Despite not meeting the 5,000 Btu/lb benchmark, wood chips are well-recognized to burn autogenously in stoker boilers with meaningful energy recovery. Poultry litter similarly has a heating value less than 5,000 Btu/lb, but burns autogenously in stoker boilers with meaningful heat recovery.

The Fibrominn plant sells the electric energy it produces to the electric utility company, Xcel Energy. The commercial performance of the Fibrominn plant for the most recent three years of operation (2010, 2011, 2012) is illustrated in the table below, indicating the tonnage of poultry litter combusted, the amount of power sold, and the high capacity factors achieved by the plant. Clearly, the performance data demonstrate that when using poultry litter as the principal fuel (~ 350,000 to 450,000 tons per year), the Fibrominn plant recovers meaningful energy, and that energy is recovered cost-effectively and with high reliability, enabling profitable sale of the energy.

Fibrominn – Net Power Generation with Poultry Litter as the Principal Fuel				
Year	**Poultry Litter Burned (TPY)**	**Net MWh Sold**	**Capacity Factor (%)**	**Availability Factor (%)**
2012	344,900	442,522	91.6	92.1
2011	412,700	430,080	89.3	92.3
2010	451,200	409,573	85.0	88.1

Finally, while the Fibrominn Plant is the only large grid-connected power plant in the U.S. fueled principally with poultry litter, there are at least six other power plants in Europe that have successfully generated power for sale using poultry litter as the predominant fuel (see table below). This further illustrates that poultry litter fuel combustion can yield meaningful energy recovery, enabling commercially-viable energy sales.

Poultry Litter Power Plants in Europe		
Plant Location	**Capacity (MW)**	**Date Commissioned**
Eye Power Station (Suffolk, U.K.)	12.7	1992
Glanford Power Station (Lincolnshire, U.K.)	13.5	1993
Thetford Power Station (Norfolk, U.K.)	38.5	1998
Fife (Scotland)	9.8	2001
Moerdijk (Netherlands)	36.6	2008

4.0 COMPARABLE CONTAMINANTS LEVELS – 40 CFR § 241.3(d)(1)(iii).

US EPA Regulatory Background

The third legitimacy criterion for NHSM used as a fuel requires comparable contaminants levels. That is, the NHSM Rule requires that "*the secondary non-hazardous material must contain contaminants or groups of contaminants at levels comparable in concentration to or lower than those in traditional fuel(s) a unit is designed to burn.*" 40 CFR § 241.3(d)(1)(iii) In revising the NHSM Rule since 2011, EPA has clarified the contaminants that must be considered when making contaminant comparisons between secondary materials and materials that EPA deems to be traditional fuels. EPA has also further evolved associated guidance regarding the bases on which contaminant comparisons are appropriately made. Such regulatory information is summarized below, as is relevant to the current contamination comparisons for the poultry litter material that Fibrominn uses as a fuel.

Definition of Contaminant. The NHSM Rule, as amended by EPA in February 2013, defines *contaminants* as all pollutants listed in Clean Air Act sections 112(b) or 129(a)(4), with certain modifications. One relevant modification pertains to the elements chlorine (Cl), fluorine (F), nitrogen (N), and sulfur (S). Those elements are included in the definition of contaminants for making contaminant comparisons when they are precursors to the formation of the Section 112(b) or 129(a)(4) pollutants, HCl, HF, NOx, or SO_2. The latter pollutants, however, are NOT contaminants themselves for purposes of contaminant comparisons.

Groups of Contaminants. The amended NHSM Rule revises the legitimacy criteria for secondary materials used as a fuel to allow contaminants to be compared on either a contaminant-by-contaminant basis or, where reasonable, on the basis of groups of contaminants. The amended NHSM Rule and its preamble language addressed grouping of contaminants as follows, 40 CFR § 241.3(d) and 71 FR , p.9146:

- The Rule indicated that contaminants could be grouped based on shared physical and chemical properties as relate to combustion, including (but not limited to) volatility, the presence of specific elements, and compound structure.
- One approach to grouping contaminants was given by EPA as: TOX, nitrogenated HAP, VOCs, SVOCs, dioxins/furans, PCBs, and radionuclides.
- EPA also noted, as another example, that the halogens, Cl and F, can be grouped as total halogens.
- EPA noted clearly that "total metals" is not an appropriate grouping, because of the disparity in volatility of various metals in the combustion environment, especially for

mercury (Hg) which is highly volatile. EPA noted that metals can be appropriately grouped as volatile, semi-volatile and low-volatile categories.

Contaminants in Manures. In the final NHSM Rule issued in March 2011, EPA indicated specific concern for N and Cl levels in manures as regards demonstrating comparable contaminant levels. EPA stated that "levels of certain pollutants, such as nitrogen and chlorine, in certain types of manure, as generated, may not be comparable to those levels found in traditional fuels that otherwise would be burned. This is based on limited data . . . ." [FR V76, N54, P.15480 March 21, 2011]

Contaminant Comparative Statistics. The NHSM Rule, as amended by EPA in February 2013, further addresses the appropriate bases for comparison of contaminant levels in a secondary material with levels in a traditional fuel. To account for natural variability in contaminant levels, the comparisons can be based on the full range of contaminant levels in traditional fuels, provided such comparisons also consider the variability in the secondary material contaminant levels. Preamble language to the amendments further indicates that one should not compare the mean contaminant level of the secondary material with the upper end of the range of contaminant levels for the traditional material. Rather, the comparisons should be based on similar statistical data analyses, for example, comparison of means and standard deviations, or comparisons of the statistical upper ends of the ranges.

Contaminant Information Sources. The NHSM Rule, as amended by US EPA in February 2013, further addresses the appropriate data sources for information on materials contamination levels, when making contaminant comparisons between secondary materials and traditional materials. Contaminant testing by the petitioner is a legitimate data source; however, such testing is not a requirement for making contaminant comparisons. Contaminant data may also be obtained from the literature and other sources nationally. Expert knowledge of the specific industry and secondary materials is also an acceptable basis for determining if contaminant levels in a secondary material do or don't exceed levels in traditional fuels.

Poultry Litter Composition as Relates to Contaminant Comparisons

Poultry litter is physically comprised of a mixture of only two components: poultry manure and poultry bedding material, each of which is demonstrably a homogeneous biomass material. The homogeneity of the poultry-manure and bedding-material components of the litter contrasts with the heterogeneous composition of some other secondary materials used as a fuel, such as municipal solid waste (MSW) and unsorted construction and demolition waste (C&D waste).

The poultry litter combusted as a fuel at the Fibrominn plant includes both turkey litter and "broiler chicken" litter. Broiler chickens are chickens raised for meat production. Turkeys and

broiler chickens are raised on the floors of poultry barns. The barn floor is covered with poultry "bedding material," *e.g.*, wood shavings. Poultry litter is the term used to describe the accumulated mixture of bedding material and excreted poultry manure that is cleared from the barn between bird growing cycles. Over the bird-growing cycle, typically several months, the poultry litter loses moisture content as a result of both natural convection and forced ventilation of the barn.

The manure and bedding material components of poultry litter are each further addressed below, as regards their compositions and expected levels of contaminants.

Manure Component of Poultry Litter. Poultry manure is essentially grain that has been biologically processed via digestion. Poultry feed is grain-based. The poultry litter used by Fibrominn as a fuel comes from regional poultry growers whose poultry feed typically has the following constituents, in descending order of composition fraction:

- Grains (corn, soybean)
- Processed grain (soybean meal, distillers grain, bakery meal)
- Dietary grit (bonemeal, ground shells)
- Dietary calcium and phosphorous nutrients
- Salt

The grain-based constituents of the poultry feed are all classified as clean cellulosic biomass materials, as defined in the NHSM Rule and hence, are inherently low-contaminant materials. Nothing about the digestion by poultry of those clean cellulosic materials imparts hazardous contaminants or other regulated contaminants in significant quantity to the excreted manure material, with the exception of two contaminants to be further discussed subsequently (nitrogen and sulfur). The salt content of the poultry feed can impart a significant chlorine content to the manure. The dietary grit and nutrients in the feed do not impart contaminants to the manure in significant quantities. Besides poultry feed, poultry drinking water has the potential to contribute small concentrations of chlorine to the manure, owing to water disinfection with chlorine compounds. Some poultry growers add an arsenic-based anti-parasitic compound to drinking water or poultry feed in small quantities and this can impart trace levels of arsenic to the manure. Fibrominn concluded that the *manure component* of the poultry litter has the *potential* to impart significant quantities of four contaminants: N, Cl, S, and arsenic (As).

Bedding Material Component of Poultry Litter. Bedding material used in poultry barns is intended to mimic bedding conditions that birds establish in nature. For this reason, the bedding material is a form of clean cellulosic biomass. The poultry litter burned by Fibrominn as a fuel comes from regional poultry growers who use wood shavings and sunflower hulls as the bedding materials, although materials such as sawdust and peanut shells are used in other

parts of the country. The bedding-material component of the litter that Fibrominn uses as a fuel is comprised entirely of materials that EPA has determined to be clean cellulosic biomass materials. Accordingly, the bedding-materials component of poultry litter does not impart contaminants to the poultry litter that differ in type or level from the contaminant types and low levels that are inherently characteristic of clean cellulosic biomass.

Identification of Contaminants in Fibrominn's Poultry Litter that Warrant Numeric Versus Qualitative Contaminant Comparisons

For Fibrominn's poultry litter, the contaminants that warrant numeric contaminant comparisons versus those for which qualitative comparisons are appropriate and sufficient have been identified based on:

- Review of the available laboratory analytical data on poultry litter contaminant levels, including laboratory analyses commissioned by Fibrominn, as well as such data from the literature.
- Fibrominn's extensive and unique experience in operating a 55MW biomass power plant fueled principally with poultry litter, including Fibrominn's knowledge of poultry growing practices, poultry litter management practices, and poultry litter characteristics gained from Fibrominn's direct interface with poultry growers while in the course of contracting poultry litter fuel supplies.

Below, the contaminants present in Fibrominn's poultry litter are identified that are present at levels sufficient to warrant numerical contaminant comparisons with levels present in traditional fuels. Following that, the contaminants are identified for which qualitative contaminant comparisons based on expert knowledge are sufficient to reasonably establish that the contaminant is not present in Fibrominn's poultry litter at a level higher than found in traditional fuels.

Contaminants Warranting Numeric Contaminant Comparisons

Fibrominn has identified four contaminants for which its poultry litter fuel has the *potential* to have contaminant levels that exceed levels in traditional fuels: nitrogen (N), chlorine (Cl), sulfur (S), and arsenic (As). Hence, explicit, numeric contamination comparisons have been performed for each of those four contaminants. Further discussion of those four contaminants follows.

Nitrogen (N) – Animal manures are highly organic materials that characteristically have a high nitrogen content. As EPA has noted, animal manures can have elevated levels of nitrogen, relative to traditional fuels. This is relevant because a high fuel nitrogen content implies the potential for higher NOx emissions when the fuel is combusted.

Chlorine (Cl) – As EPA has noted, animal manures can have elevated levels of Cl, relative to traditional fuels. Poultry litter has the potential to have higher Cl levels than many traditional fuels, because chlorine compounds are present in the poultry diet (*e.g.*, salt, chlorinated drinking water). Furthermore, the Cl level in poultry litter can vary, depending on variations in poultry diet. The Cl level in poultry litter is relevant because higher fuel Cl content implies the potential for higher HCl emissions when the fuel is combusted.

Sulfur (S) - Poultry litter has the potential to have higher sulfur levels than some traditional fuels, because sulfur compounds are present in constituents of the poultry diet. This is relevant because higher fuel sulfur content implies the potential for higher SO_2 emissions when the fuel is combusted.

Arsenic Compounds (As) – Some poultry growers add a small amount of an arsenic compound to poultry drinking water or poultry feed to prevent parasitic infections in the birds. The trend in the poultry industry, however, is towards reduced use of arsenic compounds and the State of Maryland is the first to be pursuing an outright ban. That said, because such arsenic compounds remain in use, trace amounts of arsenic can be present in the poultry litter and can potentially be emitted to the air when the poultry litter is combusted. Accordingly, the levels of arsenic present in poultry litter have been compared numerically with arsenic levels present in traditional fuels.

Contaminants Warranting Qualitative Contaminant Comparisons

Except for nitrogen (N), chlorine (Cl), sulfur (S), and arsenic (As) which were discussed above, Fibrominn has determined that for all other contaminants and groups of contaminants, the contaminant levels present in its poultry litter can be reasonably assumed comparable to levels in traditional fuels. Examples of such other contaminants include halogens (other than Cl addressed above), metals classified by volatility (other than As addressed above), volatile and semi-volatile organic compounds, PCBs, and dioxin/furan precursors. Fibrominn has based its determination of comparable contamination levels for pollutants other than N, Cl, S, and As on its expert knowledge of the properties of poultry litter and poultry-growing practices.

With the exception of N, Cl, S, and As, it is reasonable to assume that Fibrominn's poultry litter does not have the potential to contain significant levels of any other regulated contaminant. This conclusion is based on assessing the two components of poultry litter discussed above, bedding material and excreted manure. It was noted previously that bedding material is categorized by EPA as clean cellulosic biomass which is inherently low-contaminant material. Also as noted, poultry manure derives from feed that is formulated mostly from grains and processed grains, all of which EPA considers to be clean cellulosic biomass materials. Therefore, with the exception of N, Cl, S, and As, qualitative assessment of contaminant levels in poultry shows that Fibrominn's poultry litter should contain no other regulated

contaminants at levels that would be higher than levels present in traditional fuels. Nonetheless, where data specific to poultry litter exist, Fibrominn has undertaken numerical contaminant comparisons with traditional fuels for additional contaminants beyond N, Cl, S, and As. Finally, because potential concerns over mercury and dioxins/furans ("dioxin") often arise whenever an alternative fuel is combusted, further assessment was made for mercury and dioxins/furans. In the case of mercury, there were data available to make limited numeric contaminant comparisons.

Fuels the Fibrominn Plant is Designed to Burn

As noted previously, EPA has stated that contaminant comparisons between a given secondary material and traditional fuel materials can be made for any traditional fuel material that the unit is designed to burn, whether or not the combustion unit is permitted to burn that traditional fuel. In addition, EPA guidance indicates that "designed to burn" also considers the adequacy of the fuel feed mechanism for getting the material into the combustion unit, as well as the need to ensure that the material is well mixed during combustion and that the combustion temperature is maintained within unit specifications. [78 FR 26, pp.9136, 9150]

The Fibrominn plant uses a standard spreader-stoker grate boiler system, with design enhancements to enable firing poultry litter as the principal fuel (e.g., grate ash management). The principal fuel, poultry litter, is mixed with secondary biomass in the enclosed fuel hall by overhead hydraulic cranes. If necessary, the mixed fuel is minimally mechanically processed to break down any clumps of material. The fuel is then moved using a standard conveyor belt into the combustion unit.

While the Fibrominn plant was specifically designed to use poultry litter as the principal fuel, its standard stoker combustion technology and simple fuel handling system, inherently enable the combustion of a wide variety of solid fuel materials, as long as the fuel "particle size" is adequately small. Stoker boilers are specifically noted for their fuel flexibility. Besides poultry litter, the design of the Fibrominn plant would enable effective performance using the following traditional fuels: solid fossil fuels (coal, petroleum coke), tire-derived fuel (TDF), and many forms of "clean cellulosic biomass," as defined by EPA. Examples of serviceable biomass fuels include wood chips, crop residue (e.g. corn stover, alfalfa stems), and byproducts of ethanol natural fermentation processes, notably distillers dried grains with solubles (DDGS). Accordingly, Fibrominn has compared contaminant levels present in its poultry litter fuel with contaminant levels present in the traditional fuels, coal, petroleum coke, TDF, woody biomass, DDGS, corn stover, and alfalfa stems.

Contaminant Comparisons

Fibrominn has assembled extensive test data on the contaminant levels present in poultry litter for comparison with contaminant levels present in traditional fuels. Historically, to inform the design effort for its power plant, Fibrominn had sponsored extensive testing of the poultry litter generated regionally in Minnesota that now constitutes its fuel supply. Fibrominn has supplemented its own substantial data base of the contaminant levels in poultry litter with additional data from the literature. These databases on contaminant levels in poultry litter are summarized in Table 1, at the end of this letter.

Fibrominn prepared tabular comparisons between contaminant levels present in poultry litter and contaminant levels present in a variety of traditional fuels as follows:

- Contaminants Present in Poultry Litter vs. Fossil Fuels (Coal, Petroleum Coke). Please refer to Table 2.
- Contaminants Present in Poultry Litter vs. Tire-Derived Fuel (TDF). Please refer to Table 3.
- Contaminants Present in Poultry Litter vs. Clean Cellulosic Biomass (Wood Fuel, DDGS, Corn Stover, Alfalfa Stems). Please refer to Table 4.

Results of the contaminant comparisons are presented below.

Nitrogen (N)

Manures, as highly-organic materials, are inherently high in N content. This includes poultry manure, which is one of two materials of which poultry litter is comprised, the other being bedding material (e.g., wood shavings). As shown in Table 1, the N content of poultry litter, as received, averages about 3%, and ranges from approximately 1% to 6%. The N content for Fibrominn's poultry litter (average and range) is slightly lower than the literature values of N in poultry litter.

Comparing the N level in poultry litter (as received) with the N levels in traditional fuels (Tables 2 to 4), results in the following observations:

- The average N level in poultry litter (~3%) is higher than the average levels in coal (~1.5%), TDF (0.36%), wood fuel (0.35%), corn stover (0.61%), and alfalfa stems (1.0%). However, the average N level in poultry litter (~3%) is lower than the average level in DDGS (~5% dry basis, ~4% as received). Note that Fibrominn tested DDGS to support design of the boiler, and hence, considered DDGS specifically to be one of the biomass fuels that the plant would be designed to burn. The Fibrominn test data for DDGS are included in Table 4.

- The range of N levels in poultry litter (~1% to 6%) is consistent with the ranges in coal (~1 to 5.4%) and DDGS (4.5 to 5.5%), but greater than the range for pet coke (1% to 2.6%), TDF (0.24% to 0.49%), and wood fuel (0.02% to 4%).

To summarize, the average N level in poultry litter is higher than in most traditional fuels, except for at least one, DDGS, which has a higher average N level than poultry litter. However, the range of N levels in poultry litter is consistent with those of both coal and DDGS. Notably, DDGS is a biomass material the properties of which were tested and explicitly considered in the design of the Fibrominn plant's boiler system. It is concluded that, on balance, considering mean and range values of N, the N level in the poultry litter combusted by Fibrominn is comparable to the N levels present in the traditional fuels, coal and DDGS.

In the specific case of Fibrominn's poultry litter fuel and combustion system, "total nitrogen" may not be an appropriate contaminant to utilize for the purpose of contaminant comparisons with traditional fuels. Fibrominn's poultry litter material is demonstrated to have high N levels, that while comparable to the traditional fuels, coal and DDGS, are numerically higher than in most traditional fuels. However, functionally, the N level in poultry litter *that is available for conversion to NOx via combustion* may not be higher than in additional traditional fuels beyond coal and DDGS. EPA has made a case-specific determination that total N is not an appropriate contaminant to consider in the specific case of a high-nitrogen organic material, when that material is burned in a stoker boiler system equipped with a Low NOx firing system that includes Low-NOx Burners and Overfire Air. EPA's determination was in response to a petition to EPA, in which the petitioner sought a non-waste determination for dried municipal sewage sludge (biosolids) having a high N content of ~5% to 7% (dry basis), when the biosolids are co-fired with coal in a stoker boiler. The petitioner had argued that most of the N in biosolids is in the organic form (as ammonia, or converts to ammonia) and under the combustion conditions commensurate with a Low NOx firing system (i.e., lower oxygen level and lower flame temperature), the ammonia-related N will not convert to NOx, but rather, may suppress its formation. The petitioner concluded that the organic N present in the biosolids is not a contaminant, as it does not convert to NOx emissions during combustion. As summarized below, EPA stated its concurrence that in the petitioner's specific circumstances, total N is not an appropriate contaminant to consider:*

> "Regarding nitrogen, the processed biosolids have somewhat higher levels of total nitrogen than coal. However, as you argue in your September 9, 2011 letter, total nitrogen is not an appropriate way to assess this contaminant – in *your specific situation* – that will form NOx during combustion. Specifically, you note that ammonia and organic nitrogen, which will be rapidly converted into ammonia early in the combustion process, should not be considered as contaminants provided the combustion unit has a Low NOx firing system (i.e., Low NOx burners with Overfire Air). You also state that the majority of nitrogen in the processed biosolids is in fact ammonia or organic nitrogen. Due to the oxygen-deficient nature and flame temperatures characteristic of Low NOx firing systems, introducing ammonia into the combustion chamber via

the processed biosolids will actually *reduce* NOx emissions. This would happen as the ammonia reacts with existing NOx – always present in some amount due to nitrogen's presence in air – to form nitrogen gas and water. As such, we agree that total nitrogen is not an appropriate contaminant to consider for your processed biosolids, but this finding only applies in situations where the combustion unit receiving the fuel is equipped with a Low NOx firing system. This is the case at [the petitioner's combustion unit]."

* US EPA, 2012. Letter dated March 16, 2012 from James Berlow (EPA) to Fadi Mourad (DTEE) regarding biosolids as a non-waste material under the 40 CFR Part 241 regulations.

Notably, Fibrominn believes that the conclusion EPA made above for combustion of biosolids in a stoker boiler equipped with a Low NOx system also applies case-specifically to Fibrominn's combustion of poultry litter in the same type of combustion system. Like biosolids having a high N content (5% to 7%, dry basis), poultry litter has a high N level (~1% to 6%, as received). As with the biosolids case, the N present in the manure fraction of the poultry litter is mostly in the organic form of N. In addition, as with the biosolids combustion case, Fibrominn combusts its poultry litter in a spreader-stoker boiler equipped with the same Low NOx firing system; i.e., Low NOx burners plus Overfire Air. Hence, it is reasonable to assert that, as with the biosolids combustion case, the organic N content of Fibrominn's poultry litter is unlikely to convert to NOx upon combustion. Accordingly, total N may not be an appropriate way to define N as a contaminant in the case of Fibrominn's poultry litter combustion, for the same reason EPA agreed this to be true for biosolids combustion in an analogous case-specific setting.

In conclusion, Fibrominn's poultry litter material is demonstrated to have high N levels; however, on balance, those levels are comparable to the traditional fuels, coal and DDGS. While comparable with N levels in coal and DDGS, the N levels in poultry litter are numerically higher than in most traditional fuels. However, the N level in Fibrominn's poultry litter *that is available for conversion to NOx via combustion* may not be higher than the N levels in some other traditional fuels beyond coal and DDGS. This is because the N present in the manure component of the poultry litter is largely in the organic form, which is unlikely to convert to NOx in Fibrominn's specific combustion system, a stoker boiler equipped with Low NOx burners and Overfire Air control. Hence, in the specific case of Fibrominn's poultry litter fuel and combustion system, total N may not be an appropriate way to define N as a contaminant.

Chlorine (Cl)

As shown in Table 1, the Cl content of poultry litter, as received, averages about 0.4%, and ranges from approximately 0.1% to 1%. The Cl content for Fibrominn's poultry litter (average and range) is consistent with the literature values of Cl in poultry litter.

Comparing the Cl level in poultry litter (as received) with the Cl levels in traditional fuels (Tables 2 to 4), results in the following observations:

- The average Cl level in poultry litter (~0.4%) is higher than the average levels in coal (~0.1%), pet coke (0.02%), TDF (0.11%), and wood fuel (0.026%), and marginally higher than the average Cl level in DDGS, for which literature values for the average range as high as 0.3%. However, the average Cl level in poultry litter (~0.4%) is comparable with literature values reported for the average Cl level in corn stover (0.7%, 0.6%, 0.2%, dry basis) and alfalfa stems (0.5%, 0.27%, 0.03%, dry basis).

- The range of Cl levels in poultry litter (~0.1% to 1%) is consistent with the ranges in coal (ND% to 0.91%) and TDF (~0.01% to 0.7%). The range of Cl levels in poultry litter (~0.1% to 1%) is marginally greater than in wood fuel (ND% to 0.54%, dry basis) and greater than the range in pet coke (0.0007% to 0.3%). Literature data were not found regarding the ranges of Cl levels in DDGS, corn stover, or alfalfa stems.

To summarize, the average Cl level in poultry litter is comparable with average levels found in corn stover and alfalfa stems, which are materials that EPA includes under the category of clean cellulosic biomass. In addition, the range of Cl levels in poultry litter is consistent with the ranges for both coal and TDF. It is concluded that, on balance, the Cl levels present in Fibrominn's poultry litter fuel are comparable to levels present in four traditional fuels: coal, TDF, corn stover, and alfalfa stems.

Fluorine (F)

As noted previously, fluorine (F) is one of the contaminants for which Fibrominn, based on expert knowledge and experience with the composition and handling of poultry litter, has determined that poultry litter is unlikely to contain significant levels. The litter is comprised of digested poultry feed and poultry bedding (clean wood shavings) and there is no known mechanism by which significant amounts of fluorinated compounds would be present in those materials.

The only data Fibrominn found on F levels present in poultry litter is the limited test data that Fibrominn generated itself (14 tests total). As shown in Table 1, the Fibrominn poultry litter had an average F level of 0.02% and a range of 0.01% to 0.05%. Except for coal and wood fuel, Fibrominn has found little literature data on the ranges of F found in traditional fuel materials. The limited test data available for poultry litter indicates that the F level in poultry litter, although very small, may potentially be slightly higher than levels present in coal and wood fuel (Tables 2 and 4). However, for poultry litter, wood fuel, and coal, the upper end of the range of F concentrations is a very small amount in each case; i.e., all three materials have a maximum concentration of F in the range of 0.013% to 0.05%. In addition, because of the

limited F data available for poultry litter, the indicated differences in F levels for litter versus coal and wood fuel may not be statistically meaningful. Finally, if the poultry litter is compared with coal (Table 2) for the contaminant group, "halogens (Cl + F)," it is clear that the range of halogen concentrations for poultry litter (~0.1% to 1%) is comparable with the range for coal (ND% to 0.93%).

In conclusion, based on expert knowledge and experience with the composition and handling of poultry litter, Fibrominn has determined that poultry litter is unlikely to contain significant levels of F. Data are limited for assessing the average and range of F levels present in poultry litter and in traditional fuels except for wood fuel and coal. An assessment of the limited available data indicates that poultry litter and coal have comparable ranges for the contaminant group, halogens, which includes both F and Cl.

Sulfur (S)

As shown in Table 1, the S content of poultry litter, as received, averages about 0.5%, and ranges between approximately 0.13% to 1.1%. The S content for Fibrominn's poultry litter (average and range) is marginally lower than the literature values of S for poultry litter.

Comparing the S level in poultry litter (as received) with the S levels in traditional fuels (Tables 2 to 4), results in the following observations:

- The average S level in poultry litter (~0.5%) is lower than the average levels in coal (~1.36%), pet coke (4.9%), and TDF (1.56%), and marginally lower than in DDGS (~ 0.6% to 0.8%).
- The range of S levels in poultry litter (0.13% to 1.1%) is less than the ranges in coal (~1 to ~6%), pet coke (~0.5% to ~8%), and TDF (0.9% to 2.8%).

Hence, the S level present in Fibrominn's poultry litter fuel is less than levels present in coal, petroleum coke, and TDF, and is likely marginally lower than average levels in DDGS.

Arsenic (As)

As discussed previously above, some poultry growers add a small amount of an arsenic compound to poultry drinking water or poultry feed to prevent parasitic infections in the birds. Accordingly, trace amounts of arsenic can be present in the poultry litter and can potentially be emitted to the air when the poultry litter is combusted. The most commonly used arsenic compound for poultry parasite control had historically been Roxasone. An academic study found that poultry litter from chickens receiving feed *not* containing Roxasone had arsenic present in the litter at a concentration of ~1 ppm; while chickens receiving feed with Roxasone had arsenic concentrations in the litter ranging from ~3 ppm to ~80 ppm.[+] Roxasone's manufacturer stopped distribution of the product to the poultry industry prior to 2012; however, some poultry growers use another compound containing arsenic. Because some

growers still use anti-parasite compounds containing arsenic, the levels of arsenic present in poultry litter have been compared numerically with arsenic levels present in traditional fuels.

[+]Fisher, Daniel et al., University of Maryland, 2011. "The Environmental Concerns of Arsenic Additives in Poultry Litter: A Literature Review," December 1, 2011. Prepared in response to a request from the Maryland General Assembly.

As shown in Table 1, the arsenic content of poultry litter, as received, averages ~14 ppm in general, and ranges between approximately 0.13 to 41 ppm. This is based on test data for Fibrominn's poultry litter as well as on data from the literature. Note that the upper end of that range of arsenic concentration is consistent with the upper end of the range cited above for litter derived from chickens receiving Roxasone in their feed. *Notably, the arsenic content for Fibrominn's poultry litter is substantially lower than levels based on the literature.* The Fibrominn poultry litter tested to have arsenic levels averaging ~0.1 ppm and ranging from ~0.2 to ~3 ppm. It is likely that the higher levels of arsenic in litter as taken from the literature are reflective of levels tested when Roxasone was still in common use. The much lower arsenic values found in Fibrominn's poultry litter are consistent approximately with levels found in litter resulting from poultry not receiving Roxasone. It is likely, however, that some poultry growers supplying litter to Fibrominn still use an anti-parasite additive that contains some arsenic, although not the additive, Roxasone.

Comparing the arsenic levels in poultry litter (as received) with the arsenic levels in traditional fuels (Tables 2 to 4), results in the following observations:

- Considering the entire data base (Fibrominn data and literature values), the <u>average</u> arsenic level in poultry litter (~14 ppm) is somewhat greater than in coal (~8 ppm), TDF (~4 ppm), and wood fuel (~6 ppm). However, considering only the test data for the poultry litter used as fuel at the Fibrominn plant, the average arsenic level (~1 ppm) is somewhat lower than the average levels for coal (~8 ppm), TDF (~4 ppm), and wood fuel (~6 ppm).

- Considering the entire data base for poultry litter (Fibrominn data and literature values), the <u>range</u> of arsenic levels in poultry litter (0.1ppm to 41ppm) is less than the ranges in coal (~ND to 174 ppm) and wood fuel (ND to 298 ppm). For Fibrominn litter only, the range of arsenic levels (~0.2 ppm to 3.2 ppm) is two orders of magnitude less than the ranges for coal and wood fuel.

In summary, the arsenic level present in Fibrominn's poultry litter fuel is less than levels present in wood fuel and coal, and the arsenic level in poultry litter in general (considering literature values), is comparable, on balance, with levels in wood fuel and coal.

Mercury (Hg)

There is no mechanism by which mercury compounds in significant quantities would be added to the poultry feed or to the clean cellulosic biomass material that serves as bedding material. Therefore, there is no basis apparent for expecting elevated mercury levels in the poultry litter. While significant mercury levels are not reasonably expected in poultry litter, potential concerns over mercury emissions often arise whenever an alternative fuel is combusted. Accordingly, numeric contaminant comparisons were made with traditional fuels using the limited available data for mercury levels in poultry litter.

Fibrominn had samples of poultry litter from three of its suppliers tested for mercury and the results showed no mercury present at a detection level of 0.05 ppm. [Galbraith Laboratories, Inc., Laboratory Report to T. Walmsley, Fibrowatt LLC, dated May 23, 2001] The actual level of mercury may be lower than the non-detection level of 0.05 ppm, given that achieving even lower detection limits for mercury, specifically in organic substrates, is technically challenging.

From Table 1, the literature values for mercury present in poultry litter are higher than for Fibrominn's tested poultry litter. The literature values shown in Table 1 indicate an average mercury concentration of 0.12 ppm for poultry litter and a range up to 0.25 ppm. From Tables 2 through 4, the upper end of the range of mercury levels in coal (1.0 ppm) and pet coke (0.5 ppm) is higher than for poultry litter (0.25 ppm), and the upper end of the ranges for TDF (0.33 ppm) and wood fuel (0.2 ppm) are about the same as poultry litter. It is concluded that the mercury level present in Fibrominn's poultry litter is likely non-detectable, and in any case, is comparable with levels found in wood fuel and TDF.

Dioxins/Furans

The precursors for formation of dioxin are thought to be chlorine, certain combustion-related organic compounds, and metal catalysts such as copper. The presence of chlorine in a fuel material, in and of itself, is not a predictor of potential dioxin emissions. While poultry litter contains chlorine, it does not have the required organic-compound or metal catalyst precursors to form elevated levels of dioxin when the poultry litter is combusted in a modern power plant. By contrast, for example, municipal solid waste does have all required precursors for formation and emission of dioxins/furans when the material is combusted. Indicative of the fact that poultry litter does not contain the requisite contaminant precursors for significant dioxin formation are the results of dioxins/furans emissions testing recently performed at Fibrominn. Testing performed in 2012 indicated the emission rate of Total Dioxins/Furans to be 0.12 ng/dscm @ 7% O2. [Eagle Mountain Scientific, Inc., Test Report to Fibrominn LLC, May 8-10, 2012] The tested emission rate is well below any EPA Section-129 Emission Guideline or Section 112 MACT standard that is potentially applicable to the Fibrominn Facility. Notably, the very-low tested emission rate was achieved at Fibrominn without the need to have incorporated dioxin-targeted

emission controls (i.e., activated carbon injection) that are standard at municipal waste combustors, for example.

Other Contaminants

As discussed previously above, with the exception of N, Cl, S, and As, Fibrominn believes that its poultry litter contains no other regulated contaminants at levels that could potentially be higher than levels present in traditional fuels. Fibrominn has reasonably based this conclusion on its expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. While Fibrominn believes this to be a sufficient contaminants comparison demonstration for contaminants other than N, Cl, S, and As, it has nonetheless undertaken numerical contaminant comparisons with traditional fuels for additional contaminants, where data specific to poultry litter was available to enable this. Limited data on contaminant levels in poultry litter were also found to be available for a number of metals beyond the metals, arsenic and mercury, already addressed above. Contaminants comparisons are summarized below for those metals, based on the limited data available. Results corroborate Fibrominn's qualitative determination, based on expert knowledge, that contaminants besides N, Cl, S, and As are not present in poultry litter at levels that are potentially higher than levels found in traditional fuels.

Contaminant Comparisons for Metals Based on Limited Available Data	
Metal	**Comparison of Poultry Litter with Traditional Fuels (Tables 2, 3, 4)**
Arsenic (As)	Contaminant comparison was made separately above.
Beryllium (Be)	Contaminant comparison data not available for poultry litter.
Cadmium (Cd)	Levels in litter are approximately comparable with coal, TDF, and wood.
Chromium (Cr)	Levels in litter are less than for coal, pet coke, TDF, and wood fuel, based on Fibrominn data for litter. Range for litter is comparable to wood fuel based on literature values for litter.
Cobalt (Co)	Levels in litter are less than for coal, TDF, and wood fuel.
Lead (Pb)	Levels in litter are less than for coal, TDF, and wood fuel, based on Fibrominn data for litter. Range for litter is less than for TDF and wood fuel based on literature values for litter.
Manganese (Mn)	Levels for litter are less than for coal and TDF.
Mercury (Hg)	Contaminant comparison was made separately above.
Molybdenum (MO)	Contaminant comparison data not available for traditional fuels.
Nickel (Ni)	Range for litter is less than for coal and pet coke, and comparable to wood fuel.
Selenium (Se)	Levels for litter are less than in coal and are comparable, on balance, to levels in pet coke, TDF, and wood fuel.
Zinc (Zn)	Levels for litter are less than in TDF (no comparison data available for other traditional fuels).

5.0 CONCLUSIONS

Fibrominn has demonstrated that its poultry litter fuel meets all requirements for EPA to grant a non-waste determination under 40 CFR § 241.3(c). Specifically, Fibrominn has demonstrated that its poultry litter fuel has not been discarded and that it meets the fuel legitimacy criteria at 40 CFR § 241.3(d) as well as the related criteria at 40 CFR § 241.3(c)(1).

Fibrominn's Poultry Litter is not discarded; is managed as a valuable fuel product; and has a meaningful heating value for energy recovery.

