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

MAY 25 2011

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OFFICE OF
AIR AND RADIATION

Re: CAIR Applicability Determination for Georgia Pacific Corporation, Broadway Paper Mill, Boiler B25 located in Green Bay, Wisconsin

Dear Mr. Wolff:

This letter is EPA's determination of applicability under the EPA-administered trading programs under the Clean Air Interstate Rule (CAIR) and the CAIR Federal Implementation Plans (FIPs), for Georgia Pacific Corporation's (Georgia Pacific) Broadway Paper Mill Boiler B25 in Green Bay, Wisconsin.[1] This applicability determination is in response to Georgia Pacific's June 1, 2007 request for an applicability determination for Boiler B25 under the CAIR trading programs and supplemental information provided by Georgia Pacific on August 23, October 18, and November 1, 2007, February 13, April 4, and June 24, 2008, December 11, 2009, and March 23, April 22, and November 23, 2010 and February 4, 2011.[2]

Background

Under the CAIR trading programs for NOx annual and ozone season and SO_2 emissions, a unit that is a "stationary, fossil-fuel-fired boiler or a stationary, fossil-fuel-fired combustion turbine serving at any time, since the later of November 15, 1990 or the start-up of the unit's combustion chamber, a generator with nameplate capacity of more than 25 MWe producing electricity for sale" is generally a CAIR NOx, CAIR SO_2, and CAIR NOx Ozone Season unit subject to the requirements of the trading programs. 40 CFR 97.104(a) (1), 97.204(a) (1), and

[1] On October 16, 2007, EPA approved Wisconsin's State Implementation Plan (SIP) in part and disapproved in part. 72 Fed. Reg. 58542 (Oct. 16, 2007). By its approval of the SIP as an abbreviated SIP, EPA approved the methodology to be used to allocate NOx annual and ozone season allowances under the CAIR FIPs, except for allowances in the compliance supplement pool. The CAIR FIPs, with these approved modifications, are applicable to Wisconsin sources.

[2] Georgia Pacific also submitted several petitions under 40 CFR 97.175 and 97.375 requesting extensions of time for meeting the requirements, under the CAIR FIPs, that Georgia Pacific install and certify continuous emission monitoring systems (CEMS) at Boiler 25. EPA's latest approval of such a petition was on September 30, 2010.

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97.304(a) (1). However, certain units meeting these criteria are exempt from being CAIR NOx, CAIR SO_2, or CAIR NOx Ozone Season units. For example, any unit meeting the following criteria is exempt from the CAIR trading programs:

> (A) Qualifying as a cogeneration unit during the 12-month period starting on the date the unit first produces electricity and continuing to qualify as a cogeneration unit; and
>
> (B) Not serving at any time, since the later of November 15, 1990 or the start-up of the unit's combustion chamber, a generator with nameplate capacity of more than 25 MWe supplying in any calendar year more than one-third of the unit's potential electric output capacity or 219,000 MWh, whichever is greater, to any utility power distribution system for sale.

40 CFR 97.104(b)(1)(i), 97.204(b)(1)(i), and 97.304(b)(1)(i). (These provisions are generally referred to as the "cogeneration unit" exemption.)

Under CAIR a cogeneration unit is defined as:

> a stationary, fossil-fuel-fired boiler or stationary, fossil-fuel-fired combustion turbine:
>
> (1) Having equipment used to produce electricity and useful thermal energy for industrial or commercial, heating, or cooling purposes through the sequential use of energy; and
>
> (2) Producing during the 12-month period starting on the date the unit first produces electricity and during any calendar year after the calendar year in which the unit first produces electricity –
>
> (i) For a topping-cycle cogeneration unit,
>
> (A) Useful thermal energy not less than 5 percent of total energy output; and
>
> (B) Useful power that, when added to one-half of useful thermal energy produced, is not less then 42.5 percent of total energy input, if useful thermal energy produced is 15 percent or more of total energy output, or not less than 45 percent of total energy input, if useful thermal energy produced is less than 15 percent of total energy output.
>
> (ii) For a bottoming-cycle cogeneration unit, useful power not less than 45 percent of total energy input;
>
> (3) Provided that the total energy input under paragraphs (2)(i)(B) and (2)(ii) of this definition shall equal the unit's total energy input from all fuel except biomass if the unit is a boiler.

