



U.S. Environmental Protection Agency Applicability Determination Index

Control Number: 0700003

Category: NSPS
 EPA Office: Region 4
 Date: 10/04/2006
 Title: Wood Gasification Systems
 Recipient: Reece, Myra
 Author: Banister, Beverly H.
 Comments:

Part 60, Db	Indust.-Comm.-Inst. Steam Gen. Units	
	Dc	Small Indust.-Comm.-Inst. Steam Gen. Units

References:	60.40c(a) 60.41c
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Abstract:

Q: Are wood gasification systems at Norbord South Carolina, Inc., in Kinards, South Carolina and the University of South Carolina in Columbia, South Carolina, subject to 40 CFR part 60, subparts Db or Dc? The wood gasification systems will consist of wood gasifiers that produce synthetic gas, followed by secondary combustion chambers which combust the synthetic gas. Exhaust from the secondary combustion chambers will be used in steam generating boilers (and in a hot oil generator for one unit).

A: Yes. EPA finds that each secondary combustion chamber in combination with a steam boiler (and hot oil generator for one unit) is a steam generating unit affected facility. NSPS subpart Dc applies to steam generating units with a heat input capacity of 100 mmBtu/hr or less, but greater than or equal to 10 mmBtu/hr. NSPS subpart Db applies to steam generating units with a heat input capacity greater than 100 mmBtu/hr.

Letter:

4APT-ATMB

Ms. Myra Reece
 Chief
 Bureau of Air Quality Control
 South Carolina Department of Health
 and Environmental Control
 2600 Bull Street
 Columbia, SC 29201

Dear Ms. Reece:

We have received a request from Ms. Veronica Barringer of your staff for determinations concerning 40 CFR Part 60, New Source Performance Standards (NSPS), Subpart Dc "Standards of Performance for

Small Industrial-Commercial-Institutional Steam Generating Units" and 40 CFR Part 63, Subpart DDDDD "National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Industrial, Commercial, and Institutional Boilers and Process Heaters." The request relates to wood gasification systems at Norbord South Carolina, Inc., in Kinards, South Carolina and the University of South Carolina (USC) in Columbia, South Carolina.

We have determined that components of both of the operations are steam generating units which are subject to NSPS Subpart Dc or Subpart Db. Subpart Dc applies to steam generating units with a heat input capacity of 100 mmBtu/hr or less, but greater than or equal to 10 mmBtu/hr. Subpart Db is applicable to steam generating units with a heat input capacity greater than 100 mmBtu/hr. To determine which standard (NSPS Subpart Db or Dc) applies to the steam generating units, the maximum design heat input capacity of the steam generating units will need to be determined. Norbord South Carolina, Inc. is a major source of hazardous air pollutants (HAPs) and is also subject to NESHAP Subpart DDDDD. Since issues concerning the applicability of NESHAP Subpart DDDDD have not been resolved, a separate applicability determination will be provided to the State at a later date concerning that standard. If you have questions concerning the status of the NESHAP Subpart DDDDD determination, please contact Mr. Joydeb Majumder of the Environmental Protection Agency (EPA) Region 4 staff at (404) 562-9121. Descriptions of the Norbord South Carolina and USC facilities and a response to the State's questions regarding the applicability of NSPS Subparts Db and Dc are provided below.

Norbord South Carolina, Inc.

As indicated in the State's request, Norbord operates three rotary gasifier burner/oxidizer systems, which are described as having a rated capacity of 98 mmBtu/hr each. Each system uses natural gas and waste wood to generate steam and hot oil that are used in an oriented strand board manufacturing process. Each unit consists of a rotary kiln wood gasifier, a secondary combustion chamber (SCC), a saturated steam boiler, a hot oil generator (for one unit only), a multiclone and an induced draft (ID) fan. The exhaust of each ID fan is directed to a common electrostatic precipitator (ESP) and then to a single common stack, where opacity is monitored continuously. Additionally, a portion of the exhaust gas from each ID fan can be recycled and returned to the respective SCC. Each rotary kiln wood gasifier generates a combustible gas stream (synthetic gas) from wood waste. Each gasifier has a natural gas burner which is used mostly during start-up to initiate the gasification process. The synthetic gas produced by the gasifiers and natural gas are combusted in vertical secondary combustion chambers. Volatile organic compound (VOC) -laden process air (i.e., off-gases from three conveyor dryers) is also routed to the SCCs for oxidization. The exhaust gases from the secondary combustion chambers are routed to their respective steam boiler (and hot oil generator for one unit).

