

Case-by-Case MACT

*Determination for the Auxiliary Boiler
in Support of Permit No. 341-07
Karn/Weadock Generating Station
Hampton Township, Michigan*

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1.0 INTRODUCTION

Consumers Energy Company (Consumers) submitted Permit to Install Application No. 341-07 on October 17, 2007, for a new advanced supercritical pulverized coal-fired (ASCPC) boiler and ancillary equipment. The ancillary equipment includes, among other items, a natural gas-fired, package boiler to be used for auxiliary steam generation purposes when the ASCPC is not operating or is in startup or shutdown mode. This is expected to be an infrequent event. This boiler has been identified as the “auxiliary boiler” in the application. The auxiliary boiler will be rated at 220 MMBtu/hr heat input and will only be capable of firing pipeline quality natural gas. Construction on this unit is expected to start in May 2011. Construction of the auxiliary boiler is expected to be complete in June 2015 and startup will begin shortly after.

At the time the permit application was filed, the U.S. Court of Appeals for District of Columbia Circuit had issued its mandate in NRDC v. EPA vacating and remanding the USEPA’s Boiler MACT Rule (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters). In the original application, Consumers addressed this mandate by stating that it “... appears to make the auxiliary boiler subject to Section 112(g) requirements” and that the CO limit of 0.035 lb/MMBtu, which is equivalent to 40 ppmv, represents MACT for this process.

As explained in Section 2 of this analysis, Consumers believes that a §112(g) analysis is not required; however, at the request of the Michigan Department of Environmental Quality (MDEQ), Consumers is submitting this case-by-case Maximum Achievable Control Technology (MACT) determination. This determination completes the Part 1 and Part 2 application requirements contained in 40 CFR 63.53 for case-by-case determinations for the natural gas fired auxiliary boiler.

2.0 REGULATORY BACKGROUND

The federal Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (USEPA) to regulate emissions of hazardous air pollutants (HAPs) listed in Section 112(b) of the CAA. For listed source categories and subcategories of major sources of HAPs (i.e., greater than 10 tons per year for a single HAP or greater than 25 tons per year for aggregate HAPs), the CAA requires USEPA to develop standards that restrict emissions to levels consistent with the lowest-emitting facilities based on stringent air pollution reduction measures known as maximum achievable control technology (MACT). This list of source categories in

Section 112(c) of the CAA includes industrial, commercial, and institutional boilers. On September 12, 2004, USEPA promulgated emission standards for industrial, commercial, and institutional boilers, codified at 40 CFR 63, Subpart DDDDD (Boiler MACT).

On July 30, 2007, the Court of Appeals for the District of Columbia Circuit issued its mandate vacating and remanding the Boiler MACT. Since the auxiliary boiler would have been subject to the now vacated MACT standard, it is likely that a case-by-case MACT analysis under 112(j) would be required.

2.1 112(g) vs. 112(j) APPLICABILITY

Rule 336.1299(e) adopts by reference 40 CFR §§ 63.40 to 63.44 and §§ 63.50 to 63.56, the federal regulations implementing Sections 112(g) and 112(j) of the CAA, respectively.

2.1.1 Clean Air Act Section 112(g) Applicability

Section 112(g) of the CAA is applicable to newly constructed or reconstructed major sources of HAPs for which USEPA did not promulgate a regulated source category pursuant to Section 112(c) or for which USEPA did not promulgate a standard under Sections 112(d), 112(f) or 112(j). For Section 112(g) applicability, 40 CFR 63.41 clearly differentiates between projects based on whether they are proposed to be constructed at a greenfield site or at an existing site. Specifically, 40 CFR 63.41 states that Section 112(g) case-by-case MACT applies to all activities located at a stationary source that will be constructed at a greenfield site if the stationary source will be a major source of HAPs. However, if a project will be constructed at an existing source, then 40 CFR 63.41 states that Section 112(g) case-by-case MACT applies to “**a new process or production unit** which **in and of itself** emits or has the potential to emit 10 tons per year of any HAP or 25 tons per year of any combination of HAP” (emphasis added). The proposed auxiliary boiler is a separate process or production unit from the proposed ASCPC boiler for the following reasons:

1. The fuel for the auxiliary boiler is a different raw material (natural gas vs. coal).
2. The auxiliary boiler will be defined as a separate emission unit in the air use permit.
3. The auxiliary boiler represents a different industrial category (i.e., industrial boiler vs. electric utility steam generating unit) for the purpose of Clean Air Act Section 112(c).
4. The auxiliary boiler will only operate part of the time.

