

Facility Name: **CITGO Asphalt Refining Company**  
 City: Savannah  
 County: Chatham  
 AIRS #: 04-13-051-00012

Application #: TV-13891  
 Date SIP Application Received: August 27, 2002  
 Date Title V Application Received: July 12, 2002  
 Date of Draft Permit:  
 Permit No: 2911-051-0012-V-01-1

Program	Review Engineers	Review Managers
SSPP	Chakrapani Yendapally	John Yntema
SSCP		Karen Hays
ISMV		Larry Webber
Toxics	NA	NA

## Introduction

This narrative is being provided to assist the reader in understanding the content of the attached SIP permit to construct and/or draft/proposed operating permit amendment. Complex issues and unusual items are explained herein simpler terms and/or greater detail than is sometimes possible in the actual permit. This permit amendment is being issued pursuant to: (1) Georgia Air Quality Act, O.C.G.A § 12-9-1, et seq. (2) Georgia Rules for Air Quality Control, Chapter 391-3-1, and (3) Title V of the Clean Air Act Amendments of 1990. Section 391-3-1-.03(10) of the Georgia Rules for Air Quality Control incorporates requirements of Part 70 of Chapter I of Title 40 of the Code of Federal Regulations promulgated pursuant to the Federal Clean Air Act. The primary purpose of this permit amendment is to identify state and federal air requirements applicable to the modification/construction to be performed at **CITGO Asphalt Refining Company (CITGO)** and to provide practical methods for determining compliance with these requirements. The following narrative is designed to accompany the draft permit amendment and is presented in the same general order as the permit amendment. It initially describes the facility receiving the permit amendment, the applicable requirements and their significance, and the methods for determining compliance with those applicable requirements. This narrative is intended as an adjunct for the reviewer and to provide information only. It has no legal standing. Any revisions made to the permit amendment 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, minor and significant modifications to that permit, and 502(b)(10) attachments. Comments are listed in Table 2 below.

Table 1: Current Title V Permit and Amendments

Permit/Amendment Number	Date of Issuance	Comments	
		Yes	No
2911-051-0012-V-01-0	July 13, 1999		X

Table 2: Comments on Specific Permits

Permit Number	Comments
None	

**B. Regulatory Status****1. PSD/NSR**

The facility is a major source under PSD/NSR regulations and is located in an attainment area, but has never undergone a PSD review. The current modification has the potential to subject the source to a PSD review. However, the facility has requested limits to avoid the modification being subject to PSD review.

**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	Yes	No	No
PM <sub>10</sub>	Yes	Yes	No	No
SO <sub>2</sub>	Yes	Yes	No	No
VOC	Yes	Yes	No	No
NO <sub>x</sub>	Yes	Yes	No	No
CO	Yes	No	No	Yes
TRS	Yes	Yes	No	No

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
H <sub>2</sub> S	Yes	Yes	No	No
Individual HAP	Yes	Yes	No	No
Total HAPs	Yes	Yes	No	No

## Regulatory Analysis

### II. Proposed Modification

#### A. Description of Modification

CITGO Asphalt Refining Company (CITGO) owns and operates an asphalt refining facility located on Foundation Drive in Savannah, Chatham County. The facility processes high asphalt content crude oil using two distillation columns D001 and D002. Dedicated heaters F001 and F002 respectively heat crude entering each distillation column D001 and D002, from storage tanks. Boiler B004 and Boiler B005 together service D001 and D002. Only one boiler is operated at any given time. The steam from the boiler is used to heat the crude passing through the distillation column. The distillation process separates components that makeup crude by taking advantage of the fact that different components have different boiling points. Distillation separates components by converting the liquid into vapor, which is then condensed to liquid. The distillation columns separate the crude into various petroleum components including asphalt. The current capacity of the facility is rated at 28,000 barrels per day (bpd), half of it going to each distillation column. The facility is currently operated under the Title V Permit No. 2911-051-0012-V-01-0.

CITGO is proposing to replace D001 - one of the two existing process distillation columns. The maximum expected capacity of the new distillation column would increase from the current 14,000 bpd to 17,050 bpd, thus increasing the facility's total refining capacity to 31,050 bpd. Please note that the permit application indicates that this maximum expected capacity of 17,050 bpd is 10% more than the rated capacity of the distillation column, which is 15,500 bpd.