The poultry litter that Fibrominn combusts as a fuel meets the legitimacy criterion for "managed as a valuable commodity" and hence, is not discarded. The poultry litter is managed specifically as a valuable fuel product from generation, through transport to Fibrominn, and receipt and storage of the poultry litter at Fibrominn just prior to combustion. The poultry litter is always procured from the poultry growers under contract and must meet a prescribed fuel specification by contract. Fibrominn always pays the generator a price for the poultry litter fuel. The poultry litter is always transported in fully-covered trucks and upon delivery to Fibrominn, is received, off-loaded, and stored in a fully-enclosed fuel hall prior to combustion. These measures are specifically intended to (1) preserve fuel quality by prohibiting weather-related moisture uptake and (2) to prevent contact between litter and the environment, and the resultant potential impacts to the air, water, or land. Under normal operations, the potential for environmental impacts during poultry litter transport and delivery is arguably less than with some traditional fuels such as wood chips and coal, which are routinely stored in piles outdoors prior to combustion. During infrequent plant outages, poultry litter contracted by Fibrominn may be temporarily stored at the transporter's facilities, indoors or outdoors, then delivered to Fibrominn when the plant comes back on line. The duration of such staged delivery is limited to a maximum of one to two months, specifically to ensure that the quality of the poultry litter fuel does not significantly degrade and in order to minimize the potential for runoff-related environmental impacts that could occur with longer-term storage.

The poultry litter that Fibrominn combusts as a fuel meets the criterion for having a "meaningful heat value" for energy recovery. The poultry litter that Fibrominn uses as a principal fuel has an "as fired" heating value (expressed as HHV) that is less than the EPA presumptive benchmark of 5,000 Btu/lb for meaningful heat recovery. While the heating value for poultry litter, as received, is less than EPA's benchmark, poultry litter burns autogenously in stoker boilers, and particularly at Fibrominn, when comprising the *majority* fraction of the fuel mix of litter and wood chips (50% to 75% poultry litter). Since 2007, Fibrominn has established a strong commercial operating record demonstrating that, with its stoker boiler system, it can combust poultry litter as the principal fuel autogenously (without using supplemental fuel), in turn, recovering meaningful energy cost-effectively and with high reliability, resulting in profitable sale of the energy. With poultry litter as its principal fuel, Fibrominn has combusted

350,000 to 450,000 tons per year of poultry litter as the principal fuel to generate over 400,000 MWh annually of electric power that is sold on the grid.

Contaminant levels in Fibrominn's poultry litter are comparable to or less than levels in traditional fuels.

As regards contaminant comparisons, EPA had expressed a generic concern regarding the levels of nitrogen (N) and chlorine (Cl) present in manures compared with traditional fuels. This would include the poultry manure component of poultry litter. Besides N and Cl, Fibrominn determined that sulfur (S) and arsenic (As) also warranted numerical contaminant comparisons with levels in traditional fuels. This determination was based on the fact that sulfur is present in poultry diets (and hence, in excreted manure) and that some poultry growers add an arsenic-based compound to poultry feed or water in small amounts to combat parasites. Contaminant levels in Fibrominn's poultry litter (as well as literature values) were compared with contaminant levels present in traditional fuels that Fibrominn's stoker boiler system is designed to burn: coal, petroleum coke, tire-derived fuel (TDF), wood chips, distillers dried grain with solubles (DDGS), corn stover, and alfalfa stems. The levels of N, Cl, S, and As present in the poultry litter that Fibrominn burns as a fuel were demonstrated to be at levels numerically comparable to or less than levels in traditional fuel materials. Summary conclusions resulting from the contaminant comparisons made for N, Cl, S, and As are presented below:

Summary Contaminant Comparisons for Nitrogen, Chlorine, Sulfur, and Arsenic

Contaminant	Comparison of Poultry Litter with Traditional Fuels (Tables 2, 3, 4)
Nitrogen (N)	• The *average* N level in poultry litter is less than the average level in DDGS, a clean cellulosic biomass fuel, as defined by EPA • The *range* of N levels in poultry litter is comparable, on balance, with the ranges present in the traditional fuels, coal and DDGS. • "Total N" may not be an appropriate way to define the contaminant for Fibrominn's poultry litter. The organic N in the litter does not likely convert to NOx emissions when the litter is burned in Fibrominn's specific boiler type: stoker boiler with a Low-NOx firing system.
Chlorine (Cl)	• The *average* Cl level in poultry litter is comparable with the average levels in corn stover and alfalfa stems, which are clean cellulosic biomass fuels, as defined by EPA • The *range* of Cl levels in poultry litter is comparable with the ranges present in the traditional fuels, coal and TDF.
Sulfur (S)	• The *average* S level in poultry litter is less than average values in the traditional fuels, coal, petroleum coke, TDF, and comparable with average level in DDGS. • The *range* of S levels in poultry litter is less than the ranges in the traditional fuels, coal, petroleum coke, and TDF.

Arsenic(As)	• Fibrominn's poultry litter has low levels of As compared with literature values for poultry litter nationally. • *Average* levels of As in Fibrominn's poultry litter are less than average values in the traditional fuels, wood, coal, and TDF. • The *range* of As values present in poultry litter in general (including literature values nationally) is comparable, on balance, with the ranges for coal and wood fuel.

In addition to N, Cl, S, and As, Fibrominn also determined that its poultry litter contains no other regulated contaminants at levels that would be higher than levels present in traditional fuels. Fibrominn had reasonably based this conclusion on its expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. While Fibrominn believed its qualitative analysis to be sufficient, it nonetheless performed numerical contaminant comparisons with traditional fuels for additional contaminants beyond N, Cl, S, and As, where data specific to poultry litter was available to enable this. Limited data on contaminant levels in poultry litter were found to be available for mercury and a number of other metals. Results of those contaminants comparisons corroborated Fibrominn's qualitative determination, based on expert knowledge, that contaminants besides N, Cl, S, and As do not have the potential to be present in poultry litter at levels higher than those found in traditional fuels.

6.0 PRECEDENT NON-WASTE DETERMINATION

Under its delegated regulatory authority, the North Carolina Department of Environment and Natural Resources (NCDENR) has made a case-specific determination in 2012 that poultry litter is not a solid waste when used as a fuel in a combustion unit.# Prestage Farms, Inc. applied for the non-waste determination for the poultry litter it plans to combust as a boiler fuel to recover saleable energy at its feed mill in North Carolina. NCDENR determined that the poultry litter in that case is not a solid waste when combusted because the poultry litter is ". . . . maintained within the control of the generator, and meets the fuel criteria provided in 40 CFR 241.3(d)(1)." The NCDENR determination that poultry litter meets the fuel legitimacy criteria is a directly relevant precedent with regard to the application Fibrominn makes here for a non-waste determination for its poultry litter fuel. While Fibrominn's poultry litter fuel is not maintained within the control of the generator, it was clearly demonstrated above that the litter has not been discarded. Accordingly, because Fibrominn's poultry litter also meets the fuel legitimacy criteria at 40 CFR 241.3(d), Fibrominn's poultry litter is a non-waste material, consistent with the non-waste determination made by NCDENR for the Prestage Farms poultry litter.

When Prestage Farms performed its contaminants comparisons, the contaminant levels in its poultry litter were reported on a dry basis, rather than on the basis EPA prefers and Fibrominn used – an as-received basis. Because of the significant technical differences in reporting bases, it

was not technically appropriate for Fibrominn to include Prestage's poultry-litter contaminant data in the literature data base when Fibrominn performed its contaminant comparisons.

North Carolina Department of Environment and Natural Resources (NCDENR), 2012. Letter from Donald van der Vaart (DENR) to John Prestage (Prestage Farms) dated July 19, 2012, Subject: Applicability Determination No. 1887 – Secondary Materials Determination. Accessed April 2013 at: http://daq.state.nc.us/permits/memos/prestage%20farms%20NHSM%20determination.pdf

Fibrominn appreciates the Agency's efforts in reviewing this application for a non-waste determination. Please do not hesitate to contact me with any questions or should you need further information to facilitate your review. My contact information is:

- Shiv Srinivasan, Fibrominn Plant Manager (Shiv.Srinivasan@contourglobal.com; 320-297-0821).

Please also copy the following individuals on any email or written correspondence:

- David Minott, Arc5 Environmental Consulting (david.minott@arc5enviro.com);
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com).

Sincerely,

Shiv Srinivasan,
Plant Manager
Fibrominn LLC

cc: MPCA via email –

- Trevor Shearen (trevor.shearen@state.mn.us)
- Richard Cordes (richard.cordes@state.mn.us)
- Steve Gorg (steven.gorg@state.mn.us)

Also -

- David Minott, Arc5 Environmental Consulting LLC (david.minott@arc5enviro.com)
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com)

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Table 1: Contaminant Levels in Poultry Litter

		Fibrominn Poultry Litter- *As Rcvd. (1999 - 2002)* [1,2]			Literature - Poultry Litter - *As Rcvd* .[3]			Poultry Litter - *As Rcvd.*: Fibrominn[1,2] and Literature[3]		
	Units	No. of Samples	Average	Range	No. of Samples	Average	Range	No. of Samples	Average	Range
N, S, Halogens										
Nitrogen (N)	%	111	2.63	1.02 - 4.36	1,545	3.27	0.732 - 5.93	1,656	3.23	0.732 - 5.93
Sulfur (S)	%	111	0.38	0.16 - 0.70	1,419	0.54	0.133 - 1.11	1,530	0.53	0.133 - 1.11
Chlorine (Cl)	%	109	0.38	0.1 - 0.89	9	0.63	0.318 - 0.97	118	0.40	0.1 - 0.97
Fluorine (F)	%	14	0.02	0.01 - 0.05	--	--	--	14	0.02	0.01 - 0.05
Metal Elements										
Arsenic (As)	ppm	7	1.13	0.22 - 3.16	9	23.5	13.5 - 40.5	16	13.71	0.22 - 40.5
Beryillum (Be)	ppm	--	--	--	--	--	--	--	--	--
Cadmium (Cd)	ppm	--	--	--	16	1.46	0.068 - 4.39	16	1.46	0.068 - 4.39
Chromium (Cr)	ppm	8	1.19	0.19 - 1.82	9	75	8.5 - 230	17	40.27	0.19 - 230
Copper (Cu)	ppm	--	--	--	1,447	278	17.1 - 632	1,447	278	17.1 - 632
Lead (Pb)	ppm	8	0.55	0.09 - 1.07	14	20	0.8 - 70	22	12.93	0.09 - 70
Manganese (Mn)	ppm	--	--	--	1,448	0.794	0.249 - 1.54	1,448	0.794	0.249 - 1.54
Mercury (Hg)	ppm	3	< 0.05	< 0.05	3	0.195	0.105 - 0.25	6	<0.123[4]	<0.05 - 0.25
Molybdenum (Mo)	ppm	--	--	--	446	0.439	0.102 - 2.15	446	0.439	0.102 - 2.15
Nickel (Ni)	ppm	--	--	--	15	45	1.68 - 185	15	45	1.68 - 185
Selenium (Se)	ppm	8	0.76	0.21 - 0.99	3	0.00041	0.00034 - 0.00045	11	0.55	0.00034 - 0.99
Zinc (Zn)	ppm	--	--	--	1,454	346	76.9 - 664	1,454	346	76.9 - 664

References

[1]Fibrominn Poultry Litter, As Received - Test Data Summary for N, S, Cl, and HHV (1999 to 2002)

[2]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]Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined. Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html

[4]Non-detect values were included in calculating the average and range.

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Table 2: Contaminant Comparisons - Poultry Litter Versus Fossil Fuels

		Poultry Litter - *As Received*						Coal - *Dry Basis* [4]				Pet Coke - *Dry Basis* [5]	
		Fibrominn Poultry Litter - *As Rcvd. (1999 - 2002)* [1,2]			Poultry Litter - *As Rcvd:* Fibrominn[1,2] & Literature[3]			All	EPA OAQPS		EPA - Literature		
	Units	No. of Samples	Average	Range	No. of Samples	Average	Range	No. of Samples	Average	Range	Range	Average	Range
N, S, Halogens													
Nitrogen (N)	%	111	2.63	1.02 - 4.36	1,656	3.23	0.732 - 5.93	17,000	1.51	1.36 - 5.4	--	--	1.0 - 2.6
Sulfur (S)	%	111	0.38	0.16 - 0.70	1,530	0.53	0.133 - 1.11	17,000	1.36	0.074 - 6.13	--	4.87	0.54 - 7.91
Chlorine (Cl)	%	109	0.38	0.1 - 0.89	118	0.40	0.1 - 0.97	17,000	0.099	ND - 0.908	--	0.02	0.0007 - 0.3
Fluorine (F)	%	14	0.02	0.01 - 0.05	14	0.02	0.01 - 0.05	17,000	0.006	ND - 0.0178	--	0.001	--
Metal Elements													
Arsenic (As)	ppm	7	1.13	0.22 - 3.16	16	13.71	0.22 - 40.5	17,000	8.2	ND - 174	0.5 -80	--	ND - 0.3
Beryillum (Be)	ppm	--	--	--	--	--	--	17,000	1.9	ND - 206	0.1 - 15	--	ND - 1.5
Cadmium (Cd)	ppm	--	--	--	16	1.46	0.068 - 4.39	17,000	0.6	ND - 19	0.1 - 3.0	--	0.00005 - 0.1
Chromium (Cr)	ppm	8	1.19	0.19 - 1.82	17	40.27	0.19 - 230	17,000	13.4	ND - 168	0.5 - 60	5.0	--
Cobalt (Co)	ppm	--	--	--	4	0.0019	0.0014 - 0.0029	17,000	6.9	ND - 25.2	0.5 - 30	--	--
Lead (Pb)	ppm	8	0.55	0.09 - 1.07	22	12.93	0.09 - 70	17,000	8.7	ND - 148	2 - 80	--	0.00009 - 0.6
Manganese (Mn)	ppm	--	--	--	1,448	0.794	0.249 - 1.54	17,000	26.2	ND - 512	5.0 - 300	--	2.4 - 4.0
Mercury (Hg)	ppm	3	< 0.05	< 0.05	6	<0.123[4]	<0.05 - 0.25	17,000	0.09	ND - 3.1	0.02 - 1.0	0.05	0.001 - 0.5
Molybdenum (Mo)	ppm	--	--	--	446	0.439	0.102 - 2.15	--	--	--	--	--	--
Nickel (Ni)	ppm	--	--	--	15	45	1.68 - 185	17,000	21.5	ND - 730	0.5 - 50	--	200 - 500
Selenium (Se)	ppm	8	0.76	0.21 - 0.99	11	0.55	0.00034 - 0.99	17,000	3.4	ND - 74.3	0.2 - 10	--	ND - 2.0
Zinc (Zn)	ppm	--	--	--	1,454	346	76.9 - 664	--	--	--	--	0.0005	--

References

[1]Fibrominn Poultry Litter, As Received - Test Data Summary for N, S, Cl, and HHV (1999 to 2002)

[2]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]Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined. Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html

[4]EPA "Contaminant Concentrations in Traditional Fuels: Tables for Comparison." November 29, 2011.

[5]Tables 4.1 - 4.3. National Council for Air and Stream Improvement, Inc. (NCASI). 2005. Alternative Fuels Used in the Forest Products Industry: Their Composition and Impact on Emissions. Technical Bulletin No. 0906. Research Triangle Park, NC: National Council for Air and Stream Improvement, Inc.

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		Table 3: Contaminant Comparisons -- Poultry Litter Versus Tire-Derived Fuel							
		Poultry Litter - *As Received*						Tires - *Dry Basis*[4]	
		Fibrominn Poultry Litter - *As Rcvd. (1999 - 2002)*[1,2]			Poultry Litter - *As Rcvd.*: Fibrominn[1,2] & Literature[3]				
	Units	No. of Samples	Average	Range	No. of Samples	Average	*Range*	Average	Range
N, S, Halogens									
Nitrogen (N)	%	111	2.63	1.02 - 4.36	1,656	3.23	0.732 - 5.93	0.36	0.24 - 0.49
Sulfur (S)	%	111	0.38	0.16 - 0.70	1,530	0.53	0.133 - 1.11	1.56	0.86 - 2.8
Chlorine (Cl)	%	109	0.38	0.1 - 0.89	118	0.40	0.1 - 0.97	0.11	0.01 - 0.6483
Fluorine (F)	%	14	0.02	0.01 - 0.05	14	0.02	0.01 - 0.05	0.001	--
Metal Elements									
Arsenic (As)	ppm	7	1.13	0.22 - 3.16	16	13.71	0.22 - 40.5	3.82	0.58 - 17.52
Beryillum (Be)	ppm	--	--	--	--	--	--	0.03	0 - 0.17
Cadmium (Cd)	ppm	--	--	--	16	1.46	0.068 - 4.39	1.1	0.39 - 1.91
Chromium (Cr)	ppm	8	1.19	0.19 - 1.82	17	40.27	0.19 - 230	29.65	5.29 - 92.74
Cobalt (Co)	ppm	--	--	--	4	0.0019	0.0014 - 0.0029	253	105 - 400
Lead (Pb)	ppm	8	0.55	0.09 - 1.07	22	12.93	0.09 - 70	70.65	22.76 -154.5
Manganese (Mn)	ppm	--	--	--	1,448	0.794	0.249 - 1.54	460	63.2 - 1786
Mercury (Hg)	ppm	3	< 0.05	< 0.05	6	<0.123[4]	<0.05 - 0.25	0.056	0.01 - 0.328
Molybdenum (Mo)	ppm	--	--	--	446	0.439	0.102 - 2.15	--	--
Nickel (Ni)	ppm	--	--	--	15	45	1.68 - 185	30.95	4.69 - 86.54
Selenium (Se)	ppm	8	0.76	0.21 - 0.99	11	0.55	0.00034 - 0.99	0.71	0.0 - 4.0
Zinc (Zn)	ppm	--	--	--	1,454	346	76.9 - 664	14,501	12,000 - 24,400

References

[1]Fibrominn Poultry Litter, As Received - Test Data Summary for N, S, Cl, and HHV (1999 to 2002)

[2]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]Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined. Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html

[4]Tables 3.1 - 3.4. National Council for Air and Stream Improvement, Inc. (NCASI). 2005. Alternative Fuels Used in the Forest Products Industry: Their Composition and Impact on Emissions. Technical Bulletin No. 0906. Research Triangle Park, NC: National Council for Air and Stream Improvement, Inc.

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Table 4: Contaminant Comparisons -- Poultry Litter Versus "Clean Cellulosic Biomass"

		Poultry Litter - *As Received*						Wood & Biomass - *Dry Basis*[4]				DDGS[5] - *Dry Basis*			Corn Stover - *Dry Basis*	Alfalfa Stems - *Dry Basis*
		Fibrominn Poultry Litter- *As Rcvd. (1999 - 2002)*[1,2]			Poultry Litter - *As Rcvd.* - Fibrominn[1,2] & Literature[3]			All	EPA OAQPS		EPA - Literature	Literature				
	Units	No. of Samples	Average	Range	No. of Samples	Average	Range	No. of Samples	Average	Range	Range	No. of Samples (ref. A / ref. B...)	Average (ref. A / ref. B...)	Range (ref. A / ref. B...)	Literature Average	Literature Average
N, S, Halogens																
Nitrogen (N)	%	111	2.63	1.02 - 4.36	1,656	3.23	0.732 - 5.93	12,000	0.35	0.22 - 0.46	0.02 - 3.95	32/4	4.9[6]/4.79[7]/3.6[9]	4.5 - 5.4[6]/–	0.61[8]/0.13[9]	1.00[8]/1.78[9]
Sulfur (S)	%	111	0.38	0.16 - 0.70	1,530	0.53	0.133 - 1.11	12,000	0.07	ND - 0.61	ND - 0.87	32/4	0.61[6]/0.77[7]/0.64[9]	0.31 - 1.05[6]/–	0.01[8]/0.01[9]	0.02[8]/0.13[9]
Chlorine (Cl)	%	109	0.38	0.1 - 0.89	118	0.40	0.1 - 0.97	12,000	0.026	ND - 0.54	ND - 0.26	2/–	0.18[7]/0.30[8]/0.13[9]	– / –	0.60[9]/0.22[10]/ 0.23[10]/0.72[10]	0.03[8]/0.27[9]/0.50[10]
Fluorine (F)	%	14	0.02	0.01 - 0.05	14	0.02	0.01 - 0.05	12,000	0.003	ND - 0.0128	ND - 0.03	–	–	–	–	–
Metal Elements												No Data			No Data	No Data
Arsenic (As)	ppm															
Beryillum (Be)	ppm															
Cadmium (Cd)	ppm	7	1.13	0.22 - 3.16	16	13.71	0.22 - 40.5	12,000	6.3	ND - 298	ND - 6.8					
Chromium (Cr)	ppm	–	–	–	–	–	–	12,000	0.3	ND - 10	–					
Cobalt (Co)	ppm	–	–	–	16	1.46	0.068 - 4.39	12,000	0.6	ND - 17	ND - 3.0					
Lead (Pb)	ppm	8	1.19	0.19 - 1.82	17	40.27	0.19 - 230	12,000	5.9	ND - 340	ND - 130					
Manganese (Mn)	ppm	–	–	–	4	0.0019	0.0014 - 0.0029	12,000	6.5	ND - 213	ND - 24					
Mercury (Hg)	ppm	8	0.55	0.09 - 1.07	22	12.93	0.09 - 70	12,000	4.5	ND - 229	ND - 340					
Molybdenum (Mo)	ppm	–	–	–	1,448	0.794	0.249 - 1.51	12,000	302.0	ND - 15,800	7.9 - 840					
Nickel (Ni)	ppm	3	< 0.05	< 0.05	6	<0.123[4]	<0.05 - 0.25	12,000	0.03	ND - 1.1	ND - 0.2					
Selenium (Se)	ppm	–	–	–	446	0.439	0.102 - 2.15	–	–	–	–					
Zinc (Zn)	ppm	–	–	–	15	45	1.68 - 185	12,000	2.8	ND - 175	ND - 540					
		8	0.76	0.21 - 0.99	11	0.55	0.00034 - 0.99	12,000	1.1	ND - 9	ND - 2.0					

References

[1]Fibrominn Poultry Litter, As Received - Test Data Summary for N, S, Cl, and HHV (1999 to 2002)

[2]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]Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined. Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html

[4]EPA "Contaminant Concentrations in Traditional Fuels: Tables for Comparison." November 29, 2011.

[5]Distillers Dried Grains with Solubles (DDGS), which is a "byproduct of ethanol natural fermentation processes," defined by US EPA as a type of "clean cellulosic biomass."

[6]University of Minnesota, 2005. "The Value and Use of Distillers Dried Grains with Solubles (DDGS) in Livestock and Poultry Feeds." Accessed at www.ddgs.umn.edu

[7]Morey, R.V. et al., 2009. "Fuel Properties of Biomass Feed Streams at Ethanol Plants." Applied Engineering in Agriculture, Vol. 25, No. 1, pp. 57 - 64.

[8]Jenkins, Bryan et al., 1985. "Thermochemical Properties of Biomass Fuels," California Agriculture, May-June 1985, Table 1.

[9]Fibrominn LLC, "Fibrominn Composite Fuel EvaluationBased on 50 MW Export and Average Fuel Characteristics," April 10, 2001. (**Note**: Data on *As Received* basis)

[10]Tilman, David et al., 2008. "Chlorine in Solid Fuels fired in Pulverized Coal Boilers - Sources, Forms, Reactions and Consequences: A Literature Review."

4

Staniec, Carol

From: David Minott [david.minott@arc5enviro.com]
Sent: Friday, January 10, 2014 4:50 PM
To: Staniec, Carol
Cc: Mooney, Susan; trevor.shearen@state.mn.us; richard.cordes@state.mn.us; steven.gorg@state.mn.us; 'Bradley J. Pecora'; grady.third@contourglobal.com; 'Mandy Tenner'; david.minott@arc5enviro.com; 'Knudson, Scott'; 'Robert Fraser'; 'Chisom Amaechi'
Subject: FibroMinn Non-Waste Petition Supplement
Attachments: Fibrominn - NonWaste Supplmnt - 10Jan2014.pdf

Dear Carol,

As you know, Fibrominn LLC submitted to EPA Region 5 a petition for a case-specific non-waste determination under 40 CFR § 241.3(c) for the poultry litter material that Fibrominn uses as the principal fuel at its biomass power plant operating in Benson, Minnesota. When we discussed the petition in a telephone call on December 12, 2013, you had requested Fibrominn to put its poultry litter contaminants data into a prescribed tabular format for which you provided a template. You also asked Fibrominn to provide the rationale, should Fibrominn choose to assess certain contaminants subjectively based on expert knowledge, rather than on the results of laboratory test data. Attached is a Supplement to Fibrominn's original non-waste petition, providing the information you requested on December 12.

Fibrominn appreciates your efforts to review these submissions and I look forward to our next update call, which we scheduled for 10AM CST on January 31. In the meantime, please don't hesitate to contact me with any questions.

Kindly confirm via email that you have received this Supplement. Thank you!

Sincerely,
Dave

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January 10, 2014

Ms. Carol Staniec
US EPA Region V
77 West Jackson Blvd
R19J
Chicago, IL 60604-3590

Subject: Fibrominn Biomass Power Plant, Benson, MN – Poultry Litter Fuel
(MPCA Air Permit No. 15100038)
Supplement to Application for Non-Waste Determination Under 40 CFR Part 241.3(c)

Dear Ms. Staniec:

In response to your request of December 12, 2013, this letter provides supplemental information pursuant to a non-waste petition submitted previously by Fibrominn LLC for its poultry litter fuel. The supplemental information is provided below following a brief background discussion.

BACKGROUND

On July 1, 2013, Fibrominn LLC submitted to EPA Region 5 a petition for a case-specific non-waste determination under 40 CFR § 241.3(c) for the poultry litter material that Fibrominn uses as the principal fuel at its biomass power plant operating in Benson, Minnesota. Following a telephone conversation you and I had on December 12, 2013 regarding EPA's review of the petition, you emailed me a request on that date for Fibrominn to summarize contaminant levels in poultry litter, compared with contaminant levels in traditional fuels, using a prescribed tabular format for which you provided the template. You also asked for Fibrominn to provide the rationale, should Fibrominn elect to base the contaminants comparisons for certain pollutants on its expert knowledge (allowable under the regulations), rather than on laboratory sampling of the poultry litter. I agreed to complete the tables as quickly as possible, and we set the date of January 31, 2014 for a subsequent telephone update discussion.

The table templates you furnished derived from a recent action in which EPA concurred with Waste Management Inc. (WM)'s self-determination that the engineered fuel WM produces by processing municipal solid waste is a non-waste material. The contaminant comparisons prepared by WM to support its non-waste determination were notable compared with most preceding non-waste determinations nationally in that the analysis by WM went beyond a focus on contaminants such as nitrogen, sulfur, chlorine, and elemental metals, to include a detailed assessment of specific volatile organic compounds (VOC) and semi-volatile organic

compounds (SVOC). As is discussed further below, while VOC and SVOC contamination of municipal solid waste is clearly likely and warrants quantitative assessment, there is no similar basis for expecting significant levels of such VOC or SVOC contaminants to be present in poultry litter.

CHANGES TO THE ORIGINALLY SUBMITTED PETITION WITH THIS SUPPLEMENT

With very limited exceptions, all data and analyses presented in the requested tabular format in this supplemental submission were previously presented in the original petition submitted on July 1, 2013. Accordingly, there is only limited new information presented in this supplement. The supplement represents mostly a reformatting of previously submitted data, but using the requested tabular format template.

Conclusions in the Original Non-Waste Petition Do Not Change with this Supplement.

Conclusions presented in Fibrominn's original non-waste petition, including specifically with regard to contaminants comparisons, have not changed with this supplemental submission. To summarize, the conclusions of the original non-waste petition as regards contaminants comparisons are:

- In its original non-waste petition, Fibrominn identified four contaminants for which its poultry litter fuel has the *potential* to have contaminant levels that exceed levels in traditional fuels, warranting quantitative contaminants comparisons with traditional fuels: nitrogen (N), chlorine (Cl), sulfur (S), and arsenic (As).

- The levels of N, Cl, S, and As present in the poultry litter that Fibrominn burns as a fuel were demonstrated, based on sampling data from both Fibrominn's poultry litter and on literature values, to be at levels numerically comparable to or less than levels in traditional fuel materials.

- In addition to N, Cl, S, and As, Fibrominn also determined that its poultry litter contains no other regulated contaminants at levels that would be higher than levels present in traditional fuels. Fibrominn reasonably based this conclusion on its expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. Fibrominn, nonetheless, performed additional numerical contaminant comparisons with traditional fuels for contaminants beyond N, Cl, S, and As, where data specific to poultry litter was available to enable this comparison. Data on contaminant levels in poultry litter were found to be available for a number of elemental metals, including mercury. Results of those contaminant comparisons corroborated Fibrominn's qualitative determination, based

on expert knowledge, that contaminants besides N, Cl, S, and As do not have the potential to be present in poultry litter at levels higher than those found in traditional fuels.

New Information Provided in this Supplement

Additional information supplied with this supplemental submission is summarized as follows:

1. The quantitative contaminants comparisons furnished with the original non-waste petition have been re-formatted here using the table templates you have furnished.
2. New quantitative data became available and are presented here for two additional elemental metals (antimony and beryllium), enabling comparison of levels present in poultry litter versus traditional fuels.
3. New quantitative data have been included here for one specific VOC compound, formaldehyde. A contaminants comparison was added for formaldehyde levels present in poultry litter versus traditional fuels because some poultry growers add formaldehyde in clinical doses to poultry feed to combat Salmonella disease, resulting in the potential for residual formaldehyde to be present in the poultry litter above background levels.

COMTAMINANT COMPARISION TABLES

Attached, as listed below, are the contaminant comparison tables Fibrominn was requested to complete. The format for these tables follows that of the templates you had furnished.

- Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants
- Table 1B: Contaminant-by-Contaminant Comparison, HAP Compounds (i.e., VOC and SVOC Compounds)
- Table 2: Contaminant Comparison, Low-Volatile Metals (LVM) Group
- Table 3: Contaminant Comparison, Total Halogens Group
- Table 4: Contaminant Comparison, Semi-Volatile Organic Compounds (SVOC) Group

The new data enabling quantitative contaminants comparisons for antimony, beryllium, and formaldehyde are included in the tables.

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants

- This table compares the levels of chlorine (Cl), fluorine (F), nitrogen (N), sulfur (S), and the individual elemental metals present in poultry litter compared with levels in several traditional fuels and clean cellulosic biomass fuels. For all elemental contaminants, the levels present in poultry litter are shown to be comparable to or less than in the benchmark fuels. With the exception of antimony and beryllium, discussed next below, all of the data and contaminants comparisons included here in Table 1A had been previously supplied in the original non-waste petition of July 1, 2013.
- Since Fibrominn's non-waste petition was originally submitted, relevant test data regarding levels of antimony (Sb) and beryllium (Be) in poultry litter have become available in the literature#. Those data indicate very low levels in poultry litter relative to traditional fuels. The Sb and Be concentrations in Table 1A were not presented in Fibrominn's original non-waste application, so they represent newly submitted data here. The average Sb and Be concentrations in this table are based on test results from 27 samples of poultry litter (turkey litter) obtained from poultry operations in three different locations in North Carolina since 2010. The average Sb and Be concentrations were reported on a dry weight basis.

Letter dated July 19, 2012 from North Carolina Dept. of Environment and Natural Resources (NCDENR) to Prestage Farms (J. Prestage), Subject: Applicability Determination No. 1887 – Secondary Material Determination . . .." This letter granted a non-waste determination to Prestage Farms for using regional poultry litter as a combustion fuel to generate energy.

Table 1B: Contaminant-by-Contaminant Comparison, HAP Compounds (i.e., VOC/SVOC)

- As noted above, in its original non-waste petition, Fibrominn had identified four contaminants for which its poultry litter fuel has the *potential* to have contaminant levels that exceed levels in traditional fuels: nitrogen (N), chlorine (Cl), sulfur (S), and arsenic (As). As discussed further below, EPA had cited the potential for elevated levels of N and Cl in manures (which would include poultry litter). Besides N and Cl, Fibrominn saw the potential for elevated levels of S and As in poultry litter as well, because sulfur is a component of the normal poultry diet and because some poultry growers add clinical doses of As to poultry feed to combat parasites. Accordingly, quantitative contaminants comparisons between poultry litter and non-waste fuels were presented in the original non-waste petition for N, Cl, S, and As.

- In the original non-waste petition, Fibrominn had also determined that for all other contaminants and groups of contaminants, the contaminant levels present in its poultry litter can be reasonably assumed to be comparable to levels in traditional fuels. Examples of such other contaminants were cited in the original petition to include " . . . . halogens (other

than Cl addressed above), metals classified by volatility (other than As addressed above), volatile and semi-volatile organic compounds, PCBs, and dioxin/furan precursors." Fibrominn had based its determination of comparable contamination levels for pollutants other than N, Cl, S, and As on its expert knowledge of the properties of poultry litter and poultry-growing practices, as is specifically allowed by the Non-Hazardous Secondary Materials (NHSM) Rule.

- There is specific rationale to support reliance on expert knowledge, rather than using sampling data, to determine that the levels in poultry litter of all regulated contaminants besides N, Cl, S, and As, are comparable to or less than levels present in traditional fuels or other EPA-designated non-waste fuels. The elements of that rationale are summarized below.

  a. EPA's Data Base. EPA's own review of contaminants present in manures, while citing a general lack of data, identified no specific contaminants of concern besides N and Cl. Specifically, EPA has stated no specific concern over levels of organic compounds or metals contaminants present in animal manure, including poultry litter. In determining that animal manure "as generated" is a presumptive waste material when burned as a fuel, EPA stated that "levels of certain pollutants, such as nitrogen and chlorine, in certain types of manure, as generated, may not be comparable to those levels found in traditional fuels . . . This is based on limited data. . . ." [76 Fed. Reg. 15480 March 21, 2011]. EPA did not cite any potential concern or uncertainties over levels present in poultry litter of other specific contaminants or contaminant groups, e.g., VOC, SVOC, PCBs, dioxins/furans, or elemental metals.

  b. Expert Literature Information. The academic researchers at North Carolina State University who prepared the arguably most comprehensive investigation conducted to date of contaminant levels present in poultry litter did not include organic compound contaminants in their analytical study (i.e., did not include VOC, SVOC, PCBs, or dioxins/furans).[+]

  [+]Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined. Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html Currently accessible at: http://www.bae.ncsu.edu/topic/animal-waste-mgmt/program/land-ap/barker/a&pmp&c/cover_page_apmp&c.html

  c. Expert Determination by Fibrominn. In its original non-waste petition, Fibrominn determined that levels of all contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), and arsenic (As), can be determined subjectively to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling

practices. This specifically includes VOC, SVOC, PCBs, or dioxins/furans, for which Fibrominn has identified no technical basis for expecting those compounds to be present in its poultry litter fuel at levels exceeding levels present in traditional fuels.

Based on its expert knowledge of poultry growing operations and litter handling practices, Fibrominn assessed the potential contaminant levels in each of the two components comprising poultry litter: the excreted manure and the poultry bedding material. Fibrominn noted in its original petition that poultry manure is simply digested poultry feed, and that the feed is comprised mostly of grains and processed grains, which EPA considers to be clean cellulosic biomass. Fibrominn, therefore, saw no potential for contaminants to be present at elevated levels in the manure component of litter, beyond N, S, Cl, and As. Regarding the other component of poultry litter, the bedding material, Fibrominn noted that the bedding material (e.g., wood shavings) is categorized by EPA as clean cellulosic biomass which is inherently a low-contaminant material.

The relative homogeneity of the poultry-manure and bedding-material components of poultry litter contrasts with the heterogeneous composition of some other secondary materials used as a fuel. In Fibrominn's original petition, it specifically contrasted poultry litter with heterogeneous waste materials such as municipal solid waste (MSW) and unsorted construction and demolition waste (C&D waste). This contrast is directly relevant to EPA's request for Fibrominn to explain its rationale for not testing poultry litter for the VOC and SVOC compounds listed in Table 1B, as had been done by Waste Management Inc. MSW by its nature is inherently a heterogeneous and highly-variable mix of numerous, discarded materials, many of which are not identifiable via physical inspection of MSW. It is reasonable to expect that among the innumerable discards comprising MSW are quantities - sometimes significant "slugs" — of consumer products that are specifically comprised of VOC and SVOC compounds (e.g., concentrated quantities of solvents, pesticides, herbicides, adhesives, paints). Accordingly, it is rational and arguably essential to base contaminant comparisons involving fuel materials derived from MSW on laboratory test data that includes VOC and SVOC compounds. Hence, it was appropriate for Waste Management Inc. to have based its contaminants comparison for its MSW-derived fuel product on test data for individual VOC and SVOC compounds, as well as for the SVOC contaminant group. However, that precedent is not relevant in terms of Fibrominn's having to test its poultry litter for the presence of VOC and SVOC compounds. Fibrominn has adequately determined, based on its expert knowledge, that for poultry litter (unlike MSW), there is no technical basis for expecting either component of poultry litter - poultry manure (digested feed) or bedding material (clean wood shavings), to contain VOC or SVOC compounds at levels exceeding those in traditional fuels.

