



North Carolina Department of Environment and Natural Resources  
Division of Air Quality

Beverly Eaves Perdue  
Governor

Sheila C. Holman  
Director

Dee Freeman  
Secretary

July 19, 2012

Mr. John Prestage  
Senior Vice President  
Prestage Farms – Moltonville  
P.O. Box 438  
Clinton, NC 28328

SUBJECT: Applicability Determination No. 1887 – Secondary Material Determination  
Prestage Farms - Moltonville  
Facility ID No. 8200112, Permit No. 07210R07  
Moltonville, Sampson County  
Fee Class: Small

Dear Mr. Prestage:

The North Carolina Division of Air Quality (NC DAQ) received your letter dated December 2, 2011 summarizing your analysis of used poultry bedding from turkey houses. The NC DAQ received additional information in a letter dated March 16, 2012, which was submitted by Mr. William Lane at Kilpatrick Townsend & Stockton LLP on your behalf. Prestage Farms, Inc. (Prestage Farms) is proposing to burn used poultry bedding as a fuel in a new boiler at an existing feed mill located in Moltonville, Sampson County, North Carolina. The boiler will be used to generate steam for the feed manufacturing process and to produce electricity.

Used poultry bedding is a non-hazardous secondary material (NHSM) within the meaning of Title 40, Part 241 of the Code of Federal Regulations (40 CFR Part 241). The used poultry bedding described in the letters referenced above is maintained within the control of the generator, and meets the legitimacy criteria provided in 40 CFR 241.3(d)(1). The NC DAQ has determined, therefore, that the material is not a solid waste when used as fuel in a combustion unit. This determination relies on the language of the current Federal rule defining NHSM, discussions NCDAQ has had with representatives of the EPA, and on the proposed changes to the NHSM rule.

**Control of the Generator – 40 CFR 241.3(b)(1)**

The used poultry bedding that Prestage Farms proposes to burn is generated from turkey houses that are either owned by Prestage Farms or owned by growers that are contracted by Prestage Farms. In either case, Prestage Farms supplies all of the bedding used in the turkey houses, owns the turkeys raised in the turkey houses, and produces, owns, and supplies all feed for the turkeys. In addition, Prestage

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**Permitting Section**

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Farms exercises administrative control of the general conditions within the turkey houses, including medications administered to the turkeys, water quality, humidity, and temperature control.

Pursuant to 40 CFR 241.2, “generating facility” means all contiguous property owned, leased, or otherwise controlled by the NHSM generator. “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 (defined as an individual, trust, firm, etc.) shall not be deemed to “control” such facilities.

The NC DAQ has determined that Prestage Farms is the generator of the used poultry bedding because it either directly owns or otherwise controls all of the turkey houses from which the bedding is produced. In addition, Prestage Farms has the power to direct the policies of the turkey houses, whether through direct ownership and operation or through the contractual control of turkey growers operating on Prestage Farms’ behalf. Therefore, the poultry bedding is maintained within the control of Prestage Farms.

#### **Managed as a Valuable Commodity – 40 CFR 241.3(d)(1)(i)**

Prestage Farms will store the used poultry bedding in an enclosed building prior to using it as a fuel to prevent moisture uptake in the material and to control potential odors from the used poultry bedding. Use of enclosed storage areas, particularly to limit moisture intake, is consistent with typical management of wood chips and other biomass fuels. In addition, Prestage Farms has indicated that it will store the used poultry bedding for less than 90 days prior to burning the material as a fuel. The NC DAQ concludes that these management practices satisfy the requirement that the NHSM be managed as a valuable commodity, and if so managed, the used poultry bedding meets the legitimacy criterion pursuant to 40 CFR 241.3(d)(1)(i).

#### **Meaningful Heating Value – 40 CFR 241.3(d)(1)(ii)**

In the preamble to the final NHSM definitional rule, US EPA indicated that materials with a heat content of at least 5,000 Btu/lb presumptively satisfy this criterion.<sup>1</sup> However, materials with lower heat contents may also satisfy the criterion on a case-by-case basis by showing that “the energy recovery unit can cost-effectively recover meaningful energy from the non-hazardous secondary materials used as fuels.”<sup>2</sup> Factors that may be considered in this case-by-case analysis include “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 non-hazardous secondary materials to use as a fuel, whether the non-hazardous secondary materials they are burning can self-sustain combustion, and whether their operation produces energy that is sold for a profit...”<sup>3</sup>

Prestage Farms analyzed composite samples of used poultry bedding collected from turkey houses at multiple farms in North Carolina and also collected a composite sample from South Carolina farms. Because Prestage Farms is not intending to dry the material prior to burning it as a fuel it is appropriate to look at the lower heating value (LHV) of the material. The LHV of the sampled material varies between 2,970 and 4,613 British thermal units per pound (Btu/lb). The average heating value is 3,759 Btu/lb and the median heating value is 3,685 Btu/lb. As a basis of comparison, the heat content of

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<sup>1</sup> 76 Fed. Reg. 15,523 (Mar. 11, 2011).