The proposed distillation column will operate in a similar manner to the existing unit. The unit will contain approximately the same number of fractionating trays (31), but will be equipped with a more efficient fractionation packed bed.

#### B. Emissions Change

Based on the calculations provided in the permit application, pollutants PM, NO<sub>x</sub>, SO<sub>2</sub>, VOC and H<sub>2</sub>S will have increases that are above PSD significance levels. Therefore, PSD avoidance conditions that limit the 12-month rolling average of these pollutants at levels that are below the PSD significance levels are included in the permit.

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	-	<25
PM <sub>10</sub>	Yes	-	<15
SO <sub>2</sub>	Yes	-	<40
VOC	Yes	-	<40

Table 4: Emissions Change Due to Modification

Pollutant	Is the Pollutant Emitted?	Net Actual Emissions Increase (Decrease) (tpy)	Net Potential Emissions Increase (Decrease) (tpy)
NO <sub>x</sub>	Yes	-	<40
CO	Yes	-	<100
TRS	Yes	-	<10
H <sub>2</sub> S	Yes	-	<10
Individual HAP	Yes	-	<10
Total HAPs	Yes	-	<25

### C. PSD/NSR Applicability

PSD regulations apply to this modification. Potential emission increases from the modification exceed the PSD significance levels triggering a PSD review. However, conditions are included in the permit to limit emissions increases below the PSD significance levels.

## III. Facility Wide Requirements

### A. Emission and Operating Caps:

As discussed earlier, PSD significant increases will occur for emissions of PM, NO<sub>x</sub>, SO<sub>2</sub>, VOC and H<sub>2</sub>S, if not limited by practically enforceable means. To ensure that the emissions are limited below the PSD significance levels, permit conditions are included that limit the 12-month rolling total of SO<sub>2</sub> emissions from the plant to 128.9 tpy, NO<sub>x</sub> to 110.6 tpy, VOC to 149.46 tpy, H<sub>2</sub>S to 38.7 tpy and PM to 36.6 tpy. This will be achieved by limiting the usage of No. 6 fuel oil and natural gas. No explicit limits are set on the fuel usage, CITGO will be required to keep track of each fuel combusted on site and calculate monthly totals of each pollutant listed above.

A condition is included which requires CITGO to submit an initial report that includes the fuel data collected during the first full calendar month of operation after the replacement of the distillation tower. This initial report must include the emission rate calculations and the emission factors used to calculate the emission rates. The report is due within 60-days of the start-up of the distillation tower. The report is being required to ensure, to the Divisions' satisfaction, that CITGO is collecting all the required data and is keeping sufficient records to ensure compliance with Condition Nos. 2.1.2 – 2.1.5 of the permit no. 2911-051-0012-V-01-1.

Since pollutant emissions are functions of the combustion of more than one fuel, the Division will allow the operational flexibility for the facility to use as much as any fuel authorized as long as the Permittee does not violate the emission limits. Conditions are included which require the Permittee to calculate emissions on a monthly and rolling 12-month basis to ensure that permit limits are complied with. Tables 1, 2 and 3 included at the end of this section show the calculations used to arrive at these permit limits. Table 4 shows sample emission calculations of all criteria pollutants and H<sub>2</sub>S for No. 6 fuel oil combustion.

B. Applicable Rules and Regulations

The modification is subject to 40 CFR Part 52.21, Prevention of Significant Deterioration (PSD) regulations and its mirror rule in Georgia Regulation 391-3-1-.027(7). However, conditions are included in the permit to avoid these regulations.

C. Compliance Status

The facility is in compliance with all applicable requirements under Georgia Air Quality Rules.

D. Operational Flexibility

Not applicable.

E. Permit Conditions

As discussed earlier, this modification, if emission limits were not imposed, would allow PSD significant increases to occur for emission of PM, NO<sub>x</sub>, SO<sub>2</sub>, VOC and H<sub>2</sub>S. Conditions 2.1.2, 2.1.3, 2.1.4 and 2.1.5 limit SO<sub>2</sub>, NO<sub>x</sub>, and H<sub>2</sub>S to 128.9 tpy, 110.6 tpy and 38.7 tpy respectively. Limits on SO<sub>2</sub>, NO<sub>x</sub> will ensure that VOC and PM stay below 25 tpy.