Finally, because EPA has specifically requested Fibrominn to address VOC and SVOC compounds in the poultry litter, Fibrominn has investigated the potential for one particular VOC compound, formaldehyde, to be present at elevated levels in poultry litter. This was done because some poultry growers add small amounts of formaldehyde to poultry feed to combat Salmonella disease, and this means residual formaldehyde could be present in the excreted manure. Because the doses are clinical in scale and because formaldehyde readily degrades in the environment, the residual amounts of formaldehyde present in the poultry litter would be expected to be very small. However, because formaldehyde could be present in poultry litter beyond background levels, an explicit contaminants comparison was made for formaldehyde, based on the limited test data available from the literature for both poultry litter and traditional fuels. The formaldehyde contaminants comparison presented here in Table 1B is new data beyond that presented previously in Fibrominn's original non-waste petition. It is shown in Table 1B specifically for formaldehyde that levels present in poultry litter where the poultry feed contained clinical doses of formaldehyde are less than in Clean C&D Wood and Resinated Wood, and comparable to levels in Wood/Biomass.

Table 2: Contaminant Comparison, Low-Volatile Metals (LVM) Group

- Data comparison for the LVM Group is unnecessary, because contaminant levels were shown in Table 1A to be comparable to or lower than in traditional or non-waste fuels on an element-by-element basis.

Table 3: Contaminant Comparison, Total Halogens Group

- Data comparison for the Total Halogens Group is unnecessary, because (1) contaminant levels were shown to be comparable to or lower than in traditional or non-waste fuels for chlorine (Cl) and fluorine (F) individually in Table 1A, and (2) from Table 1A, it is clear that chlorine heavily dominates over fluorine in the Total Halogen Group for poultry litter (fluorine is a minor contributor to the Group-total contaminant levels).

Table 4: Contaminant Comparison, Semi-Volatile Organic Compounds (SVOC) Group

- Fibrominn, based on its expert knowledge of poultry growing operations and poultry litter handling practices, has determined that VOC and SVOC compounds individually and as contaminant groups, are not present in poultry litter at levels above those present in traditional fuels. The rationale for that determination is detailed within the discussion of Table 1B, above.

Fibrominn appreciates your efforts in reviewing Fibrominn's non-waste petition and this supplement. Please do not hesitate to contact me with any questions or should you need further information to facilitate your review.

Please also copy the following individuals on any email or written correspondence:

- Brad Pecora, Fibrominn LLC (bradley.pecora@contourglobal.com);
- Grady Third, Fibrominn LLC (grady.third@contourglobal.com);
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com).

Sincerely,

David H. Minott, QEP, CCM
President
Arc5 Environmental Consulting, LLC

978-877-7719; david.minott@arc5enviro.com

Attachments: Tables 1A, 1B, 2, 3, and 4

cc: MPCA via email –

- Trevor Shearen (trevor.shearen@state.mn.us)
- Richard Cordes (richard.cordes@state.mn.us)
- Steve Gorg (steven.gorg@state.mn.us)

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Attachment

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants[1, 2]

Contaminant	Units[3]	Poultry Litter[4]		Wood / Biomass[7]		DDGS[8]	Stover[8]	Alfalfa[8]	Coal[7]		Pet Coke[9]	TDF[9]	Results of Comparison
		Avg.	Range	Avg.	Range	Avgs.	Avgs.	Avgs.	Avg.	Range	Range	Range	
Non-metal elements													
Chlorine (Cl)	ppm	4000	1000 - 9700	259	ND - 5400	1833[8a], 3000[8b], 1300[8c]	2200[8e], 2300[8e], 6000[8b], 7200[8e]	300[8b], 2700[8c], 5000[8e]	992	ND - 9080	7 - 3000	100 - 6483	Comparable to stover and alfalfa (data avg.) Comparable to coal (data range)
Fluorine (F)	ppm	200	100 - 500	32.4	ND - 300	No Data	No Data	No Data	64.0	ND - 178	No Data	No Data	Comparable to wood, within statistical uncertainties (data range) Limited data available.
Nitrogen (N)	ppm	32300	7320 - 59300	3460	200 - 39500	36000[8c], 47900[8a], 49000[8d]	1300[8c], 6100[8b]	10000[8b], 17800[8c]	15090	13600 - 54000	10000 - 26000	2400 - 4900	Lower than DDGS (data avg.) Comparable to coal (data range)
Sulfur (S)	ppm	5300	1330 - 11100	704	ND - 8700	6100[8d], 6400[8c], 7700[8a]	100[8b] 100[8c]	200[8b], 1300[8c]	13580	740 - 61300	5400 - 79100	8600 - 28000	Lower than coal, coke, TDF (data range) and lower than DDGS and coal (data avg.)
Metal Elements													
Antimony (Sb)	ppm	< 0.60[5]	--	0.9	ND - 26	No Data	No Data	No Data	1.7	ND - 10	No Data	No Data	Comparable to wood & coal (data avg.)
Arsenic (As)	ppm	13.7, 1.13[6]	0.22 - 40.5	6.3	ND - 298	No Data	No Data	No Data	8.2	ND - 174	ND - 0.3	0.58 - 17.52	Litter lower than wood & coal (data range) Fibrominn litter lower than wood (data avg.)
Beryllium (Be)	ppm	< 0.12[5]	--	0.3	ND - 10	No Data	No Data	No Data	1.9	ND - 206	ND - 1.5	ND - 0.17	Comparable to wood; less than coal (data avg.)
Cadmium (Cd)	ppm	1.46	0.068 - 4.39	0.6	ND - 17	No Data	No Data	No Data	0.6	ND - 19	< 0.1	0.39 - 1.91	Lower than wood & coal; comparable to TDF (data range)
Chromium (Cr)	ppm	40.27	0.19 - 230	5.9	ND - 340	No Data	No Data	No Data	13.4	ND - 168	No Data	5.29 - 92.74	Comparable to wood and coal (data range)
Cobalt (Co)	ppm	0.002	0.001 - 0.003	6.5	ND - 213	No Data	No Data	No Data	6.9	ND - 25.2	No Data	105 - 400	Lower than wood, coal, TDF (data avg. and/or range)
Lead (Pb)	ppm	12.93	0.09 - 70	4.5	ND - 229	No Data	No Data	No Data	8.7	ND - 148	< 0.6	22.76 - 154.5	Lower than wood, coal, TDF (data range)
Manganese (Mn)	ppm	0.794	0.249 - 1.54	302	ND - 15800	No Data	No Data	No Data	26.2	ND - 512	2.4 - 4.0	63.2 - 1786	Lower than wood, coal, TDF; comparable to coke (data range)
Mercury (Hg)	ppm	<0.12	0.05 - 0.25	0.03	ND - 1.1	No Data	No Data	No Data	0.09	ND - 3.1	0.001 - 0.5	0.01 - 0.328	Lower than wood, coal; comparable to coke, TDF (data range)
Nickel (Ni)	ppm	45	1.68 - 185	2.8	ND - 540	No Data	No Data	No Data	21.5	ND - 730	200 - 500	4.69 - 86.54	Lower than wood, coal, coke (data range)
Selenium (Se)	ppm	0.55	<0.99	1.1	ND - 9.0	No Data	No Data	No Data	3.4	ND - 74.3	ND - 2.0	0.0 - 4.0	Lower than wood & coal; comparable to coke, TDF (data range)

Notes and References

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants

Notes:

1. NOTE: At the request of EPA, this tabular summary is submitted as a supplement to Fibrominn's original non-waste application to US EPA Region 5; i.e., *Letter dated July 1, 2013 from Fibrominn LLC to US EPA Region 5 (S. Hedman), Subject: "Fibrominn Biomass Power Plant, Benson, MN – Poultry Litter Fuel, Application for Non-Waste Determination under 40 CFR Part 241.3(c)."* Poultry litter is comprised of only two components: digested poultry feed and poultry bedding, which is clean cellulosic biomass such as wood shavings. In its original non-waste application, Fibrominn determined that levels of elemental metals, except for arsenic (As), are subjectively determined to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. Nonetheless, in the original application, Fibrominn supplemented this subjective expert determination with quantitative contaminant comparisons for the individual metals, where test data were available to enable this.
2. Except for antimony (Sb) and beryllium (Be), all data presented here in Table 1A had been previously provided to EPA in Tables 1 - 4 of Fibrominn's original non-waste application to EPA. Antimony and beryllium are further addressed in Note 5, below.
3. Concentrations (ppm) for poultry litter are for the material on an "as-received" basis, as is technically correct for purposes of this analysis. Concentrations for all other fuel materials are literature values and were available only on a dry-weight basis.
4. Averages and ranges for poultry litter are based on poultry litter test data; For N and S, based on > 1,500 tests (i.e., >100 Fibrominn litter tests, plus > 1,400 tests from literature); for Cl, based on 118 litter tests (109 Fibrominn, 9 literature); for F, based on 14 tests (all Fibrominn litter); for elemental metals, based on Fibrominn and literature test data, ranging from 6 to 1,454 tests, depending on the particular metal. 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 - 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)*
   - *Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined.* Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html
5. Reference for Antimony (Sb) and Beryllium(Be) in poultry litter: Since Fibrominn's non-waste petition was originally submitted (see Note 1 above), relevant test data regarding levels of antimony (Sb) and beryllium (Be) in poultry litter have become available in the literature, and the data indicate very low levels relative to traditional fuels. The Sb and Be concentrations in this table were not presented in Fibrominn's original non-waste application, so they represent newly submitted data here. The average Sb and Be concentrations in this table are based on test results from 27 samples of poultry litter (turkey litter) obtained from poultry operations in three different locations in North Carolina since 2010. The average Sb and Be concentrations were reported on a dry weight basis. Data reference: *"Letter dated July 19, 2012 from North Carolina Dept. of Environment and Natural Resources (NCDENR) to Prestage Farms (J. Prestage), Subject: Applicability Determination No. 1887 – Secondary Material Determination . . .."* This letter granted a non-waste determination to Prestage Farms for using regional poultry litter as a combustion fuel to generate energy.
6. The average arsenic concentration of 1.13 ppm is based on sampling of Fibrominn's litter only (7 samples), and is an order of magnitude less than the average arsenic level of 13.7 ppm, which is based on literature values. The average arsenic level in Fibrominn's litter is comparable with the average level in Wood/Biomass.
7. Ranges and averages for Wood & Biomass Materials and Coal are 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.
8. DDGS (Distillers Dried Grains with Solubles), corn stover, and alfalfa stems are all defined by EPA to be "clean cellulosic biomass." Multiple average values are shown for the chlorine (Cl), nitrogen (N), and sulfur (S) concentrations present in these materials. The multiple average values were drawn from different literature sources and from limited testing performed in the past by Fibrominn. Specific references for the reported data averages are as follows:
   - 8a - *Morey, R.V. et al., 2009. "Fuel Properties of Biomass Feed Streams at Ethanol Plants." Applied Engineering in Agriculture, Vol. 25, No. 1, pp. 57 - 64.*
   - 8b - *Jenkins, Bryan et al., 1985. "Thermochemical Properties of Biomass Fuels," California Agriculture, May-June 1985, Table 1.*
   - 8c - *Fibrominn LLC, "Fibrominn Composite Fuel Evaluation Based on 50 MW Export and Average Fuel Characteristics," April 10, 2001. (**Note**: Data on As Received basis)*
   - 8d - *University of Minnesota, 2005. "The Value and Use of Distillers Dried Grains with Solubles (DDGS) in Livestock and Poultry Feeds."* Accessed at www.ddgs.umn.edu
   - 8e - *Tilman, David et al., 2008. "Chlorine in Solid Fuels Fired in Pulverized Coal Boilers - Sources, Forms, Reactions and Consequences: A Literature Review."*
9. Pet coke and tire-derived fuel (TDF) are defined as non-waste fuels by EPA. Ranges for the chlorine (Cl), nitrogen (N), and sulfur (S) concentrations present in these materials are literature values. The specific reference for the range values of Cl, N, and S presented for pet coke and TDF is: *National Council for Air and Stream Improvement, Inc. (NCASI). 2005. Alternative Fuels Used in the Forest Products Industry: Their Composition and Impact on Emissions. Technical Bulletin No. 0906, Tables 3.1-3.4. Research Triangle Park, NC.*

Attachment

Table 1B: Contaminant-by-Contaminant Comparison, HAP Compounds[1]

Contaminant	Units[2]	Poultry Litter		Wood / Biomass	Clean C&D Wood		Resinated Wood	Coal	Results of Comparison
		Avg.	Range	Range[4]	Avg.	Range	Range	Range[4]	
Volatile Organic Compounds (VOC)									
Ethyl benzene	ppm	No Data	No Data	No Data	No Data	No Data	No Data	0.7 - 5.4	Comparable to traditional fuels, based on expert knowledge[1]. Quantitative data for poultry litter unavailable.
Formaldehyde	ppm	30.4[3],	5.8 - 46.8[3]	1.6 - 27	36.3	3.4 - 150[5]	< 200 Current[6] < 100 Future[6]	No Data	Less than Clean C&D Wood and Resinated Wood, deemed non-waste fuel materials by EPA (basis: data ranges). Comparable, approximately, with Wood/Biomass, within the statistical uncertainties of limited data bases (basis: data range). The comparative results are based on the limited available test data for both poultry litter and the comparative non-waste fuel materials.
Isopropylbenzene (Cumene)	ppm	No Data	No Data	No Data	No Data	No Data	No Data	No Data	Comparable to traditional fuels, based on expert knowledge[1]. Quantitative data for poultry litter unavailable.
Methylene chloride	ppm	No Data	No Data	No Data	No Data	No Data	No Data	No Data	
Styrene	ppm	No Data	No Data	No Data	No Data	No Data	No Data	1.0 - 26	
Tetrachloroethylene	ppm	No Data	No Data	No Data	No Data	No Data	No Data	No Data	
Toluene	ppm	No Data	No Data	No Data	No Data	No Data	No Data	8.6 - 56	
Xylenes	ppm	No Data	No Data	No Data	No Data	No Data	No Data	4.0 - 28	
21 Additional VOC	ppm	No Data	No Data	No Data	No Data	No Data	No Data	ND - 38	
Semi-Volatile Organic Compounds (SVOC)									
Bis(2-ethylhexyl) phthalate (DEHP)	ppm	No Data	No Data	ND - 26	No Data	No Data	No Data	No Data	Comparable to traditional fuels, based on expert knowledge[1]. Quantitative data for poultry litter unavailable.
PAHs	ppm	No Data	No Data	ND - 298	No Data	No Data	No Data	14 - 2090	Comparable to traditional fuels, based on expert knowledge[1]. Quantitative data for poultry litter unavailable.
13 Additional SVOC	ppm	No Data	No Data	ND - 10	No Data	No Data	No Data	No Data	Comparable to traditional fuels, based on expert knowledge[1]. Quantitative data for poultry litter unavailable.

References

Table 1B: Contaminant-by-Contaminant Comparison, HAP Compounds

Notes:

1. NOTE: At the request of EPA, this tabular summary is submitted as a supplement to Fibrominn's original non-waste application to US EPA Region 5; i.e., *Letter dated July 1, 2013 from Fibrominn LLC to US EPA Region 5 (S. Hedman), Subject: "Fibrominn Biomass Power Plant, Benson, MN – Poultry Litter Fuel, Application for Non-Waste Determination under 40 CFR Part 241.3(c)."* Poultry litter is comprised of only two components: digested poultry feed and poultry bedding, which is clean cellulosic biomass such as wood shavings. In its original non-waste application, Fibrominn determined that levels of all contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), and arsenic (As), are subjectively determined to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. This specifically includes VOC and SVOC compounds, for which Fibrominn has identified no technical basis for expecting those compounds to be present in its poultry litter fuel at levels exceeding those present in traditional fuels. However, one potential exception is formaldehyde, a VOC compound added in clinical doses to poultry feed by some growers nationally in order to combat Salmonella disease. Because formaldehyde present in the poultry diet could increase formaldehyde levels in poultry manure and litter beyond background levels, an explicit contaminants comparison was made here in Table 1B for formaldehyde, based on the limited test data available for both poultry litter and traditional fuels. The formaldehyde contaminants comparison presented here is new data beyond that presented previously in Fibrominn's original non-waste application. It is shown specifically for formaldehyde in this table that levels present in poultry litter where the poultry feed contained formaldehyde are less than in Clean C&D Wood and Resinated Wood, and comparable, approximately (within statistical uncertainty), with levels in Wood/Biomass.
2. Concentrations (ppm) for poultry litter are literature values and are either reported on a dry-weight basis, or are assumed to be such.
3. The European Commission has compiled test data from five different studies on formaldehyde levels measured in poultry litter from chickens whose feed was treated with formaldehyde at a clinical dose of 660 mg/kg. The samples of tested litter had been drawn from a large number of different poultry barns. Test data compiled from the five studies showed measured formaldehyde levels in the litter of 5.8, 42.4, 43.4, 33.0, and 46.8 mg/kg on a presumed dry-weight basis. Reference: *European Commission, 2002. Health & Consumer Protection Directorate-General, 2002. "Update of the Opinion of the Scientific Committee for Animal Nutrition on the Use Of Formaldehyde As A Preserving Agent For Animal Feeding Stuffs of 11 June 1999 (Adopted on 16 October 2002)"*
4. Ranges/averages for Wood & Biomass Materials and Coal are 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.
5. On December 18, 2012, EPA received data supplied by Waste Management Inc. (WM) regarding formaldehyde levels in clean construction and demolition (C&D) wood, which EPA has determined to be a form of clean cellulosic biomass. WM had supplied the data to EPA pursuant to EPA's information request made in the proposed NHSM Rule of December 23, 2011. WM provided test data for formaldehyde levels in samples of sorted, clean C&D wood produced by WM's sorting processes located in three states: Washington, California (2 plants), and Massachusetts. The average formaldehyde level (presumed, dry basis) ranged from 13.4 ppm to 58.7 ppm, depending on the plant, and the 4-plant average level was 36.3 ppm. The overall range of formaldehyde levels over the four plants was 3.4 ppm to 150 ppm. Data reference: *Waste Management Inc., 2012. Memorandum dated November 29, 2012 from K. Kelly, Waste Management, to S. Bodine, Barnes & Thornburg, Re: Summary of Waste Management C&D Wood Fuel Data.*
6. In designating resinated wood a non-waste, legitimate fuel, EPA found that formaldehyde levels in the existing inventory of resinated wood would be less than 200 ppm; however, EPA noted that new standards for such wood make it highly unlikely that formaldehyde levels will be present above 100 ppm in resinated wood that is currently generated. Reference: *EPA, 2011. "Resinated Wood, Scrap Tire, and Pulp/Paper Sludge Support Document for the 2011 Proposed Rulemaking; Identification of Non-hazardous Secondary Materials That Are Solid Waste;" EPA Docket ID: EPA-HQ-RCRA-2008-0329 / Phase: Proposed Rule (2011); November 22, 2011.*

Table 2: Contaminant Comparison, Low-Volatile Metals (LVM) Group

Metal[1]	Units	Average			Range		
		Poultry Litter [2]	Coal[3]	Wood[3]	Poultry Litter [2]	Coal[3]	Wood[3]
Antimony (Sb)	ppm	Analysis of LVM Group Is Unnecessary[2]	1.7	0.9	Analysis of LVM Group Is Unnecessary[2]	ND - 10	ND - 26
Arsenic (As)	ppm		8.2	6.3		ND - 174	ND - 298
Beryllium (Be)	ppm		1.9	0.3		ND - 206	ND - 10
Chromium (Cr)	ppm		13.4	5.9		ND - 168	ND - 340
Cobalt (Co)	ppm		6.9	6.5		ND - 30	ND - 213
Manganese (Mn)	ppm		26.2	302		ND - 512	ND - 15800
Nickel (Ni)	ppm		21.5	2.8		ND - 730	ND - 540
Total LVMs [4]	**ppm**		**79.8**	**324.7**		**ND - 767**	**ND - 15871**

Notes:

1. Low-volatile metals identified by citing 40 CFR 63.1219(e)(4)—National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors.
2. Data comparison for the LVM Group is unnecessary, because contaminant levels were shown in Table 1A to be comparable to or lower than in traditional or non-waste fuels on an element by element basis.
3. Data for coal and wood (i.e., clean wood and biomass materials) 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.
4. The high and low ends of each individual metal's range do not necessarily add up to the total LVM range. This is because maximum and minimum concentrations for individual metals do not always come from the same sample.

Table 3: Contaminant Comparison, Total Halogens Group

Halogen	Units	Average			Range		
		Poultry Litter[1]	Coal[2]	Wood[2]	Poultry Litter[1]	Coal[2]	Wood[2]
Chlorine	ppm	Analysis of Total Halogens Group Is Unnecessary[1]	992	259	Analysis of Total Halogens Group Is Unnecessary[1]	ND - 9080	ND - 5400
Fluorine	ppm		64	32.4		ND - 178	ND - 300
Total Halogens[3]	**ppm**		**1056**	**291**	**2425 - 3320**	**ND - 9080**	**ND - 5497**

Notes:

1. Data comparison for the Total Halogens Group is unnecessary, because (1) contaminant levels were shown to be comparable to or lower than in traditional or non-waste fuels on an element by element basis in Table 1A, and (2) from Table 1A, it is clear that chlorine heavily dominates over fluorine in the Total Halogen Group for poultry litter (fluorine is a minor contributor).
2. Data for coal and wood (i.e., clean wood and biomass materials) 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. The high and low ends of each individual halogen's range do not necessarily add up to total halogens range. This is because maximum and minimum concentrations for individual halogens do not always come from the same sample.

Table 4: Contaminant Comparison, Semi-Volatile Organic Compounds (SVOC) Group

Contaminant	Units	Average			Range		
		Poultry Litter[1]	Coal	Wood[2]	Poultry Litter[1]	Coal[3]	Wood[2]
Bis(2-ethylhexyl) phthalate (DEHP)	ppm	Analysis of SVOC Group Is Unnecessary[1]	No Data	No Data	Analysis of SVOC Group Is Unnecessary[1]	No Data	No Data
PAHs [4]	ppm		Not Available	No Data		14 - 2090	No Data
Total SVOC	**ppm**		**Not Available**	**No Data**		**14 - 2090**	**No Data**

Notes:

1. Poultry litter is comprised of only two components: digested poultry feed and poultry bedding, which is clean cellulosic biomass such as wood shavings. In its original non-waste application, Fibrominn determined that levels of contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), and arsenic (As), are subjectively determined to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. This determination includes VOC and SVOC as individual compounds, and as contaminant groups. However, one potential exception is formaldehyde, a VOC compound added to poultry feed in clinical doses by some growers nationally in order to combat Salmonella disease. It was shown specifically for formaldehyde in Table 1B that levels present in poultry litter where the poultry feed contained formaldehyde were less than in Clean C&D Wood and Resinated Wood, and comparable, approximately, with levels in Wood/Biomass.
2. EPA does not have data for DEHP or PAHs in wood, but concentrations for each are presumed to be zero or close to zero.
3. Data for coal comes from 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.
4. This comparison is based on the assumption that the absence of 16 PAHs is indicative of the absence of additional PAHs.

5

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April 8, 2014

Ms. Carol Staniec
US EPA Region V
77 West Jackson Blvd
R19J
Chicago, IL 60604-3590

Subject: Fibrominn Biomass Power Plant, Benson, MN – Poultry Litter Fuel
(MPCA Air Permit No. 15100038)
Supplement #2 to Application for Non-Waste Determination Under 40 CFR Part 241.3(c)

Dear Ms. Staniec:

Fibrominn LLC submitted a non-waste petition for its poultry litter fuel to EPA Region 5 on July 1, 2013, and submitted supplemental information on January 10, 2014. In telephone conversations on January 31, February 3, and March 17, 2014, you and I discussed the petition. Fibrominn's Plant Manager, Grady Third, participated in the telephone conversation on March 17, 2014. During these telephone conversations, you furnished a number of comments on the submitted petition materials.

This letter addresses the comments you made on January 31, February 3, and March 17, 2014. The subject matter of your comments addressed in this supplemental submission is as follows:

A. Materials Comprising Fibrominn's Fuel

B. Physical Management of the Poultry Litter Fuel

C. Heat Content (HHV) of the Poultry Litter Fuel

D. Fuels that the Fibrominn Boiler System Is Capable of Burning

E. Fibrominn's Poultry Litter Contaminants Data Are Based on Older Laboratory Analyses (The response to this comment also includes revised tables of contaminant comparisons.)

Responses to your comments follow.

A. Materials Comprising Fibrominn's Fuel

1. EPA requested further information in the January 31 and March 17, 2014 telephone conversations regarding the materials comprising the fuel mix:

   a. Details regarding the types of permissible bedding materials used by the poultry growers (p. 3 of the petition).

b. Description of the relative mix of poultry litter and wood chips in Fibrominn's fuel feed (p. 6 of the petition).

Response

Fibrominn's Plant Manager, Grady Third, provided responses to these comments orally during a telephone conversation with EPA's Ms. Staniec on March 17, 2014. Mr. Third's responses provided orally are summarized below.

- EPA asked what the relative percentages of poultry litter versus wood chips are that make up the fuel mix burned at Fibrominn. Fibrominn said that the current mix is typically 50/50. David Minott (Fibrominn's consultant at Arc5 Environmental Consulting,) noted that historically, the litter fraction had ranged from about 50% to a high of about 75%. Fibrominn further explained that fuel deliveries (litter and wood chips) are accepted in the fuel hall six days per week. All litter deliveries are made inside the enclosed fuel hall. Most wood chip deliveries are also normally to the fuel hall; however, some wood chips are stored in piles outside. Monday through Friday, the fuel deliveries are roughly an even split between litter and wood chips presently. On Saturdays, additional wood chips are typically brought in from outside storage, and the litter fraction burned can be lower than on weekdays.
- Regarding permissible poultry bedding materials, Fibrominn stated that wood shavings are the predominant type of bedding material; however, sunflower hulls are also used. Fibrominn reiterated that litter suppliers desiring to use bedding materials other than wood shavings must obtain the prior approval of Fibrominn.

  Additional relevant information is provided here, beyond that discussed between Fibrominn and EPA during the telephone conversation of March 17, 2014. A major supplier of poultry bedding material in Minnesota, D&D Ventures, was requested to identify all materials it supplies as bedding materials. Its recent letter response, included here in Attachment A, confirms that wood shavings and sunflower hulls are the principal bedding materials supplied, with ground wheat straw sometimes incorporated during the summer months. Wood shavings, sunflower hulls, and wheat straw are all classified by EPA as types of "clean cellulosic biomass."

B. Physical Management of the Poultry Litter Fuel Material

2. EPA requested further information in the January 31 and March 17, 2014 telephone conversations relative to descriptions Fibrominn provided in its petition regarding the physical management of the poultry litter:

a. Details of litter transport from the poultry grower's barn to Fibrominn (p. 4 of the petition).

b. Description of temporary interim storage of litter outdoors (pp. 4 and 5 of the petition).

c. The criterion that litter storage must not exceed a reasonable time frame (p. 4 of the petition)

Response

Fibrominn's Plant Manager, Grady Third, provided responses to these comments orally during a telephone conversation with EPA's Ms. Staniec on March 17, 2014. Mr. Third's responses provided orally are also summarized below.

- Fibrominn confirmed that litter removed from the poultry grower's barn is normally transported directly to Fibrominn, deposited in the enclosed fuel hall, and then is normally burned, all within 3 days.
- EPA had asked how often the plant goes down, necessitating temporary storage of litter offsite. Fibrominn replied that scheduled maintenance outages occur in the spring (about 10 days) and in the fall (about 5 days). Fibrominn noted that unplanned outages typically last from about 1 hour to 2-3 days. This would not interrupt normal fuel delivery to Fibrominn, unless the fuel hall happens to be full. In that event, Fibrominn explained that either the supplying poultry grower or the contract hauler arranges for temporary storage elsewhere, typically covered storage. As relates to litter storage during plant outages, Fibrominn said that the fuel hall could store approximately 4 days of litter fuel (about 10,000 tons).

3. EPA requested further information in the January 31 and March 17, 2014 telephone conversations relative to descriptions Fibrominn provided in its petition regarding poultry litter procurement and testing, specifically:

a. Details of how poultry litter is purchased under contract as a fuel material (p. 6 of the petition).

b. Further details regarding Fibrominn's fuel specification (pp. 3, 4 and 6 of the petition).

c. Further details regarding Fibrominn's program for onsite testing of the fuel properties of delivered poultry litter (pp. 4 and 6 of the petition).

Response

Fibrominn's Plant Manager, Grady Third, provided responses to these comments orally during a telephone conversation with EPA's Ms. Staniec on March 17, 2014. Mr. Third's responses provided orally are also summarized below.

- Fibrominn stated that litter is supplied under either long-term contract or spot basis, and the delivered litter is contractually subject to Fibrominn's Fuel Specification.
- Fibrominn stated that most litter is supplied under long-term, 10-year contracts; however, Fibrominn does make spot purchases under spot contracts when additional fuel is needed, usually from the same suppliers.
- EPA asked what the elements of the fuel specification are. Mr. Third said that there are specific limits on maximum moisture content, maximum ash content, and permissible bedding materials. David Minott noted that the elements of the fuel specification were listed on page 3 of the petition: allows wood shavings as the only permissible bedding materails without prior approval of Fibrominn for substitution; imposes maximum moisture and ash contents; allows no plastics or metal to be present; allows no water added; and requires poultry rearing in accordance with good animal husbandry practices.
- Fibrominn provided further information regarding the moisture content provisions of the fuel specification under the litter supply contracts:
  - Fibrominn explained that its litter supply contracts include specific economic incentives to deliver litter that is lower in moisture, and hence, higher in fuel heating value. He stated that Fibrominn pays for the litter it accepts, but at a price that is tied to the tested moisture content. Full price is paid if the moisture level is no greater than 25%. The price then lowers on a sliding scale with increasing moisture content. For any litter delivery with tested moisture exceeding 50%, the load is rejected unless case-specific acceptance is approved by the Fuel Manager. In that case, the price Fibrominn pays only the supplier's shipping cost.
  - EPA asked specifically if Fibrominn takes litter with moisture content over 50%. Fibrominn replied that such litter is sometimes accepted, but only with the express approval of the Fuel Manager. The Fuel Manager is very experienced in judging whether a particular lot of litter with moisture content over 50% could cause physical problems such as fuel clumping, or would not burn with adequate efficiency.
- EPA requested further details of Fibrominn's fuel sampling program. Fibrominn provided the following related information:
  - Trucks deliver litter obtained from over 40 poultry barns. Trucks are covered and each carries about 22 to 25 tons. Each truck carries litter from only one grower's farm; litter from more than one farm is not mixed in the trucks.
  - Litter from every arriving truck is sampled upon arrival at Fibrominn, before the truck is allowed to off-load its litter delivery. Three grab samples are taken from

different locations within a truck's load, and then aggregated for subsequent analysis onsite by Fibrominn.

- The litter sample first goes to the Initial Analysis Station, where it is ground, then analyzed for moisture content using a Near Infrared Analyzer. The resulting moisture measurement is entered into a computer, which later provides a corresponding preliminary estimate of the litter's heat content (HHV). As noted above, for any litter delivery with tested moisture exceeding 50%, the load is rejected (turned away) unless case-specific acceptance is approved by the Fuel Manager.
- Following the initial analysis and offloading of the litter, the litter sample is labeled and sent to the onsite test laboratory, where further detailed laboratory analyses are performed in accordance with detailed, written analytical procedures. The parameters measured include moisture content, ash content, and the heating value of the litter (HHV).
- EPA asked if other parameters are measured. Fibrominn replied that no others are measured.
- EPA asked if truck loads of litter are mixed together. Fibrominn said that litter truck loads are mixed only after delivery, and the mixing occurs in the fuel hall "pit." He explained that cranes take litter from various delivered litter piles and mix the litter together. Then, a second crane is used to place the blended litter onto the fuel feed conveyor.

C. Heat Content (HHV) of the Poultry Litter Fuel

4. EPA requested further information in the January 31, 2014 telephone conversation relative to the heat content of Fibrominn's poultry litter fuel:

   a. EPA noted Fibrominn's statement in the petition (p. 7) that the HHV of the litter is typically within the range of 3,400 to 5,000 Btu/lb and requested further quantitative data demonstrating the variability of the HHV profile for the litter.

   Response

   In Attachment B to this letter, Fibrominn provides a statistical summary of the range and variability of the HHV value of its poultry litter fuel over the course of a year. Figure 1 in Attachment B shows the variation in the average monthly values of the HHV of litter burned at Fibrominn during calendar year 2013. The HHV values result from onsite laboratory measurements of samples taken from every litter fuel delivery over the course of

the year, with the HHV values measured using the standard laboratory analytical method, bomb calorimitry. The test data in Figure 1 demonstrate that the monthly average HHV value for poultry litter (as received) varied from month to month during 2013 from approximately 3,600 Btu/lb to 4,100 Btu/lb. As monthly averages, rather than individual measurements, this range is somewhat narrower, but clearly within the historically typical range stated to be 3,400 to 5,000 Btu/lb.

D. Fuels that the Fibrominn Boiler System Is Capable of Burning

5. In the February 3, 2014 telephone conversation, EPA requested more detailed information regarding the fuels that the Fibrominn boiler system is capable of burning; i.e., other fuels such as coal, pet coke, corn stover, alfalfa stems, and DDGS:

   a. EPA requested further information documenting that the Fibrominn boiler and fuel feed system is designed to burn other fuels for which contaminant comparisons are being made.

   Response

   In its non-waste petition submitted to EPA on July 1, 2013, Fibrominn compared contaminant levels in its poultry litter fuel with levels present in a number of traditional fuels, including wood chips, which Fibrominn does burn as secondary fuel, as well as coal, pet coke, corn stover, alfalfa stems, and DDGS which Fibrominn can burn, but hasn't burned. In the present submission, oat stems have been added to the list of fuels for contaminant comparisons. In its petition, Fibrominn stated that its stoker boiler system is designed to be capable of combusting all these fuels; thus, contaminants comparisons between poultry litter and those traditional fuels is permissible under the NHSM Rule. Below, the capability of Fibrominn's stoker boiler to burn these traditional fuels is further detailed. Then, the adequacy of Fibrominn's fuel feed system and boiler combustion control system is addressed, as relates to combustion of these traditional fuels.

   Fibrominn Stoker Boiler

   Stoker boilers were developed in the early 1900's specifically for efficient combustion of coal, and by the 1960's, also became the boiler technology of choice for combustion of wood and other biomass fuels. Presently, stoker boilers remain a preferred boiler for coal and biomass fueling. The Fibrominn Biomass Power Plant uses a Foster Wheeler boiler employing a standard, Detroit Stoker grate system, specifically, of the vibrating-grate design. This stoker boiler, by its inherent design, has the capability to combust a wide variety of solid fuels, as long as the fuel "particle size" is less than approximately 2

inches. Besides the current fuels combusted, poultry litter and wood chips, this stoker boiler can effectively combust solid fossil fuels (coal, petroleum coke) and many types of "clean cellulosic biomass" fuel, as defined by EPA. Such biomass fuels include crop residue (e.g., corn stover, alfalfa stems, oat stems) as well as the byproducts of ethanol fermentation processes (distillers dried grains with solubles – DDGS). To ensure that the boiler design could accommodate such secondary biomass fuels as corn stover, alfalfa stems, and DDGS, Fibrominn conducted laboratory testing of those materials during the project's design phase. Accordingly, Fibrominn's Title-V air operating permit issued by MPCA on February 9, 2005 (No. 15100038-004) specifically allows Fibrominn's stoker boiler to combust the following types of clean cellulosic biomass materials as secondary fuel: "wood and wood waste; agricultural crops; crop field residue or field processing by-products; shells, husks, hulls, seed, dust, screenings and other agricultural processing residue, agricultural feedstock residues and by-products; and cultivated grasses or grass by-products." The permit, however, specifically disallows Fibrominn to combust "contaminated agricultural grains, waste from farms from an open dump, and farm chemicals." This prohibits Fibrominn from combusting contaminated or discarded biomass materials originating from poultry or other agricultural operations.

Fuel Feed Mechanism and Combustion Controls

While stoker boilers, including Fibrominn's boiler, are designed to be inherently capable of combusting a wide variety of solid fuels, both fossil fuels and biomass fuels, EPA guidance indicates that "designed to burn" also considers the adequacy of the fuel feed mechanism for getting the material into the combustion unit, as well as the need to ensure that the material is well mixed during combustion and that the combustion temperature is maintained within the boiler unit's specifications [78 FR 26 9136, 9150].

For efficient fuel feed and combustion, stoker boilers require the fuel (e.g., coal, biomass fuels) to be of a relatively consistent particle size. The Fibrominn stoker boiler and its fuel feed system can efficiently burn any solid fuel material having a fuel particle size less than approximately 2 inches. Consequently, biomass fuels in particular, are normally purchased pre-ground or pre-shredded to the proper fuel particle size. Some biomass power plants, however, may perform this initial fuel processing for size reduction themselves onsite.