Because the auxiliary boiler is a separate process or production unit that is not in and of itself a major source of HAPs, Consumers believes the auxiliary boiler is not subject to a Section 112(g) case-by-case MACT determination.

2.1.2 Clean Air Act Section 112(j) Applicability

Conversely, Section 112(j) is applicable to sources for which USEPA did promulgate a source category pursuant to Section 112(c), but failed to promulgate a timely standard pursuant to Section 112(d) of the CAA before the “Section 112(j) deadline” expired. On July 16, 1992, USEPA published in the Federal Register (FRL-4152-7) the initial list of source categories and subcategories under Section 112(c) of the CAA Amendments of 1990. Although EPA promulgated 40 CFR Subpart DDDDD before the Section 112(j) deadline expired, the U.S. Court of Appeals vacated this Section 112(d) standard well after the expiration of the Section 112(j) deadline. Thus Section 112(j) may apply to the auxiliary boiler.

Unlike the federal regulations that implement Section 112(g), the regulations that implement Section 112(j) (i.e. 40 CFR 63.50 to 40 CFR 63.56) do not distinguish between greenfield sites and existing sites. No such distinction is found in 40 CFR 63.50 (applicability), 40 CFR 63.51 (definitions), nor any of the other Section 112(j) implementation regulations. Furthermore, 40 CFR 63.52(b)(1) addresses equipment, like the auxiliary boiler, that is not subject to Section 112(g) because it will be constructed at an existing site and it is not a major source of HAPs in and of itself:

When one or more sources in a category or subcategory subject to the requirements of this subpart are installed at a major source ...and the installation does not invoke section 112(g) requirements, the owner or operator must submit an application meeting the requirements of §60.53(a) within 30 days of startup of the source. This application shall be reviewed using the procedures established in paragraph (e) of this section. Existing source MACT requirements [listed in a Title V permit] shall apply to such sources.

Therefore, Consumers believes the regulations are clear that the auxiliary boiler is not subject to a 112(g) case-by-case MACT determination but may be subject to a 112(j) case-by-case MACT determination. Furthermore, because the auxiliary boiler is not in and of itself a major source of HAPs, it is not subject to 112(g) and the 112(j) regulations would allow it to be evaluated using the less stringent “existing source”

MACT procedures. Under 112(j), the case-by-case MACT application is best handled through a Title V permit for an existing source. Alternate permitting procedures are also described in 40 CFR 63.55 entitled “MACT Determinations for New Sources Subject to Case-by-Case Determination of Equivalent Emissions Limitations.” Additionally, construction of the affected source is not necessarily dependent upon approval of the MACT application. Rather, operation of the affected source is dependent upon approval.

2.1.3 Regulatory Finding Concerning Natural Gas-Fired Boilers

On December 14, 2000, USEPA published in the Federal Register a Notice of Regulatory Finding on Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units (EUSGUs). The findings reiterate what USEPA presented in the February 1998 “Study of Hazardous Air Pollutant Emissions From Electric Utility Steam Generating Units – Final Report to Congress” (Utility RTC). Specifically, USEPA indicated that the impacts due to HAP emissions from natural gas-fired electric utility steam generating units were negligible and that the regulation of HAP emissions from these units was not appropriate or necessary.

While the Utility RTC and Findings specifically reference natural gas-fired EUSGUs, industry information, including information used by the National Association of Clean Air Agencies (NACAA), has shown that HAP emissions from natural gas-fired industrial boilers are negligible as well. The total potential HAP emissions from full operation of the proposed auxiliary boiler are estimated at less than 2 tpy, which is predominately Hexane.

