

SIP CONSTRUCTION PERMIT AND TITLE V SIGNIFICANT MODIFICATION APPLICATION REVIEW

Facility Name: **PCS Nitrogen Fertilizer – Augusta Plant**

City: Augusta, Georgia

County: Richmond County

AIRS #: 04-13-245-00002

Application #: TV-13063

Date SIP Application Received: July 30, 2001

Date Title V Application Received: July 30, 2001

Permit No: 2873-245-0002-V-01-2

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Introduction

This narrative is being provided to assist the reader in understanding the content of the attached SIP permit to construct and draft/proposed operating permit amendment. Complex issues and unusual items are explained in simpler terms and/or greater detail than is sometimes possible in the actual permit. This permit is being issued pursuant to: (1) Sections 391-3-1-.03(1) and 391-3-1-.03(10) of the Georgia Rules for Air Quality Control, (2) Part 70 of Chapter I of Title 40 of the Code of Federal Regulations, and (3) Title V of the Clean Air Act Amendments of 1990. The following narrative is designed to accompany the draft permit and is presented in the same general order as the permit. This narrative is intended only as an adjunct for the reviewer and has no legal standing. Any revisions made to the permit in response to comments received during the public participation and EPA review process will be described in an addendum to this narrative.

I. Facility Description

A. Existing Permits

Table 1 below lists the current Title V permit, and all administrative amendments and minor and significant modifications to that permit. Comments are listed in Table 2 below.

Table 1: Current Title V Permit and Amendments

Permit/Amendment Number	Date of Issuance	Comments	
		Yes	No
2873-245-0002-V-01-0	March 9, 2001	X	
2873-245-0002-V-01-1	September 7, 2001	X	

Table 2: Comments on Specific Permits

Permit Number	Comments
2873-245-0002-V-01-0	Initial Issuance of Title V
2873-245-0002-V-01-1	Significant Modification Amendment, comments received

B. Regulatory Status

1. PSD/NSR

Before Modification:

The facility was potentially a “major” source under PSD/NSR regulations, but had taken limits to avoid PSD/NSR review. Condition 3.2.1 limits NOX emissions from the ABB/CE Boiler (Source Code AB03) to 40 tons per 12 consecutive months.

Conditions 3.2.2 and 3.3.6 limit the amount of natural gas and No. 2 fuel oil allowed to be burned in the ABB/CE Boiler (Source Code AB03).

After Modification:

The modification potentially triggered PSD review, however the calculated changes in emissions do not exceed PSD thresholds.

2. Title V Major Source Status by Pollutant

Table 3: Title V Major Source Status

Pollutant	Is the Pollutant Emitted?	If emitted, what is the facility's Title V status for the Pollutant?		
		Major Source Status	Major Source Requesting SM Status	Non-Major Source Status
PM	Yes	✓		
PM ₁₀	Yes	✓		
SO ₂	Yes	✓		
VOC	Yes			✓
NO _x	Yes	✓		
CO	Yes	✓		
TRS	Yes			✓
H ₂ S	Yes			✓
Individual AP	Yes	✓		
Total HAPs	Yes			✓

II. Proposed Modification

A. Description of Modification

The facility is performing physical changes to the combustion turbine in the Ammonia Plant to improve reliability and to provide an increase in horsepower along with improved fuel efficiency. The modernization of the turbine includes improved metallurgical properties for the buckets, nozzles and shroud blocks and modification of the fuel firing nozzle tips. These modifications will allow the turbine to operate at a higher operating temperature and therefore provide more power to drive the air compressor. This modification will increase production of ammonia from the Ammonia Plant, however the entire facility will remain a net purchaser of ammonia.

B. Emissions Change

Since the emissions from the combustion turbine are fed into the Primary Reformer which in-turn feeds the Solution Regenerator, the change in emissions for PSD purposes for this modification are being considered across the entire Ammonia Plant (Source Codes GT01, AM01 and AM04).

For NSPS applicability purposes the emission change across only the gas turbine is being considered. This decision was based on USEPA Determination Detail Control Number: NR18, dated November 25, 1986, titled "Applicability of NSPS Subpart GG" which states that if a gas turbine exhausts into another piece of equipment it does not in any way conflict with or supersede the applicability of Subpart GG to the gas turbine.