As delivered, the poultry litter fuel Fibrominn burns is normally of the required particle size. However, Fibrominn subjects the poultry litter to minimal mechanical processing onsite to ensure any clumps of litter are broken up to meet the fuel particle size requirement. Prior to being conveyed to the boiler fuel feeder, the poultry litter proceeds

through a moving-ladder de-lumper, which entails sending the litter through a pair of toothed rollers that rotate in opposite directions, with the roller teeth intermeshed.

The wood fuel that Fibrominn presently burns as a secondary biomass fuel is purchased as wood chips, sized properly for the stoker boiler. Any other types of biomass (e.g. stover, alfalfa stems, oat stems, DDGS) would be purchased similarly pre-ground to the required size. Coal and pet coke are appropriately sized as-delivered, if they were to be combusted in Fibrominn's stoker boiler.

The fuel handling and combustion process at the Fibrominn plant is summarized as follows:

- The principal fuel, poultry litter, is mixed with secondary biomass fuel by overhead hydraulic cranes within the enclosed fuel hall. Fuel blending to homogenize the fuel composition so as to optimize combustion efficiency is standard industry practice. The secondary biomass fuel presently being blended with the poultry litter is wood chips; however, the same cranes would be used to blend other solid fuels with the poultry litter (e.g., coal, pet coke, stover, alfalfa stems, oat stems or DDGS).
- The blended fuel mix is placed by a crane onto a belt conveyor system, where the fuel proceeds through the de-lumper described above, then on to the boiler fuel feed conveyor system, which is a "cross-feed" conveyor.
- The fuel mix is fed to 8 fuel distribution feeders, that each includes a hopper with a center-hole sliding plate, through which fuel is removed from the hopper in successive batches, then transported via screw conveyors to the boiler. There, the fuel is entrained within a powerful jet of air that is directed into the boiler, which serves both to introduce combustion air with the fuel and also to blow the fuel to the back of the boiler, which distributes the fuel across the surface of the combustion grate. This results in an even distribution of the fuel on the grate for efficient combustion.
- The operator has the ability to adjust numerous aspects of the combustion system in order to ensure that efficient combustion is maintained, in response to changes in the fuel mix, fuel types, or fuel properties. For each of the 8 fuel feed systems, the operator can separately control the fuel feed rate to the boiler, likewise, the air jet volume flow. For the vibrating combustion grate, the operator can vary the duration and frequency of the vibration, enabling a range of 5 fuel "dwell times" on the grate. This ensures that, despite variation in fuel types or properties, the fuel resides on the combustion grate long enough for complete combustion to be achieved. Finally, the operator has full control over the absolute and relative amounts of combustion air introduced to the boiler, both the overfire air (OFA) and underfire air)UFA).

- The high degree of operator control over the combustion process, as described above (i.e., operator control of the fuel feed rate, fuel dwell time on the combustion grate, and combustion air) would ensure efficient fuel combustion for any of the solid fuels noted above (e.g., poultry litter, wood chips, coal, pet coke, stover, alfalfa stems, oat stems or DDGS).

Conclusion

Stoker boilers by their inherent design are fuel-flexible, with regard to coal, biomass, and other solid fuels. Fibrominn's stoker boiler, its fuel feed system, and the high degree of Fibrominn operator control of the combustion process would enable effective stoking and subsequent efficient combustion of all the solid fuels that Fibrominn has included in its contaminants comparison analysis: poultry litter, wood chips, coal, pet coke, corn stover, alfalfa stems, oat stems and DDGS.

E. Fibrominn's Poultry Litter Contaminants Data Are Based on Older Laboratory Analyses

6. In the February 3, 2014 telephone conversation, EPA noted that the laboratory data on contaminant levels in poultry litter that Fibrominn used in its contaminant comparisons analysis (1999 – 2002) was 12 to 14 years old. EPA expressed a concern that the composition of poultry feed, and hence poultry litter, may have changed over the intervening years, such that the litter may now contain different contaminants and/or higher levels of contaminants.

   a. EPA requested further information addressing the current representativeness of poultry litter analytical data that is over 12 years old.

Response

In the February 3, 2014 telephone conversation, David Minott noted that, based on Fibrominn's expert knowledge of poultry feed and poultry operations, Fibrominn continues to believe that its historical poultry-litter data base is representative of contaminant levels present in the poultry litter that Fibrominn burns today. Below, Fibrominn provides new corroborating documentation that the historical database is representative of current litter contaminant levels. The corroborating evidence consists of an opinion letter provided by a third-party expert, a letter from a poultry grower and feed mill operator, and the results of contaminants laboratory testing performed recently on two random samples of Fibrominn's poultry litter fuel.

The rationale for Fibrominn's expert opinion, discussed with EPA during the February 3, 2014 telephone conversation cited above, is reiterated below, followed by presentation of the new corroborating information.

Fibrominn's Expert Opinion

In its non-waste petition of July 1, 2013, Fibrominn noted that poultry litter is comprised of only two components: (1) poultry manure, which is simply digested poultry feed and (2) poultry bedding material, which is clean wood shavings or similar material deemed by EPA to be "clean cellulosic biomass." Fibrominn noted that poultry feed used by regional poultry growers typically has the following constituents, in descending order of composition fraction:

- Grains (ground whole grains, e.g., corn, soybeans)
- Processed grain (e.g., soybean meal, distillers dried grain, bakery meal)
- Dietary grit (e.g., bone meal, ground shells)
- Dietary calcium and phosphorous nutrients
- Salt

In addition, Fibrominn described how some poultry growers nationally have used chlorine to disinfect poultry drinking water. Fibrominn also noted that some poultry growers nationally use small quantities of arsenic-based anti-parasitic compound to drinking water or poultry feed, but further noted that the industry has been reducing such use of arsenic-based compounds in poultry feed/water for parasite control.

Fibrominn stated, that based on its expert knowledge of poultry feed and poultry growing practices, it had determined that the basic poultry feed composition above has not changed significantly after 1999 (i.e., since 2000), and thus, there is no reason to expect a significant change in the types and levels of contaminants present in the poultry feed.

Corroborating Expert Opinion

An independent expert has corroborated Fibrominn's opinion – Dale M. Lauer, DVM, who is the Poultry Program Director of the State of Minnesota's Board of Animal Health. Dr. Lauer, based on his own expertise, and after conferring with academic and industry turkey nutritional specialists, concluded the following: "I would agree with 'turkey nutrition experts' and Fibrominn that the composition of the poultry feed used in Minnesota has not changed significantly since 2000. As a result, no new or additional contaminants should be added to the litter that is delivered to the FibroMinn plant." Dr. Lauer's opinion letter is provided here in Attachment C.

Also supplied in Attachment C is the opinion furnished by the proprietor of Northern Turkeys, Inc. who has been growing turkeys and procuring commercial poultry feed in Minnesota for 50 years, and during this period has also owned and operated a feed mill. The opinion of Northern Turkeys, Inc. mirrors that of Dr. Lauer above, concluding that there is no reason to expect any significant change in the types and levels of contaminants in turkey feed.

Corroborating, New Test Data for Fibrominn's Poultry Litter

In February 2014, Fibrominn took multiple random grab samples of turkey litter and aggregated them to yield two samples for laboratory analysis. The two samples were sent to an independent testing laboratory (Maxxam/PSC), where the samples were analyzed in March 2014 for HHV, moisture, and contaminant levels (N, S, Cl, F, NHSM-Rule metals, VOC, and SVOC). The test results are presented and analyzed below. Relevant, original laboratory test data, as reported by the laboratory, are documented as Attachment D to this submission.

The recent analytical results for Fibrominn's poultry litter indicated HHV values for the two, new poultry litter samples (as-received) of 3,600 Btu/lb (50% moisture) and 4,630 Btu/lb (41% moisture), respectively. Those HHV values are consistent with the typical range for Fibrominn's poultry litter of 3,400 to 5,000 Btu/lb that was stated in Fibrominn's petition of July 1, 2013.

The results of the recent testing of Fibrominn's poultry litter for contaminant levels are presented here, as revisions to the contaminant comparison tables that were previously submitted to EPA in a January 10, 2014 supplement to Fibrominn's non-waste petition of July 1 2013. Revised tables are attached as follows:

- Table 1A: Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants, Supplement April 7, 2014
- Table 1B: Contaminant-by-Contaminant Comparison, VOC and SVOC Compounds, Supplement April 7, 2014
- Table 4: Contaminant Comparison, Semi-Volatile Organic Compounds (SVOC) Group, Supplement April 7, 2014

Note: Tables 2 and 3 submitted previously with Fibrominn's petition supplement dated January 10, 2014, pertaining to the contaminant groups for low volatility metals and for halogens, have not been included in the present submission because the current analysis demonstrates that levels of the individual contaminants present in poultry litter are comparable to or lower than levels present in traditional fuels.

An updated analysis of the contaminant comparisons, based on the revised tables which include the recent test data for Fibrominn poultry litter, is summarized in the Conclusions subsection, below.

Conclusions Regarding Contaminant Comparisons

i. Based on Fibrominn's expert knowledge of poultry feed, the corroborating opinions of third-parties with expert knowledge, and corroborating new test data for Fibrominn poultry litter, it is reasonable to rely on Fibrominn's historical base of test data as representative of poultry litter fuel today. Hence, Fibrominn's historical test data base for poultry litter remains a reliable data base for use in contaminant comparisons. Fibrominn's recent test data (March 2014) corroborate and supplement the historical database; they do not replace it.

ii. The contaminant comparison tables submitted previously January 10, 2014 have been revised here to include the new Fibrominn litter-testing results (March 2014). The new Fibrominn test data for its poultry litter fuel corroborate Fibrominn's expert opinion stated in its July 1, 2013 petition and January 10, 2014 supplement, that numerical contaminant comparisons are unnecessary except for N, Cl, S, As, and formaldehyde. That is for all other contaminants, Fibrominn has determined, based on its expert knowledge of poultry litter and poultry growing practices, that the contaminant levels in its poultry litter are lower than or comparable to levels in traditional fuels.

iii. The revised tables of contaminant comparisons presented in this supplement to Fibrominn's non-waste petition of July 1, 2013 demonstrate that the levels of contaminants present in Fibrominn's poultry litter fuel are lower than or comparable to contaminant levels present in traditional fuels. This conclusion has the following bases, which vary with the specific contaminant:

- Basis for N, S, Cl, As, and formaldehyde: Numerical contaminant comparisons based on test data for Fibrominn poultry litter, supplemented by literature data for poultry litter.
- Basis for F, Cr, Pb, Hg, and Se: Fibrominn's expert knowledge of poultry litter composition and poultry growing operations, indicating that these contaminants are not present in Fibrominn's poultry litter at levels exceeding levels found in traditional fuels. Fibrominn's expert knowledge as the basis for this determination is corroborated by literature values for poultry litter contaminant levels and by the results presented in the tables of the Fibrominn litter tests performed in March 2014.

- Basis for Sb, Be, Cd, Co, and Mn: Fibrominn's expert knowledge of poultry litter composition and poultry growing opertions, as noted above. Fibrominn's expert knowledge as the basis for this determination is corroborated by the results of the Fibrominn litter tests performed in March 2014.
- VOC (except formaldehyde, addressed above) and SVOC: Fibrominn's expert knowledge of poultry litter composition and poultry growing operations, as noted above. Fibrominn's expert knowledge as the basis for this determination is corroborated by the results of the Fibrominn litter tests performed in March 2014. The March 2014 tests showed tested levels of all 49 VOC compounds tested to be below detection levels, except for formaldhyde (addressed above), and also acetone and MEK, which are compounds not regulated under the NHSM Rule. The March 2014 tests showed tested levels of all 82 SVOC compounds tested to be below detection limits, including 16 PAH compounds EPA regulates as Priority Pollutants.

Fibrominn appreciates your ongoing efforts towards completing EPA's review of Fibrominn's non-waste petition. Please do not hesitate to contact me with any questions or should you need further information to facilitate your review.

Please also copy the following individuals on any email or written correspondence:

- Grady Third, Fibrominn LLC (grady.third@contourglobal.com);
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com).

Sincerely,

David H. Minott

David H. Minott, QEP, CCM 978-877-7719; david.minott@arc5enviro.com
President
Arc5 Environmental Consulting, LLC

Attachments: Revised Tables 1A, 1B, and 4 (Tables 2 and 3 are no longer included.)

cc: MPCA via email –

- Trevor Shearen (trevor.shearen@state.mn.us)
- Richard Cordes (richard.cordes@state.mn.us)
- Steve Gorg (steven.gorg@state.mn.us)

Also -

- Grady Third, Fibrominn LLC (grady.third@contourglobal.com)
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com

TABLES 1A, 1B, AND 4

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants[1] Supplement April 8, 2014 Data Units: ppm[2]

NOTE: This supplements Fibrominn's Non-Waste Petition (July 1, 2013) and Prior Supplement (January 10, 2014). All revisions since January 10, 2014 are shown in red font.

Contaminant	Poultry Litter (Fibrominn Data)		Poultry Litter[5] (Fibrominn and Literature)		Wood / Biomass[8]		DDGS[9]	Stover[9]	Alfalfa[9]	Oat Stems[9]	Coal[8]		Pet Coke[10]	Results of Comparison
	Avg.	Range[3,4]	Avg.	Range	Avg.	Range	Avgs.	Avgs.	Avgs.	Avgs.	Avg.	Range	Range	
Non-metal elements														
Chlorine (Cl)	5000, 8000[3] 3800[4]	1,000 - 8900	4000	1000 - 9700	259	ND - 5400	~~1833-1757~~[9a], ~~3000~~[9b] 3017[9f], 1300[9c]	2200[9e], 2300[9e], 6000[9b], 7200[9e]	300[9b], 2700[9c], 5000[9e]	8,568[9f]	992	ND - 9080	7 - 3000	Comparable to stover and , alfalfa (data avg.). Less than oat stems (data avg.) Comparable to coal (data range)
Fluorine (F)	< 200, < 200[3] 200[4]	100 - 500	200	100 - 500	32.4	ND - 300	No Data	No Data	No Data	No Data	64.0	ND - 178	No Data	Comparable to wood, within statistical uncertainties (data range) Fibrominn test data corroborates literature data.
Nitrogen (N)	15600, 18800[3] 26300[4]	10200 - 43600	32300	7320 - 59300	3460	200 - 39500	36000[9c], 47900[9a], 49000[9d]	1300[9c], 6100[9b]	10000[9b], 17800[9c]	6,000[9f]	15090	13600 - 54000	10000 - 26000	Lower than DDGS (data avg.) Comparable to coal (data range)
Sulfur (S)	2400, 2600[3] 3800[4]	1600 - 7000	5300	1330 - 11100	704	ND - 8700	6100[9d], 6400[9c], 7700[9a]	100[9b] 100[9c]	200[9b], 1300[9c]	900[9f]	13580	740 - 61300	5400 - 79100	Lower than coal, coke, and DDGS (data avg.) and pet coke (data range)
Metal Elements														
Antimony (Sb)	< 0.05, < 0.05[3] No Data[4]	No Data	< 0.60[6]	--	0.9	ND - 26	No Data	No Data	No Data	No Data	1.7	ND - 10	No Data	Comparable to wood & coal (data avg.)
Arsenic (As)	< 0.01, 0.02[3] 1.13[4]	< 0.02 - 3.16	13.7, 1.13[7]	< 0.02 - 40.5	6.3	ND - 298	No Data	No Data	No Data	No Data	8.2	ND - 174	ND - 0.3	Litter lower than wood & coal (data range) Fibrominn litter lower than wood (data avg.)
Beryllium (Be)	< 0.05, < 0.05[3] No Data[4]	No Data	< 0.12[6]	--	0.3	ND - 10	No Data	No Data	No Data	No Data	1.9	ND - 206	ND - 1.5	Comparable to wood; less than coal (data avg.)
Cadmium (Cd)	0.06, 0.08[3] No Data[4]	No Data	1.46	0.068 - 4.39	0.6	ND - 17	No Data	No Data	No Data	No Data	0.6	ND - 19	< 0.1	Lower than wood & coal (data range)
Chromium (Cr)	0.3, 0.6[3] 1.19[4]	0.19 - 1.82	40.27	0.19 - 230	5.9	ND - 340	No Data	No Data	No Data	No Data	13.4	ND - 168	No Data	Litter comparable to wood and coal (data range). Fibrominn litter lower than wood and coal (data avg.)
Cobalt (Co)	0.17, 0.28[3] No Data[4]	No Data	0.002	0.001 - 0.003	6.5	ND - 213	No Data	No Data	No Data	No Data	6.9	ND - 25.2	No Data	Lower than wood, coal

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants[1] **Supplement April 8, 2014** **Data Units: ppm[2]**

Lead (Pb)	0.25, 0.29[3] 0.55[4]	0.09 - 1.07	12.93	0.09 - 70	4.5	ND - 229	No Data	No Data	No Data	No Data	8.7	ND - 148	< 0.6	Fibrominn litter lower than wood and coal (data avg. and range)
Manganese (Mn)	148, 167[3] No Data[4]	No Data	0.794	0.249 - 167	302	ND - 15800	No Data	No Data	No Data	No Data	26.2	ND - 512	2.4 - 4.0	Lower than wood, coal (data range)
Mercury (Hg)	< 0.01, < 0.01[3] < 0.05[4]	< 0.01- <0.05	<0.12	0.05 - 0.25	0.03	ND - 1.1	No Data	No Data	No Data	No Data	0.09	ND - 3.1	0.001 - 0.5	Lower than wood, coal; comparable to coke (data range)
Selenium (Se)	0 5, 0.7[3] 0.76[4]	0.21 - 0.99	0.55	<0.99	1.1	ND - 9.0	No Data	No Data	No Data	No Data	3.4	ND - 74.3	ND - 2.0	Lower than wood & coal (data avg. and range); comparable to coke (data range)

Notes:

1. NOTE: This tabular summary is submitted as a supplement to Fibrominn's original non-waste application to US EPA Region 5 dated July 1, 2013, and supplement dated January 10, 2014. *All new entries to this table since the January 10, 2014 supplement appear in red font.* Poultry litter is comprised of only two components: digested poultry feed and poultry bedding, which is clean cellulosic biomass such as wood shavings. In its original non-waste application, Fibrominn determined that levels of elemental metals, except for arsenic (As), are subjectively determined to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. Nonetheless, in the original application, Fibrominn supplemented this subjective expert determination with quantitative contaminant comparisons for the individual metals, where test data were available to enable this.
2. Concentrations (ppm) for poultry litter are for the material on an "as-received" basis, as is technically correct for purposes of this analysis. Concentrations for all other fuel materials are literature values and were available only on a dry-weight basis.
3. Fibrominn poultry litter test data, two samples of poultry litter, analyzed March 2014. Test data are for two samples of turkey litter delivered from two different poultry growers to Fibrominn in February 2014 and analyzed by a third-party laboratory in March 2014. This Fibrominn test data is intended to corroborate, not replace Fibrominn's prior determination, based on Fibrominn's expert knowledge, that levels of all contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), arsenic (As), and formaldehyde are subjectively determined to be less than or comparable to levels present in traditional fuels.
4. Fibrominn poultry litter test data for turkey and chicken litter, analyzed 1999 to 2002. Fibrominn has demonstrated these data to be representative of contaminant levels present currently in its poultry litter. The number of samples comprising Fibrominn's 1999-2002 data base of poultry litter test data was documented in Fibrominn's non-waste petition of July 1, 2013, Table 1.
5. Averages and ranges for poultry litter are based on poultry litter test data; For N and S, based on > 1,500 tests (i.e., >100 Fibrominn litter tests, plus > 1,400 tests from literature); for Cl, based on 118 litter tests (109 Fibrominn, 9 literature); for F, based on 16 tests (all Fibrominn litter); for elemental metals, based on Fibrominn and literature test data, ranging from 8 to 1,454 tests, depending on the particular metal. 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)*
   - *Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined.* Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html
6. Reference for Antimony (Sb) and Beryllium(Be) in poultry litter: The average Sb and Be concentrations are based on test results from 27 samples of poultry litter (turkey litter) obtained from poultry operations in three different locations in North Carolina since 2010. The average Sb and Be concentrations were reported on a dry weight basis. Data reference: *"Letter dated July 19, 2012 from North Carolina Dept. of Environment and Natural Resources (NCDENR) to Prestage Farms (J. Prestage), Subject: Applicability Determination No. 1887 – Secondary Material Determination . . .."* This letter granted a non-waste determination to Prestage Farms for using regional poultry litter as a combustion fuel to generate energy.
7. The average arsenic concentration of 1.13 ppm is based on sampling of Fibrominn's litter only (7 samples) between 1999 and 2002, and is an order of magnitude less than the average arsenic level of 13.7 ppm, which is based on literature values. The average arsenic level in Fibrominn's litter is comparable with the average level in Wood/Biomass.

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants[1] **Supplement April 8, 2014** **Data Units: ppm[2]**

8. Ranges and averages for Wood & Biomass Materials and Coal are 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.
9. DDGS (Distillers Dried Grains with Solubles), corn stover, alfalfa stems, and oat straw are all defined by EPA to be "clean cellulosic biomass." Multiple average values are shown for the chlorine (Cl), nitrogen (N), and sulfur (S) concentrations present in these materials. The multiple average values were drawn from different literature sources and from limited testing performed in the past by Fibrominn. Specific references for the reported data averages are as follows:
    - 9a - *Morey, R.V. et al., 2009. "Fuel Properties of Biomass Feed Streams at Ethanol Plants." Applied Engineering in Agriculture, Vol. 25, No. 1, pp. 57 - 64.*
    - 9b - *Jenkins, Bryan et al., 1985. "Thermochemical Properties of Biomass Fuels," California Agriculture, May-June 1985, Table 1.*
    - 9c - *Fibrominn LLC, "Fibrominn Composite Fuel Evaluation Based on 50 MW Export and Average Fuel Characteristics," April 10, 2001. (**Note**: Data on As Received basis)*
    - 9d - *University of Minnesota, 2005. "The Value and Use of Distillers Dried Grains with Solubles (DDGS) in Livestock and Poultry Feeds."* Accessed at www.ddgs.umn.edu
    - 9e - *Tilman, David et al., 2008. "Chlorine in Solid Fuels Fired in Pulverized Coal Boilers - Sources, Forms, Reactions and Consequences: A Literature Review."*
    - 9f – *AURI, 2008. "Agricultural Renewable Solid Fuels Data – Agricultural Utilization Research Institute Fuels Initiative II Brochure. www.auri.org/research/fuels/downloads.asp*
10. Pet coke is defined as non-waste fuels by EPA. Ranges for the chlorine (Cl), nitrogen (N), and sulfur (S) concentrations present in this material are literature values. The specific reference for the range values of Cl, N, and S presented for pet coke is: *National Council for Air and Stream Improvement, Inc. (NCASI). 2005. Alternative Fuels Used in the Forest Products Industry: Their Composition and Impact on Emissions. Technical Bulletin No. 0906, Tables 3.1-3.4. Research Triangle Park, NC.*

Table 1B: Contaminant-by-Contaminant Comparison, VOC and SVOC Compounds[1]
Supplement April 8, 2014

NOTE: This supplements Fibrominn's Non-Waste Petition (July 1, 2013) and Prior Supplement (January 10, 2014). All revisions since January 10, 2014 are shown in red font.

Contaminant	Units[3]	Poultry Litter		Wood / Biomass	Clean C&D Wood		Resinated Wood	Coal	Results of Comparison
		Avg.	Range	Range[5]	Avg.	Range	Range	Range[5]	
Volatile Organic Compounds (VOC)									
Benzene	ppm	Fibrominn[2] <0.12, <0.16	--	No Data	No Data	No Data	No Data	ND - 38	Comparable to traditional fuels, based on expert knowledge[1]. Corroborating Fibrominn test data indicates less than coal[2].
Ethyl benzene	ppm	Fibrominn[2] <0.12, <0.16	No Data	No Data	No Data	No Data	No Data	0.7 - 5.4	Comparable to traditional fuels, based on expert knowledge[1]. Corroborating Fibrominn test data indicates less than coal[2].
Formaldehyde	ppm	Fibrominn[2] 3, <2 Literature 30.4[4]	-- Literature 5.8 - 46.8[4]	1.6 - 27	36.3	3.4 - 150[6]	< 200 Current[7] < 100 Future[7]	No Data	Less than Clean C&D Wood and Resinated Wood, deemed non-waste fuel materials by EPA (basis: data averages and ranges). Comparable, approximately, with Wood/Biomass, within the statistical uncertainties of limited data bases (basis: data range).
Methylene chloride	ppm	Fibrominn[2] <0.40, <0.30	No Data	No Data	No Data	No Data	No Data	No Data	Comparable to traditional fuels, based on expert knowledge[1], corroborated by Fibrominn test data
Styrene	ppm	Fibrominn[2] <0.40, <0.30	No Data	No Data	No Data	No Data	No Data	1.0 - 26	Comparable to traditional fuels, based on expert knowledge[1]. Corroborating Fibrominn test data indicates less than coal[2].
Tetrachloroethylene	ppm	Fibrominn[2] <0.40, <0.30	No Data	No Data	No Data	No Data	No Data	No Data	Comparable to traditional fuels, based on expert knowledge[1], corroborated by Fibrominn test data
Toluene	ppm	Fibrominn[2] <0.12, <0.16	No Data	No Data	No Data	No Data	No Data	8.6 - 56	Comparable to traditional fuels, based on expert knowledge[1]. Corroborating Fibrominn test data indicates less than coal.
Xylenes	ppm	Fibrominn[2] <0.12, <0.16	No Data	No Data	No Data	No Data	No Data	4.0 - 28	
40 Additional VOC	ppm	No Data	Fibrominn[2] <0.16 - <24	No Data	No Data	No Data	No Data	No Data	Comparable to traditional fuels, based on expert knowledge[1]. Corroborated by Fibrominn test data.

Table 1B: Contaminant-by-Contaminant Comparison, VOC and SVOC Compounds[1] Supplement April 8, 2014

Semi-Volatile Organic Compounds (SVOC)									
16 PAHs	ppm	No Data	Fibromin[2, 8] <5 - <10	No Data	No Data	No Data	No Data	14 - 2090	Comparable to or lower than traditional fuels, based on expert knowledge[1]. Corroborating Fibrominn test data indicates less than coal[2].
66 Additional SVOC (Not all are NHSM contaminants)	ppm	No Data	Fibromin[2] <5 - <200	No Data	No Data	No Data	No Data	No Data	Comparable to or lower than traditional fuels, based on expert knowledge[1]. Corroborated by Fibrominn test data.

Notes:

1. NOTE: This tabular summary is submitted as a supplement to Fibrominn's original non-waste application to US EPA Region 5 submitted July 1, 2013 and to a supplement submitted January 10, 2014. All new entries to this table since the January 10, 2014 supplement appear in red font. Poultry litter is comprised of only two components: digested poultry feed and poultry bedding, which is clean cellulosic biomass such as wood shavings. In its July 1, 2013 non-waste application and the January 10, 2014 supplement, Fibrominn determined that levels of all contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), arsenic (As), and formaldehyde are subjectively determined to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. This specifically includes VOC and SVOC compounds (except formaldehyde), for which Fibrominn has identified no technical basis for expecting those compounds to be present in its poultry litter fuel at levels exceeding those present in traditional fuels. A numerical contaminant comparision is provided in this table for the VOC compound, formaldehyde. Formaldehyde is added in clinical doses to poultry feed by some growers nationally in order to combat Salmonella disease. Because formaldehyde present in the poultry diet could increase formaldehyde levels in poultry manure and litter beyond background levels, an explicit contaminants comparison was made here in Table 1B for formaldehyde. It is shown specifically for formaldehyde in this table that levels present in poultry litter where the poultry feed contained formaldehyde are less than in Clean C&D Wood and Resinated Wood, and comparable, approximately (within statistical uncertainty), with levels in Wood/Biomass.
2. Test data are for two samples of turkey litter delivered from two different poultry growers to Fibrominn in February 2014 and analyzed by a third-party laboratory in March 2014. This Fibrominn test data is intended to corroborate, not replace Fibrominn's prior determination, based on Fibrominn's expert knowledge, that levels of all contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), and arsenic (As), are subjectively determined to be less than or comparable to levels present in traditional fuels.
3. Concentrations (ppm) for poultry litter are literature values and are either reported on a dry-weight basis, or are inferred to be such.
4. The European Commission has compiled test data from five different studies on formaldehyde levels measured in poultry litter from chickens whose feed was treated with formaldehyde at a clinical dose of 660 mg/kg. The samples of tested litter had been drawn from a large number of different poultry barns. Test data compiled from the five studies showed measured formaldehyde levels in the litter of 5.8, 42.4, 43.4, 33.0, and 46.8 mg/kg on a presumed dry-weight basis. Reference: European Commission, 2002. Health & Consumer Protection Directorate-General, 2002. "Update of the Opinion of the Scientific Committee for Animal Nutrition on the Use Of Formaldehyde As A Preserving Agent For Animal Feeding Stuffs of 11 June 1999 (Adopted on 16 October 2002)"
5. Ranges/averages for Wood & Biomass Materials and Coal are 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.
6. On December 18, 2012, EPA received data supplied by Waste Management Inc. (WM) regarding formaldehyde levels in clean construction and demolition (C&D) wood, which EPA has determined to be a form of clean cellulosic biomass. WM had supplied the data to EPA pursuant to EPA's information request made in the proposed NHSM Rule of December 23, 2011. WM provided test data for formaldehyde levels in samples of sorted, clean C&D wood produced by WM's sorting processes located in three states: Washington, California (2 plants), and Massachusetts. The average formaldehyde level (presumed, dry basis) ranged from 13.4 ppm to 58.7 ppm, depending on the plant, and the 4-plant average level was 36.3 ppm. The overall range of formaldehyde levels over the four plants was 3.4 ppm to 150 ppm. Data reference: Waste Management Inc., 2012. Memorandum dated November 29, 2012 from K. Kelly, Waste Management, to S. Bodine, Barnes & Thornburg, Re: Summary of Waste Management C&D Wood Fuel Data.
7. In designating resinated wood a non-waste, legitimate fuel, EPA found that formaldehyde levels in the existing inventory of resinated wood would be less than 200 ppm; however, EPA noted that new standards for such wood make it highly unlikely that formaldehyde levels will be present above 100 ppm in resinated wood that is currently generated. Reference: EPA, 2011. "Resinated Wood, Scrap Tire, and Pulp/Paper Sludge Support Document for the 2011 Proposed Rulemaking; Identification of Non-hazardous Secondary Materials That Are Solid Waste;" EPA Docket ID: EPA-HQ-RCRA-2008-0329 / Phase: Proposed Rule (2011); November 22, 2011.
8. Test data are for two samples of Fibrominn turkey litter (See Note 2, above). The test data are for the following 16 PAH compounds that are EPA Priority Pollutants: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz(ah)anthracene, benzo[ghi]perylene, and indeno[1,2,3-cd]pyrene.

Table 4: Contaminant Comparison, Semi-Volatile Organic Compounds (SVOC) Group – Supplement April 8, 2014

NOTE:

- **This supplements Fibrominn's Non-Waste Petition (July 1, 2013) and prior Supplement (January 10, 2014). All revisions since January 10, 2014 are shown in red font.**
- **Tables 2 and 3 submitted previously with Fibrominn's petition supplement dated January 10, 2014, pertaining to the contaminant groups for low volatility metals and for halogens, have not been included in the present submission because the current analysis demonstrates that levels of the individual contaminants present in poultry litter are comparable to or lower than levels present in traditional fuels.**

Contaminant	Units	Average			Range		
		Poultry Litter	Coal[2]	Wood[2]	Poultry Litter	Coal[2]	Wood[2]
PAHs [4]	ppm	Numerical analysis of SVOC Group Is Unnecessary[1] Fibrominn: 16 PAHs (EPA Priority Pollutants) *<5 - <10[3]* Fibrominn: 66 Other SVOCs (Not all NHSM pollutants) *<5 - <200[3]*	No Data	No Data	Numerical analysis of SVOC Group Is Unnecessary[1]	14 - 2090	No Data
Total SVOC	**ppm**	*<5 - <200[3]*	**No Data**	**No Data**	**No Data**	**14 - 2090**	**No Data**

Notes:

1. Poultry litter is comprised of only two components: digested poultry feed and poultry bedding, which is clean cellulosic biomass such as wood shavings. In its original non-waste application of July 1, 2013 and the January 10, 2014 supplement, Fibrominn determined that levels of contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), arsenic (As), and formaldehyde (a VOC, not an SVOC) are subjectively determined to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices.
2. Data for coal and wood come from 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. Test data are for two samples of turkey litter delivered from two different poultry growers to Fibrominn in February 2014 and analyzed by a third-party laboratory in March 2014. This Fibrominn test data is intended to corroborate, not replace Fibrominn's prior determination, based on Fibrominn's expert knowledge, that levels of all contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), and arsenic (As), are subjectively determined to be less than or comparable to levels present in traditional fuels.
4. Levels of SVOC as a contaminant group in poultry litter are shown to be lower than or comparable to levels in coal, based on the comparison in this table. This comparison is based on the assumption that the absence of 16 PAHs that are EPA Priority Pollutants in poultry litter, as well as the absence of 66 other SVOCs, are indicative of the absence of additional PAHs and SVOCs in poultry litter.

ATTACHMENTS A – D

ATTACHMENT A

Documentation for Materials Used as Poultry Bedding Material

D & D Ventures, Inc.
PO Box 61, Grove City, MN 56243
ddventures@embarqmail.com

March 11, 2014

Fibrominn

Dear Fibrominn,

As per a recent request, our bedding materials consist of a variety of hardwood shavings, sunflower hulls, and softwood shavings which we manufacture from pine, poplar and aspen. In the summer months we may incorporate ground wheat straw as well.

Warm regards,

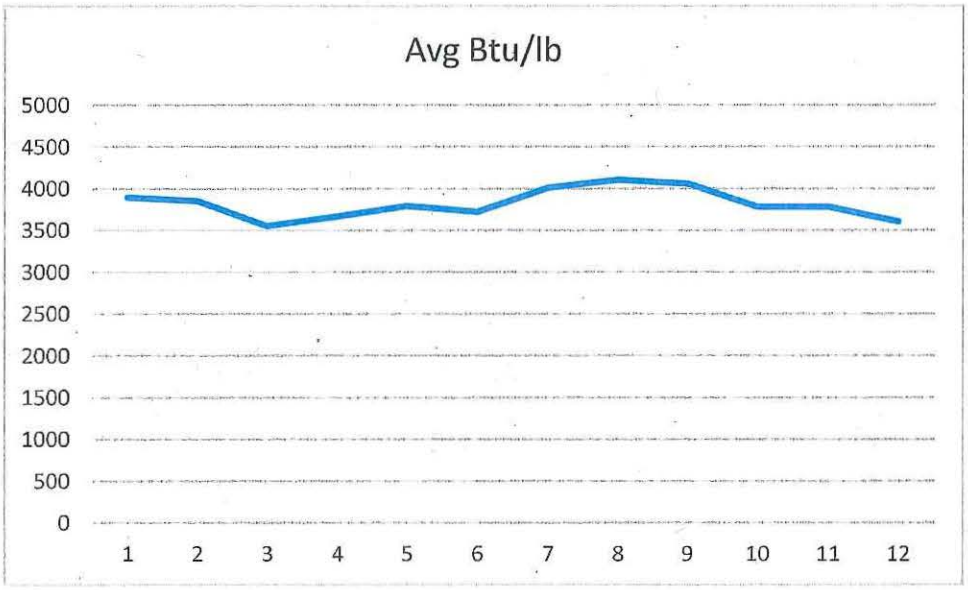
Dale Hoerchler, President

ATTACHMENT B

Variation of HHV in Fibrominn Poultry Litter Fuel

FIGURE 1 **FibroMinn - Lab-Test HHV Data – Calendar Year 2013**

	Litter (As Received)	Monthly Avg Btu/lb
Jan-13	Turkey Litter	3889
Feb-13	Turkey Litter	3847
Mar-13	Turkey Litter	3550
Apr-13	Turkey Litter	3664
May-13	Turkey Litter	3786
Jun-13	Turkey Litter	3719
Jul-13	Turkey Litter	4005
Aug-13	Turkey Litter	4100
Sep-13	Turkey Litter	4055
Oct-13	Turkey Litter	3779
Nov-13	Turkey Litter	3779
Dec-13	Turkey Litter	3601



ATTACHMENT C

Third-Party Expert Opinions on the Representativeness of Fibrominn's Poultry Litter Data Base

MINNESOTA BOARD of ANIMAL HEALTH

Minnesota Poultry Testing Laboratory

poultry@state.mn.us • www.mn.gov/bah

March 31, 2014

Ms. Heidi Gandsey, Fuel Manager
FibroMinn Power Plant
900 Industry Drive
PO Box 265
Benson, MN 56215

Dear Heidi,

As discussed earlier this month, I am responding to your request for an opinion on the composition of turkey feed ingredients used in commercial turkey operations in the region. When asked if I could get some additional information from some "turkey nutrition experts," I contacted the University and Turkey Industry nutritionists that I know for their insight. Their nutrition group meets annually at the Midwest Poultry Federation Convention and so the timing was right. To follow are their comments:

1) There have been no substantial changes to the feed rations of Minnesota turkey flocks that would increase contaminants levels as suggested in your letter dated March 5, 2014. The ingredients cited below still form the basic poultry rations in the Midwest. They include in descending order of composition fraction:
   - Grains (ground whole grains, e.g., corn, soybeans)
   - Processed grain (e.g., soybean meal, distillers dried grain, bakery meal)
   - Dietary grit (e.g., bone meal, ground shells)
   - Dietary calcium and phosphorous nutrients
   - Salt

2) Any changes that may have been made such as the increasing use of phytase (enzyme to release phosphorus from grains) and the addition/use of supplemental amino acids to reduce dietary protein content, allow poultry producers to reduce manure phosphorus and nitrogen content. These supplements are approved for use in animal feeding.