2.1.4 Conclusion

Although Consumers believes that the proper case-by-case MACT determination for the auxiliary boiler should be completed under the provisions of Section 112(j) as part of a renewable operating permit application, Consumers has prepared this analysis as specified in 40 CFR §§ 63.40 to 63.44 at MDEQ’s request. Further, this determination has also been prepared in accordance with Michigan Rule 299(e) and Operational Memorandum No. 15, which defines the “procedure for processing permit applications subject to Federal Clean Air Act Section 112(g)” under the request by MDEQ. Although prepared with citations to the Section 112(g) regulations, this analysis is consistent with the Section 112(j) regulations, as well. For example, the definition of “*Maximum achievable control technology (MACT) emission limitation for new sources*” in 40 CFR 63.41 is the same definition in 40 CFR 63.51. Additionally,

the analysis assumes that the auxiliary boiler should be treated as a new source, even though 40 CFR 63.52(b)(1) would allow it to be treated as an existing source of HAPs. Consequently, this analysis meets both the regulatory requirements of Sections 112(g) and (j), and in fact is more stringent than would be required by Section 112(j) because it treats the auxiliary boiler as a new source.

Consumers requests that MDEQ cite Section 112(j) as the underlying applicable requirement for any MACT emission limitation or standard that MDEQ establishes for the auxiliary boiler. Section 112(j) can be interpreted as having broader applicability than Section 112(g) because 40 CFR §§ 63.50 to 63.56 do not make the same distinction between projects at greenfield sites and existing sites described in Section 2.1.1 above.

3.0 APPLICATION REQUIREMENTS

The application requirements for a case-by-case MACT determination under CAA Section 112(g) are provided at 40 CFR 63.43(e). It states: “(1) An application for a MACT determination ... shall specify a control technology selected by the owner or operator that, if properly operated and maintained, will meet the MACT emission limitation or standard as determined according to the principles set forth in paragraph (d) of this section.” In each instance where a constructed or reconstructed major source would require additional control technology or a change in control technology, the application for a MACT determination must contain the following information in Table 3-1. Much of this required information has already been provided with PTI application No. 341-07 and the remaining is included with this application for a MACT determination.

Table 3-1. Application Information

Required Information	Where Found
i) The name and address (physical location) of the major source to be constructed or reconstructed;	Application
(ii) A brief description of the major source to be constructed or reconstructed and identification of any listed source category or categories in which it is included;	Application
(iii) The expected commencement date for the construction or reconstruction of the major source;	MACT Analysis
(iv) The expected completion date for construction or reconstruction of the major source;	MACT Analysis
(v) the anticipated date of start-up for the constructed or reconstructed major source;	MACT Analysis
(vi) The HAP emitted by the constructed or reconstructed major source, and the estimated emission rate for each such HAP, to the extent this information is needed by the permitting authority to determine MACT;	Application
(vii) Any federally enforceable emission limitations applicable to the constructed or reconstructed major source;	Application
(viii) The maximum and expected utilization of capacity of the constructed or reconstructed major source, and the associated uncontrolled emission rates for that source, to the extent this information is needed by the permitting authority to determine MACT;	Application
(ix) The controlled emissions for the constructed or reconstructed major source in tons/yr at expected and maximum utilization of capacity, to the extent this information is needed by the permitting authority to determine MACT;	Application and MACT Analysis
(x) A recommended emission limitation for the constructed or reconstructed major source consistent with the principles set forth in paragraph (d) of this section;	MACT Analysis
(xi) The selected control technology to meet the recommended MACT emission limitation, including technical information on the design, operation, size, estimated control efficiency of the control technology (and the manufacturer's name, address, telephone number, and relevant specifications and drawings, if requested by the permitting authority);	MACT Analysis
(xii) Supporting documentation including identification of alternative control technologies considered by the applicant to meet the emission limitation, and analysis of cost and non-air quality health environmental impacts or energy requirements for the selected control technology; and	MACT Analysis
xiii) Any other relevant information required pursuant to subpart A.	MACT Analysis

4.0 EMISSIONS OF HAZARDOUS AIR POLLUTANTS

The proposed auxiliary boiler will be a natural gas fired boiler with a design heat input rating of 220 MMBtu/hr. The auxiliary boiler will utilize pipeline quality natural gas fuel, with an approximate heating value of 1,020 Btu per standard cubic foot (Btu/scf). The purpose for the auxiliary boiler is to warm the ASCPC unit for startup, and power auxiliary steam driven equipment during shutdown or malfunction conditions.

