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

OCT 9 2014

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

Mr. Randal G. Oswald
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Dear Mr. Oswald:

In the letters dated August 7, 2013, and November 12, 2013 sent by Mr. Richard Stoll of Foley and Lardner LLP on your behalf, you requested confirmation from the U.S. Environmental Protection Agency (EPA) that Wisconsin Public Service Corporation's (WPSC) combustion of activated coke fines generated from the ReACT™ pollution control system in the boiler unit located at its Westin plant in Wisconsin ("Westin 3") would not constitute combustion of a solid waste under 40 CFR Part 241, but rather constitute a non-waste fuel. Specifically, in the August 7, 2013 letter, you indicated that the combustion of the coke fines was similar to the ash recirculation/reinjection processes and carbon burn-out units at Dominion Power's electricity generating plants since they would be an, "extension of the electricity producing operations. . . . and would not be considered a secondary material until the material exits the process or is otherwise discarded."[1]

The Agency evaluated WPSC's process and determined that WPSC's process is not entirely similar to the process utilized by Dominion Power because the pollution control system or "ReACT™" system which generates the activated coke fines, is a separate process where the primary function is for pollution control and not for fuel optimization and efficiency of the boiler. The activated coke fines exit the ReACT™ system's continuous, closed loop process when they can no longer be used for pollution control (due to size of the coke fines) and enter a storage silo prior to being conveyed as a fuel to the boiler. Thus, we concluded that the activated coke fines produced from the ReACT™ system do not constitute continual processing of (WPSC's) traditional fuel, but are rather a secondary use of the material. However, based upon the information submitted, we communicated that the activated coke fines could be evaluated against the legitimacy criteria to determine whether the activated coke fines are a non-waste fuel.[2]

[1] See http://www.epa.gov/osw/nonhaz/define/pdfs/ash-recirculation-cbo.pdf.
[2] Conference call held October 23, 2013 and letter from Richard Stoll (Foley & Lardner LLP) dated November 12, 2013.

Thus, on November 12, 2013, while you still indicated that the coke fines would not be a solid waste since they remain in a closed-loop process and therefore, have not been discarded, you followed-up with a request for confirmation that the activated coke fines that will be generated from WPSC's ReACT™ system and subsequently combusted as a non-hazardous secondary material (NHSM), are considered a non-waste fuel when burned for energy recovery in combustion units in accordance with the requirements of 40 CFR §241.3(b)(1). To be designated as a non-waste fuel under that section, the rule requires that the NHSM remain within control of the generator as defined by 40 CFR §241.2. Also, the NHSM must meet the legitimacy criteria for fuels in 40 CFR §241.3(d)(1).

Based on the information provided in your November 12, 2013 letter, supporting materials, and follow-up correspondence and conference calls,[3] we believe the activated coke fines remain within control of the generator and meet legitimacy criteria in accordance with 40 CFR 241.3(b)(1) and thus are a non-waste fuel when burned in combustion units.[4] The remainder of this letter provides the basis for our position. *If there is a discrepancy in the information provided to us, it could result in a different interpretation.*

Background

WPSC owns and operates a coal-fired electric generating ("boiler") unit at Weston 3. Pursuant to a consent decree,[5] WPSC is required to install an advanced regenerative activated coke technology that provides for control of SO_2, SO_3, NO_x, mercury, and particulate matter emissions. This system called, ReACT™, is a completely dry scrubbing system that uses activated coke pellets as the primary medium to remove contaminants from the boiler flue gas stream. The pellets are a manufactured product that is derived from coal. The ReACT™ system is not yet operational at Westin 3, however it has been successfully used in at least fourteen commercial units, with the majority located in Japan.

The ReACT™ system involves a three-stage regenerative process: the Adsorption stage, the Regeneration stage, and the By-Product Recovery stage. Activated coke fines are generated as the coke pellets move through the ReACT™ system via two different mechanisms; one mechanism involves the circulation of activated coke pellets through the Adsorption and the Regeneration stages, while the second mechanism involves the addition of new activated coke pellets into an AC Makeup Hopper during the Regeneration stage.

