CATEGORY: **PHARMACEUTICAL PROCESS**

BACT Size: Uncontrolled Emissions > 467 lb/year **PHARM MANUF**

BACT Determination Number: 207	**BACT Determination Date:**

Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: PHARM MANUF
Unit Size/Rating/Capacity: Batch Process
Equipment Location:

BACT Determination Information

ROCs	**Standard:**	
	Technology Description:	
	Basis:	
NOx	**Standard:**	
	Technology Description:	APC Scrubber with 99% control efficiency.
	Basis:	Cost Effective
SOx	**Standard:**	
	Technology Description:	
	Basis:	
PM10	**Standard:**	
	Technology Description:	
	Basis:	
PM2.5	**Standard:**	
	Technology Description:	
	Basis:	
CO	**Standard:**	
	Technology Description:	
	Basis:	
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: This is a generic BACT determination based on BACT determinations made, and published, by other air agencies in California and/or other States.

District Contact: Jeff Weiss Phone No.: (916) 874 - 4862 email: jweiss@airquality.org

CATEGORY: **PHARMACEUTICAL PROCESS**

BACT Size: Uncontrolled Emissions ≤ 467 lb/year **PHARM MANUF**

BACT Determination Number: 210	**BACT Determination Date:**

Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: PHARM MANUF
Unit Size/Rating/Capacity: Batch Process
Equipment Location:

BACT Determination Information

ROCs	**Standard:**	
	Technology Description:	
	Basis:	
NOx	**Standard:**	
	Technology Description:	APC Scrubber with 66% Control Efficiency.
	Basis:	Achieved in Practice
SOx	**Standard:**	
	Technology Description:	
	Basis:	
PM10	**Standard:**	
	Technology Description:	
	Basis:	
PM2.5	**Standard:**	
	Technology Description:	
	Basis:	
CO	**Standard:**	
	Technology Description:	
	Basis:	
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: This is a generic BACT determination based on BACT determinations made, and published, by other air agencies in California and/or other States.

District Contact:

777 12th Street, Third Floor

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.: 207 & 210

DATE: September 19, 2018

ENGINEER: Jeff Weiss

Category/General Equip Description: Pharmaceutical Manufactuirng Operations

Equipment Specific Description: Pharmaceutical Manufacturing Batch Process (NOx)

Equipment Size/Rating: Minor Source BACT

Previous BACT Det. No.: N/A

This BACT determination is for NOx emissions from a chemical process. The determination was for A/C Application 25609 (Ampac Fine Chemicals LLC).

BACT ANALYSIS

A: ACHIEVED IN PRACTICE (Rule 202, §205.1a)

The following agencies were consulted to determine the current control technologies that are used as BACT at pharmaceutical or chemical sources: South Coast AQMD, Bay Area AQMD, San Joaquin Valley APCD, Sacramento Metropolitan AQMD, San Diego County APCD, California Air Resources Board, and U.S. Environmental Protection Agency. No BACT determinations were found.

The following agencies were consulted to determine the rules and regulations that are used to control NOx at pharmaceutical or chemical sources: South Coast AQMD, Bay Area AQMD, San Joaquin Valley APCD, Sacramento Metropolitan AQMD, San Diego County APCD, California Air Resources Board, and U.S. Environmental Protection Agency (NSPS and NESHAP). No rules or regulations were found.

B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.)

Technologically Feasible Alternatives:
Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer. The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be "Achieved in Practice" per Rule 202, §205.1.a.

Pollutant	Technologically Feasible Alternatives
NOx	1. APC Scrubber with 99% control.

Cost Effectiveness Determination:
After identifying the technologically feasible control options, a cost analysis is performed to take into consideration the economic impacts of all technologically feasible controls identified.

Maximum Cost per Ton of Air Pollutants Controlled

1. A control technology is considered to be cost-effective if the cost of controlling one ton of that air pollutant is less than the limits specified below (except coating operations):

Pollutant	Maximum Cost ($/ton)
ROG	17,500
NO_X	24,500
PM10	11,400
SO_X	18,300
CO	TBD if BACT triggered

Cost Effectiveness Analysis Summary:

APC Scrubber
The cost effectiveness for a 462 lb/year NOx emission reduction from an add-on scrubber was **$24,519 per ton** (refer to Appendix A for the cost effectiveness analysis). The following basic parameters were used in the analysis.

