Air Quality
ENVIRONMENTAL QUALITY

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October 14, 2016

Mr. Rich Deming
Principal
Carolina Poultry Power RG1, LLC
2524 Oakdale Road
LaGrange, NC 28551

SUBJECT: Applicability Determination No. 2892: Non-Hazardous Secondary Material Determination
Carolina Poultry Power RG1, LLC
Facility ID No.: 7400310
Farmville, Pitt County

Dear Mr. Deming:

The North Carolina Division of Air Quality (NC DAQ) received your initial letter dated July 18, 2016 summarizing your analysis of used poultry bedding. Carolina Poultry Power RG1, LLC (CPP) is proposing to burn used poultry bedding as a fuel in the gasification/boiler system at CPP's poultry processing site in Farmville. The gasification/boiler system currently fueled by clean cellulosic biomass will be modified to incorporate used poultry bedding consisting of cellulosic shavings and poultry manure. The reciprocating grate boiler system will be operated in sub-stoichiometric (gasification) conditions at the bed and stoichiometric conditions in the upper combustion chamber for complete combustion. The gasification/boiler system will be used to generate process steam for an industrial complex while any remaining steam will operate the associated turbine/generator to produce electricity for sale to a utility company in North Carolina.

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 processed as required by 40 CFR 241.3(b)(4) and meets the legitimacy criteria provided in 40 CFR 241.3(d)(1). Therefore, NC DAQ has determined that the used poultry bedding is not a solid waste when used as fuel in a combustion unit. This determination relies on the language of the current Federal regulations defining the NHSM rule.

Processing of Discarded NHSM – 40 CFR 241.3(b)(4)

Pursuant to 40 CFR 241.2, "processing" means any operations that transform discarded NHSM into a non-waste fuel. "Processing" includes, but is not limited to, operations necessary to: remove or destroy contaminants; significantly improve fuel characteristics of the material, *e.g.* sizing or drying the material in combination with other operations; or chemically improve the as-fired energy content. Minimal operations that result only in modifying the size of the material by shredding do not constitute processing for purposes of this definition. "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.

The used poultry bedding that CPP proposes to burn is generated from poultry houses owned by poultry growers in the region. CPP proposes to significantly improve the fuel combustion properties of the used poultry bedding in order to produce an engineered fuel prior to use in the gasification/boiler system. CPP will improve the fuel characteristics of the material through sampling/testing, screening (removal of materials), sizing, blending, and drying. Each load of used poultry bedding will be assessed to determine moisture content. Also, quality assurance testing on representative samples on a batch basis from the trailers will ensure that contaminant levels are comparable to or less than those found in traditional fuels which the system is designed to burn. Large physical materials will be removed manually and by mechanical screening. Ferrous metal substances will be removed by passing the material through a magnetic separation system. Each load of used poultry bedding will be processed as it is received then burned in the boiler/gasification system as there will be no onsite storage. CPP states the process for preparing the used poultry bedding is virtually identical to the approved processing described in the US EPA Region 7 letter[1].

The NC DAQ has determined that the processing steps described above meet the regulatory definition of "processing" in 40 CFR 241.2 with further support from the recent EPA determination of proposed NHSM fuels[2].

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

CPP will unload the used poultry bedding from the trailers into an enclosed area for processing prior to using it as a fuel to prevent moisture uptake in the material and to control potential odors. Use of the enclosed unloading and processing areas, in particular to limit moisture intake, is consistent with typical management of wood chips and other biomass fuels. In addition, combustion air for the gasifier/boiler will be drawn from the enclosed area which is a similar practice commonly applied to the management of other analogous fuels. 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 British thermal units per pound (Btu/lb) presumptively satisfy this criterion.[3] 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."[4] 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…."[5]

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[1] See Letter dated April 3, 2012 from Becky Weber, Director, Air and Waste Management Division, US EPA Region 7, to Mr. Gregory Haug, PE of Resource Enterprises, LLC.
https://yosemite.epa.gov/osw/rcra.nsf/ea6e50dc62147252852 56bf00063269d/B8F83C3230D229EE85257F72006F4329/$file/14862.pdf

[2] *Ibid.*

[3] 78 Fed. Reg. 9172 (February 7, 2013).

[4] 76 Fed. Reg. 15523 (March 11, 2011).

[5] *Ibid.*

CPP analyzed composite samples of used poultry bedding collected from poultry houses at three farms in the region. Because CPP intends to dry the material prior to burning it as a fuel it is appropriate to look at the higher heating value (HHV) of the material. The HHV of the sampled material 4,895 Btu/lb as received. As a basis of comparison, the heat content of green wood chips on a wet basis is 4,300 Btu/lb.

