OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

MEMORANDUM **March 20, 2006**

TO: Dawson Lasseter, P.E., Chief Engineer, Air Quality

THROUGH: Richard Kienlen, P.E., Engr. Mgr. II, New Source Permits Section

THROUGH: Peer Review, David Pollard, ROAT

FROM: Herb Neumann, ROAT

SUBJECT: Evaluation of Construction Permit Application No. **99-113-C (M-3)(PSD)**
Fort James Operating Company – Muskogee Mill
4901 Chandler Road, Muskogee
Section 33 & W1/2 Section 34, T15N, R19E
Muskogee County, OK
Driving directions: Muskogee Turnpike to Chandler exit, east to 45th Street, south to Harold Abitz Drive, east into facility.

SECTION I. INTRODUCTION

Applicant has submitted an application covering proposed construction at their Muskogee Mill. The mill is an existing major manufacturer and converter of sanitary paper products such as tissue, napkins, and paper towels (SIC 2621). Auxiliary operations include flexographic printing, platemaking, and production polyethylene film wrap for the paper products.

DEQ received an application for a Part 70 Permit on March 5, 1999. A draft permit was prepared and was made available for public comment. The only comments received were those of the facility. After extensive review, a proposed permit commenced review by EPA Region 6 on December 16, 2005. Until the Part 70 permit is issued, the facility operates under a number of DEQ and EPA permits, where "DEQ" includes permits issued by the Oklahoma State Department of Health, predecessor agency to DEQ. The following table lists these permits, but does not detail their contents, because that information is available in the pending Part 70 permit. Note that an operating permit has not been issued for one construction permit, because the operating permit application was withdrawn after submittal of the Part 70 application, which included the equipment authorized by the construction permit.

75-053-O	PSD-OK-404 (M-1)	79-021-O
77-076-O	81-081-O	81-066-O
97-218-C	83-062-PSD	91-127-O (M-1)

Applicability Determination 99-113-AD was issued June 7, 2002, to correct the factors used in certain emission calculations to bring them into agreement with current AP-42 numbers.

The current application is styled as a Mill Process Improvement Project. The project will affect three areas of the plant and is intended to improve energy efficiency, to allow for papermaking with lower grades of wastepaper, and to reduce dependence on outside vendors of packaging material. The three areas affected are the paper machine and converting area, the polyethylene plant, and the System 5 Pulp area. Increased emissions from this project are expected to trigger Prevention of Significant Deterioration (PSD) significance levels, requiring Tier II permitting and BACT analysis. These issues will be discussed at appropriate points in the following sections of this Memorandum.

SECTION II. PROCESS DESCRIPTION

The facility is a major manufacturer and converter of sanitary paper products, i.e., they make parent rolls and they also make finished products such as tissue, napkins, and paper towels. Many of these products are printed with decorative inks during the converting process. The main processes involved in papermaking are pulping, de-inking (bleaching out the inks in the recycled paper), paper production, and printing. The company's basic raw material for wet papermaking is currently recycled wastepaper and a small amount of purchased pulp, which is processed into pulp using a proprietary process. The facility typically recycles over a thousand tons of wastepaper per day. A complete description of the processes used may be found in the memorandum associated with the pending Part 70 permit, so the discussion in this section will address only those portions of the process affected by the current project.

Pulping and Pulp Processing

The derivation, rationale, and technical justification for the emission calculations are presented in the section for emissions. Following is a list of functions performed in the pulping process and equipment used to perform each.

Converting wastepaper to a pulp slurry, using mechanical agitation and water - Pulpers.
Pulp blending - Stock Blend Tank.
Mixing the pulp slurry with process water, dilution water, chemicals, etc. – Mixer.
Providing residence time to allow the bleach medium to react with the pulp slurry- Bleach Towers.
Separating solid contaminants from the pulp slurry – Screens, Washers, Flotation Cell Washers, Cleaners.
Dewatering the pulp slurry and increasing consistency - Stock Presses.
Increasing pulp slurry consistency - Thickeners.

The pulping and pulp processing systems process and bleach wastepaper for use in the manufacture of tissue, towel, and napkin paper. This proprietary process uses bleaching agents on most grades of paper. Recycled wastepaper is re-pulped by physical and chemical processes into a pulp slurry to recover usable fiber, blended with various de-inking and bleaching compounds, and processed into paper stock to make the paper products. At the pulpers, recycled wastepaper is blended with hot water while mechanical agitation is used to convert the mixture into pulp slurry. Generally, the incoming slurry is screened to remove debris and impurities. Contaminants are removed in this step, as well. Additional contaminant removal is accomplished by means of processes performed by other equipment described above. Bleaching agents are added to the slurry for the purpose of increasing brightness. The facility uses no chlorine or chlorine dioxide to bleach pulp. Bleached pulp is stored in storage tanks for later use on paper machines to make paper. VOCs and organic pollutants are released during pulp processing as a result of chemical and mechanical processes.

The facility has five systems for this process. All systems are similar in design and operation, although they are capable of using differing types of bleaching agents or other chemicals. An extensive discussion of the effect of such operating variability is found in the Memorandum associated with the pending Part 70 permit and there will be further discussion in the Emissions section of this memorandum. Only System 5 is affected by the current project, and only non-emitting components will be physically altered. For instance, existing items, such as wastepaper handling equipment, pumps, rotors, screens, and cleaners may be upgraded, new items, such as a clarifier, a washer, and a fiber recovery unit may be added, and certain other units, such as presses, washers, flotation cells, or thickeners may be added or upgraded. None of these proposed changes affects the design capacity of System 5, but they are expected to enable it to perform closer to that capacity.

Paper Production

The processed secondary pulp fiber is pumped to the paper machines, PM-11, PM-12, PM-13, PM-14, and PM-15, where the "parent" rolls are produced. Parent rolls are large continuous rolls of paper that are slit into narrower rolls for further handling. At this facility a roll can be as wide as 273″, or nearly 23′. Water is removed from the incoming pulp stock by a screen. The pulp is then sprayed onto a belt where a vacuum is pulled from below to remove additional water. Residual moisture is removed from the produced paper as it is dried in fuel-burning hoods and/or in the Yankee Dryers by steam. These drying processes result in emissions of VOCs from the pulp and paper. All hoods will be modified to provide more efficient flow and heating and new burners will be installed in all machines except PM-15. The burners to be installed will use natural gas, with propane as an alternate. The boilers providing steam combust coal and/or natural gas. PM-11, 12, and 13 have after-dryers that use steam from the power plant. The nature and quantity of process and combustion emissions will be addressed in the Emissions section following. Much of the parent roll paper is slit into product rolls and converted to finished product at the facility. Following is a description of each paper machine.

PM-11 is a 209-inch, wet crepe/dry crepe twin-wire periformer, manufactured by KMW, with a suction forming roll, single-felted press section, two pressure rolls, an 18-foot Yankee dryer equipped with two 24 MMBTUH gas-fired hoods, and five after-dryers. The current project will replace the burners with new burners rated as high as 70 MMBTUH total. The stock system is conventional, utilizing a drum save-all for fiber recovery and an air flotation clarifier for water recycling.

PM-12 is a 209-inch, wet crepe twin-wire periformer, manufactured by KMW, with a suction forming roll, single-felted press section, two pressure rolls, an 18-foot Yankee dryer equipped with two 16.5 MMBTUH gas-fired hoods, and fourteen after-dryers. The current project will replace the burners with new burners rated as high as 70 MMBTUH total. The stock system is conventional, utilizing a drum save-all for fiber recovery and an air flotation clarifier for water recycling.

PM-13 is a 209-inch, wet crepe/dry crepe S-wrap twin-wire periformer, manufactured by KMW, with a solid forming roll, single-felted press section, two pressure rolls, an 18-foot Yankee dryer equipped with two burners rated at 16.5 MMBTUH gas-fired hoods, and eight after-dryers. The current project may replace the burners with new burners rated as high as 70 MMBTUH total. The stock system is conventional, utilizing a drum save-all for fiber recovery and an air flotation clarifier for water recycling.

PM-14 is a 271-inch, dry crepe twin-wire periformer, manufactured by Beloit, with a solid forming roll, single-felted press section, two pressure rolls, and an 18-foot Yankee dryer equipped with two 24 MMBTUH gas-fired hoods. The current project will replace the burners with new burners rated as high as 70 MMBTUH total. The stock system is conventional, utilizing a drum save-all for fiber recovery and an air flotation clarifier for water recycling.

PM-15 is a 273-inch, dry crepe twin-wire periformer, manufactured by Beloit, with a solid forming roll, single-felted press section, two pressure rolls, and an 18-foot Yankee dryer equipped with two 25 MMBTUH gas-fired hoods and high temperature hot water. The stock system is conventional, utilizing a disc save-all for fiber recovery and an air flotation clarifier for water recycling.

A table identified as "Process Flow – Paper Machines" in the pending Part 70 summarizes the equipment used in each system line and the point of entry in the process for additives in the order they are utilized. It also identifies the emission units that were tested by The National Council for Air and Stream Improvement (NCASI) in an industry-wide study of emissions from such facilities. The lengthy table is not duplicated here.

Solvent Cleaning of Paper Machines

Cleanup solvent is pumped from tanks or totes to paper machines PM-11, PM-12, PM-13, PM-14, and PM-15 for application on the machine clothing (felts and wires). The purpose of this cleanup is to rid the machine clothing of any contaminants, commonly known as stickies, which may be deposited from the paper stock going to the machines. These contaminants would adversely affect product from the machine by forming small holes or creating inconsistencies in the paper if not cleaned regularly. Additionally, smaller amounts of solvent are used occasionally for cleaning equipment at the pulp processing mill, PP-1. No physical changes or changes in the method of operation are proposed for the current project. Emissions of VOC authorized in the pending Part 70 permit do not require adjusting.

Flexographic Paper Printing

Designs are printed on the tissue products by flexographic paper printer systems FP-1, FP-7, and FP-8. These systems use water-based inks for printing. Because the project should increase parent roll production, it is reasonable to assume that more printed product will be manufactured, but the current project proposes no physical or operational changes in this area.

FP-1 consists of six flexographic printing presses that print paper parent rolls to produce printed parent rolls. These printed parent rolls become paper towel and napkin products.

FP-7 is a 101.5-inch, four color, in-line flexographic printing press and re-winder that also prints paper parent rolls to produce printed towel products at the end of the unit.

FP-8 is a 4-color, 78-inch wide, flexographic printing press, manufactured by Bretting. It was custom built and has no number. This unit was proposed for addition during the Part 70 permit review and was installed in June 2005.

Polyethylene Extruding and Flexographic Printing (polyethylene film)

The polyethylene extruder, the plate-making room, and the flexographic printing room are all housed in the Poly Plant Building.

Flexo-plate making is conducted in the plate-making room. The plates are produced for use with all of the mill plant's flexographic printers. VOC-containing solvents are used in the finishing step of plate-making. VOC emissions from a plate washing process are discharged from the building through a horizontal vent. A smaller amount of fugitives leave the room through two door openings into the Poly Plant building. The Poly Plant building has numerous vents, the most prominent being three 5' x 5' exhaust vents down the center-line peak of the building roof. These vents have hinged-flap rain caps that result in somewhat of a horizontal discharge. Some of the solvent is recovered and recycled. A proposed second plate washer will use in-line cleaning and minimize the emissions of solvent.

PO-1 is the designation of the polyethylene extruding plant. The paper products are ultimately wrapped with polyethylene over-wrap and other materials, packaged, and distributed to customers. Plastic over-wrap is produced on-site from the polyethylene and extruding plant. Polyethylene pellets, stored in silos, are pneumatically conveyed to the extruder. The extruder produces a polyethylene tube which is elongated by take-off nip rollers, air cooled, solidified, passed through a corona treater, and wound onto takeoff rolls. Ozone generated in the corona treating process is discharged through a horizontal vent. Once a full roll is produced, it is taken from the takeoff roll, rewound into rolls of unprinted polyethylene film, and stored in the same building until needed for printing. The current project will add three new extruders, each with a corona treater.

Flexographic printing of the polyethylene film is conducted in the flexographic printing room. The polyethylene rolls are fed into a six-color, central impression flexographic printing press and dried through the tunnel dryer to produce printed parent rolls of polyethylene film. A catalytic oxidizer controls VOC emissions. The finished rolls are stored and transferred to locations within the facility where the product may be needed. The current project will add three new presses and replace the catalytic oxidizer with a larger thermal oxidizer, because the catalytic oxidizer will be too small to handle the increased printing load. A complete enclosure will be constructed around all four presses and negative pressure maintained, resulting in 100% capture of all VOC.

Steam and Electricity Co-generation (power plant)

The facility has a power plant utilizing four boilers, identified as emission units B-1, B-2, B-3, and B-4, which co-generate most of the electrical and steam needs of the facility. They are fueled by coal and natural gas. The ash residue generated from this operation is landfilled in an approved on-site landfill. Opacity of the boiler emissions is monitored continuously and recorded on strip charts. Following is a description of each boiler.

B-1 is primarily a natural gas-fired package boiler rated at 310 MMBTUH. It shares a common stack with boiler B-2.

B-2 is primarily a pulverized coal-fired boiler rated at 440 MMBTUH. It is capable of firing natural gas as a backup fuel. It uses an electrostatic precipitator for particulate control and shares a common stack with boiler B-1.

B-3 is primarily a pulverized coal-fired boiler rated at 557.11 MMBTUH. It is capable of firing natural gas as a backup fuel. It uses a baghouse for particulate control and shares a common stack with boiler B-4.

B-4 is primarily a pulverized coal-fired boiler rated at 557.11 MMBTUH. It is capable of firing natural gas as a backup fuel. It uses a baghouse for particulate control and shares a common stack with boiler B-3.

Coal Preparation Plant

The coal preparation plant supplies the boilers with pulverized coal fuel. All emission units except the coal pile are subject to the provisions of 40 CFR 60, Subpart Y, (Coal Preparation Plants). More detail on the applicability criteria is found in the NSPS discussion of Section VIII of the memorandum associated with the pending Part 70 permit. The current project will not affect the applicability of any rule or regulation pertaining to the use or handling of coal. Also, the current project will not cause physical or operational changes in any of these processes.

SECTION III. EQUIPMENT

The following tables list those Emission Units (EUs) at the facility that contribute to a process that generates significant emissions. The tables are categorized by Emission Unit Groups (EUGs), based on the type of emission and/or an applicable rule. The application states that the date of construction is either the approximate date the company commenced construction of the particular process, or the date of the last modification of the process for which the company obtained an air permit under laws existing at that time. Only those EUGs or portions of EUGs affected by the current project are listed. Additional details may be found in the Memorandum associated with the pending Part 70 permit.

EUG 1 – Subpart D Boilers

This EUG includes boilers that are subject to 40 CFR 60, Subpart D (Fossil-Fuel-Fired Steam Generators for Which Construction is Commenced After August 17, 1971).

Subpart D Boilers

EU ID	Boiler Manufacturer	Boiler Rating MMBTUH	Burner Model	Construct Date
B-1	Zurn Industries, Inc.	310	Keystone SAOH-MJ-DAR-48	1975
B-2	Babcock & Wilcox Company	440	BW-24089	1975
B-3	Combustion Engineering, Inc.	557.11	VU-40	1978
B-4	Riley Stoker	557.11	RX Turbofurnace	1981

EUG 2 – Combustion Sources Not Subject to NSPS or NESHAP

This EUG includes emission units that have combustion emissions, but are not subject to an NSPS or a NESHAP performance standard. PO-1, the catalytic oxidizer, will be replaced by a regenerative thermal oxidizer (RTO). PM-11, 12, 13, and 14 will have their burners replaced. The first table following identifies existing equipment, while the second table describes the changes to be made to the emission source within the unit.

Existing Units

EU ID	EU Name	Model #	Const. Date
PM-11	Paper Machine #11	Kinedizer 27M	1975
PM-12	Paper Machine #12	Oven-Pak EB6 Model 400	1975
PM-13	Paper Machine #13	Oven-Pak EB6 Model 400	1979
PM-14	Paper Machine #14	Combustifume	1981
PM-15	Paper Machine #15	LV-85	1992
PO-1	Printing Press Tunnel Dryer	Oven-Pak EB3	1983
PO-1	Catalytic Oxidizing Incinerator	HXC II - 400	1983
DG-1	Emergency Generator	Marathon Electric, Magna One	1982
DG-2	Emergency Generator	Marathon Electric, Magna One	1982

Proposed Changes

EU ID	Burners and Heat Input Rating	
	Existing	**Proposed**
PM-11	2 @ 24 MMBTUH each	2 @ 35 MMBTUH each
PM-12	2 @ 16.5 MMBTUH each	2 @ 35 MMBTUH each
PM-13	2 @ 16.5 MMBTUH each	2 @ 35 MMBTUH each
PM-14	2 @ 24 MMBTUH each	2 @ 35 MMBTUH each
PO-1*	2 MMBTUH	10.4 MMBTUH

* Catalytic oxidizer to be replaced by regenerative thermal oxidizer.

EUG 3 – Subpart Y Coal Preparation Plant

The Coal Preparation Plant, including all emission units, such as coal processing and conveying equipment and coal storage systems, is subject to the provisions of 40 CFR 60, Subpart Y, which affects coal preparation plants that process more than 200 tons per day. The coal storage pile, including railcar unloading and stacking equipment leading to the pile, are not subject to this rule, and are not included in this EUG. The detailed equipment list found in the Memorandum associated with the pending Part 70 permit is not repeated here, because there are no physical changes or changes in the method of operation. Increased use of coal as boiler fuel is possible, but this does not affect the equipment.

EUG 4 – PP-1 Pulp Processing Units (Subpart S Affected/No Applicable Standards)

Process units in this EUG emit VOC from bleaching and pulping operations. Some of these units are affected processes under 40 CFR 63, Subpart S (Pulp and Paper Industry). The facility uses secondary wood (recycled paper) fiber and is therefore an affected facility, but is not subject to any performance standard or other requirements at this time because of the sort of processes and type of bleaching agents currently used in producing the secondary fiber pulp. Therefore, this

EUG is reserved for any future Subpart S regulated units. Emissions from these units are included with those for EUG 6. The current project is expected to add or modify several items as identified by a 2006 construction date in the following table, without altering the applicability of any MACT requirements. The bulk of these changes will occur in System 5.

Pulp Processing Units

EU Name	Construction Date
Pulpers (not system specific)	1977, 1979, 1981, 1983, 1992, est.
Unbleached Stock Blend Tanks	1977 & 1983, est.
Screens	1977, 1979, 1981, 1983, & 1992, est., 2006
Unbleached Washers	1977, est., 2006
Flotation Cell Washers	1977, 1979, 1981, 1983, & 1992, est., 2006
Unbleached Thickener	1977 & 1992, est.
Bleached Washers	1977, 1981, 1983, 1992, est., 2006
Storage (not system specific)	1977, 1979, 1981, 1983, 1992 est.
Bleach Towers	1977, 1979, 1981, 1983, 1992, est.
Thickeners	1979, 1981, 1983, est., 2006
Unbleached Stock Presses	1992, est., 2006
Mixers	1992, est.
Cleaners	1992, est., 2006

EUG 5 – Subpart KK Flexographic Printing

This EUG includes emission units such as flexographic printing presses and auxiliary equipment that are subject to 40 CFR 63, Subpart KK (Printing and Publishing Industry). No equipment will be modified, but three additional polyethylene printers will be added by the current project.

EUG 5 – Subpart KK Flexographic Printing

<table>
<tr><th>EU ID</th><th>EU Name</th><th>Manufacturer/Model No.</th><th>Const. Date</th></tr>
<tr><td rowspan="4">PO-1</td><td>Polyethylene Printer</td><td>Paper Converting Machine Company (PCMC), Model No. 6795, 6-color w/ vapor collection hood and tunnel dryer</td><td>6/84</td></tr>
<tr><td>Polyethylene Printer 2</td><td rowspan="3">Make/model N/A, but similar to that listed above.</td><td rowspan="3">2005</td></tr>
<tr><td>Polyethylene Printer 3</td></tr>
<tr><td>Polyethylene Printer 4</td></tr>
<tr><td>FP-1</td><td>Paper Printers (six)</td><td>Flexo 21-182 – PCMC/ Model No. 6724
Flexo 31-001 – Fort Howard
Flexo 31-002 – Fort Howard
Flexo 31-003 – Fort Howard
Flexo 31-005 – PCMC/Model No. 6992
Flexo 31-008 – PCMC/Model No. 7416</td><td>1983
1980
1980
1980
1990
1993</td></tr>
<tr><td>FP-7</td><td>Paper Printer</td><td>Flexo #7 – PCMC/Model No. 6726</td><td>1997</td></tr>
<tr><td>FP-8</td><td>Paper Printer</td><td>Flexo #8 – Bretting 4-color 78″ wide</td><td>6/05</td></tr>
</table>

EUG 6 – VOC Sources Not Subject to a NSPS or NESHAP

This EUG includes emission units that are subject to a VOC limit or may potentially be subject to OAC 252:100-42. It includes units having VOC or HAP emissions that are part of the paper making process, but not subject to 40 CFR 63 Subpart S, units not subject to an NSPS or NESHAP performance standard, and units subject to an NSPS or NESHAP performance standard but emitting VOC pollutants not covered by the standard (such as the flexographic printers).

EUG 6 – VOC Sources Not Subject to a NSPS or NESHAP

EU ID	EU Name	Manufacturer/Model/Serial #	Const. Date
PP-1	Pulp Processing Units	Components listed in EUG 4	1975-1992
PM-11	Paper Machine #11	KMW	1975
PM-12	Paper Machine #12	KMW	1975
PM-13	Paper Machine #13	KMW	1979
PM-14	Paper Machine #14	Beloit	1981
PM-15	Paper Machine #15	Beloit	1992
	Paper Machine Additives	NA	
SC-1	Solvent Cleaning of PM-11, PM-12, PM-13, and PM-14	NA	1975
PM-15	Solvent Cleaning	NA	1992
PO-1	Flexo-plate making	Anderson-Vreeland	June, 1984
	Flexographic Polyethylene Printer	Paper Converting Machine Company (PCMC), Model No. 6795, 6-color, w/ vapor collection hood and tunnel dryer	June, 1984
	Polyethylene Printers (3)	Similar to above (proposed)	2005
FP-1	Flexographic Paper Printers (six)	Flexo 21-182 – PCMC/ Model No. 6724 Flexo 31-001 – Fort Howard Flexo 31-002 – Fort Howard Flexo 31-003 – Fort Howard Flexo 31-005 – PCMC/Model No. 6992 Flexo 31-008 – PCMC/Model No. 7416	1983 1980 1980 1980 1990 1993
FP-7	Flexographic Paper Printer	Flexo #7 – PCMC/Model No. 6726	1997
FP-8	Flexographic Paper Printer	Bretting 4-color, 78” wide	6/05

EUG 7 – Non-Combustion PM Sources Not Subject to NSPS or NESHAP

This EUG includes emission units that have particulate process emissions not resulting from combustion, and that are not subject to an NSPS or a NESHAP performance standard.

Non-Combustion PM Sources

EU ID	EU Name	Manufacturer/Serial #	Construct Date
FS 1	Coal Pile	NA	1975
PM-11	Paper Machine #11	KMW	1975
PM-12	Paper Machine #12	KMW	1975
PM-13	Paper Machine #13	KMW	1979
PM-14	Paper Machine #14	Beloit	1981
PM-15	Paper Machine #15	Beloit	1992

SECTION IV. EMISSIONS

This section will review calculated potential emissions for those EUGs affected by the current project. Actual emissions for each EUG will also be stated, but analysis of the increase or decrease will be deferred to Section VIII (Federal Regulations). Nominal capacity of the plant is 1,476 air-dried tons of paper per day (ADT) and the system design capacity is 205,381 tons per year of oven-dried finished stock (ODTP). The 2002-2003 average has been 948 ADT and the decrease in quality of wastepaper has depressed the plant's current throughput to 114,766 ODTP. The facility bases its calculations on the high end of the ADT, using 1,476 ADT as a standard for calculating potential to emit (PTE). The facility expects a realistic increase in annual production of 36,500 ODTP, leaving annual production well below the 205,381 ODTP design rate.

EUG 1 – Subpart D Boilers

The following tables condense information available in the memorandum associated with the pending Part 70 permit. Fuel oil data is excluded here, since the facility states that it no longer has the ability to burn oil. There are no changes contemplated for these boilers and these tables will not be used to support analysis of PSD significance.

Boiler Descriptions

EU ID	Rating (MMBTUH)	Firing Configuration	Controls	Low NO_X	Fuels
B-1	310	Forced Draft Package	None	No	Gas
B-2	440	Wall Fired	Electrostatic Precipitator	No	Coal/Gas
B-3	557.11	Tilting Tangential	Baghouse Filter	No	Coal/Gas
B-4	557.11	Wall Fired, Opposing Walls	Baghouse Filter	Yes	Coal/Gas

Boiler Emission Calculations (TPY)

		COAL		NATURAL GAS	
		Emissions Factor	**Emissions**	**Emissions Factor**	**Emissions**
B-1: 310 MMBTUH	PM	NA	NA	7.6 lbs/MMCF(4)	12.4 (1)
	NO_X	NA	NA	0.115 lbs/MMBTU(3)	187 (1)
	SO_2	NA	NA	0.6 lbs/MMCF(4)	0.98 (1)
	VOC	NA	NA	5.5 lbs/MMCF(4)	8.96 (1)
	CO	NA	NA	84 lbs/MMCF(4)	137 (1)
	HCl	NA	NA	NA	NA
	H_2SO_4	NA	NA	NA	NA
	HF	NA	NA	NA	NA
B-2: 440	PM (Hi Btu Coal)	0.032 lbs/MMBTU(3)	74.0 (1)	7.6 lbs/MMCF(4),(5)	0.18 (1)
	PM (Lo Btu Coal)	0.027 lbs/MMBTU(3)	62.4 (1)		
	NO_X (Hi Btu Coal)	0.43 lbs/MMBTU(3)	994 (1)	190 lbs/MMCF(6)	366
	NO_X (Lo Btu Coal)	0.319 lbs/MMBTU(3)	738 (1)		
	SO_2 (Hi Btu Coal)	0.644 lbs/MMBTU(3)	1,489(1)	0.6 lbs/MMCF(4)	1.39 (1)
	SO_2 (Lo Btu Coal)	0.267 lbs/MMBTU(3)	617 (1)		
	VOC (Hi Btu Coal)	0.075 lbs/MMBTU(3)	173 (1)	5.5 lbs/MMCF(4),(1)	12.7 (1)
	VOC (Lo Btu Coal)	0.002 lbs/MMBTU(3)	4.63 (1)		

		COAL		NATURAL GAS	
		Emissions Factor	Emissions	Emissions Factor	Emissions
	CO (Hi Btu Coal)	0.022 lbs/MMBTU(3)	50.9 (1)	84 lbs/MMCF(1), (6)	194 (1)
	CO (Lo Btu Coal)	0.004 lbs/MMBTU(3)	9.25 (1)		
	HCl (Hi Btu Coal)	0.012 lbs/MMBTU(3)	27.8 (1)	NA	NA
	HCl (Lo Btu Coal)	0.003 lbs/MMBTU(3)	6.94 (1)		
	H_2SO_4 (Hi Btu Coal)	0.001 lbs/MMBTU(3)	2.31 (1)	NA	NA
	H_2SO_4 (Lo Btu Coal)	0.017 lbs/MMBTU(3)	39.3 (1)		
	HF (Hi Btu Coal)	0.006 lbs/MMBTU(3)	13.9 (1)	NA	NA
	HF (Lo Btu Coal)	0.001 lbs/MMBTU(3)	2.31 (1)		
B-3: 557 MMBTUH	PM	0.005 lbs/MMBTU(3)	14.6 (1)	7.6 lbs/MMCF(4),(7)	0.09 (1)
	NO_X	0.224 lbs/MMBTU(3)	656 (1)	170 lbs/MMCF(6)	456 (2)
	SO_2	0.403 lbs/MMBTU(3)	1,180 (1)	0.6 lbs/MMCF(4)	1.76 (1)
	VOC	0.001 lbs/MMBTU(3)	2.93 (1)	5.5 lbs/MMCF(4)	16.1 (1)
	CO	0.003 lbs/MMBTU(3)	8.78 (1)	24 lbs/MMCF(6)	70.3 (1)
	HCl	0.03 lbs/MMBTU(3)	87.8 (1)	NA	NA
	H_2SO_4	0.003 lbs/MMBTU(3)	8.78 (1)	NA	NA
	HF	0.001 lbs/MMBTU(3)	2.93 (1)	NA	NA
B-4: 557 MMBTUH	PM	0.015 lbs/MMBTU(3)	43.9 (1)	7.6 lbs/MMCF(4),(8)	0.18 (1)
	NO_X	0.339 lbs/MMBTU(3)	992 (1)	190 lbs/MMCF(6)	464
	SO_2	0.631 lbs/MMBTU(3)	1,847 (1)	0.6 lbs/MMCF(4)	1.76 (1)
	VOC	0.001 lbs/MMBTU(3)	2.93 (1)	5.5 lbs/MMCF(4)	13.4
	CO	0.012 lbs/MMBTU(3)	35.1 (1)	84 lbs/MMCF(6)	205
	HCl	0.033 lbs/MMBTU(3)	96.6 (1)	NA	NA
	H_2SO_4	0.004 lbs/MMBTU(3)	11.7 (1)	NA	NA
	HF	0.001 lbs/MMBTU(3)	2.93 (1)	NA	NA

(1) 20% contingency added
(2) 10% contingency added
(3) Stack tests conducted in June 1980 for Boiler B-1, on January 7, 8, 9, 2003, for B-2 (High Btu coal), May 16 & 17, 2003, for B-2 (Low Btu coal), May 20 & 21, 2003, for B-3, and April 15 & 16, 2003, for B-4.
(4) Table 1.4-2 of AP-42 (7/98)
(5) ESP efficiency of 99%
(6) Table 1.4-1 of AP-42 (7/98)
(7) Baghouse efficiency of 99.60%
(8) Baghouse efficiency of 99.20%
(9) Low BTU coal is sub-bituminous and high BTU coal is bituminous.

Worst-case PTE Summary for Boilers

	PM	NO_X	SO_2	VOC	CO	HCl	H_2SO_4	HF
B-1(2)	12.4	187	0.98	8.96	137	NA	NA	NA
B-2(1)	74.0	994	1,489	173	194(2)	27.8	39.3	13.9
B-3(1)	14.6	656	1,180	16.1(2)	70.3(2)	87.8	8.78	2.93
B-4(1)	43.9	992	1,847	13.4(2)	205(2)	96.6	11.7	2.93
Total	**145**	**2,829**	**4,517**	**211**	**606**	**212**	**59.8**	**19.8**

(1) – Coal fired emissions, unless noted otherwise

(2) – Natural gas fired emissions, unless noted otherwise

Establishing the actual-to-potential increase in emissions for PSD analysis is difficult with respect to the boilers. Since the drying operations have several options available, heat for drying may come from the hood burners, from hot water, or from steam. As will be seen at a later point in this memorandum, the full actual-to-potential emission increase is assumed to occur for the hood burners. While it is certainly possible that steam could just as easily be used, the increases in burner capacity due to this project are more than adequate to cover the planned production increases. The applicant has proposed that increases in actual-to-potential for steam from the boilers be based on the comparison between maximum actual production as the facility is currently configured and the maximum production that the applicant hopes to achieve after the current project is completed. The current maximum daily production achieved is 1,224 ADT and the design capacity is 1,476 ADT. Facility records for actual production and actual steam use during the two-year period 2002-2003 show an average steam use equivalent to 7 MMBTU/ADT. Thus, the increase to 1,476 ADT would require

$$(1{,}476 - 1{,}224) \text{ ADT} \times 7 \text{ MMBTU/ADT} \times 365 \text{ days/year} = 643{,}860 \text{ MMBTU/year.}$$

All boilers were reviewed to determine the conservatively highest emissions that could be realized by combusting the BTUs required. The first table following shows the emission factors used in this analysis. Factors for SO_2, NO_X, and PM_{10} are maximum allowables from Subpart D and/or Subchapters 19, 31, and 33. All others are footnoted. The second table shows additional project emissions from each boiler, citing the highest emissions from each. Note that gas for boilers 2 and 3 is used only for ignition or flame stabilization and cannot be delivered to these boilers in sufficient amount to allow for operation solely on gas.

Pollutant	**Emission Factors (lb/MMBTU)**	
	Coal	**Gas**
SO_2	1.20	0.2
NO_X	0.7	0.2
PM_{10}	0.1	0.1
CO	0.028(1)	0.084(2)
VOC	0.0034(3)	0.0055(4)
Sulfuric acid mist	0.017(5)	--
Lead	6.02E-06(6)	5.0E-06(4)

1. Pulverized Coal NSPS Unit emission factor from Table 1.1-3 of AP-42 (9/98), using worst-case heat content sampling of 17.68 MMBTU/ton for 2002-2003.
2. Uncontrolled Post-NSPS Large Wall-Fired Units emission factor from Table 1.4-1 of AP-42 (7/98), assuming 1,000 BTU/CF.
3. Total Non Methane OC emission factor for Dry Bottom Units from Table 1.1-19 of AP-42 (9/98), using 17.68 MMBTU/ton as in note 1.
4. Emission factor from Table 1.4-2 (7/98), assuming 1,000 BTU/CF.
5. The highest average value from three runs for each boiler during stack testing in May 2003.
6. The highest average value, including soot-blowing times, from three runs for each boiler during stack testing on January 7 and 8, 2003.

Pollutant	Emissions (TPY)			
	B-1 (Gas)	B-2 or B-3 (Coal)	B-4 (Coal/Gas)	Maximum
SO_2	64.4	386	386	386
NO_X	64.4	225	225	225
PM_{10}	32.2	32.2	32.2	32.2
CO	27.0	9.01	27.0	27.0
VOC	1.77	1.09	1.77	1.77
Sulfuric Acid Mist	0	5.47	5.47	5.47
Lead	0.0016	0.0019	0.0019	0.0019

EUG 2 – Combustion Sources Not Subject to NSPS or NESHAP

Discussion in the memoranda associated with the pending Part 70 permit and with earlier operating permits, some of whose conditions will be included in the Part 70 permit, considers fuel oil as an alternate fuel for the burners in the paper machine hoods. Since the burners are no longer capable of using liquid fuel, the only alternate considered for the current project is propane. Emission factors for natural gas represent the worst-case analysis when compared with propane and will be used for this discussion. Factors for SO_2, PM_{10}, VOC, and lead are taken from Table 1.4-2 of AP-42 (7/98), inflated by 20% as a safety factor, and assumed to apply on a 1,000 BTU/CF basis. The PM_{10} factor used is that for total PM. Factors for NO_X and CO are taken from burners similar to those currently in place. Although the new burners might have lower emission factors and may even be required by BACT to have lower emissions, and although a lower permit limit is in place for the burners on PM-14, higher values are used throughout this discussion to ensure conservatively high results. No claim is made here as to requirements for, or results from, BACT analysis. Note that the burners in PM-15 are not to be modified or replaced. The following table lists all of the emission factors used to calculate combustion emissions from the paper machine hood burners.

Machine No.	Pollutant Emission Factors (Lbs/MMBTU)					
	SO_2	PM_{10}	VOC	Lead	NO_X	CO
PM-11	7.2×10^{-4}	9.12×10^{-3}	6.6×10^{-3}	6×10^{-7}	0.12	0.37
PM-12					0.12	0.29
PM-13					0.12	0.29
PM-14					0.15	0.44
PM-15					0.15	0.44

The following table lists average annual fuel consumption for the burners in each paper machine hood for 2002 and 2003, as well as the potential fuel consumption after the project, assuming 8,760 hours per year of operation.

Machine No.	Fuel Use, MMBTU/year	
	Average Actual	Potential
PM-11	113,627	613,200
PM-12	197,251	613,200
PM-13	159,772	613,200
PM-14	111,735	613,200

PM-15	93,679	438,000

The final set of tables for burners combine data from the preceding two tables to calculate average and projected (PTE) emissions. Increase/decrease rows are shown in anticipation of later discussion concerning PSD. A summary table condenses the results into a single table covering all six pollutants. Hourly emissions may be calculated from these tables by assuming continuous operation and dividing by 8,760 hours per year.

SO_2 Emissions - TPY

Machine No.	PM-11	PM-12	PM-13	PM-14	PM-15	Total
Average	0.041	0.071	0.058	0.040	0.034	0.243
Potential	0.22	0.22	0.22	0.22	0.16	1.04
Change	0.18	0.15	0.16	0.18	0.12	0.80

PM_{10} Emissions - TPY

Machine No.	PM-11	PM-12	PM-13	PM-14	PM-15	Total
Average	0.52	0.90	0.73	0.51	0.43	3.08
Potential	2.80	2.80	2.80	2.80	2.00	13.2
Change	2.28	1.90	2.07	2.29	1.57	10.1

VOC Emissions - TPY

Machine No.	PM-11	PM-12	PM-13	PM-14	PM-15	Total
Average	0.37	0.65	0.53	0.37	0.31	2.23
Potential	2.02	2.02	2.02	2.02	1.45	9.54
Change	1.65	1.37	1.50	1.65	1.14	7.31

Lead Emissions – TPY $\times 10^{-5}$

Machine No.	PM-11	PM-12	PM-13	PM-14	PM-15	Total
Average	3.41	5.92	4.79	3.35	2.81	17.2
Potential	18.4	18.4	18.4	18.4	13.1	86.7
Change	15.0	12.5	13.6	15.0	10.3	66.4

NO_X Emissions - TPY

Machine No.	PM-11	PM-12	PM-13	PM-14	PM-15	Total
Average	6.8	11.8	9.6	8.4	7.0	43.6
Potential	36.8	36.8	36.8	46.0	32.9	189
Change	30.0	25.0	27.2	37.6	25.8	146

CO Emissions - TPY

Machine No.	PM-11	PM-12	PM-13	PM-14	PM-15	Total
Average	21.0	28.6	23.2	24.6	20.6	118
Potential	113.4	88.9	88.9	134.9	96.4	523
Change	92.4	60.3	65.7	110.3	75.8	405

Burner Combustion Emissions Summary - TPY

	SO_2	PM_{10}	VOC	Lead	NO_X	CO
Average	0.243	3.08	2.23	1.72×10^{-4}	43.6	118
Potential	1.04	13.2	9.54	8.67×10^{-4}	189	523
Change	0.80	10.1	7.31	6.64×10^{-4}	146	405

Emission calculations for the existing tunnel dryer at the polyethylene printer and for the three new dryers are based on factors from Tables 1.4-1 and 2 of AP-42 (7/98), as shown in the following table. The new tunnel dryers may be rated as high as 3.2 MMBTUH. If desired, hourly emission rates can be found by dividing the annual emissions by 8,760 hours.

Tunnel Dryer Combustion Emissions - TPY

	SO_2	PM_{10}	VOC	NO_X	CO
Existing dryer	0.01	0.07	0.05	0.88	0.74
Dryer #2 (new)	0.01	0.11	0.08	1.40	1.18
Dryer #3 (new)	0.01	0.11	0.08	1.40	1.18
Dryer #4 (new)	0.01	0.11	0.08	1.40	1.18
Total	**0.03**	**0.39**	**0.28**	**5.08**	**4.27**
Increase	0.03	0.32	0.23	4.20	3.53

The catalytic oxidizer was evaluated in the Memorandum for the Part 70 permit using emission factors from Tables 1.4-1 and 2 of AP-42 (7/98) for a rating of 2 MMBTUH. The new regenerative thermal oxidizer has not been selected, but the largest unit currently being evaluated is rated at 10.4 MMBTUH. The same factors are used in evaluating the new unit, except for NO_X. The manufacturer has supplied NO_X emission factors based on PTE, expected emission rate with no VOC present, and expected rate with VOC present. The highest of these is equivalent to the emission factor used for the smaller unit. The existing catalytic unit has been tested at 98.6% destruction efficiency, while the new RTO is estimated to be more than 95% efficient, although 95% will be used as a conservative number for this discussion. Only annual totals are listed in the following table, while hourly rates may be calculated by dividing each number by 8,760 hours per year.

	Combustion Emissions (TPY)				
Oxidizing Unit	SO_2	PM_{10}	VOC	NO_X	CO
Old Catalytic (2 MMBTUH)	0.01	0.07	0.05	0.88	0.74
New RTO (10.4 MMBTUH)	0.03	0.35	0.25	4.56	3.83
Increase	0.02	0.28	0.20	3.68	3.09

VOC emissions from polyethylene printing depend on capture and destruction efficiency. The existing single printer has capture efficiency of only 70%, which is a datum agreed upon by the facility and DEQ in discussions surrounding the Part 70 permit. As stated above, testing indicates 98.6% destruction efficiency. Average 2002-2003 uncontrolled VOC from the printer was 197.5 TPY. Fugitive emissions were 30% of this number, or 59.3 TPY. The 70% portion captured was reduced by 98.6%, leaving stack emissions of 1.9 TPY. Plans for the new printers include constructing an enclosure around all four units, leading to 100% capture. Assuming conservatively low destruction efficiency of 95% and using potential printer VOC emissions of 971 TPY leads to zero fugitive emissions and 48.6 TPY of stack emissions. The following table summarizes these calculations.

Oxidizer Emissions From Printer VOC (TPY)

Unit(s)	Uncontrolled VOC	Fugitive	Stack	Total
Catalytic Ox & 1 Printer	197.5	59.3	1.9	61.2
RTO & 4 Printers	971	0	48.6	48.6
Change	774	-59.3	46.7	-12.6

The following table summarizes all groups discussed for EUG 2, and shows their total increase in emissions.