With respect to the first mechanism, during the Adsorption stage, a large quantity of activated coke pellets is introduced into the Adsorber where a moving bed provides contact between the untreated flue gas and the activated coke pellets. The activated coke pellets flow in a top to bottom direction within the Adsorber removing the pollutants. Once at the bottom, the activated coke pellets leave the Adsorber and are moved to the Regenerator vessel. During the Regeneration stage, the activated coke pellets again move in a top to bottom direction while undergoing thermal desorption. After desorption, the activated

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[3] Conference calls held July 17, 2013, February 12, 2014, May 8, 2014 and May 30, 2014. Email dated September 6, 2013 from George Faison to Richard Stoll, Sasha Gerhard, and Jesse Miller. Email dated December 23, 2013 from Richard Stoll to George Faison and Sasha Gerhard. Email dated May 16, 2014 from Sasha Gerhard to Richard Stoll and George Faison.

[4] A non-waste determination under 40 CFR Part 241 does not preempt a state's authority to regulate a non-hazardous secondary material as a solid waste. Non-hazardous secondary materials may be regulated simultaneously as a solid waste by the state, but as a non-waste fuel under 40 CFR Part 241 for the purposes of determining appropriate emissions standards under the Clean Air Act for the combustion unit in which it is used.

[5] *See United States v. Wisconsin Public Service Corp.*, No. 13-C-10, Para.72, Jan. 4, 2013.

coke pellets are cooled and discharged through the Lock Hopper at the bottom end of the Regenerator vessel to a fines Separator (Separator I). The fines Separator removes "used" activated coke material (i.e., "fines") that has been rendered too small for reuse as activated coke pellets. Thus, the mechanical wear of the activated coke pellets as they are circulated through the ReACT™ system is the source of the used activated coke fines. The used activated coke fines exit the system while the recycled activated coke pellets are sent back to the Adsorber.

Regarding the second mechanism, new activated coke pellets are continuously added to the system to supplement the recycled activated coke pellets. The new activated coke pellets are placed into the system's AC Makeup Hopper and then move down into a Seperator (Seperator II) that removes any undersized activated coke material (fines). The "new" activated coke fines generated during the addition are inherently part of every new batch of activated coke pellets. The new activated coke fines exit the system while the new activated coke pellets are sent to the Adsorber.

The activated coke fines (new and used) from both Separator I and Separator II that exit the system are pneumatically and mechanically conveyed, in a closed-loop fashion, through a series of hoppers and dust collectors to the Weston 3 coal silos where they are mixed with the coal for use in the Weston 3 boiler.

Within Control of the Generator

Within control of the generator is defined in 40 CFR §241.2 to mean that the NHSM 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.

In your letters and supporting materials, you state that the activated coke fines are always within an enclosed structure. This is evidenced by your description of the ReACT™ system and a system flow diagram in Exhibit A to the August 7, 2013 letter. Specifically, activated coke fines are generated from the utilization of activated coke pellets within the closed-loop ReACT™ system. As the activated coke fines are generated, they are collected in Separators (I and II) and then pneumatically and mechanically conveyed, in a closed-loop fashion, through a series of hoppers and dust collectors to the Weston 3 coal silos where they are mixed with the coal for use in the Weston 3 boiler. The coal and activated coke fines mixture is then conveyed from the storage silos directly to the Weston 3 boiler.

Based on this description, we agree that the activated coke fines are maintained within the control of the generator and thus meets the definition of *within control of the generator* codified in 40 CFR §241.2.

Legitimacy Criteria

Under 40 CFR §241.3(d)(1), the legitimacy criteria for fuels include: 1) management of the material as a valuable commodity based on the following factors—storage prior to use must not exceed reasonable time frames, and management of the material must be in a manner consistent with an analogous fuel, or where there is no analogous fuel, adequately contained to prevent releases to the environment; 2) the material must have meaningful heating value and be used as a fuel in a combustion unit that recovers

energy; and 3) the material must contain contaminants at levels comparable to or less than those in traditional fuels which the combustion unit is designed to burn.

Manage As a Valuable Commodity

Regarding the first legitimacy criterion, your November 12, 2013 letter states that the activated coke fines will be used/re-used daily. In addition, the activated coke fines are collected continuously during the ReACT™ process, pneumatically and mechanically conveyed in a close-loop fashion, through a series of hoppers and dust collectors and placed into coal storage silos, which is then conveyed to the boiler fueling system and combusted in the boiler. Furthermore, you state that the management of the activated coke fines within such a system is analogous to the controlled use of coal as a fuel.