<sup>2</sup> *Id.*

<sup>3</sup> *Id.*

green wood chips on a wet basis is 4,300 Btu/lb. A summary of the data received on the heat content of the used poultry bedding is provided in Attachment 1 to this letter.

Because the used poultry bedding has an average heat content below 5,000 Btu/hr (approximately 3700 Btu/lb), the proposed boiler must be able to cost-effectively recover meaningful energy from the material to satisfy this legitimacy criterion. In your letter and subsequent correspondence, you indicate that the proposed boiler would be self-sustaining and able to fire the used poultry litter without the addition of supplemental fuels. Further, you indicate that the used litter will cost less than wood chips, and that electricity generated from its combustion will be eligible under North Carolina's Renewable Energy Standard for sale with incentives. The NC DAQ has determined that, because the used poultry bedding can be used in a self-sustaining combustion system to recover energy at a cost that is comparable to the cost of generating energy using a traditional fuel, the material has meaningful heating value and meets the legitimacy criterion under 40 CFR 241.3(d)(1)(ii).

### **Comparable Contaminant Concentrations – 40 CFR 241.3(d)(1)(iii)**

In order for a NHSM to be classified as a non-solid waste fuel, it must “contain contaminants at levels comparable in concentration to or lower than those in traditional fuels which the combustion unit is designed to burn.”<sup>4</sup>

#### **Contaminants**

A contaminant is defined as “any constituent in a non-hazardous secondary material *that will result in emissions* of the air pollutants identified in the Clean Air Act section 112(b) or the nine pollutants listed under Clean Air Act section 129(a)(4) when such non-hazardous secondary material are burned as fuel or used as an ingredient, including those constituents that could generate products of incomplete combustion.”<sup>5</sup> This definition could be interpreted to include (1) chemical pollutants that are present within the NHSM that may be emitted as regulated air pollutants during the combustion process<sup>6</sup>, (2) chemicals that are not regulated air pollutants, but which may form air pollutants during the combustion process<sup>7</sup>, and (3) chemicals that are not regulated pollutants, but which may promote the formation of air pollutants during the combustion process.<sup>8</sup> In response to comments in the final NHSM rule the EPA noted in the context of pulp and paper sludge that “high chlorine levels are an indicator that the combustion of such materials may result in increased emissions of dioxins and furans, such that if chlorine levels in pulp and paper sludges are excessively high, it may be an indication that the burning of those sludges is more reflective of waste management. Thus, chlorine levels in pulp and paper sludges should particularly be monitored and evaluated as part of a plants determination that their pulp and paper sludges meet the contaminant legitimacy criterion.”<sup>9</sup>

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<sup>4</sup> 40 CFR 241.3(d)(1)(iii) (March 23, 2011) (*emphasis added*).

<sup>5</sup> 40 CFR 241.1 (March 23, 2011) (*emphasis added*).

<sup>6</sup> *Example*: Regulated toxic metals in the NHSM may be emitted in the form of particulate matter. Toxic metals include antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and selenium.

<sup>7</sup> *Example*: Sulfur in the NHSM may be emitted as sulfur dioxide (SO<sub>2</sub>), which is a pollutant listed under CAA § 129(a)(4).

<sup>8</sup> *Example*: Copper “significantly enhance[s] the yield of [dioxins]” (see references below). Therefore, the presence of copper in the NHSM may result in the emission of these pollutants, which are listed under CAA § 129(a)(4). For information on the efficacy of copper in catalyzing the formation of Dioxin/Furnas, see for example, [http://www.epa.gov/ncea/pdfs/dioxin/2k-update/pdfs/Dioxin\\_Chapter\\_2.pdf](http://www.epa.gov/ncea/pdfs/dioxin/2k-update/pdfs/Dioxin_Chapter_2.pdf).

<sup>9</sup> 76 FR 15489.