EUG 2 - Emissions Summary (TPY)

Group	PM	NO_X	SO_2	VOC	CO	Lead
Hood burners	13.2	189	1.04	9.54	523	8.67×10^{-4}
Tunnel dryers	0.32	4.20	0.03	0.23	3.53	
Oxidizer (combustion)	0.35	4.56	0.03	0.25	3.83	
Printer VOC				48.6		
Totals	13.9	198	1.10	58.6	530	8.67×10^{-4}
Increase	10.7	153	0.86	-4.85	410	6.64×10^{-4}

EUG 3 – Subpart Y Coal Preparation Plant

Steam use may increase as a result of this project, and a method of calculating actual-to-potential emissions is needed. The increase will be discussed more fully later in this memorandum. Emission estimates have been calculated for this EUG, but the only limits placed in the pending Part 70 permit concern opacity. An analysis of the factors used, their origin, and some of the discussion with the applicant concerning these estimates may be found in the memorandum associated with the pending Part 70 permit. The following table summarizes the conclusions of that discussion, but is not used for setting a limit here, nor is it offered as support for PSD considerations. Coal throughput for 2003 was 519,362 tons. Using 8,300 BTU/lb as a lower value for sub-bituminous coal and assuming the continuous operation of Boilers 2, 3, and 4 at rated capacity implies maximum coal throughput of 820,200 tons. The table indicates that the actual-to-potential increase in PM emissions is 49.0 TPY.

EUG 3 –Coal Preparation Plant

<table>
<tr><th>EU Name</th><th rowspan="2">Particulate Matter Emission Factors (lbs/ton coal)</th><th colspan="2">PM Emissions (TPY)</th></tr>
<tr><th></th><th>2003 Actual</th><th>PTE</th></tr>
<tr><td>Railcar Unloading</td><td rowspan="3">0.0859</td><td rowspan="3">22.3</td><td rowspan="3">35.2</td></tr>
<tr><td>Radial Stacker</td></tr>
<tr><td>Grizzly Feeder</td></tr>
<tr><td>Coal Sizer/Crusher</td><td>0.2</td><td>51.9</td><td>82.0</td></tr>
<tr><td>Conveying</td><td>0.02</td><td>5.19</td><td>8.20</td></tr>
<tr><td>Coal Bunkers</td><td>0.02</td><td>5.19</td><td>8.20</td></tr>
<tr><td>Coal Feeders</td><td colspan="3" rowspan="2">Closed Process
No emissions</td></tr>
<tr><td>Pulverizers</td></tr>
</table>

EUG 4 – PP-1 Pulp Processing Units

This EUG is reserved for future Subpart S applicable units. HAP and VOC emission calculations are included in EUG 6 – VOC Sources Not Subject to an NSPS or NESHAP.

EUG 5 – Subpart KK Flexographic Printing

Printing Presses

Emissions of HAPs are limited by Subpart KK to 400 kilograms per month. In addition to restrictions on HAP emissions, these units have a large amount of VOC emissions. VOC emissions for the printers are illustrated in the discussion of emissions for EUG 6, VOC Sources Not Subject to an NSPS or NESHAP, and are not repeated here.

EUG 6 – VOC Sources Not Subject to an NSPS or NESHAP

PP-1 Pulp Processing Units

Emission factors for these units were developed in a comprehensive emissions testing program by The National Council for Air and Stream Improvement (NCASI). Lengthy discussion of this program, with details concerning applicant's participation may be found in the memorandum associated with the pending Part 70 permit. The Pulp Processing emission factors developed in this program are used to estimate total VOC and HAP emissions for all pulping systems. This action was taken in the discussion for the Part 70 permit, which concluded that such an approach is reasonable since all systems use similar processes and raw materials to produce similar products. The primary difference in the Systems lies in the bleaching agent and/or sequence. Emission factors for the systems were developed by applying the production rate-normalized emission factors from the two areas tested. In every case where the choice of bleaching agent created a difference in emissions, the higher factors were selected and applied to the maximum expected production rates for the pulping system, producing conservatively high results. An overall factor of 0.45 lbs of VOC per ton of pulp processed is the highest value shown in the NCASI study. Paper production requires approximately 100 tons of pulp for every 95 tons of finished product. The following table uses this factor in a comparison of 2002-2003 average actual emissions with current project PTE.

Paper production (TPY)		Pulp use (TPY)		Emission factor	VOC Emissions (TPY)		
Average	Potential	Average	Potential	Lb/ton	Average	Potential	Increase
345,880	538,845	364,0084	567,205	0.45	82	128	46

Paper Machines PM-11, PM-12, PM-13, PM-14, and PM-15
Various methods have been used in the past to calculate emissions of VOC from chemicals used at the paper machines. One method used a site-specific evaluation by NCASI. Emissions from building vents and equipment vents were measured, certain worst-case assumptions were made, and uniform values applied to all machines. Mass balance methods have also been used, sometimes with restrictions as to the amount of VOC released, as opposed to VOC reacted or bound in some other fashion. The method used for this permit analysis is reflected in the section following this.

Paper Machine Additives
The additives to which the heading refers are chemicals used with paper machines, but that were not in use when the NCASI testing was performed in 1995. They include chemicals that enhance the product, such as softness aids, dyes, biocides, etc. Considerations similar to those in the preceding section were made in calculations of VOC emissions for the memorandum associated with the pending Part 70 permit.

The current application re-visits the preceding issues for several reasons. First, the current project is expected to increase paper production dramatically, with a concomitant increase in additive use. Second, a principal force behind the detailed analysis in earlier versions of the pending Part 70 permit was the presence of Part 5 of Subchapter 41 of Oklahoma's Air Pollution Control Rules, which concerned emissions of Toxic Air Contaminants. Part 5 has been superseded by Subchapter 42 and no longer applies to toxics emitted by this facility. The facility has reviewed all chemical use in terms of VOC content, and has divided the VOC totals by paper production in each of 2002 and 2003. This analysis covers the chemicals covered by the NCASI study in the preceding section, as well as the additives used since the NCASI study. The worst-case results have been combined to produce a ratio, or emission factor, for all VOC as a function of paper production. Because of the uncertainty associated with formulations that may become available, the calculated factor was inflated by nearly 50% to provide a safety factor. The first table following shows the data used to calculate the ratio and the second table shows the effect of using the ratio in calculating emission changes due to the current project.

	VOC Usage (TPY)		
Additive	**2002**	**2003**	**Maximum 2002/2003**
Wet Strength	30.63	50.22	50.22
Softeners	4.67	1.76	4.67
Release Agents	0.26	0.44	0.44
Miscellaneous	10.11	7.03	10.11
Felt/Wire Conditioners	6.79	6.90	6.90
Defoamers	8.73	6.11	8.73
Biocides	0	9.94	9.94
Paper Machine Dyes	0.19	0.18	0.19
Total	**61.39**	**82.58**	**91.21**
ADT/yr*	342,202	349,558	345,880**
Lb VOC/ton paper	0.359	0.472	0.527

*Paper production in air-dried tons per year
**Two-year average ADT

Production (ADT)		Emission factor	VOC Emissions (TPY)		
2002-2003 Average	**Potential**	**Lb/ADT**	**2002-2003**	**PTE**	**Increase**
345,880	538,845	0.75	72.0*	202	130

*Average of actuals.

Solvent Cleaning of Paper Machines
Emissions of VOCs from SC-1, solvent cleaning, are based on the use of a 100% VOC solvent to clean Paper Machine wires. This solvent is applied through spray nozzles located across a boom that stretches across the Paper Machine. Emission amounts authorized in the pending Part 70 permit for machines PM-11 through PM-14 are based on research from a similar de-ink facility paper machine. According to that research, only 60% of the solvent applied to the machine becomes air emissions, 20% is consumed in the reaction with the latex buildup on the wire, and 20% ends up in the water loop and eventually in the wastewater treatment plant. This 60% evaporation rate analysis was first utilized to calculate authorized emissions in the memorandum associated with Permit No. 91-127-O (M-1), issued for PM-15. Extending this analysis to the other four machines that had not previously been subject to emission limits would have resulted in authorizing 179.1 TPY of VOC for a rolling 12-month total, but the facility requested a limit of 338 TPY, based on historic increases in use of such solvents. Permitted emissions of 37.57 TPY of VOC for PM-15 were carried into the pending Part 70 permit from Permit No. 91-127-O (M-1).

The applicant has re-visited the calculation process and proposes a more direct method of accounting. Under this method, actual solvent use for 2002-2003 was compared with paper production for each of the two years and the most-polluting ratio was taken to represent future production. The first table following shows the data used to calculate the ratio and the second table shows the effect of using the ratio in calculating emission changes due to the current project. Note that this approach assumes that all of the VOC is emitted, making recordkeeping much simpler, and assuring conservatively high calculations. It also combines the emissions and conditions for SC-1 (PM-11, 12, 13, and 14) with those for PM-15 into a single set of requirements.

	2002	**2003**
Solvent use	500 tons	414 tons
ADT*	342,202	349,558
Lbs of VOC/ADT	2.92	2.37

*Paper production in air-dried tons.

Production (ADT)		**Emission factor**	**VOC Emissions (TPY)**		
2002-2003 Average	Potential	Lb/ADT	2002-2003	PTE	Increase
345,880	538,845	2.92	505*	787	282

*Note that this is not the figure reported as actual for inventory purposes. It represents the emissions that would have been reported had the derived emission factor been used.

The memorandum associated with the pending Part 70 permit addresses individual HAP components of the solvents in use, but the Specific Conditions proposed for that permit do not set limits or standards. Since HAP are required to be speciated for annual emission inventory purposes, and since enumeration of various HAP will not alter the status of this permit, no attempt is made here to analyze the individual components of the solvents, or to establish anticipated quantities of each that may be emitted.

Polyethylene Extruder

In estimating emissions from the Poly Plant extruder processes, emission factors from a 1996 article in the Journal of the Air and Waste Management Association (JAWMA) were used for linear low density polyethylene (LLDPE) blown film at a 355°F melting temperature. The polyethylene (poly) film produced at the Poly Plant is a blown film process using 20 – 22% LLDPE at a melting temperature of approximately 350°F. Other emission factors associated with the JAWMA document refer to either high-density blow molding or extrusion coating. Neither of these processes matches the process at the Poly Plant.

VOC and HAP emissions are calculated using emission factors developed in the JAWMA study in units of pounds of emissions per million pounds of poly extruded. Potential production was estimated at 6.0 MM lbs/yr for the Part 70 permit, and actual production figures for 2002 and 2003 were 5,020,914 pounds and 5,358,174 pounds, respectively. Addition of three new extruders is expected to increase capacity to 35 MM lbs/yr. The following table reflects calculations based on these assumptions and data.

EUG 6 – VOC and HAP Emissions from the Polyethylene Extruders

	CAS #	**Factor**	**Emissions (Lbs/yr)**		
		lbs/MMlb	**2002/2003**	**PTE**	**Increase**
Formaldehyde	50-00-0	0.09	0.48	3.15	2.68
Acetaldehyde	75-07-0	0.03	0.16	1.05	0.89
Methyl ethyl ketone	78-93-3	0.02	0.10	0.70	0.60
Acrylic acid	79-10-7	0.02	0.10	0.70	0.60
Acrolein	107-02-8	0.02	0.10	0.70	0.60
Propionaldehyde	123-38-6	0.02	0.10	0.70	0.60
VOC	---------	8.0	41.5	280.0	238.5

Corona Treaters

These equipment items generate a corona that is used to treat the polyethylene film produced at the Polyethylene Plant, allowing for enhanced ink bonding to the film. Ozone is generated by this process and is vented to the atmosphere without any controls. Manufacturer's data for the existing units indicates design production of 0.073 lbs/hr/kVa, where kVa is kilovolt-ampere. The principal unit is rated at 5 kVa. A backup unit is rated at 10 kVa and has an associated decomposer, which converts 95% of the ozone to molecular oxygen. The Part 70 permit memorandum shows total ozone emissions from these two treaters to be 1.76 TPY, assuming continuous operation. Three new units to be added in the current project do not have decomposers, so their emissions are simply

$$3 \text{ units} \times 10 \text{ kVa/unit} \times 0.073 \text{ lb/kVa/hr} \times 8{,}760 \text{ hrs/yr} = 9.6 \text{ TPY of ozone.}$$

This entire amount may be treated as the increase in emissions for this equipment.

Plate Making

Analysis in the memorandum associated with the pending Part 70 permit estimated VOC emissions for the process to be 1.83 TPY for a single press, based on solvent component concentrations and the fact that the solvents are 100% VOC. Emissions are small because almost all of the used solvent is recycled at the Poly Plant. Further review of actual use suggests that 900 lbs of VOC per year is a more reasonable number. Adding three more presses will not multiply the emissions by four, because the plates made may be used interchangeably among the presses. Despite that fact, the facility has opted to make the conservatively high assumption that emissions will be 900 × 4 = 3,600 lbs/yr (1.8 TPY). This number is less than the amount estimated in the Part 70 memorandum, so the actual-to-potential difference is taken to be 900 lb/press/yr times three new presses, or 1.35 TPY.

Flexographic Printers

VOC emissions from polyethylene printing depend on capture and destruction efficiency. The existing single printer has capture efficiency of only 70%, which is a datum agreed upon by the facility and DEQ in discussions surrounding the Part 70 permit. Recall that testing indicates 96.8% destruction efficiency. Average 2002-2003 uncontrolled VOC from the printer was 197.5 TPY. Fugitive emissions were 30% of this number, or 59.3 TPY. The 70% portion captured was reduced by 96.8%, leaving stack emissions of 1.9 TPY. Plans for the new printers include constructing an enclosure around all four units, leading to 100% capture. Assuming conservatively low destruction efficiency of 95% and using potential printer VOC emissions of 971 TPY leads to zero fugitive emissions and 48.6 TPY of stack emissions. The following table summarized these calculations.

Oxidizer Emissions From Printer VOC (TPY)

Unit(s)	Uncontrolled VOC	Fugitive	Stack	Total
Catalytic Ox & 1 Printer	197.5	59.3	1.9	61.2
RTO & 4 Printers	971	0	48.6	48.6
Change	774	-59.3	46.7	-12.6

VOC emissions from paper printing are calculated based on assumptions made in analyses for earlier permits and assuming that the current project will lead to a large increase in the amount of printed paper products manufactured. The project will increase actual paper production, but will not exceed the amount of paper already authorized. Thus, the existing 92.28 TPY of VOC authorized by existing permits is not to be increased by this permit. At the time the VOC level was authorized, average VOC concentration in water-based inks ranged from approximately 6% to 8%. A conservatively high 10% was used to calculate a PTE and to allow for flexibility in varying ink VOC concentrations. The data used imply use of 0.343 pounds of VOC per ton of paper. Actual use figures for 2002 and 2003 indicate that calculations supporting the 92 TPY level greatly exaggerated the VOC concentration, in that 2002 use was approximately 0.018 lbs/ton and 2003 use was approximately 0.031 lbs/ton. There are two possible approaches to establish the actual-to-potential increase. First (Option 1), we could use the original emission factor of 0.343 lbs/ton and apply it to all potential production, comparing that result with 2002-2003 actuals. Second, (Option 2) we could apply the 0.343 lbs/ton emission factor to only the increase in production, holding the existing production at the levels shown in 2002-2003, and then compare the total to the 2002-2003 actuals. Both options use actual average production of 345,880 tons and design capacity of 538,845 tons per year, for an increase of 192,965 tons per year. The following table shows these calculations. The second option is clearly more realistic, but the first option may be required for technically accurate PSD analysis.

Paper Printer VOC Emissions (TPY)

Potential Emissions	**92.28**	**37.31**
2002-2003 Actual Average	4.26	4.26
Increase	88.02	33.05

EUG 7 – Non-Combustion PM Sources Not Subject to NSPS or NESHAP

Paper Machines

Paper fibers are released into the atmosphere via the drying, trimming, handling and slitting of the paper sheet. Emissions were calculated using stack test data from a sister mill in Rincon, Georgia. Results from the 2002 stack testing of Rincon's #19 Paper Machine drying hood indicated 0.415 lbs/hr of non-combustion particulate matter generated. Dividing this number by the paper production rate yielded an emission factor of 0.048 lbs PM/ton paper. The derived emission factor was doubled to account for particulate matter emissions generated by the wet end of the paper machine, which is a conservatively high assumption. Similarly, stack test data (November 2001) from the roof vents in the building above Rincon's #19 paper machine showed 0.875 lbs/hr of particulate matter, which was converted to an emission factor of 0.108 lb PM/ton paper produced. The memorandum associated with the pending Part 70 permit treats these factors separately, but they are combined here for ease of presentation. Details may be found in the referenced memorandum. The following table shows 2002-2003 average actual emissions for each machine, potential emissions after the current project, and the actual-to-potential increase.

Machine	Paper Throughput (TPY)		PM Emissions (TPY)		
	2002-2003	Potential	2002-2003	Potential	Increase
PM-11	48,335	91,250	4.93	9.31	4.38
PM-12	77,338	127,750	7.89	13.03	5.14
PM-13	70,961	109,500	7.24	11.17	3.93
PM-14	75,145	109,500	7.67	11.17	3.50
PM-15	74,101	100,845	7.56	10.29	2.73
Total	345,880	538,845	35.3	55.0	19.7

Coal Pile Emissions
Although additional coal may be handled, none of the considerations involved in calculating emissions for the coal pile will change. Thus, there is no change in emissions to be expected.

Polyethylene Plant
The Part 70 permit calculated PM emissions from resin storage and handling using an emission factor from Table 6.6.2-1 of AP-42 (1/95) for dimethyl terephthalate resin production processes, assuming a resin usage rate of 6.0 MM lbs/yr. Addition of three more extruders will increase throughput to 35 MM lbs/yr. The following table presents the results, using 2002-2003 average production instead of the Part 70 Memorandum estimate.

Film Production (MMlbs/yr)		Factor	PM Emissions (TPY)		
2002-2003	Potential		2002-2003	Potential	Increase
5.19	35.0	0.017%	0.44	2.98	2.53

<u>Hazardous Air Pollutants (HAPs)</u>
Individual HAP emissions were discussed in the memorandum associated with the pending Part 70 permit and are not repeated here, both because the PTE for these materials will not increase and because any actual-to-potential increases require discussion in the context of PSD. PSD issues will be discussed later in this memorandum.

The following table summarizes actual-to-potential emission changes for all EUGs discussed in this section.

EUG	NO_X	CO	SO_2	PM_{10}	VOC	Other
1	225	27.0	386	32.2	1.77	H_2SO_4 - 5.47, Lead – 0.0019
2	152	410	0.83	10.6	(4.94)	Lead – 0.000664
3				49.0		
4	No change, or changes were discussed in other EUGs					
5	No change, or changes were discussed in other EUGs					
6					490	O_3 – 9.6 (included in VOC total)
7				22.2		
Totals	377	437	387	114	487	H_2SO_4 - 5.47, Lead – 0.0026

SECTION V. AIR DISPERSION MODELING

Overview

Air dispersion modeling has been performed at various times in the permitting life of the facility. Some modeling has been performed to demonstrate compliance with Part 5 of OAC 252:100-41 and some has been performed to demonstrate compliance with other ambient standards. Two PSD permits and evaluations have been issued during the life of this plant and further analyses were submitted with the application for the pending Part 70 permit. These analyses have been reviewed in previous permit memoranda or will have been reviewed in the memorandum associated with the Part 70 operating permit. These reviews are not reproduced or summarized here. Note that previous analyses dealing with toxic air contaminants (TACs) are no longer pertinent, due to the replacement of Part 5 of Subchapter 41 by Subchapter 42. Modeling information for those TAC constituents that are also HAP remain valid unless updated by this construction permit.

Ozone Modeling

The modeling analysis for ozone was performed by DEQ. OAC 252:100-8-35 requires an air quality impact evaluation for each regulated pollutant for which a major modification would result in a significant net emissions increase. No de minimis air quality level is provided for ozone. However, any net increase of 100 tons per year or more of volatile organic compounds subject to PSD is required to perform an ambient impact analysis. Methods for evaluating single source impacts on ozone concentrations are not consistent, due to the lack of availability of data at a refined level, readily available tools and EPA guidance. DEQ has evaluated the impact of the proposed modification to the Fort James facility using an existing air quality database generated for a SIP evaluation and the CAMx photochemical modeling system.

Oklahoma entered into Early Action Compact (EAC) agreements with EPA for the Tulsa and Oklahoma City metropolitan areas. Photochemical modeling evaluations were prepared in support of the agreements. These evaluations were conducted in accordance with EPA guidance and underwent an extensive public comment process and EPA review. The modeling was based on a two week episode beginning in Mid-August of 1999 and extending through the first week of September 1999. This episode was chosen both by virtue of being a prolonged period of high ozone concentrations and a reflection of the most common meteorological conditions that spawn high concentrations for Tulsa and Oklahoma City.

Modeling for Fort James was conducted using the EAC base case. Emissions to be modeled were calculated by subtracting the 1999 inventoried emissions from the future potential emissions identified in the application. VOC emissions were further speciated by Source Classification Code, SCC, using speciation tables generated by EPA and SCCs for Fort James processes as identified in annual inventories.

	NOx		CO		VOC	
	1999 TPY	Model TPY	1999 TPY	Model TPY	1999 TPY	Model TPY
Boiler -Unit B-1 Zurn	24.63		17.99		1.18	
Boiler -Unit B-2 Babcock & Wilcox	222.04		44.79		5.08	
Boiler -Unit B-3	512.76		48.77		5.96	
Boiler -Unit B-4*	655.2	225.35	12.52	27.04	5.42	1.77
Paper Dryer- Hood PM-11	11.15	25.65	9.37	104.03	6.86	35.58
Paper Dryer- Hood PM-12	6.706	30.094	6.94	81.96	9.79	32.65
Paper Dryer- Hood PM-13	10.28	26.52	9.63	79.27	8.57	33.87
Paper Dryer- Hood PM-14	9.84	36.16	8.27	126.63	7.92	34.52
Paper Dryer- Hood PM-15	7.88	25.02	6.62	89.78	8.52	33.35
FXRT #1 - Unleaded Gasoline					1.23	
FXRT #2 - Aqueous NH3						
Emergency Diesel Generators	0.31		0.08		0.01	
Chlor Alkali Absorption Towers						
Misc VOC					2.04	
Pulp Bleaching with Hypochlorite					13.98	32.23
Polyethylene Extruding and Printing**	0.62		0.13		67.62	-18.98
PM Solvent Cleaning					151.16	635.5537
Non-hypochlorite Pulp Bleaching					15.304	
Paper Printing					3.91	29.19
Coal Pile Fugitive Emissions						
Waste Water Treatment Plant					7.06	
Paper Machine Additives					10.17	

* The applicant requested a maximum duty increase for boilers. Modeling reflects the maximum increase as requested rather than actual to future potential. There have been no permit modifications to the boilers since the baseline ozone modeling inventory (1999).
** Negative emissions were not included in the modeling.

Maximum impacts from the proposed increases occur in the Muskogee area. A maximum 8-hour average increase of 1.3 ppb was predicted for Muskogee in the immediate vicinity of the facility. Maximum downwind impacts in Wagoner and Mayes Counties did not reach 1 ppb over any 8-hour average during the episode. The maximum increase in predicted concentrations in south west Tulsa County was 0.3 ppb. The highest current design value for Tulsa (2003-2005) is 79 ppb.

The highest concentrations were predicted in Muskogee and South East portions of Wagoner Counties. The total modeled concentrations for those areas were less than 70 ppb for the entire episode. The facility is not expected to cause or significantly contribute to a violation of the 8-hour standard.

Point Source Modeling

The following material is taken from the application. It has been reviewed by ODEQ and determined to be acceptable. Table and section numbering used in the application is preserved here. (*Begin material from application*)

D.1 INTRODUCTION

United States Environmental Protection Agency (EPA) and Oklahoma Department of Environmental Quality (ODEQ) rules require major new facilities and major modifications to undergo several analyses for emission increases subject to Prevention of Significant Deterioration (PSD) review. These analyses determine whether significant air quality deterioration will result from the new or modified facility. The modifications proposed and the resultant emission changes are described in their application and previously in this memorandum. In addition to an analysis of control technology discussed in this memorandum's Federal Regulations (Section VIII), PSD review requires G-P (Georgia-Pacific, parent company to Ft. James) to conduct the following analyses.

Source impact analysis
Good engineering practice stack height (GEP)
Air quality analysis (monitoring)
Additional impact analyses

EPA regulations (40 CFR 52.21(k)) require that an applicant perform a source impact analysis for each applicable pollutant. The PSD regulations specifically provide for the use of atmospheric dispersion models in performing impact analyses, estimating baseline and future air quality levels, and determining compliance with National Ambient Air Quality Standards (NAAQS) and allowable PSD increments. Section D.2 of this discussion presents the Source Impact Analysis.

In addition to the source impact analysis, PSD review requires that any emission limit must be applied in a source impact analysis with a stack height that does not exceed GEP (refer to 40 CFR 52.21(h)). To demonstrate this, G-P performed an analysis of the physical arrangement of stacks and solid physical structures that may affect dispersion and computed GEP stack heights. Section D.3 of this discussion presents the GEP Analysis.

The third analysis is specified by EPA regulation 40 CFR 52.21(m). In addition to predicting a source impact, a PSD permit application must contain an analysis of continuous ambient air quality data in the area affected by the project. The regulation presents the conditions that require pre-construction and post-construction monitoring of ambient air. Section D.4 of this discussion presents the Ambient Air Quality Analysis.

Lastly, EPA regulations (40 CFR 52.21(o)) require an analysis of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of the project. These analyses are to be conducted primarily for PSD Class I areas. Impacts from general commercial, residential, industrial, and other growth associated with the facility or modification also must be addressed. Sections D.5 and D.6 present the Additional Impact Analysis for Class II and Class I areas, respectively.

D.2. SOURCE IMPACT ANALYSIS

G-P conducted the Source Impact Analysis in two phases: 1) impact of the project, and 2) full impact analysis. The first phase determines the impact from the change in emissions associated with the project alone. G-P compares these impacts to EPA thresholds for significance and ambient monitoring criteria. If the project impacts exceed the Significant Impact Levels (SILs), then G-P conducts a full impact analysis. A full impact analysis predicts impacts from the sources across the entire Mill. G-P compares these impacts to state and national ambient air quality standards. The following sections discuss the methodology, data inputs, and techniques for both phases of the Source Impact Analysis.

D.2.1 AIR MODELING METHODOLOGY

The general modeling approach follows EPA and ODEQ modeling guidelines for determining compliance with the NAAQS and PSD Increments. In general, current policies stipulate that the highest annual average and highest, second-highest or highest-sixth-highest short-term (*i.e.*, 24 hours or less) concentrations be compared to the applicable standard when 5 years of meteorological data are used. This approach is consistent with the air quality standards, which permit a short-term average concentration to be exceeded once per year at each receptor.

To develop the maximum short-term impacts for the G-P Muskogee Mill, the general modeling approach was to first perform a screening analysis with a coarse receptor grid spacing to determine the critical impact locations. First, G-P predicted impacts for the screening analysis using a 5-year meteorological data record. Then, a refined analysis was performed if the receptor spacing at the location of maximum impact is greater than 100 meters (m). The refined analyses used a denser receptor grid centered on the receptor at which the concentration produced from the screening phase. G-P then executed the air dispersion model for the entire year(s).

D.2.2 MODEL SELECTION

G-P selected an air dispersion model based on the model's ability to simulate air quality impacts in areas surrounding the Muskogee Mill. The area surrounding the Mill is mostly rural and gently rolling with some isolated areas of significant terrain. Along the southeast edge of the property, the topography changes to a hilly area with several areas of elevated terrain. Figure D-1 presents a topographic map of the Muskogee Mill vicinity. Based on these features, G-P has selected the Industrial Source Complex Short-Term (ISCST3) model version to predict maximum concentrations in all areas in the vicinity of the plant site.

In this analysis, the US EPA regulatory default options are utilized in the ISCST3 model to predict all maximum impacts. These options include:

Final plume rise at all receptor locations
Stack-tip downwash
Buoyancy-induced dispersion
Default wind speed profile coefficients
Default vertical potential temperature gradients
Calm wind processing

D.2.3 LAND USE CLASSIFICATION
Dispersion coefficients are set in the model by selecting the land-use mode as urban or rural. The land use in the vicinity of the source is the criteria used to determine the setting. Auer developed a land-use procedure in 1978 to determine the model setting. The procedure involves classifying land areas within a 3-kilometer (km) radius circle centered on the Mill. The urban mode is selected if more than 50 percent of the land-use consists of one or more of heavy industrial, light-moderate industrial, commercial, or compact residential land-use classifications. Urban classifications constitute less than 50% of the total area. Therefore, the rural mode is used for ISCST3 modeling.

D.2.4 METEOROLOGICAL DATA
Tulsa is the nearest site for surface observations to the Mill and is located approximately 30 miles to the northwest. G-P predicted impacts with hourly meteorological data for the years 1986-1988 with upper air observations from Oklahoma City and surface observations from Tulsa. In 1989, the NWS moved the upper air monitoring site from Oklahoma City to Norman in 1989, causing a three-week gap in met data for this year. Thus, to complete a 5-year dataset for the analyses, G-P also predicted impacts with 1990-1991 data using upper air observations from Norman and surface observations from Tulsa. The anemometer height for observations in Tulsa during this period is 23 feet. Figure D-2 in the application presents a regional map with the locations of the Mill and meteorological sites.

The surface observations include wind direction, wind speed, temperature, cloud cover, and cloud ceiling. The wind speed, cloud cover, and cloud ceiling values were used in the ISCST meteorological preprocessor program to determine atmospheric stability using the Turner stability scheme. Based on the temperature measurements at morning and afternoon, mixing heights were calculated with the radiosonde data using the Holzworth (1972) approach. Hourly mixing heights were derived from the morning and afternoon mixing heights using an interpolation method.

ODEQ accepted this dataset for the most recent air modeling for the Mill. Roberts/Schornick & Associates, Inc., provided the ISCST-ready meteorological data to G-P.

D.2.5 BUILDING DOWNWASH
Aerodynamic forces in the vicinity of structures and obstacles, such as buildings, disturb atmospheric flow fields. This flow disturbance near buildings and other structures can enhance the dispersion of emissions from stacks affected by the disturbed flow. The disturbance can also reduce the effective height of emissions from stacks located near buildings and obstacles. The height of these disturbances can be compared to the release points of modeled sources. For sources with release points above these disturbances, the effect on dispersion is not significant. This release height threshold is known as the Good Engineering Practice (GEP) height. GEP stack height is defined in Section 123 of the Clear Air Act Amendments of 1977 as:

"the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, and wakes which may be created by the source itself, nearby structures, or nearby terrain obstacles."

The EPA Guideline for Determination of Good Engineering Practice Stack Height[1] contains detailed guidance on issues relating to the determination of GEP height. This guidance specifies use of the following formula for "new" stacks (e.g., stacks not in existence until after January 1979) for calculating the minimum stack height for which the adverse aerodynamic effects are avoided.

$H_{GEP} = H_B + 1.5\,L$, where

H_{GEP} = GEP formula stack height
H_B = height of building or nearby structure
L = lesser of the height or projected width of the structure

The formula for stacks in existence before 1979 is:

$H_{GEP} = 2.5\,H_B$

Both the height and projected width of the structure are determined from the projection of the structure on a plane perpendicular to the direction of the wind. The downwind area in which a nearby structure is presumed to have a significant effect on a stack is defined as 5L. Therefore, the GEP formula heights calculated by the formulas listed above are only applicable to stacks that are located within 5L of the building or structure in question.

No stack height that exceeds GEP stack height (predicted by the formulae) can be used in any modeling that is used to determine emission limitations. This does not limit actual stack height, only the portion of stack height that can be used in modeling. The construction date for both boiler stacks is prior to 1979. Stacks in other areas of the mill were constructed in periods both before and after 1979. All modeled stack heights at the Mill are less than the calculated GEP formula heights (see Section C.3 for detailed calculations).

G-P entered the dimensions for all significant building structures at the Mill into the EPA program, Building Profile Input Program. The BPIP program computes direction-specific building heights and widths. These data describe the downwash effects to the dispersion model. Table D-1 presents a summary of the horizontal and vertical (above grade) dimensions of the Mill structures analyzed by BPIP. Additional small tanks and structures exist at the Mill. However, G-P excluded structures with heights and widths (or diameters) less than 10 feet (ft) or other remote structures. Figures D-3 and D-4 in the application present plot plan drawings of the buildings, tanks, and sources.

Table D-1. Summary of Downwash Structures Analyzed at G-P Muskogee Mill

BPIP ID	Building Description	Base Elev. (m)	Peak Ht (m)
BLD #1	BLD #1	165.4	15.24
BLD #2	BLD #2	163	15.24
BLD #3	BLD #3	163	7.32
BLD #4	BLD #4	158.1	13.72
BLD #5	BLD #5	159.5	13.72
BLD #6	BLD #6	160.2	8.53

[1] EPA, 1985. Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulation) Revised. EPA450/4-80-023R

BPIP ID	Building Description	Base Elev. (m)	Peak Ht (m)
BLD #7	BLD #7	160.2	8.53
BLD #8	BLD #8	162.3	25.6
BLD #9	BLD #9	162.8	15.54
BLD #10	BLD #10	163.8	15.54
BLD #11	BLD #11	164.2	15.54
BLD #12	BLD #12	162.5	18.29
BLD #14	BLD #14	161.9	5.18
BLD #15	BLD #15	160.7	7.01
BLD #16	BLD #16	156.8	15.24
BLD #18	BLD #18	159.2	15.24
BLD #20	BLD #20	163.5	15.54
BLD #21	BLD #21	161.1	9.45
BLD #22	BLD #22	162.8	8.53
BLD #23	BLD #23	159.8	25.6
BLD #24	BLD #24	162.1	15.54
BLD #25	BLD #25	157.1	15.24
BLD #26	BLD #26	158.7	15.24
BLD #27	BLD #27	164.2	15.54
BLD #28	BLD #28	161.6	18.29
BLD #29	BLD #29	162.3	6.1
BLD #30	BLD #30	161.7	15.24
BLD #31	BLD #31	164.9	15.54
BLD #32	BLD #32	159.6	25.6
BLD #34	BLD #34	161.7	8.53
BLD #36	BLD #36	165.7	15.24
BLD #39	BLD #39	156.5	15.24
BLD #40	BLD #40	161	25.6
BLD #41	BLD #41	161	15.24
BLD #42	BLD #42	159.6	15.24
BLD #43	BLD #43	160.2	15.24
BLD #44	BLD #44	162.3	15.24
BOILERS	BOILER COMPLEX	162.6	39.62
COOLLT	COAL PILE LONG TERM	162.1	9.14
COOLM	COOLING TWR MIDDLE	159.9	18.29
COOLN	COOLING TOWER N	160.6	18.29
COOLS	COOLING TOWER S	160.1	12.19
COOLST	COAL PILE SHORT TERM	162	15.24

Table D-2 presents a summary of structure dimensions for storage tanks also considered in the downwash analysis. While additional tanks and structures exist at the Mill, the analysis excluded structures with heights and widths (or diameters) less than 10 ft.

Table D-2

BPIP ID	Building Description	Base Elevation (m)	Tank Height(m)	Tank Diameter (m)
TANK4_1	Near Bldg 4 Tank 1	158.7	30.48	16
TANK5_1	Near Bldg 5 Tank 1	158.5	30.48	11.4
TANK5_2	Near Bldg 5 Tank 2	158.2	30.48	12
TANK8_1	Near Bldg 8 Tank 1	158.6	15.24	10.6
TANK8_2	Near Bldg 8 Tank 2	159.4	15.24	10.6
TANK8_3	Near Bldg 8 Tank 3	160.6	15.24	10.6
TANK8_4	Near Bldg 8 Tank 4	161.2	15.24	10.6
TANK14_1	Near Bldg 14 - Tank 1	162	5.18	47
TANK14_2	Near Bldg 14 Tank 2	160.9	5.18	31.7
TANK14_3	Near Bldg 14 Tank 3	160.6	5.18	31.6
TANK23_1	Near Bldg 23 Tank 1	158.4	15.24	10.6
Tank 23_2	Near Bldg 23 Tank 2	158.4	15.24	10.6
Tank 32_1	Near Bldg 32 Tank 1	159.9	15.24	10.6
Tank 32_2	Near Bldg 32 Tank 2	159.3	15.24	10.6
Tank 40_1	Near Bldg 40 Tank 1	161.9	15.24	10.6
Tank 40_2	Near Bldg 40 Tank 2	161.8	15.24	10.6
Tank 40_3	Near Bldg 40 Tank 3	161.3	15.24	10.6

D.2.6. SIGNIFICANT IMPACT ANALYSIS

Purpose and Methodology

The significant impact analysis is the first phase of the Source Impact Analysis and determines two results: 1) the maximum impacts from the project emissions increase and 2) the location of predicted impacts greater than significant impact levels (SILs). The area of these impacts defines the impact area of the project and the significant impact distance (SID).

G-P performed a significant impact analysis to determine whether the emission increases result in maximum predicted impacts greater than the PSD modeling SILs or the EPA monitoring de minimis concentrations. Current EPA and ODEQ policies stipulate that G-P compare the highest predicted short-term impacts to these levels. Table D-3 presents the SILs and de minimis concentrations.

Table D-3

Pollutant	Averaging Time	Significant Impact Levels ($\mu g/m^3$)	De Minimis Concentration ($\mu g/m^3$)
PM_{10}	24-hour	5	10
	Annual	1	--
NO_2	Annual	1	14
SO_2	3-hour	25	--
	24-hour	5	13
	Annual	1	--
CO	1-hour	2,000	--
	8-hour	500	575

Model Inventory

For the significant impact analysis, the model inventory only includes point and fugitive sources that will experience an increase or decrease in emissions due to the project. The emission increase represents two sets of sources. For sources physically modified, G-P determined an emission increase by calculating the difference between the potential maximum emissions limited by permit or source capacity, and the actual level of emissions for the period 2002-2003. G-P calculated annual and short-term average emission changes. Table D-4 presents the baseline emissions, potential emissions and computes the difference in particulate matter (PM_{10}) emissions from the modified project sources.