As identified in the permit to install support materials, the proposed auxiliary boiler will emit HAPs listed in Section 112(b)(1) of the CAA. The emissions have been calculated on both a short-term (lb/hr) and long-term (tpy) basis assuming full load operation during the entire year. As the boiler will only operate as needed during the year to assist in startup of the ASCPC boiler and to provide auxiliary steam loads when the ASCPC boiler is down, these emission estimates are considered extremely conservative. Since the ASCPC boiler is designed for base load operations and is expected to operate on a nearly continuous basis, with a minimum number of starts each year, the operation of the auxiliary boiler should be infrequent.

The potential emissions of HAPs were calculated based upon the factors contained in "Compilation of Air Pollutant Emissions Factors, USEPA Document No. AP-42, Fifth Edition, Ch. 1.4, July 1998." The emissions represent normal operating conditions and do not include startups or shutdowns. As a conservative approach, all annual calculations are based on continuous operation at 8,760 hours per year at base load (100% load) conditions, even though the auxiliary boiler will only operate during a small fraction of that time. The potential emissions of HAPs from the auxiliary boiler are detailed in Appendix B of PTI Application No. 341-07 and are summarized in Table 4-1 below.

Table 4-1. Potential HAP Emissions from the Auxiliary Boiler

Compound	Emission Factor (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy) ¹
Arsenic	1.96E-07	4.31E-05	1.89E-04
Benzene	2.06E-06	4.53E-04	1.98E-03
Beryllium	1.18E-08	2.59E-06	1.13E-05
Cadmium	1.08E-06	2.37E-04	1.04E-03
Chromium, total	1.37E-06	3.02E-04	1.32E-03
Cobalt	8.24E-08	1.81E-05	7.94E-05

Compound	Emission Factor (lb/MMBtu)	Emission Rate (lb/hr)	Emission Rate (tpy) ¹
1,4-Dichlorobenzene	1.18E-06	2.59E-04	1.13E-03
Formaldehyde	7.35E-05	1.62E-02	7.09E-02
Hexane	1.76E-03	3.88E-01	1.70E+00
Lead	4.90E-07	1.08E-04	4.72E-04
Manganese	3.73E-07	8.20E-05	3.59E-04
Mercury	2.55E-07	5.61E-05	2.46E-04
Nickel	2.06E-06	4.53E-04	1.98E-03
Selenium	2.35E-08	5.18E-06	2.27E-05
Toluene	3.33E-06	7.33E-04	3.21E-03
Polycyclic Organic Matter (POM)			
2-Methylnaphthalene	2.35E-08	5.18E-06	2.27E-05
3-Methylcholanthrene	1.76E-09	3.88E-07	1.70E-06
7,12-Dimethylbenz(a)anthracene	1.57E-08	3.45E-06	1.51E-05
Acenaphthene	1.76E-09	3.88E-07	1.70E-06
Acenaphthylene	1.76E-09	3.88E-07	1.70E-06
Anthracene	2.35E-09	5.18E-07	2.27E-06
Benzo(a)anthracene	1.76E-09	3.88E-07	1.70E-06
Benzo(a)pyrene	1.18E-09	2.59E-07	1.13E-06
Benzo(b)fluoranthene	1.76E-09	3.88E-07	1.70E-06
Benzo(g,h,i)perylene	1.18E-09	2.59E-07	1.13E-06
Benzo(k)fluoranthene	1.76E-09	3.88E-07	1.70E-06
Chrysene	1.76E-09	3.88E-07	1.70E-06
Dibenzo(a,h)anthracene	1.18E-09	2.59E-07	1.13E-06
Fluoranthene	2.94E-09	6.47E-07	2.83E-06
Fluorene	2.75E-09	6.04E-07	2.65E-06
Indeno(1,2,3,c,d)pyrene	1.76E-09	3.88E-07	1.70E-06
Naphthalene	5.98E-07	1.32E-04	5.76E-04
Phenanthrene	1.67E-08	3.67E-06	1.61E-05
Pyrene	4.90E-09	1.08E-06	4.72E-06
Total HAP Emissions		0.41	1.8

¹ Annual emissions conservatively assume 8,760 hours per year of operation

5.0 CASE-BY-CASE MACT ANALYSIS METHODOLOGY

Section 112(g) of the CAA is implemented through promulgation of 40 CFR §§63.40 through 63.44. MACT is defined in 40 CFR 63.41 as:

*the emission limitation which is **not less stringent** than the **emission limitation achieved in practice** by the **best controlled similar source**, and which reflects the **maximum degree of reduction in emissions** that the permitting authority, taking into consideration the **cost of achieving such emission reduction**, and **any non-air quality health and environmental impacts** and **energy requirements**, determines is **achievable** by the constructed or reconstructed major source. (emphasis added)*

The principles of case-by case MACT determinations have been codified in 40 CFR 63.43(d):

(d) Principles of MACT determinations.

