Best Available Control Technology Determination
(4) Boilers
Combustion Turbine
Duct Burner & Heat Recovery Boiler

Best Available Control Technology (BACT) Determination
Anheuser-Busch, Inc.
Duval County

The applicant has installed four (4) boilers at their brewery in Jacksonville, Florida. Each boiler has a design capacity of 100 MMBtu/hr and is fired with No.6 fuel oil. The boilers are used for steam production and are scheduled to operate 8,760 hours per year.

The four boilers were originally permitted with the following limitations:

Particulates - 0.1 lbs per million BTU heat input.

SO_2 - 2.5 lbs per million BTU heat input (equivalent to the use of 2.28% sulfur content fuel oil).

Once the boilers were put into operation it became evident that particulate limitation could not be consistently met using fuel oil with the allowable sulfur content.

Review Group Members:

This determination was based upon comments received from the applicant, the Stationary Source Control Section, the Northeast District, and the City of Jacksonville Bio-Environmental Services Division.

BACT Determined by DER:

Pollutant	Emission Limit
Particulates	0.10 1b per MMBtu
SO_2	*Fuel oil sulfur content shall not exceed 1.5%.
Visible Emissionss	Not to exceed 20% opacity. 40% opacity is permitted for not more than two minutes in any one hour.

*If particulate emission limitation is exceeded, sulfur content shall be further reduced to achieve compliance.

Alternate BACT Determination

Each of the four boilers shall be fired with natural gas.

BACT Determination Rationale

The latest (June 1985) BACT/LAER Clearinghouse lists BACT determinations for several oil fired boilers. A review of BACT determinations for boilers of this size (100 MMBtu/hr) indicates that BACT for S02 is a fuel oil sulfur content not to exceed - 1.3%. Similar determinations were listed for particulate emissions from larger boilers. BACT determinations for particulates were 0.08 and 0.1 Ib per MMBtu for boilers with ratings of 144.0 and 185 MMBtu/hr, respectively. In addition, a review of BACT determinations for other No.6 fuel oil fired boilers in the state indicate that the norm for boilers rated under 100 MMBtu/hr is equivalent to limiting the sulfur content to 1.5 percent.

The applicant has stated that by firing 1.5 percent sulfur fuel oil the particulate limitation of 0.10 lbs/MMBtu can be achieved. In accordance with AP-42, one would expect the particulate emission to be approximately 0.12 lbs/MMBtu based on a fuel sulfur content of 1.5% and a fuel oil heating value of 152,000 BTU per gallon. Using this line of thought, in order to achieve the particulate limitation of 0.10 lb/MMBtu the fuel oil sulfur content could not exceed 1.3%.

In addition to the emission estimates resulting from using 1.5% sulfur fuel oil, the applicant has stated that the switch to 1.5% fuel oil will increase fuel costs by over $250,000 annually. In order to justify the increased costs incurred by fuel switching, an economic analysis on the cost per ton of pollutant controlled is necessary.

The applicant has stated that by purchasing 1.5% fuel oil the particulate emission would be reduced by 29.7 tons per year at a cost of $9,586 per ton. This appears to be excessive compared to the California South Coast Air Quality Management District (SCAQMD) BACT guideline of $5,600 per ton of particulate removed. It should be noted that in accordance with AP-42, the switch to 1.5% sulfur fuel oil would also reduce S02 emissions by 465 tons per year at a cost of approximately $611.00 per ton. This is much less than the SCAQMD BACT guideline of $3,600 per ton of sulfur oxides removed. The" cost of removal for both S02 and particulates is calculated to be approximately $574.00 which is indeed reasonable based on the economic guidelines available. By comparison, a switch to 1.0% sulfur fuel oil would result in cost per ton of pollutant removed to be $9,561 and $609.00 for particulates and sulfur oxides respectively. The combined removal cost would be approximately $572.00 which again could be deemed as being reasonable in accordance with the economic guidelines available.