Table D-4		**PM_{10} Significant Impact Analysis Emiss. Rates**			
Model ID	**Source Description**	**Baseline (TPY)**	**Potential (TPY)**	**Project (TPY)**	**Project (g/s)**
No. 11 and 12 Paper Machines (a) (b)					
1112_8	PM 11 Yankee Wet End Exh. - process	1.16	2.19	2.17	0.062
	PM 11Yankee Wet End Exh. - burner	0.26	1.40		
	PM 11 Yankee Wet End Exh. - total	1.42	3.59		
1112_7	PM 11 Yankee Dry End Exh. - process	1.16	2.19	2.17	0.062
	PM 11Yankee Dry End Exh. - burner	0.26	1.40		
	PM 11 Yankee Dry End Exh. - total	1.42	3.59		
1112_20	PM12 Yankee Exh -process	3.71	6.13	4.32	0.124
	PM12 Yankee Exh -burner	0.90	2.80		
	PM12 Yankee Exh -total	4.61	8.93		
1112_1	Building Exhaust	0.35	0.61	0.26	0.0077
1112_2	Building Exhaust	0.35	0.61	0.26	0.0077
1112_3	Building Exhaust	0.35	0.61	0.26	0.0077
1112_4	Building Exhaust	0.35	0.61	0.26	0.0077
1112_5	Building Exhaust	0.35	0.61	0.26	0.0077
1112_9	Building Exhaust	0.35	0.61	0.26	0.0077
1112_10	Building Exhaust	0.35	0.61	0.26	0.0077
1112_11	Building Exhaust	0.35	0.61	0.26	0.0077
1112_13	Building Exhaust	0.35	0.61	0.26	0.0077
1112_14	Building Exhaust	0.35	0.61	0.26	0.0077
1112_15	Building Exhaust	0.35	0.61	0.26	0.0077
1112_17	After Dryer Exh.	0.29	0.51	0.22	0.0064
1112_18	After Dryer Exh.	0.29	0.51	0.22	0.0064
1112_19	After Dryer Exh.	0.29	0.51	0.22	0.0064
1112_22	Vacuum Pump	0.18	0.31	0.13	0.0039
1112_23	Vacuum Pump	0.18	0.31	0.13	0.0039
1112_24	Former Exh	0.37	0.65	0.28	0.0082
1112_25	Fan Pump Silo	0.04	0.07	0.03	0.00091
1112_26	Wall Exh.	0.18	0.31	0.13	0.0039
1112_28	Wall Exh.	0.18	0.31	0.13	0.0039
1112_29	Fan Pump Silo	0.04	0.06	0.03	0.0008
1112_30	Former Exh	0.36	0.63	0.27	0.0079
1112_31	Wall Exh.	0.18	0.31	0.13	0.0039
1112_27	Wall Exh.	0.18	0.31	0.13	0.0039
1112_32	Wall Exh.	0.18	0.31	0.13	0.0039

Table D-4		PM_{10} Significant Impact Analysis Emiss. Rates			
Model ID	Source Description	Baseline (TPY)	Potential (TPY)	Project (TPY)	Project (g/s)
Paper Machine 13					
13_13	Yankee Economizer - burner	0.729	2.796	3.92	0.113
	Yankee Economizer - process	3.406	5.256		
	Yankee Economizer - total	4.135	8.052		
13_1	Roof Exhausts	0.30	0.47	0.17	0.005
13_2	Roof Exhausts	0.30	0.47	0.17	0.005
13_3	Roof Exhausts	0.30	0.47	0.17	0.005
13_4	Roof Exhausts	0.30	0.47	0.17	0.005
13_5	Roof Exhausts	0.30	0.47	0.17	0.005
13_6	Roof Exhausts	0.30	0.47	0.17	0.005
13_7	Roof Exhausts	0.30	0.47	0.17	0.005
13_10	After Dryer Hood Exh	0.56	0.86	0.30	0.009
13_14	Fan Pump Silo	0.06	0.09	0.03	0.001
13_17	Vacuum Pump	0.25	0.39	0.14	0.004
13_18	Former Exh	0.41	0.64	0.22	0.006
13_19	Wall Exh. Fan	0.21	0.33	0.11	0.003
13_20	Wall Exh. Fan	0.21	0.33	0.11	0.003
Paper Machine 14					
14_13	Yankee Wet End Exh. - burner	0.255	1.398	1.968	0.057
	Yankee Wet End Exh. - process	1.803	2.628		
	Yankee Wet End Exh. - total	2.058	4.026		
14_17	Yankee Dry End Exh.burner	0.255	1.398	1.968	0.057
	Yankee Dry End Exh.process	1.803	2.628		
	Yankee Dry End Exh. total	2.058	4.026		
14_1	Vacuum Pump exh.	0.18	0.26	0.08	0.010
14_2	Building exh.	0.33	0.48	0.15	0.002
14_3	Building exh.	0.33	0.48	0.15	0.004
14_4	Building exh.	0.33	0.48	0.15	0.004
14_5	Building exh.	0.33	0.48	0.15	0.004
14_6	Building exh.	0.33	0.48	0.15	0.004
14_7	Building exh.	0.33	0.48	0.15	0.004
14_8	Building exh.	0.33	0.48	0.15	0.004
14_9	Building exh.	0.33	0.48	0.15	0.004
14_10	Fan Pump Silo Exh.	0.27	0.40	0.13	0.004
14_11	Former Exh.	0.32	0.46	0.15	0.004
14_20	Wall Exh. Fan	0.27	0.40	0.13	0.004
14_21	Wall Exh. Fan	0.27	0.40	0.13	0.004
14_22	Wall Exh. Fan	0.27	0.40	0.13	0.004
Paper Machine 15					
15_13	Yankee Wet End Exh. - burner	0.214	0.999	1.427	0.041
	Yankee Wet End Exh. - process	1.778	2.420		
	Yankee Wet End Exh. - total	1.992	3.419		
15_18	Yankee Dry End Exh.burner	0.214	0.999	1.427	0.041
	Yankee Dry End Exh.process	1.778	2.420		
	Yankee Dry End Exh. total	1.992	3.419		

Table D-4		PM_{10} Significant Impact Analysis Emiss. Rates			
Model ID	**Source Description**	**Baseline (TPY)**	**Potential (TPY)**	**Project (TPY)**	**Project (g/s)**
15_11	Riffler Roof Exhaust	0.20	0.28	0.074	0.002
15_12	Former Exhaust w/ separator	0.50	0.67	0.179	0.005
15_2	Roof Exh.	0.28	0.39	0.102	0.0029
15_3	Roof Exh.	0.28	0.39	0.102	0.0029
15_4	Roof Exh.	0.28	0.39	0.102	0.0029
15_5	Roof Exh.	0.28	0.39	0.102	0.0029
15_6	Roof Exh.	0.28	0.39	0.102	0.0029
15_7	Roof Exh.	0.28	0.39	0.102	0.0029
15_8	Roof Exh.	0.28	0.39	0.102	0.0029
15_9	Roof Exh.	0.28	0.39	0.102	0.0029
15_22	Roof Exh.	0.28	0.39	0.102	0.0029
15_1	Vacuum Pump Silo	0.34	0.46	0.123	0.0035
15_19	Wall Fan	0.24	0.32	0.085	0.0025
15_20	Wall Fan	0.24	0.32	0.085	0.0025
15_21	Fan Pump Silo	0.14	0.20	0.052	0.0015
Subtotals for all Paper Machine emissions		**38.570**	**68.376**	**29.807**	**1.633**

For sources affected by a change in a production rate (i.e., debottlenecking), G-P determined an emission increase by calculating the amount of emissions attributable to the production rate change. Table D-5 presents the emission changes associated with the project at affected emission sources for particulate matter.

Table D-5 Model ID	**Source Description**	**Project Emission Rates (TPY)**	**(g/s)**
Steam Production by Boilers (a)			
Stack1	Boilers 1 and 2	34.824	1.002
Stack3	Boilers 3 and 4	34.824	1.002
Associated Fuel Handling for Steam Production			
RCUN	Railcar Unload	0.008	0.00024
STKER	Coal Stacker	0.008	0.00024
CRUSHER	Coal Crusher	0.11	0.0105
GRIZZLY	Coal Grizzly	0.008	0.00024
BNKXF	Bunker Coal Transfer	0.73	0.021
Roads			
RDA1..A39	Main Gate to 1st intersection	0.108	0.003
RDB1..B57	1st Intersection to Coal Pile	0.006	0.000
RDC1..C28	1st Intersection to Shipping/Rcv	0.079	0.002
RDD1..D300	Ash Management	1.149	0.033

(a) Steam increase can be produced by any boiler. The total PM_{10} emission increase attributable to the project for steam is 2.0 grams/sec. The emission rate reflects the permit limit of 0.1 lbs/MMBtu. The analysis to determine project impact divided these emissions equally between the two stacks.

Tables D-6, D-7, and D-8 present the project emissions for sulfur dioxide, nitrogen oxides, and carbon monoxide, respectively.

Table D-6		**Annual Fuel Usage (MMBTU)**		**SO_2 Emission Rates for Significant Impact Analysis**			
Model ID	**Source Description**	**Baseline**	**Potential**	**Baseline (TPY)**	**Potential (TPY)**	**Project (TPY)**	**Project (g/s)**
Modified Sources							
1112_8	PM 11 Yankee Wet End	56813.5	219000	0.020	0.110	0.090	0.0026
1112_7	PM 11 Yankee Dry End	56813.5	219000	0.020	0.110	0.090	0.0026
1112_20	PM12 Yankee Exh	197251	438000	0.071	0.221	0.150	0.0043
13_13	PM 13 Yankee Economizer	159772	438000	0.058	0.221	0.163	0.0047
14_13	PM 14 Yankee Wet End	55868	219000	0.020	0.110	0.090	0.0026
14_17	PM 14 Yankee Dry End	55868	219000	0.020	0.110	0.090	0.0026
15_13	PM 15 Yankee Wet End	46840	219000	0.017	0.079	0.062	0.0018
15_18	PM 15 Yankee Dry End	46840	219000	0.017	0.079	0.062	0.0018
Affected Sources							
Stack1	Boilers 1 and 2 (a)	NA	NA	NA	NA	193.2	5.56
Stack3	Boilers 3 and 4 (a)	NA	NA	NA	NA	193.2	5.56
Totals				0.24	1.05	387.12	11.14

(a) Net Emission Rate increase reflects an attributable heat input of 643,860 MMBtu/yr or 73.5 MMBtu/hr and worst-case fuel. Attributable Boiler Emissions may be exhausted via either Stack 1 or Stack 2. Total attributable emissions are equal to 73.5 MMBtu/hr x 1.2 lbs SO_2/MMBtu x 454 g/lb x hr/3,600s = 11.13 gram/s

Table D-7		**Annual Fuel Usage (MMBTU)**		**NO_X Emission Rates for Significant Impact Analysis**			
Model ID	**Source Description**	**Baseline**	**Potential**	**Baseline (TPY)**	**Potential (TPY)**	**Project (TPY)**	**Project (g/s)**
Modified Sources							
1112_8	PM 11 Yankee Wet End	56813.5	306600	3.409	18.40	14.99	0.43
1112_7	PM 11 Yankee Dry End	56813.5	306600	3.409	18.40	14.99	0.43
1112_20	PM12 Yankee Exh	197251	613200	11.835	36.79	24.96	0.72
13_13	PM 13 Yankee Economizer	159772	613200	9.586	36.79	27.21	0.78
14_13	PM 14 Yankee Wet End	55868	306600	4.190	23.00	18.80	0.54
14_17	PM 14 Yankee Dry End	55868	306600	4.190	23.00	18.80	0.54
15_13	PM 15 Yankee Wet End	46840	306600	3.513	16.425	12.91	0.37
15_18	PM 15 Yankee Dry End	46840	306600	3.513	16.425	12.91	0.37
PPRTO	Proposed Press RTO	0	26280	0.88	2.19	1.31	0.038
Affected Sources							
Stack1	Boilers 1 and 2 (a)	NA	NA	NA	NA	112.7	3.24
Stack3	Boilers 3 and 4 (a)	NA	NA	NA	NA	112.7	3.24
Totals				44.52	191.41	372.24	10.71

(a) Net Emission Rate increase reflects an attributable heat input of 643,860 MMBtu/yr or 73.5 MMBtu/hr and worst-case fuel. Attributable Boiler Emissions may be exhausted via either Stack 1 or Stack 2. Actual model runs applied two source groups for these two cases. Total attributable emissions are equal to 73.5 MMBtu/hr x 0.7 lbs NOx/MMBtu x 454 g/lb x hr/3,600s = 6.48 gram/s.

Table D-8 Model ID	Source Description	Annual Fuel Usage (MMBTU) Baseline	Annual Fuel Usage (MMBTU) Potential	CO Emission Rates for Significant Impact Analysis: Baseline (TPY)	Potential (TPY)	Project (TPY)	Project (g/s)
Modified Sources							
1112_8	PM 11 Yankee Wet End	56813.5	306600	10.510	56.72	46.21	1.33
1112_7	PM 11 Yankee Dry End	56813.5	306600	10.510	56.72	46.21	1.33
1112_20	PM12 Yankee Exh	197251	613200	28.601	88.91	60.31	1.74
13_13	PM 13 Yankee Economizer	159772	613200	23.167	88.91	65.75	1.89
14_13	PM 14 Yankee Wet End	55868	306600	12.291	67.45	55.16	1.59
14_17	PM 14 Yankee Dry End	55868	306600	12.291	67.45	55.16	1.59
15_13	PM 15 Yankee Wet End	46840	306600	10.305	48.18	37.88	1.09
15_18	PM 15 Yankee Dry End	46840	306600	10.305	48.18	37.88	1.09
PPRTO	Proposed Press RTO	0	26280	0	3.68	3.68	0.11
Affected Sources							
Stack1	Boilers 1 and 2 (a)	NA	NA	NA	NA	13.5	0.39
Stack3	Boilers 3 and 4 (a)	NA	NA	NA	NA	13.5	0.39
Totals				117.98	285.75	194.81	5.60

(a) Net Emission Rate increase reflects an attributable heat input of 643,860 MMBtu/yr or 73.5 MMBtu/hr and worst-case fuel. Attributable Boiler Emissions may be exhausted via either Stack 1 or Stack 2. Actual model runs applied two source groups for these two cases. Total attributable emissions are equal to 73.5 MMBtu/hr x 0.084 lbs CO/MMBtu x 454 g/lb x hr/3,600s = 0.78 gram/s.

G-P modeled point sources using the POINT source type. Table D-9 presents source modeling parameters for POINT sources.

Table D-9 Model ID	Description	Source Location UTM (m) East	Source Location UTM (m) North	Stack Parameters: Hs (m)	Temp K	Vs (m/s)	Ds (m)
STACK3	STACK #3 – BOILERS B-3 & B-4	292538	3956420	79.3	433.15	12.06	4.20
STACK1	STACK #1 - BOILER B-2	292498	3956399	79.3	410.93	13.2	3.05
1112_1	Building Exhaust	292399	3956330	26.3	295	0.001	1.22
1112_2	Building Exhaust	292400	3956345	26.3	295	0.001	1.22
1112_3	Building Exhaust	292401	3956359	26.3	295	0.001	1.22
1112_4	Building Exhaust	292401	3956420	26.3	295	0.001	1.22
1112_5	Building Exhaust	292415	3956333	26.3	295	0.001	1.22
1112_9	Building Exhaust	292413	3956335	26.3	295	0.001	1.22
1112_10	Building Exhaust	292413	3956344	26.3	295	0.001	1.22
1112_11	Building Exhaust	292413	3956357	26.3	295	0.001	1.22
1112_13	Building Exhaust	292379	3956330	26.3	295	0.001	1.22
1112_14	Building Exhaust	292385	3956335	26.3	295	0.001	1.22
1112_15	Building Exhaust	292386	3956345	26.3	295	0.001	1.22
1112_8	Yankee Wet End Exh.	292416	3956372	27.6	400	14.7	1.74
1112_7	Yankee Dry End Exh	292419	3956372	27.6	400	14.7	1.74
1112_17	After Dryer Exh.	292383	3956362	25.5	295	16.84	1.22

Table D-9 Model ID	Description	Source Location UTM (m)		Stack Parameters			
		East	North	Hs (m)	Temp K	Vs (m/s)	Ds (m)
1112_18	After Dryer Exh.	292384	3956380	25.5	295	16.84	1.22
1112_19	After Dryer Exh.	292384	3956383	25.5	295	16.84	1.22
1112_20	Yankee Exh	292376	3956386	25.5	400	10.47	2.80
1112_22	Vacuum Pump	292376	3956336	24.7	295	80	0.30
1112_23	Vacuum Pump	292421	3956349	24.7	295	80	0.30
1112_24	Former Exh	292422	3956342	3.7	295	0.001	1.80
1112_25	Fan Pump Silo	292418	3956352	16.2	295	0.001	0.91
1112_26	Wall Exhaust	292420	3956333	12.2	295	0.001	1.22
1112_28	Wall Exhaust	292376	3956328	12.2	295	0.001	1.22
1112_29	Fan Pump Silo	292376	3956341	16.2	295	0.001	0.91
1112_30	Former Exh	292373	3956353	6.1	295	20.62	1.22
1112_32	Wall Exhaust	292410	3956322	12.2	295	0.001	1.22
13_1	Roof Exhausts	292336	3956328	26.4	295	0.001	1.52
1112_31	Wall Exhaust	292382	3956322	12.2	295	0.001	1.22
1112_27	Roof Exhausts	292426	3956367	12.2	295	0.001	0.00
13_2	Roof Exhausts	292332	3956358	26.4	295	0.001	1.52
13_3	Roof Exhausts	292344	3956334	26.4	295	0.001	1.52
13_4	Roof Exhausts	292344	3956340	26.4	295	0.001	1.52
13_5	Roof Exhausts	292345	3956345	26.4	295	0.001	1.52
13_6	Roof Exhausts	292344	3956357	26.4	295	0.001	1.52
13_7	Roof Exhausts	292349	3956330	26.4	295	0.001	1.52
13_10	After Dryer Hood Exh	292348	3956370	26.4	295	21.08	1.52
13_13	Yankee	292351	3956383	26.4	400	10.91	1.74
13_14	Fan Pump Silo	292348	3956350	28.3	295	21.08	0.46
13_17	Vacuum Pump	292318	3956342	25.6	295	20.12	0.91
13_18	Former Exh	292353	3956347	6.1	295	21.56	1.22
13_19	Wall Exhaust Fan	292353	3956332	18.9	295	19.7	1.22
13_20	Wall Exhaust Fan	292353	3956335	18.9	295	0.001	0.61
14_1	Vacuum Pump Exhaust	292258	3956345	27.1	295	8.55	1.07
14_2	Building Exhaust	292269	3956330	26.4	295	0.001	1.22
14_3	Building Exhaust	292269	3956335	26.4	295	0.001	1.22
14_4	Building Exhaust	292269	3956341	26.4	295	0.001	1.22
14_5	Building Exhaust	292269	3956347	26.4	295	0.001	1.22
14_6	Building Exhaust	292269	3956353	26.4	295	0.001	1.22
14_7	Building Exhaust	292269	3956362	26.4	295	0.001	1.22
14_8	Building Exhaust	292269	3956385	26.4	295	0.001	1.22
14_9	Building Exhaust	292269	3956410	26.4	295	0.001	1.22
14_10	Fan Pump Silo Exhaust	292289	3956332	26.5	295	13.2	1.07

Table D-9 Model ID	Description	Source Location UTM (m)		Stack Parameters			
		East	North	Hs (m)	Temp K	Vs (m/s)	Ds (m)
14_11	Former Exhaust	292285	3956336	28.9	295	20.84	0.91
14_13	Yankee Wet	292291	3956359	30.5	400	22.93	1.88
14_17	Yankee Dry	292293	3956391	30.5	400	22.93	1.88
14_20	Wall Exhaust Fan	292272	3956327	12.2	295	0.001	1.22
14_21	Wall Exhaust Fan	292292	3956366	12.2	295	0.001	1.22
14_22	Wall Exhaust Fan	292297	3956325	12.2	295	0.001	1.22
15_11	Riffler Roof Exhaust	292227	3956329	27.1	295	8.77	1.22
15_12	Former Exhaust w/ separator	292227	3956333	28.7	295	21.22	1.22
15_2	Roof Exhaust	292206	3956334	27.1	295	12.13	1.22
15_3	Roof Exhaust	292206	3956340	27.1	295	12.13	1.22
15_4	Roof Exhaust	292206	3956346	27.1	295	12.13	1.22
15_5	Roof Exhaust	292206	3956353	27.1	295	12.13	1.22
15_6	Roof Exhaust	292206	3956358	27.1	295	12.13	1.22
15_7	Roof Exhaust	292206	3956364	27.1	295	12.13	1.22
15_8	Roof Exhaust	292206	3956406	27.1	295	12.13	1.22
15_9	Roof Exhaust	292206	3956419	27.1	295	12.13	1.22
15_22	Roof Exhaust	292211	3956321	27.1	295	12.13	1.22
15_1	Vacuum Pump Silo	292192	3956345	27.4	295	19.01	1.07
15_13	Wet End Yankee Exhaust	292229	3956342	31.6	400	18.48	2.13
15_18	Dry End Yankee Exhaust	292229	3956380	31.6	400	18.48	2.13
15_19	Wall Fan	292214	3956322	12.2	295	0.001	1.22
15_20	Wall Fan	292233	3956325	12.2	295	0.001	1.22
15_21	Fan Pump Silo	292234	3956329	12.2	295	0.001	0.91
PPRTO	Proposed Press RTO	291954	3956854	9.14	402	15.4	1.29

G-P modeled fugitive sources using the VOLUME source type. The VOLUME source type applies two dimensions and a square base to represent the emission source. In cases where the model cannot approximate a fugitive emission source as a single square base model source, G-P divided the emission source into multiple identical sources. G-P divided the emission rate equally among the model sources. Table D-10 presents the fugitive emission source parameters for VOLUME sources.

Table D-10	Roads	Railcar Unload	Coal Stacker	Coal Crusher	Coal Grizzly	Bunker Transfer
Model ID	Various	RCUN	STKER	CRUSHER	GRIZZLY	BNKXF
Source ht (m)	7.3	5.0	1.0	11.4	3.0	1.0
Release Ht (m)	3.7	2.5	14.6	5.7	1.5	31.4
Surface Based or Elevated	Surface	Surface	Elevated	Surface	Surface	Elevated
Side Length (m)	14.1	7.5	14.1	11.8	3.5	1.0
Initial Lateral dim. (Σy) (m)	6.6	3.5	6.6	5.5	1.6	0.5
Source ht (m)	7.3	5.0	1.0	11.4	3.0	1.0
Initial Vertical dim (Σz) (m)	3.4	1.2	0.2	2.7	0.7	0.2

"Volume Source Inputs" in the EPA's User's Guide for the Industrial Source Complex (ISC3) Dispersion Models Volume I - User Instructions (EPA-454/B-95-003a)

Receptor Locations
All analyses will use screening and refined Cartesian receptor grids. The receptors are spaced at 25-m intervals along the fenceline, at 100-m intervals within 3 km of the Mill, and at 500-m intervals beyond 7.5 km of the Mill. G-P inspected the analysis results to determine if predicted impacts at the edges of the most coarse receptor grid were decreasing. The analysis was supplemented with additional refined receptor sets if the receptor spacing at the maximum impact location was more than 100 m. The analysis modeled all areas, including our property outside the fence, as ambient air. G-P compiled the terrain and source elevations using USGS Digital Elevation Model 7.5-minute series data. G-P used the AERMAP program to interpolate the raw USGS DEM data into the uniform receptor grids. The raw datasets were prepared by the USGS with a resolution of 30 m for the 7.5-minute data. G-P inspected the resultant grid files for accuracy. G-P used the fine resolution dataset (i.e., 7.5 minute series) to extract terrain data.

D.2.7 NAAQS MODELING ANALYSIS
Purpose and Methodology
As discussed in the result section, preliminary modeling of the proposed project indicated a significant impact (i.e., maximum impact at or above the PSD significance levels) for NO_2, SO_2, and PM_{10}. Therefore, PSD review requires G-P to perform a full air quality analysis to demonstrate compliance with the NAAQS. The NAAQS impact analysis predicts the maximum ambient air concentration due to 1) all Mill sources emitting at maximum potential emission rates, 2) off-site sources at maximum permitted rates, and 3) natural and background sources. The total of these concentrations must be less than the NAAQS. Table D-11 summarizes the NAAQS.

Table D-11

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)	Form of Standard
PM_{10}	24-hour	150	High-sixth-highest for 5 years
	Annual	50	Annual Mean
NO_2	Annual	100	Annual Mean
SO_2	3-hour	1,300	High-second-highest for each year
	24-hour	365	High-second-highest for each year
	Annual	80	Annual Mean

Background Concentrations
Background concentrations are necessary to determine total ambient air quality impacts to demonstrate compliance with the NAAQS. "Background concentrations" are defined as concentrations due to sources other than those specifically included in the modeling analysis. For example, background concentration would account for other small point sources not included in the modeling, fugitive emission sources, and natural background sources (e.g., mobile sources).

ODEQ recommended conservative values for background concentrations considering monitor locations, their proximity to the Muskogee Mill, data quality, and how recent the data was collected. Table D-12 presents the background concentrations in micrograms per cubic meter ($\mu g/m^3$) used for the analyses.

Table D-12 Pollutant	**Monitor and Data Description**	**Averaging Period**	**Background Concentration**	
			(ppm)	**($\mu g/m^3$)**
SO_2	Muskogee – 2004 High Second High for 3-hour and 24-hour; 2004 Annual mean	3-hr	0.061	159.8
		24-hr	0.016	41.9
		Annual	0.0026	6.8
NO_2	Tulsa - 2004 Annual Mean	Annual	0.0054	10.2
PM_{10}	Muskogee – 2002-2004 High Fourth High and 2004 Annual mean	24-hr	--	72
		Annual	--	23.2

Note: ODEQ recommended these values in an e-mail from E. Milligan to M. Aguilar, 2/2/2005

Inventory – G-P

For the NAAQS impact analysis, the model inventory includes all emission sources from the entire Mill at their potential emission rates. The inventory does not include any offset or negative emission sources. Table D-13 summarizes the emission rates for the NAAQS analyses. The modeled emission rates are identical to the rates in the current Title V permit application (with exceptions noted).

Table D-13 Model ID	**Source Description**	**Emission Rates (g/s)**		
		PM_{10}	**SO_2**	**NO_X**
1112_7	PM 11 Yankee Dry End Exh. Maximum	0.103	0.003	0.363
1112_8	PM 11 Yankee Wet End Exh.Maximum	0.103	0.003	0.363
1112_20	PM12 Yankee Exh -Maximum	0.257	0.0064	0.4990
13_13	PM13 Yankee Economizer - Maximum	0.232	0.0047	1.0584
14_13	PM14 Yankee Wet End Exh. - Maximum	0.116	0.0032	0.6615
14_17	PM17 Yankee Dry End Exh. - Maximum	0.116	0.0032	0.6615
15_13	PM15 Yankee Wet End Exh. - Maximum	0.110	0.0032	0.378
15_18	PM15 Yankee Dry End Exh. - Maximum	0.110	0.003	0.378
1112_20	PM12 Yankee	0.243	0.0021	1.0584
1112_1	Building Exhaust	0.018	--	--
1112_2	Building Exhaust	0.018	--	--
1112_3	Building Exhaust	0.018	--	--
1112_4	Building Exhaust	0.018	--	--
1112_5	Building Exhaust	0.018	--	--
1112_9	Building Exhaust	0.018	--	--
1112_10	Building Exhaust	0.018	--	--
1112_11	Building Exhaust	0.018	--	--
1112_13	Building Exhaust	0.018	--	--
1112_14	Building Exhaust	0.018	--	--
1112_15	Building Exhaust	0.018	--	--
1112_17	After Dryer Exh.	0.015	--	--

Table D-13 Model ID	Source Description	Emission Rates (g/s)		
		PM_{10}	SO_2	NO_X
1112_18	After Dryer Exh.	0.015	--	--
1112_19	After Dryer Exh.	0.015	--	--
1112_22	Vacuum Pump	0.009	--	--
1112_23	Vacuum Pump	0.009	--	--
1112_24	Former Exh	0.019	--	--
1112_25	Fan Pump Silo	0.002	--	--
1112_26	Wall Exh.	0.009	--	--
1112_28	Wall Exh.	0.009	--	--
1112_29	Fan Pump Silo	0.002	--	--
1112_30	Former Exh	0.018	--	--
1112_31	Wall Exh.	0.009	--	--
1112_27	Wall Exh.	0.009	--	--
1112_32	Wall Exh.	0.009	--	--
13_13	Yankee Economizer	0.218	0.0024	1.0584
13_1	Roof Exhausts	0.013	--	--
13_2	Roof Exhausts	0.013	--	--
13_3	Roof Exhausts	0.013	--	--
13_4	Roof Exhausts	0.013	--	--
13_5	Roof Exhausts	0.013	--	--
13_6	Roof Exhausts	0.013	--	--
13_7	Roof Exhausts	0.013	--	--
13_10	After Dryer Hood Exh	0.025	--	--
13_14	Fan Pump Silo	0.003	--	--
13_17	Vacuum Pump	0.011	--	--
13_18	Former Exh	0.018	--	--
13_19	Wall Exh. Fan	0.009	--	--
13_20	Wall Exh. Fan	0.009	--	--
14_13	Yankee Wet End	0.109	0.0014	0.5292
14_17	Yankee Dry End	0.109	0.0014	0.5292
14_1	Vacuum Pump exh.	0.007	--	--
14_2	Building exh.	0.014	--	--
14_3	Building exh.	0.014	--	--
14_4	Building exh.	0.014	--	--
14_5	Building exh.	0.014	--	--
14_6	Building exh.	0.014	--	--
14_7	Building exh.	0.014	--	--
14_8	Building exh.	0.014	--	--
14_9	Building exh.	0.014	--	--
14_10	Fan Pump Silo Exh.	0.012	--	--
14_11	Former Exh.	0.013	--	--
14_20	Wall Exh. Fan	0.012	--	--
14_21	Wall Exh. Fan	0.012	--	--

Table D-13 Model ID	**Source Description**	**Emission Rates (g/s)**		
		PM_{10}	**SO_2**	**NO_X**
14_22	Wall Exh. Fan	0.012	--	--
15_13	Yankee Wet End	0.103	0.0015	0.5292
15_18	Yankee Dry End	0.103	0.0015	0.5292
15_11	Riffler Roof Exhaust	0.009	--	--
15_12	Former Exhaust w/ separator	0.021	--	--
15_2	Roof Exh.	0.012	--	--
15_3	Roof Exh.	0.012	--	--
15_4	Roof Exh.	0.012	--	--
15_5	Roof Exh.	0.012	--	--
15_6	Roof Exh.	0.012	--	--
15_7	Roof Exh.	0.012	--	--
15_8	Roof Exh.	0.012	--	--
15_9	Roof Exh.	0.012	--	--
15_22	Roof Exh.	0.012	--	--
15_1	Vacuum Pump Silo	0.014	--	--
15_19	Wall Fan	0.010	--	--
15_20	Wall Fan	0.010	--	--
15_21	Fan Pump Silo	0.006	--	--
PPRTO	Proposed RTO	0	0	0.063
Stack1	Boilers 1 and 2 (a)	9.45	74.34	46.62
Stack3	Boilers 3 and 4 (a)	14.04	168.44	98.25
RCUN	Railcar Unload	0.00521	--	--
STKER	Coal Stacker	0.00521	--	--
GRIZZLY	Coal Grizzly	0.00521	--	--
CRUSHER	Coal Crusher	0.0675	--	--
BNKXF	Bunker Coal Transfer	0.450	--	--
RDA1..A39	Main Gate to 1st intersection	0.00866	--	--
RDB1..B57	1st Intersection to Coal Pile	0.00059	--	--
RDC1..C28	1st Intersection to Shipping/Rcv	0.00635	--	--
RDD1..D300	Ash Management	0.01459	--	--
Additional Source For NAAQS Analysis				
RESIN	Resin Material Baghouse	0.025	--	--
Total for NAAQS Analysis		**26.2**	**191.61[a]**	**150.23**

(a) Muskogee Mill proposes to restrict total SO_2 emissions from Boilers 1 through 4 combined to 191.6 grams/second.

Table D-14 summarizes the modeling parameters for the RESIN source, which was not affected by the project and thus not included in the significant impact analysis.

Table D-14

Parameter	Value
Easting (m)	291920
Northing (m)	3956855
Stack Ht (m)	20.74
Exit Temp K	Ambient
Exit Velocity (m/s)	17.7
Exit Diameter (m)	0.298

Inventory – Competing Sources

A full analysis must include the emissions of competing sources. G-P considered competing sources within the screening area. The screening area is unique for each pollutant, and is the area within a circle centered on the project with a radius equal to the significant impact distance plus 50 km, but not to exceed 100 km. The screening areas for NO_2, PM_{10}, and SO_2, are 55, 52.5 and 58 km, respectively. Table D-15 presents a summary of competing sources within 60 km of the Mill provided by ODEQ.

Table D-15

Facility ID	Facility	Site City	Distance From Mill (km)	Direction From Mill (degrees)	Potential Emissions (lb/hr)		
					SO_2	NO_2	PM_{10}
13665	American Foundry Group	Muskogee	1.0	278	0.02	3.26	3.95
9943	OG&E	Fort Gibson	3.3	357	19808	11844	463
9987	Owens Brockway Glass Cntr	Muskogee	5.5	322	29.6	160.7	20.4
10113	Sintertec Div Of BPI Inc	Muskogee	5.8	352	9.5	15.8	5.9
8668	Boral Bricks Of Texas LP	Muskogee	11.6	244	18.8	29.9	24.4
10242	Global Stone St Clair Inc	Marble City	44.4	111	256.8	149.8	36.4
18787	Calpine Corp	Coweta	47.9	312	11.72	361	55.68
9257	Grand River Dam Auth	Chouteau	51.2	2	9334	6239.7	660.6

G-P included all competing sources within 60 km in the NAAQS modeling analysis. Table D-16 presents the individual stack parameters for sources at these facilities. In cases of missing stack parameters in the data, the following assumptions were made.

For point sources, stack temperature set to ambient (293 K), stack diameter set to 0.001 m, exit velocity set to 0.001 m/s, and stack height set to 10 feet.

For fugitive sources, release height set to 10 meters, vertical extent set to 10 m, initial vertical dispersion coefficient (σ_z) of m, lateral extent set to 5 m, and initial lateral dispersion coefficient (σ_y) set to 1.16 m or based on footprint of source area.

Table D-16 (page 1)

Facility / Source Description	Model ID	Potential Emissions (gram/sec) SO_2	NO_2	PM_{10}	Stack Ht (m)	Stack Diam (m)	Stack Temp K	Exit Velocity m/s	Volume Source Dimensions (m) Sig y	Sig z
AMERICAN FOUNDRY GROUP										
Electric Induction Furnaces	13665	0	0	(a)	3.0	NA	NA	NA	1.16	2.33
Pouring and Casting	13666	0	0	(a)	3.0	NA	NA	NA	1.16	2.33
Casting Cleaning	13667	0	0	(a)	3.0	NA	NA	NA	1.16	2.33
Charge Handling	13668	0	0	(a)	3.0	NA	NA	NA	1.16	2.33
Casting Cooling	13669	0	0	(a)	3.0	NA	NA	NA	1.16	2.33
Sand Grinding	13670	0	0	(a)	3.0	NA	NA	NA	1.16	2.33
Ladle Heaters	13673	0.0025	0.411	0.498	10	NA	NA	NA	11.62	9.31
OG&E (per permit)										
Unit #3	9943	10.04	71.49	5.52	53.6	4.7	422	9.3		
Unit #4	9944	828.58	483.34	13.04	106.7	7.3	402	14.1		
Unit #5	9945	828.58	483.34	13.04	106.7	7.3	402	14.1		
Unit #6	9946	828.58	454.23	26.71	152.4	6.6	402	25.2		
Coal Crushing, Loading, and Handling	9947	0	0	0.068	10.0	NA	NA	NA	5	8.3
OWENS BROCKWAY GLASS										
Glass Melting Furnace #4	9987	0.9702	7.65	0.781	45.7	1.6	765	8.9		
Glass Melting Furnace #42	9988	2.76	12.60	1.79	24.4	2.1	471	9.0		
SINTERTEC DIV OF BPI INC										
Kiln #1 (Shuttle)	10113	1.197	1.99	0.315	10.1	0.4	505	19.1		
Raw Mill	10117	0	0	0.214	10.1	0.4	294	19.1		
Crushing (Primary,Secondary,Tertiary)	10118	0	0	0.214	10.1	0.4	294	19.1		

Table D-16 (Page 2)

Facility / Source Description	Model ID	Potential Emissions (g/sec) SO_2	NO_2	PM_{10}	Stack Ht (m)	Stack Diam (m)	Stack Temp K	Exit Velocity m/s	Volume Source Dimensions (m) Sig y	Sig z
BORAL BRICKS OF TEXAS LP										
Tunnel Kiln	8668	2.37	3.77	3.07	8.5	1.5	533	12.4		
GLOBAL STONE ST CLAIR INC										
Rotary Lime Kiln #1 - KVS	10242	11.94	6.97	1.76	29.3	2.1	341	9.5		
Rotary Lime Kiln #2 - Fuller	10243	20.41	11.91	2.82	30.5	2.1	341	14.4		
CALPINE CORP										
Power Block 1, #1-1	18787	0.738	22.74	3.51	43.9	6.1	355	14.4		
Power Block 2, #2-1	18789	0.738	22.74	3.51	43.9	6.1	355	14.4		
GRAND RIVER DAM AUTH										
Electric Power Generation Unit #1	9257	775.78	452.55	64.65	153.9	6.1	408	27.6		
Electric Power Generation Unit #2	9258	400.30	333.65	18.59	153.9	6.1	344	26.4		

(a) PM_{10} Emissions for all American Foundry Group sources modeled as a single source - 13673

Table D-17 presents UTM locations and estimated base elevation from an AERMAP analysis.

Table D-17

Facility ID	Facility	Base Elevation (m)	UTM (m)	
			Easting	Northing
13665	American Foundry Group	165	291620	3956280
9943	OG&E Muskogee Generating	154	292335	3959747
9987	Owens Brockway Glass Cntr	182	289175	3960751
10113	Sintertec Div Of BPI Inc	157	291741	3962143
8668	Boral Bricks Of Texas LP	182	282067	3951391
10242	Global Stone St Clair Inc	211	334047	3940559
18787	Calpine Corp	213	257093	3988582
9257	Grand River Dam Auth	191	294073	4007568

Receptors

For the NAAQS analyses, G-P used receptor spacing identical to the spacing for the significant impact analysis. For each pollutant, these receptors extended out to the SID. The SID for PM, NOx, and SO_2 are 0.8, 4.5, and 5.25 km, respectively. If the maximum impact location is in an area with receptor spacing greater than 100 m, then G-P also performed a refined analysis with additional receptors spaced apart at 100 m intervals.

D.2.8 PSD CLASS II INCREMENT ANALYSIS

Purpose and Methodology

As discussed in the result section, preliminary modeling of the proposed project indicated a significant impact (i.e., maximum impact at or above the PSD significance levels) for NO_2, SO_2, and PM_{10}. Therefore, PSD review requires G-P to perform a full air quality analysis to demonstrate compliance with the PSD Class II Increments. The Increment impact analysis predicts the maximum ambient air concentration due to all Mill sources and off-site sources within the screening areas that affect or consume increment. The total of these concentrations must be less than the PSD Increment, as listed in Table D-18.

Table D-18

Pollutant	Averaging Time	Allowable PSD Increment (μg/m^3)	Form of Standard
PM_{10}	24-hour	30	High-second-highest for each year
	Annual	17	Annual Mean
NO_2	Annual	25	Annual Mean
SO_2	3-hour	512	High-second-highest for each year
	24-hour	91	High-second-highest for each year
	Annual	20	Annual Mean

Inventory – G-P

In contrast to the NAAQS/AAQS analysis, the Increment inventory includes increases or decreases in actual emissions for non-major sources only after the minor source baseline date, and increases or decreases in emissions for major sources due to a change in the method of operation after the major source baseline date. Because the Mill is a major source, all emission increases after the major source baseline due to a change in the method of operation consume increment. The Mill was constructed after the major source baseline date for SO_2 and PM_{10}, 1975. Thus, the NAAQS inventory for PM_{10} and SO_2 emissions from the Muskogee Mill are also the complete inventory of increment-affecting emissions from the Mill. Table D-13 above lists the NAAQS inventory emission rates for these pollutants.

In contrast, the PSD major source baseline date for NO_X is March 1988. Table D-19 summarizes the NO_2 emission calculations for increment-affecting emissions.

Table D-19

Model ID	Source Description	Source Modified Since 1988?	Emission Rates Baseline (g/sec)	Emission Rates Maximum (g/sec)	Emission Rates Increment (g/sec)	Emission Rates Increment (lb/hr)
1112_8	PM 11 Yankee Wet End	No	0	0.5292	0.431	3.42
1112_7	PM 11 Yankee Dry End	No	0	0.5292	0.431	3.42
1112_20	PM12 Yankee	No	0	1.0584	0.718	5.70
13_13	Yankee Economizer	No	0	1.0584	0.783	6.21
14_13	Yankee Wet End	No	0	0.5292	0.433	3.43
14_17	Yankee Dry End	No	0	0.5292	0.433	3.43
15_13	Yankee Wet End	Yes	0	0.5292	0.529	4.2
15_18	Yankee Dry End	Yes	0	0.5292	0.529	4.2
PPRTO	Proposed RTO	No	0	0.063	0.063	0.5
Stack1	Boilers 1 and 2	No	31.67	46.620	14.750	118.68
Stack3	Boilers 3 and 4	No	67.95	98.255	30.305	240.51
Analysis Total			100.6	150.2	49.4	392.1

The inventory reflects the following conservative assumptions. Baseline emissions for all Yankee dryer emissions are set to zero. Actual emissions on the PSD baseline date were above zero for sources 11 through 14 as these sources existed in 1988. The analysis included the proposed RTO and did not include the credit from the shut-down of the existing RTO. PSD Baseline emissions for Stack 1 and Stack 3 sources reflect the average of 2002 and 2003 fuel usage. In 1988, all boilers were burning fuel oil. Emission factors for fuel oil are greater than natural gas emission factors. By assuming heat input for Boiler 1 (one of two boilers exhausting through Stack 1) was provided by gas instead of oil, the estimated baseline emissions are conservatively low, yielding a higher amount of emissions that affect increment.

Inventory – Competing Sources

A full analysis must include the emissions of competing sources. In contrast to the NAAQS analysis, the PSD Increment analysis includes emissions only from competing sources that affect increment. ODEQ identified several sources within 60 km of the Mill that consume increment. G-P modeled all PSD-consuming competing sources. Table D-20 presents modeling parameters of competing sources identified by ODEQ included in the analysis. As a conservative measure, the analysis used the potential emission rates for each pollutant affected by increment, regardless of source status during the baseline.

Receptors

For the PSD Increment analyses, G-P used receptor spacing identical to the spacing for the NAAQS analyses.

Table D-20 Facility / Source Description	Model ID	Increment Emissions (gram/sec) SO_2	NO_2	PM_{10}	Stack Ht (m)	Stack Diam (m)	Stack Temp K	Exit Velocity m/s	Volume Source Dimensions (m) Sig y	Sig z
AMERICAN FOUNDRY GROUP	--	0	0	0					NA	NA
OG&E										
Unit #6	9946	828.58	0	26.71	152.4	6.6	402	25.2		
Coal Crushing, Loading, and Handling	9947	0	0	0.068	10.0	NA	NA	NA	5	8.53
OWENS BROCKWAY GLASS	--	0	0	0	NA	NA	NA	NA		
SINTERTEC DIV OF BPI INC										
Kiln #1 (Shuttle)	10113	1.197	1.9908	0.315	10.1	0.4	505	19.1		
Raw Mill	10117	0	0	0.214	10.1	0.4	294	19.1		
Crushing	10118	0	0	0.214	10.1	0.4	294	19.1		
BORAL BRICKS OF TEXAS LP										
Tunnel Kiln	8668	2.37	0	3.07	8.5	1.5	533	12.4		
GLOBAL STONE ST CLAIR INC										
Rotary Lime Kiln #1 - KVS	10242	11.94	6.97	1.76	29.3	2.1	341	9.5		
Rotary Lime Kiln #2 - Fuller	10243	20.41	11.91	2.82	30.5	2.1	341	14.4		
CALPINE CORP										
Power Block 1, #1-1	18787	0.738	22.74	3.51	43.9	6.1	355	14.4		
Power Block 2, #2-1	18789	0.738	22.74	3.51	43.9	6.1	355	14.4		
GRAND RIVER DAM AUTH										
Electric Power Generation Unit #1	9257	775.78	0	64.65	153.9	6.1	408	27.6		
Electric Power Generation Unit #2	9258	400.30	0	18.59	153.9	6.1	344	26.4		

D.2.9 SOURCE IMPACT ANALYSIS RESULTS

Significant Impact Analysis

Carbon Monoxide

By modeling the emissions that would result from the project, G-P determined that the proposed project will not have a significant CO impact. Table D-21 presents the maximum predicted impacts from the significant impact analysis.