See 40 CFR 97.102, 97.202, and 97.302 (definition of "cogeneration unit").

Georgia Pacific operates five coal-fired boilers at the Broadway Paper Mill, Boilers B25, B26, B27, B28, and B29 with maximum design heat input capacities of 200 mmBtu/hr, 350 mmBtu/hr, 615 mmBtu/hr, 250 mmBtu/hr, and 486 mmBtu/hr respectively. These boilers provide steam to a common header, which distributes steam (at 400 psi) to the mill processes and to five steam turbine/ generator combinations with nameplate capacities of 10.0, 17.3, 18.7, 28.9,

43.2, and 28.2 MWe respectively, from which steam is drawn at several different points and pressures (e.g., at 35, 135, and 400 psi) and distributed to the mill for processes and heating and which produce electricity. See August 23, 2007, June 24, 2008, December 11, 2009, and November 23, 2010 supplemental information. According to Georgia-Pacific, the Broadway Paper Mill initially used its on-site boilers to produce only steam and met all on-site processing and heating needs but, since at least 1954, used some of the steam to generate electricity, as well, for on-site use. Since at least 1980, on-site boilers have met all of the mill's steam and electricity needs. See November 23, 2010 supplemental information (response 1). In 1990, the mill began supplying some of the generated electricity for sale, through a 10,000 kW tie line, to a utility distribution system, i.e., a portion of an electricity grid owned or operated by a utility (Wisconsin Public Service Corporation). The capacity of the tie line was increased to 25,000 kW in 1999. See id. (response 2); and 40 CFR 97.102, 97.202, and 97.302 (definition of "utility power distribution system").

According to Georgia Pacific, each of the five boilers produces electricity and useful thermal energy for industrial purposes through sequential use of energy and is a topping-cycle unit. See 40 CFR 97.102, 97.202, and 97.302 (definitions of "cogeneration unit" and "topping cycle cogeneration unit"). Further, Georgia Pacific asserted that the overall efficiency of the system of on-site boilers and steam turbine/generators (all of which are on a common steam header) meets the efficiency requirement, and that the system and each individual boiler meet the sales limitation requirement, for the exemption from the CAIR trading programs for cogeneration units under 40 CFR 97.104(b)(1)(i), 97.204(b)(1)(i), and 97.304(b)(1)(i).

Georgia Pacific provided calculations for 2005 through 2009 that used the steam contribution (in mmBtus) measured at each of the five boilers as a percentage of total steam contribution by the group of all five boilers to apportion to each individual boiler the total useful power and total useful thermal energy produced by the system (i.e., five boilers serving five steam turbine/generators). In its calculations, Georgia Pacific also used fuel sampling data on the heat input per ton for the types of coal combusted in the boilers and data on the tons of coal combusted in each boiler to calculate annual energy input for each boiler. Georgia Pacific then calculated annual efficiency for each individual boiler by adding the useful power produced to one-half of the useful thermal energy produced and dividing the result by the energy input. Based on this calculation, all the boilers except Boiler B25 met the efficiency requirement for the cogeneration unit exemption. Georgia Pacific also calculated annual efficiency for the entire system by adding total useful power produced by the system to one-half of total useful thermal energy produced by the system and dividing the result by total energy input for the system. Based on that calculation, the entire system, and thus all five boilers in the system, met the efficiency requirement. See August 23, 2007 and April 22, 2010 supplemental information.

According to Georgia Pacific, calculating the efficiency of each boiler or the efficiency of the system requires the calculation of useful thermal energy produced, which, in turn, requires data on the amounts and pressure of the steam provided from the boilers and the steam turbine/ generators for mill processing and heating. Georgia Pacific stated that it does not have data on steam drawn before 2005 from the steam turbine/generators and that therefore it is unable to

produce even "reasonable estimates" of the efficiency of the boilers before 2005. March 23, 2010 supplemental information; see also November 23, 2010 supplemental information. According Georgia-Pacific, the total amount of useful thermal energy provided from the boilers and steam turbine/generators was higher before 2005 because of steam reduction projects that starting in 2005 reduced the steam processing needs of the mill. Id.