The following general principles shall govern preparation by the owner or operator of each permit application or other application requiring a case-by-case MACT determination concerning construction or reconstruction of a major source, and all subsequent review of and actions taken concerning such an application by the permitting authority:

1. The MACT emission limitation or MACT requirements recommended by the applicant and approved by the permitting authority shall not be less stringent than the emission control which is achieved in practice by the best controlled similar source, as determined by the permitting authority.
2. Based upon available information, as defined in this subpart, the MACT emission limitation and control technology (including any requirements under paragraph (d)(3) of this section) recommended by the applicant and approved by the permitting authority shall achieve the maximum degree of reduction in emissions of HAP which can be achieved by utilizing those control technologies that can be identified from the available information, taking into consideration the costs of achieving such emission reduction and any non-air quality health and environmental impacts and energy requirements associated with the emission reduction.
3. The applicant may recommend a specific design, equipment, work practice, or operational standard, or a combination thereof, and the permitting authority may approve such a standard if the permitting

authority specifically determines that it is not feasible to prescribe or enforce an emission limitation under the criteria set forth in section 112(h)(2) of the Act.

4. If the Administrator has either proposed a relevant emission standard pursuant to section 112(d) or section 112(h) of the Act or adopted a presumptive MACT determination for the source category which includes the constructed or reconstructed major source, then the MACT requirements applied to the constructed or reconstructed major source shall have considered those MACT emission limitations and requirements of the proposed standard or presumptive MACT determination.

The definition establishes a two-step analysis in determining MACT. Step 1 of the MACT analysis is to identify the emission limitation achieved by the best controlled similar source and to determine the emission control achieved in practice by that source. This is often referred to as the “MACT floor”. While the term “MACT floor” is specifically defined in §63.51 for sources subject to 112(j) of the CAA, it is used here to describe the compilation of the best controlled similar sources. Step 2 of the MACT analysis requires the applicant to look at the maximum reduction in HAPs using any technology, not just that representing the MACT floor. This entails determining the maximum reduction in HAP emissions that the specific source, on a case-by-case basis, can achieve taking into consideration cost and non-air quality health and environmental impacts and energy requirements.

5.1 STEP 1 – IDENTIFYING THE MACT FLOOR

Pursuant to 40 CFR 63.43(d), an applicant is required to review all “available information” in determining the emission limit achieved in practice by the best controlled similar source. Available information is defined in §63.41 as: for purposes of identifying control technology options for the affected source, information contained in the following information sources as of the date of approval of the MACT determination by the permitting authority:

1. A relevant proposed regulation, including all supporting information;
2. Background information documents for a draft or proposed regulation;
3. Data and information available for the Control Technology Center developed pursuant to section 113 of the Act;

4. Data and information contained in the Aerometric Informational Retrieval System including information in the MACT data base;
5. Any additional information that can be expeditiously provided by the Administrator; and
6. For the purpose of determinations by the permitting authority, any additional information provided by the applicant or others, and any additional information considered available by the permitting authority.

40 CFR 63.43(d) (4) as well as the definition of “available information” described above, require that the emission limitations and requirements of a proposed standard or presumptive MACT determination for a source category be considered in a MACT determination. Therefore, it is appropriate to consider background and supporting information for the proposed and vacated regulations regarding gas-fired Industrial, Commercial, and Institutional (ICI) boilers when establishing the MACT floor.

The first step in the case-by-case MACT analysis is to identify the emission limit of the best controlled similar source. Since certain control technologies targeting specific pollutant reductions can result in an increase in emissions of other pollutants, it is important to recognize that the best controlled similar source does not always correlate to the lowest emission limit for every pollutant. The determination for similar source is done on a source basis, and not pollutant basis. In the vacated Boiler MACT, USEPA categorized and sub-categorized similar sources based upon boiler size, fuel and annual capacity factor.