Table D-21 **Averaging Period**	**Year**	**Maximum Predicted Impact (μg/m³)**	**Receptor Location UTM Zone 15 (m)**		**Period Ending YYMMDDHH**	**Significant Impact Level (μg/m³)**	**Monitoring De minimis Conc., (μg/m³)**
			East	**North**			
1-hour High 1st High	1986	323	291715	3956388	86080904	2000	--
	1987	318	291714	3956338	87090301		
	1988	322	291714	3956338	88062323		
	1990	319	291714	3956338	90082206		
	1991	320	291715	3956363	91081204		
8-hour High 1st High	1986	95	293900	3955300	86041524	500	575
	1987	100	293500	3954600	87090908		
	1988	101	291715	3956388	88091024		
	1990	88	291714	3956313	90082208		
	1991	97	291715	3956463	91060708		

The maximum 8-hour CO impact due to the project is below the SIL and monitoring de minimis concentrations. In addition, the maximum 1-hour impact value is also below the modeling significance level for that averaging period. Therefore, G-P did not perform a full NAAQS analysis for CO.

Nitrogen Dioxide

By modeling the emissions that would result from the project, G-P determined that the proposed project will have a significant NO_2 impact out to approximately 4.5 km from the Mill. Table D-22 presents the maximum predicted impacts from the significant impact analysis.

Table D-22 **Averaging Period**	**Year**	**Maximum Predicted Impact (μg/m³)**	**Receptor Location UTM Zone 15 (m)**		**Period Ending YYMMDDHH**	**Significant Impact Level (μg/m³)**	**Monitoring De minimis Conc., (μg/m³)**
			East	**North**			
Annual	1986	3.7	292201	3957272	3.8	1	14
	1987	3.1	292151	3957273	3.3		
	1988	3.0	292101	3957274	3.4		
	1990	3.9	292326	3957270	4.0		
	1991	3.6	292301	3957270	3.7		

The maximum annual NO_2 impact due to the project is above the SIL but below the monitoring de minimis concentration of 1 and 14 μg/m^3, respectively. Therefore, G-P performed a full NAAQS analysis for NO_2.

Sulfur Dioxide
By modeling the emissions that would result from the project, G-P determined that the project will have a significant SO_2 impact out to 5.25 km. Table D-23 presents the maximum predicted impacts from the significant impact analysis.

Table D-23 **Averaging Period**	**Year**	**Maximum Predicted Impact (μg/m³)**	**Receptor Location UTM Zone 15 (m)**		**Period Ending YYMMDDHH**	**Significant Impact Level (μg/m³)**	**Monitoring De minimis Conc., (μg/m³)**
			East	**North**			
Annual Mean	1986	0.6	292300	3958000	--	1	--
	1987	0.5	292200	3958000	--		
	1988	0.5	292200	3957900	--		
	1990	0.6	292500	3957700	--		
	1991	0.7	292400	3958200	--		
24-hour High 1st High	1986	4.7	296000	3954000	86041524	5	13
	1987	4.2	294600	3954600	87011024		
	1988	5.3	294700	3954600	88032624		
	1990	4.0	293700	3954500	90122924		
	1991	5.0	296500	3955000	91110324		
3-hour High 1st High	1986	20.4	296500	3955500	86070124	25	--
	1987	20.7	296500	3955000	87042203		
	1988	24.2	294700	3954700	88030406		
	1990	21.2	296500	3955000	90050924		
	1991	14.3	296500	3955000	91120306		

The maximum 24-hour SO_2 impact due to the proposed project is 5.3 μg/m^3, which is above the SIL but below the monitoring de minimis concentrations of 5 and 13 μg/m^3, respectively. The maximum 3-hour and annual average impacts are below the respective modeling significance levels. Therefore, G-P performed a full NAAQS analysis for SO_2.

Particulate Matter
By modeling the emissions that would result from the project, G-P determined that the project will have a significant PM_{10} impact out to 2.1 km. Table D-24 presents the maximum predicted impacts from the significant impact analysis.

Table D-24 Averaging Period	Year	Maximum Predicted Impact (μg/m³)	Receptor Location UTM Zone 15 (m)		Period Ending YYMMDDHH	Significant Impact Level (μg/m³)	Monitoring De minimis Conc., (μg/m³)
			East	North			
24-hour High 1st High	1986	8.1	291897	3956770	86102824	5	10
	1987	6.2	292391	3955890	87012424		
	1988	5.6	292441	3955890	88020324		
	1990	5.7	292391	3955890	90122224		
	1991	5.9	292391	3955890	91030224		
Annual	1986	1.33	292101	3957274	--	1	--
	1987	1.19	292101	3957274	--		
	1988	1.20	292101	3957274	--		
	1990	1.40	292351	3957270	--		
	1991	1.29	292351	3957270	--		

The maximum 24-hour PM_{10} impact due to the project is above the SIL but below the monitoring de minimis concentrations of 5 and 10 μg/m³, respectively. In addition, the maximum annual impact also slightly exceeds the modeling significance level. Therefore, G-P performed a full NAAQS analysis for PM_{10}.

Summary

The significant impact analysis determined that the project emission increase would cause a maximum impact above the SILs and the EPA monitoring de minimis concentrations for several pollutants. Figures D-5, D-6, and D-7 in the application present the arrangement of the significant impact areas for these pollutants. Table D-25 summarizes the significant increment diameter (SID) for each pollutant and indicates if the project impact is above the de minimis monitoring concentration.

Table D-25

Pollutant	Averaging Time	SID (km)	Exceed de minimis Monitoring Conc?
SO_2	24-hr	4.25	No
	3-hr	0	--
	Annual	0	--
NO_X	Annual	4.8	No
PM_{10}	Annual	2.0	--
	24-hr	2.5	No

NAAQS Analysis

Nitrogen Dioxide

By modeling the total potential Mill emissions and competing source emissions, the analysis predicted the total impact to compare to the NAAQS. Table D-26 summarizes the NO_2 model results.

Table D-26

Year	Annual Predicted Impact (ug/m^3)(a)	Receptor Location UTM Zone 15 (m)	
		East	North
1986	27.2	291600	3956300
1987	28.3	291600	3956300
1988	29.8	291600	3956300
1990	23.6	291600	3956400
1991	25.0	291600	3956400

(a) maximum impact of two model runs with and without American Foundry Group

G-P added a background concentration of 10.2 $\mu g/m^3$ to the modeling result. As summarized in Table D-27, when adding the background concentrations, the annual concentration is 40.1 $\mu g/m^3$. This impact is less than the respective NAAQS of 100 $\mu g/m^3$. Therefore, G-P has demonstrated that the Mill emissions that reflect all project changes will not cause or contribute to a violation of the NAAQS.

Table D-27	Concentrations in $\mu g/m^3$			
Averaging Period	Maximum Predicted Impact	Background Concentration	Total Concentration	NAAQS
Annual	29.8	10.2	40.1	100

Sulfur Dioxide

By modeling the total potential Mill emissions and competing source emissions, G-P determined that the maximum SO_2 predicted impacts are 4,915, 133, and 14.5 $\mu g/m^3$, for the 3-hour, 24-hour and annual averaging times, respectively. The maximum impact locations were in an area that did not require additional refined receptor grids. Table D-28 summarizes the SO_2 model results.

Table D-28 Averaging Period	Year	Maximum Predicted Impact ($\mu g/m^3$)	Receptor Location		Period Ending (YYMMDDHH)
			East (m)	North (m)	
Annual	1986	13.0	292400	3957700	--
	1987	12.7	292700	3954100	--
	1988	11.8	292200	3957600	--
	1990	14.4	292500	3957700	--
	1991	14.5	292500	3957700	--
24-Hour High Second High	1986	122	292700	3954100	86022024
	1987	133	292600	3954100	87080424
	1988	110	296500	3954000	88031324
	1990	109	292700	3954100	90062224
	1991	114	292700	3954100	91041924
3-Hour High Second High	1986	373	289700	3954100	86060815
	1987	433	292700	3954100	87062412
	1988	445	296000	3954000	88090403
	1990	360	292700	3954100	90062218
	1991	491	291500	3954100	91060921

G-P added background concentrations of SO_2 to the modeling results. As summarized in Table D-29, when adding the background concentrations, the 3-hour, 24-hour, and annual concentrations are less than the respective NAAQS. Therefore, G-P has demonstrated that the Mill-wide emissions will not cause or contribute to a violation of the NAAQS.

Table D-29	**Concentrations in μg/m³**			
Averaging Period	**Maximum Predicted Impact**	**Background Concentration**	**Total Concentration**	**NAAQS**
Annual	14.46	6.8	21.3	80.0
24-Hour High 2nd High	132.5	41.9	174.4	365.0
3-Hour High 2nd High	490.5	159.8	650.3	1300.0

Particulate Matter – PM_{10}

The analysis predicted exceedances of the 24-hour NAAQS for PM_{10} on a single receptor on the American Foundry Group property when modeling all sources, including the American Foundry Group source, Model ID 13673. The placement of receptors was automatically set by a Cartesian grid and included one receptor within a short distance of the modeled emission source. G-P further analyzed for NAAQS by using two analyses. The first analysis includes all sources and excludes the one receptor on American Foundry Group property. The second analysis includes all receptors and excludes model source 13673. Table D-30 presents the results of these analyses.

Table D-30 **Averaging Period**	**Year**	**Maximum Predicted Impact (μg/m³)**	**Receptor Location UTM Zone 15(m)**		**Period Ending (YYMMDDHH)**
			East	**North**	
Maximum Impact on All Receptors Including American Foundry Group Property (a)					
Annual	1986	4.9	292301	3957270	--
	1987	4.6	292226	3957272	--
	1988	4.5	292201	3957272	--
	1990	4.4	292301	3957270	--
	1991	4.3	292326	3957270	--
24-Hour High 6th High	1986-1991	17	292391	3955890	86102524
Maximum Impact off American Foundry Group Property (b)					
Annual	1986	12.5	291600	3956500	--
	1987	11.6	291600	3956500	--
	1988	11.1	291600	3956500	--
	1990	11.2	291600	3956500	--
	1991	11.4	291600	3956500	--
24-Hour High 6th High	1986-1991	42	291712	3956013	86102424

(a) Impacts on American Foundry Group Property exclude the model source on the property [ISC files PMAQS*_2]

(b) Impacts off the American Foundry Group Property only exclude receptor (291600, 3956300) [ISC file PMAQS*_1]

G-P added background concentrations to the modeling results. Table D-31 summarizes the total concentrations for both analyses. With these two sets of data, the analysis predicted that the NAAQS would not be exceeded. Further, the modeling output files for the significant impact analysis of PM_{10} demonstrate that the project emissions will not cause any significant impact near the American Foundry Group property.

Table D-31	**Concentrations in μg/m^3**	
Averaging Period	Annual	24-Hour High 6th High
Maximum Predicted Impact	12.54	42
Background Concentration	23.2	72
Total Concentration	35.74	114.40
NAAQS	50	150

PSD Class II Increment Analysis

Nitrogen Dioxide
By modeling the increment-affecting emissions from the Mill and competing source, G-P determined that the maximum annual mean NO_2 increment predicted impact is 14.3 μg/m^3. The maximum impact location is in an area that did not require additional refined receptor grids. Table D-32 summarizes the NO_2 model results. This impact is less than the allowable increment of 25 μg/m^3. Therefore, G-P has demonstrated that the Mill emissions will not cause or contribute to a violation of the PSD Class II Increment.

Table D-32 Averaging Period	**Year**	**Maximum Predicted Impact (μg/m^3)**	**Receptor Location UTM Zone 15 (m)**		**Allowable Increment (μg/m^3)**
			East	**North**	
Annual	1986	14.0	92326	3957270	25
	1987	12.8	92326	3957270	
	1988	12.9	92201	3957272	
	1990	14.3	92500	3957700	
	1991	14.1	92500	3957700	

Sulfur Dioxide
By modeling the increment-affecting emissions from the Mill and competing sources, G-P determined that maximum SO_2 increment predicted impacts for the 3-hour, 24-hour and annual averaging times. The maximum impact locations were in an area that did not require additional refined receptor grids. Table D-33 summarizes the SO_2 model results. These impacts are less than the respective allowable increments of 512, 91, and 20 μg/m^3. Therefore, G-P has demonstrated that the Mill emissions will not cause or contribute to a violation of the PSD Class II Increment.

Table D-33 Averaging Period	Year	Maximum Predicted Impact (μg/m³)	Receptor Location UTM Zone 15 (m)		Period Ending (YYMMDDHH)	Allowable Increment (μg/m³)
			East	North		
Annual	1986	11.7	292300	3958000	--	20
	1987	10.3	292300	3957800	--	
	1988	10.3	292200	3957700	--	
	1990	13.2	292500	3957700	--	
	1991	13.5	292500	3957700	--	
24-Hour High Second High	1986	75	292800	3954000	86030324	91
	1987	74	292600	3954100	87080424	
	1988	70	294700	3954700	88030424	
	1990	65	293700	3954500	90071224	
	1991	68	294600	3954600	91110324	
3-Hour High Second High	1986	266	296000	3954500	86102321	512
	1987	301	294700	3954600	87092906	
	1988	373	294700	3954600	88030406	
	1990	255	296500	3955000	90012103	
	1991	245	296500	3955000	91110303	

Particulate Matter – PM_{10}
By modeling the increment-affecting emissions from the Mill and competing source, G-P determined that the maximum PM_{10} increment predicted impacts for the 24-hour and annual averaging times, are less than the respective allowable increments of 30 and 17 μg/m³. Therefore, G-P has demonstrated that the Mill emissions will not cause or contribute to a violation of the PSD Class II Increment.

Table D-34 Averaging Period	Year	Maximum Predicted Impact (μg/m³)	Receptor Location		Period Ending (YYMMDDHH)	Allowable Increment (μg/m³)
			East (m)	North (m)		
Annual	1986	5	292301	3957270	--	17
	1987	4	292201	3957272	--	
	1988	4	292101	3957274	--	
	1990	5	292426	3957268	--	
	1991	5	292351	3957270	--	
24-Hour High 2nd High	1986	20	291897	3956770	86102724	30
	1987	17	292391	3955890	87110924	
	1988	15	291715	3956413	88091024	
	1990	16	292476	3957268	90092724	
	1991	16	292466	3955890	91122824	

D.3. GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

D.3.1 INTRODUCTION

PSD review rules require that controls required for emission sources using the Best Available Control Technology Analysis (see Attachment E) cannot be affected by a stack height that exceeds Good Engineering Practice (GEP) or any other dispersion technique. In other words, emission rates specified in a source impact analysis must demonstrate compliance with stack heights at or below GEP, even if the physical height of the stack is greater. On July 8, 1985, EPA defined GEP stack height in the final stack height regulations (see 40 CFR 51.100(hh)). GEP stack height is defined as the greater of the following.

(1) 65 meters, measured from the ground-level elevation at the base of the stack.

(2) (i) For stacks in existence on January 12, 1979, and for which the owner or operator had obtained all applicable permits or approvals required under 40 CFR parts 51 and 52, Hg = 2.5H, provided the owner or operator produces evidence that this equation was actually relied on in establishing an emission limitation, where
Hg = good engineering practice stack height, measured from the ground-level elevation at the base of the stack, and
H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack.
(ii) For all other stacks, Hg = H + 1.5L, where
L = lesser dimension, height or projected width, of nearby structure(s) provided that the EPA, State or local control agency may require the use of a field study or fluid model to verify GEP stack height for the source.

(3) The height demonstrated by a fluid model or a field study approved by the EPA, State or local control agency, which ensures that the emissions from a stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures or nearby terrain features. “Nearby” is defined as a distance up to five times the lesser of the height or projected width dimensions of a structure or terrain feature but not greater than 0.8 kilometer (km).

The proposed project includes one new stack: Model ID PPRTO. To determine if the stack meets GEP regulations, G-P assembled stack height and building information from the source impact analysis.

D.3.2 GEP CALCULATIONS

Table D-35 presents a summary of stack construction date and computed GEP value for the proposed source modeled at the Mill. For this stack, the applicable GEP equation is GEP = (Height of structure) + 1.5 × (Lesser of structure height or width).

Table D-35 Stack Description	**Model ID**	**Stack Construction Date**	**GEP Calculations (meters)**		
			Structure Height (a)	**Structure Width (a)**	**GEP Height Computed by 40 CFR 51.100(hh)**
Proposed RTO	PPRTO	2006	15.24	42.29	38.10

(a) BPIP program selected the critical structure that produces the largest GEP value. Height and width shown is for the critical structure.

The proposed stack height is 20.7 m. This value is less than the computed GEP height; therefore, the proposed stack at its physical height complies with GEP regulations.

D.4. AMBIENT AIR QUALITY ANALYSIS

Rule 40 CFR 52.21(m) describes the analyses of ambient air quality data required by PSD review. These requirements include pre-application and post-application analyses. Both of these requirements are exempted by Rule 40 CFR 52.21(i)(8) if the source impact analysis demonstrates that the emissions increase from the modification would cause air quality impacts less than the de minimis monitoring concentrations in all areas. The source impact analysis (Section D.3) for the Muskogee Mill concluded that the maximum impacts from the project for SO_2, NO_2, and PM_{10} would not exceed this concentration. Therefore, the rule exemption is applicable. The following section describes the current air quality.

D.4.1 PRE-APPLICATION ANALYSIS

The Mill is located in an area generally free from the impact of other sources (except for OGE Muskogee Generating Station). For these conditions, EPA guidance recommends that monitoring data from a ‘regional’ site may be used as representative data. To determine if existing data is appropriate, EPA guidance recommends three criteria: monitor location, data quality, and currentness of the data. Table D-36 summarizes the criteria for the available recent data collected in the vicinity of the Muskogee Mill.

Table D-36 **Station ID**	**County**	**City**	**Location**	**Years of Available Data**	**Distance to Mill (km)**
SO_2 Monitors					
400219002	Tahlequah	Cherokee Co	Residential – Rural	2002-current	31
401010167	Muskogee	Muskogee Co	Residential – Rural	2002-current	6.8
401430175	Tulsa	Tulsa	Industrial – Suburban	2002-current	80
401430235	Tulsa	Tulsa	Industrial – Urban	2002-current	77
PM_{10} Monitors					
400219002	Tahlequah	Cherokee Co	Residential – Rural	2002-current	31
401010167	Muskogee	Muskogee Co	Residential – Rural	2002-current	6.8
NO_2 Monitors					
400219002	Tahlequah	Cherokee Co	Residential – Rural	2002-current	31
401010167	Muskogee	Muskogee Co	Residential – Rural	2002-2003	6.8
401430174	Glenpool	Tulsa	Agricultural – Rural	2002-2003	68

Table D-37 summarizes the ambient monitored values among these monitors as recommended by ODEQ for use in an air quality analysis.

Table D-37 Pollutant	Monitor and Data Description	Averaging Period	Background Concentration Recommended by ODEQ (ppm)	Background Concentration Recommended by ODEQ ($\mu g/m^3$)
SO_2	Muskogee – 2004 High Second High for 3-hour and 24-hour; 2004 Annual mean	3-hr	0.061	159.8
		24-hr	0.016	41.9
		Annual	0.0026	6.8
NO_2	Tulsa - 2004 Annual Mean	Annual	0.0054	10.2
PM_{10}	Muskogee – 2002-2004 24-hour High Fourth High and 2004 Annual Mean	24-hr	--	72
		Annual	--	23.2

D.4.2 POST-APPLICATION ANALYSIS

The post-application analysis determines post-construction ambient monitoring needs, such as quantifying the effect of the Mill-wide emissions on air quality. EPA guidance recommends that post-construction monitoring is appropriate when the NAAQS is threatened, or when the modeling databases contain significant uncertainties. G-P believes that neither of these conditions exists for this project. Therefore, G-P believes that no post-application monitoring is necessary.

D.5. ADDITIONAL IMPACT ANALYSIS IN CLASS II AREAS

D.5.1 IMPACTS UPON SOILS AND VEGETATION

Predicted impacts that will result from the project are less than the NAAQS and state AAQS. As such, G-P expects that the increase in emissions due to the project will not adversely impact the areas adjacent to the Muskogee Mill.

D.5.2 IMPACTS DUE TO ADDITIONAL GROWTH

No significant increase in additional personnel will be added to the current plant staff because of the project. Therefore, there will be no significant effects on the residential, commercial, and industrial growth in the Mill area.

D.5.3 IMPACTS ON VISIBILITY

The Muskogee Mill is isolated from the town and other sensitive areas. The distance to the nearest significant recreational area (e.g., state parks) is 28 km to the Sequoyah State Park. The distance to the nearest airport is approximately 28 km at the same state park. In the area of the airport and park, the Mill does not cause a significant impact for any pollutant. With these low levels of predicted impacts, G-P expects that the visibility at the park and airport will not be adversely affected.

D.6. AMBIENT IMPACT ANALYSIS IN CLASS I AREAS

D.6.1. INTRODUCTION

Generally, if the facility undergoing the modification is within 200 kilometers of a PSD Class I area, then a significant impact analysis is also performed to evaluate the impact due to the project alone at the PSD Class I areas. The three nearest PSD Class I areas to the Mill are the Upper Buffalo National Wilderness Area (NWA), 166 km northeast of the Mill, the Caney Creek NWA, 178 km east of the Mill, and the Hercules-Glades NWA, 233 km northeast of the Mill.

The analysis compared the maximum predicted impacts due to the project at these Class I areas to EPA's proposed significant impact levels for PSD Class I areas. These recommended significant impact levels have never been promulgated as rules, but are the currently accepted criteria for determining whether a proposed project will incur a significant impact on a PSD Class I area.

If the project-only impacts at the PSD Class I area are above the proposed EPA PSD Class I significant impact levels, then an analysis is performed to demonstrate compliance with allowable PSD Class I impacts at the PSD Class I area. The proposed project's maximum emission increases are also evaluated at the PSD Class I area to support the air quality related values (AQRV) analysis, which includes an evaluation of regional haze degradation.

For predicting maximum impacts at all three PSD Class I areas, G-P used the California Puff (CALPUFF) modeling system. CALPUFF, Version 5.711a (EPA, 2004), is a Lagrangian puff model that is recommended by the USEPA, in coordination with the Federal Land Manager (FLM) for the NWAs, for predicting pollutant impacts at PSD Class I areas that are beyond 50 km from a project site. The following sections present a description of the CALPUFF model methodology.

D.6.2 GENERAL AIR MODELING APPROACH

The general modeling approach was based on using the long-range transport model, California Puff model (CALPUFF, Version 5.711a). The methods and assumptions used in the CALPUFF model were based on the latest recommendations for a refined analysis as presented in the IWAQM Phase 2 Summary Report and the FLAG document.

The following sections present the methods and assumptions used to assess the impacts of the proposed project. The analysis is consistent with a "refined analysis" since it was performed using the detailed weather data from multiple surface and upper air stations as well as the MM4/MM5 prognostic with fields.

Model Selection And Settings

CALPUFF was used to assess the proposed project's impacts at the PSD Class I areas. CALPUFF is a non-steady state Lagrangian Gaussian puff long-range transport model that includes algorithms for building downwash effects as well as chemical transformations (important for visibility controlling pollutants), and wet/dry deposition. The CALPUFF meteorological and geophysical data preprocessor (CALMET, Version 5.53a), a preprocessor to

CALPUFF, is a diagnostic meteorological model that produces a three-dimensional field of wind and temperature and a two-dimensional field of other meteorological parameters. CALMET was designed to process raw meteorological, terrain and land-use databases to be used in the air modeling analysis. The CALPUFF modeling system uses a number of FORTRAN preprocessor programs that extract data from large databases and convert the data into formats suitable for input to CALMET. The processed data produced from CALMET was input to CALPUFF to assess the pollutant specific impact. Both CALMET and CALPUFF were used in a manner that is recommended by the IWAQM Phase 2 and FLAG reports.

CALPUFF Model Approaches And Settings

The IWAQM has recommended approaches for performing a Phase 2 refined modeling analyses that are presented in Table D-38. These approaches involve use of meteorological data, selection of receptors and dispersion conditions, and processing of model output. The specific settings used in the CALPUFF model are presented in Table D-39.

Table D-38

Model Input/Output	**Refined Modeling Analyses Recommendations [a] Description**
Meteorology	Use CALMET (minimum 6 to 10 layers in the vertical; top layer must extend above the maximum mixing depth expected); horizontal domain extends 50 to 80 km beyond outer receptors and sources being modeled; terrain elevation and land-use data is resolved
Receptors	Within Class I area(s) of concern; obtain regulatory concurrence on coverage.
Dispersion	1. CALPUFF with default dispersion settings.
	2. Use MESOPUFF II chemistry with wet and dry deposition.
	3. Define background values for ozone and ammonia for area.
Processing	1. For PSD increments: use highest, second highest 3-hour and 24-hour average SO_2 concentrations; highest, second highest 24-hour average PM_{10} concentrations; and highest annual average SO_2, PM_{10}, and NO_x concentrations.
	2. For haze: process, on a 24-hour basis, compute the source extinction from the maximum increase in emissions of SO_2, NO_x, and PM_{10}; compute the daily relative humidity factor [f(RH)], provided from an external disk file; and compute the maximum percent change in extinction using the FLM supplied background extinction data in the FLAG document.
	3. For significant impact analysis: use highest annual and highest short-term averaging time concentrations for SO_2, PM_{10}, and NOx.

[a] IWAQM Phase II report (December, 1998) and FLAG document (December, 2000)

Table D-39	**CALPUFF Model Settings**
Parameter	Setting
Pollutant Species	SO_2, SO_4, NO_x, HNO_3, NO_3, PM_{10}
Chemical Transformation	MESOPUFF II scheme including hourly ozone data
Deposition	Include both dry and wet deposition, plume depletion
Meteorological/Land Use Input	CALMET
Plume Rise	Transitional, Stack-tip downwash, Partial plume penetration
Dispersion	Puff plume element, PG /MP coefficients, rural mode, ISC building downwash scheme

Terrain Effects	Partial plume path adjustment
Output	Create binary concentration file including output species for SO_4, NO_3, PM_{10}, SO_2, and NO_x; process for visibility change using Method 2 and FLAG background extinctions
Model Processing	For haze: highest predicted 24-hour extinction change (%) for the year
	For significant impact analysis: highest predicted annual and highest short-term averaging time concentrations for SO_2, NO_x, and PM_{10}.
Background Values	Ozone: 50 ppb; Ammonia: 1 ppb

Emission Inventory and Building Wake Effects
The CALPUFF model included the facility’s emission, stack, and operating data as well as building dimensions to account for the effects of building-induced downwash on the emission sources. Dimensions for all significant building structures were processed with the Building Profile Input Program modified to process additional direction-specific building information, and were included in the CALPUFF model input. The modeling presents a listing of the facility’s emissions and structures included in the analysis.

Receptor Locations
All Class I receptor grids were obtained from the National Park Service.

Meteorological Data
G-P developed a wind field for 3 three years domain that included all PSD Class I areas that were evaluated in this analysis. A detailed description of the domain is provided in the following sections.

Modeling Domain
A rectangular modeling domain extending 380 km in the east-west (x) direction and 420 km in the north-south (y) direction was used for the refined modeling analysis. The southwest corner of the domain is the origin and is located at 36.612 north latitude and 96.149 west longitude. For the processing of meteorological and geophysical data, the domain contains 95 grid cells in the x-direction and 105 grid cells in the y-direction. The domain grid resolution is 4 km. The air modeling analysis was developed in the Lambert Conformal Conic System.

Mesoscale Model – Generations 4 and 5 (MM4 and MM5) Data
Pennsylvania State University in conjunction with the NCAR Assessment Laboratory developed the MM4 and MM5 data set, a prognostic wind field or “guess” field, for the United States. The hourly meteorological variables used to create this data set (wind, temperature, dew point depression, and geopotential height for eight standard levels and up to 15 significant levels) are extensive and are available for 1990, 1992, and 1996. The analysis used the MM4 and MM5 data to initialize the CALMET wind field. The MM4 and MM5 data available for 1990 and 1992, respectively, have a horizontal spacing of 80 km and are used to simulate atmospheric variables within the modeling domain. The MM5 data are also available for 1996 and have a horizontal spacing of 36 km.

The MM4 and MM5 data used in the CALMET, although advanced, lack the fine detail of specific temporal and spatial meteorological variables and geophysical data. These variables were processed into the appropriate format and introduced into the CALMET model through the additional data files obtained from the following sources.

Surface Data Stations and processing

The surface station data processed for the CALPUFF analyses consisted of data from up to three NWS stations. The surface station parameters include wind speed, wind direction, cloud ceiling height, opaque cloud cover, dry bulb temperature, relative humidity, station pressure, and a precipitation code that is based on current weather conditions. The surface station data were processed into a SURF.DAT file format for CALMET input.

Upper Air Data Stations and Processing

Upper air data from NWS stations at Oklahoma City and Norman, based on the availability of the upper air data, were used in the modeling analysis.

Precipitation Data Stations and Processing

Precipitation data were processed from a network of hourly precipitation data files collected from primary and secondary NWS precipitation-recording stations located within the latitude and longitudinal limits of the modeling domain. Data for 128 stations were obtained in NCDC TD-3240 variable format and converted into a fixed-length format. The utility programs PXTRACT and PMERGE were then used to process the data into the format for the PRECIP.DAT file that is used by CALMET.

Geophysical Data Processing

Terrain elevations for each grid cell of the modeling domain were obtained from 1-degree Digital Elevation Model (DEM) files obtained from the U.S. Geographical Survey (USGS) Internet website. The DEM data was extracted for the modeling domain grid using the utility program TERREL. Land-use data were also extracted from 1-degree USGS files and processed using utility programs CTGCOMP and CTGPROC. Both the terrain and land use files were combined into a GEO.DAT file for input to CALMET with the MAKEGEO utility program.

D.6.3 METHODOLOGY AND MODEL RESULTS

The following paragraphs summarize the processing methods for deposition, visibility, and ambient impact.

Deposition

As part of the AQRV analyses, total nitrogen (N) and sulfur (S) rates were predicted for the proposed project at each PSD Class I area evaluated. The deposition analysis criterion is based on the annual averaging period.

Estimates of dry (SO_2, SO_4, NO_x, HNO_3 and NO_3) and wet (SO_2, SO_4, HNO_3 and NO_3) deposition were obtained by selecting the options in CALPUFF to calculate and output dry and wet fluxes of the pollutants modeled. Generally, AQRV analyses require values of total deposition (background plus modeled impact) to be given in units of kilogram/hectare/year (kg/ha/yr). The modeled deposition flux of each of the oxides of sulfur and nitrogen from

CALPUFF must be adjusted for the difference of molecular weights of their oxides and the element and the various forms must be summed to yield a total deposition.

The CALPUFF model was instructed to output both dry (*.DRY) and wet (*.WET) flux files, which then will be input into CALPOST to produce hourly deposition estimates of SO_2, SO_4, NO_x, HNO_3 and NO_3. The results from CALPOST are adjusted to normalize the molecular weight to a common compound (Sulfur or Nitrogen) and then converted from the default CALPOST units of gram/meter^2/second (g/m^2/s) to kg/ha/yr. These procedures were performed in accordance with Section 3.3 of the IWAQM – Phase II guidance document. Finally, the adjusted sulfur and nitrogen CALPOST values are summed using the POSTUTIL utility program to predict total sulfur and total nitrogen deposition values.

The deposition analysis threshold (DAT) for N and S of 0.01 kg/ha/yr was provided by the USFWS (January 2002). A DAT is the additional amount of N and S deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant. The maximum N and S deposition predicted for the proposed G-P project is, therefore, compared to the DAT.

Table D-40 compares the maximum nitrogen deposition predicted for the proposed project only at each evaluated PSD Class I area. The predicted impacts are less than the criterion of 0.01 kg/ha/yr.

Table D-40	**Total wet and dry deposition**						**Deposition Analysis Threshold[b] (kg/ha/yr)**
	1990		**1992**		**1996**		
Class I Area and Species	**(g/m^2/s)**	**(kg/ha/yr) [a]**	**(g/m^2/s)**	**(kg/ha/yr) [a]**	**(g/m^2/s)**	**(kg/ha/yr) [a]**	
Caney Creek NWA							
Nitrogen (N)	1.012E-12	0.0003	7.722E-13	0.0002	7.98E-13	0.0003	0.01
Sulfur (S)	2.538E-12	0.0008	2.891E-12	0.0009	3.86E-12	0.0012	0.01
Hercules Glades NWA							
Nitrogen (N)	1.051E-12	0.0003	1.290E-12	0.0004	8.6E-13	0.0003	0.01
Sulfur (S)	2.893E-12	0.0009	3.398E-12	0.0011	2.1E-12	0.0006	0.01
Upper Buffalo NWA							
Nitrogen (N)	9.048E-13	0.0003	1.569E-12	0.0005	9.21E-13	0.0003	0.01
Sulfur (S)	2.470E-12	0.0008	4.568E-12	0.0014	2.42E-12	0.0008	0.01

[a] Conversion factor is used to convert g/m^2/s to kg/hectare is 1 g/m^2/s = 3.1536E+08 kg/ha/yr.
[b] Deposition analysis thresholds (DAT) for nitrogen and sulfur deposition provided by the U.S. Fish and Wildlife Service, January 2002.

Visibility

Based on the FLAG document, current regional haze guidelines characterize a change in visibility by the change in the light-extinction coefficient (b_{ext}). The b_{ext} is the attenuation of light per unit distance due to the scattering and absorption by gases and particles in the atmosphere. A change in the extinction coefficient produces a perceived visual change. An index that simply quantifies the percent change in visibility due to the operation of a source is calculated as

$$\Delta\% = (b_{exts} / b_{extb}) \times 100, \text{ where}$$

b_{exts} is the extinction coefficient calculated for the source, and
b_{extb} is the background extinction coefficient.

The purpose of the visibility analysis is to calculate the extinction at each receptor for each day (24-hour period) of the year due to the proposed project. The criteria to determine if the project's impacts are potentially significant are based on a change in extinction of 5 percent or greater for any day of the year.

The analysis processing of visibility impairment for this study was performed with the CALPUFF model and the CALPUFF post-processing program CALPOST. The analysis was conducted in accordance with the most recent guidance from the FLAG report (December 2000). The CALPUFF postprocessor model CALPOST is used to calculate the combined visibility effects from the different pollutants that are emitted from the proposed project. Daily background extinction coefficients are calculated on an hour-by-hour basis using hourly relative humidity data from CALMET and hygroscopic and non-hygroscopic extinction components specified in the FLAG document. Table D-41 compares the maximum visibility impairment predicted for the proposed project at each evaluated PSD Class I area. The predicted impacts are all below the criterion of 5 percent.

Table D-41	**Visibility Impairment (%)** [a]			**Visibility Impairment Criterion (%)**
Class I Area	1990	1992	1996	
Caney Creek NWA	1.26	1.37	0.55	5.0
Hercules-Glades NWA	0.78	0.53	0.54	5.0
Upper Buffalo NWA	2.35	1.29	0.65	5.0

[a] Concentrations are highest predicted using CALPUFF model and a refined CALMET domain for years 1990, 1992 and 1996. Background extinctions calculated using FLAG Document (December 2000) values and hourly relative humidity data.

Ambient Impact

Table D-42 compares the maximum concentrations predicted for the proposed projects at each evaluated PSD Class I area with EPA's proposed PSD Class I significance levels. The maximum concentrations were predicted to be below the significant impact levels at each PSD Class I area. Therefore, a full PSD Class I increment analysis was not required for these pollutants.

Table D-42 Pollutant	**Averaging Time**	**Maximum Concentrations ($\mu g/m^3$)** [a]			**Significant Impact Level ($\mu g/m^3$)**
		1990	**1992**	**1996**	
Caney Creek NWA					
SO_2	Annual	0.001	0.002	0.002	0.10
	24-Hour	0.047	0.056	0.043	0.20
	8-Hour	0.109	0.081	0.091	NA
	3-Hour	0.148	0.121	0.131	1.00
	1-Hour	0.157	0.126	0.137	NA

Table D-42 Pollutant	**Averaging Time**	**Maximum Concentrations (μg/m³) [a]**			**Significant Impact Level (μg/m³)**
		1990	**1992**	**1996**	
PM_{10}	Annual	0.0002	0.0003	0.0003	0.20
	24-Hour	0.007	0.009	0.006	0.30
	8-Hour	0.013	0.013	0.010	NA
	3-Hour	0.015	0.018	0.014	NA
	1-Hour	0.016	0.035	0.018	NA
NO_2	Annual	0.001	0.001	0.001	0.10
	24-Hour	0.026	0.024	0.025	NA
	8-Hour	0.074	0.058	0.060	NA
	3-Hour	0.087	0.078	0.085	NA
	1-Hour	0.095	0.090	0.120	NA
CO	Annual	0.001	0.001	0.001	NA
	24-Hour	0.028	0.041	0.025	NA
	8-Hour	0.052	0.054	0.050	NA
	3-Hour	0.074	0.080	0.079	NA
	1-Hour	0.097	0.086	0.119	NA
SAM	Annual	0.0002	0.0002	0.0002	NA
	24-Hour	0.005	0.007	0.004	NA
	8-Hour	0.012	0.016	0.009	NA
	3-Hour	0.019	0.022	0.016	NA
	1-Hour	0.026	0.023	0.025	NA
Hercules-Glades NWA					
SO_2	Annual	0.001	0.001	0.001	0.10
	24-Hour	0.019	0.038	0.015	0.20
	8-Hour	0.030	0.060	0.041	NA
	3-Hour	0.055	0.089	0.086	1.00
	1-Hour	0.095	0.106	0.133	NA
PM_{10}	Annual	0.0001	0.0001	0.0001	0.20
	24-Hour	0.003	0.006	0.003	0.30
	8-Hour	0.005	0.007	0.008	NA
	3-Hour	0.010	0.011	0.013	NA
	1-Hour	0.016	0.025	0.036	NA
NO_2	Annual	0.0002	0.0002	0.0001	0.10
	24-Hour	0.005	0.013	0.007	NA
	8-Hour	0.016	0.031	0.021	NA
	3-Hour	0.027	0.046	0.046	NA
	1-Hour	0.047	0.054	0.073	NA
CO	Annual	0.001	0.001	0.0004	NA
	24-Hour	0.016	0.016	0.006	NA
	8-Hour	0.031	0.030	0.016	NA
	3-Hour	0.061	0.035	0.031	NA
	1-Hour	0.077	0.046	0.042	NA
SAM	Annual	0.0002	0.0002	0.0001	NA
	24-Hour	0.003	0.004	0.005	NA
	8-Hour	0.006	0.007	0.013	NA
	3-Hour	0.010	0.011	0.017	NA
	1-Hour	0.018	0.017	0.018	NA

Table D-42 Pollutant	**Averaging Time**	**Maximum Concentrations (μg/m^3) [a]**			**Significant Impact Level (μg/m^3)**
		1990	**1992**	**1996**	
Upper Buffalo NWA					
SO_2	Annual	0.001	0.001	0.001	0.10
	24-Hour	0.044	0.036	0.035	0.20
	8-Hour	0.093	0.095	0.092	NA
	3-Hour	0.132	0.134	0.148	1.00
	1-Hour	0.162	0.147	0.294	NA
PM_{10}	Annual	0.0002	0.0002	0.0001	0.20
	24-Hour	0.005	0.001	0.005	0.30
	8-Hour	0.014	0.012	0.012	NA
	3-Hour	0.025	0.020	0.019	NA
	1-Hour	0.031	0.029	0.029	NA
NO_2	Annual	0.0003	0.0007	0.0003	0.10
	24-Hour	0.019	0.026	0.02	NA
	8-Hour	0.050	0.066	0.058	NA
	3-Hour	0.069	0.097	0.117	NA
	1-Hour	0.080	0.123	0.141	NA
CO	Annual	0.001	0.001	0.001	NA
	24-Hour	0.038	0.025	0.017	NA
	8-Hour	0.072	0.045	0.042	NA
	3-Hour	0.126	0.079	0.077	NA
	1-Hour	0.162	0.104	0.096	NA
SAM	Annual	0.0002	0.0002	0.0001	NA
	24-Hour	0.011	0.006	0.008	NA
	8-Hour	0.030	0.010	0.009	NA
	3-Hour	0.044	0.024	0.013	NA
	1-Hour	0.046	0.027	0.018	NA

[a] Concentrations are highest predicted using CALPUFF model and refined CALMET wind fields for 1990, 1992, and 1996.

D.7. ADDITIONAL IMPACTS ANALYSIS FOR NATIONAL WILDLIFE AREAS

The analysis addresses the potential impacts on vegetation, soils, and wildlife of the Class I area due to the proposed project. In addition, potential impacts upon visibility resulting from the proposed project are assessed.

Ambient Impact
The maximum pollutant concentrations predicted for the project in the NWAs are presented above. The results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. Threshold information is not available for all species found in the Class I area, although studies have been performed on a few of the common species and on other similar species that can be used as indicators of effects. All predicted impacts were far below thresholds.

Impacts to soils

For soils, the potential and hypothesized effects of atmospheric deposition include increased soil acidification, alteration in cation exchange, loss of base cations, and mobilization of trace metals.

The potential sensitivity of specific soils to atmospheric inputs is related to two factors. First, the physical ability of a soil to conduct water vertically through the soil profile is important in influencing the interaction with deposition. Second, the ability of the soil to resist chemical changes, as measured in terms of pH and soil cation exchange capacity (CEC), is important in determining how a soil responds to atmospheric inputs.

The relatively low sensitivity of the soils to atmospheric inputs coupled with the extremely low ground-level pollutant concentrations due to the project precludes any significant impact on soils.

Impacts to Vegetation

The phytotoxic effects from the project's emissions are minimal. It is important to note that the elements were conservatively modeled with the assumption that 100 percent was available for plant uptake. This is rarely the case in a natural ecosystem.