Georgia Pacific requested that, using one of the following approaches, EPA determine that Boiler B25 is not subject to the CAIR trading programs:

1) Approve use of the overall annual efficiency of the system at the Broadway Paper Mill, comprising all five boilers on a common steam header that serves five turbine/generator combinations and supplies process steam, to determine whether Boiler B25 and the other boilers qualify for the exemption for cogeneration units under the CAIR trading programs; or

2) Establishing, and applying to Boiler B25, a new exemption from the CAIR trading programs for boilers serving a common header that are incapable of individually providing enough steam to a steam turbine/generator combination to generate at least 25 MWe without additional steam from some other unit or source.[3]

EPA's Determination

As discussed above, according to Georgia Pacific, each of the five boilers at the Broadway Paper Mill serves at least one generator with a nameplate capacity greater than 25 MWe producing electricity for sale. Each boiler is therefore subject to the CAIR trading programs unless it qualifies for the cogeneration unit exemption. See 40 CFR 97.104(a)(1) and (b)(1)(i), 97.204(a)(1) and (b)(1)(i), and 97.304(a)(1) and (b)(1)(i). As discussed above, in order to be a cogeneration unit, each boiler must -- during the 12-month period starting on the date the boiler first produces electricity and thereafter -- have the equipment to produce electricity, and useful thermal energy for industrial or commercial, heating, or cooling purposes, through sequential use of energy. Further, because each boiler is a topping-cycle unit in that it produces first electricity and then useful thermal energy[4], the remaining requirements for qualification for

[3] In its request, Georgia Pacific only requested a determination of applicability of the CAIR NOx annual and NOx ozone season trading programs, ostensibly because the initial control periods for these programs are in 2009 while the initial control period for the CAIR SO_2 trading program is in 2010. However, the applicability provisions relevant to Boiler 25, and the provisions for cogeneration units in particular, are identical in all three trading programs. Accordingly, if a unit qualifies for the exemption for certain cogeneration units under any of these trading programs, the unit qualifies for the exemption under all three trading programs. EPA is therefore extending, sua sponte, its applicability determination for Boiler 25 to cover all three CAIR trading programs.

the cogeneration unit exemption concerning the five boilers are that: (i) during the 12-month period starting on the date the boiler first produced electricity and each calendar year thereafter, useful thermal energy equal not less than 5 percent of total energy output and useful power that, when added to one-half of useful thermal energy produced, equal not less than 42.5 percent of total energy input; and (ii) starting November 15, 1990, the generators served by the boilers not produce more than one-third of the unit's potential electric output capacity or 219,000 MWh, whichever is greater, to any utility power distribution system for sale.

EPA determines that -- based on boiler performance data for 2005 through 2009 and electricity sales data from 1999 through 2009 and conditioned on the accuracy and completeness of certain assumptions about boiler performance before 2005 -- Boiler B25 qualifies for the cogeneration unit exemption, and is not covered by the CAIR trading programs, up through 2009. Further, EPA concludes that a new exemption (i.e., for any boiler that cannot produce enough steam to generate more than 25 MWe without additional steam from another unit) from the CAIR trading programs cannot be established, through this applicability determination.

A. Cogeneration Unit Exemption

As discussed above, in order to be a cogeneration unit, a unit must be fossil-fuel-fired and -- during the 12-month period starting on the date the unit first produces electricity and thereafter -- have the equipment to produce electricity, and useful thermal energy for industrial or commercial, heating, or cooling purposes, through sequential use of energy. Georgia Pacific stated that it believes that each of the boilers at the Broadway Paper Mill was designed for cogeneration and has been consistently used as a cogeneration unit since installation of the steamturbine/ generators in to order provide steam and electricity for the mill. See November 23, 2010 supplemental information (response 5).