Table 4: Emissions Change Due to Modification

Pollutant	Is the Pollutant Emitted?	Net Actual Emissions Increase (Decrease) (tpy)	Net Potential Emissions Increase (Decrease) (tpy)
PM	Yes	3.9	3.9
PM ₁₀	Yes	3.9	3.9
SO ₂	Yes	(0.3)	(0.3)
VOC	Yes	37.9	37.9
NO _x	Yes	(24.6)	(24.6)
CO	Yes	71.8	71.8
TRS	Yes	0	0
H ₂ S	Yes	0	0
Individual AP	Yes	0	0
Total HAPs	Yes	0	0

The Potential values are based on calculations from vendor estimates at a 5,000 lb/hr steam injection rate. The facility is required to maintain a minimum of 5,000 lb/hour steam injection rate.

C. PSD/NSR Applicability

The modification would have triggered PSD for NO_x and SO₂, however the facility has volunteered to install steam injection on the turbine that will actually reduce NO_x and will no longer inject mercaptans into the gas turbine fuel feed line to reduce SO₂ emissions. The facility has calculated emissions based on a minimum steam injection rate of 5,000 lb/hr into the turbine and an Ammonia production rate of 784,750 tons per year. An initial performance test is required to show that the turbine is meeting the NO_x PSD Avoidance Limits. In addition, the facility is rerouting the Reformer Accumulator Vent stream so that it will no longer be burned in the Reformer. By routing the Accumulator Vent stream to the Aqua Unit, which recycles ammonia back into the Refrigeration section for recovery as product, no NO_x will be created by this stream any more.

Based on AP-42 factors the CO emissions from the CO₂ Reformer are nearly 71.8 tons per year. Some concern was raised since the emissions are very large and the emission factor is rated at ‘E’. Material balance calculations submitted by the facility estimate this total at 0.73 tons per year.

In addition, the VOC emissions from the CO₂ Reformer are nearly 37.9 tons per year, close to the PSD threshold. Condition 4.2.10 requires a VOC performance test establishing a VOC emission rate below the AP-42 factor (1.04 lb/ton) used in the PSD Avoidance calculations.

III. Facility Wide Requirements

No changes in Facility Wide Regulations occur due to this modification.

IV. Regulated Equipment Requirements

A. Brief Process Description

No change in process operation will occur due to this modification.

B. Equipment List for the Process

Emission Units		Specific Limitations/Requirements		Air Pollution Control Devices	
ID No.	Description	Applicable Requirements/Standards	Corresponding Permit Conditions	ID No.	Description
AMMONIA PLANT					
GT01	Gas Turbine	40 CFR 60 Avoidance	3.2.7, 3.2.8, 3.2.9, 3.3.8, 3.3.9, 3.5.4, 3.5.5, 4.1.3, 4.2.9, 5.2.3, 6.1.7, 6.2.11, 6.2.12, 6.2.13, 6.2.14		

C. Equipment & Rule Applicability

Emission and Operating Caps

The calculations provided by the facility (included in Exhibit A) indicate that the modification will not increase any emissions of criteria pollutants beyond the PSD thresholds. Emissions estimates were based on very conservative AP-42 factors or guaranteed vendor estimates. The PSD Avoidance review was conducted using a base steam injection rate of 5,000 lb/hr and a NOx emission rate of 74.83 ppm. The facility must provide a minimum steam injection rate of 5,000 lb/hr to the gas turbine per the permit.

Applicable Rules and Regulations

The facility currently uses steam injection to increase the operating capacity of the gas turbine, therefore the past potential calculations must include the steam injection reduction of NOx for NSPS applicability. Based on the submitted calculations the facility’s past potential NOx emissions were 33 lb/hr at the currently used steam injection rate. After the modification the NOx emission rate will be 80.87 lb/hr, this is an increase in the hourly emission rate of NOx and therefore triggers 40 CFR 60 Subpart GG – Standards of Performance for Stationary Gas Turbines.

The facility will perform a performance test to determine the modified gas turbine’s heat rate and NOx emissions. This value will be compared to the standard allowed by Subpart GG and the limit established for PSD Avoidance of 74.83 ppm. If the NOx emissions are below both the standard and the value used for PSD Avoidance a minimum steam injection rate of 5,000 lb/hr will be required. If the NOx emissions are above either the standard or the value used for PSD Avoidance the steam injection rate will be increased until the lower of the two values is met.

No SO₂ monitoring is necessary due to the keeping of fuel receipts for the natural gas burned. Up to this point in time the facility injected extra mercaptans into the pipeline natural gas before the gas was sent to process equipment. The facility is currently moving the mercaptan injection to after the gas turbine, but before the administration buildings.

D. Compliance Status

The facility indicates it is in compliance.

E. Operational Flexibility

Not Applicable.

