

Applicability of New Source Performance Standard (NSPS), Subpart Db to a Thermal Oxidizer/Waste Heat-Recovery Boiler at an Ethanol Production Facility Guidance

A recent EPA memo (following pages) indicates thermal oxidizers and waste heat boilers used at ethanol plants are subject to New Source Performance Standards (NSPS) Subpart Db which regulates and establishes emissions standards for "Industrial, Commercial and Institutional Steam Generating Units."

The recent EPA decision was made for Badger State Ethanol in Monroe, WI, where a thermal oxidizer installation is planned. The 125 million Btu/hr, natural gas fired unit will control volatile organic emissions from a grain dryer. Waste heat will be recovered via a waste heat boiler.

NSPS Subpart Db applies to units built, modified, or reconstructed after June 19, 1984 with a heat input capacity greater than 100 million Btu/hr and other specifications.

While the standard sets limits on sulfur dioxide, particulate matter and nitrogen oxides, the sulfur oxide and particulate standards won't apply unless the heat is derived from coal or oil. However, the nitrogen oxide standard will apply to natural gas fired oxidizers and require a continuous emission monitor (CEM) for NO_x unless a plan that details how monitoring hourly operating conditions will predict NO_x emission rates.

The NSPS can be viewed [here](#). For more information about the ruling as it pertains to ethanol plants, contact the DNR's Karen Kuhn at 515-725-9560.



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Control Number: 0300032

Category: NSPS

EPA Office: CAMPD

Date: 01/08/2003

Title: Thermal Oxidizer/Waste Heat Boiler at Ethanol Prod. Facility

Recipient: George Czerniak

Author: Michael Alushin

Comments: See ADI Control Nos. NA07, NB04, and NB26 referenced herein.

Subparts: Part 60, Db, Indust.-Comm.-Inst. Steam Gen. Units

References: 60.40b

Abstract:

Q1: Is the thermal oxidizer with heat recovery boiler located at the Badger State Ethanol facility a steam generating unit and, therefore, subject to NSPS Subpart Db?

A1: Yes. The thermal oxidizer/heat recovery boiler would be considered a steam generating unit because it will combust fuel and heat a heat transfer medium; it is covered by NSPS Subpart Db.

Q2: How do Applicability Determinations NB04 and NA07 affect the applicability of the thermal oxidizer/heat recovery boiler?

A2: Applicability Determination NA07 concerns the applicability of NSPS Subpart Dc to a combined cycle system comprised of a gas turbine and a waste heat boiler. The thermal oxidizer/waste heat boiler configuration at the Badger State facility is treated differently than the gas turbine/waste heat boiler configuration in Applicability Determination NA07.

Applicability Determination NB04 consists of a gas turbine followed by a duct burner which, in turn, is followed by a waste heat boiler. In this configuration the duct burner followed by the waste heat boiler meets the criteria for a device to be considered a steam generating unit. Neither Applicability Determination NA07 nor NB04 contradict this applicability determination.

Letter:

MEMORANDUM

SUBJECT: Applicability of New Source Performance Standards at 40 CFR Part 60, Subpart Db to a Thermal Oxidizer/Waste Heat-Recovery Boiler at an Ethanol Production Facility

FROM: Michael S. Alushin, Director

Compliance Assessment and Media Programs Division Office of Compliance (2223A)

TO: George T. Czerniak, Chief

Air Enforcement and Compliance Assurance Branch (AE-17J)

Air and Radiation Division USEPA Region 5

This memorandum responds to your February 6, 2002 request for an applicability determination for the New Source Performance Standards (NSPS) at 40 CFR Section 60.40b (Subpart Db). We agree that the thermal oxidizer/waste heat boiler, which Badger State Ethanol plans to install at its Monroe, Wisconsin facility, is subject to NSPS Subpart Db.



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Description of the Badger State Thermal Oxidizer/Waste Heat Boiler

Documents provided to us indicate that Badger State Ethanol plans to install a thermal oxidizer to reduce volatile organic compound (VOC) emissions from its grain dryer. The proposed thermal oxidizer will have a heat input capacity of 125 million Btu/hr from the combustion of natural gas. Hot combustion gases from the oxidizer will be directed to the waste heat boiler, where heat will be recovered by means of a heat transfer medium. No supplemental combustion will occur in the waste heat boiler.

NSPS Subpart Db Applies to the Badger State Facility

According to 40 CFR Section 60.40b(a) an affected facility to which this subpart applies is: 1) a "steam generating unit"; 2) that commenced "construction, modification or reconstruction after June 19, 1984;" and 3) that has a heat input capacity of greater than 100 million Btu/hr from fuels combusted in the unit.

Badger State's proposed thermal oxidizer/waste heat boiler, meets these criteria. It will be constructed after June 19, 1984, and has a design capacity of 125 million Btu/hr. As discussed below, the thermal oxidizer/waste heat boiler constitutes a "steam generating unit."

Under 40 CFR Section 60.41b, a "steam generating unit" is defined as "a device that combusts any fuel or byproduct/waste to produce steam or to heat water or any other heat transfer medium. This term includes any municipal-type solid waste incinerator with a heat recovery generating unit or any steam generating unit that combusts fuel and is part of a cogenerating system or a combined cycle system. This term does not include process heaters as they are defined in this subpart."