Moreover, EPA's requirement that a unit has equipment to produce electricity and useful thermal energy using sequential use of energy is analogous to the sequential-use-of-energy requirement in the definition of "cogeneration facility" adopted by the Federal Energy Regulatory Commission (FERC) and reflected in FERC's decisions about whether facilities are "qualifying cogeneration facilities". Compare 40 CFR 97.102, 97.202, and 97.302 (paragraph (2)(k) for the definition of "cogeneration unit") with 18 CFR 292.202(c) (definition of "cogeneration facility). Applying the same criterion as EPA of sequential use of energy to produce electricity and useful thermal energy (as well as other ownership, operating, and efficiency requirements), FERC approved certification of the Broadway mill (then owned by Fort Howard Corporation) as a qualifying cogeneration facility on June 8, 1990. See Fort Howard Corp., Small Power Production and Cogeneration Facilities -- Qualifying Status, 51 FERC ¶62,223 (Je. 8, 1990) (holding that the mill, then comprising 6 boilers and 9 steam turbine/generators, was a "topping-cycle cogeneration facility"). There is no indication that this certification was ever subsequently terminated. For the period before the issuance of FERC's certification approval, EPA assumes, based on the information provided by Georgia Pacific and

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[4] See 40 CFR 97.102, 97.202, and 97.302 (definitions of "topping cycle cogeneration unit").

solely for purposes of this determination, that each boiler at the Broadway Paper Mill has consistently operated as a cogeneration unit since the boiler's commencement of electricity generation up to the issuance date of the FERC approval.

In addition, a unit that is a topping-cycle unit, like Boiler B25, must -- during the 12-month period starting on the date the unit first produces electricity and each calendar year thereafter -- meet the requirement of producing useful thermal energy equal to not less than 5 percent of total energy output and producing useful power that, when added to one-half of useful thermal energy produced, equal at least 42.5 percent of total energy input.

Georgia Pacific provided data for 2005 through 2009, during which period all five boilers operated, except for Boiler B25 in 2009. That data indicated that, for each year, both the system (including five boilers and five turbine/generator combinations) and each boiler alone -- except Boiler B25 in 2009 -- produced useful thermal energy well in excess of the minimum of 5 percent of total energy output, i.e., ranging from 49.1 to 53.9 % on a system wide basis and from 48.8 to 56.7 % on an individual-boiler basis. The data also indicated that, for each year, the system produced useful power that, when added to one-half of useful thermal energy produced by the system, was in excess of the minimum of 42.5 percent of total energy input for the system, i.e., ranging from 47.4 % to 48.4 %. Further, the data showed that Boiler B25 alone did not meet this latter efficiency requirement on an individual-boiler basis, having an efficiency of 36 % for 2005, 34.1 % for 2006, 37.1 % for 2007, and 35.2% for 2008 and no efficiency percentage value for 2009, when the unit did not operate. See August 23, 2007 and April 22, 2010 supplemental information.

EPA has reviewed Georgia Pacific's efficiency calculations for the units at the Broadway Paper Mill. Based on this review, EPA finds that, given the configuration and operational conditions unique to the Broadway Paper Mill, i.e., where five boilers feed five turbine/generators through a common header, one boiler is used as a swing boiler to reduce the effects of variability of load and capacity availability on the other boilers, process steam is extracted from the common header and from the five turbines, and the turbines power five electricity generators, it is not feasible to calculate, with any reasonable accuracy, the individual boiler efficiencies for this facility.

The accuracy of the efficiency calculation for Boiler B25 depends on the ability to accurately calculate the efficiency of that boiler separately from the efficiency of the other boilers in the system. As explained by Georgia Pacific, Boilers B27 and B29 are used as base load units for steam demand at the Broadway Mill, and the use of Boilers B26 and B28 is adjusted to follow steam demand. However, Boiler B25 is the first boiler whose use is adjusted to steam demand changes and boiler maintenance outages, i.e., is used as a swing boiler to address variability in steam demand and availability of steam production capacity. In those circumstances, Boiler B25 is used in lieu of or before starting up one of the other larger boilers. Between scheduled outages in the spring, Boiler B25 is generally kept in operation to avoid mechanical problems associated with cycling the boiler. The net result of this type of boiler use is that Boiler B25 has more frequent startups and shutdowns, and shorter run periods, than the