Based on this information, the activated coke fines are managed as a valuable commodity and storage does not exceed a "reasonable time frame" as discussed in the NHSM final rule (40 CFR §241.3(d)(1)(i)(A).[6]

Meaningful Heating Value and Used As A Fuel to Recover Energy

Regarding the second legitimacy criterion on meaningful heating value, you indicate that, based on testing, the activated coke fines have a heating value of approximately 10,700 Btu/lb (as-fired)[7] and will be used in the Westin 3 boiler unit that will recover energy from the combustion of the fuel. As the Agency has stated in the preamble to the final rule, NHSMs with an energy value greater than 5,000 Btu/pound, as fired, are considered to have a meaningful heating value (see 76 FR 15541, March 21, 2011). Thus, we believe that WPSC's activated coke fines meet the second legitimacy criterion.

Comparability of Contaminant Levels

Regarding the third legitimacy criterion on contaminant levels, your letters and supporting material provided contaminant data on three samples of activated coke fines that have been utilized in a ReACT™ system located at the Isogo coal-fired power plant in Japan.[8] As presented in your supporting materials, you compared contaminant data for Isogo's used activated coke fines to contaminant data for coal as outlined in the "Contaminant Concentrations in Traditional Fuels: Tables for Comparison."

Used activated coke fines were chosen for analysis since they have circulated through the ReACT™ system and may possess contaminants that may not have been completely removed during the regeneration process, whereas unused activated coke fines would not contain (flue gas) contaminants because they have not been in contact with boiler flue gas. Therefore, the used activated coke fines were analyzed to demonstrate that contaminants from all activated coke fines are representative and within the range of coal.

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[6] In the NHSM final rule (76 FR 15520), "reasonable time frame" is not specifically defined as such time frames vary among the large number of non-hazardous secondary materials and industries involved.

[7] The high heating value of coke is attributed to its high carbon content. Typically, coal is heated to high temperatures (1800° F – 2000° F) in the absence of oxygen to drive off volatile compounds, which results in a hard, porous material comprised of carbon and ash. (See http://www.worldcoal.org/coal/uses-of-coal/coal-steel/.)

[8] The Isogo power plant was chosen for comparison due to it having the longest operating history of any large, utility-scale use of ReACT™ technology and its use of a low sulfur coal, similar to that used in Weston 3.

A direct contaminant-to-contaminant comparison, based on the information provided in your supporting materials, is presented in Table 1. Based on this comparison, all contaminants in the activated coke fines are comparable to or lower than those contaminants in coal, with the exception of fluorine. All three samples of activated coke fines contain fluorine values higher than typically found in coal. However, it is anticipated that fluorine values will be considerably lower for the activated coke fines generated by the ReACT™ system at WSPC's Westin 3 for two reasons. First, the system design is slightly different. The Isogo plant utilizes an electrostatic precipitator to pre-treat the boiler flue gas prior to it entering the ReACT™ system, whereas the Westin plant will utilize a fabric filter (baghouse) to pre-treat the boiler flue gas, which results in greater removal efficiency of contaminants, such as fluorine. Second, the data collected and analyzed is representative of activated coke fines generated over an approximately 2 year period rather than on a daily basis. The ReAct™ system is shut down every 18 months to 2 years for maintenance and cleaning. During this time, the Regenerator vessel is cleaned to remove the accumulated activated coke fines residue from the interior walls. As a result, the activated coke fines contain contaminants that have been concentrated due to the adsorption, chemisorption, and catalytic reactions within the Regenerator, over a period of 18 months to 2 years. In consideration of these reasons, as well as information indicating that the activated coke fines from the Regenerator (collected in Separator I) are continuously collected and conveyed to the storage silos,[9] the fluorine concentration of the used activated coke fines is anticipated to be considerably lower than the data presented in Table 1.

Nevertheless, in the absence of actual analytical data from the Westin 3 plant, WPSC submitted data for total halogens to demonstrate that the concentration for total halogens, when compared to the concentration of total halogens in coal, is within the range for total halogens in all instances.

EPA previously stated that for the purposes of contaminant comparisons, it may be appropriate to group contaminants sharing similar physical and chemical properties that influence behavior in the combustion unit prior to the point where emissions occur. Although not included in the Agency's sample approach,[10] grouping of total halogens--chlorine and fluorine--would be appropriate since this group of contaminants shares key physical and chemical properties and would be expected to behave similarly in a combustion unit prior to the point where emissions occur. For example, the halogens chlorine and fluorine are highly reactive and form acid gases when bonded with hydrogen in the combustion chamber.