The State has questioned the applicability of NSPS Subpart Dc for the above operation, and has referenced a February 16, 2000, determination from EPA Region 6 concerning a similar wood gasification system. As indicated in 60.40c(a), the affected facility to which Subpart Dc applies is a steam generating unit that has a maximum design heat input capacity of 100 mmBtu/hr or less, but greater than or equal to 10 mmBtu/hr. A "steam generating unit" is defined in 60.41c as a device that combusts any fuel and produces steam or heats water or any other heat transfer medium. The term includes any duct burner that combusts fuel and is part of a combined cycle system, but does not include process heaters. A "process heater" is defined in the standard as a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst. A "heat transfer medium" is defined in the standard as any material that is used to transfer heat from one point to another point.

Based on the description provided, two types of combustion units (the gasifiers and the SCCs) exist in the process. The gasifiers are used to heat wood waste to produce synthetic gas, which is then combusted in the SCCs. Since there is no indication that a heat transfer medium is used in the operation of the gasifiers, the three gasifiers at Norbord are not steam generating units and are not regulated by NSPS. In the process used by Norbord, each SCC in combination with a steam boiler (and hot oil generator for one unit) is a steam generating unit. The three SCCs combust natural gas and synthetic gas produced from wood waste to produce steam, which is a heat transfer medium. It has previously been determined by the EPA that the combustion and heat transfer zones of a steam generating unit may be contained in different pieces of equipment, as in the Norbord system (i.e., one device combusts fuel and the other produces steam from the exhaust gases of the first device).

While the State's request relates to the applicability of NSPS Subpart Dc, the applicability of Subpart Db also needs to be evaluated. Subpart Db applies to steam generating units with a heat input capacity greater than 100 mmBtu/hr. The term "heat input" is defined in Subparts Db and Dc as heat derived from combustion of fuel in a steam generating unit and does not include the heat derived from preheated combustion air, recirculated flue gases, or exhaust gases from other sources (such as stationary gas turbines, internal combustion engines, and kilns). The State has provided to us a February 7, 2002, letter from Norbord which discusses the applicability of NSPS. The letter indicates there are two sources of heat in the SCCs which meet the definition of "heat input." These sources include the combustion of wood-derived fuel (synthetic gas) and the combustion of natural gas. The design heat input capacity for each of the SCCs from these fuel sources is reported by Norbord in a February 7, 2002, letter to be 83.2 mmBtu/hr. This value of 83.2 mmBtu/hr is the average heat input during three performance test runs conducted on two of the three gasifier/SCC systems. The average total heat input for the two SCC units operated during the tests was reported as 166.4 mmBtu/hr, so the average for the two SCC units was reported to be 83.2 mmBtu/hr. We agree with Norbord that the heat input to the SCCs from the exhaust of the conveyor dryers is not included in the heat input of the SCCs. However, the heat input from the combustion of VOCs in the exhaust from conveyor dryers must be included when determining the design heat input of the SCCs. While the process description provided in the State's determination request indicates that each system has a rated capacity of 98 mmBtu/hr, there is no explanation concerning the basis of this quantity or how it relates to the two combustion sources in each system (the gasifiers and the SCCs).