The thermal oxidizer/waste heat boiler would be considered a "steam generating unit" because it will combust fuel and heat a heat transfer medium. Even though the combustion and heat transfer zones are contained in different pieces of equipment such that the thermal oxidizer combusts the fuel and the waste heat boiler generates the process steam, together they are considered a device which combusts fuel and heats a heat transfer medium. This analysis is consistent with Applicability Determination No. NB26, issued June 1, 1991, where a medical waste incinerator and boiler were found to comprise a steam generating unit. In that memorandum, EPA stated:

"The medical waste incinerator and the boiler comprise a steam generating unit, since medical waste is used as fuel to produce steam."

This is analogous to the Badger State Facility where the burning of VOCs in the thermal oxidizer is used as fuel to produce steam. In addition, EPA stated in Applicability Determination No. NB26 that the combination of the medical waste incinerator and boiler "is a steam generating unit even though the combustion and heat transfer zones are contained in different pieces of equipment (one device combusts the fuel and the other produces steam from the exhaust gases of the first device). Separating the combustion source from the heat transfer does not affect the applicability."

Furthermore, EPA noted "that heat input derived from the medical waste incinerator exhaust gas should be included in the heat input calculation. Subpart Dc's definition of heat input excludes heat derived from exhaust gases from other sources. However, other sources means processes that produce a product such as electrical or mechanical energy, lime, etc. Heat from exhaust gas of an incinerator, whose primary product is heat which is used to reduce waste volume, would be included in the heat input calculation."

Relevance of Applicability Determinations NB04 and NA07

We have reviewed Applicability Determinations NA07 and NB04, cited by Badger State in its request. Applicability determinations are decided on a case-by-case basis and are dependent on the facts of that case. These determinations do not change our analysis of the applicability of NSPS Subpart Db to the thermal oxidizer/waste heat boiler at Badger State.

Applicability Determination NA07

Applicability Determination NA07 concerns the applicability of NSPS Subpart Dc to a combined cycle system comprised of a gas turbine and a waste heat boiler. NSPS Subpart Dc does not apply to the waste heat boiler in this configuration. This is because the only heat that goes to the waste heat boiler is from the gas turbine exhaust gases.



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"Heat input" is defined at 40 CFR Section 60.41c under NSPS Subpart 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)."

Under NSPS Subpart Dc, a steam generating unit is a device which meets two criteria: it combusts a fuel and heats a heat transfer medium. The heat that goes to the waste heat boiler in Applicability Determination NA07 is derived solely from the gas turbine. Under the definition of "heat input" in Subpart Dc, however, the heat from the gas turbine is not considered "heat input" to the waste heat boiler for the purpose of determining the applicability of Subpart Dc.

Because the heat from the gas turbine is not considered "heat input" under Subpart Dc, there is no heat input to the waste heat boiler in Applicability Determination NA07. With no heat input, there is no fuel combustion which would cause the waste heat boiler to be a "steam generating unit" under NSPS Subpart Dc. Therefore, while the waste heat boiler may meet the second criteria for a steam generating unit (i.e., heat transfer to a heat transfer medium), it does not meet the first criteria (i.e., fuel combustion). Consequently, the waste heat boiler is not considered a "steam generating unit," and Subpart Dc does not apply to the gas turbine/waste heat boiler configuration considered in Applicability Determination NA07.

In contrast, the Badger State thermal oxidizer/waste heat boiler is subject to NSPS. The heat derived from the exhaust gases from the thermal oxidizer is considered "heat input" to the waste heat boiler under NSPS Subpart Db. This is because the thermal oxidizer does not qualify as an "other source" under the definition of "heat input" in NSPS Subpart Db (see 40 CFR Section 60.41b).

The thermal oxidizer is not a gas turbine, internal combustion engine or kiln, nor is it like, or similar in function to, a gas turbine, internal combustion engine or kiln. The primary function of these units is to generate shaft output energy (as in the case of a gas turbine or an internal combustion engine) or to produce a product (as in the case of a cement kiln or a lime kiln). The primary purpose of the Badger State thermal oxidizer is combustion of fuel to combust and destroy volatile organic compounds (VOCs).

Therefore, the thermal oxidizer/waste heat boiler configuration at the Badger State facility must be treated differently than the gas turbine/waste heat boiler configuration in Applicability Determination NA07. The Badger State thermal oxidizer/waste heat boiler is subject to NSPS Subpart Db.

Applicability Determination NB04

Applicability Determination NB04, cited by Badger State, also supports our conclusion in this case. Although the facility configuration in Applicability Determination NB04 is not described in detail, it consists of a gas turbine, followed by a duct burner which, in turn, is followed by a waste heat boiler. The heat directed to the waste heat boiler from the gas turbine is not considered in evaluating compliance with particulate matter (PM) and nitrogen oxides (NOx) standards. This is because, as discussed above, "heat input" under NSPS Subpart Dc does not include exhaust gases from gas turbines (40 CFR Section 60.41c).

The heat input to the waste heat boiler from the duct burner, on the other hand, as discussed in Applicability Determination NB04, is considered in evaluating compliance with the PM and NOx emission limits. Thus, that portion of the configuration discussed in NB04 which consists of a duct burner followed by a waste heat boiler meets the criteria for a device to be considered a steam generating unit: i.e., it combusts a fuel (with the duct burner) and heats a heat transfer medium (with the waste heat boiler).

Conclusion

We find that NSPS Subpart Db, 40 CFR Section 60.40b, applies to the proposed Badger State thermal oxidizer/waste heat boiler. Should you have any questions about this determination, please feel free to contact Joanne Callahan (202 564-5009) or Dan Chadwick (202 564-7054) of my office.

cc: Bruce Buckheit, AED Rich Biondi, AED

Mario Jorquera, AED Fred Porter, OAQPS Jon Knodel, R7

Ron Rutherford, R8