Since the final rule was promulgated the US EPA has indicated that it did not intend for the definition of contaminants to be so broadly interpreted. On December 23, 2011, the US EPA proposed a revision to the contaminant definition “to clarify what will be considered contaminants for the purposes of the legitimacy criteria.”<sup>10</sup> The US EPA proposed including a specific list of pollutants and precursors that fall within the definition of “contaminants” in place of the existing definition that includes constituents that would result in emissions of air pollutants.<sup>11</sup> In the preamble to the proposed rulemaking, US EPA repeatedly asserts that the revised language is only intended to clarify the intent of the March 2011 rule and that the Agency does “not expect this change to affect any of the decisions previously made on whether NHSMs are solid wastes when burned as fuels.”<sup>12</sup>

In communications with the NC DAQ, the US EPA reaffirmed its intent to define contaminants in the narrower manner described in the proposed revision. Specifically, the NC DAQ sought the US EPA’s guidance on whether copper<sup>13</sup> should be considered a contaminant under the current rule because it is a catalyst for the formation of dioxins.<sup>14</sup> The US EPA believes it is appropriate to include chemicals that form air pollutants (e.g., chlorine, fluorine, nitrogen, and sulfur) within the definition of contaminants, but had not thought of copper as a contaminant to date. “Regulating copper as a contaminant based on its role in dioxin formation would take that logic [of including precursors] even further and would likely be more difficult. Copper doesn’t turn into dioxin. It may facilitate it, but the extent to which that is true depends heavily on temperature, chlorine concentrations and other combustion conditions that are independent of the waste determination that must be made under the NHSM rule.”<sup>15</sup> While the US EPA acknowledged that “[c]opper could potentially be considered a contaminant under the current rule (although it would be a stretch),” it indicated that copper could not be considered a contaminant under the proposed revised definition because it is not included in the specific list of precursors.<sup>16</sup>

Based on these representations from the US EPA, both on the catalytic effects of copper as well as the current rule’s interpretation, the NC DAQ reviewed the concentrations of the following contaminants without including copper in the used poultry bedding:

- **Metals:** Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Mercury, Nickel, Selenium, Silver, and Zinc
- **Halogens:** Chlorine, Fluorine
- **Additional Precursors:** Nitrogen, Sulfur

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<sup>10</sup> 76 Fed. Reg. 80470 (Dec. 23, 2011).

<sup>11</sup> The proposed definition is as follows: “*Contaminants* means all pollutants listed in Clean Air Act sections 112(b) and 129(a)(4), with modifications outlined in this definition to reflect constituents found in non-hazardous secondary materials prior to combustion. The definition includes the following elemental contaminants that commonly form Clean Air Act section 112(b) and 129(a)(4) pollutants: Antimony, arsenic, beryllium, cadmium, chlorine, chromium, cobalt, fluorine, lead, manganese, mercury, nickel, nitrogen, selenium, and sulfur. The definition does not include the following Clean Air Act section 112(b) and 129(a)(4) pollutants that are either unlikely to be found in non-hazardous secondary materials prior to combustion or are adequately measured by other parts of this definition: Hydrogen chloride (HCl), chlorine gas (Cl<sub>2</sub>), hydrogen fluoride (HF), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), fine mineral fibers, particulate matter, coke oven emissions, diazomethane, white phosphorus, titanium tetrachloride, m-cresol, o-cresol, p-cresol, m-xylene, o-xylene, and p-xylene.” See 76 Fed. Reg. 80529 (Dec. 23, 2011).

<sup>12</sup> 76 Fed. Reg. 80470 (Dec. 23, 2011).

<sup>13</sup> Used poultry litter would be expected to have higher copper concentrations than wood since copper sulfate is a feed supplement for poultry.

<sup>14</sup> See the United States EPA reassessment of Dioxin at [http://www.epa.gov/ncea/pdfs/dioxin/2k-update/pdfs/Dioxin\\_Chapter\\_2.pdf](http://www.epa.gov/ncea/pdfs/dioxin/2k-update/pdfs/Dioxin_Chapter_2.pdf) (last visited May 24, 2012).

<sup>15</sup> E-mail from George Faison (US EPA) to Donald van der Vaart (NC DAQ), dated April 24, 2012.

<sup>16</sup> E-mail from George Faison (US EPA) to Donald van der Vaart (NC DAQ), dated April 25, 2012.

### Designed, not Permitted to Burn

To determine whether a NHSM satisfies the legitimacy criteria, the current rule requires that the contaminant levels in the NHSM be compared against the levels in “traditional fuels which the combustion unit is designed to burn.”<sup>17</sup> The current rule is silent as to whether the traditional fuels used in the comparison should include all fuels that the combustion unit is capable of burning, or whether it is limited to those fuels that the combustion unit is legally allowed to burn. However, US EPA has subsequently made it clear both through communications with the NC DAQ and in subsequent proposed rulemaking, that the contaminant comparison should be based on what the combustion unit is simply capable of burning.<sup>18</sup> Thus, according to the EPA while the combustion unit used to burn turkey litter will be permitted as a biomass boiler, the turkey litter can be compared with coal for the purposes of meeting the legitimacy criteria.<sup>19</sup>

Further, following the publication of the final NHSM rule in the Federal Register, the US EPA issued a Guidance Concept Paper indicating its intent to “address questions raised by industry, assist them in making determinations under the rule, and ensure their use of the flexibility embodied in the rule.”<sup>20</sup> The Agency forecasted that the guidance would include a compilation of data it had collected on contaminant levels in traditional fuels which could be used by industry and other interested parties in the contaminant level comparison.