other boilers. See July 1, 2007 request; and June 24, 2008 supplemental information. Because a boiler tends to be less efficient during startup and shutdown and more efficient when operating for periods of time at a relatively constant load, Boiler B25's calculated efficiency is lower than that of the other boilers in the system, but, by operating in this less efficient mode, Boiler 25 enables the other boilers generally to operate more efficiently.[5] Id.; see also Wayne, C. Turner, Energy Management Handbook at 109 (5th ed. 2005) (explaining that "boilers generally operate most efficiently at 65 to 85% full-load rating", "[n]ewer units and units with higher capacity are generally more efficient than are older, smaller units", and "[g]enerally, steam plant load swings should be taken in the smallest and least efficient unit"). In short, calculating the efficiency of Boiler B25 alone ignores the effect of Boiler B25 on the efficiency of the other boilers and thereby effectively understates the efficiency that results from operating Boiler B25.

For this reason, EPA finds that it is not feasible to calculate, with any reasonable accuracy, the individual boiler efficiencies for this facility and that, for 2005 through 2009, all five boilers, viewed together, met the efficiency requirements for cogeneration units. Georgia Pacific stated that it believes that the boilers were operated in essentially the same manner before 2005 (i.e., as cogeneration units for providing steam and heating, and, starting at least in 1984, electricity, for the mill) as during and after 2005. See November 23, 2010 supplemental information (response 5). Under these circumstances, with regard to each year from boiler start-up through 2004, EPA assumes, solely for purposes of this determination, that the boilers at the Broadway Paper Mill have been operated in generally the same manner as they are currently operated and that the boilers, viewed together, have met the efficiency and operating requirements for a cogeneration unit. See 40 CFR 97.102, 97.202, and 97.302 (setting forth, paragraphs (2)(i)(A) and (B), standards for topping-cycle units in definition of "cogeneration unit").

In addition, EPA finds that the electricity sales limit applicable to Boiler B25 in order to qualify for the cogeneration unit exemption is 219,000 MWh because that figure is higher than one-third of the unit's potential electric output capacity. Based on Boiler B25's maximum design heat input of 200 mmBtu/hr, one-third of the unit's potential electric output capacity is 56,940 MWh,[6] which is not greater than 219,000 MWh. Georgia Pacific explained that, until

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[5] However, the full impact of Boiler B25 on the other boilers' efficiency is somewhat more complex. According to Georgia Pacific, when Boiler B25 is used instead of increasing load at Boilers B26 and B28, the load, and thus the efficiency, of the latter two boilers at those times is somewhat lower. See June 24 supplemental information. Determining the efficiency of all five boilers together allows for such efficiency interactions to be reflected in the efficiency determination.

[6] Potential electrical output capacity for a unit is calculated by dividing the maximum design heat input capacity in Btu/hr of the unit by 3 (reflecting the assumed efficiency of the unit), dividing again by 3,413 (reflecting the assumed heat rate), dividing again by 1,000 (converting to MWe), and multiplying by 8,760 (hours per year). See 40 CFR 97.102, 97.202, and 97.302 (definition of "potential electrical output capacity").

1999, the Broadway Paper Mill had a 10,000 kW utility tie line, which, even if used every hour to its maximum capacity, could not carry more than about 88,000 KWh per year. While the utility tie line capacity was increased to 25,000 kW in 1999, Georgia Pacific provided data on electricity sales for the Broadway Paper Mill for 1999 through 2009. According to Georgia Pacific, total annual electricity sold during 1999 through 2009 never exceeded 219,000 MWh and generally was significantly lower, ranging from less than 1% to about 21 %. November 23, 2010 supplemental information. Boiler B25's proportional share of the total annual electricity generation by the five generators was, of course, less than the total generation sold by the facility and comprised an even lower percentage of the 219,000 MWe sales limit.[7]

EPA therefore concludes that, up through 2009 and conditioned on the accuracy of the assumptions about the Broadway Paper Mill's boiler operation before June 8, 1990, Boiler B25 at Georgia Pacific's Broadway Paper Mill qualifies as a cogeneration unit and meets the requirements for the cogeneration unit exemption from the CAIR trading programs. Because EPA has no data on operations and electricity sales for the Broadway Paper Mill for 2010 and later, EPA is not determining whether Boiler B25 is exempt for any year after 2009.