As a result of the information presented, I would agree with "turkey nutrition experts" and FibroMinn that the composition of the poultry feed used in Minnesota has not changed significantly since 2000. As a result, no new or additional contaminants should be added to the litter that is delivered to the FibroMinn plant.

If you have any questions or require additional information let me know.

Sincerely,

Dale C. Lauer, DVM
Poultry Program Director
Minnesota Board of Animal Health

Dear Heidi Gandsey, FibroMinn Fuel Manager: April 3, 2014

My name is John Gorton and I am a turkey grower from Pelican Rapids, MN. My family has been raising turkeys for over fifty years of which I have been actively involved for the past twenty years. We have owned and operated feed mills and purchased turkey feed from commercial feed mills.

I am in agreement with FibroMinn's position that the composition of turkey feed has not changed significantly since 2000. If there ever was a time to change the turkey feed ration it would have been in 2012 when the price of a bushel of corn was over $7.00 and soybeans were over $13.00. Even with these incredibly high grain input prices, the ingredients in a ton of turkey feed remained the same as any other year. The feed ration that a turkey eats is continuously adjusted to get the maximum growth performance out of the turkey. However with all the adjusting, the main ingredients remain the same, all that changes is their inclusion level. Ground corn is still the largest component of a ton of turkey feed followed by soybean meal. I see no reason to expect any significant change in the types and levels of contaminants in turkey feed.

John Gorton

Northern Turkeys, Inc

Pelican Rapids, MN 56572

ATTACHMENT D

Fibrominn Poultry Litter – Laboratory Test Data – March 2014

Republic Environmental Systems (Pennsylvania), LLC

2889 Sandstone Dr. Hatfield Pa. 19440

(tel)215-822-8995 (fax)215-822-1293

Certificate of Analytical Results

Date: *10-Mar-14*

CLIENT: Maxxam Analytical Services
6740 Campobello Road
Mississauga, Ontario L5N 2L8

Lab Order: R14020065

Project: B428351

Analyses	As Received Basis	Dry Basis	Units	Method	Date	Analyst
UY8493-01R\BROOD#1328 RED HOR./JOTS E WAD						
Lab ID: R14020065-01A						
Date Sampled:	**Date Received:** 02/27/2014			**Matrix:** SOLID		
PERCENT MOISTURE						
Moisture, Total	50.0		%	D 2216	26-Feb-14	VJO
ASH, ~~COAL~~						
Ash	10.5	21.0	%	D3174	03-Mar-14	VJO
CARBON, HYDROGEN, NITROGEN, OXYGEN (~~COAL~~)						
Carbon	19.9	39.8	%	D5291/537	07-Mar-14	VJO
Hydrogen (Excl. H in Moisture)	2.65	5.30	%			
Hydrogen (Incl. H in Moisture)	8.24		%			
Nitrogen	1.56	3.12	%			
Oxygen (Excl. O in Moisture)	15.1	30.2	%			
Oxygen (Incl. O in Moisture)	59.5		%			
FIXED CARBON, ~~COAL~~						
Fixed Carbon	6.10	12.2	%	D3172	03-Mar-14	VJO
HEATING VALUE, ~~COAL~~						
Heating Value	3600	7,200	Btu/lb	D5865	06-Mar-14	VJO
SULFUR						
Sulfur	0.260	0.52	%	D4239	07-Mar-14	VJO
VOLATILE MATTER, ~~COAL~~						
Volatile Matter	33.4	66.8	%	D3175	03-Mar-14	VJO

< Indicates less than the limit of quantitation

H - Hold Time excedance

Republic Environmental Systems (Pennsylvania), LLC

2869 Sandstone Dr. Hatfield Pa 19440

(tel)215-822-8995 (fax)215-822-1293

Certificate of Analytical Results

Date: *10-Mar-14*

CLIENT: **Maxxam Analytical Services**
6740 Campobello Road
Mississauga, Ontario L5N 2L8

Lab Order: R14020065

Project: B428351

Analyses	As Received Basis	Dry Basis	Units	Method	Date	Analyst
UY8494-01R\BROOD#1037/HULS/JOTS B SCOTT L						
Lab ID: R14020065-02A						
Date Sampled:	**Date Received:** 02/27/2014			**Matrix:** SOLID		
PERCENT MOISTURE						
Moisture, Total	41.2		%	D 2216	26-Feb-14	VJO
ASH, COAL						
Ash	6.59	11.2	%	D3174	03-Mar-14	VJO
CARBON, HYDROGEN, NITROGEN, OXYGEN (COAL)						
Carbon	26.1	44.4	%	D5291/537	07-Mar-14	VJO
Hydrogen (Excl. H In Moisture)	3.39	5.77	%			
Hydrogen (Incl. H In Moisture)	8.00		%			
Nitrogen	1.88	3.20	%			
Oxygen (Excl. O In Moisture)	20.6	35.0	%			
Oxygen (Incl. O In Moisture)	57.2		%			
FIXED CARBON, COAL						
Fixed Carbon	9.23	15.7	%	D3172	03-Mar-14	VJO
HEATING VALUE, COAL						
Heating Value	4630	7,870	Btu/lb	D5865	06-Mar-14	VJO
SULFUR						
Sulfur	0.240	0.41	%	D4239	07-Mar-14	VJO
VOLATILE MATTER, COAL						
Volatile Matter	43.0	73.1	%	D3175	03-Mar-14	VJO

< Indicates less than the limit of quantitation

H - Hold Time excedance

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Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

RESULTS OF ANALYSES OF SOLID

Maxxam ID		UY8493	UY8494		
Sampling Date					
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
Inorganics					
Chloride (Cl)	%	0.8	0.5	0.1	3549913
Fluoride (F-)	%	<0.02	<0.02	0.02	3549913
Moisture	%	52	40	1.0	3532340

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

ELEMENTS BY ICP/MS (SOLID)

Maxxam ID		UY8493	UY8494		
Sampling Date					
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
Metals					
Antimony (Sb)	ug/g	<0.05	<0.05	0.05	3531086
Arsenic (As)	ug/g	0.2	<0.1	0.1	3531086
Beryllium (Be)	ug/g	<0.05	<0.05	0.05	3531086
Cadmium (Cd)	ug/g	0.08	0.06	0.01	3531086
Chromium (Cr)	ug/g	0.6	0.3	0.3	3531086
Cobalt (Co)	ug/g	0.28	0.17	0.01	3531086
Lead (Pb)	ug/g	0.25	0.29	0.03	3531086
Manganese (Mn)	ug/g	167	148	0.3	3531086
Selenium (Se)	ug/g	0.7	0.5	0.2	3531086

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

ELEMENTS BY ATOMIC SPECTROSCOPY (SOLID)

Maxxam ID		UY8493	UY8494		
Sampling Date					
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
Metals					
Mercury (Hg)	ug/g	<0.01	<0.01	0.01	3548448

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

VOLATILE ORGANICS BY GC/MS (SOLID)

Maxxam ID		UY8493		UY8494		
Sampling Date						
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	RDL	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
Volatile Organics						
Acetone (2-Propanone)	ug/g	130	4.0	19	3.0	3528489
Benzene	ug/g	<0.16	0.16	<0.12	0.12	3528489
Bromodichloromethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
Acrolein	ug/g	<24	24	<18	18	3524468
Bromoform	ug/g	<0.40	0.40	<0.30	0.30	3528489
Bromomethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
Carbon Tetrachloride	ug/g	<0.40	0.40	<0.30	0.30	3528489
Chlorobenzene	ug/g	<0.40	0.40	<0.30	0.30	3528489
Chloroform	ug/g	<0.40	0.40	<0.30	0.30	3528489
Dibromochloromethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,2-Dichlorobenzene	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,3-Dichlorobenzene	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,4-Dichlorobenzene	ug/g	<0.40	0.40	<0.30	0.30	3528489
Dichlorodifluoromethane (FREON 12)	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,1-Dichloroethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,2-Dichloroethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,1-Dichloroethylene	ug/g	<0.40	0.40	<0.30	0.30	3528489
cis-1,2-Dichloroethylene	ug/g	<0.40	0.40	<0.30	0.30	3528489
trans-1,2-Dichloroethylene	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,2-Dichloropropane	ug/g	<0.40	0.40	<0.30	0.30	3528489
cis-1,3-Dichloropropene	ug/g	<0.24	0.24	<0.18	0.18	3528489
trans-1,3-Dichloropropene	ug/g	<0.32	0.32	<0.24	0.24	3528489
Ethylbenzene	ug/g	<0.16	0.16	<0.12	0.12	3528489
Ethylene Dibromide	ug/g	<0.40	0.40	<0.30	0.30	3528489
Hexane	ug/g	<0.40	0.40	<0.30	0.30	3528489
Methylene Chloride(Dichloromethane)	ug/g	<0.40	0.40	<0.30	0.30	3528489
Methyl Isobutyl Ketone	ug/g	<4.0	4.0	<3.0	3.0	3528489
Methyl Ethyl Ketone (2-Butanone)	ug/g	30	4.0	39	3.0	3528489
Methyl t-butyl ether (MTBE)	ug/g	<0.40	0.40	<0.30	0.30	3528489
Styrene	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,1,1,2-Tetrachloroethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,1,2,2-Tetrachloroethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
Tetrachloroethylene	ug/g	<0.40	0.40	<0.30	0.30	3528489
Toluene	ug/g	<0.16	0.16	<0.12	0.12	3528489

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

* Not regulated under NAAM Reg

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Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

VOLATILE ORGANICS BY GC/MS (SOLID)

Maxxam ID		UY8493		UY8494		
Sampling Date						
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	RDL	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
1,1,1-Trichloroethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
1,1,2-Trichloroethane	ug/g	<0.40	0.40	<0.30	0.30	3528489
Trichloroethylene	ug/g	<0.40	0.40	<0.30	0.30	3528489
Vinyl Chloride	ug/g	<0.16	0.16	<0.12	0.12	3528489
p+m-Xylene	ug/g	<0.16	0.16	<0.12	0.12	3528489
o-Xylene	ug/g	<0.16	0.16	<0.12	0.12	3528489
Xylene (Total)	ug/g	<0.16	0.16	<0.12	0.12	3528489
Trichlorofluoromethane (FREON 11)	ug/g	<0.40	0.40	<0.30	0.30	3528489
Surrogate Recovery (%)						
4-Bromofluorobenzene	%	95		94		3528489
D10-o-Xylene	%	97		97		3528489
D4-1,2-Dichloroethane	%	106		106		3528489
D8-Toluene	%	96		97		3528489

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Elemental Air, LLC
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Formaldehyde (a VOC)

MISCELLANEOUS (SOLID)

Maxxam ID		UY8493	UY8494		
Sampling Date					
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
Miscellaneous Parameters					
Miscellaneous Organics	ug/g	3	<2	2	3524368

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

SEMI-VOLATILE ORGANICS BY GC-MS (SOLID)

Maxxam ID		UY8493		UY8494		
Sampling Date						
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	RDL	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
Semivolatile Organics						
** No Parameter Attached **	ug/Kg	ATTACHED	N/A	ATTACHED	N/A	3536646
Acenaphthene	ug/g	<5	5	<10	10	3529143
Acenaphthylene	ug/g	<5	5	<10	10	3529143
Anthracene	ug/g	<5	5	<10	10	3529143
Benzo(a)anthracene	ug/g	<5	5	<10	10	3529143
Benzo(a)pyrene	ug/g	<5	5	<10	10	3529143
Benzo(b/j)fluoranthene	ug/g	<5	5	<10	10	3529143
Benzo(g,h,i)perylene	ug/g	<5	5	<10	10	3529143
Benzo(k)fluoranthene	ug/g	<5	5	<10	10	3529143
1-Chloronaphthalene	ug/g	<50	50	<100	100	3529143
2-Chloronaphthalene	ug/g	<5	5	<10	10	3529143
Chrysene	ug/g	<5	5	<10	10	3529143
Dibenz(a,h)anthracene	ug/g	<5	5	<10	10	3529143
Fluoranthene	ug/g	<5	5	<10	10	3529143
Fluorene	ug/g	<5	5	<10	10	3529143
Indeno(1,2,3-cd)pyrene	ug/g	<5	5	<10	10	3529143
1-Methylnaphthalene	ug/g	<5	5	<10	10	3529143
2-Methylnaphthalene	ug/g	<5	5	<10	10	3529143
Naphthalene	ug/g	<5	5	<10	10	3529143
Perylene	ug/g	<10	10	<20	20	3529143
Phenanthrene	ug/g	<5	5	<10	10	3529143
Pyrene	ug/g	<5	5	<10	10	3529143
Quinoline	ug/g	<10	10	<20	20	3529143
1,2-Dichlorobenzene	ug/g	<5	5	<10	10	3529143
1,3-Dichlorobenzene	ug/g	<5	5	<10	10	3529143
1,4-Dichlorobenzene	ug/g	<5	5	<10	10	3529143
Hexachlorobenzene	ug/g	<10	10	<20	20	3529143
Pentachlorobenzene	ug/g	<10	10	<20	20	3529143
1,2,3,4-Tetrachlorobenzene	ug/g	<10	10	<20	20	3529143
1,2,3,5-Tetrachlorobenzene	ug/g	<10	10	<20	20	3529143
1,2,4,5-Tetrachlorobenzene	ug/g	<10	10	<20	20	3529143
1,2,3-Trichlorobenzene	ug/g	<10	10	<20	20	3529143
1,2,4-Trichlorobenzene	ug/g	<10	10	<20	20	3529143

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B428351
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Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

SEMI-VOLATILE ORGANICS BY GC-MS (SOLID)

Maxxam ID		UY8493		UY8494		
Sampling Date						
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	RDL	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
1,3,5-Trichlorobenzene	ug/g	<10	10	<20	20	3529143
2-Chlorophenol	ug/g	<5	5	<10	10	3529143
4-Chloro-3-Methylphenol	ug/g	<5	5	<10	10	3529143
m/p-Cresol	ug/g	<10	10	<20	20	3529143
o-Cresol	ug/g	<10	10	<20	20	3529143
2,3-Dichlorophenol	ug/g	<5	5	<10	10	3529143
2,4-Dichlorophenol	ug/g	<5	5	<10	10	3529143
2,5-Dichlorophenol	ug/g	<5	5	<10	10	3529143
2,6-Dichlorophenol	ug/g	<5	5	<10	10	3529143
3,4-Dichlorophenol	ug/g	<5	5	<10	10	3529143
3,5-Dichlorophenol	ug/g	<5	5	<10	10	3529143
2,4-Dimethylphenol	ug/g	<5	5	<10	10	3529143
2,4-Dinitrophenol	ug/g	<50 (1)	50	<100 (1)	100	3529143
4,6-Dinitro-2-methylphenol	ug/g	<50 (1)	50	<100 (1)	100	3529143
2-Nitrophenol	ug/g	<30	30	<50	50	3529143
4-Nitrophenol	ug/g	<30	30	<50	50	3529143
Pentachlorophenol	ug/g	<100 (1)	100	<100 (1)	100	3529143
Phenol	ug/g	120	10	<20	20	3529143
2,3,4,5-Tetrachlorophenol	ug/g	<5	5	<10	10	3529143
2,3,4,6-Tetrachlorophenol	ug/g	<5	5	<10	10	3529143
2,3,5,6-Tetrachlorophenol	ug/g	<50 (1)	50	<200 (1)	200	3529143
2,3,4-Trichlorophenol	ug/g	<5	5	<10	10	3529143
2,3,5-Trichlorophenol	ug/g	<5	5	<10	10	3529143
2,3,6-Trichlorophenol	ug/g	<5	5	<10	10	3529143
2,4,5-Trichlorophenol	ug/g	<5	5	<10	10	3529143
2,4,6-Trichlorophenol	ug/g	<5	5	<10	10	3529143
3,4,5-Trichlorophenol	ug/g	<5	5	<10	10	3529143
Benzyl butyl phthalate	ug/g	<10	10	<20	20	3529143
Bis(2-chloroethoxy)methane	ug/g	<5	5	<10	10	3529143
Bis(2-chloroisopropyl)ether	ug/g	<5	5	<10	10	3529143
Bis(2-ethylhexyl)phthalate	ug/g	<30	30	<50	50	3529143
4-Bromophenyl phenyl ether	ug/g	<5	5	<10	10	3529143
p-Chloroaniline	ug/g	<10	10	<20	20	3529143
4-Chlorophenyl phenyl ether	ug/g	<5	5	<10	10	3529143

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Detection limit was raised due to matrix interference.

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Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

SEMI-VOLATILE ORGANICS BY GC-MS (SOLID)

Maxxam ID		UY8493		UY8494		
Sampling Date						
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	RDL	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
3,3'-Dichlorobenzidine	ug/g	<30	30	<50	50	3529143
Diethyl phthalate	ug/g	<10	10	<20	20	3529143
Di-N-butyl phthalate	ug/g	<10	10	<20	20	3529143
Di-N-octyl phthalate	ug/g	<30	30	<50	50	3529143
2,4-Dinitrotoluene	ug/g	<5	5	<10	10	3529143
2,6-Dinitrotoluene	ug/g	<5	5	<10	10	3529143
Dimethyl phthalate	ug/g	<10	10	<20	20	3529143
Biphenyl	ug/g	<5	5	<10	10	3529143
Bis(2-chloroethyl)ether	ug/g	<10	10	<20	20	3529143
Hexachlorobutadiene	ug/g	<5	5	<10	10	3529143
Hexachlorocyclopentadiene	ug/g	<30	30	<50	50	3529143
Hexachloroethane	ug/g	<5	5	<10	10	3529143
Isophorone	ug/g	<5	5	<10	10	3529143
Nitrobenzene	ug/g	<5	5	<10	10	3529143
Nitrosodiphenylamine/Diphenylamine	ug/g	<10	10	<20	20	3529143
N-Nitroso-di-n-propylamine	ug/g	<5	5	<10	10	3529143
Surrogate Recovery (%)						
2,4,6-Tribromophenol	%	81		78		3529143
2-Fluorobiphenyl	%	81		84		3529143
2-Fluorophenol	%	71		68		3529143
D14-Terphenyl	%	85		86		3529143
D5-Nitrobenzene	%	64		68		3529143
D5-Phenol	%	72		72		3529143

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May 5, 2014

Ms. Carol Staniec
US EPA Region V
77 West Jackson Blvd
R19J
Chicago, IL 60604-3590

Subject: Fibrominn Biomass Power Plant, Benson, MN – Poultry Litter Fuel
(MPCA Air Permit No. 15100038)
Revision to Supplement #2 to Application for Non-Waste Determination Under 40 CFR Part 241.3(c)

Dear Ms. Staniec:

Fibrominn LLC submitted a non-waste petition for its poultry litter fuel to EPA Region 5 on July 1, 2013, and submitted supplemental information on January 10, 2014 and again on April 8, 2014. With this letter, Fibrominn revises two data points that appeared in Table 1A of its supplemental submission dated April 8, 2014. Table 1A is attached here, showing two revised values in blue font for the chlorine level recently measured in Fibrominn's poultry litter. The revised chlorine levels in the litter are lower than previously reported and reinforce Fibrominn's prior conclusion that the chlorine levels present in Fibrominn's poultry litter are less than or comparable to levels in traditional fuels. The basis for revising the reported chlorine levels is further explained below.

Table 1A had summarized the contaminant levels present in samples of Fibrominn's poultry litter obtained from two different poultry growers. The two litter samples had been obtained in February 2014 and were originally laboratory tested in March 2014. The then reported levels of chlorine, at 5,000 and 8,000 ppm for the two litter samples, were higher than average for Fibrominn litter, although within the historical range of values for Fibrominn litter. While possible, Fibrominn thought it unlikely that those tested chlorine levels in litter from two different poultry growers would both be above average. In addition, the standard laboratory test that produced the reported results is less accurate than other laboratory tests that are specifically used to test fuel materials. Accordingly, Fibrominn had both litter samples (same litter samples as tested in March 2014) re-analyzed for chlorine by another laboratory that specializes in analyzing fuel materials using a more accurate test method.

The test method used originally (March 2014) is the standard method for ultimate/proximate analysis in which chlorine is measured using flow injection analysis following bomb combustion calorimetry (i.e., Chlorine - E776/9250 Titrimetric Silver Nitrate Method). The subsequent re-analysis (April 2014) employed a microcoulometric technique following the ASTM D6721 test method. Using that test method, the analysis for chlorine is performed

directly on the litter sample, not following combustion of the sample as with the standard method. Coulometric analysis directly of the litter sample itself enables more accurate measurement at lower concentrations.

A comparison of the chlorine test results via the two test methods follows for the same two samples of Fibrominn poultry litter. The laboratory test results, as reported by the two test laboratories are attached.

Standard Test Method for Ultimate/Proximate Analysis – Chlorine-E776/9250	**More Sensitive Method for Direct Testing of Fuel Samples – ASTM D6721**
Laboratory: Maxxam	Laboratory: MVTL
Litter Analysis Date: March 2014	Litter Analysis Date: April 2014
Litter Sample from Poultry Grower A (Labeled "Red Horizon")	Litter Sample from Poultry Grower A (Labeled "Red Horizon")
Litter Chlorine Level (As Received): **8,000 ppm**	Litter Chlorine Level (As Received): **4,010 ppm**
Litter Sample from Poultry Grower B (Labeled "Huls")	Litter Sample from Poultry Grower B (Labeled "Huls")
Litter Chlorine Level (As Received): **5,000 ppm**	Litter Chlorine Level (As Received): **2,870 ppm**

The more sensitive laboratory analytical method showed lower chlorine levels present in both of the Fibrominn litter samples (2,870 and 4,010 ppm), consistent with the average level tested historically in Fibrominn's poultry litter (3,800 ppm).

Thank you for reviewing this revised data. Please do not hesitate to contact me with any questions or should you need further information to facilitate your review.

Please also copy the following individuals on any email or written correspondence:

- Grady Third, Fibrominn LLC (grady.third@contourglobal.com);
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com).

Sincerely,

David H. Minott

David H. Minott, QEP, CCM
President
Arc5 Environmental Consulting, LLC

978-877-7719; david.minott@arc5enviro.com

Attachments: Revised Table 1A

cc: MPCA via email –

- Trevor Shearen (trevor.shearen@state.mn.us)
- Richard Cordes (richard.cordes@state.mn.us)
- Steve Gorg (steven.gorg@state.mn.us)

Also -

- Grady Third, Fibrominn LLC (grady.third@contourglobal.com)
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants[1]

Supplement April 8, 2014 **Data Units: ppm[2]**
(Revised May 5, 2014, updating chlorine data, blue font)

NOTE: This supplements Fibrominn's Non-Waste Petition (July 1, 2013) and Prior Supplement (January 10, 2014). All revisions since January 10, 2014 are shown in red or blue font.

Contaminant	Poultry Litter (Fibrominn Data)		Poultry Litter[5] (Fibrominn and Literature)		Wood / Biomass[8]		DDGS[9]	Stover[9]	Alfalfa[9]	Oat Stems[9]	Coal[8]		Pet Coke[10]	Results of Comparison
	Avg.	Range[3,4]	Avg.	Range	Avg.	Range	Avgs.	Avgs.	Avgs.	Avgs.	Avg.	Range	Range	
Non-metal elements														
Chlorine (Cl)	~~5000~~ 2870, ~~8000~~ 4010[3] 3800[4]	1,000 - 8900	4000	1000 - 9700	259	ND - 5400	~~1833-1~~ 757[9a], ~~3 000[9b]~~ 3017[9f], 1300[9c]	2200[9e], 2300[9e], 6000[9b], 7200[9e]	300[9b], 2700[9c], 5000[9e]	8,568[9f]	992	ND - 9080	7 - 3000	Comparable to stover and , alfalfa (data avg.). Less than oat stems (data avg.) Comparable to coal (data range)
Fluorine (F)	< 200, < 200[3] 200[4]	100 - 500	200	100 - 500	32.4	ND - 300	No Data	No Data	No Data	No Data	64.0	ND - 178	No Data	Comparable to wood, within statistical uncertainties (data range) Fibrominn test data corroborates literature data.
Nitrogen (N)	15600, 18800[3] 26300[4]	10200 - 43600	32300	7320 - 59300	3460	200 - 39500	36000[9c], 47900[9a], 49000[9d]	1300[9c], 6100[9b]	10000[9b], 17800[9c]	6,000[9f]	15090	13600 - 54000	10000 - 26000	Lower than DDGS (data avg.) Comparable to coal (data range)
Sulfur (S)	2400, 2600[3] 3800[4]	1600 - 7000	5300	1330 - 11100	704	ND - 8700	6100[9d], 6400[9c], 7700[9a]	100[9b] 100[9c]	200[9b], 1300[9c]	900[9f]	13580	740 - 61300	5400 - 79100	Lower than coal, coke, and DDGS (data avg.) and pet coke (data range)
Metal Elements														
Antimony (Sb)	< 0.05, < 0.05[3] No Data[4]	No Data	< 0.60[6]	--	0.9	ND - 26	No Data	No Data	No Data	No Data	1.7	ND - 10	No Data	Comparable to wood & coal (data avg.)
Arsenic (As)	< 0.01, 0.02[3] 1.13[4]	< 0.02 - 3.16	13.7, 1.13[7]	< 0.02 - 40.5	6.3	ND - 298	No Data	No Data	No Data	No Data	8.2	ND - 174	ND - 0.3	Litter lower than wood & coal (data range) Fibrominn litter lower than wood (data avg.)
Beryllium (Be)	< 0.05, < 0.05[3] No Data[4]	No Data	< 0.12[6]	--	0.3	ND - 10	No Data	No Data	No Data	No Data	1.9	ND - 206	ND - 1.5	Comparable to wood; less than coal (data avg.)
Cadmium (Cd)	0.06, 0.08[3] No Data[4]	No Data	1.46	0.068 - 4.39	0.6	ND - 17	No Data	No Data	No Data	No Data	0.6	ND - 19	< 0.1	Lower than wood & coal (data range)
Chromium (Cr)	0.3, 0.6[3] 1.19[4]	0.19 - 1.82	40.27	0.19 - 230	5.9	ND - 340	No Data	No Data	No Data	No Data	13.4	ND - 168	No Data	Litter comparable to wood and coal (data range). Fibrominn litter lower than wood and coal (data avg.)
Cobalt (Co)	0.17, 0.28[3] No Data[4]	No Data	0.002	0.001 - 0.003	6.5	ND - 213	No Data	No Data	No Data	No Data	6.9	ND - 25.2	No Data	Lower than wood, coal

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants[1] **Supplement April 8, 2014** **Data Units: ppm[2]**

Lead (Pb)	0.25, 0.29[3] 0.55[4]	0.09 - 1.07	12.93	0.09 - 70	4.5	ND - 229	No Data	No Data	No Data	No Data	8.7	ND - 148	< 0.6	Fibrominn litter lower than wood and coal (data avg. and range)
Manganese (Mn)	148, 167[3] No Data[4]	No Data	0.794	0.249 - 167	302	ND - 15800	No Data	No Data	No Data	No Data	26.2	ND - 512	2.4 - 4.0	Lower than wood, coal (data range)
Mercury (Hg)	< 0.01, < 0.01[3] < 0.05[4]	< 0.01- <0.05	<0.12	0.05 - 0.25	0.03	ND - 1.1	No Data	No Data	No Data	No Data	0.09	ND - 3.1	0.001 - 0.5	Lower than wood, coal; comparable to coke (data range)
Selenium (Se)	0 5, 0.7[3] 0.76[4]	0.21 - 0.99	0.55	<0.99	1.1	ND - 9.0	No Data	No Data	No Data	No Data	3.4	ND - 74.3	ND - 2.0	Lower than wood & coal (data avg. and range); comparable to coke (data range)

Notes:

1. NOTE: This tabular summary is submitted as a supplement to Fibrominn's original non-waste application to US EPA Region 5 dated July 1, 2013, and supplement dated January 10, 2014. *All new entries to this table since the January 10, 2014 supplement appear in red font.* Poultry litter is comprised of only two components: digested poultry feed and poultry bedding, which is clean cellulosic biomass such as wood shavings. In its original non-waste application, Fibrominn determined that levels of elemental metals, except for arsenic (As), are subjectively determined to be less than or comparable to levels present in traditional fuels, basing this determination on Fibrominn's expert knowledge of poultry growing practices, poultry litter composition, and litter handling practices. Nonetheless, in the original application, Fibrominn supplemented this subjective expert determination with quantitative contaminant comparisons for the individual metals, where test data were available to enable this.
2. Concentrations (ppm) for poultry litter are for the material on an "as-received" basis, as is technically correct for purposes of this analysis. Concentrations for all other fuel materials are literature values and were available only on a dry-weight basis.
3. Fibrominn poultry litter test data, two samples of poultry litter, analyzed March 2014. Test data are for two samples of turkey litter delivered from two different poultry growers to Fibrominn in February 2014 and analyzed by a third-party laboratory in March 2014. This Fibrominn test data is intended to corroborate, not replace Fibrominn's prior determination, based on Fibrominn's expert knowledge, that levels of all contaminants except for nitrogen (N), sulfur (S), chlorine (Cl), arsenic (As), and formaldehyde are subjectively determined to be less than or comparable to levels present in traditional fuels.
4. Fibrominn poultry litter test data for turkey and chicken litter, analyzed 1999 to 2002. Fibrominn has demonstrated these data to be representative of contaminant levels present currently in its poultry litter. The number of samples comprising Fibrominn's 1999-2002 data base of poultry litter test data was documented in Fibrominn's non-waste petition of July 1, 2013, Table 1.
5. Averages and ranges for poultry litter are based on poultry litter test data; For N and S, based on > 1,500 tests (i.e., >100 Fibrominn litter tests, plus > 1,400 tests from literature); for Cl, based on 118 litter tests (109 Fibrominn, 9 literature); for F, based on 16 tests (all Fibrominn litter); for elemental metals, based on Fibrominn and literature test data, ranging from 8 to 1,454 tests, depending on the particular metal. 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)*
   - *Barker et al., January 1994 (Rev. 2001). "Animal and Poultry Manure Production & Characterization," Tables 61 and 71 combined.* Accessed March 2013 at http://www.bae.ncsu.edu/programs/extension/manure/awm/program/barker/a&pmp&c/cover_page_apmp&c.html
6. Reference for Antimony (Sb) and Beryllium(Be) in poultry litter: The average Sb and Be concentrations are based on test results from 27 samples of poultry litter (turkey litter) obtained from poultry operations in three different locations in North Carolina since 2010. The average Sb and Be concentrations were reported on a dry weight basis. Data reference: *"Letter dated July 19, 2012 from North Carolina Dept. of Environment and Natural Resources (NCDENR) to Prestage Farms (J. Prestage), Subject: Applicability Determination No. 1887 – Secondary Material Determination . . .."* This letter granted a non-waste determination to Prestage Farms for using regional poultry litter as a combustion fuel to generate energy.
7. The average arsenic concentration of 1.13 ppm is based on sampling of Fibrominn's litter only (7 samples) between 1999 and 2002, and is an order of magnitude less than the average arsenic level of 13.7 ppm, which is based on literature values. The average arsenic level in Fibrominn's litter is comparable with the average level in Wood/Biomass.

Table 1A: Contaminant-by-Contaminant Comparison, Elemental Contaminants[1] **Supplement April 8, 2014** **Data Units: ppm[2]**

8. Ranges and averages for Wood & Biomass Materials and Coal are 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.
9. DDGS (Distillers Dried Grains with Solubles), corn stover, alfalfa stems, and oat straw are all defined by EPA to be "clean cellulosic biomass." Multiple average values are shown for the chlorine (Cl), nitrogen (N), and sulfur (S) concentrations present in these materials. The multiple average values were drawn from different literature sources and from limited testing performed in the past by Fibrominn. Specific references for the reported data averages are as follows:
    - 9a - *Morey, R.V. et al., 2009. "Fuel Properties of Biomass Feed Streams at Ethanol Plants." Applied Engineering in Agriculture, Vol. 25, No. 1, pp. 57 - 64.*
    - 9b - *Jenkins, Bryan et al., 1985. "Thermochemical Properties of Biomass Fuels," California Agriculture, May-June 1985, Table 1.*
    - 9c - *Fibrominn LLC, "Fibrominn Composite Fuel Evaluation Based on 50 MW Export and Average Fuel Characteristics," April 10, 2001. (**Note**: Data on As Received basis)*
    - 9d - *University of Minnesota, 2005. "The Value and Use of Distillers Dried Grains with Solubles (DDGS) in Livestock and Poultry Feeds."* Accessed at www.ddgs.umn.edu
    - 9e - *Tilman, David et al., 2008. "Chlorine in Solid Fuels Fired in Pulverized Coal Boilers - Sources, Forms, Reactions and Consequences: A Literature Review."*
    - 9f – *AURI, 2008. "Agricultural Renewable Solid Fuels Data – Agricultural Utilization Research Institute Fuels Initiative II Brochure. www.auri.org/research/fuels/downloads.asp*
10. Pet coke is defined as non-waste fuels by EPA. Ranges for the chlorine (Cl), nitrogen (N), and sulfur (S) concentrations present in this material are literature values. The specific reference for the range values of Cl, N, and S presented for pet coke is: *National Council for Air and Stream Improvement, Inc. (NCASI). 2005. Alternative Fuels Used in the Forest Products Industry: Their Composition and Impact on Emissions. Technical Bulletin No. 0906, Tables 3.1-3.4. Research Triangle Park, NC.*

Maxxam

Maxxam Job #: B428351
Report Date: 2014/03/14

Elemental Air, LLC
Client Project #: E13063
Site Location: FIBROMIN, LLC. - BENSON, MN

RESULTS OF ANALYSES OF SOLID

Maxxam ID		UY8493	UY8494		
Sampling Date					
	Units	BROOD#1328/RED HORIZON/JOTS W WADENA	BROOD#1037/HULS/JOTS B SCOTT LAKE	RDL	QC Batch
Inorganics					
Chloride (Cl)	%	0.8	0.5	0.1	3549913
Fluoride (F-)	%	<0.02	<0.02	0.02	3549913
Moisture	%	52	40	1.0	3532340

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

MINNESOTA VALLEY TESTING LABORATORIES, INC.

MVTL

1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890
2616 E. Broadway Ave. ~ Bismarck, ND 58501 ~ 800-279-6885 ~ Fax 701-258-9724
51 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885

MEMBER ACIL

Sample Number: 14-M868

Report Date: 4/24/14

Mark Carlson
Elemental Air, LLC
830 Tower Drive, Suite 100
Medina MN 55340

Work Order #: 81-405
P.O. #: E14021

Date Received: 4/16/14

Sample Description: Red Horizon
Sample Site: Fibrominn

*** PROXIMATE ***

ANALYTE	AS RECEIVED	DRY BASIS
Total Moisture	45.45 wt. %	

*** ULTIMATE ***

ANALYTE	AS RECEIVED	DRY BASIS
Total Moisture	45.45 wt. %	
Chlorine	4010 ug/g	7350 ug/g

*** SULFUR FORMS ***

ANALYTE	AS RECEIVED	DRY BASIS

*** ASH FUSION ***

ANALYTE	REDUCING	OXIDIZING

*** MINERAL ANALYSIS OF ASH ***

ANALYTE	DRY BASIS

*** MISCELLANEOUS ***

ANALYTE	AS RECEIVED	DRY BASIS

Approved by: Stacy Zander

MINNESOTA VALLEY TESTING LABORATORIES, INC.