The guidance was provided by US EPA on November 29, 2011. It consists of three tables that provide a range of compiled contaminant concentrations for coal, untreated wood and biomass materials, and fuel oils.<sup>21</sup> The table does not distinguish between concentration levels of different coal ranks (i.e., anthracite, bituminous, sub-bituminous, and lignite) or different types of biomass (i.e., wood, bark, biogas, hogged fuel, and agricultural plant residues).<sup>22</sup> This approach is consistent with the NHSM rule revisions that US EPA proposed on December 23, 2011. The US EPA is proposing to codify the meaning of “designed to burn” to include “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.”<sup>23</sup> In the preamble, the US EPA further clarifies that comparisons to contaminant levels in coal could include data on all coal ranks

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<sup>17</sup> 40 CFR 241.3(d)(1)(iii) (March 23, 2011).

<sup>18</sup> E-mail from George Faison (US EPA) to Donald van der Vaart (NC DAQ), dated May 2, 2012 (indicating that the contaminant levels in the NHSM “should be compared to what traditional fuel the unit is [burning] or CAN burn, not what it is permitted for.”; 76 Fed. Reg. 80530 (Dec. 23, 2011) (proposing to revise 40 CFR 241.3(d)(1)(ii) to indicate that, “In determining which traditional fuel(s) a unit is designed to burn, persons can 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.”

<sup>19</sup> If a combustion unit is designed to burn both wood and coal, the EPA interprets the current rule to say that the contaminant concentrations of both wood and coal can be compared with those of the NHSM. However, if based on that comparison the material is found to meet the legitimacy criteria, the combustion unit would not be regulated under CISWI, but instead under the Part 63 MACT program. The standards under that program depend solely on the fuel the unit is permitted rather than simply designed to burn. This means that a combustion unit may be regulated under less stringent standards than those the unit is designed to burn. Thus, allowing the comparison to be made with the “as designed” fuel rather than the “as permitted” fuel may not ensure the unit’s emission standards will correspond to the comparison fuel.

<sup>20</sup> US EPA, “Non-Hazardous Secondary Materials (NHSM) Rule: Comparable Contaminant Guidance Concept Paper” (July 11, 2011). <http://www.epa.gov/osw/nonhaz/define/pdfs/nhsm-concept.pdf>

<sup>21</sup> US EPA, “Contaminant concentrations in Traditional Fuels: Tables for Comparison” (November 29, 2011). [http://www.epa.gov/osw/nonhaz/define/pdfs/nhsm\\_cont\\_tf.pdf](http://www.epa.gov/osw/nonhaz/define/pdfs/nhsm_cont_tf.pdf)

<sup>22</sup> This, despite the fact that a coal fired boiler is designed differently based on the rank of coal it will burn.

<sup>23</sup> 76 Fed. Reg. 80530 (Dec. 23, 2011).

and comparisons to wood and biomass materials could include data on untreated lumber, timber, bark, biomass, and hogged fuel.<sup>24</sup> In communications with NC DAQ, the US EPA confirmed that the language in the proposed rule is consistent with their interpretation of the current rule and that “we [EPA] do not differentiate between ‘ranks’ of coal for comparison purposes; thus any rank of coal can be used.”<sup>25</sup>

Prestage Farms is proposing to burn the used poultry bedding in a new boiler system. You have indicated that the boiler system will be designed to burn solid fuels, including coal and wood. In accordance with US EPA’s interpretation of “designed to burn,” the NC DAQ compared the concentrations of contaminants in the used poultry bedding to the contaminant levels in coal and wood and biomass materials as provided in the November 29, 2011 guidance document and literature values.