5.1.1 Boiler Size

In the vacated MACT, USEPA categorized boilers based primarily upon unit size making a clear distinction between small units and large units. In the final Boiler MACT rule, USEPA ultimately classified large boilers as those with a rated capacity of greater than 10 MMBtu/hr heat input and an annual capacity factor greater than 10 percent.

Based upon this definition, the proposed auxiliary boiler would be considered a large unit since it is rated at 220 MMBtu/hr and the estimated annual capacity factor is greater than 10 percent.

5.1.2 Fuel Selection

In the vacated Boiler MACT, USEPA differentiated between boilers that use any amount of gaseous, liquid, or solid fuels. In fact, USEPA took a very conservative approach in classifying a boiler based upon fuel selection. Specifically, for a boiler to be classified in the gaseous subcategory, it must not fire any combination of solid fuels and is limited to liquid fuel for emergency instances only, during periods of gas curtailment or gas supply emergencies. A boiler firing any amount of solid fuel was classified as a solid fuel boiler and subject to the emission standards for that category.

Based upon the category definition for gaseous fuel, the proposed auxiliary boiler would be considered a gaseous unit since it will not have the ability to burn any amount of solid or liquid fuels.

5.1.3 Annual Capacity Factor

USEPA included a limited use subcategory for each boiler size and fuel selection that is only used during emergency, startup/shutdown or peaking conditions. As these units must be available immediately and respond without lengthy startup practices, placing restrictions requiring extensive add-on control systems would significantly impair the ability of these units to function as designed.

While the auxiliary boiler proposed for this project best fits into the limited use subcategory, accepting an operating condition limiting the annual capacity to 10 percent is not desirable. Therefore, the MACT determination will not be based on limited use conditions.

5.1.4 Selection of the Emission Limit of the Best Controlled Similar Source

To determine the emission limit of the best controlled similar source, a review of the archived inventory database used by USEPA in drafting the Boiler MACT was compared against existing and recently issued permits for large gaseous fuel-fired boilers. All of the boilers firing only natural gas identified in the Boiler MACT inventory database list no equipment for control of either CO or VOC emissions. Further, all recently issued permits for similarly sized natural gas-fired auxiliary boilers identify only combustion controls for CO and VOC emissions.

Therefore, the best controlled similar source would be defined as any large natural gas-fired boiler in the similar size range.

5.1.5 Achieved In Practice

Once the technology used by a best controlled similar source is identified, the next step is to determine the emission limitation that is currently being achieved in practice with that control technology. Achieved in practice means a MACT limit that is able to be met continuously under reasonably foreseeable worst-case conditions. See *Sierra Club v. EPA*, 167 F.3d 658, 665 (D.C. Cir. 1999). It does not mean the lowest HAP emission rate ever measured from a similar source, which primarily, if not exclusively, are the result of short-term stack tests conducted under normal operations. To establish a limit based on the lowest emission rate ever measured would guarantee that limit would be violated, even by the source upon which it is based. See *id.* (“It is reasonable to suppose that if an emissions standard is as stringent as ‘the emissions control that is achieved in practice’ by a particular unit, then that particular unit will not violate the standard. This only results if ‘achieved in practice’ is interpreted to mean ‘achieved under the worst foreseeable circumstances.’”) Thus, to ensure the MACT limits are continuously achievable, it is appropriate to include a margin of safety in the limit to ensure that reasonably foreseeable worst-case circumstances are covered, particularly when based on limited data. See *id.*; see also 69 Fed. Reg. at 4678 (describing approach EPA used in developing proposed MACT limits for new EGUs to address uncertainty and variability in emission test results).

5.2 STEP 2 – BEYOND THE FLOOR ANALYSIS

Once the MACT Floor has been identified, the next step is commonly referred to as a “Beyond the Floor” (BTF) analysis. The BTF analysis involves a review of whether or not it is appropriate to set an emission limit at a level more stringent than the MACT floor. BTF determines the maximum reduction that can be achieved using available technology and taking into consideration economic cost, non air quality related health and environmental impacts and energy requirements (40 CFR 63.43(d)(2)).

