

APPENDIX BD
BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION (BACT)

Sulfuric Acid Plant
Farmland Hydro, L.P.
PSD-FL-243 and 1050053-019-AC
Bartow, Polk County

BACKGROUND

The applicant, Farmland Hydro, L.P., proposes to replace the existing 2100 ton per day (TPD) No. 3 sulfuric acid plant (SAP) with a new 2750 TPD No. 6 SAP at the existing facility in Polk County.

The proposed project will result in "significant increases" with respect to Table 62-212.400-2, Florida Administrative Code (F.A.C.) of emissions of sulfur dioxide (SO₂), sulfuric acid mist (SAM), and nitrogen oxides (NO_x). The project is therefore subject to review for the Prevention of Significant Deterioration (PSD) and a determination of Best Available Control Technology (BACT) in accordance with Rule 62-212.400, F.A.C.

Descriptions of the process, project, ambient air quality effects, and rule applicability are given in the separate Technical Evaluation and Preliminary Determination issued with the Department's Intent and Public Notice package.

DATE OF RECEIPT OF A BACT APPLICATION:

The BACT application was received on November 20, 1997.

REVIEW GROUP MEMBERS:

Syed Arif, P.E.

BACT DETERMINATION REQUESTED BY THE APPLICANT:

<u>POLLUTANT</u>	<u>CONTROL TECHNOLOGY</u>	<u>PROPOSED BACT LIMIT</u>
Sulfur Dioxide	Double Absorption	3.5 pounds per ton 100% H ₂ SO ₄
Sulfuric Acid Mist	Fiber Mist Eliminators	0.15 pounds per ton 100% H ₂ SO ₄
Visibility	As Above and Process Controls	10 percent
Nitrogen Oxides	None - Low Fuel Nitrogen, Combustion Temperature	0.12 pounds per ton 100% H ₂ SO ₄

The applicant has proposed to use the double absorption process and improved process control technology to achieve the proposed limits. These limits will be met by converting SO₂ produced into sulfur trioxide (SO₃), absorbing the SO₃ in circulating streams of sulfuric acid, and minimizing SAM formation and losses by process controls and high efficiency mist eliminators.

Farmland Hydro, L.P.
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BACT DETERMINATION PROCEDURE:

In accordance with Chapter 62-212, F.A.C., this BACT determination is based on the maximum degree of reduction of each pollutant emitted which the Department of Environmental Protection (Department), on a case by case basis, taking into account energy, environmental and economic impacts, and other costs, determines is achievable through application of production processes and available methods, systems, and techniques. In addition, the regulations state that, in making the BACT determination, the Department shall give consideration to:

- Any Environmental Protection Agency determination of BACT pursuant to Section 169, and any emission limitation contained in 40 CFR Part 60 - Standards of Performance for New Stationary Sources or 40 CFR Part 61 - National Emission Standards for Hazardous Air Pollutants.
- All scientific, engineering, and technical material and other information available to the Department.
- The emission limiting standards or BACT determination of any other state.
- The social and economic impact of the application of such technology.

The EPA currently stresses that BACT should be determined using the "top-down" approach. The first step in this approach is to determine, for the emission unit in question, the most stringent control available for a similar or identical emission unit or emission unit category. If it is shown that this level of control is technically or economically unfeasible for the emission unit in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections.

BACT DETERMINATION BY DEP:

<u>POLLUTANT</u>	<u>CONTROL TECHNOLOGY</u>	<u>EMISSION LIMIT</u>
Sulfur Dioxide	Double Absorption	3.5 lb/ton 100% H ₂ SO ₄
Sulfuric Acid Mist	High Efficiency Mist Eliminators	0.15 pounds per ton 100% H ₂ SO ₄
Visibility	As Above and Process Controls	10 percent
Nitrogen Oxides	None - Low Fuel Nitrogen, Combustion Temperature	0.12 lb/ton 100% H ₂ SO ₄ Applicant Estimate

DETERMINATION RATIONALE:

The BACT determination has been based on the established double absorption technology wherein the production process and the BACT are identical, thus eliminating the need for add-on control equipment. The applicant's BACT proposal for SO₂ is more stringent than the NSPS and previous BACT determinations.

The BACT determination for the permit issued on February 2, 1998 to Piney Point Phosphates, Manatee County serves as a basis for the evaluation of the new plant at Farmland, L.P. In the evaluation of the Piney Point plant, the Department concluded that an SO₂ emission limit of 2.4-3.2 pounds per ton of acid produced was feasible by using cesium-promoted vanadium catalyst in the final pass in place of conventional vanadium catalyst. According to Monsanto Enviro-Chem, the full service vendor, the optimum plant operating conditions for the Farmland project are such that the cesium promoted catalyst will not yield a reduction in SO₂ emissions. This is because the Monsanto cesium-promoted catalyst has an advantage over the non-cesium product only at lower temperatures.

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The Department notes that Haldor-Topsoe claims its cesium line has an advantage over its non-cesium line at all typical operating temperatures. However the Haldor-Topsoe product is not an option for this project and the Department recognizes that the applicant has alternatives available to achieve emissions reflective of the Department's BACT determination.

The applicant will achieve the proposed emissions limits by improving the sulfur dioxide conversion of a traditional double absorption plant. The improvement over a traditional plant will be accomplished by an increase in the size of the converter; increase in the catalyst loading; increase in the plant operating pressure to overcome the additional pressure drop; increase in heat exchange capacity to accommodate the increase in heat of reaction; and, increase in the horsepower of the main compressor turbine drive to accommodate the higher discharge pressure. This is considered to be equivalent to BACT for sulfur dioxide. The emission limit of 3.5 pounds per ton of acid averaged over three hours is more stringent than the limit set for the Piney Point Plant where emissions are averaged over 48 hours.

Control options involving production of by-products or wastes have been rejected by Farmland. There is no indication that add-on control methods are competitive with process improvements that result in production of additional sulfuric acid. Recovery of sulfuric acid mist is an economic necessity as well as an environmental requirement. High efficiency mist eliminators are considered BACT for sulfuric acid mist.

The Department agrees with the applicant that the sulfur burning process utilized in the sulfuric acid plant inherently produces low NO_x emissions, and is considered BACT for NO_x.

COMPLIANCE METHODOLOGY:

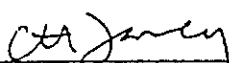
Demonstration of compliance with the emissions limits shall be as required by Subpart H. These are EPA Reference Method 8 for SO₂ and SAM. EPA Methods 1, 2, and 3 shall be used to determine stack and flue gas properties. An initial and annual compliance test for NO_x using EPA Method 7E is required to verify the low emission rate projected in the application.

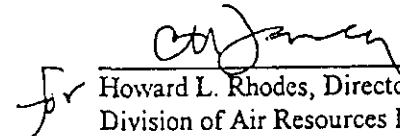
DETAILS OF THE ANALYSIS MAY BE OBTAINED BY CONTACTING:

Syed Arif, P.E., Permit Engineer, New Source Review Section
Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Recommended By:

Approved By:


C. H. Fancy, P.E., Chief
Bureau of Air Regulation


Howard L. Rhodes, Director
Division of Air Resources Management

Date:

7/15/98

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