F. Permit Conditions

Condition 3.2.7 requires a minimum steam injection rate of 5,000 lb/hr into the gas turbine. If the initial performance test shows that NO_x emissions do not meet the value calculated in condition 3.2.8, then the facility will establish a new minimum steam injection rate to meet the NSPS (40 CFR 60 Subpart GG).

Condition 3.2.8 establishes NO_x limits for the gas turbine based on the standard as required by NSPS Subpart GG or the value used in the PSD Avoidance calculations (74.8 ppm), whichever is smaller. For the Subpart GG emissions limit the heat rate value will be established in the performance test and the fuel bound nitrogen allowance is 0 for pipeline natural gas.

Condition 3.2.9 limits Ammonia production to 784,750 tons per 12-month period for PSD Avoidance purposes. This production limit was used by the facility in its PSD Avoidance calculations.

Condition 3.3.8 permits the turbine to burn only pipeline natural gas with no additional mercaptans added. The original site Title V application indicated that the turbine could burn possibly No. 2 fuel oil, however after discussions with the company this is not the case. The facility is currently removing the ability to use No. 2 fuel oil.

Condition 3.3.9 applies 40 CFR 60 Subpart GG and the General Provisions of 40 CFR 60 Subpart A to the gas turbine (Source Code GT01).

Condition 3.5.4 requires the facility to perform the reroute of the Accumulator Vent System as described in the application within 60 days of permit issuance and report to the Division when it is complete.

Condition 3.5.5 requires the facility to relocate the mercaptan injection site for the natural gas routed to the Gas Turbine (Source Code GT01) to after the gas turbine. This action is to occur within 60 days of permit issuance and reported to the Division when it is complete. Based on conversations with PCS, additional mercaptans were injected into the gas stream (most likely to meet local regulations for the administration building) before the gas turbine. The injection site will be moved to immediately before the administration buildings and after the gas turbine.

V. Testing Requirements (with Associated Record Keeping and Reporting)

Condition 4.2.9 requires a performance test within 60 days of the issuance of this permit. The test must show that the emissions from the gas turbine do not exceed the NO_x emissions allowed in condition 3.2.8. This test shall establish a minimum steam injection rate (5,000 lb/hr minimum) for the Gas Turbine (Source Code GT01) such that the limit is not violated. The facility plans to adjust the steam injection rate to a level such that the NO_x emissions are below that required by Subpart GG and the value used to avoid PSD (74.8 ppm).

The application indicates that “SO₂ emissions from the combustion of natural gas for the baseline period is based on a sulfur analysis that was completed for the natural gas after the addition of mercaptans. The mercaptans will no longer be added for these sources in the future, therefore future SO₂ emissions for natural gas combustion were based on a sulfur analysis of the natural gas prior to the addition of mercaptan.”

VI. Monitoring Requirements (with Associated Record Keeping and Reporting)

Condition 5.2.3.aa requires the facility to monitor the steam injection rate.

VI. Other Record Keeping and Reporting Requirements

The excursion ranges in Table 1 have been changed due to a letter submitted by PCS dated May 30, 2001, and a subsequent application (#13227) received on August 2, 2001. Table 1 shows which ranges were changed and explains the justification for the range change.

Condition 6.1.7.c.11 requires the facility to report to the Division each hour for which the steam injection rate falls below 5,000 lb/hr or the value established by the performance test, which ever is greater.

Condition 6.1.7.c.12 requires the facility to report to the Division when the 12-month rolling total of Ammonia production exceeds 784,750 tons as established by PSD Avoidance calculations.

Condition 6.2.11 requires semi-annual submittal of a supplier provided natural gas analysis instead of the monitoring requirements of Subpart GG. This procedure is allowed as an alternate to fuel sampling per U.S. EPA Region 4 memo, dated March 31, 1988.

Condition 6.2.12 specifies that no determination of fuel bound nitrogen content is required. This alternate monitoring requirement is allowed under the Delegation of Authority to Regions for Custom Fuel Monitoring Under NSPS GG; approved by U.S. EPA August 14, 1987.

Condition 6.2.13 requires the maintenance of monthly fuel usage records for the gas turbine.

Condition 6.2.14 requires the maintenance and reporting of monthly Ammonia production rates from the Ammonia Plant.