Table 2 provides data for comparison of total halogens--chlorine and fluorine--in the activated coke fines and coal. The data show that, for this group of contaminants, the range of the totals present in the activated coke fines is within the range found in coal.[11] This conclusion assumes that the activated coke fines were tested for any contaminants expected to be present. Additional contaminants for which the activated coke fines were not tested must, as is the case for those tested, be present at levels comparable to or less than those in coal, based on your knowledge of the material.

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[9] As verified in an email exchange on August 15, 2014 (between Sasha Gerhard, Richard Stoll, and Shelly Heston, consultant for WPSC) the activated coke fines collected from the 18 month - 2 year maintenance and cleaning cycle will not be fed to the Westin 3 boiler, but will be taken offsite via a licensed contractor for disposal in accordance with applicable regulations. Only the activated coke fines continuously collected in the Separators will be fed to the boiler.

[10] See 78 FR 9146.

[11] Although fluorine and chlorine are closely related, fluorine concentrations are significantly higher than chlorine concentrations in the activated coke fines primarily because fluorine is atomically smaller than chlorine and thus, can more readily bind to and/or enter the small surface pores of the activated coke fines and subsequently, be more difficult to remove through the regeneration (thermal desorption) process.

Conclusion

Overall, based on the information provided in your letters and supporting materials, we believe the facts indicate that the activated coke fines meet both the within control of the generator definition and the legitimacy criteria outlined above. Accordingly, we would consider this NHSM a non-waste fuel under the 40 CFR Part 241 regulations.

If you have any other questions, please contact Sasha Gerhard of my staff at 703-347-8964.

Sincerely,

Betsy Devlin, Director
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Enclosures

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Enclosures

Table 1. Contaminant Comparison for Activated Coal Fines

Contaminant	Fuel Contaminant Levels[a]				Coal: Range[b]	Comparison Results
	AC Fines 09/29/2011	AC Fines Sample A 04/01/14	AC Fines Sample B 04/01/2013	Max		
Metal Elements (ppm - dry basis)						
Antimony (Sb)	0.38	1.46	1.47	1.47	ND - 10	Lower than coal
Arsenic (As)	1.4	5.5	5.5	5.5	ND - 174	Lower than coal
Beryllium (Be)	0.7	3.0	3.0	3.0	ND - 206	Lower than coal
Cadmium (Cd)	0.05	0.21	0.22	0.22	ND - 19	Lower than coal
Chromium (Cr)	6.0	24	25	25	ND - 168	Lower than coal
Cobalt (Co)	3.8	14.9	14.9	14.9	ND - 25.2	Lower than coal
Lead (Pb)	5.7	23.6	24.1	24.1	ND - 148	Lower than coal
Manganese (Mn)	17	64	65	65	ND - 512	Lower than coal
Mercury (Hg)	2.47	2.39	2.30	2.47	ND - 3.1	Lower than coal
Nickel (Ni)	7.0	31	30	31	ND - 730	Lower than coal
Selenium (Se)	59.9	65.0	66.2	66.2	ND - 74.3	Lower than coal
Non-metal Elements (ppm - dry basis)						
Chlorine (Cl)	771	851	874	874	ND - 9080	Lower than coal
Fluorine (F)	4870	4410	4160	4870	ND - 178	All samples higher
Nitrogen (N)	53200	53100	53000	53200	13600 - 54000	Lower than coal
Sulfur (S)	12600	13000	12800	13000	740 - 61300	Lower than coal

Notes:

a. Data provided by Wisconsin Public Service Corp (WPSC).

b. Data for coal from a combination of EPA data and literature sources, as presented in EPA document *Contaminant Concentrations in Traditional Fuels: Table for Comparison, November 29, 2011*, available at www.epa.gov/epawaste/nonhaz/define/index.htm.

Table 2. Contaminant Comparison, Total Halogens Group

Halogen	Units	Range	
		AC Fines	Coal[a]
Chlorine	Ppm	771 - 874	ND - 9,080
Fluorine	Ppm	4160 - 4870	ND - 178
Total Halogens[b]	**Ppm**	**5034 - 5641**	**ND - 9,080**

Notes:

a. Data for coal 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.

b. 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.