### **Results of the Contaminant Comparison**

There are long established statistical tests to determine whether two materials are statistically different based on samples from both material populations. However, the US EPA is simply interested in not designating a candidate NHSM as solid waste if doing so based on its contaminant level would *ever* also define the traditional fuel as a solid waste as well.<sup>26</sup> To this end, the US EPA has indicated that a variety of comparisons could be made. For example, the highest contaminant levels in the NHSM could be compared against the highest contaminant levels in the relevant traditional fuels. Alternatively, the average values of the NHSM could be compared with the average values of the traditional fuels. “Anything less could result in ‘traditional fuel’ samples being considered solid waste if burned in the very combustion units designed to burn them – not the Agency’s intent in either the 2011 NHSM final rule or today’s proposed rule.”<sup>27</sup> However, using different bases for comparison could lead to different results. The US EPA warned that “[i]t would not be appropriate to compare an average NHSM contaminant value to the high end of a traditional fuel range, as the existence of an average implies multiple data points from which a more suitable statistic (*e.g.*, range or standard deviation) could have been calculated.” Finally, the EPA warned that “in the context of an inspection or enforcement action, the Agency will evaluate the appropriateness of alternative methodologies and data sources on a case-by-case basis when determining whether the legitimacy criteria have been met.”<sup>28</sup> The NC DAQ chose to use both maximum values and averages in this comparison. The vast number of samples available for coal obviated the need for the NCDAQ to estimate its distribution. (see Attachment 2 for the contaminant chlorine).

Prestage Farms analyzed the contaminant levels in composite samples of used poultry bedding collected from different locations identified as PFGO, PFS, and PFN. A summary of the measured contaminant levels and the contaminant levels in coal and wood and biomass materials is provided in Attachment 3 to this letter. For many contaminants the results show that the measured contaminant levels in the used poultry bedding are within the range of contaminant concentrations in the traditional fuels that the new boiler system will be designed to burn (both using maximum values and averages). In the case of manganese, the average manganese content of turkey litter is 488 ppm which is higher than the average manganese content of either wood or coal. However, the highest measured manganese content in the used poultry bedding was 580 ppmd, which is lower than the upper range of manganese content in wood

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<sup>24</sup> 76 Fed. Reg. 80481 (Dec. 23, 2011).

<sup>25</sup> E-mail from George Faison (US EPA) to Donald van der Vaart (NC DAQ), dated April 24, 2012.

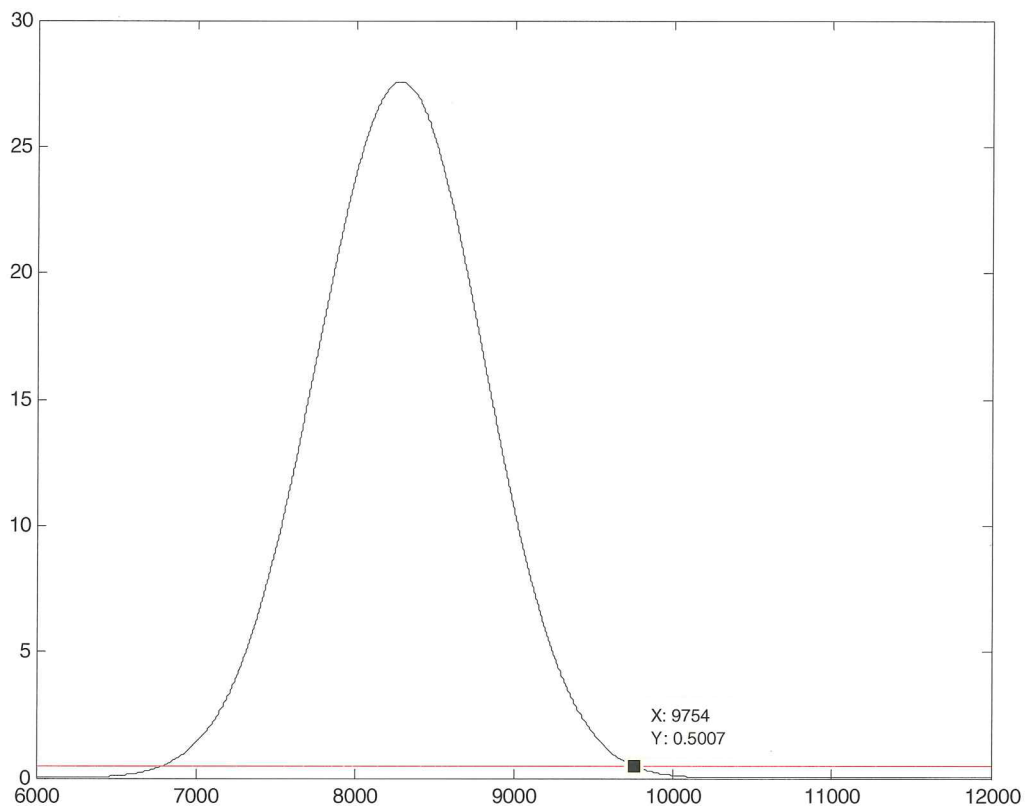
<sup>26</sup> Indeed, the EPA points out in its proposed rule that, for example, the coals used in a comparison need not be limited to the coal received from either the current or past suppliers. Of course, in cases where the unit is not permitted to burn coal, but is designed to burn coal, any coal rank can be considered including anthracite, lignite, bituminous, and sub-bituminous. 76 Fed. Reg. 80477 (Dec. 23, 2011).