Based on the analysis completed herein, BACT is determined to be a particulate limitation of 0.10 lb per MMBtu and a sulfur content not to exceed 1.5%. In the event that the particulate limitation cannot be met using 1.5% sulfur fuel oil, the applicant will be required to reduce fuel oil sulfur content to a level in which compliance can be achieved.

In addition to the analysis completed for fuel oil firing, the department judges the firing of natural gas to also constitute BACT for these boilers. The use of natural gas would minimize the emissions of both particulates and sulfur dioxide from the boilers.

Details of the Analysis May be Obtained by Contacting:

Barry Andrews, P.E., BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

Recommended by:

_____
C.H. Fancy, P.E.
Deputy Bureau Chief, BAQM

July 18, 1986
Date

Approved by:

_____
Victoria J. Tschinkel, Secretary

21 July 86
Date

Revised
Best Available Control Technology (BACT) Detemination
Anheuser-Busch, Inc. - Duval County
Gas Turbine and Heat Recovery Boiler

Projects

The applicant proposes to install an 95.7 MMBtu/hr natural gas- fired turbine to operate an 9,114 kilowatt electric generator and an 80,000 lb~ steam/hr heat recovery boiler with a 38 MMBtu/hr natural gas-fired burner for supplementary heat input. Because of the increase in nitrogen oxides (NOx) emissions associated with these projects, the allowable emissions from these sources are established by a BACT determination.

Review Group Members

This determination is based on the proposal by the applicant, EPA documents, and the Stationary Source Control Section.

BACT Determined by DER

SOURCE	POLLUTANT	EMISSION LIMIT
Turbine	Nitrogen Oxides	STD = 0.0150 (14.4/Y) + F

Where:

STD = allowable NOx emission (percent by volume at 15 percent oxygen and on dry basis)

Y = manufacturer's rated heat rate at manufacturer's rated peak load (kilojoules per watt hour)

F = NOx emission allowance for fuel-bound nitrogen as described in 40 CFR 60, Subpart GG

	Visible Emiss.	5% opacity (6 min. avg.)
Heat Recov. Boiler contribution to emissions.	Nitrogen Oxides	0.1 Ibs NOx/MMBtu heat input
	Visible Emiss.	5% opacity (6 min. avg.)

Compliance test shall be by Reference Methods 9 and 20 or other EPA approved alternative methods as described in 40 CFR 60, Appendix A.

BACT Determination Rationale

Turbine - The applicant proposes to meet the new source performance standards (NSPS) for gas turbine (40 CFR 60, Subpart GG) by operational controls and limiting the unit to natural gas fuel only. NOx emissions from turbines can also be controlled by water or steam injection. On the proposed turbine, this would increase capital cost by $250,000 and require 14 days annual downtime for maintenance. There is no assurance that the NOx emissions would be lower than the NSPS. Therefore, the BACT for this unit is determined to be operational controls and natural gas fuel that result in the unit complying with NSPS for station ary gas turbines.

Heat Recovery Boiler - Low excess air (LEA) operations and limiting the unit to natural gas fuel will minimize the emissions of air pollutants from this source. The heated combustion air (hot gases from turbine) will cause NOx emissions to be higher than similar units using ambient air. According to the development work performed for the Standards of Performance for New Stationary Sources: Industrial Commercial-Institutional Steam Generating Units (June 19, 1984, Federal Register) NOx emissions from steam generating units employing combustion air preheat can meet a standard of 0.1 lb/MMBtu heat input. This standard is adopted as the BACT determination for this unit.

Turbine and Boiler - Proper combustion of natural gas cause no visible emissions.

Details of the Analysis May be Obtained by Contacting:

Barry Andrews, P.E., BACT Coordinator
Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301
Recommended By:

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C. H. Fancy, P.E., Deputy Bureau Chief

Date: _____4/22/87_____

Approved:

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Dale Twachtmann, Secretary

Date: ____27 April 87_____

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