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Table 1: Changes to Ranges for Excursions

Condition 6.1.7.c.	Unit	Monitoring	Ranges		Justification
			Current	Proposed	
6.B	AN Neutralizer Scrubber	Pump Pressure (psig)	85 - 100	75 - 100	Pump pressure is normal at 80 psig. No flow measurement or venturi pressure excursions exist at this pressure.
7.A	AN Neutralizer Scrubber	Pump Flow Rate	none	138 - 168	Initial performance test performed.
7.B	AN Neutralizer Scrubber	Pump Pressure (psig)	35 - 50	35 - 60	Pump pressure is normal at 55 psig. No flow measurement excursions exist at this pressure.
7.C	AN Neutralizer Scrubber	Sump Concentration (%)	15 - 25	0 - 45	Weaker concentration lends to better scrubbing (usually around 15%). The new range should be in line with the Ducon Scrubber sump concentration.
8.A	Peabody Scrubber	Stack Temperature (degrees F)	90 - 105	75-105	Actual Temperatures during the last compliance test were 80-83oF (January) and the stack temperature is affected by ambient conditions. Temperature logs were submitted to show this.
8.B	Peabody Scrubber	Pump Pressure-A (psig)	25 - 35	25 - 50	Pressure during the last compliance test was 42-44. In general, high pressure gives more flow (normal operations are ~40). Logs were submitted to show this.
8.C	Peabody Scrubber	Pump Pressure-B (psig)	25 - 35	40 - 60	Pressure during the last compliance test was 52-56. In general, high pressure gives more flow (normal operations are ~50). Logs were submitted to show this.
9.A & B	Ducon Scrubber	Pump Pressure A & B (psig)	45 - 55	40 - 60	In general, high pressure gives more flow for scrubbing. Normal/design range for this pump is 55-60.
9.C	Ducon Scrubber	Blower Amperage-A (amps)	100 - 115	95 - 115	Blower amps occasionally drop to 95. This is only 2% below the lower limit and has little corresponding effect on the blower capacity and is considered normal operation.
9.E	Ducon Scrubber	Stack Temperature (degrees F)	85 - 99	60 - 120	Actual Temperatures during the last compliance test were 69-73oF (January) and the stack temperature is affected by ambient conditions. Temperature logs were submitted to show this.
9.F	Ducon Scrubber	Sump AN Concentration	0 – 45%	0 – 50%	Normal operating ranges is 40 – 50%. The scrubber is operating at 1/5 of the allowable. Higher AN concentration yields a higher pressure also.

Addendum to Narrative

Comments were received from the facility on September 24, 2001. The following comments were received:

1. Condition 3.2.8 refers to the wrong equation, it should be 40 CFR 60.332(a)(2) and not 40 CFR 60.332(a)(1).

Since the unit is not an “electric utility stationary gas turbine”, the Division agrees with the facility and has changed the equation and associated reference.

Original Condition:

- 3.2.8 The Permittee shall not discharge or cause the discharge into the atmosphere from the gas turbine (Source Code GT01), nitrogen oxides in excess of 74.8 ppm or that allowed by the following equation, whichever is lower:
[40 CFR 52..21 Avoidance, 40 CFR 60.332(a)(1)]

$$\text{STD} = \underline{0.0075}(14.4/Y) + F$$

where: STD = allowable NO_x emissions (% volume @ 15% O₂, dry)

Y = heat rate in kilojoules per watt hour

F = fuel bound nitrogen allowance, 0 for pipeline natural gas

Modified Condition:

- 3.2.8 The Permittee shall not discharge or cause the discharge into the atmosphere from the gas turbine (Source Code GT01), nitrogen oxides in excess of 74.8 ppm or that allowed by the following equation, whichever is lower:
[40 CFR 52..21 Avoidance, 40 CFR 60.332(a)(2)]

$$\text{STD} = \underline{0.0150}(14.4/Y) + F$$

where: STD = allowable NO_x emissions (% volume @ 15% O₂, dry)

Y = heat rate in kilojoules per watt hour

F = fuel bound nitrogen allowance, 0 for pipeline natural gas

2. The proposed reroute of the ammonia accumulator vent had to be modified from the original application. During Startup/Shutdown/Malfunction situations the ammonia cannot be fed to the nitric acid plants due to explosion potential. The facility will vent during S/S/M situations causing 0.3 tons per year of ammonia to be vented.

Due to the overall NO_x decreases in emissions from the overall modification this minimal change to the overall project is acceptable to the Division.

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Draft Permit Review		
Reviewing Program	Comments Received (y/n)?	Comments Taken into Consideration in Draft Permit (y/n)?
ISMP	Yes, informal comments	Yes
SSCP	Yes, informal comments	Yes

SSPP Unit Manager: _____
Heather Abrams Date

SSPP Program Manager: _____
Jimmy Johnston Date