Impacts To Wildlife

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the National AAQS. This occurs in non-attainment areas (e.g., Atlanta). Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations (Newman and Schreiber, 1988). Under these conditions, chronic effects (e.g., particulate contamination) and acute effects (e.g., injury to health) have been observed (Newman, 1981).

A wide range of physiological and ecological effects to fauna has been reported for gaseous and particulate pollutants (Newman, 1981; Newman and Schreiber, 1988). The most severe of these effects have been observed at concentrations above the secondary AAQS. Physiological and behavioral effects have been observed in experimental animals at or below these standards.

Based on the very low level of impacts, G-P does not expect any effects on wildlife AQRVs from SO_2, NO_2, and particulates. The proposed project's contribution to cumulative impacts is expected to be negligible.

Research with primates shows that O_3 penetrates deeper into non-ciliated peripheral pathways and can cause lesions in the respiratory bronchioles and alveolar ducts as concentrations increase from 0.2 to 0.8 ppm (Paterson, 1997). These bronchioles are the most common site for severe damage. In rats, the Type I cells in the proximal alveoli (where gas exchange occurs) were the primary site of action at concentrations between 0.5 and 0.9 ppm (Paterson, 1997). Work with rats and rabbits suggest that the mucus layer that lines the large airways does not protect completely against the effects of O_3, and desquamated cells were found from acute exposures at 0.25, 0.5, and 1.0 ppm. In animal research, O_3 has been found to increase the susceptibility to bacterial pneumonia (Paterson, 1997). During the last decade, there has also been growing concern with the possibility that repeated or long-term exposure to elevated O_3 concentrations may be causing or contributing to irreversible chronic lung injury.

The project's contribution to ground level O_3 is expected to be low and dispersed over a large area. Coupled with the historical ambient data, mobility of wildlife, the potential for exposure of wildlife to the facility's impacts that lead to high concentration is unlikely.

SELECTED REFERENCES

Holzworth, G.C., 1972. Mixing Heights, Wind Speeds and Potential for Urban Air Pollution Throughout the Contiguous United States. Pub. No. AP-101. U.S. Environmental Protection Agency.

Mandoli, B.L. and P.S. Dubey. 1988. The Industrial Emission and Plant Response at Pithampur (M.P.). Int. J. Ecol. Environ. Sci. 14:75-79.

Newman, J.R. 1981. Effects of Air Pollution on Animals at Concentrations at or Below Ambient Air Standards. Performed for Denver Air Quality Office, National Park Service, U.S. Department of the Interior. Denver, Colorado.

Newman, J.R. and R.K. Schreiber. 1988. Air Pollution and Wildlife Toxicology. Environmental Toxicology and Chemistry. 7:381-390.

(*End material from application*)

SECTION VI. INSIGNIFICANT ACTIVITIES

The list of activities in the pending Part 70 permit will not be affected by the current project. The Part 1b form submitted with the current application lists two items not included in the list. After discussion with the facility and with the permit writer responsible for the operating permit, agreement has been reached and no further discussion is needed here.

SECTION VII. OKLAHOMA AIR POLLUTION CONTROL RULES

OAC 252:100-1 (General Provisions) [Applicable]
Subchapter 1 includes definitions but there are no regulatory requirements.

OAC 252:100-3 (Air Quality Standards and Increments) [Applicable]
Subchapter 3 enumerates the primary and secondary ambient air quality standards and the significant deterioration increments. At this time, all of Oklahoma is in "attainment" of these standards. In addition, modeled emissions from the proposed facility demonstrate that the facility would not have a significant impact on air quality.

OAC 252:100-4 (New Source Performance Standards) [Applicable]
Federal regulations in 40 CFR Part 60 are incorporated by reference as they exist on July 1, 2002, except for the following: Subpart A (Sections 60.4, 60.9, 60.10, and 60.16), Subpart B, Subpart C, Subpart Ca, Subpart Cb, Subpart Cc, Subpart Cd, Subpart Ce, Subpart AAA, and Appendix G. These requirements are covered in the "Federal Regulations" section.

OAC 252:100-5 (Registration, Emissions Inventory and Annual Operating Fees) [Applicable]
Subchapter 5 requires sources of air contaminants to register with Air Quality, file emission inventories annually, and pay annual operating fees based upon total annual emissions of regulated pollutants. Emission inventories were submitted and fees paid for previous years as required.

OAC 252:100-8 (Permits for Part 70 Sources) [Applicable]
Part 5 includes the general administrative requirements for Part 70 permits. Any planned changes in the operation of the facility that result in emissions not authorized in the permit and that exceed the "Insignificant Activities" or "Trivial Activities" thresholds require prior notification to AQD and may require a permit modification. Insignificant activities refer to those individual emission units either listed in Appendix I or whose actual calendar year emissions do not exceed the following limits.

- 5 TPY of any one criteria pollutant
- 2 TPY of any one hazardous air pollutant (HAP) or 5 TPY of multiple HAPs or 20% of any threshold less than 10 TPY for a HAP that the EPA may establish by rule

Emission limitations and operational requirements necessary to assure compliance with all applicable requirements for all sources are taken from existing and pending permits, the current permit application, or are developed from the applicable requirement.

OAC 252:100-9 (Excess Emissions Reporting Requirements) [Applicable]
In the event of any release which results in excess emissions, the owner or operator of such facility shall notify the Air Quality Division as soon as the owner or operator of the facility has knowledge of such emissions, but no later than 4:30 p.m. the next working day. Within ten (10) working days after the immediate notice is given, the owner or operator shall submit a written report describing the extent of the excess emissions and response actions taken by the facility. Part 70/Title V sources must report any exceedance that poses an imminent and substantial danger to public health, safety, or the environment as soon as is practicable. Under no circumstances shall notification be more than 24 hours after the exceedance.

OAC 252:100-13 (Open Burning) [Applicable]
Open burning of refuse and other combustible material is prohibited except as authorized in the specific examples and under the conditions listed in this subchapter.

OAC 252:100-19 (Particulate Matter (PM)) [Applicable]
Section 19-4 regulates emissions of PM from new and existing fuel-burning equipment, with emission limits based on maximum design heat input rating. Appendix C specifies PM emission limitations for all equipment at this facility. Fuel-burning equipment is defined in OAC 252:100-1 as "combustion devices used to convert fuel or wastes to usable heat or power." Boilers B-1, B-2, B-3, and B-4, Paper Machine Drying Hoods PM-11, PM-12, PM-13, PM-14, and PM-15, and the Poly Printer Tunnel Dryers are subject to the requirements of this subchapter. AP-42 (7/98) Table 1.4-1 lists natural gas Total Particulate Matter (TPM) emissions to be 7.6 lbs/million scf or about 0.0076 lbs/MMBTU. Stack tests conducted on January 7, 8, 9, 2003 for B-2, on May 20 & 21, 2003 for B-3, and on April 15 & 16, 2003 for B-4, established emission factors for coal. Converting these factors to units of lbs/MMBTU yields the values illustrated in the tables below, which demonstrate compliance with the allowable. It should be noted that these emission factors are uncontrolled factors, i.e., they do not take emission controls into account.

Emission Unit	Heat Input MMBTUH	Coal Factor, Lb/MMBTU	NG Factor, Lb/MMBTU	APP "C" Allowable Lb/MMBTU
Boiler B-1	310	NA	0.0076	0.27
Boiler B-2	440	0.032 *	0.0076	0.24
		0.027 **	0.0076	0.24
Boiler B-3	557	0.005	0.0076	0.23
Boiler B-4	557	0.015	0.0076	0.23

* High-BTU sub-bituminous coal
** Low-BTU bituminous coal

Emission Unit	Heat Input MMBTUH	NG Emission Factor, Lb/MMBTU	APP "C" Allowable, Lb/MMBTU
Paper Machine PM-11	75	0.0076	0.37
Paper Machine PM-12	75	0.0076	0.37
Paper Machine PM-13	75	0.0076	0.37
Paper Machine PM-14	75	0.0076	0.37
Paper Machine PM-15	50	0.0076	0.41
PO-1 RTO	11.4	0.0076	0.58

Section 19-12 limits particulate emissions from new and existing directly fired fuel-burning units and emission points in an industrial process based on process weight rate, as specified in Appendix G. Hourly throughputs were calculated by dividing the annual rates stated in the Emissions Section above by 8,760 hours per year and using emission factors from that section. The following table illustrates the calculated hourly rates of PM emissions. All emission points will be in compliance with the Subchapter 19 limits.

Paper Machines

Emission Unit	Throughput, TPH	Emissions (lbs/hr)	App. G Limit (lbs/hr)
PM-11	10.42	2.13	19.71
PM-12	14.58	2.97	24.69
PM-13	12.50	2.55	22.27
PM-14	12.50	2.55	22.27
PM-15	11.51	2.35	21.07

Coal Preparation Plant

Emission Unit	Coal Throughput TPH	Emissions (lbs/hr)	App. G Limit (lbs/hr)
Railcar Unloading, Radial Stacker, Grizzly Feeder	59.29	5.09	46.2
Coal Sizer/Crusher	59.29	11.86	46.2
Conveying	59.29	1.18	46.2
Coal Bunkers	59.29	1.18	46.2
Coal Feeders, Pulverizers	Closed Process, No emissions		
FS-1 Coal Pile	Emissions included with above		

OAC 252:100-25 (Visible Emissions and Particulates) [Applicable]
No discharge of greater than 20% opacity is allowed except for short-term occurrences that consist of not more than one six-minute period in any consecutive 60 minutes, not to exceed three such periods in any consecutive 24 hours. In no case shall the average of any six-minute period exceed 60% opacity. Boilers B-1, B-2, B-3, and B-4 are not subject to Subchapter 25 since they are subject to an opacity limitation in NSPS Subpart D. Other combustion units are units fired with natural gas and are therefore not likely to exceed this standard. Equipment subject to Subpart Y at the Coal Preparation plant is also not subject to Subchapter 25 since those items are subject to an opacity limitation.

OAC 252:100-29 (Fugitive Dust) [Applicable]
No person shall cause or permit the discharge of any visible fugitive dust emissions beyond the property line on which the emissions originated in such a manner as to damage or to interfere with the use of adjacent properties, or cause air quality standards to be exceeded, or to interfere with the maintenance of air quality standards. Under normal operating conditions, this facility has negligible potential to violate this requirement; therefore it is not necessary to require specific precautions to be taken.

OAC 252:100-31 (Sulfur Compounds) [Applicable]
<u>Part 5</u> limits sulfur dioxide emissions from new fuel-burning equipment (constructed after July 1, 1972). The limits, based on heat input, are 0.2 lbs/MMBTU for gaseous fuels, 0.8 lbs/MMBTU for liquid fuels, and 1.2 lbs/MMBTU for solid fuels. The averaging time for the emission limits is 3 hours unless a solid fuel sampling and analysis method is used to determine emission compliance, in which case the averaging time is 24 hours. Testing was done for emissions from

coal combustion that demonstrated emissions from this fuel were well within the limits. Specific conditions in the permit limiting fuel sulfur content for the various fuels will ensure compliance with the limits when these fuels are used. The table below illustrates compliance based on calculations from the Emissions Section above.

Emission Unit	Heat Input MMBTUH	NG Factor, Lbs/MMBTU (1)	Coal Factor, Lbs/MMBTU (2)
B-1	310	0.0006	NA
B-2	440	0.0006	0.644 (3)
			0.267 (4)
B-3	557	0.0006	0.403
B-4	557	0.0006	0.631
PM-11	75	0.0006	NA
PM-12	75	0.0006	NA
PM-13	75	0.0006	NA
PM-14	75	0.0006	NA
PM-15	50	0.0006	NA

(1) AP-42, Table 1.4-2 (7/98)
(2) Stack tests conducted on January 7-9 for B-2, May 20 & 21 for B-3, and April 15 & 16 for B-4, all 2003.
(3) Low-BTU sub-bituminous coal
(4) High-BTU bituminous coal

OAC 252:100-33 (Nitrogen Oxides) [Applicable]

This subchapter limits new gas-fired, liquid-fired, and solid fossil fuel-burning equipment with rated heat input greater than or equal to 50 MMBTUH to emissions of 0.20, 0.30, and 0.70 respectively, lbs of NO_X per MMBTU, three-hour average. Only boilers B-1, B-2, B-3, and B-4 exceed the 50 MMBTUH threshold and are subject to these standards. The table below illustrates compliance based on calculations from the Emissions Section above.

Emission Unit	Heat Input MMBTUH	NG Factor, Lbs/MMBTU	Coal Factor, Lbs/MMBTU (2)
B-1	310	0.138 (5)	NA
B-2	440	0.19 (1)	0.52 (3)
			0.38 (4)
B-3	557	0.187 (6)	0.27
B-4	557	0.19 (1)	0.41

(1) AP-42, Table 1.4-1 (7/98)
(2) Stack tests, conducted January 7-9, 2003, for B-2, May 20-21, 2003, for B-3, and April 15-16, 2003, for B-4
(3) Low BTU sub-bituminous coal
(4) High BTU bituminous coal
(5) 20% contingency added to B-1 stack test result of June 1980.
(6) 10% contingency added to AP-42, Table 1.4-1 (7/98).

OAC 252:100-35 (Carbon Monoxide) [Not Applicable]
None of the following affected processes are located at this facility: gray iron cupola, blast furnace, basic oxygen furnace, petroleum catalytic cracking unit, or petroleum catalytic reforming unit.

OAC 252:100-37 (Volatile Organic Compounds) [Part 7 Applicable]
Part 3 requires storage tanks constructed after December 28, 1974, with a capacity of 400 gallons or more and storing a VOC with a vapor pressure greater than 1.5 psia to be equipped with a permanent submerged fill pipe or with an organic vapor recovery system. An existing aboveground 10,000-gallon gasoline tank is equipped with a submerged fill pipe.
Part 5 limits the VOC content of coating used in coating lines or operations. This facility will not normally conduct coating or painting operations except for routine maintenance of the facility and equipment, which is exempt.
Part 7 requires fuel-burning equipment to be operated and maintained so as to minimize VOC emissions. Temperature and available air must be sufficient to provide essentially complete combustion. All fuel-burning equipment at this facility including the boilers, paper machine drying hoods, PO-1 tunnel dryers, and regenerative thermal oxidizer are designed to provide essentially complete combustion of organic materials.

OAC 252:100-41 (Hazardous Air Pollutants and Toxic Air Contaminants) [Applicable]
Part 3 addresses hazardous air contaminants. NESHAP, as found in 40 CFR Part 61, are adopted by reference as they exist on September 1, 2004, with the exception of Subparts B, H, I, K, Q, R, T, W and Appendices D and E, all of which address radionuclides. In addition, General Provisions as found in 40 CFR Part 63, Subpart A, and the Maximum Achievable Control Technology (MACT) standards as found in 40 CFR Part 63, Subparts F, G, H, I, J, L, M, N, O, Q, R, S, T, U, W, X, Y, AA, BB, CC, DD, EE, GG, HH, II, JJ, KK, LL, MM, OO, PP, QQ, RR, SS, TT, UU, VV, WW, XX, YY, CCC, DDD, EEE, GGG, HHH, III, JJJ, LLL, MMM, NNN, OOO, PPP, QQQ, RRR, TTT, UUU, VVV, XXX, AAAA, CCCC, DDDD, EEEE, FFFF, GGGG, HHHH, IIII, JJJJ, KKKK, MMMM, NNNN, OOOO, PPPP, QQQQ, RRRR, SSSS, TTTT, UUUU, VVVV, WWWW, XXXX, YYYY, ZZZZ, AAAAA, BBBBB, CCCCC, EEEEE, FFFFF, GGGGG, HHHHH, IIIII, JJJJJ, KKKKK, LLLLL, MMMMM, NNNNN, PPPPP, QQQQQ, RRRRR, SSSSS and TTTTT are hereby adopted by reference as they exist on September 1, 2004. These standards apply to both existing and new sources of HAPs. These requirements are covered in the "Federal Regulations" section.
Part 5 is a **state-only** requirement governing toxic air contaminants. Part 5 regulates sources of toxic air contaminants that have emissions exceeding a *de minimis* level. However, Part 5 of Subchapter 41 has been superseded by OAC 252:100-42. The Air Quality Council approved Subchapter 42 for permanent rulemaking on April 20, 2005. The Environmental Quality Board approved Subchapter 42 as both a permanent and emergency rule on June 21, 2005. The emergency Subchapter 42 was sent for Gubernatorial signature on June 30, 2005, and became effective by emergency August 11, 2005. Subchapter 42 is expected to become permanently effective on June 15, 2006. Because Subchapter 41, Part 5 has been superseded, the requirements of Part 5 will not be reviewed in this memorandum. Should Subchapter 42 fail to take effect, this permit will be reopened to address the requirements of Subchapter 41, Part 5.

OAC 252:100-42 (Toxic Air Contaminants (TAC)) [Applicable]
All parts of OAC 252:100-41, with the exception of Part 3, shall be superseded by this subchapter. Any work practice, material substitution, or control equipment required by the Department prior to June 11, 2004, to control a TAC, shall be retained, unless a modification is approved by the Director.

OAC 252:100-43 (Testing, Monitoring, and Recordkeeping) [Applicable]
This subchapter provides general requirements for testing, monitoring and recordkeeping and applies to any testing, monitoring or recordkeeping activity conducted at any stationary source. To determine compliance with emissions limitations or standards, the Air Quality Director may require the owner or operator of any source in the state of Oklahoma to install, maintain and operate monitoring equipment or to conduct tests, including stack tests, of the air contaminant source. All required testing must be conducted by methods approved by the Air Quality Director and under the direction of qualified personnel. A notice-of-intent to test and a testing protocol shall be submitted to Air Quality at least 30 days prior to any EPA Reference Method stack tests. Emissions and other data required to demonstrate compliance with any federal or state emission limit or standard, or any requirement set forth in a valid permit shall be recorded, maintained, and submitted as required by this subchapter, an applicable rule, or permit requirement. Data from any required testing or monitoring not conducted in accordance with the provisions of this subchapter shall be considered invalid. Nothing shall preclude the use, including the exclusive use, of any credible evidence or information relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

The following Oklahoma Air Pollution Control Rules are not applicable to this facility:

OAC 252:100-7	Permits for Minor Facilities	not in source category
OAC 252:100-11	Alternative Emissions Reduction	not requested
OAC 252:100-15	Mobile Sources	not in source category
OAC 252:100-17	Incinerators	not type of emission unit
OAC 252:100-23	Cotton Gins	not type of emission unit
OAC 252:100-24	Grain Elevators	not in source category
OAC 252:100-35	Carbon Monoxide	not in source category
OAC 252:100-39	Nonattainment Areas	not in area category
OAC 252:100-47	Landfills	not in source category

SECTION VIII. FEDERAL REGULATIONS

PSD, 40 CFR Part 52 [Applicable]
As noted in the table at the end of Section IV (Emissions) above, the current project causes increases in the emissions of many pollutants. The following table compares the actual-to-potential increases with the PSD significance thresholds.

Pollutant	NO_X	CO	SO_2	PM_{10}	VOC	H_2SO_4 mist	Lead
Increase	377	437	387	114	487	5.47	0.0026
Threshold	40	100	40	15	40	7	0.6
Significant?	Y	Y	Y	Y	Y	N	N

There are no contemporaneous decreases to consider, so pollutants NO_X, CO, SO_2, PM_{10}, and VOC require study. The following table reviews where these emission increases will occur, showing which equipment will be added (new), and showing which existing equipment is to be modified. Certain EUGs relate to only a single pollutant, so that pollutant has been indicated in the column labeled EUG. Note that emissions for EUG 4 and EUG 5 are treated in EUG 6. As the reader may recall, the only reason for establishing EUG 5 was to describe equipment subject to NSPS Subpart KK. Emissions from EUGs 4 and 5 are very similar to sources included in EUG 6. The BACT review following the table is taken from the applicant's submittal, and has been edited for length and reformatted. The term "G-P" in this document refers to Georgia-Pacific, the parent company of Fort James.

EUG	Equipment	New?	Modified?	Actual-to-potential increases?
1	Boilers	N	N	Y
2	PM-11, 12, 13, & 14 burners	N	Y	Y
	PM-15 burner	N	N	Y
	Tunnel dryer #1	N	N	N/A
	Tunnel dryers #2, 3, & 4	Y	N	Y
	Poly printer #1	N	N	N/A
	Poly printers #2, 3, & 4	Y	N	Y
3 PM	Coal prep plant	N	N	Y
4	Subpart S units	N	N	N/A
5	Paper printers	N	N	Y
6 VOC	Pulping units	N	Y (only #5)	Y
	PM-11, 12, 13, 14, & 15	N	Y	Y
	PM additives	N	N	Y
	PM solvent cleaning	N	N	Y
	Poly extruder #1	N	N	N/A
	Poly extruders #2, 3, & 4	Y	N	Y
	Corona treaters (existing)	N	N	N/A
	New corona treaters (3)	Y	N	Y
	Plate making	N	Y	Y
	Poly printer #1	N	N	N/A
	Poly printers #2, 3, & 4	Y	N	Y
	Paper printers	N	N	Y
7 PM	Paper machines (5)	N	N	Y
	Coal pile	N	N	N
	Poly plant	N	N	Y

(*From the application*) EPA and ODEQ require that BACT be applied to control emissions from a proposed new or modified source that triggers review under PSD regulations. The proposed project will increase the actual paper production rate on the paper machines and allow more flexibility to use lower quality wastepaper supplies. The project will also increase the actual production rate at System 5 pulping to allow more flexibility with lower quality wastepaper supplies. The project will expand the polyethylene plant by adding 3 extruders, 3 flexographic presses, and a new in-line plate cleaner for related platemaking. The project will not modify or debottleneck other areas of the Mill, such as the boilers or paper printing. Such sources affected by the project may realize an increase in utilization.

The emissions sources subject to BACT review in this permit application are:

- Nos. 11, 12, 13, and 14 Paper Machine Drying Hoods
- Nos. 11, 12, 13, 14 and 15 Paper Machine Process Emissions
- Converting Area Baghouse
- Proposed Nos. 2, 3, and 4 Polyethylene Flexographic Printing Presses
- Proposed Nos. 2, 3, and 4 Extruders
- Platemaking
- System 5 Pulping

BACT ANALYSIS METHODOLOGY

BACT requirements are intended to ensure that the control systems incorporated in the design of a proposed or modified facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the facility. BACT must, at a minimum, demonstrate compliance with the New Source Performance Standards (NSPS) for a source (if applicable). A cost-benefit analysis of the materials, energy, economic penalties, and the environmental benefits associated with a control system may also be necessary. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts (EPA, 1978).

The guidelines for a BACT analysis state that the applicant must demonstrate that each emission unit to be constructed, reconstructed, or modified in a PSD permit will receive BACT. BACT is to be applied to all regulated pollutants from such emission units and include fugitive as well as stack emissions. In selecting one of the alternatives in technology, the applicant is to consider application of flue gas treatment, fuel treatment and processes, and techniques that are inherently low polluting and are economically feasible. In cases where technological or economic limitations on the application of measurement techniques would make the imposition of an emission limitation infeasible, a design, operating, equipment, or work practice standard can be provided by the source. According to the regulations, the BACT analysis shall include the following steps.

(1) Identify all potential control strategies.
(2) Determine technical feasibility of control options identified in above step. Explain availability versus applicability for technologies identified in above step. Eliminate

technically infeasible options. The demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that the technical difficulties would preclude the successful use of the control option on the emission unit under review.

(3) Rank remaining control technologies by control effectiveness. The ranking should include the following relevant information including control effectiveness, expected emission rate, expected emission reduction, energy impacts, environmental impacts, and economic impacts.

(4) Evaluate the most effective controls and document results. The evaluation should include case-by-case consideration of energy, environmental and economic impacts. If the top option is not selected as BACT, the evaluation should consider the next most effective control option.

(5) Select BACT. BACT is the most effective option not rejected in Step 4.

BACT FOR NOs. 11, 12, 13 AND 14 PAPER MACHINE DRYER BURNERS

SOURCE DESCRIPTION

Paper Machines 11, 12, 13, and 14 produce tissue, napkins, and paper towel products. The Mill is proposing to replace/modify the dryer hoods and/or burners for each of these paper machines. Hoods that are replaced will include both hot air recirculating and "once through" hot air designs. The exact size of the new burners for each paper machine has not yet been determined, however, the maximum heat input for both burners will not exceed 70 MMBTUH for each paper machine (note that Paper Machine 15 burners will not be modified). The new hoods will enable the paper machines to increase actual drying rates, closer to the machine design rate, and have less natural gas consumption. These projects will not change the potential production rates for the paper machines. This section of the BACT analysis will only address burner emissions.

These conventional paper machines utilize Yankee dryers or after dryers to complete the drying process for tissue, towel, and napkin manufacturing. Yankee dryers are a specific kind of dryer that combines large steam cylinders with an air hood that contains two natural gas-fired burners. The Yankee dryer is a large cylinder heated internally by steam and externally by a hot air hood (hot air generated by gas or propane-fired burners).

While a detailed scope for the five paper machine modifications has not been fully developed as of the time of submittal of this permit application, the project will increase the drying capacity of all five paper machines. The past actual average daily production is 948 ADT/day, and the proposed projects are expected to yield an average actual increase of 50 tons per day combined.

Step 1 – Identify Control Technologies

To identify the current technologies in use today for reducing PM/PM_{10}, SO_2, NO_x, CO, and VOC emissions from paper machine burners, information was collected either from vendor literature from the Internet or from the vendors directly. Additionally, a review of the technologies in use at G-P's other paper manufacturing operations was conducted. The most recent paper machines that have been permitted with new burners include G-P's paper mills in Wauna, Oregon; Port Hudson, Louisiana; Crossett, Arkansas; and Green Bay, Wisconsin. The permitted paper machines at the Wauna, Port Hudson, and Crossett locations are unique in drying technology (i.e., through-air drying). The analysis compared these emission rates with the Muskogee paper machines, even though these are not configured in a common design.

The technologies described below are for emissions generated by the combustion of natural gas in paper machine dryer burners. Within the company, an example technology is the Maxon Crossfire burner. This burner utilizes low-NO_X burner technology and is similar to some of the burners used in G-P's paper mills in the United States.

Particulate Matter

Typically, when discussing the issue of minimizing PM/PM_{10} emissions from natural gas-fired burners in a BACT analysis, the only control used is "clean fuels". Natural gas is the cleanest burning fuel available for combustion burners used in the United States. The use of natural gas for the dryer burners in the paper machines will result in very low emissions of PM/PM_{10}. Based on a PM/PM_{10} emission factor of 7.6 lbs/MM ft^3 gas burned from AP-42 (EPA) and a 20% safety factor, the potential emissions for PM/PM_{10} are 0.00912 lbs/MMBTU.

Control technologies such as a baghouse or wet scrubber would not normally be considered for reducing PM/PM_{10} emissions when burning natural gas due to the very low emissions generated.

Sulfur Dioxide (SO_2)

Natural gas and propane are the cleanest burning fuel available for consideration of SO_2 emissions. The use of natural gas/propane for the dryer burners will result in very low emissions of SO_2.

Vendor data and company operations do not identify control technologies such as a wet scrubber for natural gas/propane burning due to the very low emissions generated. The estimated SO_2 emission rate from the two dryer burners rated for a maximum of 70 MMBTUH heat input, using emission factors from AP-42 (with a 20% contingency) and a heat content of natural gas of 1,000 Btu/ft^3 is only 0.00072 lbs/MMBTU or 0.22 tons per year, assuming 8,760 hours of operation per year.

The estimated concentration of SO_2 in the flue gas exhaust from the dryer burners from the combustion of natural gas would be less than 3 ppmv (based on a typical 3,100 ft^3/min combustion air flow for burner, operating temperature of 400°F, and 0.05 lbs/hr emission rate). Add-on pollution control devices could not reduce SO_2 emissions with such a low concentration in the flue gas exhaust.

Volatile Organic Compounds (VOC)

When combustion equipment is operated properly, by maintaining the correct combustion chamber temperature and oxygen content, VOC emissions are minimized. Good combustion practices include operator practices and maintenance practices, and following the manufacturer's recommended practices. Good combustion practices will maintain the correct combustion temperature and oxygen content to support complete combustion. This ensures minimization of VOC emissions.

The actual level of VOC reduction achieved by using combustion control versus not using combustion control is hard to predict since most facilities utilize good combustion practices to maintain efficient operations and so fuel is not wasted. However, an estimate for the reduction in VOC emissions from the use of good combustion practices on paper machine burners can range from 30-60% over poor combustion practices.

Other control technologies to reduce VOC emissions, such as the use of an oxidation catalyst, would not be considered when burning natural gas due to the very low emissions generated. Based on a VOC emission factor of 5.5 lbs/MM ft^3 of gas burned, a 20% safety factor, and a maximum heat input rating of 70 MMBTUH, the VOC emission rate is 2.0 tons per year, assuming 8,760 hours of operation per year.

The estimated concentration of VOCs (as propane) in the flue gas exhaust from the dryer exhaust from the combustion of natural gas will be about 30 ppmv (based on 3,100 ft^3/min combustion air flow for burner, operating temperature of 400°F, and 0.4 lbs/hr emission rate). No pollution control device could work effectively in reducing VOC emissions with such a low concentration in the flue gas exhaust.

Carbon Monoxide (CO)

The CO emission rate from a natural gas-fired burner depends on the efficiency of the burner and whether or not nitrogen oxide controls have been designed into the burner (e.g., low-NO_X or ultra low-NO_X burners). When gas-fired burners incorporate low-NO_X (or ultra low-NO_X) burner technology as part of the design, CO emissions may be higher than they would otherwise be without the use of such technology. This occurs because low-NO_X burners require the use of low excess oxygen in the first stage of the burner compared to a conventional burner. Reducing the oxygen content in the first stage of the burner will tend to increase CO emissions due to less efficient combustion in this stage of the burner.

Other control technologies to reduce CO emissions, such as the use of an oxidation catalyst, would not be considered when burning natural gas due to the very low emissions generated. AP-42 lists a CO emission factor of 84 lbs/MM ft^3 for natural gas. In preparing this permit application, the Mill reviewed recent data from the burner manufacturers. The burner-specific emission factor estimate is more accurate than using the AP-42 emission factor estimate for boilers since it is based on actual vendor test data for similar applications (not at the Muskogee Mill) of these Yankee dryer burners. The CO emission factor (from the manufacturer) for the existing Maxon burners in the paper machines varies from 0.29 to 0.44 lbs/MMBTU.

The use of good combustion practices assures that CO emissions from a burner are kept to a minimum. Good combustion practices include operator practices and maintenance practices, and following the manufacturer's recommended practices. Good combustion practices will maintain the correct combustion temperature and oxygen content to support complete combustion.

The control efficiency achieved for combustion control varies depending upon a number of factors, including the age of the burner and control system utilized for mixing fuel with combustion air (manual vs. automatic), how closely manufacturer's operating procedures are followed, and maintenance practices. The actual level of CO reduction achieved by using combustion control versus not using combustion control is hard to predict since most facilities utilize good combustion practices to maintain efficient operations and so fuel is not wasted. However, an estimate for the reduction in CO emissions from the use of good combustion practices can range from 30-60% compared to not using good combustion practices for a paper machine burner.

Nitrogen Oxide (NO_x)

NO_x emissions are generated in three ways; thermal NO_x, prompt NO_x, and fuel NO_x. Thermal NO_x occurs in the high temperature zone near the burner itself. The formation of thermal NO_x is affected by oxygen concentration, peak flame temperature, and time of exposure at peak temperatures. As these three factors increase, NO_x emissions also increase. The second mechanism of NO_x formation, prompt NO_x, occurs in the flame itself and results from the early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals in the fuel. Prompt NO_x is usually negligible when compared to the amount of NO_x formed from the thermal NO_x mechanism. The third mechanism of NO_x formation, called fuel NO_x, results from the reaction of fuel-bound nitrogen compounds with oxygen. Since natural gas has very low nitrogen content, NO_x formation through the fuel NO_x mechanism is insignificant compared to thermal NO_x formation.

There are two approaches to control the emissions of nitrogen oxides in combustion gases: either modify the combustion operation to prevent the formation of NO_x or treat the combustion gas chemically, after the flame, to convert NO_x to elemental nitrogen. Low-NO_X burners and flue gas recirculation modify the combustion operation.

Low-NO_X methods
The technique normally used to control NO_x emissions from natural gas-fired burners in paper machine burners is the use of low-NO_X or ultra low-NO_X burners**.** These burners employ either air staging or fuel staging or a combination of air/fuel staging techniques and specialized combustion controls to minimize the formation of NO_x emissions. Air staging is performed by introducing 50-75% of the combustion air into the primary combustion zone with all of the fuel. This produces a rich flame zone that reduces NO_x emissions due to substoichiometric combustion conditions (low oxygen content). The remainder of the air is injected downstream, forming a secondary flame zone where combustion is completed. NO_x emissions in the secondary flame zone are reduced because the inerts from the primary flame zone reduce flame temperature.

Fuel staging is the reverse condition of air staging. Generally, 30-50% of the fuel is injected into the combustion air to form a lean primary flame zone. NO_x emissions are minimized by the low flame temperatures that are generated due to the lean combustion conditions. The remainder of the fuel is then injected downstream forming a secondary flame zone where combustion is completed. NO_x formation rates in this zone are low because the inerts from the primary flame zone lower the flame temperature and oxygen concentration.

Low-NO_X burners will reduce NO_x emissions by at least 30% compared to NO_x emissions generated by conventional burners, depending upon the size of the burner, the physical configuration of the paper machine dryer, and the type of fuel being used. Ultra low-NO_X burners can also be used in paper machine dryer applications according to North American, who is the only burner manufacturer offering this technology for Yankee dryers. Ultra low-NO_X burners can reduce NO_x emissions by 50% compared to NO_x emissions generated by conventional burners.

According to the manufacturer in 2005, the NO_x emission rate from the existing Maxon LV-85 Line burners is approximately 0.12- 0.15 lbs/MMBTU. Estimates for NO_x emissions from low-NO_X burners range from 0.036-0.06 lbs/MMBTU based on information from several paper machine burner vendors. Estimates for NO_x emissions for ultra low-NO_X burners range from 0.015-0.05 lbs/MMBTU based on information from North American.

Flue Gas Recirculation (FGR)
FGR involves recirculating part of the combustion gases back to the burners in order to reduce the flame temperature and the available oxygen content. Reducing the temperature and the available oxygen reduces the formation of NO_x emissions. FGR can reduce NO_x emissions by approximately 15-25%, depending upon specific operating conditions.

Selective Catalytic Reduction (SCR)
SCR is a post combustion control technology that uses the injection of ammonia followed by a catalyst to convert all NO_x to elemental nitrogen. Typically, vanadium oxide is used as the catalyst. The flue gas directed over the catalyst must be maintained within a specific temperature range, usually between 600 and 1,100°F, or the catalyst will not perform correctly. If the temperature is too high, then the catalyst will be destroyed. SCR can reduce NO_x emissions by as much as 90%.

Selective Non-Catalytic Reduction (SNCR)
SNCR is another post combustion control technology for NO_x reduction. This technology is similar to SCR in that ammonia injection is required to convert all NO_x to elemental nitrogen. However, SNCR operates in the absence of a catalyst and requires a much higher temperature for the reaction to take place, usually in the range of 1,700-2,100°F. SNCR can reduce NO_x emissions by 25-50%, depending upon specific operating conditions.

Review of EPA RACT/BACT/LAER Clearinghouse

Searches of the RACT/BACT/LAER Clearinghouse (RBLC) were conducted to identify control technologies for the control of PM/PM_{10}, SO_2, NO_x, CO, and VOC emissions from paper machine dryer burners. Searches were only conducted for RBLC determinations added during or after January 1994. Any entries listing LAER as the basis for permit issuance were deleted since this project is not subject to LAER. The specific EPA RBLC categories searched are listed below. The query excluded two drying technologies that are not appropriate for tissue paper manufacturing: Infrared and Flotation drying. These types of dryers are not commercially used to dry tissue, napkin, or towel products. Flotation dryers are normally used to dry solvent-containing coatings used on paper substrate surfaces while infrared dryers are normally used on grades heavier than tissue or towel products. The burners used in both flotation and infrared dryers are designed specifically for use only in these dryers and cannot be used in Yankee dryers. To the best of G-P's knowledge, there are no flotation or infrared dryers in use or available for use to manufacture tissue paper products. Therefore, the burners in these two types of dryers and their respective emission rates will not be compared to Yankee dryers in a BACT analysis.

11.05: External Combustion-Natural Gas Combustion
30.002: Kraft Pulp Mills
30.004: Pulp & Paper Production Other than Kraft

Several pages of the application are used to list all references found, but this analysis lists only the salient points. Five companies in four states listed 15 units for the PM/PM_{10} review. These units ranged in size from 12 to 117 MMBTUH and all of them listed natural gas or "clean fuel" as the control description. For the 13 units specifying an emission rate in units of lbs/MMBTU, the range of values was from 0.004 to 0.024 lbs/MMBTU. Three companies in three states listed 11 units for the SO_2 review. These units ranged in size from 12 to 117 MMBTUH and all of them listed natural gas or "clean fuel" as the control description. For the six units specifying an emission rate in units of lbs/MMBTU, the range of values was from 0.0007 to 0.0018 lbs/MMBTU. Five companies in five states listed 13 units for the NO_X review. These units ranged in size from 18 to 117 MMBTUH and 10 of them listed low-NO_X burners as the control description. The control for three units in Wisconsin operated by Inter Lake Paper (18.2, 60.0, and 116.6 MMBTUH) showed "Conventional Dryer (modified)" as the control description. For the seven low-NO_X units specifying an emission rate in units of lbs/MMBTU, the range of values was from 0.0913 to 0.115 lbs/MMBTU. All three of the Inter Lake units were listed at 0.12 lbs/MMBTU. Five companies in five states listed 16 units for the CO review. These units ranged in size from 12 to 117 MMBTUH and all but one of them listed natural gas or "Good Combustion Practices" as the control description. The excepted unit showed "No controls." For the 12 units specifying an emission rate in units of lbs/MMBTU, the range of values was from 0.1139 to 0.26 lbs/MMBTU. The excepted unit did not show an emission factor. Four companies in five states listed 12 units for the VOC review. These units ranged in size from 21 to 90 MMBTUH and all of them listed "No Controls" or "Good Combustion Practices" as the control description. For the nine units specifying an emission rate in units of lbs/MMBTU, the range of values was from 0.019 to 0.0564 lbs/MMBTU.

Step 2 - Technical Feasibility Analysis

PM/PM_{10}
Clean Fuel
The use of clean fuel such as natural gas is technically feasible for the paper machine burners.

SO_2
Clean Fuel
The use of clean fuel such as natural gas is technically feasible for the paper machine dryer burners.

CO and VOC

Oxidation Catalyst

The use of an oxidation catalyst would not be feasible for use with the paper machine dryer burner exhaust after the gases have left the hood section of the paper machine since the exhaust temperature is approximately 400-450°F. This temperature range is well below the temperature requirement for an oxidation catalyst system to work efficiently, which is a minimum of 600°F. While the paper machine dryer exhaust gases could be heated back up to the optimum temperature range for the oxidation catalyst to work, this would negate the effect of minimizing energy consumption and recovering heat from the dryer exhaust. Additionally, the PM/PM_{10} emissions from the paper machine process (not from the burners) would coat the oxidation catalyst, thereby significantly reducing its effectiveness. For these reasons, the use of an oxidation catalyst is not technically feasible for controlling CO or VOC emissions from the paper machine burners.

Low-NO_x and Ultra Low-NO_x Burners

The use of low-NO_X or ultra low-NO_X burners in the paper machines dryer is technically feasible. These types of burners have CO and VOC emission rates that are lower than conventional burners that do not employ the low-NO_X technology.

Combustion Control

Through the use of good combustion practices, combustion control, is feasible for the control of CO and VOC emissions from the paper machine dryer burners.

NO_x

Low-NOX or Ultra low-NOX Burners

The use of low-NO_X or ultra low-NO_X burners is technically feasible for the paper machines dryer burners.

Flue Gas Recirculation

Flue gas recirculation (FGR) involves recirculating part of the combustion gases for use as combustion air, in order to reduce the available oxygen, which in turn limits the generation of NO_x. This means that the combustion gases from the paper machine dryer burners would need to contain significantly higher oxygen content in order for FGR to be a usable source of combustion air. Since this is not possible, FGR with the existing Maxon burners would not be able to lower NO_x emissions. In addition, FGR presents other complications. The recirculated combustion gas from the paper machine hood would contain suspended particulate matter (from the paper machine process) that could foul the burner air passages. This, in turn, would create a fuel rich condition, resulting in a potentially serious safety hazard. For these reasons, FGR is not technically feasible for controlling NO_x emissions from the existing paper machine burners.

Selective Catalytic Reduction

SCR would not be technically feasible for reducing NO_x emissions from the paper machines dryer burners for several reasons. First, the exhaust temperature would be too low (400-450°F) for the SCR catalyst to react and convert NO_x emissions to elemental nitrogen. The use of additional heat to raise the temperature of the exhaust gases would waste energy since the new hood for the paper machines includes a design to recover the dryer heat for preheating the intake air. Second, even if the exhaust temperature were raised to the proper level for SCR to work effectively, particulate matter emissions from the paper machine process (not from the dryer) would coat the SCR catalyst. This would significantly reduce the effectiveness of the SCR system. Lastly, there is no room inside the dryer hood (where the burner is located) to install an SCR system. G-P is not aware of any paper machine burners in the U.S. that enlist SCR technology to control NO_x emissions. For these reasons, SCR is not technically feasible for controlling NO_x emissions from the paper machine dryer burners.