B. Exemption for Low Capacity Boilers

Georgia Pacific requested that EPA consider alternate rule language exempting small boilers that are incapable of providing enough steam on their own to support a 25 MWe steam turbine/generator combination (Georgia Pacific's method 2). EPA rejects this argument because 40 CFR 97.104, 97.204, and 97.304 specifically state that CAIR applies to fossil-fuel fired boilers that serve a generator over 25 MWe are CAIR units. The CAIR applicability provisions do not differentiate between single boilers or groups of boilers serving the generator over 25 MWe nor do they make any distinctions based on the boiler capacity or steam output.

Further, EPA considers Georgia Pacific's argument as a request that the Agency amend the CAIR FIP, to create a new exemption from the CAIR requirements. First, EPA promulgated the CAIR FIP as a final rule on April 28, 2006, after providing public hearing and opportunity for submission of comments, as a final rule on April 28, 2006. EPA cannot, in the context of applying the applicability provisions of the EPA-administered trading programs (including the CAIR FIP trading programs) amend the applicability provisions of the CAIR FIP to create new exemptions. The time for parties to request new exemptions was during the rulemaking process for the CAIR FIP, thus affording all interested parties where parties requesting or opposing new exemptions would have had the opportunity to comment.

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[7] In applying the electricity sales limit, EPA interprets the limit as applying to the total amount of electricity produced by all generators served by the unit -- whether the unit serves one generator or multiple generators -- and attributable to the steam produced by the unit for such generators. Otherwise, a unit providing steam to multiple generators would have a different electricity sales limit than a unit with the same maximum design heat input capacity providing the same amount of steam but to only one generator.

Second, under CAIR, a State that wants to participate in the EPA-administered trading programs must adopt rules that -- except for a few, allowed differences -- are substantively identical to the CAIR model rules. Those model rules include the applicability provisions (in 40 CFR 96.104, 96.204, and 96.304) that lack an exemption for non-cogeneration units based on unit size. See, 40 CFR 51.123(o)(2) and (aa)(2) and 51.124(o)(2). The differences that States participating in the EPA-administered trading programs are allowed to adopt in CAIR SIPs do not include the creation of small unit exemptions from the applicability provisions. See 40 CFR 51.123(o)(2) and (aa)(2) and 51.124(o)(2). Therefore, under CAIR, Wisconsin cannot create a new small unit exemption through a CAIR SIP revision and still participate in the EPA-administered trading programs.

NODA Objection

On August 4, 2006, EPA published a Notice of Data Availability for EGU NOx Annual and NOx Ozone Season Allocations for the Clean Air Interstate Rule Federal Implementation Plan Trading Programs (NODA) (71 FR 44283 (Aug. 4, 2006)). The NODA did not provide any allowance allocations for Boiler 25. Georgia Pacific stated that it objected to the lack of allocations if EPA determined that the unit was subject to the CAIR trading programs. Because EPA has determined that Boiler B25 meets the cogeneration unit exemption up through 2009 for reasons explained above, Georgia Pacific's objection to the NODA is moot.

Conclusion

EPA's determination is conditioned on the above-described assumptions about the Broadway Paper Mill's boiler operation and relies on the accuracy and completeness of the information provided by Georgia Pacific in the June 1, 2007 request for an applicability determination for Boiler B25 under the CAIR trading programs and supplemental submissions by Georgia Pacific on August 23, October 18, and November 1, 2007, February 13, April 4, and June 24, 2008, December 11, 2009, and March 23, April 22, and November 23, 2010 and February 4, 2011. The determination is appealable under 40 CFR part 78. If you have any questions regarding this determination, please contact Louis Nichols at (202) 343-9008. Thank you for your continued cooperation.

Sincerely,

Sam Napolitano, Director
Clean Air Markets Division

cc: Constantine Blathras, EPA Region 5
Andy Seeber, WDNR