MVTL

1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890
2616 E. Broadway Ave. ~ Bismarck, ND 58501 ~ 800-279-6885 ~ Fax 701-258-9724
51 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885

MEMBER ACIL

Sample Number: 14-M869

Report Date: 4/24/14

Mark Carlson
Elemental Air, LLC
830 Tower Drive, Suite 100
Medina MN 55340

Work Order #: 81-405
P.O. #: E14021

Date Received: 4/16/14

Sample Description: Huls
Sample Site: Fibrominn

*** PROXIMATE ***

ANALYTE	AS RECEIVED	DRY BASIS
Total Moisture	45.16 wt. %	

*** ULTIMATE ***

ANALYTE	AS RECEIVED	DRY BASIS
Total Moisture	45.16 wt. %	
Chlorine	2870 ug/g	5230 ug/g

*** SULFUR FORMS ***

ANALYTE	AS RECEIVED	DRY BASIS

*** ASH FUSION ***

ANALYTE	REDUCING	OXIDIZING

*** MINERAL ANALYSIS OF ASH ***

ANALYTE	DRY BASIS

*** MISCELLANEOUS ***

ANALYTE	AS RECEIVED	DRY BASIS

Approved by: Stacy Zander

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Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Wednesday, January 21, 2015 4:37 PM
To: Staniec, Carol
Cc: 'Grady Third'; 'Joe Richards'; 'Knudson, Scott'
Subject: Fibrominn - NonWaste Petition

Hello Carol,

Provided here are the data clarifications you requested in our telephone conversation today (January 21, 2015) with regard to the non-waste petition submitted for the poultry litter fuel burned at the Fibrominn Biomass Power Plant. After checking Fibrominn's related submissions, I confirm the following:

- Test data for the metals content of Fibrominn's poultry litter were presented only for Arsenic (As), Barium (Ba), Chromium (Cr), Lead (Pb), and Selenium (Se) in Fibrominn's original submission dated *July 1, 2013 (Tables 1 through 4).*

- Test data for additional metals were presented within the *April 8, 2014* supplemental submission *(Table 1A)*: Antimony (Sb), Beryllium (Be), Cadmium (Cd), Cobalt (Co), and Manganese (Mn). With that submission, additional new data were also presented for Arsenic (As), Chromium (Cr), Lead (Pb), Mercury (Hg), and Selenium (Se). The test data presented in that submission for Manganese (Mn) are the only Fibrominn-specific data that has been submitted for Manganese.

- No data, based on testing of Fibrominn's poultry litter, has ever been submitted with regard to the level of Nickel (Ni) present in the litter.

- The test data that was presented for the Nickel (Ni) level in poultry litter had been based entirely on literature values; i.e., the average value (45 ppm) and range of values (1.68 to 185 ppm), as presented in the *July 1, 2013* original submission *(Tables 1 to 4)* and the *January 10, 2014* supplement *(Table 1A).*

Please don't hesitate to contact me should you find that further discussion would facilitate your review.

Regards,
Dave

David H. Minott, QEP, CCM
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8

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Wednesday, February 25, 2015 4:30 PM
To: Staniec, Carol
Cc: 'Morecroft, Robin'; 'Joe Richards'; "Grady Third"
Subject: Fibrominn - Litter Moisture
Attachments: MonthlyAvgLitterMoisture - 2012-2015.xlsx

Dear Carol,

Pursuant to our telephone conversation earlier today, attached is a data summary Fibrominn has on hand that summarizes the monthly average moisture content of Fibrominn's poultry litter delivered during each month of the 32 month period, June 2012 to January 2015. For the 32 month period, the moisture averaged 34% for the 776,193 tons of poultry litter combusted. In terms of recent history, calendar year 2014, the annual average moisture content was similar at 37% and the monthly average moisture percentages ranged from 32% to 41%.

Fibrominn is preparing another special summary this afternoon of the moisture levels measured on a per-load basis for every load of poultry litter delivered to Fibrominn in calendar year 2014. We will supply that as soon as it is ready, hopefully, this afternoon.

In the meantime, this attached summary provides relevant information. Please don't hesitate to call should questions arise

Sincerely,
Dave Minott

David H. Minott, QEP, CCM
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20 Rockwood Lane, Groton, MA 01450
+1 978 877 7719 david.minott@arc5enviro.com

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Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Wednesday, February 25, 2015 6:26 PM
To: Staniec, Carol
Cc: 'Morecroft, Robin'; 'Joe Richards'; "Grady Third"
Subject: Fibrominn - Litter Moisture - More Data
Attachments: MonthlyAvgLitterMoisture - 2012-2015.xlsx; Litter Moisture - 2014 Per-Load Statistics.xlsx

Dear Carol,

Earlier this afternoon, I had sent you the attached summary statistics on Fibrominn's monthly average values of poultry litter moisture content. Here, I'm attaching a second summary Fibrominn has prepared today of the moisture levels measured on a per-load basis for over 10,000 loads of poultry litter delivered to Fibrominn in calendar year 2014.

First, recapping the information sent earlier on the average moisture content of Fibrominn's poultry litter delivered during each month of the 32 month period, June 2012 to January 2015:

- For the 32 month period, the moisture averaged 34% for the 776,193 tons of poultry litter combusted.
- In terms of recent history, calendar year 2014, the annual average moisture content was similar just over 37% and the monthly average moisture percentages ranged from 32% to 41%.

Regarding the attached new statistical analysis of the moisture levels measured on a per-load basis for 10,335 loads of poultry litter delivered to Fibrominn in calendar year 2014:

- 10,335 loads of poultry litter, delivered to Fibrominn during calendar year 2014, were tested for moisture content.
- The annual average moisture content was 37.8%, consistent with historical norms at Fibrominn.
- Over 75% of all litter samples in 2014 had moisture contents in the range of 25% to 50%.
- Only 9% had moisture contents exceeding 50%.
- Fibrominn's fuel manager will accept loads of litter with moisture over 50% rarely, and only if they can be accommod
- NOTE: The moisture distribution annually for the litter on a per-load basis is consistent with that of green wood chip

Please don't hesitate to call should questions arise; I'm available all day tomorrow, Friday.

Sincerely,
Dave Minott

David H. Minott, QEP, CCM
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MONTHLY TONNAGES AND AVERAGE MOISTURE -- June 2012 to January 2015

	Period Average Moisture	Total Litter Tonnage
Jun 2012 to Jan 2015 (32 Mos.)	34.10%	776,193
Jan 2014 to Dec 2014	37.4% (Monthly Range: 32% to 41%)	272,428

Date	Product	Tons	Moisture%
June-12	Turkey Litter	24608	37.9
	Turkey Litter - SPOT	2294	35.0
	Layer Litter - SPOT	7186	18.0
	Stockpiled Litter	447	33.9
July-12	Turkey Litter	25188	37.2
	Turkey Litter - SPOT	807	34.6
	Layer Litter - SPOT	7316	19.9
	Stockpiled Litter	465	29.2
August-12	Turkey Litter	19393	37.2
	Turkey Litter - SPOT	1819	34.5
	Layer Litter - SPOT	6752	22.9
	Stockpiled Litter	140	23.9
September-12	Turkey Litter	17080	35.1
	Turkey Litter - SPOT	604	25.3
	Layer Litter - SPOT	4002	21.1
October-12	Turkey Litter	16225	34.9
	Turkey Litter - SPOT	1508	29.4
	Layer Litter - SPOT	5576	16.6
	Stockpiled Litter	357	35.2
November-12	Turkey Litter	22998	39.3
	Turkey Litter - SPOT	998	31.0
	Layer Litter - SPOT	4894	22.3
	Stockpiled Litter	268	27.0
December-12	Turkey Litter	26678.2	39.89
	Turkey Litter - SPOT	659.57	28.43
	Layer Litter - SPOT	3482.12	19.48
	Stockpiled Litter	405.53	41.7
January-13	Turkey Litter	15662.75	41.98
	Turkey Litter - SPOT	663.54	30.68
	Layer Litter - SPOT	2828.79	20.67
	Stockpiled Litter	136.31	37.35

MONTHLY TONNAGES AND AVERAGE MOISTURE -- June 2012 to January 2015

	Period Average Moisture	Total Litter Tonnage
Jun 2012 to Jan 2015 (32 Mos.)	34.10%	776,193
Jan 2014 to Dec 2014	37.4% (Monthly Range: 32% to 41%)	272,428

Date	Product	Tons	Moisture%
February-13	Turkey Litter	4043.09	38.82
	Stockpiled Litter	479.1	38.13
March-13	Turkey Litter	23074.39	41.82
	Layer Litter - SPOT	2592.56	26.27
	Stockpiled Litter	4985.82	42.28
April-13	Turkey Litter	23147.08	40.62
	Turkey Litter - SPOT	150.1	29.4
	Layer Litter - SPOT	5679.51	25.78
	Stockpiled Litter	5274.8	41.57
May-13	Turkey Litter	19824.11	38.63
	Turkey Litter - SPOT	692.47	29.52
	Layer Litter - SPOT	4546.05	24.74
	Stockpiled Litter	4817.68	30.73
June-13	Turkey Litter	20133.42	39.17
	Turkey Litter - SPOT	67.73	16.9
	Layer Litter - SPOT	3787.55	27.2
	Stockpiled Litter	5586.26	37.36
July-13	Turkey Litter	15439.3	36.74
	Turkey Litter - SPOT	14205.68	32.39
	Layer Litter - SPOT	715.51	28.75
	Stockpiled Litter	6012.13	40.92
August-13	Turkey Litter	17652.91	34.15
	Turkey Litter - SPOT	1813.07	30.94
	Layer Litter - SPOT	2627.35	26.9
	Stockpiled Litter	2605.4	35.78
September-13	Turkey Litter	17893.72	35.04
	Turkey Litter - SPOT	696.2	31.42
	Stockpiled Litter	334.22	36.64
October-13	Turkey Litter	11026.88	35.57
	Turkey Litter - SPOT	116.08	27.66
	Stockpiled Litter	1740.03	37.31

MONTHLY TONNAGES AND AVERAGE MOISTURE -- June 2012 to January 2015

	Period Average Moisture	Total Litter Tonnage
Jun 2012 to Jan 2015 (32 Mos.)	34.10%	776,193
Jan 2014 to Dec 2014	37.4% (Monthly Range: 32% to 41%)	272,428

Date	Product	Tons	Moisture%
November-13	Turkey Litter	14657.05	38.76
	Turkey Litter - SPOT	363.38	35.35
	Stockpiled Litter	2523.71	39.88
December-13	Turkey Litter	17700.63	40.64
	Turkey Litter - SPOT	113.48	19.75
	Stockpiled Litter	2734.34	43.36
January-14	Turkey Litter	26176.85	40.29
	Turkey Litter - SPOT	81.25	29.42
	Stockpiled Litter	4166.32	39.97
February-14	Turkey Litter	22223.65	40.19
	Turkey Litter - SPOT	407.07	30.57
	Stockpiled Litter	1970.35	45.72
March-14	Turkey Litter	20671.74	41.85
	Turkey Litter - SPOT	504.94	36.49
	Stockpiled Litter	842.44	45.44
April-14	Turkey Litter	26341.19	42.01
	Turkey Litter - SPOT	215.22	27.63
	Stockpiled Litter	4537.46	43.98
May-14	Turkey Litter	13273.99	39.23
	Stockpiled Litter	5674.01	43.77
June-14	Turkey Litter	26623.34	38.09
	Turkey Litter - SPOT	958.05	34.19
	Stockpiled Litter	3122.09	44.4
July-14	Turkey Litter	20994.04	34.74
	Turkey Litter - SPOT	1387.15	32.7
	Stockpiled Litter	3243.87	42.7
August-14	Turkey Litter	18835.46	34.66
	Turkey Litter - SPOT	206.53	32.61
	Stockpiled Litter	3927.05	42.31

MONTHLY TONNAGES AND AVERAGE MOISTURE -- June 2012 to January 2015

	Period Average Moisture	Total Litter Tonnage
Jun 2012 to Jan 2015 (32 Mos.)	34.10%	776,193
Jan 2014 to Dec 2014	37.4% (Monthly Range: 32% to 41%)	272,428

Date	Product	Tons	Moisture%
September-14	Turkey Litter	14505.06	33.37
	Turkey Litter - SPOT	143.18	33.1
	Stockpiled Litter	155.78	49.9
October-14	Turkey Litter	7356.9	30.6
	Turkey Litter - SPOT	39	26.55
	Stockpiled Litter	1366.18	39.36
November-14	Turkey Litter	14593.52	33.39
	Stockpiled Litter	4306.35	39.33
December-14	Turkey Litter	18200.02	35.44
	Turkey Litter - SPOT	88.16	29.54
	Stockpiled Litter	5289.78	37.91
January-15	Turkey Litter	20488.62	38.06
	Stockpiled Litter	1984.38	38.25

FIBROMINN -- DISTRIBUTION OF PER-LOAD POULTRY-LITTER MOISTURE LEVELS IN 2014

Analysis, Based on Statistics Presented Below:

> 10,335 loads of poultry litter, delivered to Fibrominn during calendar year 2014, were tested for moisture content.

> The annual average moisture content was 37.8%, consistent with historical norms at Fibrominn.

> Over 75% of all litter samples in 2014 had moisture contents in the range of 25% to 50%.

> Only 9% had moisture contents exceeding 50%.

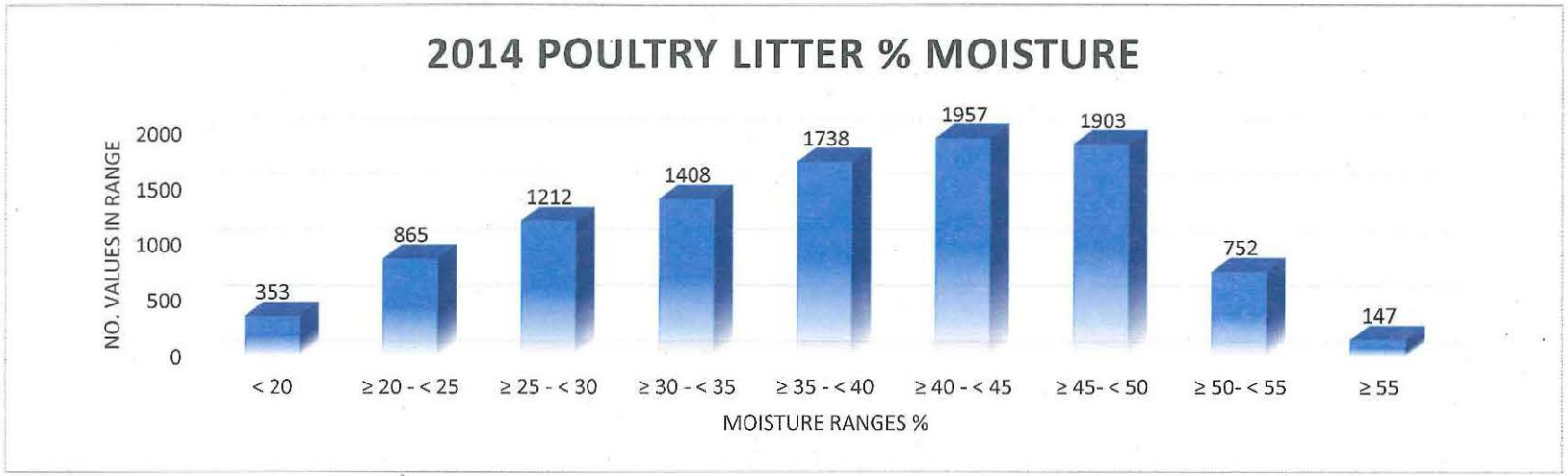
> Fibrominn's fuel manager will accept loads of litter with moisture over 50% rarely, and only if they can be accomodated during normal fuel blending.

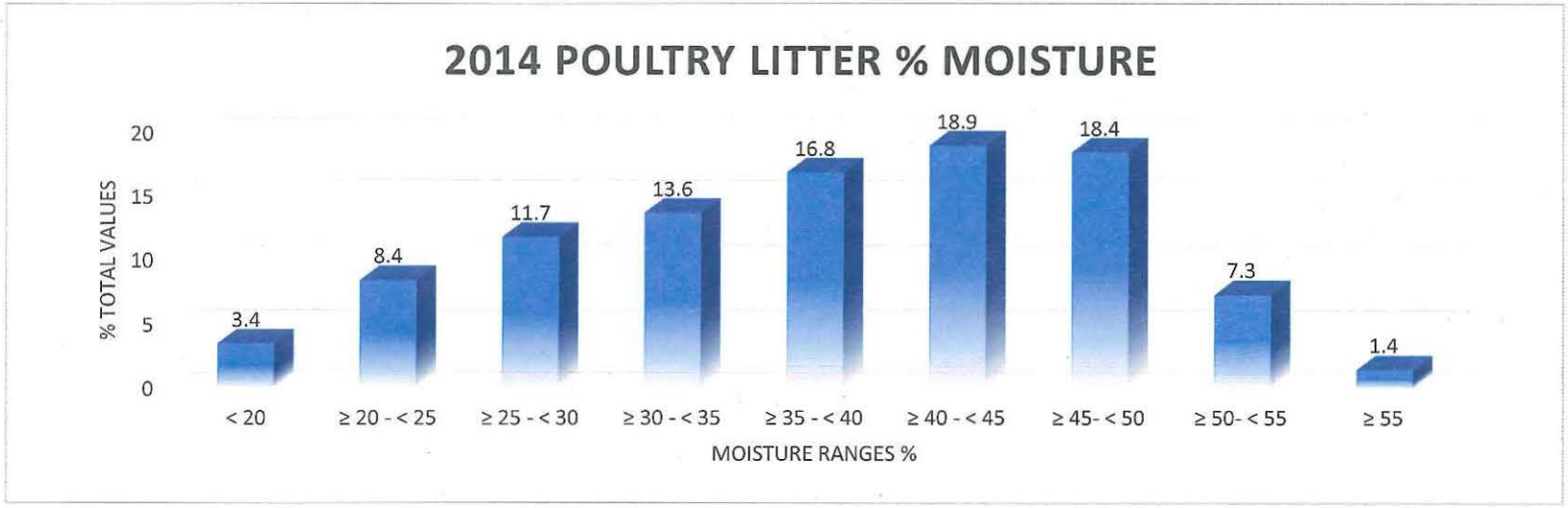
> NOTE: The moisture distribution annually for the litter on a per-load basis is consistent with that of green wood chips, which is Fibrominn's co-fuel.

2014 Poultry Litter Moisture Ranges (%)										
Range	< 20	≥ 20 - < 25	≥ 25 - < 30	≥ 30 - < 35	≥ 35 - < 40	≥ 40 - < 45	≥ 45- < 50	≥ 50- < 55	≥ 55	Total
No. Points	353	865	1212	1408	1738	1957	1903	752	147	10335
Range	< 20	≥ 20 - < 25	≥ 25 - < 30	≥ 30 - < 35	≥ 35 - < 40	≥ 40 - < 45	≥ 45- < 50	≥ 50- < 55	≥ 55	Total
% Total	3.4	8.4	11.7	13.6	16.8	18.9	18.4	7.3	1.4	100.0

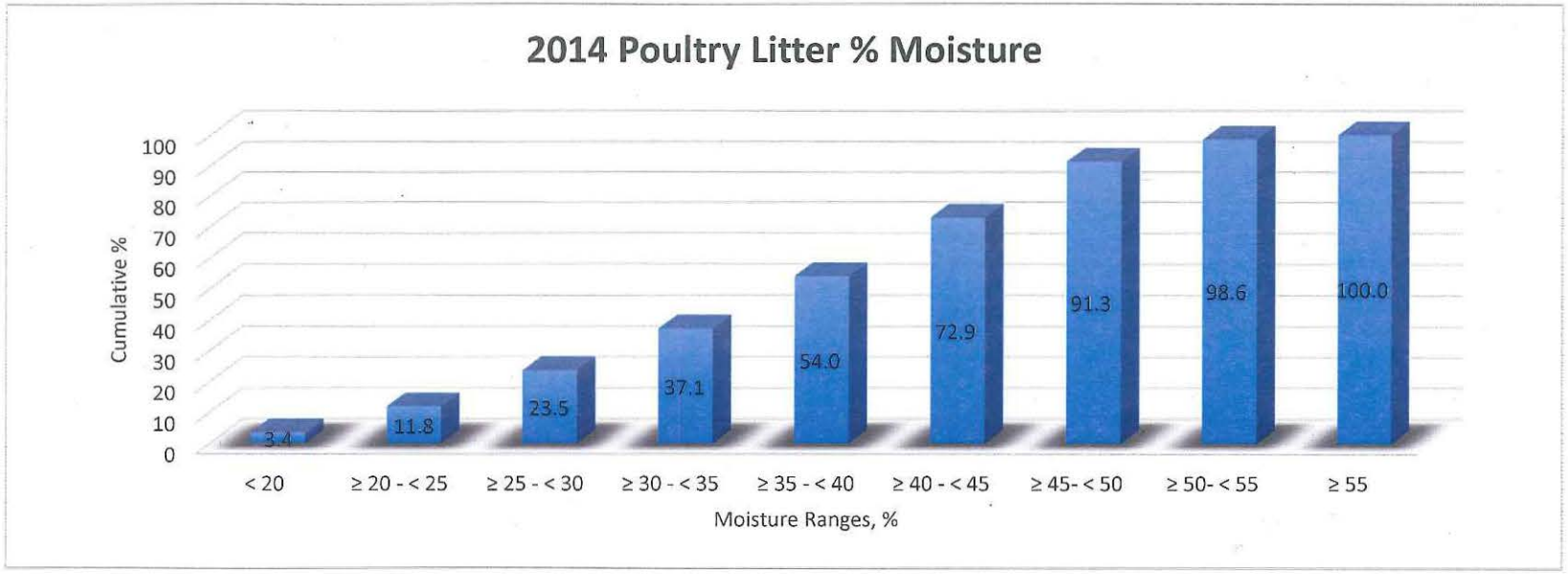
MEAN MOISTURE, 2014: 37.8%

FIBROMINN -- DISTRIBUTION OF PER-LOAD POULTRY-LITTER MOISTURE LEVELS IN 2014





FIBROMINN -- DISTRIBUTION OF PER-LOAD POULTRY-LITTER MOISTURE LEVELS IN 2014



9

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Thursday, April 02, 2015 2:03 PM
To: Staniec, Carol
Cc: 'Myers, Greg'; 'Richards, Joe'
Subject: Fibrominn - Non-Waste Petition - Suppl Information-2Apr2015

Dear Ms. Staniec,

During our telephone conversation today, you asked for additional information pertaining to the composition of Fibrominn's poultry litter fuel and regarding the current legal owner of the Fibrominn facility. I furnish below the information you requested.

1. Regarding Fibrominn's control over permissible, poultry bedding materials:

   - For all poultry litter procured by Fibrominn under both long-term contracts and spot-purchase contracts, the predominant bedding material is wood shavings. Sun flower hulls are also used as bedding by some poultry growers supplying Fibrominn, and ground wheat straw is sometimes used seasonally as bedding material.
   - The poultry litter Fibrominn procures under both long-term and spot purchases is generally obtained from the same poultry growers; hence, there is generally no difference in the bedding materials comprising the litter procured on a spot-contract basis versus a long-term contract basis.
   - For litter supplied to Fibrominn under long-term contract, the associated poultry litter Specification requires that *"All Poultry Litter shall consist of a bedding base of wood shavings, unless otherwise agreed by the parties."* Fibrominn has not agreed with any poultry grower to permit use of any bedding material other than materials classified by US EPA as "clean cellulosic biomass" materials.
   - For litter supplied on a spot contract basis, the litter supplier is held to the same Specification as above as regards permissible bedding materials.

2. Regarding the legal entity that is the Petitioner:

   - Facility Owner: Fibrominn, LLC
   - Owner's Representative: Donald Atwood, Asset Manager Representative, Competitive Power Ventures (CPV) – (781) 848-2202; datwood@cpv.com
   - Plant Contact: Greg Meyers, Fibrominn Plant Manager – 320-843-9013 x 18201; Greg.Myers@naes.com

   Please note that the Fibrominn plant is in the process of being sold to an entity to be called Benson Power; however, this transaction will take some time because the sale must first be approved by FERC. Until the transaction is complete, the legal owner and its representatives are as summarized above. After the sale, the plant owner and responsible officials will change.

Please let me know should you have further questions.

Sincerely,
David Minott

David H. Minott, QEP, CCM
President and Principal Consultant
Arc5 Environmental Consulting, LLC

20 Rockwood Lane, Groton, MA 01450
+1 978 877 7719 david.minott@arc5enviro.com

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10

Fibrominn - NonWaste - Further Cl and F Analyses

Delete Reply Reply all Forward

David Minott <david.minott@arc5enviro.com> Mark as unread

Fri 4/17/2015 12:23 PM

To: Staniec, Carol;

You forwarded this message on 4/17/2015 3:02 PM

Contaminant Concentra...
61 KB

1 attachment (61 KB) Download all

Hello Carol,

Attached please find an amended contaminant comparision table reflecting results of further analysis for Chlorine and Fluorine. Please let me know should you have any questions.

Regards,
Dave

David H. Minott, QEP, CCM
President and Principal Consultant
Arc5 Environmental Consulting, LLC
20 Rockwood Lane, Groton, MA 01450
+1 978 877 7719 david.minott@arc5enviro.com

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Fibrominn Non-Waste Petition Additional Analysis of the Historical Litter Sampling Data

Submitted to US EPA Region 5 (Carol Staniec) by David Minott, Arc5 Environmental Consulting on April 17, 2015

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									
	1.15	0.32-1.5									
Non-metal elements - dry basis											
Chlorine (Cl)[5,6]	6290[8]	5230-7350[8]	ND-5400	ND – 9,080	1,900	1,200-3,600	3,600	500-7,600[b]	3,600	300-7,800[b]	**Lower** than Coal (Range for Recent Test Data) **Lower** than Coal (Range, 95th Percentile for Historical Test Data)
	5776	Range: 1520-13528 Range, 95th Percentile: 8816*									
Fluorine (F)[5]	<200	200-<200	ND-300	ND – 178							**Lower** than Wood (Range for Recent Test Data) **Comparable** to Wood (Range, 93rd Percentile for Historical Test Data)
	127^	Range: ND-759 Range, 93rd Percentile: 304[&]									
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 (Average)
	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]	
	5776	2,432-10,640									

* In the Historical Data Base, there were 110 litter samples with chlorine (Cl) measurements. Of the 110 samples, the top six had Cl mass fractions, as received, of 0.0089, 0.0081, 0.0068, 0.0067, 0.0061, and 0.0058. The last value, 0.0058, is the 95th Percentile value in the distribution of all 110 samples. Recalculated on a dry weight basis, the 95th Percentile value is 8816 PPM. The scatter plot below illustrates that sample Cl levels measured above the 95th Percentile appear to be a very few, extreme values (outliers).

DOCUMENTATION FOR SUPPLEMENTAL ANALYSIS SENT EPA OF FIBROMINN'S LITTER SAMPLING DATA FOR FLUORINE CONCENTRATIONS, HISTORICAL DATA BASE ONLY.

Supplied to EPA (Carol Staniec) by Arc5 Environmental Consulting (David Minott) on April 17, 2015

Fluorine (F) in Litter, As Received

Mass Fraction	
0.0005	
0.0004	
0.0003	95th Percentile Value
0.0002	93rd Percentile Value
0.0002	
0.0002	
0.0002	
0.0002	
0.0002	
0.0002	
0.0002	
0.0002	
0.0001	
0.0001	
0.000005	Not Detected. Value set at 1/2 the lowest detected value.
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
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0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected
0.000005	Not Detected

Avg., As Received 0.0000832

Avg., Dry Basis 127

Assumes concentration (dry) = concentration (as rcvd) time 1.52, per EPA documentation.

11

April 17, 2015 phone call with Dave Minaty by CS

fluorine test method 4/17/15

There was 26 ND in the data which were not used. Chromium came up with a calculated # of 152

152 calculated

to the historical data base

- changed from 303-127 include

26/40 - were NM detects and not report them. 100 ppm as received x 1.52 = 152 is my # value using dry basis - assume detection - came up with by using half of the value. See discussion in the 4/17/2015 email

average 127 -

take 40 measurements but only 14 had values

fluorine analyses

3 High

9 - comparable

~~28~~

2 - lower

26 ND.

CES checked fluorine test method

ASTM D7359

analyze samples 10 - 10 mg/L

below 1.0 mg/

special considerations must be made

1000 ppm

ppm wet			
.0005 x 1,000,000 =	500	* 1.52 =	760
.0004	400	1.52 =	608
3	300	456 =	304
(9) 2	200		
(2) 1			
(26)			

37 samples that are in the range

945-1114

112 - 2 =
110
Identical
+
2 new
112

4/110 =

QS-analysis
4/17/2015

~~96~~ 106/110 = 96.3%

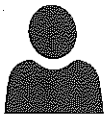
Chlorine

12/20/2002	.0089			
	.0081			
	.0068	= 6800 x 1.52 =	10,336	
	.0067		10,184	
	.0061		9,272	comparabl
	.0058	5800	8,816 ⇐	95% 105

12

Fibrominn - Raw Cl and F Data

Delete Reply Reply all Forward



David Minott <david.minott@arc5enviro.com>
Thu 4/16/2015 6:19 PM

Mark as unread

To: Staniec, Carol;

You forwarded this message on 5/27/2015 5:04 PM

Fibrominn Litter - Histor...
19 KB

1 attachment (19 KB) Download all

Hi Carol,

Here is a spreadsheet that provides all the Chlorine and Fluorine sampling data for the "Historical Sampling Data" data base. Note that of the total of 40 Fluorine tests, 14 have data values and 26 were non- detects. That, in itself, says something.

I'll give you a call as planned at 9:45AM Central today (Friday) to discuss.

Regards,
Dave

David H. Minott, QEP, CCM
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HISTORICAL DATA BASE - CHLORINE AND FLUORINE DATA FOR LITTER, AS RECEIVED
Supplied to EPA (Carol Staniec) by Arc5 Environmental Consulting (David Minott) on April 17, 2015

NOTE: Sample Dates are not tied electronically to the litter sampling data.

If the order of the sampling data columns is changed, the dates will not match the data properly.

Sample Date	Chlorine (Cl) in Litter, As Received		Fluorine (F) in Litter, As Received	
	Percent (%)	Mass Fraction	Percent (%)	Mass Fraction
17-Nov-00	0.24%	0.0024	No Test	No Test
28-Jan-00	0.40%	0.004	No Test	No Test
12-May-00	0.32%	0.0032	No Test	No Test
23-Aug-00	0.44%	0.0044	No Test	No Test
17-Jan-00	0.58%	0.0058	No Test	No Test
5-Oct-00	0.34%	0.0034	No Test	No Test
7-Apr-00	0.45%	0.0045	No Test	No Test
28-Jun-00	0.28%	0.0028	No Test	No Test
20-Jul-00	0.26%	0.0026	No Test	No Test
3-Aug-00	0.25%	0.0025	No Test	No Test
21-Nov-00	0.21%	0.0021	No Test	No Test
3-Aug-00	0.48%	0.0048	No Test	No Test
8-Nov-00	0.49%	0.0049	No Test	No Test
9-May-00	0.36%	0.0036	No Test	No Test
3-Aug-00	0.43%	0.0043	No Test	No Test
3-Aug-00	0.38%	0.0038	No Test	No Test
8-Nov-00	0.34%	0.0034	No Test	No Test
9-May-00	0.28%	0.0028	No Test	No Test
14-Dec-00	0.39%	0.0039	No Test	No Test
14-Dec-00	0.42%	0.0042	No Test	No Test
14-Dec-00	0.35%	0.0035	No Test	No Test
18-Jul-00	0.37%	0.0037	No Test	No Test
18-Jul-00	0.20%	0.002	No Test	No Test
28-Jun-00	0.30%	0.003	No Test	No Test
14-Jul-00	0.35%	0.0035	No Test	No Test
1-Jun-00	0.28%	0.0028	No Test	No Test
22-Jun-00	0.38%	0.0038	No Test	No Test
28-Jun-00	0.25%	0.0025	No Test	No Test
14-Jul-00	0.30%	0.003	No Test	No Test
1-Jun-00	0.39%	0.0039	No Test	No Test
22-Jun-00	0.31%	0.0031	No Test	No Test
28-Jun-00	0.52%	0.0052	No Test	No Test
14-Jul-00	0.34%	0.0034	No Test	No Test
1-Jun-00	0.33%	0.0033	No Test	No Test
22-Jun-00	0.39%	0.0039	No Test	No Test
28-Jun-00	0.36%	0.0036	No Test	No Test
14-Jul-00	0.39%	0.0039	No Test	No Test
22-Jun-00	0.41%	0.0041	No Test	No Test
5-Jan-01	0.19%	0.0019	No Test	No Test

HISTORICAL DATA BASE - CHLORINE AND FLUORINE DATA FOR LITTER, AS RECEIVED
Supplied to EPA (Carol Staniec) by Arc5 Environmental Consulting (David Minott) on April 17, 2015

NOTE: Sample Dates are not tied electronically to the litter sampling data.

If the order of the sampling data columns is changed, the dates will not match the data properly.

Sample Date	Chlorine (Cl) in Litter, As Received		Fluorine (F) in Litter, As Received	
	Percent (%)	Mass Fraction	Percent (%)	Mass Fraction
5-Jan-01	0.23%	0.0023	No Test	No Test
8-Jan-01	0.19%	0.0019	No Test	No Test
8-Jan-01	0.12%	0.0012	No Test	No Test
8-Jan-01	0.21%	0.0021	No Test	No Test
28-May-02	0.32%	0.0032	No Detect	No Detect
28-May-02	0.42%	0.0042	No Detect	No Detect
28-May-02	0.40%	0.004	0.05%	0.0005
28-May-02	0.36%	0.0036	No Detect	No Detect
28-May-02	0.43%	0.0043	No Detect	No Detect
28-May-02	0.39%	0.0039	No Detect	No Detect
28-May-02	0.46%	0.0046	No Detect	No Detect
28-May-02	0.51%	0.0051	No Detect	No Detect
28-May-02	0.34%	0.0034	0.04%	0.0004
18-May-01	0.31%	0.0031	No Test	No Test
10-Jul-02	No Test	No Test	No Test	No Test
10-Jul-02	No Test	No Test	No Test	No Test
15-Aug-00	0.51%	0.0051	No Test	No Test
5-Oct-00	0.51%	0.0051	No Test	No Test
5-Oct-00	0.46%	0.0046	No Test	No Test
18-May-01	0.51%	0.0051	No Test	No Test
10-Jan-01	0.10%	0.001	No Test	No Test
10-Jan-01	0.15%	0.0015	No Test	No Test
18-Oct-00	0.33%	0.0033	No Test	No Test
12-Dec-01	0.45%	0.0045	0.02%	0.0002
12-Dec-01	0.47%	0.0047	No Test	No Test
12-Dec-01	0.58%	0.0058	0.02%	0.0002
12-Dec-01	0.36%	0.0036	No Test	No Test
12-Dec-01	0.40%	0.004	No Test	No Test
12-Dec-01	0.37%	0.0037	No Test	No Test
12-Dec-01	0.19%	0.0019	No Test	No Test
12-Dec-01	0.41%	0.0041	0.01%	0.0001
24-Jan-02	0.52%	0.0052	No Detect	No Detect
24-Jan-02	0.47%	0.0047	No Detect	No Detect
24-Jan-02	0.21%	0.0021	No Detect	No Detect
7-Mar-02	0.68%	0.0068	No Test	No Test
1-Apr-02	0.38%	0.0038	No Test	No Test
22-Dec-01	0.50%	0.005	No Detect	No Detect
22-Dec-01	0.53%	0.0053	No Detect	No Detect
22-Dec-01	0.28%	0.0028	0.01%	0.0001

HISTORICAL DATA BASE - CHLORINE AND FLUORINE DATA FOR LITTER, AS RECEIVED
Supplied to EPA (Carol Staniec) by Arc5 Environmental Consulting (David Minott) on April 17, 2015

NOTE: Sample Dates are not tied electronically to the litter sampling data.

If the order of the sampling data columns is changed, the dates will not match the data properly.