The only emission limit requirement under the vacated Institutional, Commercial and Industrial Boiler MACT for large natural gas-fired boilers was to use CO as a surrogate for organic HAP emissions and was established at a limit of 400 ppm corrected to 3% oxygen. This limit was promulgated as representing the “best of the best” technologies for new natural gas fired boilers. CO was selected because organic HAP emissions are directly related to combustion efficiency and only organic HAP emissions were determined to be of any concern from such units. Particulate emissions and particulate bound HAP emissions, including metals, are very low from natural gas combustion, due primarily to lack of any ash or solid content in the fuel.

6.0 CASE-BY-CASE MACT ANALYSIS

A case-by-case MACT analysis has been performed for those pollutants determined to have emissions at a level that might have an affinity to further, add-on control technology. This analysis has been completed consistent with the requirements contained in 40 CFR 63.43.

Because emissions of acid gases, mercury and metal compounds are only expected in trace amounts or in non-detectable amounts and there is no emissions data in the RBLC or ARB databases for this type of auxiliary boiler, this case-by case analysis only addresses organic HAP emissions. This decision is wholly consistent with USEPA's decision in proposing the ICI MACT standards to only regulate organic HAP emissions from natural gas fired industrial boilers and process heaters. There was nothing in the vacatur order issued on June 8, 2007, by the U.S. Court of Appeals for the District of Columbia (No. 04-1385, NRDC, Sierra Club, Environmental Integrity Project v. USEPA) that invalidated this position,

6.1 ORGANIC HAP EMISSIONS

In the Boiler MACT, USEPA selected CO as a surrogate for control of organic HAP emissions since both are products of incomplete combustion. However, volatile organic compound (VOC) emissions are also directly related to the combustion efficiency of the boiler. Specifically, both CO and VOC emissions increase when the boiler is operating inefficiently and the combustion byproducts do not proceed to complete combustion. Conversely, both CO and VOC emissions decrease when the boiler is operating efficiently.

As mentioned previously, in the context of EUSGUs, USEPA has determined that control of HAP emissions from natural gas-fired boilers of any size is neither appropriate nor necessary. This is specifically identified in a February 2004 memorandum from Jim Eddinger, USEPA – OAQPS to Docket No. OAR-2002-0058 titled *Revised MACT Floor Analysis for the Industrial, Commercial, and Institutional Boilers and Process Heaters National Emission Standards for Hazardous Air Pollutants Based on Public Comments*. This document can be found at: <http://www.epa.gov/ttn/atw/boiler/mactflrmemo.pdf>.

An independent review of existing, recently issued permits for similar boilers did not identify any required control technologies beyond combustion controls. Therefore, the best controlled similar source in this

category is no add-on controls. Further, review of these permits did not identify any similar boiler required to have an emission limit or emissions testing for HAPs.

Utilities and industry have historically tested for either CO or VOC to determine the operating efficiency of these types of boilers. Further, regulatory and permitting agencies (including USEPA) have recognized that the same technology employed to control CO emissions will also control VOC emissions, and vice versa. As an emission limit for organic HAP emissions could not be identified in any database, using either CO or VOC as a surrogate for determining these emissions is appropriate. We also note that USEPA in the preamble to the Hazardous Waste Combustor MACT stated that,

“Although some sources are achieving carbon monoxide levels below 100 ppmv, it is not appropriate to establish a lower floor level because carbon monoxide is a conservative surrogate for organic HAP. Organic HAP emissions may or may not be substantial at carbon monoxide levels greater than 100 ppmv, and are extremely low when sources operate under the good combustion conditions required to achieve carbon monoxide levels in the range of zero to 100 ppmv. As such, lowering the carbon monoxide floor below 100 ppmv may not provide significant reductions in organic HAP emissions.”¹

As a result, Consumers has selected to measure VOC emissions from the natural gas-fired auxiliary boiler as a surrogate for emissions of organic HAPs. Due to the inherent low emissions of CO, VOC, and HAP emissions from natural gas-fired boilers, it is difficult to find emissions data. Further, no evidence for a case-by-case MACT analysis pursuant to 112(g) could be found for other facilities. Therefore, the USEPA RACT/BACT/LAER Clearinghouse (RBLC) database for natural gas-fired auxiliary boilers was searched. The lowest emission rate found was 0.0013 lb/MMBtu for the 400 MMBtu/hr natural gas fired boiler at Weyerhaeuser Company in Mississippi. This boiler was permitted in 1996, is operating without additional control beyond combustion controls, and has shown compliance with the VOC emission limit through three out of four stack tests in the last six years. Therefore, the MACT floor is 0.013 lb/MMBtu.