Because the used poultry bedding has an average heat content below 5,000 Btu/lb (approximately 4,895 Btu/lb), the gasifier/boiler must be able to cost-effectively recover meaningful energy from the material to satisfy this legitimacy criterion. In your letter and subsequent correspondence, CPP indicated that the gasification/boiler system would be self-sustaining and able to fire the used poultry bedding without the addition of supplemental fuels. Further, CPP indicated that the used poultry bedding 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 or groups of contaminants *at levels comparable in concentration to or lower than* those in traditional fuels which the combustion unit is designed to burn."[6]

Contaminants

Contaminants are defined as "all pollutants identified in the Clean Air Act sections 112(b) or 129(a)(4) *including the elements chlorine, fluorine, nitrogen, and sulfur in cases where non-hazardous secondary material are burned as fuel and combustion will result in the formation of hydrogen chloride, hydrogen fluoride, and nitrogen oxides or sulfur dioxide*."[7] In addition to a specific list of pollutants and precursors that fall within the definition of "contaminants," the listing also excludes pollutants that are unlikely to be found in non-hazardous secondary materials as well as individual cresol and xylene isomers.[8]

The NC DAQ reviewed the concentrations of the following contaminants in the used poultry bedding:

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[6] 40 CFR 241.3(d)(1)(iii) (February 7, 2013) (*emphasis added*). Note effective April 8, 2013; however, this rule revision does not affect the outcome of this determination.

[7] 40 CFR 241.2 (February 7, 2013) (*emphasis added*).

[8] The definition is as follows: "*Contaminants* means all pollutants listed in Clean Air Act sections 112(b) and 129(a)(4), with the following three modifications. This 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). 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, diazomethane, white phosphorus, and titanium tetrachloride. 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." See 78 Fed. Reg. 9212 (Feb. 7, 2013).

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

Designed, not Permitted to Burn

CPP is proposing to burn the used poultry bedding in the existing gasification/boiler system. CPP has indicated that the gasification/boiler system is 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 again to the contaminant levels in coal and wood and biomass materials as provided in the November 29, 2011 guidance document.

Results of the Contaminant Comparison

CPP analyzed the contaminant levels in composite samples of used poultry bedding. A summary of the measured contaminant levels and the contaminant levels in coal and biomass materials is provided as attachment to this letter. All contaminants show that the measured contaminant levels in the used poultry bedding are within the range of contaminant concentrations in the traditional fuel (biomass and coal) that the gasification/boiler system is capable of burning using maximum and average values (see attached table).

Given the comparability of all relevant contaminants between biomass, coal and used poultry bedding 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 letter received August 12, 2016 and your updated table received October 13, 2016, the used poultry bedding is processed and does meet the legitimacy criteria provided in 40 CFR 241.3(d)(1). Therefore, the NC DAQ has determined that used poultry bedding is not a solid waste when used as fuel in a combustion unit. As a result of this determination, the gasification/boiler system 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 Mr. Jeff Twisdale at (919) 707-8472 or Jeff.Twisdale@ncdenr.gov.

Sincerely,

William D. Willets, P.E., Chief, Permitting Section
Division of Air Quality, NCDEQ

Attachment

c: Washington Regional Office
Central Files

Table 3. Comparison of Used Poultry Bedding Contaminants to Analogous Fuels

Pollutants	Coal	Wood and Biomass Materials	CPP Litter
Heat Value (Btu/lb)	8,500 – 14,000	4,500 – 9,000	4,256-5,268
Antimony	ND - 6.9	ND – 6.0	0.59
Arsenic	ND - 174	ND – 298	3.3
Barium	N/M	N/M	<0.25
Beryllium	ND - 206	ND – 10	<0.069
Cadmium	ND - 19	ND – 17	0.11
Chromium	ND - 168	ND – 340	3.5
Cobalt	ND - 25.2	ND – 213	<0.34
Lead	ND - 148	ND – 229	1.1
Manganese	ND - 512	ND – 15800	905
Mercury	ND - 3.1	ND – 1.1	<0.00020
Nickel	ND - 730	ND – 175	24
Selenium	ND - 74.3	ND – 9.0	1.8
Silver	N/M	N/M	<0.34
Zinc	N/M	N/M	914
Halogens			
Chlorine	ND – 9,080	ND – 5,400	8,278
Fluorine	ND – 178	ND - 128	
Nitrogen (N)	13600-54000	2200-4600	26300-32700
Sulfur (S)	740-61300	ND-6100	5500-7600

Notes:

All data are reported on a dry weight basis unless indicated otherwise.

Coal and wood data are from "Contaminant Concentrations in Traditional Fuels; Tables for Comparison" published by U.S.EPA on November 29, 2011, with the exception of Lower Heat Value for wood which is from http://www.ces.ncsu.edu/forestry/biomass/presentation/hopkins2.pdf

Litter Samples: Analysis of CPP poultry bedding sample collected in March 2016. Heat value includes LHV for multiple samples.

Halogen data is from 1/20/2012 analysis of turkey litter from Prestage AgEnergy of NC, which is analogous to turkey litter used by CPP. Both litter samples are from turkeys with the same or similar feed.

N/M: Not Measured.

Total halogen value for used poultry bedding was converted to a dry weight basis using reported moisture content.