The maximum design heat input capacity, the criteria for determining applicability of NSPS Subparts Db or Dc, is defined in those standards as the ability of a steam generating unit to combust a stated maximum amount of fuel (or combination of fuels) on a steady state basis, as determined by the physical design and characteristics of the steam generating unit. In order for the State to determine whether the three SCCs at Norbord are subject to NSPS Subpart Db or Subpart Dc, the company will need to provide information from the manufacturer of the units to verify the maximum design heat input capacity of each SCC. The average value of the heat input reported by Norbord does not confirm that the SCCs do not have a maximum design heat input capacity which is greater than 100 mmBtu/hr, the applicability threshold for Subpart Db. The maximum design heat input capacity is based on the physical design and characteristics of a steam generating and is not the maximum rate a steam generating unit is intended to be operated. Therefore, it is not possible to limit the maximum design heat input capacity by accepting a permit limit on the rate of operation of the steam generating unit or a limit on the amount of fuel which may be combusted.

The synthetic gas produced in the gasifiers and combusted in the SCCs at Norbord is considered wood under Subparts Db and Dc. "Wood" is defined in both NSPS Subparts Db and Dc as wood, wood residue, bark, or any derivative fuel or residue thereof, in any form, including but not limited to sawdust, sanderdust, wood chips, scraps, slabs, millings, shavings, and processed pellets made from wood or other forest residues. Since the SCCs combust natural gas and wood, they will be subject to emission standards applicable to the combustion of those fuels.

University of South Carolina (USC)

As described in the State's request, USC has submitted a permit application to construct a new biomass gasification system which will consist of three 36 mmBtu/hr gasifiers. Each gasifier will include a 5 mmBtu/hr natural gas fired burner which will be used during startup in order to warm the refractory and oxidizer in a controlled manner to prevent damage to the system. The gasifiers will be operated using biomass, consisting of untreated wood waste only, and will generate synthetic gas under an oxygen-deprived environment. The synthetic gas produced in the three gasifiers will be transported to a single oxidizer where it will undergo complete combustion. The flue gas from the oxidizer will be used in a steam generating boiler to generate steam for the operation of a steam turbine. The State has requested a determination as to whether NSPS Subpart Dc will apply to the process and a determination concerning which emission standards will apply.

The USC operation is similar to the Norbord system, in that two types of combustion units will be used. The gasifiers are used to heat wood waste to produce synthetic gas, which is then combusted in an oxidizer to produce steam (a heat transfer medium) in a steam generating boiler. Similar to the Norbord process, the gasifiers are not steam generating units since there is no indication that a heat transfer medium is used in their operation. The oxidizer in combination with the steam boiler in the USC process will be a steam generating unit affected facility under Subpart Dc, provided the heat input

capacity is 100 mmBtu/hr or less, and greater than or equal to 10 mmBtu/hr. The USC process description submitted to us does not specify the maximum design heat input capacity of the oxidizer and does not indicate if any fuels other than synthetic gas are combusted in the oxidizer, as they are in the Norbord system. The discussion provided in this letter concerning the heat input of the SCCs in the Norbord system also applies to the oxidizer in the USC system. Ms. Barringer has provided to us a statement from Nexterra Energy Corporation, the manufacturer of the USC gasification system, indicating the maximum rate at which synthetic gas will be combusted in the oxidizer is 76 mmBtu/hr. If this value is also the maximum design heat input capacity of the oxidizer, the oxidizer will be subject to NSPS Subpart Dc. If the reported heat input value of 76 mmBtu/hr is the maximum rate the oxidizer is expected to be operated and the maximum design heat input capacity is greater than 100 mmBtu/hr, the oxidizer will be subject to NSPS Subpart Db. As with the Norbord gasification system, the combustion of synthetic gas produced from wood will be subject to emission limits applicable to wood combustion in either Subpart Db or Dc.

This response has been coordinated with the EPA's Office of Enforcement and Compliance Assurance (OECA). If there are any questions regarding this letter, please contact Mr. Keith Goff of the Region 4 staff at (404) 562-9137.

Sincerely,

Beverly H. Banister
Director
Air, Pesticides, and Toxics
Management Division

cc: Veronica Barringer, South Carolina
Department of Health and Environmental Control
Greg Fried, EPA Office of Enforcement
and Compliance Assurance