<sup>27</sup> 76 Fed. Reg. 80841 (Dec. 23, 2011).

<sup>28</sup> 76 Fed. Reg. 80482-3. (Dec. 23, 2011).

(15,800 ppm). The relatively few number of samples of turkey litter would indicate that the highest measured value is undoubtedly not the maximum value for all turkey litter. However, the disparity between the average manganese contents indicate that there is little doubt that the maximum manganese content of turkey litter would be considerably below 15,800 ppm.

The same cannot be said for chlorine content. The highest measured chlorine content in the used poultry bedding was 8,647 ppm, which is lower than the upper range of chlorine content in coal (9,080 ppm), but the average litter chlorine content (8278 ppm) was significantly higher than the average chlorine content in coal (992). In this case only two used poultry bedding samples were available. For the particular case of chlorine, the NC DAQ estimated the maximum value assuming the Cl content in turkey litter was normally distributed. See the graph below.



Note that the maximum predicted Cl content (indicated by the highest value for which the sample size is greater than 0.5) is approximately 9750 ppm. This is slightly more than the maximum value reported by the EPA of 9080 ppm for coal. Following the EPA's determination of engineered fuel products, the NCDAQ believes the less than 10% difference between these values constitutes comparability.<sup>29</sup>

<sup>29</sup> See April 3, 2012 determination from Becky Weber, Director, Air and Waste Management Division, US EPA Region 7, to Mr. Gregory Haug, PE of Resource Enterprises, LLC.

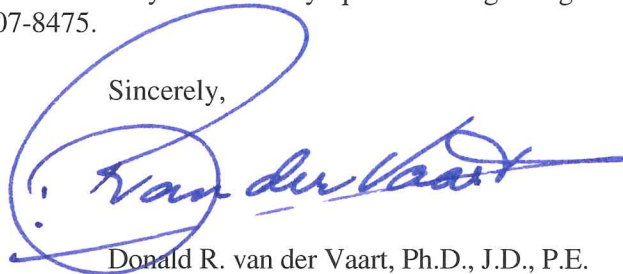
Mr. Prestage  
July 19, 2012  
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Given the comparability of all relevant contaminants between coal and turkey litter as characterized by your submittal, the NC DAQ has determined that the used poultry bedding does meet the legitimacy criteria under 40 CFR 241.3(d)(1)(iii).

**Conclusion**

As described in the letters received by you or on your behalf on December 2, 2011 and March 16, 2012, the used poultry bedding is maintained within the control of the generator and does meet the legitimacy criteria provided in 40 CFR 241.3(d)(1). Therefore, the NC DAQ has determined that it is not a solid waste when used as fuel in a combustion unit. As a result of this determination, the proposed boiler would not be subject to the combustion source emission standards for biomass fuel promulgated pursuant to Section 129 of the Clean Air Act. If you have any questions regarding this NHSM determination, please contact me at (919) 707-8475.