<b>TABLE 1</b>										
<b>POTENTIAL EMISSIONS CALCULATED BASED ON NATURAL GAS USAGE</b>										
PM										
Emission Unit	Design Heat	Emission	Potential NG Usage		Emission of Criteria Pollutants based on					
	Input rate	Rate based	Based on the Permit		the potential NG Usage					
	MM Btu/hr	on Permit	MM SCF/yr	MM SCF/mo.	SO2	Nox	VOC	CO	PM	PM
		lb/MM Btu			tpy	tpy	tpy	tpy	tpy	tpy
									(AP-42)	Permit
B004	52.83	0.71	462.79	38.57	0.14	32.40	0.64	8.10	1.76	165.32
B005	59.4	0.49	520.34	43.36	0.16	36.42	0.72	9.11	1.98	127.07
F001	56.4	0.21	494.06	41.17	0.15	34.58	0.69	8.65	1.88	52.01
F002	46.48	0.23	407.16	33.93	0.12	28.50	0.57	7.13	1.55	47.21
Totals			1,884.36	157.03	0.57	131.91	2.62	32.98	7.16	391.62
<b>NOTES:</b>										
Permit Condition No. 3.4.1 formula (B004 & B005)				Permit Condition No. 3.4.2 formula (F001 & F002)						
E =	0.7*(10/R)^0.202		E =		0.5*(10/R)^0.5					
Where	E is the emission rate in Lb/MM Btu			Where	E is the emission rate in Lb/MM Btu					
	R is the heat input in MM Btu/hr				R is the heat input in MM Btu/hr					
<b>Emission Factors for NG combustion</b>										
Heat Rate for Natural Gas	1000MM Btu/MM SCF		<b>AP-42 Chapter 1.4</b>							
Heat input rate for No. 2 FO	140,000Btu/gal		SO2		0.6lb/MM SCF					
Heat input rate for No. 6 FO	120,000Btu/gal		Nox		140lb/MM SCF					
One year	8760hours/year		VOC		2.78lb/MM SCF					
One ton	2,000lbs/ton		CO		35lb/MM SCF					
			PM		7.6lb/MM SCF					
			OR		0.0076lb/MM Btu					

<b>TABLE 2</b>									
<b>POTENTIAL EMISSIONS CALCULATED BASED ON NO. 6 FUEL OIL USAGE</b>									
PM									
Emission Unit	Design Heat	Emission	Potential # 6 FO Usage		Emission of Criteria Pollutants based on				
	Input rate	Rate based	Based on the Permit		the potential # 6 FO Usage				
	MM Btu/hr	on Permit							
		lb/MM Btu	M gallons/yr	M gals/mo.	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	PM
					tpy	tpy	tpy	tpy	tpy
B004	52.83	0.50	3,085.27	257.11	581.27	84.84	0.43	7.71	38.99
B005	59.4	0.49	3,468.96	289.08	653.55	95.40	0.49	8.67	43.84
F001	56.4	0.21	3,293.76	274.48	620.54	90.58	0.46	8.23	41.63
F002	46.48	0.23	2,714.43	226.20	511.40	74.65	0.38	6.79	34.30
Totals			12,562.42	1,046.87	2,366.76	345.47	1.76	31.41	158.76
<b>NOTES:</b>									
Permit Condition No. 3.4.1 formula (B004 & B005)					Permit Condition No. 3.4.2 formula (F001 & F002)				
E =	0.7*(10/R)^0.202		E =		0.5*(10/R)^0.5				
Where	E is the emission rate in Lb/MM Btu			Where	E is the emission rate in Lb/MM Btu				
	R is the heat input in MM Btu/hr				R is the heat input in MM Btu/hr				
Heat Rate for Natural Gas		1000MM Btu/MM SCF		<b>Emission Factors for # 6 Fuel Oil combustion</b>					
Heat input rate for No. 2 FO		140,000Btu/gal		AP-42 Chapter 1.3					
Heat input rate for No. 6 FO		0.15MM Btu/gal		SO <sub>2</sub> *		376.8Lb/ M gallons			
One year	8,760		hours/year		Nox		55Lb/ M gallons		
One ton	2,000		lbs/ton		VOC		0.28Lb/ M gallons		
One M gallon	1,000		gallons		CO		5Lb/ M gallons		
Density of No. 6 fuel oil		7.88lb/gallon		PM		25.28Lb/ M gallons			
* Based on 2.4% sulfur.									