Sample Date	Chlorine (Cl) in Litter, As Received		Fluorine (F) in Litter, As Received	
	Percent (%)	Mass Fraction	Percent (%)	Mass Fraction
24-Jan-02	0.36%	0.0036	No Detect	No Detect
4-Feb-02	0.49%	0.0049	No Detect	No Detect
4-Feb-02	0.48%	0.0048	No Detect	No Detect
4-Feb-02	0.33%	0.0033	No Detect	No Detect
18-Dec-01	0.44%	0.0044	0.02%	0.0002
24-Jan-02	0.44%	0.0044	No Detect	No Detect
12-May-00	0.23%	0.0023	No Test	No Test
12-May-00	0.50%	0.005	No Test	No Test
12-May-00	0.34%	0.0034	No Test	No Test
12-May-00	0.27%	0.0027	No Test	No Test
12-May-00	0.30%	0.003	No Test	No Test
19-Feb-02	0.67%	0.0067	0.01%	0.0001
21-Dec-01	0.21%	0.0021	0.01%	0.0001
18-May-01	0.14%	0.0014	No Test	No Test
1-Aug-00	0.40%	0.004	No Test	No Test
10-Dec-01	0.15%	0.0015	0.02%	0.0002
24-Jan-02	0.52%	0.0052	No Detect	No Detect
24-Jan-02	0.54%	0.0054	No Detect	No Detect
24-Jan-02	0.49%	0.0049	No Detect	No Detect
11-Dec-01	0.47%	0.0047	0.02%	0.0002
28-Dec-01	0.36%	0.0036	No Detect	No Detect
28-Jan-02	0.48%	0.0048	No Detect	No Detect
28-Dec-01	0.45%	0.0045	0.02%	0.0002
11-Dec-01	0.24%	0.0024	0.02%	0.0002
28-Dec-01	0.31%	0.0031	0.03%	0.0003
28-Dec-01	0.31%	0.0031	No Detect	No Detect
28-May-02	0.81%	0.0081	No Detect	No Detect
28-May-02	0.51%	0.0051	No Detect	No Detect
28-May-02	0.89%	0.0089	No Detect	No Detect
17-Jun-02	0.42%	0.0042	No Test	No Test
17-Jun-02	0.61%	0.0061	No Test	No Test
17-Jun-02	0.44%	0.0044	No Test	No Test
5-Oct-00	0.12%	0.0012	No Test	No Test
5-Oct-00	0.43%	0.0043	No Test	No Test

13

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Tuesday, April 14, 2015 12:39 PM
To: Staniec, Carol
Subject: Fibrominn - Sampling Question

Hi Carol,

Regarding the litter samples analyzed in 2014, Fibrominn reports that those samples were taken from the litter delivery trucks inside the Fuel Hall. Let me know if you have further questions on this.

Regards,
Dave

David H. Minott, QEP, CCM
President and Principal Consultant
Arc5 Environmental Consulting, LLC
20 Rockwood Lane, Groton, MA 01450
+1 978 877 7719 david.minott@arc5enviro.com

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14

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Tuesday, April 14, 2015 12:03 PM
To: Staniec, Carol
Subject: Fibrominn - Sampling Question

Hi Carol,

I've asked Fibrominn to check on where they obtained the litter samples in 2014; i.e., from either the turkey barns or the Fuel Hall. They are checking now and I'll let you know as soon as they get back to me.

Regards,
Dave

David H. Minott, QEP, CCM
President and Principal Consultant
Arc5 Environmental Consulting, LLC
20 Rockwood Lane, Groton, MA 01450
+1 978 877 7719 david.minott@arc5enviro.com

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15

CONVERSATION RECORD

TIME

DATE 4/2/2015

TYPE ☐ VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Dave Menat	Fibrominn	978-877-7719

SUBJECT
Fibrominn

ROUTING	
NAME/SYMBOL	INT

SUMMARY

① generators under contract - wood shavings, ~~permeable~~ material
dispense from litter spreaders

② spot purchases - inspection sampling also
what about the bedding. they test for moisture and ash.
do a visual inspection

③ chick practices of poultry being burned -
usual commodity price
poultry price
upto 75% ~~15~~ 50%
little less than

④ 999-2002 where was this data from
taken in Minnesota by the developers of the
ACTION REQUIRED Fibrominn for the purposes of designing
the plant property. from the poultry growing region →
got a construction permit in 2002. actual construction

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
Carol L Stamer		Began in 2004

ACTION TAKEN
Company supplied supplemental information
that was included in technical document

SIGNATURE	TITLE	DATE
as supplemental petition dated 4/2/2015		

normally of concern for metal contaminants.

→ needed to know the containment level(s) property(ies) of the liner and fuel material

(5) Greg Meyers who owns the plant

Name -

16

recorded by C. Stanuc

Dave Minatt -
4/15/2015 - Dave and I discussed the adjusted values. - He stated that he would try to obtain the original data and put them. I suggested that once he finds the "raw" data, lets talk again. If he does not have access to the data, he should also let me know.

17

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Thursday, March 19, 2015 2:45 PM
To: Staniec, Carol
Subject: Resinated Wood
Attachments: 2012 NSHM Redline regulatory text.pdf; 2011 Final NHSM 76 FR 1456.pdf; 2011 NHSM Rule Excerpts - Resinated Wood.pdf

Hello Carol,

Thank you very much for the update today on the status of EPA's review of Fibromnn's Non-Waste Petition. During the discussion, I had mentioned in passing EPA's classification of resinated wood as a non-waste secondary material under the NHSM Rule. Attached here and summarized below are the relevant regulatory references:

- The Amended 2012 Final NHSM – Entire rule is attached (See pp. 2 and 6). Gives resinated wood a categorical designation as a non-waste secondary material when burned as a fuel.
- The 2011 Final NHSM Rule – Entire rule is attached here and also two highlighted excerpted pages (pp. 15499 and 15500). This rule designated resinated wood to be a non-waste material, indicating that resinated wood *"generally"* meets the legitimacy criteria, this despite acknowledging that resinated wood had formaldehyde levels (a Hazardous Air Pollutant and carcinogen) at 200 ppm, compared with under 10 ppm for natural wood. This was accompanied by convoluted language regarding acceptable levels of formaldehyde in resinated wood to meet the legitimacy criteria.

Regards,
Dave

David H. Minott, QEP, CCM
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attached to 3/19/2015 email 1/6

This is the Amended Final NHSM Rule signed December 20, 2012 (Changes from the 2011 final rule are shown by EPA in red)

Part 241 Regulations

- The amendments pursuant to the final rule (signed December 20, 2012) are indicated in red text.

PART 241—SOLID WASTES USED AS FUELS OR INGREDIENTS IN COMBUSTION UNITS

Section Contents

Authority: 42 U.S.C. 6903, 6912, 7429.

Source: 76 FR 15549, Mar. 21, 2011, unless otherwise noted.
(This will be updated when the regulatory amendments are published in the Federal Register.)

Subpart A—General

§241.1 Purpose.
This part identifies the requirements and procedures for the identification of solid wastes used as fuels or ingredients in combustion units under section 1004 of the Resource Conservation and Recovery Act and section 129 of the Clean Air Act.

§241.2 Definitions.
For the purposes of this subpart:

Clean cellulosic biomass means those residuals that are akin to traditional cellulosic biomass, including, but not limited to: agricultural and forest-derived biomass (e.g., green wood, forest thinnings, clean and unadulterated bark, sawdust, trim, tree harvesting residuals from logging and sawmill materials, hogged fuel, wood pellets, untreated wood pallets); urban wood (e.g., tree trimmings, stumps, and related forest-derived biomass from urban settings); corn stover and other biomass crops used specifically for the production of cellulosic biofuels (e.g., energy cane, other fast growing grasses, byproducts of ethanol natural fermentation processes); bagasse and other crop residues (e.g., peanut shells, vines, orchard trees, hulls, seeds, spent grains, cotton byproducts, corn and peanut production residues, rice milling and grain elevator operation residues); wood collected from forest fire clearance activities, trees and clean wood found in disaster debris, clean biomass from land clearing operations, and clean construction and demolition wood. These fuels are not secondary materials or solid wastes unless discarded. Clean biomass is biomass that does not contain contaminants at concentrations not normally associated with virgin biomass materials.

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Contained means the non-hazardous secondary material is stored in a manner that adequately prevents releases or other hazards to human health and the environment considering the nature and toxicity of the non-hazardous secondary material.

The regulations for non-hazardous secondary materials (NHSM) were initially promulgated under the 2011 NHSM final rule. For additional information on the NHSM rulemakings, see http://www.epa.gov/osw/nonhaz/define/rulemaking.htm.

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Contaminants means all pollutants listed in Clean Air Act sections 112(b) or 129(a)(4), with the following three modifications:

(1) The definition includes the elements chlorine, fluorine, nitrogen, and sulfur in cases where non-hazardous secondary materials are burned as a fuel and combustion will result in the formation of hydrogen chloride (HCl), hydrogen fluoride (HF), nitrogen oxides (NO_X), or sulfur dioxide (SO_2). Chlorine, fluorine, nitrogen, and sulfur are not included in the definition in cases where non-hazardous secondary materials are used as an ingredient and not as a fuel.

(2) The definition does not include the following pollutants that are either unlikely to be found in non-hazardous secondary materials and products made from such materials or are adequately measured by other parts of this definition: hydrogen chloride (HCl), chlorine gas (Cl_2), hydrogen fluoride (HF), nitrogen oxides (NO_X), sulfur dioxide (SO_2), fine mineral fibers, particulate matter, coke oven emissions, opacity, diazomethane, white phosphorus, and titanium tetrachloride.

(3) The definition does not include m-cresol, o-cresol, p-cresol, m-xylene, o-xylene, and p-xylene as individual contaminants distinct from the grouped pollutants total cresols and total xylenes.

Deleted: *Contaminants* means any constituent in non-hazardous secondary materials that will result in emissions of the air pollutants identified in Clean Air Act section 112(b) or the nine pollutants listed under Clean Air Act section¶
129(a)(4)) when such non-hazardous secondary materials are burned as a fuel or used as an ingredient, including those constituents that could generate products of incomplete combustion.¶

Control means the power to direct the policies of the facility, whether by the ownership of stock, voting rights, or otherwise, except that contractors who operate facilities on behalf of a different person as defined in this section shall not be deemed to "control" such facilities.

Established tire collection program means a comprehensive collection system or contractual arrangement that ensures scrap tires are not discarded and are handled as valuable commodities through arrival at the combustion facility. This can include tires that were not abandoned and were received from the general public at collection program events.

Deleted: in accordance with section 241.3(b)(2)(i) from the point of removal from the vehicle

Generating facility means all contiguous property owned, leased, or otherwise controlled by the non-hazardous secondary material generator.

Ingredient means a non-hazardous secondary material that is a component in a compound, process or product.

Non-hazardous secondary material means a secondary material that, when discarded, would not be identified as a hazardous waste under Part 261 of this chapter.

Person is defined as an individual, trust, firm, joint stock company, Federal agency, corporation (including government corporation), partnership, association, State, municipality, commission, political subdivision of a state, or any interstate body.

Processing means any operations that transform discarded non-hazardous secondary material into a non-waste fuel or non-waste ingredient product. Processing includes, but is not limited to, operations necessary to: Remove or destroy contaminants; significantly improve the fuel characteristics of the material, e.g., sizing or drying 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 purposes of this definition.

Resinated wood means wood products (containing binders and adhesives) produced by primary and secondary wood products manufacturing. Resinated wood includes residues from the manufacture and use of resinated

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Part 241 Regulations

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wood, including materials such as board trim, sander dust, panel trim, and off-specification resinated wood products that do not meet a manufacturing quality or standard.

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Secondary material means any material that is not the primary product of a manufacturing or commercial process, and can include post-consumer material, off-specification commercial chemical products or manufacturing chemical intermediates, post-industrial material, and scrap.

Solid waste means the term solid waste as defined in 40 CFR 258.2.

Traditional fuels means materials that are produced as fuels and are unused products that have not been discarded and therefore, are not solid wastes, including: (1) Fuels that have been historically managed as valuable fuel products rather than being managed as waste materials, including fossil fuels (e.g., coal, oil and natural gas), their derivatives (e.g., petroleum coke, bituminous coke, coal tar oil, refinery gas, synthetic fuel, heavy recycle, asphalts, blast furnace gas, recovered gaseous butane, and coke oven gas) and cellulosic biomass (virgin wood); and (2) alternative fuels developed from virgin materials that can now be used as fuel products, including used oil which meets the specifications outlined in 40 CFR 279.11, currently mined coal refuse that previously had not been usable as coal, and clean cellulosic biomass. These fuels are not secondary materials or solid wastes unless discarded.

Within control of the generator means that the non-hazardous secondary material is generated and burned in combustion units at the generating facility; or that such material is generated and burned in combustion units at different facilities, provided the facility combusting the non-hazardous secondary material is controlled by the generator; or both the generating facility and the facility combusting the non-hazardous secondary material are under the control of the same person as defined in this section.

Subpart B—Identification of Non-Hazardous Secondary Materials That Are Solid Wastes When Used as Fuels or Ingredients In Combustion Units

§241.3 Standards and procedures for identification of non-hazardous secondary materials that are solid wastes when used as fuels or ingredients in combustion units.

(a) Except as provided in paragraph (b) of this section or in §241.4(a) of this subpart, non-hazardous secondary materials that are combusted are solid wastes, unless a petition is submitted to, and a determination granted by, the EPA pursuant to paragraph (c) of this section. The criteria to be addressed in the petition, as well as the process for making the non-waste determination, are specified in paragraph (c) of this section.

Deleted: Regional Administrator

(b) The following non-hazardous secondary materials are not solid wastes when combusted:

(1) Non-hazardous secondary materials used as a fuel in a combustion unit that remain within the control of the generator and that meet the legitimacy criteria specified in paragraph (d)(1) of this section.

(2) The following non-hazardous secondary materials that have not been discarded and meet the legitimacy criteria specified in paragraph (d)(1) of this section when used in a combustion unit (by the generator or outside the control of the generator):

(i) [Reserved]

(ii) [Reserved]

Deleted: (i) Scrap tires used in a combustion unit that are removed from vehicles and managed under the oversight of established tire collection programs.¶
(ii) Resinated wood used in a combustion unit.¶

(3) Non-hazardous secondary materials used as an ingredient in a combustion unit that meet the legitimacy criteria specified in paragraph (d)(2) of this section.

The regulations for non-hazardous secondary materials (NHSM) were initially promulgated under the 2011 NHSM final rule. For additional information on the NHSM rulemakings, see http://www.epa.gov/osw/nonhaz/define/rulemaking.htm.

(4) Fuel or ingredient products that are used in a combustion unit, and are produced from the processing of discarded non-hazardous secondary materials and that meet the legitimacy criteria specified in paragraph (d)(1) of this section, with respect to fuels, and paragraph (d)(2) of this section, with respect to ingredients. The legitimacy criteria apply after the non-hazardous secondary material is processed to produce a fuel or ingredient product. Until the discarded non-hazardous secondary material is processed to produce a non-waste fuel or ingredient, the discarded non-hazardous secondary material is considered a solid waste and would be subject to all appropriate federal, state, and local requirements.

(c) The Regional Administrator may grant a non-waste determination that a non-hazardous secondary material that is used as a fuel, which is not managed within the control of the generator, is not discarded and is not a solid waste when combusted. This responsibility may be retained by the Assistant Administrator for the Office of Solid Waste and Emergency Response if combustors are located in multiple EPA Regions and the petitioner requests that the Assistant Administrator process the non-waste determination petition. If multiple combustion units are located in one EPA Region, the application must be submitted to the Regional Administrator for that Region. The criteria and process for making such non-waste determinations includes the following:

(1) Submittal of an application to the Regional Administrator for the EPA Region where the facility or facilities are located or the Assistant Administrator for the Office of Solid Waste and Emergency Response for a determination that the non-hazardous secondary material, even though it has been transferred to a third party, has not been discarded and is indistinguishable in all relevant aspects from a fuel product. The determination will be based on whether the non-hazardous secondary material that has been discarded is a legitimate fuel as specified in paragraph (d)(1) of this section and on the following criteria:

(i) Whether market participants treat the non-hazardous secondary material as a product rather than as a solid waste;

(ii) Whether the chemical and physical identity of the non-hazardous secondary material is comparable to commercial fuels;

(iii) Whether the non-hazardous secondary material will be used in a reasonable time frame given the state of the market;

(iv) Whether the constituents in the non-hazardous secondary material are released to the air, water or land from the point of generation to the point just prior to combustion of the secondary material at levels comparable to what would otherwise be released from traditional fuels; and

(v) Other relevant factors.

(2) The Regional Administrator or Assistant Administrator for the Office of Solid Waste and Emergency Response will evaluate the application pursuant to the following procedures:

(i) The applicant must submit an application for the non-waste determination addressing the legitimacy criteria in paragraph (d)(1) of this section and the relevant criteria in paragraphs (c)(1)(i) through (v) of this section. In addition, the applicant must also show that the non-hazardous secondary material has not been discarded in the first instance.

(ii) The Regional Administrator or Assistant Administrator for the Office of Solid Waste and Emergency Response will evaluate the application and issue a draft notice tentatively granting or denying the application. Notification of this tentative decision will be published in a newspaper advertisement or radio broadcast in the locality where the facility combusting the non-hazardous secondary material is located, and be made available on the EPA's web site.

(iii) The Regional Administrator or the Assistant Administrator for the Office of Solid Waste and Emergency Response will accept public comments on the tentative decision for 30 days, and may also hold a public hearing upon request or at his discretion. The Regional Administrator or the Assistant Administrator for the Office of Solid Waste and Emergency Response will issue a final decision after receipt of comments and after a hearing (if any). If a determination is made that the non-hazardous secondary material is a non-waste fuel, it will be retroactive and apply on the date the petition was submitted.

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(iv) If a change occurs that affects how a non-hazardous secondary material meets the relevant criteria contained in this paragraph after a formal non-waste determination has been granted, the applicant must re-apply to the Regional Administrator or the Assistant Administrator for the Office of Solid Waste and Emergency Response for a formal determination that the non-hazardous secondary material continues to meet the relevant criteria and, thus, is not a solid waste.

(d) Legitimacy criteria for non-hazardous secondary materials.

(1) Legitimacy criteria for non-hazardous secondary materials used as a fuel in combustion units include the following:

(i) The non-hazardous secondary material must be managed as a valuable commodity based on the following factors:

(A) The storage of the non-hazardous secondary material prior to use must not exceed reasonable time frames;

(B) Where there is an analogous fuel, the non-hazardous secondary material must be managed in a manner consistent with the analogous fuel or otherwise be adequately contained to prevent releases to the environment;

(C) If there is no analogous fuel, the non-hazardous secondary material must be adequately contained so as to prevent releases to the environment;

(ii) The non-hazardous secondary material must have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy.

(iii) The non-hazardous secondary material must contain contaminants or groups of contaminants at levels comparable in concentration to or lower than those in traditional fuel(s) which the combustion unit is designed to burn. In determining which traditional fuel(s) a unit is designed to burn, persons may choose a traditional fuel that can be or is burned in the particular type of boiler, whether or not the combustion unit is permitted to burn that traditional fuel. In comparing contaminants between traditional fuel(s) and a non-hazardous secondary material, persons can use data for traditional fuel contaminant levels compiled from national surveys, as well as contaminant level data from the specific traditional fuel being replaced. To account for natural variability in contaminant levels, persons can use the full range of traditional fuel contaminant levels, provided such comparisons also consider variability in non-hazardous secondary material contaminant levels. Such comparisons are to be based on a direct comparison of the contaminant levels in both the non-hazardous secondary material and traditional fuel(s) prior to combustion.

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(2) Legitimacy criteria for non-hazardous secondary materials used as an ingredient in combustion units include the following:

(i) The non-hazardous secondary material must be managed as a valuable commodity based on the following factors:

(A) The storage of the non-hazardous secondary material prior to use must not exceed reasonable time frames;

(B) Where there is an analogous ingredient, the non-hazardous secondary material must be managed in a manner consistent with the analogous ingredient or otherwise be adequately contained to prevent releases to the environment;

(C) If there is no analogous ingredient, the non-hazardous secondary material must be adequately contained to prevent releases to the environment;

(ii) The non-hazardous secondary material must provide a useful contribution to the production or manufacturing process. The non-hazardous secondary material provides a useful contribution if it contributes a valuable ingredient to the product or intermediate or is an effective substitute for a commercial product.

(iii) The non-hazardous secondary material must be used to produce a valuable product or intermediate. The product or intermediate is valuable if:

(A) The non-hazardous secondary material is sold to a third party, or

(B) The non-hazardous secondary material is used as an effective substitute for a commercial product or as an ingredient or intermediate in an industrial process.

(iv) The non-hazardous secondary material must result in products that contain contaminants at levels that are comparable in concentration to or lower than those found in traditional products that are manufactured without the non-hazardous secondary material.

§241.4 Non-waste determinations for specific non-hazardous secondary materials when used as a fuel.

(a) The following non-hazardous secondary materials are not solid wastes when used as a fuel in a combustion unit:

(1) Scrap tires that are not discarded and are managed under the oversight of established tire collection programs, including tires removed from vehicles and off-specification tires.

(2) Resinated wood.

(3) Coal refuse that has been recovered from legacy piles and processed in the same manner as currently-generated coal refuse.

(4) Dewatered pulp and paper sludges that are not discarded and are generated and burned on-site by pulp and paper mills that burn a significant portion of such materials where such dewatered residuals are managed in a manner that preserves the meaningful heating value of the materials.

(b) Any person may submit a rulemaking petition to the Administrator to identify additional non-hazardous secondary materials to be listed in paragraph (a) of this section. Contents and procedures for the submittal of the petitions include the following:

(1) Each petition must be submitted to the Administrator by certified mail and must include:

(i) The petitioner's name and address;

(ii) A statement of the petitioner's interest in the proposed action;

(iii) A description of the proposed action, including (where appropriate) suggested regulatory language; and

(iv) A statement of the need and justification for the proposed action, including any supporting tests, studies, or other information. Where the non-hazardous secondary material does not meet the legitimacy criteria, the applicant must explain why such non-hazardous secondary material should be considered a non-waste fuel, balancing the legitimacy criteria with other relevant factors.

(2) The Administrator will make a tentative decision to grant or deny a petition and will publish notice of such tentative decision, either in the form of an advanced notice of proposed rulemaking, a proposed rule, or a tentative determination to deny the petition, in the Federal Register for written public comment.

(3) Upon the written request of any interested person, the Administrator may, at its discretion, hold an informal public hearing to consider oral comments on the tentative decision. A person requesting a hearing must state the issues to be raised and explain why written comments would not suffice to communicate the person's views. The Administrator may in any case decide on its own motion to hold an informal public hearing.

(4) After evaluating all public comments the Administrator will make a final decision by publishing in the Federal Register a regulatory amendment or a denial of the petition.

(5) The Administrator will grant or deny a petition based on the weight of evidence showing the following:

(i) The non-hazardous secondary material has not been discarded in the first instance and is legitimately used as a fuel in a combustion unit, or if discarded, has been sufficiently processed into a material that is legitimately used as a fuel.

(ii) Where any one of the legitimacy criteria in section 241.3(d)(1) is not met, that the use of the non-hazardous secondary material is integrally tied to the industrial production process, that the non-hazardous secondary material is functionally the same as the comparable traditional fuel, or other relevant factors as appropriate.

3/19/2015 attached to email

FEDERAL REGISTER

Vol. 76 Monday,
No. 54 March 21, 2011

Part III

Environmental Protection Agency

40 CFR Part 241
Identification of Non-Hazardous Secondary Materials That Are Solid Waste; Final Rule

only printed cover. entire FR notice was submitted

final NHSM Rule of 2011 attached to 3/19/2015 email

titled "Handling Considerations Conveying, Crete and Ash." In summary, EPA considers that previously discarded tires that have been made into TDF (shredded/chipped, sized, sorted, and with a significant portion of the metal belts or wire removed, at a level appropriate for the unit), meets the definition of "sufficient processing."

Finally, as discussed above, the final rule also allows for scrap tires that have been harvested from vehicles (as part of an established tire collection program) to be used as a non-waste fuel. The question of processing into TDF or the "extent of processing" is only relevant if they are using scrap tires that have first been discarded.[99] Scrap tire processors typically enter into contracts with the end users of these products that specify that the processed tires meet certain specifications (*i.e.*, size of chips and possibly other considerations) to ensure that the product that is produced consistently meets the needs of that particular end use. Boilers, unlike cement kilns,[100] benefit from TDF that has been processed into small chips that feed in the combustion unit like coal and the reduction of metal to improve its handling and operational qualities in the combustion unit. For instance, the removal of the exposed wire around the perimeter of the tire chips makes it "flowable" like coal in the combustion unit.

EPA notes that merely harvesting tires from vehicles does not render the material a non-waste. If the tires are used in a combustor for which they are not suitable, which can be determined through the analysis of the legitimacy criteria, they would be wastes.

6. Resinated Wood Residuals

The proposed rule described resinated wood products as those generated during the manufacture of particleboard, medium density fiberboard, and hardboard and includes materials, such as board trim, sander dust, and panel trim. The proposal indicated that such resinated wood products were considered a non-waste fuel when burned in a combustion unit because this secondary material generally meets the legitimacy criteria. We acknowledged, however, that we had limited data on the level of contaminants in resinated wood products, but the data we had did generally indicate that this non-hazardous secondary material would meet the legitimacy criterion for contaminants. In order to gather additional information on which to base our decision, we requested comment and data on the contaminant levels contained in these secondary materials, as well as the appropriateness of calling them a non-waste.

Comment: The *American Mining Congress* v. *EPA* case states that secondary materials beneficially used within the generating industry, not within the generating plant, is part of a continuous industrial process and thus, not a solid waste. Therefore, transfer of materials within the generating industry would have to be considered a non-waste fuel.

Some commenters contend, however, that any secondary material burned for energy recovery is a solid waste, regardless of whether it remains within the control of the generator. These commenters object to allowing control by the generator to be relevant to rendering secondary material a non-waste, even if burned under the legitimacy criteria, claiming that these secondary materials are wastes. The commenter goes on to note that EPA itself admits that a secondary material could still be a waste even if it is recycled on-site or within the control of the generator and cites the court's holding in *API II*.

EPA's Response: EPA needs to correct some of the industry and environmental group misrepresentations of the cases on the definition of solid waste. In *AMC I*, the court was only noting that secondary materials reclaimed within a continuous process are not wastes and are not subject to EPA's jurisdiction as solid wastes. The case is actually a narrow discussion of one basic principle regarding what is not discarded. The court does not even state whether any particular material is discarded. For example, while there is a reference to used oil that could be discarded, the court in no sense was saying that all used oil is discarded. In fact, in *API II* the court specifically noted that in *AMC I* they "did not address the discard status of any of the particular materials discussed in the briefs." 216 F.3d at 56. The court freely admitted in *API II* that its "prior cases have not had to draw a line for deciding when discard has occurred," but only dealt with the extreme cases of materials that were either wastes or non-wastes. 216 F.3d at 57.

As the various definition of solid waste cases hold, the ultimate issue for deciding when most materials are discarded is whether EPA's determination complies with the arbitrary and capricious standard of the Administrative Procedure Act (APA). Sweeping formulations involving whether a process is within an "industry" is not helpful, nor is it consistent with the case law. EPA, and the courts, reject any formulation that under *AMC I* the statement that discard cannot be found in the case of immediate recycling within a continuous industrial process means ipso facto that any material transferred within an "industry," even between companies located in New York and California, is not a waste. EPA's decision on whether resinated wood is a waste (within the control of the generator or if transferred) is based on the circumstances under which the material is handled and combusted. Merely keeping material on-site will not render it a non-waste, nor will mere transfer make the material a waste.

Comment: Trim, sawdust, shavings, sander dust and other residual materials from producing panels and other engineered wood products containing resins have been widely used as fuels by wood product plants since the industry began in the 1950s and should, therefore, be classified as a traditional fuel. In fact, the wood product plants have been designed so as to specifically utilize these residuals that the process creates and would not be able to operate as designed without this material. The commenters argue that there are no significant contaminants in resinated wood residuals that are used as fuels. None of the constituents are among the contaminants controlled under CISWI. This fact provides sufficient justification to accept resinated fuels as traditional fuels from the standpoint of contaminants.

EPA's Response: We do not agree with those commenters who argue that resinated wood residuals should be considered a traditional fuel, since it can have contaminants at levels greater than traditional fuels (as discussed below). We recognize, however, that much of the resinated wood residuals are used as a product fuel, and that the plants have been designed to catch and then burn these residuals to supply energy and heat to other parts of the plant. EPA recognizes that some specific types of non-hazardous secondary materials, such as resinated wood residuals, are more like valuable

[99] Since scrap tires that are harvested from vehicles (as part of an established tire collection program) can be burned as whole tires and still be considered a non-waste fuel, the Agency does not believe it appropriate to require such tires to meet the level of processing (as codified in § 241.3). However, other scrap tires, e.g., those that are removed from tire piles, would need to be processed (as codified in § 241.3) in order to be burned as a non-waste fuel.

[100] We note that most cement kilns use whole tires as fuels, as opposed to TDF chips, because their process does not require the TDF to be in the form of small chips to use it as a fuel, and does not require removal of the metal (since they use the metal as an ingredient).

commodities than solid wastes.

Resinated wood is a secondary material that, upon examination, is not discarded when used on-site or transferred off-site to a different company. Thus, EPA would consider resinated wood residuals used as a fuel in a combustion unit as not being a solid waste, provided these materials satisfy the specified legitimacy criteria for fuels.

Comment: Commenters argued that resinated wood residuals are often used off-site in a manner that does not constitute discard and the secondary materials should not be classified as solid waste when transferred between facilities or companies. As much as 6% of resinated wood residuals are sold into the fuel market and are routinely transferred between either intra- or inter-company facilities and used as either "furnish" (*i.e.*, raw materials) or fuel at the receiving facilities. Inter-company transfers are typically managed through buy-sell contracts that likely do not specify how the materials will be used because the receiving facility likely mixes the purchased material with self-generated materials. Those combined materials are either used as furnish or fuel in accordance with the needs of the facility at the time. Because these resinated materials are bought and sold and used in a manner—either as furnish or fuel—similar to how self-generated resinated materials are used, this transaction does not constitute discard and the materials should not be classified as solid waste simply due to the transfer between facilities or between companies.

EPA's Response: We agree that transferring secondary materials between companies or facilities does not necessarily mean that the material has been discarded. As resinated wood residuals transferred off-site are utilized in the same manner as self-generated resinated wood residuals (*i.e.*, contained in the same bins as furnish materials used in the product, transferred via conveyors or ducts), which the plants are specifically designed to burn as a fuel, we agree that this does not constitute discard. Thus, we have determined that resinated wood residuals are not solid waste when transferred off-site for use as fuel, provided the material meets the legitimacy criteria and has not been otherwise deemed to be discarded. We have codified this concept under 40 CFR 241.3(b)(2)(i).

Comment: Processing should not be necessary when utilizing the material on-site or off-site to be considered a non-waste fuel. However, resinated wood residuals are generally chipped or hogged to reduce its size before burning. This should be sufficient to meet the processing requirement.

EPA's Response: We generally agree with the commenters that resinated wood residuals do not need to be processed, but if processed, such as by chipping or hogging, this level of processing would not affect the status of this material.

Comment: Resinated wood residuals have contaminants that are comparable to traditional fuels. The list of resins and adhesives include constituent chemicals that are on the hazardous air pollutant list. Notably, phenol, formaldehyde, methylene di-isocyanate and epichlorohydrine are HAP. However, these individual components react completely within the resin curing process, leaving, in the worst case, only trace amounts of the HAP. With the exception of formaldehyde, undetectable or extremely low levels of these HAP remain behind after the resin/adhesive cure. As noted in the comments referenced in the proposal, miniscule amounts of formaldehyde remain in some resinated wood residuals; less than 0.02%, a number that is expected to fall as the California Air Resource Board (CARB) Composite Wood Airborne Toxic Control Measure (ATCM) is implemented nationwide, per the new Public Law 111–199 (which establishes consistent standards for wood products across the country). Further, since formaldehyde is found in natural wood, it should not be considered a contaminant in resinated wood.

EPA's Response: The proposed rule acknowledged a general lack of data regarding the levels of formaldehyde in these non-hazardous secondary materials and specifically requested data on this issue. While we received only limited contaminant information during the comment period, the data we do have suggests that the levels of formaldehyde in these resinated wood residuals is at non-detect levels. The existing data we have is that resinated wood residuals contain "free" formaldehyde at levels less than 0.02 percent (or 200 ppm). In addition, new rules, as mandated by the CARB Composite Wood ATCM, per new Public Law 111–199, will reduce the formaldehyde levels even further to levels that are comparable to unadulterated wood. We also have limited data on the formaldehyde levels in traditional fuels. Specifically, we have limited data that natural wood has between 0.6 and 8.5 ppm of formaldehyde,[161] but we have no data on formaldehyde levels in other traditional fuels, such as coal, oil, and natural gas. We do know, however, that organic materials produce formaldehyde. For example, studies have shown that formaldehyde is generated from coal piles.[162]

Thus, considering the fact that new rules will reduce the amount of formaldehyde to levels comparable to unadulterated wood, we have concluded that resinated wood residuals when burned as a fuel by the generator or outside the control of the generator and not discarded should be considered a non-waste fuel. However, as we have noted elsewhere, the generator of these secondary materials would still need to demonstrate that such residuals meet the legitimacy criteria. Thus, they would need to show that the levels of formaldehyde, as well as other possible contaminants, in the resinated wood residuals are at levels comparable to those found in traditional fuels, which in this case would be natural wood. We would note that we would not consider levels of formaldehyde of 200 ppm or slightly less to be comparable since the levels in unadulterated wood are at least two orders of magnitude lower. The levels would need to be lower to be considered comparable to those found in natural wood.

Comment: The comments indicated that resinated wood residuals have about 5 percent moisture content, with heating values typically between 8,500–9,000 Btu/lb (as fired). This fuel value is equal to or better than unadulterated wood, which has higher moisture content.

The comments also argue that resinated wood residuals are managed as a commodity as they are typically pneumatically transferred through ducts, stored temporarily in a fuel silo, and then utilized in boilers to provide heat to hot presses and dryers. In fact, wood product plants have been designed so as to specifically utilize

---

[161] Weigl, M., R. Wimmer, D. Sykacek, and M. Steinwender, 2009. "Wood-borne formaldehyde varying with species, wood grade, and cambial age." Forest Products Journal 59(1/2):86–93.

Meyer, B. and C. Boehme. 1997. "Formaldehyde Emission from Solid Wood." Forest Products Journal 47(5):45–48.

Killiam, B. "Background Formaldehyde Emissions for Solid Wood," Temple-Inland Forest Products Corporation, Diboll, TX.

[162] Cohen, H. and E. Green. 2009. "Oxidative decomposition of formaldehyde catalyzed by bituminous coal." Energy Fuels 23(6) 3078–3082. Nehemia, V., S. Davidi, and H. Cohen. 1999. "Emission of hydrogen gas from weathered steam coal piles via formaldehyde as a precursor: I. Oxidative decomposition of formaldehyde catalyzed by coal—batch reactor studies." Fuel, 78(7) 775–780.

Nehemia, V., 1992. "Oxidative decomposition of formaldehyde catalyzed by coal." Fuel and Energy Abstracts 38(6) p. 399.

18

CONVERSATION RECORD

TIME: 255PM

DATE: 3/11/2015

TYPE: ☐ VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☑ OUTGOING

Location of Visit/Conference:

ROUTING	
NAME/SYMBOL	INT

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU: Dave Minott

ORGANIZATION (Office, dept., bureau, etc.): Fibro-Minn

TELEPHONE NO.: 1-978-877-7719

SUBJECT: Sampling method for the 2 "new pieces" of data

SUMMARY

- How did they sample the pile - March 2013 - from the sample the delivered material, litter is from the Barn, Fibrominn takes three random grab sample. How did they take then make a composite and then at that is what is sampled. Take three samples composite them and analyze.

- ~~new~~ any difference between turkey/broiler/ The question was asked to me by HQ & I was concerned that both new samples were from a turkey brood. I asked Dave was there any differences and he gave me literature values (below) on chlorine

Sampling of the brood -

118 samples wet samples - sample - composite - told Dave we were was converting to a dry basis for comparison to the tables. - three grab samples and make a composite and sampling was done at the barn.

The results

Turkey versus broilers for contaminant 2001 reference. North Carolina Barker et al Last name #3 on July 1, 2013

ACTION REQUIRED

turkey average chlorine - 0.60%

broiler average chlorine ~~0.65~~ 0.65%

He stated there was no significant difference from broilers and turkeys - However they do not pick up or take egg laying as there is a significant moisture content (goopy).

NAME OF PERSON DOCUMENTING CONVERSATION | SIGNATURE | DATE

ACTION TAKEN

SIGNATURE | TITLE | DATE

50271-101 ☆ GPO : 1985 O - 461-275 (20090) CONVERSATION RECORD OPTIONAL FORM 271 (12-76) DEPARTMENT OF DEFENSE

19

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Wednesday, February 04, 2015 4:34 PM
To: Staniec, Carol
Subject: Power Plant Definitions

Hi Carol,

I believe that the following definitions are appropriate:

The *Annual Capacity Factor* is the ratio of the electric energy produced by the power 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 Factor* is the number of hours in a given year when the power plant was able to produce electric power, divided by the number of hours in the year.

As you pointed out correctly, the Capacity Factor is always less than the Availability Factor.

Regards,
Dave

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Staniec, Carol

From: Miller, Jesse
Sent: Tuesday, February 03, 2015 3:43 PM
To: Staniec, Carol
Subject: Fibrominn

Carol,

I talked this over with Jason...