Sincerely,



Donald R. van der Vaart, Ph.D., J.D., P.E.  
Chief

Attachments

c: Fayetteville Regional Office  
Central Files



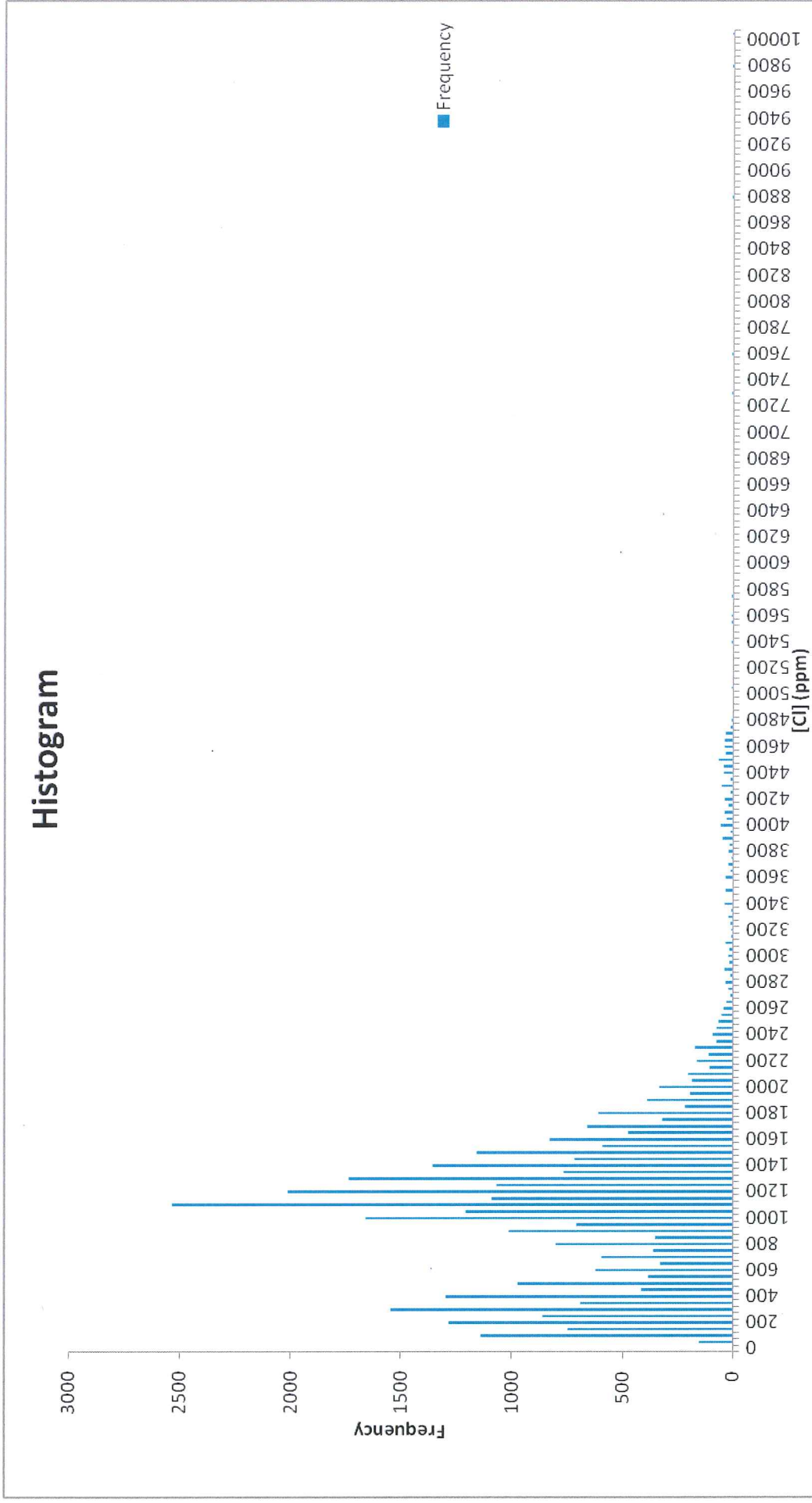
Attachment 1: Heat Contents of Used Poultry Bedding

Sample Source	Sample ID No.	Higher Heating Value (HHV) Btu/lb	Moisture Content <sup>1</sup> % by Weight	Lower Heating Value <sup>2</sup> (LHV) Btu/lb
NC - Breeder Dark Out	120	5,226	23.55%	4,602
	121	5,244	25.62%	4,613
	122	5,712	17.83%	5,117
NC Breeder Laying	130	4,355	18.61%	3,848
	131	4,286	28.39%	3,685
NC Tom Grow Out	142	3,888	42.32%	3,176
NC Tom w/ Brooder	150	3,813	48.31%	3,048
	151	3,726	48.33%	2,970
	152	3,930	41.98%	3,223
NC Light Hen	160	4,127	37.56%	3,442
	161	4,588	30.60%	3,941
	162	4,744	28.72%	4,113
NC Heavy Hen	170	4,882	31.75%	4,221
	171	3,851	42.63%	3,142
	172	4,396	25.58%	3,829
NC Composite	11/16-17	4,283	32.32%	3,655
SC Prestage	11/16	3,890	33.63%	3,274
<b>Range:</b>		3,726 - 5,712		<b>2,970 - 5,117</b>
<b>Average:</b>		4,408	32.81%	<b>3,759</b>
<b>Median:</b>		4,286	31.75%	<b>3,685</b>

1. All moisture contents were measured from the samples as received.

2. Because Prestage is not proposing to dry the used poultry litter prior to firing, it is appropriate to use the LHV when determining whether the material has a meaningful heating value within the meaning of 40 CFR 241.3(d)(1)(ii).

Attachment 2: Frequency Distribution of Chlorine in Coal



**Attachment 3: Contaminant Level Comparison for Used Poultry Bedding**

Unless otherwise provided, all measurements in parts per million on a dry basis (ppmd). Highest contaminant levels are shaded orange.