<b>TABLE 3</b>										
<b>PSD AVOIDANCE CALCULATION</b>										
				<b>PM</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>2</sub></b>	<b>CO</b>	<b>VOC<sup>1</sup></b>	<b>H<sub>2</sub>S</b>	
Potential Emissions W/ Modifications (Combustion of No. 6 FO)			tpy	158.76	345.47	2,366.76	31.41	162.73	40.35	
Past actual Annual Emission (Obtained from the data provided by CITGO)			tpy	11.60	70.58	88.86	15.58	109.46	28.70	
Potential Increase w/o limiting permit conditions			tpy	147.16	274.89	2,277.90	15.83	53.27	11.65	
PSD Significant Increase Levels			tpy	25.00	40.00	40.00	100.00	40.00	10.00	
PSD Significant Increases (Yes/No)				Yes	Yes	Yes	No	Yes	Yes	
New Potential (with Permit limits) (Past actual + PSD significance level) <sup>2</sup>			tpy	<b>36.60</b>	<b>110.58</b>	<b>128.86</b>	<b>115.58</b>	<b>149.46</b>	<b>38.70</b>	
<p>1. Most of the VOC emissions are caused by condenser (REF1) and the calculation is not shown here. The number is obtained from the CITGO permit application.</p> <p>2. Note that permit conditions only limit NO<sub>x</sub>, SO<sub>2</sub>, VOC and H<sub>2</sub>S. Since NO<sub>x</sub>, SO<sub>2</sub> and PM emissions are caused by the combustion of No. 6 fuel oil and a lower amount of fuel is needed to reach the SO<sub>2</sub> significance level compared to NO<sub>x</sub>, by limiting SO<sub>2</sub> emissions, all other criteria pollutants including PM emissions are automatically limited to less than their respective PSD significance level. A calculation to establish the above is provided in Table 4.</p>										

<b>TABLE 4</b>									
<b>CALCULATION TO SHOW EMISSION INCREASE LEVELS WITH PERMIT LIMITS</b>									
Maximum allowable SO <sub>2</sub>						=			128.86tpy
Maximum allowable NO <sub>x</sub>						=			110.58tpy
Sulfur percentage in No. 6 fuel oil used by CITGO						=			2.40%
Maximum amount of Fuel oil combusted to reach the SO <sub>2</sub> limit <sup>1</sup>						=			683,970gallons/yr
Maximum amount of Fuel oil combusted to reach the NO <sub>x</sub> limit <sup>1</sup>						=			4,021,091gallons/yr
<p>Since amount of fuel oil combusted to reach SO<sub>2</sub> PSD significance level is lower compared to NO<sub>x</sub> PSD significance level, CITGO will not be able to use the amount of oil needed to reach the NO<sub>x</sub> limit. Therefore, SO<sub>2</sub> emission limit will be the limiting parameter used to determine other criteria pollutant emissions.</p>									
Assuming 683,970 gallons of NO. 6 FO is combusted the maximum amount from other criteria pollutants are									
							PM	=	8.64Tons/year
							NO <sub>x</sub>	=	18.81Tons/year
							VOC	=	0.10Tons/year
							CO	=	1.71Tons/year
							H <sub>2</sub> S <sup>2</sup>	=	36.38Tons/year
<b>Emission Factors for # 6 Fuel Oil combustion</b>					<b>Other Conversion Factors</b>				
AP-42 Chapter 1.3									
SO <sub>2</sub> *	376.8	Lb/ M gallons					Heat input rate for No. 6 FO		0.15MM Btu/gal
Nox	55	Lb/ M gallons					One year		8760hours/year
VOC	0.28	Lb/ M gallons					One ton		2,000lbs/ton
CO	5	Lb/ M gallons					One M gallon		1,000gallons
PM	25.28	Lb/ M gallons					Density of No. 6 fuel oil		7.88lb/gallon
* Based on 2.4% sulfur.									
<p>1 This is a conservative estimate, as this does not take into account the emission from NG combustion. SO<sub>2</sub> emissions from NG are lower than from fuel oil. Therefore, this estimate provides a worst-case scenario. Actual fuel oil usage will be lower because of the combustion of Natural Gas. While Natural gas was not taken into consideration to present the scenario here, the permit requires CITGO to consider all fuels in calculating actual emissions.</p>									
<p>2 AP-42 factors listed above are used to calculate the emissions of all pollutants except H<sub>2</sub>S. The emission factor used to calculate H<sub>2</sub>S emissions are 0.00712 lb H<sub>2</sub>S /Barrel of crude. This is based on historical sampling data (provided in the application) and assuming that H<sub>2</sub>S emissions are directly proportional to the production rate. Total potential H<sub>2</sub>S emissions can be calculated using the maximum capacity of the plant to process crude oil, which is 10,220,000 barrels</p> <p>10,220,000 barrels crude X 0.00712 lb H<sub>2</sub>S /barrel crude processed = 36.38 tpy</p>									