Selective Non-Catalytic Reduction
SNCR would not be technically feasible for reducing NO_x emissions from the paper machines dryer burners for one of the same reasons stated above for an SCR system – the temperature of the paper machine exhaust is too low for attempting to treat the burner exhaust after it has left the hood section of the paper machine. Furthermore, SNCR systems require temperatures in the range of 1,700-2,000°F to operate effectively. Also, the SNCR process actually requires the injection of ammonia in the zone above the paper machine dryer burner. This would contaminate the paper product. G-P cannot risk contaminating the paper product with ammonia and still ensure that it conforms to customer specifications for sale to the general public. There are no paper machines in the U.S. that G-P is aware of that use SNCR technology to control NO_x emissions. For these reasons, SNCR is not technically feasible for controlling NO_x emissions from the paper machines dryer burners.

Step 3 - Ranking the Technically Feasible Control Alternatives
The following table presents the control technologies not eliminated in the previous step for paper machine burners using natural gas as the fuel, ranked by control efficiency.

Pollutant	**Technology**	**Control Efficiency (%)**
PM/PM_{10}	Clean Fuel/Use of Natural Gas	N/A
SO_2	Clean Fuel/Use of Natural Gas	N/A
NO_x	low-NO_X Burners	30-75
	Ultra low-NO_X Burners	50-95
CO/VOC	Combustion Control	30-60

Step 4 – Control Effectiveness Evaluation
This step of the BACT process is necessary when the top control is not selected as BACT. Step 4 determines the economic impact of the feasible control options listed in Step 3 and then selects the most appropriate technology as BACT for the paper machine burners. The economic analysis is based on cost data supplied by the equipment suppliers and the use of EPA's Office of Air Quality Planning & Standards (OAQPS) Control Cost Manual, 6th edition, June 2003 (Chapter 2-Cost Estimating Methodology). Typical values were selected from the OAQPS Manual for the various parameters used to determine the cost effectiveness for reducing pollutant emissions.

Particulate Matter
Since the Mill will only be burning natural gas in the paper machine burners, which is equal to the best level of control for PM/PM_{10} emissions, an economic analysis is not required.

SO_2
Since the Mill will only be burning natural gas in the paper machine burners, which is equal to the best level of control for SO_2 emissions, an economic analysis is not required.

VOC
As stated earlier in this analysis, due to the very low level of VOC emissions generated by paper machine burners, no control equipment can be justified to reduce VOC emissions any further. Therefore, cost effectiveness calculations have not been prepared.

NO_x
The only feasible control technologies to reduce NO_x emissions are the use of either low-NO_X or ultra low-NO_X burners in the paper machine dryer. For cost estimating and emission estimating purposes, G-P has first calculated the cost effectiveness of North American's ultra low-NO_X burner since it has the lowest NO_x emission rate of several different burners investigated, which are listed below:

- North American Ultra low-NO_X burner (Model 4213 LEx)—0.015 lbs NO_x/MMBTU
- Maxon Crossfire low-NO_X burner—0.036 lbs NO_x/MMBTU
- Maxon Kinedizer low-NO_X burner—0.04 lbs NO_x/MMBTU
- North American low-NO_X burner (Model 4096)—0.05 lbs NO_x/MMBTU
- Coen low-NO_X burner (Model THE-QL)—0.06 lbs NO_x/MMBTU

North American informed G-P that is has signed confidentiality agreements with the customers who have installed the ultra low-NO_X burner and therefore G-P cannot verify the operational reliability or performance of the North American ultra low-NO_X burner. The capital equipment cost data and installation cost data for North American's ultra low-NO_X burner was obtained from Andritz Fiber Drying, an engineering firm that has worked with North American's burners on paper machine projects.

G-P Engineering Department estimated the startup and testing costs and also suggested the use of 30% of the direct capital costs for project contingencies. G-P used 30% as a contingency because of uncertainties with the use of a new type of burner that has never been used in any of G-P's paper mills and the fact that the cost estimate for North American's burner is based on a plus or minus 30% accuracy. This is in line with the instructions contained in EPA's New Source Review Workshop Manual (Draft October 1980, page B.35). The cost for direct labor for the operation of the new burner system was also estimated by G-P's Engineering Department. G-P used standard EPA Cost Control Manual factors for the following parameters.

- Freight charges – 5% of basic equipment cost
- 30-day working capital cost – direct operating costs divided by 12 months
- Supervisory labor costs for new burner system – 15% of direct labor costs
- Maintenance labor and material costs – equal to direct labor costs for the operation of the new burner system
- Overhead costs – 60% of direct operating labor and maintenance costs
- Property taxes – 1% of total capital investment

- Insurance - 1% of total capital investment
- Administration - 2% of total capital investment
- Cost recovery factor – 0.1424 based on a 10-year life of the equipment and a 7% interest rate for capital monies

The following table presents the annualized costs for the top two burners.

Table C-4. Summary of Annualized Costs for Burners for Paper Machines 11-14, Muskogee Mill

Cost Items			Cost Factor	2004 dollars	
				NA Ultra low-NO_X	Maxon Crossfire low- NO_X
DIRECT CAPITAL COSTS (DCC):					
	(1)	Purchased Equipment Cost			
		(a) Basic Equipment	Based on Vendor Quote	$542,000	$112,000
		(b) Freight	0.05 x (1a)	$27,100	$5,600
		(c) Subtotal	(1a + 1b)	$569,100	$117,600
	(2)	Direct Installation	outside engineering estimate	$69,900	$47,805
Total DCC:			(1) + (2)	$639,000	$165,405
INDIRECT CAPITAL COSTS (ICC):					
	(3)	Indirect Installation Costs			
		(a) Engineering & Supervision		incl. w/1a	$10,107
		(b) Construction & Field Expenses		incl. w/1a	$10,107
		(c) Construction Contractor Fee		incl. w/1a	incl. w/1a
		(d) Contingencies Ultra Low NOx	(0.30) x (DCC) (G-P estimate)	$191,700	
		(d) Contingencies Low NOx	(0.15) x (DCC) (G-P estimate)		$24,811
	(4)	Other Indirect Costs			
		(a) Startup & Testing	G-P Engineering Estimate	$5,000	$5,000
		(b) Working Capital	30-day DOC	$1,463	$1,463
		(c) Spare parts		$30,000	$15,000
Total ICC:			(3) + (4)	$228,163	$66,488
TOTAL CAPITAL INVESTMENT (TCI):			DCC + ICC	$867,163	$231,893
DIRECT OPERATING COSTS (DOC):					
	(1)	Operating Labor			
		Operator	1 hr/d x $22.37/hr x 365 d/yr	$8,165	$8,165
		Supervisor	15% of operating labor cost	$1,225	$1,225
	(2)	Maintenance			
		Labor & Materials	Equivalent to operating labor	$8,165	$8,165
Total DOC:			(1) + (2)	$17,555	$17,555
INDIRECT OPERATING COSTS (IOC):					
	(3)	Overhead	60% of oper. labor & maintenance	$10,533	$10,533
	(4)	Property Taxes	1% of total capital investment	$8,672	$2,319
	(5)	Insurance	1% of total capital investment	$8,672	$2,319
	(6)	Administration	2% of total capital investment	$17,343	$4,638
Total IOC:			(3) + (4) + (5) + (6)	$45,219	$19,809
CAPITAL RECOVERY FACTOR (CRF)*:			CRF 10 yrs @ 7%	0.1424	0.1424

Table C-4. Summary of Annualized Costs for Burners for Paper Machines 11-14, Muskogee Mill			
		2004 dollars	
Cost Items	Cost Factor	NA Ultra low-NO_X	Maxon Crossfire low- NO_X
CAPITAL RECOVERY COSTS (CRC):	CRF x TCI	$123,464	$33,016
ANNUALIZED COSTS (AC):	DOC + IOC + CRC	$186,239	$70,380

Cost effectiveness is equal to the tons of pollutant removed divided by annual cost ($). The tons of pollutant removed can reflect either the emissions associated with the baseline throughput or the emissions associated with the potential throughput . The uncertainty for the "tons removed" term reflects the fact that the burners are not usually operated at their maximum design heat input rates. While the grade of paper product and consistency (water content) of stock determine the amount of drying needed, the paper machine uses heat exchangers, and steam in addition to the burners to dry the paper. Thus, the Mill determined the cost effectiveness using both methodologies for determining the "tons removed" term. The table immediately following presents the calculations for the amount of tons removed for each of these two burners. The next table calculates the range of cost effectiveness for both burners using the "tons removed" term from the first table.

	PM11	PM12	PM13	PM14
North American Ultra Low NO_X Burner @ 0.015 lb/MMBTU				
Baseline heat input (MMBTU/yr)	113627	197251	159772	111735
Existing Burner NO_X TPY (baseline)	6.8	11.8	9.6	8.4
ULNOX Burner NO_X TPY (baseline heat input)	0.85	1.48	1.20	0.84
Tons removed	6.0	10.4	8.4	7.5
Potential Burner heat input (MMBTU/yr)	613200	613200	613200	613200
Existing Burner NO_X TPY PTE	25.2	17.3	17.3	25.2
ULNOX Burner NO_X TPY (PTE heat input)	4.60	4.60	4.60	4.60
Tons removed	20.6	12.7	12.7	20.6
Cross Fire Low NOx Burner @ 0.036 lb/MMBTU				
Baseline heat input (MMBTU/yr)	113627	197251	159772	111735
Existing Burner NO_X TPY (baseline)	6.8	11.8	9.6	8.4
Lo NOX Burner NO_X TPY (baseline heat input)	2.05	3.55	2.88	2.01
Tons removed	4.77	8.28	6.71	6.37
Potential Burner heat input (MMBTU/yr)	613200	613200	613200	613200
Existing Burner NO_X TPY PTE	25.2	17.3	17.3	25.2
Lo NO_X Burner NO_X TPY (PTE heat input)	11.04	11.04	11.04	11.04
Tons removed	14.19	6.31	6.31	14.19

Cost Effectiveness Summary

NA Ultra Low NOx		PM11	PM12	PM13	PM14
	Annualized Cost	$186,239	$186,239	$186,239	$186,239
Baseline heat input	tons removed	5.97	10.36	8.39	7.54
	Cost Effectiveness ($/ton)	$31,220	$17,984	$22,203	$24,693
PTE heat input	tons removed	20.6	12.7	12.7	20.6
	Cost Effectiveness ($/ton)	$9,028	$14,612	$14,612	$9,028
CrossFire Low NOx					
	Annualized Cost	$70,380	$70,380	$70,380	$70,380
Baseline heat input	tons removed	4.77	8.28	6.71	6.37
	Cost Effectiveness ($/ton)	$14,748	$8,495	$10,488	$11,051
PTE heat input	tons removed	14.19	6.31	6.31	14.19
	Cost Effectiveness ($/ton)	$4,959	$11,159	$11,159	$4,959

Based on the ranges of cost effectiveness values, the Mill believes that the North American's ultra low-NOX burner is not cost-effective. The CrossFire Low NOx burner can be considered cost-effective.

CO

The use of low-NO_X burners will affect CO emissions, and in some instances, installing low-NO_x burners will increase CO emissions as discussed earlier in this analysis. Based on a review of a number of low-NO_X and ultra low-NO_X burners available in the marketplace, and as shown below, the best level of CO emissions attainable for burners that can be used in Yankee dryers is 0.15 lbs/MMBTU.

- North American Ultra low-NO_X burner (Model 4213 LEx)—0.15 lbs CO/MMBTU
- Maxon Crossfire low-NO_X burner—0.184 lbs CO/MMBTU
- Maxon Kinedizer low-NO_X burner—0.3 lbs CO/MMBTU
- North American low-NO_X burner (Model 4096)—0.15 lbs CO/MMBTU
- Coen low-NO_X burner (Model THE-QL)—0.15 lbs CO/MMBTU

The Maxon Crossfire low-NO_X burner generates slightly higher CO emissions than the lowest burner available, which is 0.15 lbs/MMBTU. However, the primary purpose of installing low-NO_x burners is to reduce NO_x emissions. To accomplish low NOx technology, each burner manufacturer designs equipment that meets slightly different standards. Since the Maxon Crossfire low-NO_X burner is more cost effective than the North American ultra low-NO_X burner, and since Maxon's Crossfire low-NO_X burner has lower NO_x emissions than any of the other burners investigated, G-P believes the Maxon Crossfire low-NO_X burner represents the best choice for CO emissions. It should be noted that the Maxon Crossfire low-NO_X burner only generates about 60% of the CO emissions that the burners currently in the paper machines generate.

Step 5 – Select BACT
For all of the reasons discussed in Step 4 above, G-P believes that BACT for the paper machines should be the use of Maxon's Crossfire low-NO_X burner. Based on North American's ultra low-NO_X burner cost effectiveness, G-P does not believe that these burners meet BACT. Additionally, to the best of G-P's knowledge, North American's ultra low-NO_X burner has not been installed in any Yankee dryer hood as the result of a BACT analysis required by a PSD application.

The following paragraphs present G-P's proposed BACT emission limits for Maxon's Crossfire low-NO_X burner for each of the criteria pollutants:

PM/PM_{10}
BACT for PM/PM_{10} emissions should be the use of natural gas as a clean fuel. G-P agrees to a permit limit of 0.0091 lbs/MMBTU heat input.

SO_2
BACT for SO_2 emissions should be the use of natural gas as clean fuel. G-P agrees to a permit limit of 0.00072 lbs/MMBTU heat input. This value is equal to the lowest values contained in the RBLC summary above.

VOC
BACT for VOC emissions should be combustion control through the use of good combustion practices. G-P agrees to a permit limit of 0.0066 lbs/MMBTU heat input.

NO_x
For individual paper machines that replace the burner, BACT for NO_x emissions is the use of a low-NO_X burner. G-P agrees to a permit limit of 0.04 lbs/MMBTU, which is equivalent to Maxon's emission factor guarantee for the Crossfire low-NO_X burner. This value is lower than the range of values contained in the RBLC summary above.

CO
For individual paper machines that replace the burner, BACT for CO emissions is the use of a low-NO_X burner. G-P agrees to a permit limit of 0.184 lbs/MMBTU heat input for the burner, which is equivalent to Maxon's emission factor guarantee for the Crossfire low-NO_X burner. This value is within the range of values contained in the RBLC summary above, which is 0.06 to 0.214 lbs/MMBTU. Reducing the CO limit any further would most likely result in a higher NO_x value, which is undesirable.

<u>BACT FOR PAPER MACHINE NOs. 11, 12, 13, 14, AND 15 PROCESS OPERATIONS</u>

SOURCE DESCRIPTION
The paper machine process operations emit only VOC and PM among the pollutants subject to PSD. The purpose of this analysis is to perform a BACT review of emissions from each paper machine, excluding those emissions from the burners, which were addressed above. VOC emissions are equal to the amount of VOC contained in chemical additives used to enhance

product quality and make the process more efficient. Examples of additives are softeners, wet strength resins, conditioners, defoamers, and retention aids. In addition to these chemicals, release agents help keep the paper product from sticking to the process equipment. Additional VOC emissions from the paper machine area are from the cleaning solvents used to periodically clean the wire fabric of the paper machine. However, the cleaning solvent use is not modified as part of this project, and thus not subject to BACT.

Step 1 – Identify Control Technologies
Review of Vendor Data and Other Operations Within the Company

VOC
To identify the current technologies in use today for reducing VOC emissions from the addition of process chemical additives and cleaning solvents for paper machines, information was collected from vendor literature found on the Internet or directly from the vendors. The analysis also reviewed technology in use at G-P's other paper manufacturing operations. The most recent paper machine project permitted at a G-P facility is the No. 1 Paper Machine at the Green Bay, Wisconsin Broadway Mill (final PSD permit issued this year available at http://dnr.wi.gov/org/aw/air/permits/APM_toc.htm). Another permit was issued in April 2003 for the No. 10 Paper Machine, also located at the Green Bay, Wisconsin Broadway Mill.

As indicated above, VOC emissions are primarily generated by the paper machine process from VOC-containing compounds that are added to the pulp at the "wet-end" of the paper machine. For potential emission calculations, the very conservative assumption was made that all of the VOC-containing portion of the chemical additives are released to the atmosphere, either as fugitive emissions at the wet-end of the paper machine, through building roof vents, or as point source emissions picked up off of the paper sheet through the Yankee Dryer exhausts (dry-end of paper machine).

Based on VOC stack testing performed by NCASI at the Muskogee Mill (Nos. 12 and 14, December 1995), the "dry end" of both paper machines emitted 62% of the VOCs measured and the "wet end" of the two paper machines emitted the other 38% of the VOCs measured. The testing performed by NCASI does not account for losses attributable to all fugitive emissions from chemical additives and manual cleaning activities with VOC-containing cleaners.

Based on a comparison of emission factors developed for paper machines by NCASI versus the use of material balance to calculate VOC emission rates, G-P has determined that considerably higher VOC emission rates are estimated based on the material balance approach. G-P believes that one of the reasons for this difference in VOC emission estimates is because the emission factors developed by NCASI are based on stack testing conducted through point sources and do not capture all of the fugitive VOC emissions that escape through other portions of a building enclosure, such as roof vents, doorways, etc. Additionally, the stack testing conducted by NCASI does not "capture" all VOC-emitting materials because of inaccuracies with the test methodology. Because of these previous findings by G-P, the more conservative technique of using a material balance approach to calculate total VOC emissions from paper machine operations has been used in this BACT analysis.

Within the last few years, three paper machines have been permitted at G-P's facilities in Wauna, Oregon, Port Hudson, Louisiana, and Crossett, Arkansas. However, the paper machines at these three facilities are unique in drying technology (through air drying) and are not configured similar to the Muskogee Mill paper machines.

Typical control technologies for the control of VOC emissions from manufacturing processes within the company are limited to use of low-VOC containing chemicals or water-borne chemical additives. The use of low-VOC containing chemicals or water-borne chemicals with little or no VOC content in place of currently used VOC-containing chemicals are methods that will reduce VOC emissions when applied properly. The amount of VOC emission reduction that can be achieved is highly variable depending on the specific application.

Particulate Matter

PM/PM_{10} emissions are generated in the paper machine primarily on the "dry end" of the machine as fugitive dust. Some of this dust is picked up by the paper machine hood exhausts and is emitted through stacks to the atmosphere. Based on stack testing conducted at the FJOC Savannah River Mill (Paper Machine No. 19), it is known that a significant percentage (50% or more) of the overall PM/PM_{10} emissions generated by a paper machine are emitted as fugitive dust through the roof vents of the building that houses the paper machine. This information was used when calculating the potential PM/PM_{10} emission rates for the paper machine and in this BACT analysis. PM/PM_{10} emissions from the "wet end" of the paper machine are considered insignificant when compared to PM/PM_{10} emissions from the "dry end" of a paper machine based on the following reasoning:

The fan pump transports a large amount of water to the "wet end" of the paper machine. This water is a carrier of the fiber (stock) that is formed into a sheet and dried to make our tissue and toweling products. The water that is removed from the sheet is returned to the process to be reused again to transport stock. Since the paper machine is running at a very high rate of speed when making product (4,500-5,000 feet per minute), there is some spray and water droplets generated inside the paper machine room. The spray and water droplets fall back onto the process and do not exit the paper machine room and are returned to the water recycle loop or are routed to the wastewater treatment system. The only vapor from the "wet end" of the paper machine that exits the machine room is through the vacuum pump exhaust. The vacuum pump assists in the removal of water from the fibers in the wire and felt sections of the "wet end" (forming section). These vapors would not contain any fibers but may contain insignificant trace amounts of suspended material from the water loop.

Because of this reasoning, G-P has not routinely conducted stack tests to determine the particulate matter emissions from the "wet-end" of paper machines. A search for "wet end" stack test data at all of G-P's recycle paper mills indicated that there has only been one "wet end" stack test for particulate matter emissions performed, which was at the Port Hudson, Louisiana Mill on the pulper exhaust for Paper Machine No. 5 (test conducted in September 2001). The results of that testing indicated a particulate matter emission rate of 0.14 pounds per hour (lbs/hr) or 0.01 pounds per air-dried ton (lbs/ADT). While this represents only one exhaust point from the "wet end" of a paper machine, the results confirm that particulate matter emissions from the "wet-end" of a paper machine are quite low when compared to the particulate matter emissions from the "dry end" of a paper machine.

The Nos. 11, 12, and 13 Paper Machines are considered a "wet crepe" paper machine. An explanation of the word "crepe" used in paper machine manufacturing is provided below:

The continuous sheet of paper leaves the forming section ("wet-end") of the machine where water has been drained from the formed sheet to approximately 50% moisture. The paper sheet then goes through the Yankee drying section where it actually sticks to the hot surface of the Yankee cylinder. The sheet must then be scraped off of the cylinder with a doctor blade. This removal of the sheet by the doctor blade causes the sheet to "crepe" off, (e.g., come off in a wrinkled state) giving the sheet a bulk texture that makes it softer and more absorbent. A "dry crepe" process doctors the sheet off the Yankee after the sheet is fully dry. A "wet crepe" process doctors the sheet off while it is still slightly moist (10-20% moisture) and then further dries the sheet in an after-dryer that follows the Yankee. The "wet creping" sheet better retains its bulkiness and absorbent characteristics.

Based on this explanation, dry crepe paper machines create more dust than wet crepe paper machines. For example, one of the primary points of dust generation, the doctor knife blade that removes the tissue (or towel) sheet from the Yankee Dryer, would be expected to have higher PM emissions when the tissue sheet is at a much lower moisture content (approximately 5% moisture content).

Typical control technologies for the control of PM/PM_{10} emissions from manufacturing processes within the company include baghouses and wet scrubbers. A brief explanation of these control technologies is provided below.

Baghouses

A baghouse, or fabric filter, is one of the most efficient devices for removing particulate matter. Baghouses have the capability of maintaining collection efficiencies above 99% for particles down to 0.3 micrometers (μm) in diameter. The basic components of a fabric filter unit consist of woven or felted fabric, usually in the form of bags that are suspended in a housing structure (baghouse), an induced draft or forced draft fan; and a blow-back fan, reverse air fan, pulse-jet fan, or a mechanical shaking mechanism. The emission stream is distributed by means of specially designed entry and exit plenum chambers, providing equal gas flow through the filtration medium. The particle collection mechanism for fabric filters includes inertial impaction, Brownian diffusion, gravity settling, and electrostatic attraction. The particles are collected in dry form on a cake of dust supported by the fabric or on the fabric itself. The process occurs with a relatively low-pressure drop requirement (usually within the range of 2-6" water column pressure). Periodically, most of the cake dust is removed for disposal. Cake dust is removed by shaking or a "rapping" system, with the use of reverse air, or with the use of a pulse jet of air. Dust is collected in a hopper at the bottom of the baghouse and is removed through a valve and dumped into a storage container. Usually, the dust is disposed of at an industrial landfill.

Wet Scrubbers

Wet scrubbers are collection devices that trap wet particles in order to remove them from a gas stream. They utilize inertial impaction and/or Brownian diffusion as the particle collection mechanism. Wet scrubbers generally use water as the cleaning liquid. Water usage and wastewater disposal requirements are important factors in the evaluation of a scrubber alternative. Types of scrubbers include spray scrubbers, cyclone scrubbers, packed-bed scrubbers, plate scrubbers, and venturi scrubbers. The most common particulate matter removal scrubber is the venturi scrubber because of its simplicity (i.e., no moving parts) and high collection efficiency. In this type of scrubber, a gas stream is passed through a venturi section, before which, a low-pressure liquid (usually water) is added to the throat. The liquid is atomized by the turbulence in the throat and begins to collect particles impacting the liquid as a result of differing velocities for the gas stream and atomized droplets. A separator is used to remove the particles or liquid from the gas stream. The most important design consideration is the pressure drop across the venturi. Generally, the higher the pressure drop, the higher the collection efficiency.

Review of EPA RACT/BACT/LAER Clearinghouse

VOC

Additional typical technologies for the control of VOC emissions from general manufacturing processes include carbon adsorption, biofiltration, incineration (e.g., recuperative thermal oxidation, recuperative catalytic oxidation, regenerative thermal oxidation, etc.). However, none of these add-on control devices have been determined as BACT by EPA or Oklahoma DEQ. Thus no additional technologies are considered available.

Searches of the RACT/BACT/LAER Clearinghouse (RBLC) were conducted to identify control technologies for the control of VOC emissions from the paper machine manufacturing process. Searches were only conducted for RBLC determinations added during or after January 1994 to determine the latest technologies in use.

The specific EPA RBLC categories searched are listed below:
30.002 Kraft Pulp Mills
30.004 Pulp & Paper Production Other than Kraft

Several pages of the application are used to list all references found, but this analysis lists only the salient points. Three companies in three states listed five units for the PM/PM_{10} review. Only three had capacity listed, and these ranged from 304 to 806 tons per day. Only four of the five manufacture tissue or toweling. Control descriptions included "good operating practices," wet scrubber, venturi scrubber (dry end), and cyclone (wet end). Emission rates were specified in many ways. One scrubber had emissions specidied as 0.0035 grains/acfm, while another scrubber specified 0.24 lbs/ADT. The venturi specified 95% reduction and the cyclone specified 90% reduction. Fifteen companies in eight states listed 39 units for the VOC review.

The vast majority of the listed units are for facilities that manufacture paper products that are significantly different from the tissue/toweling products that the Muskogee Mill manufactures. These other paper products include coated board, containerboard, specialty papers, fine printing and writing papers, baby diapers, school and office papers, corrugated containers, and paperboard. All of these types of products have different properties that are specific for their designated end-use.

The two most important differences in the paper making process related to this BACT analysis are the "basis weight" characteristic and the additive chemistry. The "basis weight" on the Muskogee Machines is generally much lower than the "basis weight" for the majority of the products listed in the RBLC review. The "basis weight" for the Muskogee Mill machine products varies from 9.3-13.1 pounds per 3,000 square feet while the "basis weight" for the other types of products listed in the RBLC review is several times higher. The products made on the Muskogee Mill paper machines have special end-use characteristics that require the use of certain types of chemical additives to produce these specific qualities.

For these two reasons, the majority of the paper machines listed in the RBLC review cannot be considered to be "similar sources" to the Muskogee Mill machines for purposes of this BACT analysis. Only those five units that manufacture tissue or toweling and can be considered to be "similar sources" are discussed in Step 2 of this analysis. The five units to be considered listed control descriptions that involved limiting total VOC or limiting the VOC content of materials used.

Step 2 - Technical Feasibility Analysis
VOC
Use of Water-Borne or Low VOC-Containing Chemical Additives

The use of water-borne chemicals or low VOC-containing chemicals in place of currently used VOC-containing chemicals is a method that will reduce VOC emissions when applied properly. The reduction in VOC emissions, of course, depends on the VOC content of the chemical being replaced. Not all water-borne or low VOC-containing chemicals can perform as effectively as those chemicals with a higher VOC content. The paper manufacturing process is very sensitive to different chemicals since the final product must meet stringent customer specifications for sale to the general public.

The Muskogee Mill machines make a number of different types of tissue/toweling products that require the use of a wide range of chemical additives to meet customer specifications. It is important that the Muskogee paper machines be able to use the different types of chemical additives, in order to continue to make the many different types of tissue/toweling products for its customers.

The entries listed in the RBLC review that make products similar to those made by the five machines at the Muskogee Mill are the No. 8 Tissue Machine at G-P's Crossett, Arkansas Mill, the Nos. 9 and 10 Paper Machines at the Green Bay Broadway Mill, and Proctor & Gamble's four paper machines located in Missouri. BACT for the No. 8 Tissue Machine was considered to be no control because controlling the VOC emissions from the paper machine was not considered to be cost effective due to the relatively low VOC emissions and the high airflow from the paper machine. This selection of BACT resulted in an emission rate of 0.046 lbs VOC/ton paper.

This value was derived from a similar source listed in a NCASI technical bulletin (Technical Bulletin No. 681, October 1994, Table V.C.1). The No. 8 Tissue Machine application did not incorporate VOC emission estimates using a material balance for the chemical additives used on the paper machine as has been done for the Muskogee paper machines. If a material balance calculation had been used, then the BACT limit would have been considerably higher than the 0.046 lbs VOC/ton value.

The overall BACT limit for G-P's No. 10 Paper Machine at the Green Bay Mill was listed as 2.9 lbs VOC/ton paper while the overall BACT limit for the No. 9 Paper Machine at the Green Bay Mill was listed as 2.7 lbs VOC/ton paper. These BACT limits are based on using a material balance for the chemical additives to determine the VOC emission rate from the paper machines. BACT for both of these paper machines also established specific VOC limits in the units of pounds per month for cleaning solvent and chemical additive usage.

BACT for Proctor & Gamble's four paper machines was listed as "VOC emissions limited to 2% of the chemical additives content" and use of low-VOC content additives consistent with product quality and equipment operation. It should be noted that the P&G paper machines use "through air dry" (TAD) technology, which is different from a conventional paper machine that uses Yankee Dryer technology. The difference between TAD technology and conventional technology primarily involves the drying section of the paper machine, where TAD allows the evaporation of large quantities of water prior to the Yankee drying section, imparting optimum quality with high bulk and great softness. In the TAD drying section, the formed sheet travels on a felt fabric and a release aid (containing VOC) is needed to assist in removing the sheet off the fabric. The chemical additive package for the TAD technology is very different from the chemical additive package used for the Muskogee Mill paper machines.

Particulate Matter

Baghouses

The use of a Baghouse for this process is technically feasible if the combined air flow from all "dry end" point sources of the paper machine and the building roof vents were collected as one large source and then directed to a baghouse. As stated earlier in this report, the majority of the PM/PM_{10} emissions from the paper machine are generated in the "dry end" of the unit, as well as from roof vents that collect fugitive dust. Based on tests conducted on the No. 19 Paper Machine at the FJOC Savannah River Mill, about 50% of the PM/PM_{10} is generated from "dry end" point sources of the paper machine and the other 50% of the PM/PM_{10} is generated as fugitive dust from the paper machine operation and is emitted to the atmosphere through room vents in the roof of the building. The cost effectiveness of using a baghouse to control PM/PM_{10} emissions from all of the "dry end" point sources and roof vents is presented later in this analysis.

A baghouse could not be used to control emissions from only the "wet end" of a paper machine since the high moisture content of the exhaust gases generated from this section of a paper machine makes the baghouse collection ineffective.

Wet Scrubbers
A wet scrubber could also be used to control PM/PM_{10} emissions from the same "dry end" exhaust points of the paper machine and from the roof vents. The cost effectiveness of doing this is presented later in this analysis. As stated earlier in this analysis, the "wet end" of the paper machine does not generate significant quantities of PM/PM_{10} emissions and it would not be cost effective to try to control small quantities of emissions from a source with very high air flow.

As noted in the PM/PM_{10} entries listed for the RBLC review, there are four paper machine sources with BACT determinations from "similar sources." Each of these BACT results is discussed more fully below:

Crossett, Arkansas No. 8 Paper Machine
BACT for G-P's No. 8 Paper Machine at the Crossett Mill was determined to be a wet scrubber on the "dry end" of the paper machine. Paper Machine No. 8 is a dry crepe paper machine that primarily makes tissue products. As discussed above, dry crepe paper machines create more dust than wet crepe paper machines because one of the primary points of dust generation, the doctor knife blade that removes the tissue sheet from the Yankee Dryer, is contacting a sheet that has a much lower moisture content (approximately 5% moisture content) than would be encountered for a wet crepe paper machine (up to 20% moisture content). The wet scrubber at the Crossett Mill was voluntarily installed by the Mill to reduce dust exposure for the paper machine operators rather than for environmental permitting purposes. The wet scrubber was also installed as a safety measure to minimize the build-up of dust that could lead to a fire in the paper machine building. Additionally, the wet scrubber does not control all of the dust generated by the paper machine, because there are only a few points of dust generation that are "picked-up" from the paper machine and directed to the wet scrubber. There are additional losses of dust to the atmosphere through the paper machine exhaust stacks, as well as through the paper machine building roof vents.

P & G Paper Machines in Missouri
BACT for the four P & G paper machines was determined to be a cyclone on the former section of the paper machines and a venturi scrubber on the "dry end" section of the paper machines. The use of a cyclone on the former section of a paper machine is done primarily to reduce wet mist generated by that section of the paper machine and not to reduce PM/PM_{10} emissions. The wet mist can be a nuisance for the operation of a paper machine by causing corrosion on the structure of the paper machine and the paper machine building over time. Some paper machines have installed mist elimination systems that consist of a fan and a separation device, such as a mist eliminator or cyclone separator. A mist elimination system directs the wet mist outside of the paper machine building while the water collected by the separation device is either recycled or sent to the mill's wastewater treatment system.

Green Bay, Wisconsin No. 10 Paper Machine
BACT for Paper Machine No. 10 was determined to be good operating practices. No. 10 is a wet crepe paper machine that does not generate significant quantities of dust when manufacturing tissue/towel products. It does not require a scrubber or other type of control device to minimize employee exposure to dust in the workplace. Operators for Paper Machine No. 10 utilize good

operating practices to minimize the generation of dust by routine cleaning of the paper machine and paper machine area with the use of air and water hoses to blow or wash the machine and floor areas.

Green Bay, Wisconsin No. 9 Paper Machine
BACT for Paper Machine No. 9 was determined to be the use of a wet scrubber and good operating practices. No. 9 is a dry crepe paper machine that generates significant quantities of dust when manufacturing tissue/towel products, therefore, it requires a wet scrubber to minimize employee exposure to dust in the workplace. Operators for No. 9 also utilize good operating practices to minimize the generation of dust by routine cleaning of the paper machine and paper machine area with the use of air and water hoses to blow or wash the machine and floor areas.

Step 3 -Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy
VOC
The only technically feasible technology for paper machine process emissions is "Use of Low-VOC containing chemicals." Thus, it is ranked as the top control.

Particulate Matter
The only technically feasible technology for paper machine process emissions are a baghouse and wet scrubber for "dry crepe" machines and wet scrubber for "wet crepe" and dry/wet crepe machines. Baghouses are ranked as the top control above wet scrubbers.

Step 4 – Control Effectiveness Evaluation
This step of the BACT process is necessary when the top control is not selected as BACT. Step 4 determines the economic impact of the feasible control options listed in Step 3 and then selects the most appropriate technology as BACT for the paper machine manufacturing process. The economic analysis is based on cost data supplied by the equipment suppliers and the use of EPA's Office of Air Quality Planning & Standards (OAQPS) Control Cost Manual, 5th Edition, February 1996 (Chapter 2 - Cost Estimating Methodology). Typical values were selected from the OAQPS Manual for the various parameters used to determine the cost effectiveness for reducing pollutant emissions. Various engineering calculations utilized to complete the data requirements for the spreadsheets were provided in the application.

VOC
Use of Water-Borne or Low VOC-Containing Chemical Additives
The Mill has a New Substance Review program in place to review all chemicals for environmental effects. Before any new substance can be purchased at the Mill, the Mill's Environmental Department must make an assessment of the VOC content and decide if there should be an alternative substance used that has a lower VOC content. This program helps to assure that the Mill can use the lowest VOC-containing materials available in the marketplace, yet maintain product quality. Over the past few years, this program has enabled the Mill to reduce the VOC content of a number of chemical additives. For example, the conversion of some of the wet strength resin used in the paper machines has resulted in reducing the VOC content from 3.4% to 1.5%. Wet strength resins account for a large portion of the VOC

generated in the paper machines due to the large quantities of resin used (not due to its VOC concentration). A third example is the conversion of the use of VOC-containing inks used in the Mill's printing operations to water-based printing inks, or printing inks with low VOC content.

A cost analysis for this section of the BACT analysis is not being performed since lowering the overall VOC content of the chemicals used as additives and cleaners is considered a pollution prevention technique and is considered the most effective choice.

Particulate Matter

Baghouse

Paper Machines 11, 12, and 13 are wet/dry crepe and a baghouse is not technically feasible for these 3 machines. To utilize a baghouse to control particulate matter emissions for paper machines 14 and 15, the exhaust airflow from the various process sections of the paper machine and the roof vents must be tied together to reduce the moisture content and the temperature to an acceptable level. The analysis used the EPA's cost control spreadsheet for baghouses. The total airflow rate for the building exhausts for paper machines 14 and 15 are 385,200 and 445,400 acfm, respectively. The most conservative estimate is obtained by using the lowest flowrate. Thus, the cost effectiveness analysis evaluated the flowrate for Paper Machine No. 14, but the conclusion is applicable to both Paper Machine 14 and 15. The equipment cost does not include a site-specific amount for auxiliaries. As this table indicates, the lowest estimated rate is over $6,000/ton and is not cost effective.

Total Annual Cost Spreadsheet Program—Baghouse [1]		
COST BASE DATE: Second Quarter 1998 [2]		
VAPCCI (Fourth Quarter 1998--FINAL): [3]		122.0
Escalation from 4th quarter 1998 to 4th quarter 2002 (Estimated at 1.1)		
INPUT PARAMETERS:		
-- Inlet stream flowrate (acfm):		385,200
-- Inlet stream temperature (°F):		120
-- Inlet stream temperature, adj.--pulse jet only (°F):		120
-- Dust type:		Paper fiber
-- Inlet dust loading (gr/ft^3): (based on 5.9 tpy)		0.0078
-- Dust mass median diameter (microns):		7
-- Filtration time (min):		10
-- Dust specific resistance (in.H_2O/fpm/lb/ft^2):		15
-- G/C ratio factors (shaker & reverse-air):	A:	2.0
	B:	0.9
	C:	1.0
-- G/C ratio factors (pulse-jet):		
---dust type	Material:	12.0
---nuisance relief	Application:	1.0
---G/C ratio factors(cartr. filters):	A:	2.1
---application	B:	1.0
---temperature	C:	0.90
---Dust fineness factor	D:	0.9
---Grain Loading	E:	0.008
-- Cleaning pressure, psig (pulse-jet only):		100
-- Fraction of bags cleaned (shaker & rev-air):		0.1
-- Insulation required? ('yes'=1;'no'=0):		1
-- Stainless steel required? ('yes'=1;'no'=0):		0
-- Bag material:		Polyester
-- Fabric effective residual drag (in. H_2O/fpm):		1.1

Total Annual Cost Spreadsheet Program—Baghouse [1]		
Cleaning Mech	Bag Diam. (in.)	Price ($/ft2)
Pulse jet--BBR	4.5 to 5.125	1.69
	6 to 8	1.55
Pulse jet--cart.	4.875	0.00
	6.125	0.00
Shaker--strap	5	0.00
Shaker--loop	5	0.00
Reverse air w/o rings	8	0.95
	11.5	0.75
-- Cost of auxiliary equipment ($): [7]		50,000
-- Gas-to-cloth ratio (acfm/ft^2 cloth area):	Shaker:	1.80
	Reverse-air:	1.80
	Pulse-jet:	13.81
	Cartridge:	1.33E-02
-- Net cloth area required (ft^2):	Shaker:	214,000
	Reverse-air:	214,000
	Pulse-jet:	27,898
	Cartridge:	28,918,102
-- Gross cloth area required (ft^2):	Shaker:	222,560
	Reverse-air:	222,560
	Pulse-jet:	27,898
	Cartridge:	28,918,102
-- Area per bag--reverse-air (ft^2) (8-in. x 24-ft):		50.3
-- Number of bags--reverse air:		4,428
-- Area per bag--shaker (ft^2) (5-in x 8-ft):		10.5
-- Number of bags--shaker		21,253
-- Area per bag--pulse jet (ft^2):	Small (4.5-in. x 8-ft)	9.42
	Large (5.125-in. x 10-ft)	13.42
-- Number of bags/cages (pulse-jet only):	Small bags	2,961
	Large bags	2,080
-- Area per bag--cartridge (ft^2):		153
-- Number of bags--cartridge:		189,008
-- Bag pressure drop (in. w.c.):	Shaker	1.98
	Reverse-air	1.98
	Pulse-jet	4.24
	Cartridge	0.01
-- Baghouse shell pressure drop (in. w.c.):		3.00
-- Ductwork pressure drop (in. w.c.):		4.00

CAPITAL COSTS				
Equipment Item:	Cost ($):			
System type	Shaker	Rev-air	P-J (mod)	P-J (com)
Baghouse	0	1,066,625	261,416	202,143
Bags--small	0	166,920	47,148	47,148
Bags--large			43,242	43,242
Insulation	0	210,844	63,254	76,079
Stainless	0	0	0	0
Cages-small [5]	0	0	17,718	17,718
Cages-large	0	0	22,954	22,954
Auxiliaries	0	50,000	50,000	50,000
Total--small[5a]	0	1,494,388	439,536	393,087
Total--large:			440,867	394,418
PEC($)-base:	0	1,763,378	518,653	463,843
PEC($)-esc.:	0	1,978,975	582,065	520,554
TCI ($):	0	4,294,375	1,263,081	1,129,602
($/acfm):	0	11.15	3.28	2.93
Operating factor (hr/yr):		8,760		
Operating labor rate ($/hr):		24.60		
Maintenance labor rate ($/hr):		27.06		
Operating labor factor (hr/shift):		2		

Total Annual Cost Spreadsheet Program—Baghouse [1]				
Maintenance labor factor (hr/shift):		1		
Electricity price ($/kWhr):		0.0340		
Compressed air ($/1000 scf):		0.11		
Dust disposal ($/ton):		13.35		
Annual interest rate (fraction):		0.07		
Control system life (years):		10		
Capital recovery factor:		0.1424		
Bag life (years):		2		
Capital recovery factor (bags):		0.5531		
Taxes, insurance, admin. factor:		0.01		
Item	Shaker	Reverse-air	P-J (modular)	P-J (common)
Oper. labor	0	53,874	53,874	53,874
Supv. labor	0	8,081	8,081	8,081
Maint. labor	0	29,631	29,631	29,631
Maint. matl.	0	29,631	29,631	29,631
Electricity	0	805,796	233,394	233,394
Compr. air	0	0	44,137	44,137
Bag repl.	0	126,217	50,564	50,564
Dust disposal.	0	1,512	1,512	1,512
Overhead	0	72,730	72,730	72,730
Tax,ins.,adm	0	42,944	12,631	11,296
Cap. recov.	0	578,931	166,818	147,813
Total Annual	0	1,749,346	703,002	682,663
($/ton):[6]	0	$ 15,447	$ 6,208	$ 6,028

[1] Parameters and other input data needed for this program can be found in Chapter 5 (December 1998 revision) of the 'OAQPS Control Cost Manual' (5th edition).
[2] Base equipment costs reflect this date.
[3] VAPCCI = Vatavuk Air Pollution Control Cost Index (for fabric filters) corresponding to year and quarter shown. Base equipment cost, purchased equipment cost, and total capital investment have been escalated to this date via the VAPCCI.
[4] These prices pertain to the bag material entered above. If this bag material is not available for a baghouse type, enter '0'. (See 'Manual,' Chapter 5, Table 5.8.)
[5] Cage prices calculated from "500-cage lots" cost equations
[5a] Total equipment cost for "small" and "large" bags and cages cases, respectively.
[6] Total annual cost ($/yr) divided by total particulate captured (tons/yr).
[7] As a conservatively low estimate, the analysis included $50,000 for the cost of the large amount of ductwork needed to tie all paper machine exhaust stacks into one common duct that would direct emissions to the baghouse. The Mill believes that this estimate is much less than a site-specific value would be.