ND = Non-Detect

Contaminant	TRADITIONAL FUELS - Tables for Comparison <sup>1</sup>						Prestage Samples		
	Coal <sup>2</sup>			Wood & Biomass Materials			PFGO <sup>3</sup>	PFS <sup>4</sup>	PFN <sup>5</sup>
	Range	Average	ND Rate	Range	Average	ND Rate			
<b>Metals</b>									
Antimony	ND - 6.9	1.7	25%	ND - 6.0	0.9	45%	<0.58	<0.60	<0.52
Arsenic	ND - 174	8.2	8%	ND - 298	6.3	57%	1.6	26.4	21.9
Beryllium	ND - 206	1.9	12%	ND - 10	0.3	69%	<0.12	<0.12	<0.1
Cadmium	ND - 19	0.6	38%	ND - 178	0.6	32%	0.15	<0.12	<0.1
Chromium	ND - 168	13.4	1%	ND - 340	5.9	14%	4.9	3.5	10.6
Cobalt	ND - 25.2	6.9	8%	ND - 213	6.5	23%	1.2	0.88	1
Lead	ND - 148	8.7	5%	ND - 229	4.5	28%	<0.58	<0.60	<0.52
Manganese	ND - 512	26.2	<1%	ND - 15800	302	<1%	580	426	458
Mercury	ND - 3.1	0.09	5%	ND - 1.1	0.03	22%	<0.006	<0.0062	<0.20
Nickel	ND - 730	21.5	<1%	ND - 175	2.8	17%	5.4	4.1	6.5
Selenium	ND - 74.3	3.4	22%	ND - 9.0	1.1	69%	3.1	3.6	2.9
Silver							<0.58	<0.60	<0.52
Zinc							658	477	544
<b>Halogens</b>									
Chlorine	ND - 9,080	992	4%	ND - 5,400	259	5%	See Note 6	7,910	8,647
Fluorine	ND - 178	64.0	9%	ND - 128	32.4	43%			
<b>Precursors</b>									
Nitrogen	13,600 - 54,000	15,090	0%	2,200 - 4,600	3460	0%		30,000	34,400
Sulfur	740 - 61,300	13,580	0%	ND - 6,100	704	5%		4,700	4,700

1. U.S. EPA's Contaminant Concentrations in Traditional Fuels: Tables for Comparison (Nov. 29, 2011). [http://www.epa.gov/wastes/nonhaz/define/pdfs/nhsm\\_cont\\_tf.pdf](http://www.epa.gov/wastes/nonhaz/define/pdfs/nhsm_cont_tf.pdf)

2. Includes data for anthracite, bituminous, sub-bituminous, and lignite coal.

3. Samples taken from Prestage Grow Out operations. Included in Prestage's Dec. 1, 2011 submittal.

4. Samples taken from Prestage Southern operations. Composites collected from eleven farms in South Carolina and blended. Included in both Prestage's Dec. 1, 2011 and Mar. 16, 2011 submittals.

5. Samples taken from Prestage Northern operations. Composites collected from sixteen farms in North Carolina and blended. Included in Prestage's Mar. 16, 2011 submittal.

6. In the Dec. 1, 2011 submittal (PFGO & PFS), chlorine, fluorine, and bromine were reported as extractable halogens rather than total halogens. The March 16, 2011 submittal (PFS & PFN) included total halogen values. Laboratory staff indicated to Prestage that the total halogens consist primarily of chlorine.

**Copper Content Comparison - Literature Review**

Material	Concentration (ppmd)	Source
Coal	ND - 275.4	1. West Virginia Geological and Economic Survey, Copper (Cu) Summary Statistics. <a href="http://www.wvgs.wvnet.edu/www/datastat/te/Cuhist.htm">http://www.wvgs.wvnet.edu/www/datastat/te/Cuhist.htm</a> (last visited May 21, 2012).
Wood/Biomass	N/A	No data found
Used Poultry Bedding	195 - 570	1. John P. Chastain, et. al., <i>Poultry Manure Production and Nutrient Content</i> . See at <a href="https://www.clemson.edu/extension/livestock/livestock/camm_files/poultry/pch3b_00.pdf">https://www.clemson.edu/extension/livestock/livestock/camm_files/poultry/pch3b_00.pdf</a> (last visited May 8, 2012). 2. NCSU, Soil Facts, <i>Poultry Manure as a Fertilizer Source</i> . See at <a href="http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-05/">http://www.soil.ncsu.edu/publications/Soilfacts/AG-439-05/</a> (last visited May 8, 2012). 3. Robert L. Woods, Poultry Litter - Nutrient Content and Value. See at <a href="http://www.ok-littermarket.org/upload/Poultry_Litter_nutrient_content.doc">http://www.ok-littermarket.org/upload/Poultry_Litter_nutrient_content.doc</a> (last visited May 8, 2012).