NOx emissions (Uncontrolled) = 467 lb per year

NOx Control Level = 99%

Equipment Life = 10 years

Direct Cost = $29,065

Direct Annual Cost = $461 per year

Indirect Annual Cost = $5,207 per year

Total Annual Cost = $5,668 per year

NOx Removed = 462 tons per year

Cost of NOx Removal = $24,519 per ton reduced

The use of an add-on scrubber with a control efficiency of 99% is cost effective for an uncontrolled NOx emission of greater than 467 lb/year. This technology is not cost-effective for an uncontrolled NOx emission of 467 lb/year or less.

C. SELECTION OF BACT:

A NOx technology has not been identified as achieved-in-practice for chemical batch processes. However, a wet scrubber with a NOx control efficiency of 99% is cost effective for uncontrolled emissions of more than 467 lb/year. Therefore, BACT will be the use of an APC scrubber (or equivelant) with a control efficiency of at least 99% for NOx emissions greater than 467 lb/year. Since there isn't a BACT standard for uncontrolled emissions of 467 lb/year or less, and the applicant is proposing to use a wet scrubber with a control efficiency of 66%, the District will consider a 66% control efficiency (as calculated by Emission Master® software) to be technologically feasible. Since the applicant is proposing this control efficiency, a cost effectiveness determination will not be required.

BACT #207 for Chemical Processes > 467 lb NOx/year (uncontrolled)		
Pollutant	**Standard**	**Source**
NOx	Scrubber with 99% control	Industry (A)

(A) Control standard was obtained from CECO Environmental (https://www.cecoenviro.com/nox-control-wet-scrubbers-hee-duall).

BACT #210 for Chemical Processes ≤ 467 lb NOx/year (uncontrolled)		
Pollutant	**Standard**	**Source**
NOx	66% control efficiency (A)	SMAQMD (B)

(A) Calculated by Emission Master® software
(B) Control standard was obtained from A/C Application 25609 for Ampac Fine Chemicals.

REVIEWED BY: _____ **DATE:** _____

Attachment A

Cost Effectiveness Determination for Scrubber

BOILER SCR COST EFFECTIVENESS CALCULATION

EPA AIR POLLUTION CONTROL COST MANUAL, Sixth Edition, EPA/452/B-02-001, January 2002
Section 5 - SO_2 and Acid Gas Controls, Chapter 5 – Wet Scrubbers for Acid Gas

Cost Effectiveness = $ 24,519 $/ton

Equipment

NOx Emission (Uncontrolled)	467	Lb/year
NOx Removed by Scrubber	462	lb/year (0.2312 ton/year)
Control Efficiency	99	%
Scrubber Operation Hours	50	hours/year
Cost year	2018	
Equipment Life	10	years
Annual interest Rate	5	%
CRF	0.1295	

Scrubber Calculations

Liquid Flow Rate Entering Scrubber	3	gal/min
Waste Gas Rate Entering Scrubber	500	acfm
Packing Height	7	feet
Packing Diameter	1.67	Feet
Packing Material	Polypropylene	1 inch diameter
Make-up Water	0.3	gpm
Pressure Drop (Gas)	3	Inches water
Pressure Drop (Liquid)	27.5	Inches water
Motor Efficiency	70	Percent
Disposal Cost	0.5	$/gal
Power Cost	0.12	$/kw-hr
Waste Fraction (Make-up)	10	%

Indirect Costs

Administrative	$ 581	per year
Overhead	$ 157	per year
Property Tax	$ 291	per year
Insurance	$ 291	per year
Capital Recovery	$ 3,764	per year
Total Capital Investment	$ 29,065	per year

BOILER SCR COST EFFECTIVENESS CALCULATION

EPA AIR POLLUTION CONTROL COST MANUAL, Sixth Edition, EPA/452/B-02-001, January 2002
Section 5 - SO_2 and Acid Gas Controls, Chapter 5 – Wet Scrubbers for Acid Gas

Direct Annual Costs

Electricity	$ 2	per year
Wastewater Disposal	$ 1	per year
Operating Labor	$ 150	per year
Supervisor	$ 23	per year
Maintenance Labor	$ 120	per year
Maintenance Material	$ 120	per year
Water Cost	$ 2	per year
Sodium Hydroxide Cost	$ 43	per year

Cost Totals

Direct Annual Cost	$ 461	per year
Indirect Annual Cost	$ 5,207	per year
Total Annual Cost	$ 5,668	per year
Cost of NOx removal	**$ 24,519**	**per ton**