Here's what he said...

I took a look at the meaningful heating value discussion in this, and to me, these seem like some key concepts:

1. The unit is was designed with poultry litter as the primary fuel in mind, and is capable of running without fossil fuel assist with a blend of primarily poultry litter and biomass (see page 7);
2. The heating value of poultry litter ranges from 3,400-5,000 Btu/lb (p.7);
3. The other biomass considered in the unit's design include wood chips, corn stover, oat hulls, alfalfa stems, distillers dried grain (DDG), and switchgrass (p.7);
4. The unit is a net generator of electricity (p.8);
5. The poultry litter is procured under contract and tested for conformance with fuel specification (p. 6);
6. The collection, transport, and storage description indicates that the material is used in a short time frame and is handled to prevent moisture increase from precipitation (p.4) (also helps reduce odor from the facility, though, so dual benefit there...)

Considering these, it seems that they demonstrate meeting the criteria presented in the March 21, 2011 preamble discussion on materials with heating values less than 5,000 Btu/lb.

While I know from previous research on this facility they have not had a stellar past with compliance with air quality requirements, I cannot argue that the Fibrominn facility was designed and has been operated all along with the intent of using poultry litter as the primary fuel, so in that regard, it seems they have met the meaningful heating value requirements.

Does this agree with your thoughts, or do you have some other concerns or questions?

Thanks,
Jason

21

phone conversation with David Minott
1/30/2015

started
- poultry litter was $4/ per Ton [18 written above]
and at the time
→ 15 ton - 35 per ton coal [wood, 19 green written above; coal written below]

- 50 to 75% page 2 4/8/2014. -
*- cost of the green wood chips and
cost of poult litter - page 7 of 7/2013

if litter has been your leastmost fuel

standard stoker boiler - enhancements were made to ensure proper ash management on the grate - because poult litter has a high ash, that combustion ash is effectively managed - you would get uneven combustion, could have an effect on emission

[Left margin:] design of combustion grate and the combustion air system.
|
designed to accommodate high ash content of poultry litter

could burn any of these other biomass fuels on coal

design to burn biomass fuels

- Except for plant start up ~~and shut down~~ has only used propane at

* don't use natural gas to generate power

generate at maximum power that it
- could generate in a year -

generate at the most power that could generate

Capacity factor is the
fraction of the theoretical power that
the plant could generate in a year.

capable
availability is the fraction that
the plant was available to produce

91.6

Capacity is the fraction

actually maximum
fraction generated of the theoretical power
of that the plant could generate in a year

availability is the fraction that the plant
was available to produce energy at maximum
rate.

22

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Wednesday, January 21, 2015 4:37 PM
To: Staniec, Carol
Cc: 'Grady Third'; 'Joe Richards'; 'Knudson, Scott'
Subject: Fibrominn - NonWaste Petition

Hello Carol,

Provided here are the data clarifications you requested in our telephone conversation today (January 21, 2015) with regard to the non-waste petition submitted for the poultry litter fuel burned at the Fibrominn Biomass Power Plant. After checking Fibrominn's related submissions, I confirm the following:

- Test data for the metals content of Fibrominn's poultry litter were presented only for Arsenic (As), Barium (Ba), Chromium (Cr), Lead (Pb), and Selenium (Se) in Fibrominn's original submission dated *July 1, 2013 (Tables 1 through 4).*

- Test data for additional metals were presented within the *April 8, 2014* supplemental submission *(Table 1A)*: Antimony (Sb), Beryllium (Be), Cadmium (Cd), Cobalt (Co), and Manganese (Mn). With that submission, additional new data were also presented for Arsenic (As), Chromium (Cr), Lead (Pb), Mercury (Hg), and Selenium (Se). The test data presented in that submission for Manganese (Mn) are the only Fibrominn-specific data that has been submitted for Manganese.

- No data, based on testing of Fibrominn's poultry litter, has ever been submitted with regard to the level of Nickel (Ni) present in the litter.

- The test data that was presented for the Nickel (Ni) level in poultry litter had been based entirely on literature values; i.e., the average value (45 ppm) and range of values (1.68 to 185 ppm), as presented in the *July 1, 2013* original submission *(Tables 1 to 4)* and the *January 10, 2014* supplement *(Table 1A).*

Please don't hesitate to contact me should you find that further discussion would facilitate your review.

Regards,
Dave

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23

Staniec, Carol

From: Miller, Jesse
Sent: Thursday, January 08, 2015 3:59 PM
To: Staniec, Carol
Subject: Fibrominn

Carol,

I checked about adding the chart to the website.

Verdict:

We can use it as a reference for Fibrominn, but it won't go on the website.

So, just plan on using it and we can put it in the final.

Take care,
Jesse

PS – I'm working on the heating value stuff.

24

1-8-2015

Lucy Stanfield 61121

called (left message) about incorporating two farms together

Jason Huckaby - 919-468-7826

jason.huckaby@erg.com

1/21/2015

call with Dave Minott about meter issues

1/29/2015 call with Dave Minott - heating issues and stoker operations

2/4/2015 call with Dave Minott about the capacity and availability issues

25

1/6/2015 Dave Minatt - called to discuss containment levels.

26

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Thursday, December 18, 2014 5:54 AM
To: Staniec, Carol
Subject: Fibrominn - NonWaste Supplmnt - 8Apr2014
Attachments: Fibrominn - NonWaste Supplmnt - 8Apr2014.pdf; Fibrominn - Table 1A Elements - 8Apr2014.docx; Fibrominn - Table 1B VOC-SVOC - 8Apr2014.docx; Fibrominn - Table 4 SVOC Contam Gp - 8Apr2014.docx

Hello Carol,

I checked my records for a submission made on April 8, 2014, found that submission, and am re-sending it here. Kindly let me know if there is something more you need.

Regards,
Dave

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From: David Minott [mailto:david.minott@arc5enviro.com]
Sent: Tuesday, April 08, 2014 4:43 PM
To: 'Staniec, Carol'
Cc: 'mooney.susan@epa.gov'; 'trevor.shearen@state.mn.us'; 'richard.cordes@state.mn.us'; 'steven.gorg@state.mn.us'; 'grady.third@contourglobal.com'; 'Mandy Tenner'; 'david.minott@arc5enviro.com'; 'Knudson, Scott'; 'Robert Fraser'; 'Chisom Amaechi'
Subject: Fibrominn - NonWaste Supplmnt - 8Apr2014

Dear Carol,

As you know, Fibrominn LLC submitted a non-waste petition for its poultry litter fuel to EPA Region 5 on July 1, 2013, and submitted supplemental information on January 10, 2014. In telephone conversations on January 31, February 3, and March 17, 2014, you and I discussed the petition. Fibrominn's Plant Manager, Grady Third, also participated in the telephone conversation on March 17, 2014. During these telephone conversations, you furnished a number of comments on the submitted petition materials.

Attached is a letter dated April 8, 2014 that addresses the comments you made during our telephone conversations on January 31, February 3, and March 17, 2014. This letter is being submitted as a further supplement to Fibrominn's petition dated July 1, 2013 and supplement of January 10, 2014.

Fibrominn appreciates your ongoing conversations with us as you review our petition-related submissions. Please don't hesitate to contact me with any questions.

Kindly confirm via email that you have received this Supplement. Thank you.

Sincerely,
Dave

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27

Staniec, Carol

From: David Minott <david.minott@arc5enviro.com>
Sent: Monday, December 08, 2014 6:39 AM
To: Staniec, Carol
Cc: Mooney, Susan; "Grady Third"; 'Knudson, Scott'
Subject: Fibrominn - Non-Waste Petition
Attachments: EPA Response - Area Source RDA - 25Nov2014.pdf

Dear Carol,

When I had last inquired regarding the status of Fibrominn's Non-Waste Petition in August, I was informed that EPA's Land and Chemicals Division and EPA's Air and Radiation Division needed to coordinate in reviewing certain pertinent matters before the Land Division could issue its determination on Fibromnn's Non-Waste Petition. The Air Division recently issued a letter to Fibrominn on November 25, 2014, addressing the questions Fibrominn had asked them regarding permitting ground rules for coming under the Section 112 Area Source Rule. While the Land Division's letter also addressed some aspects of CISWI applicability, it did not address the fact that Fibrominn is subject to the CISWI Rule's Emission Guidelines for existing energy-recovery facilities, nor did it address the disposition of Fibrominn's Non-Waste Petition in that regard. I presume that you have by now received a copy of Land Division's letter (attached here).

Land Division's letter affirms Fibrominn's understanding that, if exempted from CISWI, Fibrominn faces a very tight deadline for modifying its existing Title V permit to come under the Area Source Rule, this because of the EPA's "Once-In Always-In" policy regarding MACT standards. Accordingly, it is now essential for Fibrominn to know the disposition of its Non-Waste Petition. Would you kindly advise when EPA will convey this information to Fibrominn?

Thank you for your attention to this important matter.

Sincerely,
David Minott

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28

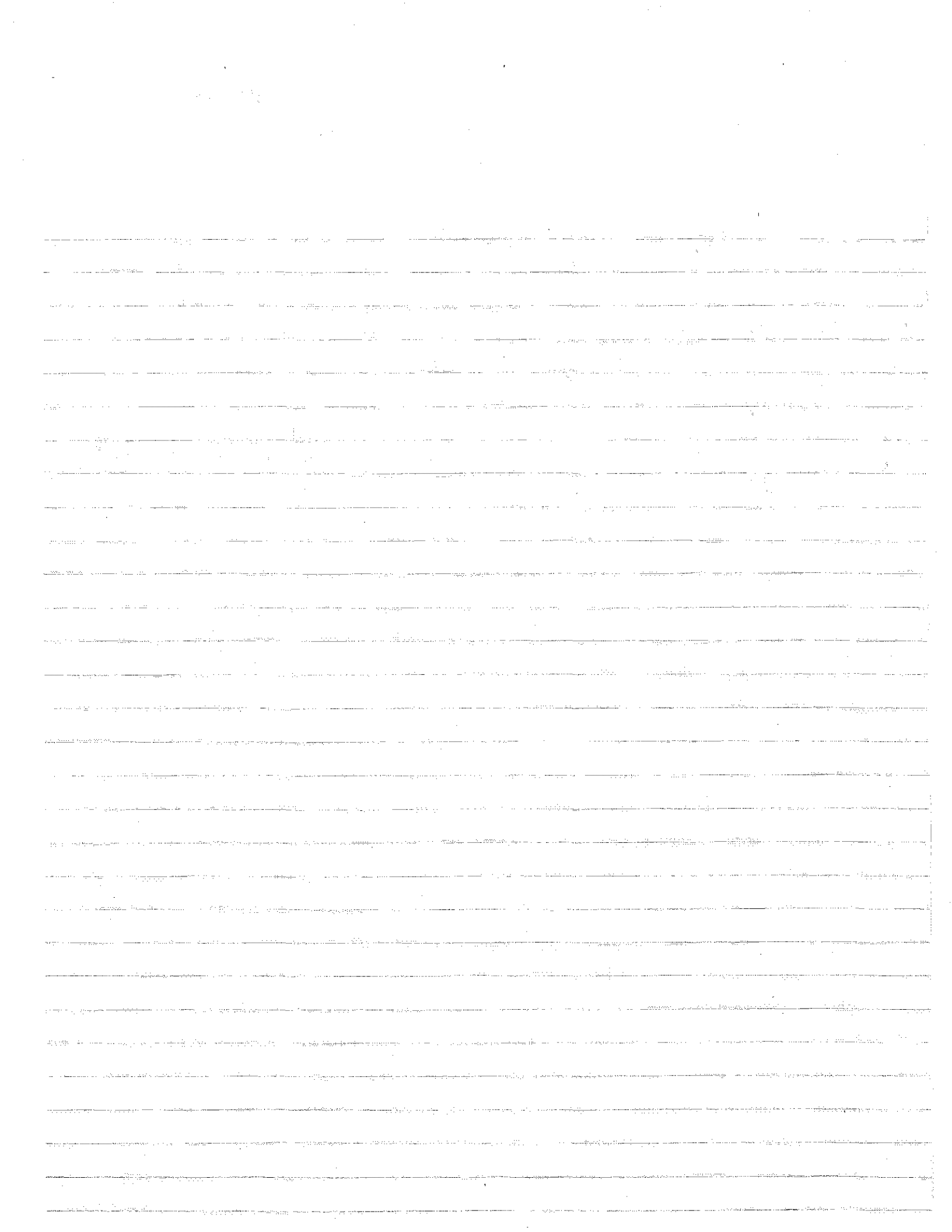
3/26/2014

Amber Allen - 919 468-7889
- Jason - 919- 468- 7826

* Check chrome #'s

Sent them information on chrome and ask that they follow up.

These are discussions regarding EPA development of a DDGS



Summary:

Contaminant	Units	DDGS			
		Weighted Average	Lower Bound	Upper Bound	Weighted Average
Metal elements - dry basis					
Arsenic (As)	ppm	<3.2			2.50
Beryllium (Be)	ppm	<0.093			<0.089
Cadmium (Cd)	ppm	<0.046			<0.45
Chromium (Cr)	ppm	<0.50			<0.45
Lead (Pb)	ppm	<0.046			0.46
Manganese (Mn)	ppm	15.82	15.42	17.10	23.4
Mercury (Hg)	ppm	<0.010			<0.010
Nickel (Ni)	ppm	0.87			<0.45
Selenium (Se)	ppm	1.80			<1.30
Non-metal elements - dry basis					
Chlorine (Cl)	ppm	1900	1200	3600	3600
Nitrogen (N)	ppm	47000	45000	54000	5100
Sulfur (S)	ppm	6700	3100	10500	470

Ranges from References:

Material	Contaminant	Range	Ref
DDGS	Chlorine	1200-3600	g2
DDGS	Nitrogen	45000-54000	g2
DDGS	Nitrogen	48000-53000	g1
DDGS	Sulfur	3100-10500	g2
DDGS	Sulfur	3600-8400	g1
Stover	Nitrogen	5900-7400	j
Stover	Sulfur	600-1000	j
Alfalfa	Nitrogen	19800-21400	i

90% UPLs for remaining ranges (assumes normal distribution):

Material	Contaminant	avg	count	stdev	t-stat
DDGS	Manganese	15.685	2	0.374767	3.07768354

Stover	Chlorine	3263.333333	6	2691.778	1.47588405
Alfalfa	Chlorine	2666.666667	3	2350.177	1.88561808
Alfalfa	Sulfur	766.6666667	3	550.7571	1.88561808

References:

a. Morey, R.V. et al., 2009. "Fuel Properties of Biomass Feed Streams at Ethanol Plants." Applied Er

b. Jenkins, Bryan et al., 1985. "Thermochemical Properties of Biomass Fuels," California Agriculture,

c. Fibrominn LLC, "Fibrominn Composite Fuel Evaluation Based on 50 MW Export and Average Fue basis)

d. University of Minnesota, 2005. "The Value and Use of Distillers Dried Grains with Solubles (DDGS www.ddgs.umn.edu

e. Tillman, David et al., 2008. "Chlorine in Solid Fuels Fired in Pulverized Coal Boilers - Sources, For

f. AURI, 2008. "Agricultural Renewable Solid Fuels Data – Agricultural Utilization Research Institute www.auri.org/research/furels/downloads.asp

g. Morey, R. V., "Generating Electricity with Biomass Fuels at Ethanol Plants." University of Minnesot Report Date: March 3, 2006. Additional data were available from this source, based on the following

g1. U of IL data: DDGS N and S values and ranges.

g2. U of MN data: DDGS N, S, and Cl means and ranges.

g3. DDGS data from Dakota Gold.

g4. DDGS and Stover S values from AURI 2005.

h. www.dakotagoldmarketing.com March 2013

i. Delone, Max M. et al. 1995. "Alfalfa Stem Feedstock for IGCC Power System Fuel," accessed at: http://web.anl.gov/PCS/acsfuel/preprint%20archive/Files/40_3_CHICAGO_08-95_0699.pdf. **Note:** Da Values are wet basis.

j. U.S. DOE EEREs Biomass Feedstock Composition and Property Database search results for corn http://www.afdc.energy.gov/biomass/progs/search1.cgi **Note:** unsure if values on dry or wet basis, a

Contaminant Concentrations in Select Non-woody Biomass Materials

Contaminant	Units	DDGS		Stover		Alfalfa	
		Average[a]	Range	Average[a]	Range	Average[a]	Range
Metal elements - dry basis							
Arsenic (As)	ppm	<3.2		2.50			
Beryllium (Be)	ppm	<0.093		<0.089			
Cadmium (Cd)	ppm	<0.046		<0.45			
Chromium (Cr)	ppm	<0.50		<0.45			
Lead (Pb)	ppm	<0.046		0.46			
Manganese (Mn)	ppm	15.82	15.42-17.10[b]	23.4			
Mercury (Hg)	ppm	<0.010		<0.010			
Nickel (Ni)	ppm	0.87		<0.45			
Selenium (Se)	ppm	1.80		<1.30			
Non-metal elements - dry basis							
Chlorine (Cl)	ppm	1,900	1,200-3,600	3,600	500-7,600[b]	3,600	300-7,800[b]
Nitrogen (N)	ppm	47,000	45,000-54,000	5,100	5,900-7,400	17,300	19,800-21,400
Sulfur (S)	ppm	6,700	3,100-10,500	470	600-1,000	780	200-2,000[b]

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.

b. 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.

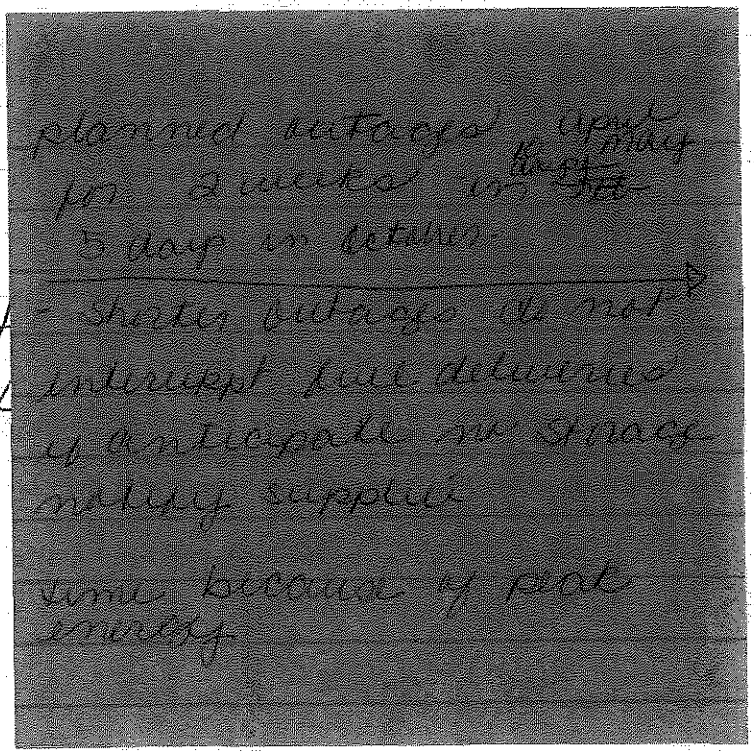
29

Grady Third - plant manager at Ishromin
320-368-3204

Dave minati.

phone call on 3/17/2014 with Ishromin

- go through petition
pg 4 - moisture content - 25% or below contract
if moisture is at 50% or above needs management approval.
moisture limit would lead to dumping
if load is rejected
→ if above 50% would not pay for fuel but for trucking.
or



- comparison t
- % numbers f

#8 • Bryan Jenkins

#9.

30

Mike Harris - 886 0760

C (703) 305-7652 Dave Minatt - 978 877 7719

3/6/2014

discarded agreement
nonwaste when used as a fuel 241.3(c)

~~Stating #~~
has not been discarded

material accepting/now

material is generated by poultry growers and transferred under by contract, used within three days.
from the time it leaves the poultry produces not physically discarded ~~#~~
dewaterable and stored indoors.

Dave Minatt - 978-877-7719 called on 3/6/2014

- self sustain combustion.
used to generate electricity

31

Staniec, Carol

From: Faison, George
Sent: Friday, February 28, 2014 8:11 AM
To: Mooney, Susan; Staniec, Carol
Subject: FW: FW: Reference Review

From: Amber Allen <Amber.Allen@erg.com>
Sent: Friday, February 28, 2014 9:00 AM
To: Faison, George
Cc: Huckaby, Jason
Subject: Re: FW: Reference Review

Good morning George,
I looked into to references and associated notes listed for the DDGS contaminant values in the comparison table from the file you sent. I was able to hunt down a few of them, and they look like reasonable references to me. I also did a brief search to see if I could find other sources with values that were inconsistent with these, but most of these searches seemed to lead me back to the University of Minnesota's DDGS website, developed specifically to house research summaries, nutrient profiles, and presentations on DDGS. In other words, based on my searching (albeit brief), the U of Minn references below appear to be the best readily available sources I can find for what limited DDGS contaminant data is out there. I'm not sure about reference 8 or 9, however.
My comments on each reference/note are in green, below.
If you'd like me to dedicate more time to this, let me know, but I didn't want to go too far if you thought this review was sufficient.

5. Distillers Dried Grains with Solubles (DDGS), which is a "byproduct of ethanol natural fermentation processes," defined by US EPA as a type of "clean cellulosic biomass." Correct
6. University of Minnesota, 2005. "The Value and Use of Distillers Dried Grains with Solubles (DDGS) in Livestock and Poultry Feeds." Accessed at www.ddgs.umn.edu
Could not find same source, but similar source from U of Minn that contains same values and references the same source (http://www.biomasschpethanol.umn.edu/Project1/ProjectReports/XcelRD-56ProgressReportOne3-3-06.pdf) also comparable means and ranges for S.
7. Morey, R.V. et al., 2009. "Fuel Properties of Biomass Feed Streams at Ethanol Plants." Applied Engineering in Agriculture, Vol. 25, No. 1, pp. 57 - 64. Unable to get access to this article, but also through University of Minn. Another source from 2006 (http://www.biomasschpethanol.umn.edu/papers/ASABEPaper064180.pdf) actually has the same values as well.
8. Jenkins, Bryan et al., 1985. "Thermochemical Properties of Biomass Fuels," California Agriculture, May-June 1985, Table 1. Found this reference (http://ucce.ucdavis.edu/files/repositoryfiles/ca3905p14-62863.pdf) but Table 1 does not appear to list DDGS specifically. Even if it goes by another name in this table, I did not see any Cl values matching the 0.3 % shown in Fibrominn's comparison table.
9. Fibrominn LLC, "Fibrominn Composite Fuel Evaluation Based on 50 MW Export and Average Fuel Characteristics," April 10, 2001. (**Note**: Data on *As Received* basis) Unable to track this down online - perhaps FibroMinn could provide this evaluation for our review?
Regards,

Amber

>>> "Faison, George" <Faison.George@epa.gov> 2/26/2014 12:35 PM >>>

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Washington, DC 20460

Phone - (703)305-7652
faison.george@epa.gov

From: Faison, George
Sent: Tuesday, February 25, 2014 6:54 PM
To: 'Amber Allen'; 'amanda.singleton@erg.com'
Cc: 'Jason Huckaby'; Jason Price; Miller, Jesse
Subject: Reference Review

Hi Amber and Amanda-- this petition uses distilled dried grains with solubles as a traditional fuel for contaminant comparison. Needless to say, we haven't run across this before. The company provides a long list of references regarding this material. We'd like to get your best technical judgement on the validity and reliability of these references.

Can we talk tomorrow ? Need this by Friday, unfortunately.

Many thanks !!!!!!

George Faison
U.S. Environmental Protection Agency
OSWER, ORCR
1200 Pennsylvania Avenue, NW
Mail Code 5303P
Washington, DC 20460

Phone - (703)305-7652
faison.george@epa.gov

From: Mooney, Susan
Sent: Tuesday, July 02, 2013 12:13 PM
To: Staniec, Carol
Cc: Faison, George; Tesnau, Tab
Subject: FW: Fibrominn - Part-241 Non-Waste Application

Another to add to the list. I didn't look at it long enough to see if this is a clarification letter request or an actual petition. Focus is on poultry litter

Susan Mooney

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George

Have to have been designed to burn what kind of boiler can take the types of fuel

Has it been designed to be used as a fuel

nitrogen. He will look at the

Called Dave Minott on 2/3/2014
- 31 978-877-7719

- want to know that the boiler was designed to take DDGS, stover and alfalfa stems.
Distillers Dry Grains & Solubles

- Also need you to remove literature data from Turbomis data

concern about the age of the data and they will not give more information

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Staniec, Carol

From: David Minott [david.minott@arc5enviro.com]
Sent: Thursday, December 12, 2013 5:04 PM
To: Staniec, Carol
Subject: RE: FibroMinn Non-Waste Petition

Hello Carol,

Thank you again for committing the time today for us to engage in an extended discussion of Fibrominn's 241.3(c) petition for a non-waste determination for its poultry litter fuel. The underlying NHSM rule is a very complex one, and I appreciate that the Agency's reviews of these petitions are resource-intensive during a time when resources are being curtailed by budget limitations. Your email here has summarized the status of Fibrominn's petition at Region 5 and the path forward accurately and succinctly, as you conveyed to me by the end of our conversation today.

Fibrominn will complete and return to you the new data tables you have requested.

Regarding an update call in late January, my schedule is presently open as well. Would any of the following be better for you: January 29, 30, or 31 at say 10AM CST or 1PM CST?

Once again, thank you for your efforts to review this petition.

Regards,
Dave

David H. Minott, QEP, CCM
President and Principal Consultant
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20 Rockwood Lane, Groton, MA 01450
+1 978 877 7719 david.minott@arc5enviro.com

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From: Staniec, Carol [mailto:staniec.carol@epa.gov]
Sent: Thursday, December 12, 2013 5:35 PM
To: David Minott
Subject: RE: FibroMinn Non-Waste Petition

Dear Dave,
I only have you calling late on 12/9 and then I returned the call on 12/10 and again on 12/11/13. I definitely apologize for not being able to get a live person until today December 12, 2013. Thank you for the conversation and I understand that you are frustrated that the Agency cannot give you a definitive date for a response to the issuance of a letter, the petition review process or even a time frame for completion of the review of the company's submittal.

As you stated the facility you represent was previously given a CAA permit as a process unit that does not combust solid waste, regulated under CAA 112. Since manure has been defined as a solid waste you have applied for a petition to determine that your manure is not a solid waste. You state that this was necessary because FibroMinn could not meet

the stricter CAA requirements under CAA 129. You need to have the review completed, so the company could make informed decisions about its compliance. Region 5 will be reviewing this submittal as a petition submitted under 241.3(c).

During our discussion, I stated that I have begun a review and am asking you to complete, the attached tables and provide a basis for not including information about parameters you chose not to monitor for. Let us touch base the last week in January 2014, and I will call you with questions, if I have any beforehand. If you would like to set up a time and date, I currently have nothing pending that week.

I hope this summary was helpful moving forward.

From: David Minott [mailto:david.minott@arc5enviro.com]
Sent: Thursday, December 12, 2013 12:17 PM
To: Stanlec, Carol
Cc: Mooney, Susan
Subject: Fibrominn Non-Waste Petition

Hello Carol,

We've been playing telephone tag over the past two weeks and haven't been able to complete our discussion regarding the status of Fibrominn's non-waste application. Accordingly, why don't we agree to a specific day and time to speak on the phone, and I'd be happy to call you then.

As it has been nearly six months since the Fibrominn application was submitted, Fibrominn needs to know the Region's timeframe for making a determination. When we last conversed about this in September, you were targeting to have preliminary feedback for us on Fibrominn's non-waste petition by mid-November, and management had set a goal for formal decision-making by the end of the year.

What date/time would be convenient for you to speak with me on the phone?

Regards,
Dave

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Staniec, Carol

From: Staniec, Carol
Sent: Thursday, December 12, 2013 4:35 PM
To: 'David Minott'
Subject: RE: FibroMinn Non-Waste Petition
Attachments: empty tables template.docx

Dear Dave,
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Sent: Thursday, December 12, 2013 12:17 PM
To: Staniec, Carol
Cc: Mooney, Susan
Subject: Fibrominn Non-Waste Petition

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Dave

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Staniec, Carol

From: Staniec, Carol
Sent: Wednesday, September 25, 2013 5:08 PM
To: 'David Minott'
Cc: Susan Mooney
Subject: RE: Fibrominn Submissions

There is a commitment to management by December 31, 2013. My goal then would then be mid November (around the 22). I will be out of the office starting this Monday till October 17 on leave.

From: David Minott [mailto:david.minott@arc5enviro.com]
Sent: Wednesday, September 25, 2013 4:20 PM
To: Staniec, Carol
Subject: RE: Fibrominn Submissions

Hello Carol,

Thank you for such a quick response. Yes, in the real world, our best-intentioned schedule goals often get thwarted by unforeseen obstacles. Chronic computer problems can really affect a professional's productivity.

When might you have a better handle on the likely timeline? While Fibrominn is understandably eager to get some initial feedback on their non-waste petition, you don't need me pestering you every week for the status. It would be better, if we can, to give them some sort of amended timeframe.

Regards,
Dave

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From: Staniec, Carol [mailto:staniec.carol@epa.gov]
Sent: Wednesday, September 25, 2013 3:16 PM
To: David Minott
Subject: RE: Fibrominn Submissions

Hi David,
It was my goal, which I will not be able to reach. I have had days of computer problems. At least five hours a day for the last two weeks. I do not have a time frame for you.

From: David Minott [mailto:david.minott@arc5enviro.com]
Sent: Wednesday, September 25, 2013 6:40 AM

To: Staniec, Carol
Subject: Fibrominn Submissions

Hello Carol,

When we last conversed on the phone, you indicated that you were targeting to have preliminary feedback for us on Fibrominn's non-waste petition by the end of September. Is that still the expectation at your end? Thanks very much.

Regards,
Dave Minott

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Arc5

From: David Minott [mailto:david.minott@arc5enviro.com]
Sent: Wednesday, August 28, 2013 3:35 PM
To: 'staniec.carol@epa.gov'; 'Hall, Charles'
Subject: Fibrominn Submissions

Hello Carol and Charlie,

To facilitate coordination of your respective reviews, I thought it would be a good idea to make sure each of you is aware of both submissions to the Region recently made on behalf of the Fibrominn Biomass Power Plant that operates in Benson, Minnesota, fueled principally with poultry litter. I'm Fibrominn's environmental consultant in this matter. The two submissions are as follows:

1. Pursuant to 40 CFR 241.3(c)], Fibrominn had submitted to Region 5 on July 1, 2013 an application (petition) for a non-waste determination for its poultry litter fuel. Charlie, regarding coordination, the Region 5 reviewer for this submission is Carol Staniec.

2. Pursuant to 40 CFR 60.2020(e), Fibrominn had submitted to Region 5 on July 20, 2013 a Notification of exemption from the CISWI Rule by virtue of Fibrominn's being a Qualified Facility("QF") burning a homogeneous waste fuel (poultry litter). Carol, regarding coordination, the Notification was submitted to Region 5's Margaret Sieffert, and she has indicated that review responsibility has now been assigned to Charlie Hall.

Fibrominn's principal objective is to secure a non-waste determination for its poultry litter fuel under the first submission above. Should EPA grant that non-waste determination, then Fibrominn's poultry litter would no longer be regulated as a waste material when combusted, and Fibrominn's second submission above (the QF Notification) would be moot. If, however, EPA decides not to grant the non-waste determination, with poultry litter then remaining a waste material, the second submission (QF Notification) provides a backup means for exemption from CISWI. Hence, if initial review of the non-waste application indicates a non-waste determination is likely for the poultry litter, then EPA would not need to expend resources reviewing the QF Notification. Fibrominn could withdraw the Notification in that event if EPA thought it appropriate.

In any case, should either of you have questions going forward, please don't hesitate to contact me. Carol and Charlie, your efforts and time in reviewing these submissions are very much appreciated.

Regards,
Dave Minott

P.S. Charlie, my middle initial stands for Hall, via my maternal grandfather. His name was, of course . . . . . Charlie Hall !

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978-877-7719
cell phone

Staniec, Carol

From: David Minott [david.minott@arc5enviro.com]
Sent: Wednesday, September 25, 2013 6:40 AM
To: Staniec, Carol
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Arc5

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To: 'staniec.carol@epa.gov'; 'Hall, Charles'
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Dave Minott

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Staniec, Carol

From: Mooney, Susan
Sent: Wednesday, July 10, 2013 10:32 AM
To: Staniec, Carol
Subject: FW: Fibrominn - Part-241 Non-Waste Application

Hi Carol,

Can you follow-up with the Mr. Minott to let him know we have received the submittal and that you are the contact? Thanks.

Susan Mooney
312-886-3585

From: Guerriero, Margaret
Sent: Wednesday, July 10, 2013 9:32 AM
To: Garl, Jerri-Anne; Mooney, Susan
Subject: FW: Fibrominn - Part-241 Non-Waste Application

As discussed

From: Mathur, Bharat
Sent: Wednesday, July 10, 2013 9:19 AM
To: Guerriero, Margaret; Kaplan, Robert
Subject: RE: Fibrominn - Part-241 Non-Waste Application

Yes please

From: Guerriero, Margaret
Sent: Wednesday, July 10, 2013 9:18 AM
To: Mathur, Bharat; Kaplan, Robert
Subject: RE: Fibrominn - Part-241 Non-Waste Application

Yes we got it and we are working on it. D Would you like me to reply and give him our contact info?

From: Mathur, Bharat
Sent: Wednesday, July 10, 2013 7:07 AM
To: Guerriero, Margaret; Kaplan, Robert
Subject: Fw: Fibrominn - Part-241 Non-Waste Application

I hope somebody got this. Please forward as appropriate

From: David Minott
Sent: Wednesday, July 10, 2013 6:44:06 AM
To: Mathur, Bharat
Subject: Fibrominn - Part-241 Non-Waste Application

Hello Mathur,

I had emailed a Part 241 non-waste petition last week, as indicated below, and want to make sure you received it. Would you kindly confirm receipt? Thank you very much.

Dave Minott

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From: David Minott [mailto:david.minott@arc5enviro.com]
Sent: Monday, July 01, 2013 7:29 PM
To: 'mathur.bharat@epa.gov'
Cc: 'Shiv Srinivasan'; 'Mandy Tenner'; 'trevor.shearen@state.mn.us'; 'richard.cordes@state.mn.us'; 'steven.gorg@state.mn.us'; 'david.minott@arc5enviro.com'; 'Knudson, Scott'
Subject: Fibrominn - Part-241 Non-Waste Application

This communication is being submitted by Fibrominn LLC to Ms. Susan Hedman, Regional Administrator, through Mr. Bharat Mathur, Deputy Regional Administrator.

Dear Mr. Bharat,

Fibrominn LLC owns and operates a biomass power plant in Benson, Minnesota, fueled principally with poultry litter. Fibrominn submits herewith to the Regional Administrator, pursuant to 40 CFR Part 241.3(c), a non-waste petition (application) for its poultry litter fuel material. Fibrominn requests that you kindly confirm receipt of this email and the attached non-waste petition.

Please do not hesitate to contact Fibrominn with any questions or should you need further information to facilitate your review. Fibrominn's contact information is:

- Shiv Srinivasan, Plant Manager, Fibrominn LLC (Shiv.Srinivasan@contourglobal.com; 320-297-0821).

Please also copy the following individuals on any email or written correspondence:

- David Minott, Arc5 Environmental Consulting (david.minott@arc5enviro.com);
- Scott Knudson, Briggs and Morgan (SKnudson@Briggs.com).

Fibrominn appreciates the Region's efforts in reviewing this application.

Submitted on behalf of Fibrominn LLC by its environmental consultant, Arc5 Environmental Consulting, LLC:

Sincerely,
David Minott
Arc5 Environmental Consulting, LLC

David H. Minott, QEP, CCM

President and Principal Consultant
Arc5 Environmental Consulting, LLC
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CONVERSATION RECORD

TIME | DATE 7/10/13 @ 1220 CST

TYPE ☐ VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
David Minatt		

SUBJECT 241 petition

ROUTING	
NAME/SYMBOL	INT

SUMMARY Called and confirmed receipt of petition

Legal

Scott Knudson Bruce and Morgan -

MR ~~Shiv responded back~~ on 7/10/13 and said that he is will send contact information about attorney to me - Only want attorney/tech - attorney/tech Contacts

- Dave Minatt - talked with him about intervene deadline which is 6 months.

Margaret Siefert - in EPA we gave it to Charlie Hall will/should coordinate review with Charlie

ACTION REQUIRED
- Send mail to C. Hall.

NAME OF PERSON DOCUMENTING CONVERSATION | SIGNATURE | DATE

Called back on 12/18/13 - left message

called back on 12/11/13

ACTION TAKEN

SIGNATURE | TITLE | DATE