6.1.1 Beyond the Floor Analysis

The auxiliary boiler will use combustion controls in order to maximize the efficiency of the boiler, and achieve a balance between reduced NO_x emissions and reduced organic HAP emissions. In considering the

¹ <http://www.epa.gov/fedrgstr/EPA-AIR/2005/October/Day-12/a18824b.pdf>, 70FR59462 (October 12, 2005)

maximum level of control that could be achieved, the two available technologies specifically designed to control emissions of organic compounds, including CO and VOC, are an oxidation catalyst, also referred to as a catalytic oxidizer or catalytic incinerator, and thermal incinerator.

Oxidation Catalyst

Catalytic oxidizers treat exhaust gas from a combustion device utilizing a catalyst bed, typically a media-supported film of precious metals, such as platinum/rhodium, where oxidation of VOCs takes place. The two primary types of oxidizers are fixed-bed and packed-bed and both operate on much the same principle. Depending on catalyst formation, the reaction can occur over a temperature range of approximately 450°F to 1,200°F. In a catalytic oxidizer, the gas stream enters a mixing chamber and is heated, usually by a natural gas-fired heater. Oxygen and VOCs are adsorbed on the catalyst surface where oxidation occurs.

The amount of VOC oxidation will depend on several factors, including operating temperature, gas composition, exhaust gas velocity and pressure drop across the catalyst bed. Oxidation catalysts are designed for low velocity gas streams, typically below 50,000 acfm. A properly designed system can control VOC emissions up to 95 percent based on low exit velocities. The auxiliary boiler exit gas volume is estimated at 75,000 acfm; this is much higher than the operating design of typical oxidation catalyst systems.

Thermal Oxidation

Thermal oxidation, or thermal incineration, employs the use of a thermal oxidizer (afterburner) to increase the temperature of the flue gas above the auto-ignition temperature of VOC, typically from 1,100°F to 1,200°F, to induce combustion of flue gas contaminants (VOC). There are two primary types of thermal oxidizers: regenerative and recuperative. In regenerative thermal oxidizers, packed bed media, such as ceramic filters, are used to preheat the flue gas stream. The exhaust gas is partially oxidized and used as fuel in the primary chamber. The combustion chamber is typically heated with auxiliary fuel, primarily natural gas. The hot exhaust stream exits the chamber and is directed to the ceramic-packed beds for heat transfer. Once thermal transfer is complete, the cooled exhaust gas exits the system. In recuperative systems, heat transfer is typically not as efficient and uses plate-to-plate and shell-and-tube heat exchangers to achieve thermal transfer. Otherwise, the oxidation principal is the same.

Thermal oxidation systems are designed to achieve reductions of at least 98 percent at inlet concentrations of 1,500 to 3,000 ppm. The inlet concentration of VOCs in the exhaust gas stream from the auxiliary boiler will be below 20 ppm.

Beyond the floor emission reductions are therefore not appropriate due to the auxiliary boiler operational parameters and the emission profile.

6.2 SUMMARY OF MACT LIMITS

The proposed auxiliary boiler will be designed to achieve a MACT emission limit for VOC of 0.0013 lb/MMBtu, consistent with the MACT Floor, as a surrogate for organic HAP emissions.

7.0 MONITORING, RECORDKEEPING, AND TESTING

To provide for monitoring of compliance with the proposed MACT limit, Consumers' will perform an initial performance test for VOC emissions from auxiliary boiler, and will perform periodic testing consistent with the requirements of Title V. The testing will be completed while the boiler is operating at full load.

8.0 SUMMARY

The use of combustion practices designed to minimize the formation of CO and organic compounds, including VOCs and organic HAP represents control measures that are as stringent as the controls used by the best similar source and will meet MACT under 112(g) for HAP emissions from the proposed auxiliary boiler. The proposed MACT VOC emission limit is 0.0013 lb/MMBtu.