Wet Scrubber

The next most effective control device for all Paper Machines is a wet scrubber and it is technically feasible. To determine the cost effectiveness of using a wet (venturi) scrubber to control PM/PM_{10} emissions, the analysis used EPA's Cost Control spreadsheet for a venturi scrubber. The following table presents the cost control calculations and assumptions. It is assumed that only the wet-end and dry-end Yankee Dryer exhaust stacks are controlled by the wet scrubber. The flowrate for the Yankee exhausts alone are much lower than the other roof vents. The Yankee exhaust flow rates and PM emissions (uncontrolled) for paper machines 14 and 15 are approximately 270,000 acfm and 7.3 tons per year for each.

Cost Effectiveness Calculations for Paper Machine Yankee Exhausts [1]		
COST BASE DATE: June 1988 [2]		
VAPCCI (Fourth Quarter 2003--FINAL): [3]		120.6
INPUT PARAMETERS		
-- Inlet stream flowrate (acfm):		270,000
-- Inlet stream temperature (ºF):		260
-- Inlet moisture content (molar, fraction):		0.075
-- Inlet absolute humidity (lb/lb b.d.a.): [4]		0.10
-- Inlet water flowrate (lb/min):		1,378.0
-- Saturation formula parameters: [5]	Slope, B	3.335
	Intercept,,A	9.41E-09
-- Saturation absolute humidity (lb/lb b.d.a.):		0.10
-- Saturation enthalpy temperature term (ºF):[6]		260.0
-- Saturation temperature (ºF):		127.9
-- Inlet dust loading (gr/dscf) (based on 7.3 tpy)		0.00071
-- Overall control efficiency (fractional):		0.99
-- Overall penetration (fractional):		0.01
-- Mass median particle diameter (microns): [7]		7.0
-- 84th % aerodynamic diameter (microns): [7]		3.4
-- Particle cut diameter (microns): [7]		0.44
-- Scrubber liquid solids content (lb/lb H_2O):		0.25
-- Liquid/gas (L/G) ratio (gpm/1000 acfm):		5.0
-- Recirculation pump head (ft of water):		100
-- Material of construction (see list below):[8]		1
DESIGN PARAMETERS		
-- Scrubber pressure drop (in. w.c.): [9]		24.73
-- Inlet dry air flow rate (dscfm): [10]		183,843.8
-- Inlet (= outlet) air mass rate (lb/min):		13,780.0
-- Water recirculation rate (gpm):		1,350.0
-- Outlet water mass rate (lb/min):		1,378.0
-- Outlet total stream flow rate (acfm):		236,791.0
-- Scrubber liquid bleed rate (gpm):		0.01
-- Scrubber evaporation rate (gpm):		0.00
-- Scrubber liquid makeup rate (gpm):		0.01
CAPITAL COSTS		
Equipment Costs ($):		
-- Scrubber (base)		177,544
-- Scrubber (escalated)		244,179
-- Total		244,179
Purchased Equipment Cost ($):		288,131
Total Capital Investment ($):		550,331
ANNUAL COST INPUTS		
Operating factor (hr/yr):		8,760
Operating labor rate ($/hr):		24.60
Maintenance labor rate ($/hr):		27.06
Operating labor factor (hr/shift):		2
Maintenance labor factor (hr/shift):		1.5
Electricity price ($/kWhr):		0.034
Chemicals price (specify) ($/ton):		0
Process water price ($/1000 gal):		0.810
Wastewater treatment ($/1000 gal):		0.86

Cost Effectiveness Calculations for Paper Machine Yankee Exhausts [1]	
Overhead rate (fractional):	0.60
Annual interest rate (fractional):	0.07
Control system life (years):	10
Capital recovery factor (system):	0.1424
Taxes, insurance, admin. factor:	0.01
ANNUAL COSTS	
Item	Cost ($/yr)
Operating labor	53,874
Supervisory labor	8,081
Maintenance labor	44,446
Maintenance materials	44,446
Electricity--fan	315,242
Electricity--recirculation pump	11,620
Chemicals	0
Process water	4
Wastewater treatment	4
Overhead	90,508
Taxes, insurance, administrative	5,503
Capital recovery	78,355
Total Annual Cost ($/yr)	652,084
Cost Effectiveness ($/ton)	89,327

[1] Data used to develop this program were taken from 'Estimating Costs of Air Pollution Control' (CRC Press/Lewis Publishers, 1990).
[2] Base equipment costs reflect this date.
[3] VAPCCI = Vatavuk Air Pollution Control Cost Index (for wet scrubbers) corresponding to year and quarter shown. Base equipment cost, purchased equipment cost, and total capital investment have been escalated to this date via the VAPCCI and control equipment vendor data.[4] Program calculates from the inlet moisture content.
[4] Program calculates from the inlet moisture content.
[5] By assumption, the saturation humidity (hs)-temperature (ts) curve is a power function, of the form: hs = A*(ts)^B.
[6] To obtain the saturation temperature, iterate on the saturation humidity. Continue iterating until the saturation temperature and the saturation enthalpy term are approximately equal.
[7] Both the 'mass median' and '84th percentile aerodynamic' diameters are obtained from a log-normal distribution of the inlet stream particle diameters. The particle cut diameter is a graphical function of the penetration, the mass median diameter, and the standard deviation of the particle size distribution. (For detailed guidance in determining these particle sizes, see "Wet Scrubbers: A Practical Handbook" by K.C. Schifftner and H.E. Hesketh(CRC Press/Lewis Publishers, 1986). A condensed procedure is given in "Estimating Costs of Air Pollution Control" by W.M. Vatavuk (CRC Press/Lewis Publishers, 1990).)
[8] Enter one of the following numbers: carbon steel--'1'; rubber-lined carbon steel--'1.6'; epoxy-coated carbon steel--'1.6'; fiber-reinforced plastic (FRP)--'1.6'.
[9] The scrubber pressure drop is extremely sensitive to the particle cut diameter. Hence, the user must determine the cut diameter with great care.
[10] Measured at 70 degrees F and 1 atmosphere.

The estimated rate for a wet scrubber on the Yankee exhausts is over $89,000/ton, and is not cost effective. The cost analysis is conservatively low because it did not include any auxiliaries for tying the two Yankee exhausts (e.g., separate wet and dry end stack for a single paper machine) into a common duct.

The analysis methodology was also to calculate the scrubber cost effectiveness for the following additional cases.

1. PM11 or PM12 Yankee dryer exhausts
2. PM13 Yankee dryer exhaust
3. PM11, PM12, PM13, PM14, and PM15 roof vents

The following table summarizes the calculations using the same formulas and cost factors presented in the immediately preceding table.

Wet Scrubber Cost Effectiveness Calculations, Muskogee Mill Paper Machine Process Emissions						
	Yankee		Roof Vents			
INPUT PARAMETERS	PM 11/12	PM13	PM11/12	PM13	PM14	PM15
-- Inlet stream flowrate (acfm):	145,000	54,000	965,000	453,000	395,000	445,400
-- Inlet stream temperature (ºF):	265	260	70	70	70	70
-- Inlet water flowrate (lb/min):	734.9	275.6	6,690.7	3,140.8	2,738.7	3,088.1
-- Saturation enthalpy	265.0	260.0	70.0	70.0	70.0	70.0
-- Inlet dust loading (gr/dscf)	0.00065	0.00075	0.00033	0.00035	0.00041	0.00034
DESIGN PARAMETERS						
-- Scrubber pressure drop (in.	24.73	24.73	24.73	24.73	24.73	24.73
-- Inlet dry air flow rate (dscfm):	98,050.0	36,768.	892,625.0	419,025	365,375	411,995
-- Inlet (= outlet) air mass rate	7,349.3	2,756.0	66,906.5	31,407.	27,386.	30,881
-- Water recirculation rate (gpm):	725.0	270.0	4,825.0	2,265.0	1,975.0	2,227
-- Outlet water mass rate	734.9	275.6	6,690.7	3,140.8	2,738.7	3,088
-- Outlet total stream flow rate	126,288.5	47,358.	1,149,702	539,704	470,603	530,650
CAPITAL COSTS						
Equipment Costs ($):						
--Scrubber (base)	121,358	66,304	430,914	271,264	249,446	268,469
--Scrubber (escalated)	166,906	91,188	592,642	373,073	343,067	369,230
--Other -install ductwork	0	0	0	0	0	0
--Total	166,906	91,188	592,642	373,073	343,067	369,230
Purchased Equipment Cost ($):	196,949	107,602	699,317	440,226	404,819	435,691
Total Capital Investment ($):	376,172	205,520	1,335,696	840,832	773,204	832,170
ANNUAL COSTS						
Item	Cost ($/yr)					
Operating labor	53,874	53,874	53,874	53,874	53,874	53,874
Supervisory labor	8,081	8,081	8,081	8,081	8,081	8,081
Maintenance labor	44,446	44,446	44,446	44,446	44,446	44,446
Maintenance materials	44,446	44,446	44,446	44,446	44,446	44,446
Electricity—fan	168,129	63,048	1,530,611	718,515	626,519	706,460
Electricity--recirculation pump	6,240	2,324	41,532	19,496	17,000	19,169
Chemicals	0	0	0	0	0	0
Process water	2	1	8	4	4	4
Wastewater treatment	2	1	9	4	5	4
Overhead	90,508	90,508	90,508	90,508	90,508	90,508
Taxes, insurance, administrative	3,762	2,055	13,357	8,408	7,732	8,322
Capital recovery	53,558	29,261	190,173	119,715	110,087	118,482
Total Annual Cost ($/yr)	473,049	338,046	2,017,045	1,107,4	1,002,7	1,093,797
Cost Effectiveness ($/ton)	64,801	46,308	276,308	151,712	137,357	149,835

The calculations above indicate that it is not cost effective to consider any attempt to control PM emissions from the wet and dry ends with a wet scrubber.

Step 5 – Select BACT
VOC
The only listings for paper machines that can be considered similar to the Muskogee Mill Paper Machines are the No. 8 Paper Machine at G-P's Crossett, Arkansas Mill, P & G's four paper machines at its mill in Cape Girardeau, Missouri, and the Nos. 9 and 10 Paper Machines at G-P's Green Bay Mill. BACT for the No. 8 Paper Machine at G-P's Crossett, Arkansas Mill was determined to be no control while BACT for P & G's Mill in Cape Girardeau, Missouri was determined to be a VOC limit of 2% of the chemical additives used and the use of low-VOC content additives consistent with product quality and equipment operation. BACT for the paper machines at G-P's Green Bay Mill was 2.9 lbs/ADT for Paper Machine No. 10 and 2.7 lbs/ADT for Paper machine No. 9.

The Mill does not believe a specific VOC limit on the chemical additives used on the paper machines is appropriate for BACT. The primary reason that the Mill presents this position is based on the fact that a specific VOC limit takes away the Mill's flexibility for developing new VOC-containing additives that although might have a higher VOC content, but have a lower usage rate, which could result in lower overall VOC emissions from the paper machine.

In lieu of agreeing to a specific "lb/ton of product" VOC limit on the chemical additives that are used for the Muskogee paper machine as BACT, the Mill proposes the continued use of its New Substance Review Program. The Mill will utilize a lower VOC-containing chemical whenever one is available as a substitute for the chemicals being used, as long as the substitute chemical will not change or degrade product quality. In those instances where necessary, the Mill will run trial tests with the substitute chemical to ensure that product quality is not changed or degraded before incorporating the use of the substitute chemical. This program will continue to be monitored and enforced by the Mill's Environmental Department.

As stated earlier in this analysis, this program has shown to be cost effective in reducing VOC emissions at the Mill without the use of expensive pollution control equipment.

Particulate Matter
The available control technologies for control are not cost effective. The Mill proposes no additional controls.

<u>BACT FOR CONVERTING AREA</u>

SOURCE DESCRIPTION
The Converting Department takes parent rolls from each paper machine, cuts or slices the roll into smaller widths, then prints, perforates, and attaches each product stream to a core, finally cutting the paper to the proper length for the product being manufactured. Each product is packaged and sent to warehouses for later shipment to both commercial and retail customers, or for direct shipment to other G-P customers. The project will not modify any converting area

paper printer, and thus paper printing is not subject to BACT. The Converting Department also makes paper cores for use in the final packages by gluing a paper substrate together. Each of the rewinding/slitting machines has a trim collection system that picks up waste from the cutting operation and directs the waste to a cyclone for product recovery. The recovered waste paper is sent back to the Pulp Processing Department where it is made into recycled pulp. The dust from the cyclone is discharged to a baghouse to control emissions before clean air is discharged to the atmosphere.

Glues, pastes, and solvent cleaners are used throughout the Converting Department as necessary. These materials emit small quantities of VOC through evaporation as they are used. No VOC controls are used in any of the Converting Department operations since the amount of VOC emitted at any individual workstation is not significant and does not warrant controls. The use of VOC in the converting area is also not being modified. Thus the BACT analysis below addresses only PM.

STEP 1 - Review of Vendor Data and Other Operations Within the Company
To identify the current technologies in use today for reducing PM/PM_{10} and VOC emissions from Converting Department operations, information was collected from vendor literature from the Internet or directly from vendors. Additionally, the analysis reviewed the technologies in use at G-P's other Converting Department operations. The only recent BACT analyses for Converting Department operations that have been prepared due to a PSD permit application include one for the No. 9 Paper Machine and associated converting equipment for G-P's Paper Mill in Crossett, Arkansas in April 2001 and another for the No. 6 Paper Machine and associated converting equipment at G-P's Port Hudson, Louisiana Paper Mill in August 2001. The Crossett Mill No. 9 Paper Machine was never constructed. The Port Hudson No. 6 Paper Machine and associated converting equipment were constructed and began operation in 2002. The converting equipment for the No. 6 Paper Machine project included the use of wet scrubbers for dust control from the trim line operations.

The technologies identified below include those that either are being used or could be used for the particulate matter emissions generated by the type of trim collection system in the Muskogee Mill's Converting Department. This is the only operation within the Converting Department that generates a sufficient quantity of dust to warrant the use of pollution controls.

<u>Cyclone Separators</u>
Cyclone separators are devices that utilize centrifugal forces and low pressure caused by spinning motion to separate materials of different density, size and shape. Gas cyclones are used to separate particulate matter (including lead) from dust-laden air streams. Cyclones are popular because they are simple to operate, inexpensive to manufacture, require little maintenance, have no moving parts, and operate at high temperatures and pressures. There are two types of separators available, tangential and axial. Both types operate on the same principle; however, in axial flow cyclones the gas stream enters from the top of the unit and is forced to move tangentially by a grate in the top of the cyclone. In tangential cyclones the gas stream enters from an inlet on the side that is positioned tangentially to the body of the unit. Multi-stage cyclones can increase the amount of particulate matter that is removed by connecting a number of single

stage cyclones in series. The first stage of a multi-stage cyclone removes the larger particles while the remaining stages remove smaller particles. The collection efficiency of cyclones vary anywhere from 25-95%, depending upon whether the system is comprised of a single-stage cyclone or a multi-stage cyclone system.

<u>Baghouses(see previous description of technology)</u>

<u>Wet Scrubbers(see previous description of technology)</u>

<u>Electrostatic Precipitators (ESP)</u>
ESPs use electrical energy to charge and collect particles with a very high removal efficiency. The classification of ESPs may be as wet or dry systems and/or single-stage or two-stage systems. Dry systems are the predominant type used in industrial applications. Wet systems are gaining in use today since they eliminate the possibility of fires, which can sometimes occur in dry systems.

<u>Dry Electrostatic Precipitator (DESP)</u>
The principal components of a DESP include the housing, discharge and collection electrodes, power source, cleaning mechanism, and solids handling systems. The housing is gas-tight, weatherproof, and grounded for safety. Dust particles entering the housing are charged by ions from the discharge electrodes. Dust is collected on the collection electrodes, also referred to as plates. The system voltage and the distance between the discharge and collection electrodes govern the electric field strength and the amount of charge on the particles. DESPs are most effective at collecting coarse, larger particles above the 1.0 micron (μm) size. Particles smaller than this are difficult to remove because they can inhibit the generation of the charging corona in the inlet field and thereby reduce collection efficiency. Rappers serve as the cleaning mechanisms for DESPs. Dust hoppers collect the precipitated particles from a DESP. Dust is removed continuously or periodically from the hopper and stored in a container until final disposition. Collection efficiencies for DESPs are usually at or above 98-99%.

<u>Wet Electrostatic Precipitator (WESP)</u>
An ESP is a collection device that uses electromotive forces to drive particles out of a gas stream onto collector plates. Electrodes in the center of the gas stream are maintained at a high voltage, which charge the particles. Wet ESPs operate a wet wall on the back of an ESP with either continuous or intermittent water flow. The water flow is collected into a sump. The advantage to a wet ESP is that it has no back coronas and reduced risk of fire. The collection efficiency for a wet ESP is similar to that of a dry ESP.

Review of EPA RACT/BACT/LAER Clearinghouse (RBLC)
Searches of the RBLC were conducted to identify control technologies for the control of PM/PM_{10} and VOC emissions from converting department equipment operations. Searches were conducted only for RBLC determinations added during or after January 1995. The specific EPA RBLC categories searched are listed below:

Process name contains "converting" or "printing"
30.002 Kraft Pulp Mills
30.004 Pulp & Paper Production Other than Kraft

The only entry in the RBLC is G-P Port Hudson, LA Mill (permit PSD-LA-581 (M-2)). The specified control is a wet scrubber for each converting area. While the determination in the RBLC does not specify a control efficiency, the permitted emission rate of 1.75 lbs PM/hr for each stack is listed.

Step 2 - Technical Feasibility Analysis
The technically feasible controls are wet scrubbers and a baghouse.

Step 3 – Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy
The next step in the BACT analysis is to rank the various control options not eliminated in the previous step. The two control technologies are ranked as follows:

1. The top level of control is a baghouse rated at up to 99% removal
2. The next level of control is a wet scrubber rated at up to 98% removal

Step 4 – Control Effectiveness Evaluation
The Mill currently operates a baghouse for this source that will not need modification to control potential dust emissions from the converting area following the completion of the construction project. The Mill selects the top level of control. Thus, no additional effectiveness evaluation is needed.

Step 5 – Select BACT
The Mill proposes the top level of control, the existing baghouse, as BACT

BACT FOR POLYETHYLENE FILM FLEXOGRAPHIC PRINTERS

SOURCE DESCRIPTION
The Mill is proposing to add three flexographic printers to its polyethylene plant. The three printers will operate in the same work area as the existing printer. The plant produces rolls of polyethylene film and prepares them for printing logos. The proposed presses will unwind the unprinted rolls produced at the Muskogee Mill or offsite and transfer color images using the flexographic process and solvent-based inks.

The existing printing operations use a catalytic oxidation unit to control the existing press. BACT is not applicable to the existing press as it will not be modified. However, the Mill is voluntarily designing the control system for BACT on the new presses to accommodate and control emissions for the existing press at a common level of control. The existing control system will no longer be used. As the printing presses do not emit particulates, BACT for this source addresses only VOC.

STEP 1 - Review of Vendor Data and Other Operations Within the Company
VOC emissions from polyethylene printing presses could be routed to a catalytic or thermal oxidizer for destruction, or to a carbon adsorption system. Thermal oxidation offers up to 99% control, catalytic oxidation offers up to 95% control, and carbon adsorption offers up to 90% control. G-P currently operates three printing presses at its facility in Warwick, NY, using a thermal oxidizer to destroy VOC.

Review of EPA RACT/BACT/LAER Clearinghouse (RBLC)
Searches of the RBLC were conducted to identify control technologies for VOC emissions from printing press equipment operations. Searches were conducted only for RBLC determinations added during or after January 1995. The specific EPA RBLC categories searched are any whose process name contains the term "printing." A large table in the application lists 16 companies using carbon adsorption, thermal oxidizers, catalytic oxidizers, low-VOC or UV-cured inks, and various combinations of the first four. A brief explanation of these control technologies is listed below.

Carbon Adsorption
Carbon adsorption recovers VOC-containing gas streams by passing the gas stream through a static "bed" of activated carbon. The VOC is retained in the pores of the carbon molecules while "clean" air is discharged to the atmosphere. The bed of carbon must be regenerated after it becomes saturated with VOC. Regeneration may involve the use of heat to release the adsorbed VOC so the "bed" can be reused. The VOC may be collected by condensation or treated by another piece of control equipment, such as an incinerator. There are usually a series of "beds" in use so that one or more beds are in use while the other beds are being regenerated. VOC removal efficiencies above 90% are achievable, depending upon the ability of the carbon to adsorb the VOC.

Thermal Oxidizers
Thermal oxidizers (including regenerative and recuperative) react volatile organic compounds with oxygen in the air to form carbon dioxide and water vapor as follows:

$$\text{VOC} + \text{Oxygen} + \text{heat} \rightarrow H_2O + CO_2$$

This reaction occurs when the air is heated to a sufficiently high temperature, typically 1,400-1,600°F. The fuel needed to heat the gas stream to the oxidation temperature is greatly reduced by the use of a "recuperator," or preheater. The preheater will recover as much as 95% of the heat, thus providing significant fuel savings as compared to a system that does not incorporate a preheater. These types of oxidizers can remove over 95% of VOC from a gas stream.

Regenerative thermal oxidizers (RTOs) build on the principle of thermal oxidation, but with enhanced fuel efficiency. An RTO consists of two or more heat exchangers connected by a common combustion zone. The heat exchangers use beds of ceramic beads to store and release heat recovered from the oxidation process. The VOC-laden air stream enters the first heat exchange bed where the air stream passes directly through the ceramic medium and is then preheated before entering the combustion chamber. In the combustion chamber, a burner is used to supply any heat necessary to reach the optimum combustion temperature (e.g., usually 1,400°F or higher) and complete the oxidation process.

The cleaned air stream next enters a second heat exchanger where it passes directly through the ceramic medium and is cooled while simultaneously heating the medium before the air stream is exhausted to the atmosphere. The airflow through the heat exchange beds is reversed at regular intervals to conserve the heat of combustion within the RTO. VOC destruction efficiencies can be 95% or higher with thermal efficiencies as high as 95%.

Catalytic Oxidation
In contrast to recuperative thermal oxidizers, recuperative catalytic oxidizer (RCO) systems use a catalyst to encourage the oxidation reaction instead of depending on heat alone. Reactions in a recuperative catalytic oxidizer usually take place between 500 and 600°F. This creates the opportunity to reduce fuel expenses and materials cost, since the materials of construction will be subjected to much lower temperatures. The addition of a preheater can further reduce the fuel costs. These types of oxidizers are capable of removing VOC from a gas stream with destruction efficiencies equal to 95% or higher.

UV cured or low-VOC containing inks
The technology of using UV cured or low-VOC containing inks is strictly limited by specific product requirements.

Step 2 - Technical Feasibility Analysis
Of the technologies identified, thermal oxidation, catalytic oxidation, and carbon adsorption are technically feasible and are demonstrated, while the use of UV-cured or low-VOC containing inks may not be technically feasible due to the specific product requirements.

Step 3 – Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy
The following table ranks the remaining technologies by VOC destruction efficiency. The control efficiencies in this table are actually only destruction efficiencies, as they do not account for VOC emission capture efficiency. The existing press control system captures approximately 70% of VOC emissions and destroys at least 85%, for an overall destruction of approximately 60% of total emissions.

Technology	Control Efficiency
Thermal Oxidizer	95% +
Catalytic Oxidizer	95%
Carbon Adsorption	90%

Step 4 – Control Effectiveness Evaluation
To yield the highest level of overall VOC control, the Mill proposes to design a permanent total enclosure to meet total capture efficiency for all four presses. The Mill has selected the top level of control, a regenerative thermal oxidizer to destroy the collected VOC. No additional control effectiveness evaluation is necessary.

Step 5 – Select BACT
The Mill proposes a permanent total enclosure for all four presses collected into an RTO with a minimum destruction efficiency of 95%. The enclosure will meet the definition of "total enclosure" specified in EPA Method 204.

BACT FOR POLYETHYLENE FILM EXTRUDERS

SOURCE DESCRIPTION

Step 1 - Review of Vendor Data and Other Operations Within the Company
The Company operates polyethylene film extrusion at two other facilities. Neither of these facilities applies any control technologies to the film extrusion process.

Review of EPA RACT/BACT/LAER Clearinghouse (RBLC)
The RBLC was searched for "polyethylene" and "extrusion" / "extruder" individually. The clearinghouse does not contain any entries for a process similar to the Muskogee Mill extruders. For other types of extrusion of plastics, the RBLC listed no add-on controls.

Step 2 - Technical Feasibility Analysis
Step 3 – Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy
Step 4 – Control Effectiveness Evaluation
Step 5 – Select BACT
Because Step 1 of this BACT analysis did not identify any technically feasible control technologies, Steps 2, 3, and 4 are satisfied vacuously, and the Mill proposes "No add-on controls" for its proposed polyethylene film extruders. The proposed extruders will emit less than 300 lbs of VOC per year.

BACT FOR PLATEMAKING

SOURCE DESCRIPTION
An additional part of the polyethylene plant that is being modified as part of the project is the plate making operation. The activity of plate making is related to the number of different logos or images that must be cast. To accommodate additional presses, the Mill will add one plate washer and one electric dryer. The operation prepares plates to transfer a logo or other image to the polyethylene film on the printers in addition to plates made for all paper printing. Once a plate is prepared, it is washed in an enclosed-top washer prior to use on a printer. The emissions are the evaporation of solvents used in plate making and are limited to VOCs.

STEP 1 - Review of Vendor Data and Other Operations Within the Company
The Company makes plates at most locations that print our products. None of the existing platemaking operations use add-on control technologies. A solvent recovery unit is a standard work practice and integral part of the washer design. VOC emissions are avoided by chilling the solvent vapors when the washer is operating with the door closed.

Review of EPA RACT/BACT/LAER Clearinghouse (RBLC)
A search of the RBLC only returned one entry for plate making or pre-press operations. Golden Books Publishing Co. (RBLC ID WI-0188) is a paper printing and book assembly facility. The entire facility is subject to Lowest Achievable Emission Rate rules (LAER) and not BACT. The control technology identified for this source (permit 97-RV-019) is a set of work practices for the cold cleaning operation. These practices include equipping the cleaner with a cover, closing the cover whenever parts are not being handled in the cleaner, draining the cleaned parts for at least 15 seconds or until dripping ceases; and providing a permanent, conspicuous label summarizing the operating procedures and provide supervision or instruction adequate to ensure that the procedures are followed. The permit is available at http://dnr.wi.gov/org/aw/air/permits/APM_toc.htm. The Golden Books equipment is a cold-cleaning batch technology with a top-sitting lid over a washing chamber.

In contrast, the plate washer proposed for the Mill Improvement Project, and manufactured by Euroflex, is a new generation of washing technology that has all but eliminated exposure of the solvent to the work area air. The proposed washer has no hinged top or direct contact of operator with the solvent. The plates are fed on a small conveyor belt and enter the cleaning chamber through a narrow slot under a slight negative pressure. The plates emerge on the belt dry to the touch. The design of the in-line cleaner is inherently lower emitting than a batch cold cleaner.

Step 2 - Technical Feasibility Analysis
Both the work practice standard and the in-line conveyor cleaning technology are technically feasible for the proposed Muskogee Mill plate washer.

Step 3 – Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy
The top ranked choice for control efficiency is the in-line conveyor cleaner.

Step 4 – Control Effectiveness Evaluation
The Mill proposes to operate the top choice, so no additional control effectiveness evaluation is required.

Step 5 – Select BACT
The Muskogee Mill proposes to install a new generation in-line plate washer with inherently lower emission design by minimizing the contact of solvent with the work area air.

BACT FOR SYSTEM 5 PULPING

SOURCE DESCRIPTION
The pulp processing and bleaching lines generate fugitive VOC emissions as a result of the use of chemical additives and to a lesser extent; the wastepaper stock generates a smaller quantity of VOCs that are liberated during the pulp processing steps.

Step 1 - Review of Vendor Data and Other Operations Within the Company
Bleaching in a recycle paper mill (sometime referred to as “deinking” mills) can be accomplished by using chemical agents, such as sodium hydrosulfite, hydrogen peroxide, or peracetic acid that do not contain chlorine or chlorine dioxide. The use of elemental chlorine as a bleaching agent, which was used in the past for Kraft pulp and paper mills is no longer allowed under the US EPA’s “Cluster Rules,” promulgated in April 1999. Chlorine dioxide, a substitute bleaching agent for elemental chlorine, has become the main bleaching agent used in the Kraft pulp and paper industry since the Cluster Rules became effective. However, neither elemental chlorine nor chlorine dioxide is used in the recycle paper industry.

Most recycle paper mills in the US today use sodium hypochlorite or other non-chlorine bleaching agents, such as those listed above. Facilities that use non-chlorine-containing bleaching agents are exempt from the stringent standards of the “Cluster Rules.” Use of these non-chlorine bleaching agents will generate VOC and hazardous air pollutants (HAPs). Based on a study performed by NCASI that was published in July 1997 for deinking processes, the most significant HAP at mills that utilize hypochlorite as a bleaching agent was chloroform. At mills that did not use hypochlorite, the chloroform emissions were much smaller. Other HAPs present in significant concentrations were methanol, biphenyl, toluene, and acetaldehyde. All of these HAPs are also considered VOCs.

Higher emissions of methanol, acetaldehyde, and biphenyl were observed during the study at mills that used peroxide, while lower emissions of chloroform were observed. Peracetic acid systems are believed to have similar VOC emissions of peroxide systems. System 5 and System 1 were specifically tested at the Muskogee Mill. System 5 was tested using peroxide bleaching.

G-P operates five recycle pulp mills in the United States. The bleaching agents used at these mills are listed below.

Savannah River Mill Bleaching Systems Nos. 1-3	Hypochlorite, hydrosulfite
Savannah River Mill Bleaching System No. 4	Hypochlorite, peroxide, hydrosulfite, oxygen
Green Bay Broadway Mill	Hypochlorite, peroxide, hydrosulfite, oxygen
Green Bay Day Street Mill	Hypochlorite
Halsey Mill	Peroxide and hydrosulfite

G-P is not aware of any type of pollution controls used in recycle pulp bleach plants except for the Chlor-Alkali plants that are used to manufacture the hypochlorite solution. The Muskogee Mill uses hypochlorite solution on System 1, but does not currently operate its Chlor-Alkali plant.

Review of EPA RACT/BACT/LAER Clearinghouse (RBLC)
Searches of the RBLC were conducted to identify control technologies for the control of VOC emissions from bleaching processes. Searches were conducted for RBLC determinations added

before and after January 1994 to determine what technologies are in use to control VOC emissions from recycle mill bleach plants. The RLBC database was searched for process names containing the terms “bleach”, “hypochlorite”, “hydrosulfite”, “de-inking”, “peroxide”, “chlor-alkali”, and “recycle pulp” to see which entries were listed for the addition of or the modification of a bleach plant. The specific EPA RBLC categories searched are listed below.

30.002 Kraft Pulp Mills
30.004 Pulp & Paper Production Other than Kraft

The only facility that matched any of these terms for a recycle pulp mill (and not a Kraft mill) was for the Consolidated Paper Company’s Mill located in Stevens Point, Wisconsin. The BACT entry listed was for a modification of the hydrogen peroxide pulp bleaching system in 1999. BACT for the modification was “no control” with a methanol limit of 4.1 tons per year. There were no BACT entries for recycle paper mills found before this date.

Conventional VOC removal technologies for other types of VOC sources include Recuperative/ Regenerative/ Catalytic/ Thermal Oxidation, Carbon Adsorption, and Biofiltration. However, these technologies have never been demonstrated on a pulp mill system for BACT or for any other purpose.

Step 2 - Technical Feasibility Analysis
Bleaching chemical agents
The use of hypochlorite solutions (e.g., calcium hypochlorite and sodium hypochlorite) and the use of non-chlorine-containing chemical agents, such as sodium hydrosulfite, thiourea dioxide, hydrogen peroxide, or peracetic acid are technically feasible as the Mill currently operates at least one of its pulping systems with these chemicals. System 5 has utilized sodium hydrosulfite and peroxide systems in the past. System 5 has not used sodium/calcium hypochlorite to date for production.

As grades change, the Mill needs to adapt its chemical package. Specifically, as wastepaper quality deteriorates, the Mill needs the flexibility to switch its chemical package on System 5 between sodium hypochlorite and other Cluster Rule-exempt materials (e.g., peroxide). The proposed modification at the pulp mill is intended to improve the yield from increasingly lower grades of wastepaper. The wastepaper currently processed is not bleached with sodium hypochlorite.

Add-on oxidation/incineration
The use of recuperative/ regenerative/ catalytic/ thermal oxidation, carbon adsorption, or biofiltration techniques have not been demonstrated and they are not technically feasible for at least the following two reasons.

1) The presence of poisoning halides attack the oxidizer components and conventional media
2) The heat value and concentration of VOC in the exhausts measured during the NCASI stack testing is very low and cannot sustain an oxidation reaction without continuous natural gas combustion that can generate significant amounts of NO_X.

Biofiltration
Mr. Karl Mundorff of Bioreaction Company, a biofilter vendor, expressed serious doubt about this application of biofilters. Chloroform will either inhibit or poison the biological population of a biofilter. Since chloroform comprises a significant amount of the total VOC emitted from the Bleach Plants, most of the biofilter media would be rendered useless for emissions control. Additionally, based on the approximate composition of other HAP compounds listed in the NCASI study, and information supplied by Bioreaction, only 80% of the remaining HAPs could be removed by biofiltration technology, leaving the other 20% unabated. Therefore, it is technically infeasible to use biofiltration to remove VOC.

Step 3 – Ranking the Technically Feasible Control Alternatives to Establish a Control Hierarchy
The top level of control is use of various non-chlorine-containing chemical agents, such as sodium hydrosulfite, hydrogen peroxide, peracetic acid, or sodium hypochlorite to minimize methanol formation.

Step 4 – Control Effectiveness Evaluation
The Muskogee Mill System 5 is able to use hypochlorite solutions and other non-chlorine chemical agents. As this technology is the top choice, there is no additional control effectiveness evaluation.

Step 5 – Select BACT
The Muskogee Mill proposes no additional control for System 5. The existing technology is the most effective choice.

BACT SUMMARY

The following table summarizes proposed BACT for each of the modified sources.

Source	Pollutant	Existing Controls	Proposed BACT	Emission Rate
Paper Machine Combustion (a)				
Paper Machine 11-14	SO_2	Clean Fuel	No Additional Controls	0.2 tpy each
Paper Machine 11-14	NOx	Conventional Burners	Low NOx Burners	0.04 lb/MMBTU
Paper Machine 11-14	PM/PM_{10}	Clean Fuel	No Additional Controls	2.3 tpy each
Paper Machine 11-14	CO	Conventional Burners	Low NOx Burners	0.184 lb/MMBTU
Paper Machine 11-14	VOC	Good Combustion Practices	No Additional Controls	1.7 tpy each
Paper Machine Process				
Paper Machine 11	PM/PM_{10}	None	No Additional Controls	9.3 tpy (b)
Paper Machine 12	PM/PM_{10}	None	No Additional Controls	13.0 tpy (b)
Paper Machine 13	PM/PM_{10}	None	No Additional Controls	11.2 tpy (b)
Paper Machine 14	PM/PM_{10}	None	No Additional Controls	11.2 tpy (b)
Paper Machine 15	PM/PM_{10}	None	No Additional Controls	10.3 tpy (b)
Paper Machine Additives (PM11-15)	VOC	None	New Substance Review	202 tpy combined
Converting Area Vent	PM/PM_{10}	Baghouse	No Additional Controls	0.032 tpy (b)
3 New Printing Presses	VOC	NA - Proposed Source	Permanent Enclosure, RTO	48.5 tpy (c)
3 New Extruders	VOC	NA - Proposed Source	No Additional Controls	0.14 tpy
New Plate Washer/Making(d)	VOC	NA - Proposed Source	Washer Inherent Design	1.4 tpy
Pulping System 5	VOC	No use of chlorine or chlorine dioxide (e)	No Additional Controls	46.2 tpy (c)

(a) BACT levels for the burners are applicable only if the physical modification includes replacing the existing burner.
(b) No change from existing permit limit/maximum emissions.
(c) The emission rate reflects the proposed control on all four presses combined – the proposed presses and one existing press not undergoing modification
(d) This source does not include emissions from the existing platemaking operations.
(e) This is equivalent to one of the requirements of MACT under 40 CFR 64 Subpart S

(*This ends the quotation from the application*)

Based on the immediately preceding table and upon the discussions from which the table is derived, the only emissions that require testing will be NO_X and CO emissions from the paper machines' new burner configurations and VOC from the polyethylene printing area. These emissions will be addressed in the Specific Conditions of the permit.

NSPS, 40 CFR Part 60 [No Change Due to This Project]
Subparts D, Da, Db, and Dc These standards affect steam generating units of particular sizes and dates of construction, reconstruction, and modification. As explained in detail in memorandum associated with the pending Part 70 permit, all four boilers are affected facilities under only Subpart D. The standards and requirements identified in that memorandum are unchanged by this project.

Subpart Y This standard applies to affected facilities in coal preparation plants that process more than 181 Mg (200 tons) per day and that commenced construction or modification after October 24, 1974. The current project does not alter any of the discussion found in the memorandum associated with the pending Part 70 permit, and the standards and conditions of that permit remain unchanged.

NESHAP, 40 CFR Part 61 [No Change Due to This Project]
There are no emissions of any of the regulated pollutants: arsenic, asbestos, benzene, beryllium, coke oven emissions, mercury, radionuclides, or vinyl chloride except for small amounts of mercury from the boilers which are covered by NSPS Subpart D and will become subject to NESHAP Subpart DDDDD.
Subpart M – The facility may be subject to certain regulations pertaining to the construction, demolition, and disposal of asbestos-containing materials.

NESHAP, 40 CFR Part 63 [Only Subpart KK Affected by This Project]
Subpart S (Pulp and Paper Industry) The memorandum associated with the pending Part 70 permit shows that, although Ft. James is an affected facility under Subpart S, there are no standards that apply to the equipment or processes. The current project will not add any units or processes that will alter that status.
Subpart KK (Printing and Publishing Industry) The memorandum associated with the pending Part 70 permit shows that the flexographic printing presses at the facility are affected sources. That memorandum describes the standards and requirements that apply. The current project adds three new polyethylene printers, but none of the standards is changed by this increase in machine count. The following lists the affected sources:

EU ID	EU Name	Manufacturer/Model No.	Const. Date
PO-1	Polyethylene Printer	Paper Converting Machine Company (PCMC), Model No. 6795, 6-color w/ vapor collection hood and tunnel dryer	6/84
	Polyethylene Printer 2 Polyethylene Printer 3 Polyethylene Printer 4	Make/model N/A, but similar to that listed above.	2005
FP-1	Paper Printers (six)	Flexo 21-182 – PCMC/ Model No. 6724 Flexo 31-001 – Fort Howard Flexo 31-002 – Fort Howard Flexo 31-003 – Fort Howard Flexo 31-005 – PCMC/Model No. 6992 Flexo 31-008 – PCMC/Model No. 7416	1983 1980 1980 1980 1990 1993
FP-7	Paper Printer	Flexo #7 – PCMC/Model No. 6726	1997
FP-8	Paper Printer	Flexo #8 – Bretting 4-color 78″ wide	6/05

Subpart DDDDD (Industrial, Commercial, and Institutional Boilers and Process Heaters) affects all existing, new, or reconstructed industrial boilers, institutional and commercial boilers, and process heaters located at a major source of HAPs. Requirements are discussed in the memorandum associated with the pending Part 70 permit. According to that analysis, all four boilers will be subject to the subpart, with a compliance demonstration date of September 13, 2007, and the current project will cause no change in the conditions established.

CAM, 40 CFR Part 64 [Not Applicable to Current Project]
The memorandum associated with the pending Part 70 permit shows that the boilers at the facility are affected sources. While the boilers have potential pre-control emissions greater than or equal to major source levels (100 TPY of a regulated pollutant or 10/25 TPY of a HAP), they are not large emissions units since post-control emissions do not equal or exceed 100 TPY. They will be subject to CAM upon renewal of the Title V permit. The boilers will have to demonstrate compliance with MACT DDDDD before the operating permit is renewed, which may obviate the need for CAM. Similarly, the addition of three printers will lead to an estimated 971 TPY of pre-controlled VOC emissions from the group of four printers, but only 49 TPY of controlled emissions, making them "other" sources under CAM, thus requiring that they satisfy CAM at the time of Title V renewal.