**IV. Regulated Equipment Requirements**

A. Brief Process Description

CITGO is proposing to replace D001, one of the two existing process distillation columns. The maximum capacity of the new distillation column will be 17,050 bpd, compared to the existing column's 14,000 bpd. Note that the permit application indicates that the design capacity of the new distillation column is 15,500 bpd.

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
D001**	Distillation Tower	40 CFR Part 52.21	2.1.1, 2.1.2, 2.1.3, 2.1.4	REF1	Refrigeration/condenser system

\* Generally applicable requirements contained in this permit may also apply to emission units listed above.

\*\* Replacement of original D001

C. Equipment & Rule Applicability

The permitting engineer will elaborate on the facts stated in section II. above as follows:

**Emission and Operating Caps** – Not applicable

**Applicable Rules and Regulations** – Not applicable

D. Compliance Status

Not applicable.

E. Operational Flexibility

Not applicable

F. Permit Conditions

Not applicable.

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

Not applicable.

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

Not applicable.

## VII. Other Record Keeping and Reporting Requirements

### 1. Plant wide

Condition 6.2.9 requires CITGO to use the monthly records required in Condition 6.2.2 and 6.2.3 to calculate the total monthly VOC emissions. VOC emissions are calculated using the formulas outlined in Conditions 3.4.1 and 3.4.2. Each 12-month rolling total of VOC emissions must be calculated to determine if it is in compliance with the emission limit listed in Condition No. 2.1.4. The Permittee is required to notify the Division in writing if VOC emissions exceed the annual limit in Condition No. 2.1.4.

Condition 6.2.10 requires CITGO to use the monthly records required in Condition 6.2.7 to calculate the total monthly SO<sub>2</sub> emissions. Each 12-month rolling total SO<sub>2</sub> emissions must be calculated to determine if it is in compliance with the emission limit listed in Condition No. 2.1.2. The Permittee is required to notify the Division in writing if SO<sub>2</sub> emissions exceed the annual limit in Condition No. 2.1.2.

Condition 6.2.11 requires CITGO to use the monthly records required in Condition 6.2.7 to calculate the total monthly NO<sub>x</sub> emissions. Each 12-month rolling total NO<sub>x</sub> emissions must be calculated to determine if it is in compliance with the emission limit listed in Condition No. 2.1.3. The Permittee is required to notify the Division in writing if NO<sub>x</sub> emissions exceed the annual limit in Condition No. 2.1.3.

Condition 6.2.12 requires CITGO to use the monthly records required in Condition 6.2.2 to calculate the total monthly H<sub>2</sub>S emissions. Each 12-month rolling total of H<sub>2</sub>S emissions must be calculated to determine if it is in compliance with the emissions limit listed in Condition No. 2.1.5. The Permittee is required to notify the Division in writing if H<sub>2</sub>S emissions exceed the annual limit in Condition No. 2.1.5.

### 2. Individual Equipment

Not applicable

### 3. Equipment Groups

Not applicable.

**VIII. Specific Requirements**

Discuss any of the following specific requirements as they apply to the modification.

A. Operational Flexibility

Not applicable.

B. Alternative Requirements

Not applicable.

C. Insignificant Activities

Not applicable.

D. Temporary Sources

Not applicable.

E. Short-Term Activities

Not applicable.

F. Compliance Schedule/Progress Reports

Not applicable.

G. Emissions Trading

Not applicable.

H. Acid Rain Requirements

Not applicable.

I. Prevention of Accidental Releases

Not applicable.

J. Stratospheric Ozone Protection Requirements

Not applicable.

K. Pollution Prevention

Not applicable.

L. Specific Conditions

Not applicable.

**Addendum to Narrative**

The Division did not receive any comments in response to the public notice published on March 2, 2003.