Chemical Accident Prevention Provisions, 40 CFR Part 68 [Not Applicable]
The emissions units subject to this determination do not process or store more than the threshold quantity of any regulated substance (Section 112r of the Clean Air Act 1990 Amendments). More information on this federal program is available on the web page: www.epa.gov/ceppo.

Stratospheric Ozone Protection, 40 CFR Part 82 [No Change Due to This Project]
This Part sets standards for Class I & II substances. The current project will not cause any change in applicability of Part 82.

SECTION IX. COMPLIANCE

Testing

Testing of the boilers for initial compliance with 40 CFR 60 Subpart D was performed for each fuel fired. Additional testing in anticipation of 40 CFR 60 Subpart DDDDD, National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters, was conducted on January 7-9, April 15-16, and May 16-17 & 20-21, 2003. Details of this testing are contained in the discussion of emissions in the memorandum associated with the Part 70 permit.

Inspection

The facility is subject to unscheduled inspections by DEQ Enforcement/Compliance personnel and has been visited by David Pollard, permit writer for the pending Part 70 permit. No inspection is required for this construction permit.

Tier Classification and Public Review

This application has been classified as **Tier III** based on the request for a construction permit for a potentially significant source at a major stationary source. The applicant has submitted an affidavit that they are not seeking a permit for land use or for any operation upon land owned by others without their knowledge. The affidavit certifies that the applicant owns the land.

The applicant published a "Notice of Filing a Tier II Application" in the *Muskogee Daily Phoenix*, a daily newspaper in the City of Muskogee, Muskogee County, on October 12, 2005. The notice stated that the application was available for public review at the Muskogee County Health Department, 530 S. 34th St., Muskogee, Oklahoma. It also gave the address of the DEQ Air Quality Division office in Oklahoma City. Notice of the availability of the Draft permit was also published in the *Muskogee Daily Phoenix* on January 31, 2006. A copy of the draft permit was made available at the Muskogee County Health Department, at DEQ's Oklahoma City office, and on the DEQ website. The same draft copy was made available to EPA Region 6 for concurrent review, which commenced February 1, 2006. The 30-day public comment period expired March 2, 2006, and the 45-day period for Region 6 review expired March 18, 2006.

This facility is not located within 50 miles of the border of Oklahoma and any other state. No comments were received from the public. Information on all permit actions is available for review by the public in the Air Quality section of the DEQ Web page at *http://www.deq.state.ok.us*.

Fee Paid

Significant modification construction permit for a Title V source fee of $1,500.

SECTION X. SUMMARY

There are no active Air Quality compliance or enforcement issues that would affect the issuance of this permit. Issuance of the construction permit is recommended.

PART 70 PERMIT

AIR QUALITY DIVISION
STATE OF OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
707 N. ROBINSON STREET, SUITE 4100
P.O. BOX 1677
OKLAHOMA CITY, OKLAHOMA 73101-1677

Permit Number: 99-113-C (M-3)(PSD)

FORT JAMES OPERATING COMPANY,

having complied with the requirements of the law, is hereby granted permission to construct the Mill Process Improvement Project at the Muskogee Paper Mill located at 4901 Chandler Road, Muskogee, Oklahoma, Muskogee County, having the legal description of Section 33 & W/2 Section 34, T15N, R19E

subject to the following conditions, attached:

[X] Standard Conditions dated July 1, 2005

[X] Specific Conditions

This permit shall expire 18 months from the issuance date below, except as Authorized under Section VIII of the Standard Conditions.

Director, Air Quality Division	**Date**

PERMIT TO CONSTRUCT
AIR POLLUTION CONTROL FACILITY
SPECIFIC CONDITIONS

Fort James Operating Company **Permit No. 99-113-C (M-3)(PSD)**
Muskogee Mill
Mill Process Improvement Project

The permittee is authorized to construct in conformity with the specifications submitted to the Air Quality Division on October 6, 2005. The Evaluation Memorandum dated March 20, 2006, explains the derivation of applicable permit requirements and the estimates of emissions, however, it does not contain operating limitations or permit requirements. Commencing construction or continuing operations under this permit constitutes acceptance of, and consent to, the conditions contained herein.

The following conditions are numbered according to the format established in the pending Part 70 permit. The phrase "No Changes" appears in each condition or subcondition for which the requirements of this construction permit match those established in the Part 70 permit.

1. Points of emission and emissions limitations. [OAC 252:100-8-6(a)(1)]

Where two emission limits with different bases are given for a single emission point and pollutant, the source shall not exceed either limit at any time.

EUG 1 – Subpart D Boilers

A. No changes
B. No changes
C. No changes
D. Total SO_X emissions from Boilers B-1, B-2, B-3, and B-4 shall not exceed 36,460 pounds per day. The calculation shall be based upon actual fuel consumption and emissions factors identified in development of the Part 70 Permit for the facility, as follow.

Unit	Fuel type	Emission factor
B-1, B-2, B-3, B-4	Natural gas	0.6 lbs/MMSCF*
B-2	High BTU coal	0.644 lbs/MMBTU**
B-2	Low BTU coal	0.267 lbs/MMBTU**
B-3	Coal	0.403 lbs/MMBTU**
B-4	Coal	0.631 lbs/MMBTU**

*Assumes 1,020 BTU/CF
**Based on the heating value of the coal used.

EUG 2 – Combustion Sources Not Subject to NSPS or NESHAP

EU ID	Manufacturer & Serial Number	Burners (MMBTUH)	Fuels	EU Construct	Burner Replace
PM-11	Kinedizer 27M*	2 - 35 (70)*	Gas/Propane	1975	2006

PM-12	Oven-Pak EB6 Model 400*	2 - 35 (70)*	Gas/Propane	1975	2006
PM-13	Oven-Pak EB6 Model 400*	2 - 35 (70)*	Gas/Propane	1979	2006
PM-14	Combustifume*	2 - 35 (70)*	Gas/Propane	1981	2006
PM-15	LV-85	2 - 25 (50)	Gas	1992	1992
PO-1	Oven-Pak EB3*	4 – 3.2 (12.8)	Gas	1984	2006
PO-1	RTO*	10.4*	Gas	2006	NA
		Power Output			
DG-1	Marathon Electric, Magna One, Model# 683	1,200 KW	Diesel	1982	NA
DG-2	Marathon Electric, Magna One, Model# 683	1,200 KW	Diesel	1982	NA

* Some design elements have not been fully determined. Heat ratings for each are the maximum that may occur. Manufacturer and model information will be provided with the application for modified operating permit.

Authorized Burner Combustion Emissions Summary – TPY[1]

	SO_2	PM_{10}	VOC	NO_X	CO
PM-11	0.22	2.80	2.02	11.0	56.4
PM-12	0.22	2.80	2.02	11.0	56.4
PM-13	0.22	2.80	2.02	11.0	56.4
PM-14	0.22	2.80	2.02	11.0	56.4
PM-15	0.16	2.00	1.45	32.9	96.4
PO-1[2]	0.03	0.35	0.25	4.56	3.83

1. NO_X and CO emission factors for PM-11, 12, 13, and 14 reflect BACT values of 0.036 lb/MMBTU for NO_X and 0.184 lb/MMBTU for CO.
2. This reflects only the RTO, since the tunnel dryers are Insignificant activities. Depending upon final design criteria, the RTO may also be Insignificant.

All Paper Machines – OAC 252:100-25, 31, & 33 Standards			
	Opacity	**SO_2 (lbs/MMBTU)**	**NO_X (lbs/MMBTU)**
Natural Gas	20/60	0.20	0.20

EUG 3 – Subpart Y Coal Preparation Plant
No change.

EUG 4 – PP-1 Pulp Processing Units (Subpart S Affected/No Applicable Standards)
No change.

EUG 5 – 40 CFR 63 Subpart KK Flexographic Printing

EU ID	EU Name	Manufacturer/Model No.	Const. Date
PO-1	Polyethylene Printer	Paper Converting Machine Company (PCMC), Model No. 6795, 6-color w/ vapor collection hood and tunnel dryer	6/84
	Polyethylene Printer 2 Polyethylene Printer 3 Polyethylene Printer 4	Make/model N/A, but similar to that listed above.	2006
FP-1	Paper Printers (six)	Flexo 21-182 – PCMC/ Model No. 6724 Flexo 31-001 – Fort Howard Flexo 31-002 – Fort Howard Flexo 31-003 – Fort Howard Flexo 31-005 – PCMC/Model No. 6992 Flexo 31-008 – PCMC/Model No. 7416	1983 1980 1980 1980 1990 1993
FP-7	Paper Printer	Flexo #7 – PCMC/Model No. 6726	1997
FP-8	Paper Printer	Flexo #8 – Bretting 4-color 78″ wide	6/05

G. All presses, **Subpart KK Flexographic Printing**. [40 CFR 63 Subpart KK]
No change.

EUG 6 – VOC Sources Not Subject to an NSPS or NESHAP

EU ID	EU Name	Manufacturer/Model/Serial #	Const. Date
PP-1	Pulp Processing Units	Components listed in EUG 4	1977-1992
PM-11	Paper Machine #11	KMW	1975
PM-12	Paper Machine #12	KMW	1975
PM-13	Paper Machine #13	KMW	1979
PM-14	Paper Machine #14	Beloit	1981
PM-15	Paper Machine #15	Beloit	1992
	Paper Machine Additives	NA	
SC-1	Solvent Cleaning of PM-11, PM-12, PM-13, and PM-14	NA	1975
PM-15	Solvent Cleaning	NA	1992
PO-1	Flexo-plate making	Anderson-Vreeland	June, 1984
	Flexographic Polyethylene Printer	Paper Converting Machine Company (PCMC), Model No. 6795, 6-color, w/ vapor collection hood and tunnel dryer	June, 1984
	Polyethylene Printers (3)	Similar to above (proposed)	2005
FP-1	Flexographic Paper Printers (six)	Flexo 21-182 – PCMC/ Model No. 6724 Flexo 31-001 – Fort Howard Flexo 31-002 – Fort Howard Flexo 31-003 – Fort Howard Flexo 31-005 – PCMC/Model No. 6992 Flexo 31-008 – PCMC/Model No. 7416	1983 1980 1980 1980 1990 1993
FP-7	Flexographic Paper Printer	Flexo #7 – PCMC/Model No. 6726	1997
FP-8	Flexographic Paper Printer	Bretting 4-color, 78” wide	6/05

H. **Paper Machine Additives** and **Solvent Cleaning** of **PM-11** through **PM-15**.
   i. Emissions from Paper Machine Additives are emissions from VOC-containing paper enhancement chemicals including dyes, softness aids, and biocides. Emissions of VOCs from the use of paper machine additives shall not exceed 202 TPY, 12-month rolling cumulative.
   ii. Emissions of VOCs from solvent cleaning of Paper Machines PM-11, PM-12, PM-13, PM-14, and PM-15 shall not exceed 787 TPY, 12-month rolling cumulative.
   iii. Emissions shall be calculated based on the total VOC content of each additive or cleaner material used.

I. Eliminated

J. No changes.

K. Eliminated

L. Paper printers **FP-1**, **FP-7**, and **FP-8**. Total emissions of VOCs from these printers is limited to 92.28 TPY, rolling 12-month cumulative. Emissions calculations shall be based on mass balance, considering the VOC content of the inks.

M. Polyethylene printers (4) **PO-1**.
   i. Total VOC emissions from this group of printers shall not exceed a cumulative of 48.5 tons per year based on a 12-month rolling cumulative period.
   ii. The printers shall be contained in a 100% enclosure that routes all emissions to a regenerative thermal oxidizer with a minimum 95% destruction efficiency.

N. No changes.

O. Additional limitations for **Platemaking.** With the addition of inline washers, this process is expected to emit only 1.8 TPY of VOC and is an Insignificant Activity. Records sufficient to demonstrate this status shall be maintained.

EUG 7 – Non-Combustion PM Sources Not Subject to NSPS or NESHAP
No changes.

2. Initial Testing requirements. [OAC 252:100-8-6(a)(1)], [OAC 252:100-43]
   A. **Boilers B-1, B-2, B-3, and B-4.** [40 CFR 60 Subpart D]
   No changes

   B. Additional requirements for **Boiler B-4.** [40 CFR 60 Subpart D], [Permit No. PSD-OK-404]
   No changes.

   C. Additional requirements for **Boiler B-4.** [General Conditions, Permit No. PSD-OK-404]
   No changes.

D. The low-NO_X burners to be installed on paper machines PM-11, PM-12, PM-13, and PM-14 shall be performance tested at 90% or more of rated heat input to demonstrate compliance with the BACT limits of 0.036 lbs/MMBTU for NO_X and 0.184 lbs/MMBTU for CO. Testing shall occur within 60 days of initial operation of each burner. A protocol describing the test design and Reference Methods to be used shall be supplied to the DEQ Regional Office at Tulsa at least 30 days before the tests are scheduled to be performed. Testing is not required for any of the other pollutants reviewed in the BACT analysis. [OAC 252:100-43]

E. Performance testing to demonstrate the 95% overall destructive efficiency of the regenerative thermal oxidizer shall be performed within 60 days of first operation of the new enclosure and polyethylene printers, with all four printers operating at representative rates. A protocol describing the test design, Reference Methods to be used, presentation of results, and monitoring parameters measured that will demonstrate continued compliance, shall be supplied to the DEQ Regional Office at Tulsa at least 30 days before the test is scheduled to be performed. [OAC 252:100-43]

3. Monitoring Requirements. [OAC 252:100-43], [OAC 252:100-4], [40 CFR 60 Subpart D]

A. No changes.
B. No changes.
C. No changes.
D. **PO-1** Flexographic Printing Press Tunnel Dryers and Regenerative Thermal Oxidizer.
  i. The tunnel dryers and catalytic oxidation incinerator shall be fueled only with commercial pipeline-grade natural gas.
  ii. Monitoring parameter information necessary to assure that design efficiency of the regenerative thermal oxidizer (RTO) is maintained shall be provided with the application for a modified operating permit so that appropriate specific conditions may be applied.
E. No changes.
F. No changes.
G. No changes.
H. No changes.
I. No changes.
J. No changes.
K. No changes.
L. No changes.

4. Hours of Operation. [OAC 252:100-8-6(a)(1)]
No changes.

5. Emission Controls. [OAC 252:100-8-6(a)(1)], [OAC 252:100-37]
A. All boilers, **B-1, B-2, B-3, and B-4.**
No changes.

B. **Boilers B-2**, **B-3**, and **B-4**.
No changes.

C. **Paper Machines PM-11, 12, 13, 14.**
BACT shall consist of the use of low-NO_X burners and natural gas for the primary fuel and the use of propane as secondary fuel. All other pollutants shall be minimized by proper operation of the unit.

6. Reporting Requirements. [OAC 252:100-8-6(a)(3)(B)], [OAC 252:100-43]
No changes.

7. No changes.

8. Recordkeeping. [OAC 252:100-8-6(a)(3)(B)]
A. No changes.
B. No changes.
C. No changes.
D. No changes.
E. No changes.
F. No changes.
G. Sufficient records to demonstrate the calculations of VOC emissions from the group of paper printers (currently 8), the group of polyethylene printers (currently 4), and the solvent cleaning of paper machines (currently 5). These records typically include the basis of a mass-balance analysis; gallons and/or pounds of product used, VOC content of each gallon and/or pound, any associated capture or destruction efficiency, and any other appropriate information.
H. No changes.
I. No changes.

9. Insignificant Activities. [OAC 252:100-8-6 (a)(3)(B)]
No changes.

10. Permit Shield [OAC 252:100-8-6(d)(2)]
No changes.

11. Compliance certification. [OAC 252:100-8-6(c)(5)(A), (C) & (D)]
No changes.

12. No changes.

TITLE V (PART 70) PERMIT TO OPERATE / CONSTRUCT
STANDARD CONDITIONS
(July 1, 2005)

SECTION I. DUTY TO COMPLY

A. This is a permit to operate / construct this specific facility in accordance with Title V of the federal Clean Air Act (42 U.S.C. 7401, et seq.) and under the authority of the Oklahoma Clean Air Act and the rules promulgated there under. [Oklahoma Clean Air Act, 27A O.S. § 2-5-112]

B. The issuing Authority for the permit is the Air Quality Division (AQD) of the Oklahoma Department of Environmental Quality (DEQ). The permit does not relieve the holder of the obligation to comply with other applicable federal, state, or local statutes, regulations, rules, or ordinances. [Oklahoma Clean Air Act, 27A O.S. § 2-5-112]

C. The permittee shall comply with all conditions of this permit. Any permit noncompliance shall constitute a violation of the Oklahoma Clean Air Act and shall be grounds for enforcement action, for revocation of the approval to operate under the terms of this permit, or for denial of an application to renew this permit. All terms and conditions (excluding state-only requirements) are enforceable by the DEQ, by EPA, and by citizens under section 304 of the Clean Air Act. This permit is valid for operations only at the specific location listed.
[40 CFR §70.6(b), OAC 252:100-8-1.3 and 8-6 (a)(7)(A) and (b)(1)]

D. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit. [OAC 252:100-8-6 (a)(7)(B)]

SECTION II. REPORTING OF DEVIATIONS FROM PERMIT TERMS

A. Any exceedance resulting from emergency conditions and/or posing an imminent and substantial danger to public health, safety, or the environment shall be reported in accordance with Section XIV. [OAC 252:100-8-6 (a)(3)(C)(iii)]

B. Deviations that result in emissions exceeding those allowed in this permit shall be reported consistent with the requirements of OAC 252:100-9, Excess Emission Reporting Requirements.
[OAC 252:100-8-6 (a)(3)(C)(iv)]

C. Oral notifications (fax is also acceptable) shall be made to the AQD central office as soon as the owner or operator of the facility has knowledge of such emissions but no later than 4:30 p.m. the next working day the permittee becomes aware of the exceedance. Within ten (10) working days after the immediate notice is given, the owner operator shall submit a written report describing the extent of the excess emissions and response actions taken by the facility. Every written report submitted under OAC 252:100-8-6 (a)(3)(C)(iii) shall be certified by a responsible official. [OAC 252:100-8-6 (a)(3)(C)(iii)]

SECTION III. MONITORING, TESTING, RECORDKEEPING & REPORTING

A. The permittee shall keep records as specified in this permit. Unless a different retention period or retention conditions are set forth by a specific term in this permit, these records, including monitoring data and necessary support information, shall be retained on-site or at a nearby field office for a period of at least five years from the date of the monitoring sample, measurement, report, or application, and shall be made available for inspection by regulatory personnel upon request. Support information includes all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. Where appropriate, the permit may specify that records may be maintained in computerized form.

[OAC 252:100-8-6 (a)(3)(B)(ii), 8-6 (c)(1), and 8-6 (c)(2)(B)]

B. Records of required monitoring shall include:

(1) the date, place and time of sampling or measurement;
(2) the date or dates analyses were performed;
(3) the company or entity which performed the analyses;
(4) the analytical techniques or methods used;
(5) the results of such analyses; and
(6) the operating conditions as existing at the time of sampling or measurement.

[OAC 252:100-8-6 (a)(3)(B)(i)]

C. No later than 30 days after each six (6) month period, after the date of the issuance of the original Part 70 operating permit, the permittee shall submit to AQD a report of the results of any required monitoring. All instances of deviations from permit requirements since the previous report shall be clearly identified in the report. [OAC 252:100-8-6 (a)(3)(C)(i) and (ii)]

D. If any testing shows emissions in excess of limitations specified in this permit, the owner or operator shall comply with the provisions of Section II of these standard conditions.

[OAC 252:100-8-6 (a)(3)(C)(iii)]

E. In addition to any monitoring, recordkeeping or reporting requirement specified in this permit, monitoring and reporting may be required under the provisions of OAC 252:100-43, Testing, Monitoring, and Recordkeeping, or as required by any provision of the Federal Clean Air Act or Oklahoma Clean Air Act.

F. Submission of quarterly or semi-annual reports required by any applicable requirement that are duplicative of the reporting required in the previous paragraph will satisfy the reporting requirements of the previous paragraph if noted on the submitted report.

G. Every report submitted under OAC 252:100-8-6 and OAC 252:100-43 shall be certified by a responsible official. [OAC 252:100-8-6 (a)(3)(C)(iv)]

H. Any owner or operator subject to the provisions of NSPS shall maintain records of the occurrence and duration of any start-up, shutdown, or malfunction in the operation of an affected facility or any malfunction of the air pollution control equipment. [40 CFR 60.7 (b)]

I. Any owner or operator subject to the provisions of NSPS shall maintain a file of all measurements and other information required by the subpart recorded in a permanent file suitable for inspection. This file shall be retained for at least two years following the date of such measurements, maintenance, and records. [40 CFR 60.7 (d)]

J. The permittee of a facility that is operating subject to a schedule of compliance shall submit to the DEQ a progress report at least semi-annually. The progress reports shall contain dates for achieving the activities, milestones or compliance required in the schedule of compliance and the dates when such activities, milestones or compliance was achieved. The progress reports shall also contain an explanation of why any dates in the schedule of compliance were not or will not be met, and any preventative or corrective measures adopted. [OAC 252:100-8-6 (c)(4)]

K. All testing must be conducted by methods approved by the Division Director under the direction of qualified personnel. All tests shall be made and the results calculated in accordance with standard test procedures. The use of alternative test procedures must be approved by EPA. When a portable analyzer is used to measure emissions it shall be setup, calibrated, and operated in accordance with the manufacturer's instructions and in accordance with a protocol meeting the requirements of the "AQD Portable Analyzer Guidance" document or an equivalent method approved by Air Quality. [40 CFR §70.6(a), 40 CFR §51.212(c)(2), 40 CFR § 70.7(d), 40 CFR §70.7(e)(2), OAC 252:100-8-6 (a)(3)(A)(iv), and OAC 252:100-43]

L. The permittee shall submit to the AQD a copy of all reports submitted to the EPA as required by 40 CFR Part 60, 61, and 63, for all equipment constructed or operated under this permit subject to such standards. [OAC 252:100-4-5 and OAC 252:100-41-15]

SECTION IV. COMPLIANCE CERTIFICATIONS

A. No later than 30 days after each anniversary date of the issuance of the original Part 70 operating permit, the permittee shall submit to the AQD, with a copy to the US EPA, Region 6, a certification of compliance with the terms and conditions of this permit and of any other applicable requirements which have become effective since the issuance of this permit. The compliance certification shall also include such other facts as the permitting authority may require to determine the compliance status of the source.

[OAC 252:100-8-6 (c)(5)(A), (C)(v), and (D)]

B. The certification shall describe the operating permit term or condition that is the basis of the certification; the current compliance status; whether compliance was continuous or intermittent; the methods used for determining compliance, currently and over the reporting period; and a statement that the facility will continue to comply with all applicable requirements.

[OAC 252:100-8-6 (c)(5)(C)(i)-(iv)]

C. Any document required to be submitted in accordance with this permit shall be certified as being true, accurate, and complete by a responsible official. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the certification are true, accurate, and complete.

[OAC 252:100-8-5 (f) and OAC 252:100-8-6 (c)(1)]

D. Any facility reporting noncompliance shall submit a schedule of compliance for emissions units or stationary sources that are not in compliance with all applicable requirements. This schedule shall include a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any applicable requirements for which the emissions unit or stationary source is in noncompliance. This compliance schedule shall resemble and be at least as stringent as that contained in any judicial consent decree or administrative order to which the emissions unit or stationary source is subject. Any such schedule of compliance shall be supplemental to, and shall not sanction noncompliance with, the applicable requirements on which it is based, except that a compliance plan shall not be required for any noncompliance condition which is corrected within 24 hours of discovery.
[OAC 252:100-8-5 (e)(8)(B) and OAC 252:100-8-6 (c)(3)]

SECTION V. REQUIREMENTS THAT BECOME APPLICABLE DURING THE PERMIT TERM

The permittee shall comply with any additional requirements that become effective during the permit term and that are applicable to the facility. Compliance with all new requirements shall be certified in the next annual certification. [OAC 252:100-8-6 (c)(6)]

SECTION VI. PERMIT SHIELD

A. Compliance with the terms and conditions of this permit (including terms and conditions established for alternate operating scenarios, emissions trading, and emissions averaging, but excluding terms and conditions for which the permit shield is expressly prohibited under OAC 252:100-8) shall be deemed compliance with the applicable requirements identified and included in this permit. [OAC 252:100-8-6 (d)(1)]

B. Those requirements that are applicable are listed in the Standard Conditions and the Specific Conditions of this permit. Those requirements that the applicant requested be determined as not applicable are summarized in the Specific Conditions of this permit. [OAC 252:100-8-6 (d)(2)]

SECTION VII. ANNUAL EMISSIONS INVENTORY & FEE PAYMENT

The permittee shall file with the AQD an annual emission inventory and shall pay annual fees based on emissions inventories. The methods used to calculate emissions for inventory purposes shall be based on the best available information accepted by AQD.
[OAC 252:100-5-2.1, -5-2.2, and OAC 252:100-8-6 (a)(8)]

SECTION VIII. TERM OF PERMIT

A. Unless specified otherwise, the term of an operating permit shall be five years from the date of issuance. [OAC 252:100-8-6 (a)(2)(A)]

B. A source's right to operate shall terminate upon the expiration of its permit unless a timely and complete renewal application has been submitted at least 180 days before the date of expiration. [OAC 252:100-8-7.1 (d)(1)]

C. A duly issued construction permit or authorization to construct or modify will terminate and become null and void (unless extended as provided in OAC 252:100-8-1.4(b)) if the construction is not commenced within 18 months after the date the permit or authorization was issued, or if work is suspended for more than 18 months after it is commenced. [OAC 252:100-8-1.4(a)]

D. The recipient of a construction permit shall apply for a permit to operate (or modified operating permit) within 180 days following the first day of operation. [OAC 252:100-8-4(b)(5)]

SECTION IX. SEVERABILITY

The provisions of this permit are severable and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.
[OAC 252:100-8-6 (a)(6)]

SECTION X. PROPERTY RIGHTS

A. This permit does not convey any property rights of any sort, or any exclusive privilege.
[OAC 252:100-8-6 (a)(7)(D)]

B. This permit shall not be considered in any manner affecting the title of the premises upon which the equipment is located and does not release the permittee from any liability for damage to persons or property caused by or resulting from the maintenance or operation of the equipment for which the permit is issued. [OAC 252:100-8-6 (c)(6)]

SECTION XI. DUTY TO PROVIDE INFORMATION

A. The permittee shall furnish to the DEQ, upon receipt of a written request and within sixty (60) days of the request unless the DEQ specifies another time period, any information that the DEQ may request to determine whether cause exists for modifying, reopening, revoking, reissuing, terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the DEQ copies of records required to be kept by the permit.
[OAC 252:100-8-6 (a)(7)(E)]

B. The permittee may make a claim of confidentiality for any information or records submitted pursuant to 27A O.S. 2-5-105(18). Confidential information shall be clearly labeled as such and shall be separable from the main body of the document such as in an attachment.
[OAC 252:100-8-6 (a)(7)(E)]

C. Notification to the AQD of the sale or transfer of ownership of this facility is required and shall be made in writing within 10 days after such date.

[Oklahoma Clean Air Act, 27A O.S. § 2-5-112 (G)]

SECTION XII. REOPENING, MODIFICATION & REVOCATION

A. The permit may be modified, revoked, reopened and reissued, or terminated for cause. Except as provided for minor permit modifications, the filing of a request by the permittee for a permit modification, revocation, reissuance, termination, notification of planned changes, or anticipated noncompliance does not stay any permit condition.

[OAC 252:100-8-6 (a)(7)(C) and OAC 252:100-8-7.2 (b)]

B. The DEQ will reopen and revise or revoke this permit as necessary to remedy deficiencies in the following circumstances: [OAC 252:100-8-7.3 and OAC 252:100-8-7.4(a)(2)]

(1) Additional requirements under the Clean Air Act become applicable to a major source category three or more years prior to the expiration date of this permit. No such reopening is required if the effective date of the requirement is later than the expiration date of this permit.

(2) The DEQ or the EPA determines that this permit contains a material mistake or that the permit must be revised or revoked to assure compliance with the applicable requirements.

(3) The DEQ or the EPA determines that inaccurate information was used in establishing the emission standards, limitations, or other conditions of this permit. The DEQ may revoke and not reissue this permit if it determines that the permittee has submitted false or misleading information to the DEQ.

C. If "grandfathered" status is claimed and granted for any equipment covered by this permit, it shall only apply under the following circumstances: [OAC 252:100-5-1.1]

(1) It only applies to that specific item by serial number or some other permanent identification.

(2) Grandfathered status is lost if the item is significantly modified or if it is relocated outside the boundaries of the facility.

D. To make changes other than (1) those described in Section XVIII (Operational Flexibility), (2) administrative permit amendments, and (3) those not defined as an Insignificant Activity (Section XVI) or Trivial Activity (Section XVII), the permittee shall notify AQD. Such changes may require a permit modification. [OAC 252:100-8-7.2 (b)]

E. Activities that will result in air emissions that exceed the trivial/insignificant levels and that are not specifically approved by this permit are prohibited. [OAC 252:100-8-6 (c)(6)]

SECTION XIII. INSPECTION & ENTRY

A. Upon presentation of credentials and other documents as may be required by law, the permittee shall allow authorized regulatory officials to perform the following (subject to the permittee's right to seek confidential treatment pursuant to 27A O.S. Supp. 1998, § 2-5-105(18) for confidential information submitted to or obtained by the DEQ under this section):

[OAC 252:100-8-6 (c)(2)]

(1) enter upon the permittee's premises during reasonable/normal working hours where a source is located or emissions-related activity is conducted, or where records must be kept under the conditions of the permit;
(2) have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
(3) inspect, at reasonable times and using reasonable safety practices, any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
(4) as authorized by the Oklahoma Clean Air Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit.

SECTION XIV. EMERGENCIES

A. Any emergency and/or exceedance that poses an imminent and substantial danger to public health, safety, or the environment shall be reported to AQD as soon as is practicable; but under no circumstance shall notification be more than 24 hours after the exceedance.

[OAC 252:100-8-6 (a)(3)(C)(iii)(II)]

B. An "emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under this permit, due to unavoidable increases in emissions attributable to the emergency. [OAC 252:100-8-2]

C. An emergency shall constitute an affirmative defense to an action brought for noncompliance with such technology-based emission limitation if the conditions of paragraph D below are met.

[OAC 252:100-8-6 (e)(1)]

D. The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs or other relevant evidence that:

[OAC 252:100-8-6 (e)(2), (a)(3)(C)(iii)(I) and (IV)]

(1) an emergency occurred and the permittee can identify the cause or causes of the emergency;
(2) the permitted facility was at the time being properly operated;

(3) during the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards or other requirements in this permit;
(4) the permittee submitted timely notice of the emergency to AQD, pursuant to the applicable regulations (i.e., for emergencies that pose an "imminent and substantial danger," within 24 hours of the time when emission limitations were exceeded due to the emergency; 4:30 p.m. the next business day for all other emergency exceedances). *See OAC 252:100-8-6(a)(3)(C)(iii)(I) and (II).* This notice shall contain a description of the emergency, the probable cause of the exceedance, any steps taken to mitigate emissions, and corrective actions taken; and
(5) the permittee submitted a follow up written report within 10 working days of first becoming aware of the exceedance.

E. In any enforcement proceeding, the permittee seeking to establish the occurrence of an emergency shall have the burden of proof. [OAC 252:100-8-6 (e)(3)]

SECTION XV. RISK MANAGEMENT PLAN

The permittee, if subject to the provision of Section 112(r) of the Clean Air Act, shall develop and register with the appropriate agency a risk management plan by June 20, 1999, or the applicable effective date. [OAC 252:100-8-6 (a)(4)]

SECTION XVI. INSIGNIFICANT ACTIVITIES

Except as otherwise prohibited or limited by this permit, the permittee is hereby authorized to operate individual emissions units that are either on the list in Appendix I to OAC Title 252, Chapter 100, or whose actual calendar year emissions do not exceed any of the limits below. Any activity to which a State or federal applicable requirement applies is not insignificant even if it meets the criteria below or is included on the insignificant activities list. [OAC 252:100-8-2]

(1) 5 tons per year of any one criteria pollutant.
(2) 2 tons per year for any one hazardous air pollutant (HAP) or 5 tons per year for an aggregate of two or more HAP's, or 20 percent of any threshold less than 10 tons per year for single HAP that the EPA may establish by rule.

SECTION XVII. TRIVIAL ACTIVITIES

Except as otherwise prohibited or limited by this permit, the permittee is hereby authorized to operate any individual or combination of air emissions units that are considered inconsequential and are on the list in Appendix J. Any activity to which a State or federal applicable requirement applies is not trivial even if included on the trivial activities list. [OAC 252:100-8-2]

SECTION XVIII. OPERATIONAL FLEXIBILITY

A. A facility may implement any operating scenario allowed for in its Part 70 permit without the need for any permit revision or any notification to the DEQ (unless specified otherwise in the permit). When an operating scenario is changed, the permittee shall record in a log at the facility the scenario under which it is operating. [OAC 252:100-8-6 (a)(10) and (f)(1)]

B. The permittee may make changes within the facility that:

(1) result in no net emissions increases,
(2) are not modifications under any provision of Title I of the federal Clean Air Act, and
(3) do not cause any hourly or annual permitted emission rate of any existing emissions unit to be exceeded;

provided that the facility provides the EPA and the DEQ with written notification as required below in advance of the proposed changes, which shall be a minimum of 7 days, or 24 hours for emergencies as defined in OAC 252:100-8-6 (e). The permittee, the DEQ, and the EPA shall attach each such notice to their copy of the permit. For each such change, the written notification required above shall include a brief description of the change within the permitted facility, the date on which the change will occur, any change in emissions, and any permit term or condition that is no longer applicable as a result of the change. The permit shield provided by this permit does not apply to any change made pursuant to this subsection. [OAC 252:100-8-6 (f)(2)]

SECTION XIX. OTHER APPLICABLE & STATE-ONLY REQUIREMENTS

A. The following applicable requirements and state-only requirements apply to the facility unless elsewhere covered by a more restrictive requirement:

(1) No person shall cause or permit the discharge of emissions such that National Ambient Air Quality Standards (NAAQS) are exceeded on land outside the permitted facility. [OAC 252:100-3]
(2) Open burning of refuse and other combustible material is prohibited except as authorized in the specific examples and under the conditions listed in the Open Burning Subchapter. [OAC 252:100-13]
(3) No particulate emissions from any fuel-burning equipment with a rated heat input of 10 MMBTUH or less shall exceed 0.6 lb/MMBTU. [OAC 252:100-19]
(4) For all emissions units not subject to an opacity limit promulgated under 40 CFR, Part 60, NSPS, no discharge of greater than 20% opacity is allowed except for short-term occurrences which consist of not more than one six-minute period in any consecutive 60 minutes, not to exceed three such periods in any consecutive 24 hours. In no case shall the average of any six-minute period exceed 60% opacity. [OAC 252:100-25]
(5) No visible fugitive dust emissions shall be discharged beyond the property line on which the emissions originate in such a manner as to damage or to interfere with the use of adjacent properties, or cause air quality standards to be exceeded, or interfere with the maintenance of air quality standards. [OAC 252:100-29]

(6) No sulfur oxide emissions from new gas-fired fuel-burning equipment shall exceed 0.2 lb/MMBTU. No existing source shall exceed the listed ambient air standards for sulfur dioxide. [OAC 252:100-31]

(7) Volatile Organic Compound (VOC) storage tanks built after December28, 1974, and with a capacity of 400 gallons or more storing a liquid with a vapor pressure of 1.5 psia or greater under actual conditions shall be equipped with a permanent submerged fill pipe or with a vapor-recovery system. [OAC 252:100-37-15(b)]

(8) All fuel-burning equipment shall at all times be properly operated and maintained in a manner that will minimize emissions of VOCs. [OAC 252:100-37-36]

SECTION XX. STRATOSPHERIC OZONE PROTECTION

A. The permittee shall comply with the following standards for production and consumption of ozone-depleting substances. [40 CFR 82, Subpart A]

1. Persons producing, importing, or placing an order for production or importation of certain class I and class II substances, HCFC-22, or HCFC-141b shall be subject to the requirements of §82.4.
2. Producers, importers, exporters, purchasers, and persons who transform or destroy certain class I and class II substances, HCFC-22, or HCFC-141b are subject to the recordkeeping requirements at §82.13.
3. Class I substances (listed at Appendix A to Subpart A) include certain CFCs, Halons, HBFCs, carbon tetrachloride, trichloroethane (methyl chloroform), and bromomethane (Methyl Bromide). Class II substances (listed at Appendix B to Subpart A) include HCFCs.

B. If the permittee performs a service on motor (fleet) vehicles when this service involves an ozone-depleting substance refrigerant (or regulated substitute substance) in the motor vehicle air conditioner (MVAC), the permittee is subject to all applicable requirements. Note: The term “motor vehicle” as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed. The term “MVAC” as used in Subpart B does not include the air-tight sealed refrigeration system used as refrigerated cargo, or the system used on passenger buses using HCFC-22 refrigerant. [40 CFR 82, Subpart B]

C. The permittee shall comply with the following standards for recycling and emissions reduction except as provided for MVACs in Subpart B. [40 CFR 82, Subpart F]

(1) Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to § 82.156.

(2) Equipment used during the maintenance, service, repair, or disposal of appliances must comply with the standards for recycling and recovery equipment pursuant to § 82.158.

(3) Persons performing maintenance, service, repair, or disposal of appliances must be certified by an approved technician certification program pursuant to § 82.161.

(4) Persons disposing of small appliances, MVACs, and MVAC-like appliances must comply with record-keeping requirements pursuant to § 82.166.

(5) Persons owning commercial or industrial process refrigeration equipment must comply with leak repair requirements pursuant to § 82.158.
(6) Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records of refrigerant purchased and added to such appliances pursuant to § 82.166.

SECTION XXI. TITLE V APPROVAL LANGUAGE

A. DEQ wishes to reduce the time and work associated with permit review and, wherever it is not inconsistent with Federal requirements, to provide for incorporation of requirements established through construction permitting into the Sources' Title V permit without causing redundant review. Requirements from construction permits may be incorporated into the Title V permit through the administrative amendment process set forth in Oklahoma Administrative Code 252:100-8-7.2(a) only if the following procedures are followed:

(1) The construction permit goes out for a 30-day public notice and comment using the procedures set forth in 40 Code of Federal Regulations (CFR) § 70.7 (h)(1). This public notice shall include notice to the public that this permit is subject to Environmental Protection Agency (EPA) review, EPA objection, and petition to EPA, as provided by 40 CFR § 70.8; that the requirements of the construction permit will be incorporated into the Title V permit through the administrative amendment process; that the public will not receive another opportunity to provide comments when the requirements are incorporated into the Title V permit; and that EPA review, EPA objection, and petitions to EPA will not be available to the public when requirements from the construction permit are incorporated into the Title V permit.
(2) A copy of the construction permit application is sent to EPA, as provided by 40 CFR § 70.8(a)(1).
(3) A copy of the draft construction permit is sent to any affected State, as provided by 40 CFR § 70.8(b).
(4) A copy of the proposed construction permit is sent to EPA for a 45-day review period as provided by 40 CFR § 70.8(a) and (c).
(5) The DEQ complies with 40 CFR § 70.8 (c) upon the written receipt within the 45-day comment period of any EPA objection to the construction permit. The DEQ shall not issue the permit until EPA's objections are resolved to the satisfaction of EPA.
(6) The DEQ complies with 40 CFR § 70.8 (d).
(7) A copy of the final construction permit is sent to EPA as provided by 40 CFR § 70.8 (a).
(8) The DEQ shall not issue the proposed construction permit until any affected State and EPA have had an opportunity to review the proposed permit, as provided by these permit conditions.
(9) Any requirements of the construction permit may be reopened for cause after incorporation into the Title V permit by the administrative amendment process, by DEQ as provided in OAC 252:100-8-7.3 (a), (b), and (c), and by EPA as provided in 40 CFR § 70.7 (f) and (g).
(10) The DEQ shall not issue the administrative permit amendment if performance tests fail to demonstrate that the source is operating in substantial compliance with all permit requirements.

B. To the extent that these conditions are not followed, the Title V permit must go through the Title V review process.

SECTION XXII. CREDIBLE EVIDENCE

For the purpose of submitting compliance certifications or establishing whether or not a person has violated or is in violation of any provision of the Oklahoma implementation plan, nothing shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.

[OAC 252:100-43-6]

April 3, 2006

Mr. Karl L. Meyers, Operating Vice President, Muskogee
Fort James Operating Company
4901 Chandler Road
Muskogee, OK 74403

RE: Construction Permit No. **99-113-C (M-3)(PSD)**
Fort James Operating Company Muskogee Mill – Mill Process Improvement Project

Dear Mr. Meyers:

Enclosed is the referenced permit authorizing construction of the Mill Process Improvement Project at the Muskogee Mill. Please note that this permit is issued subject to certain standard and specific conditions that are attached. These conditions must be carefully followed since they define the limits of the permit and will be confirmed by periodic inspections.

Also note that you are required to annually submit an emission inventory for this facility. An emission inventory must be completed on approved AQD forms and submitted (hardcopy or electronically) by March 1st of every year. Any questions concerning the form or submittal process should be referred to the Emission Inventory Staff at 405-702-4100.

Thank you for your cooperation in this matter. If we may be of further service, please contact our office at (918) 293-1600. Air Quality personnel are located in the DEQ Regional Office at Tulsa, 3105 E. Skelly Drive, Suite 200, Tulsa, OK, 74105.

Sincerely,

Herb Neumann
AIR QUALITY DIVISION

Enclosure(s)

cc: Muskogee County DEQ Office