INTERNATIONAL PAPER – PENSACOLA MILL

Air Quality Modeling Protocol

Submitted By:

INTERNATIONAL PAPER

IP PENSACOLA MILL

CANTONMENT, FLORIDA

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1. INTRODUCTION

International Paper (IP) is proposing to make changes at their Pensacola, Florida pulp and paper mill (IP Pensacola Mill). These changes will qualify as "major modifications" as described in the Prevention of Significant Deterioration (PSD) regulations that are codified at 40 Code of Federal Regulation (CFR) Part 52.21 (2)(b). Since the changes are "major modifications" and will result in a significant increase in emissions above current baseline emission levels, an air quality modeling study will be performed. The air quality modeling study will assess whether emissions due to the project will result in ambient air concentration levels that are greater than the PSD ambient air short-term and annual significance levels. In addition, the project-related emissions will be evaluated for the potential to cause adverse impacts on air quality related values (AQRVs) at Class I areas. Further air quality modeling analyses may be conducted to demonstrate that the Mill is in compliance with the National Ambient Air Quality Standards (NAAQS) as well as the PSD increments.

As part of the air quality modeling study, IP has prepared this air quality modeling protocol to document the air quality modeling approach and technical information that will be part of the air quality modeling effort. Additional sections of this air quality modeling protocol contain the following information:

Section 2	Description of the IP Pensacola Mill and the Proposed Project
Section 3	Summary of the Proposed Project and Mill-Wide Emission Inventory
Section 4	Air Quality Modeling Approach and Technical Information
Section 5	Class I AQRV Analysis
Section 6	Presentation of Air Quality Modeling Results
Section 7	References

IP is submitting the air quality modeling protocol to the Florida Department of Environmental Protection (DEP) for review and approval. Pending approval by Florida DEP and other regulatory agencies (e.g., USEPA Region IV and the Federal Land Manager), IP will complete the air quality modeling study and incorporate the results as part of a PSD permit application.

2. DESCRIPTION OF THE IP PENSACOLA MILL AND THE PROPOSED PROJECT

This section of the air quality modeling protocol contains a description of the IP Pensacola Mill. The description contains general information on the manufacturing processes at the Mill, a brief history of the Mill, and a summary of the proposed project. A description of the geographic and topographic setting of the IP Pensacola Mill is also provided.

2.1 MANUFACTURING PROCESS DESCRIPTION

The IP Pensacola Mill produces bleach kraft pulp and fine paper from hardwood and softwood using the Kraft process. Hardwood and softwood logs are processed into wood chips. The softwood chips are fed to a continuous digester where pressure, steam, elevated temperatures, and white liquor are used to separate the lignin and wood fiber to produce softwood pulp. The hardwood chips are fed to batch digesters where a similar process occurs to produce hardwood pulp. Both the hardwood and softwood pulp are washed, screened, and separated from wood knots. The hardwood and softwood pulp is further delignified in oxygen reactors and then washed and bleached. The bleached pulp is used to produce paper on two paper machines at the Mill. Pulp for resale is dried on a pulp drying machine.

During the "cooking" of the wood chips, the white liquor becomes mixed with organic and lignin laden filtrates and is referred to as black liquor. The black liquor is processed to recover chemicals that can be reused in the Kraft cooking process. The black liquor is concentrated in evaporators, which concentrates the black liquor by removing some of the moisture in the stream. The black liquor is then fired in the two recovery furnaces at the Mill. The molten inorganic ash, or smelt, from the recovery furnaces is dissolved in weak wash to make green liquor. By adding lime to the green liquor, the green liquor is causticized to produce white liquor. A byproduct of the causticizing process is lime mud, which is burned in the Mill's kiln to recover lime.

Steam and electricity that are used in the Kraft cooking process, the recovery processes, and the paper making processes are provided from power boilers located at the Mill. In addition, steam is produced by the two recovery furnaces that recovery the black liquor and by the thermal oxidizer. Additional electricity is purchased from the local utility.

2.2 PROPOSED PROJECT

The Mill is being modified to realize pulping capability that the Mill currently has, but is not able to achieve due to limitations with selected process units. The production of additional pulp will allow the Mill to make more paper. In order to produce more paper, several emission units at the Mill will need to be modified. Specifically, the No. 1 and No. 2 Recovery Furnaces at the Mill will be modified as part of the proposed project. Other Mill emission units may also be modified including the two Smelt Dissolving Tanks, the No. 2 Evaporator Set, the Lime Kiln/Lime Mud Dryer, Continuous Digester System, Lime Slaker, Bleach Plant System and other minor process equipment. In addition, a new Causticizer may be installed as a result of the proposed project.

2.3 MILL HISTORY

The Pensacola Mill was built in 1941 by the Pensacola Pulp and Paper Company. The Mill was subsequently purchased by St. Regis Paper Company and Champion International Corporation. In 2000, IP purchased the Champion International Corporation. The Mill has undergone many modifications over the years. The most recent PSD projects were the Lime Kiln/Mud Dryer project and the Alkaline Conversion project that were constructed in 1993 and 1998, respectively. During the past five years there has been one minor NSR permitting project that included the installation of the Thermal Oxidizer which qualified as a pollution control project.

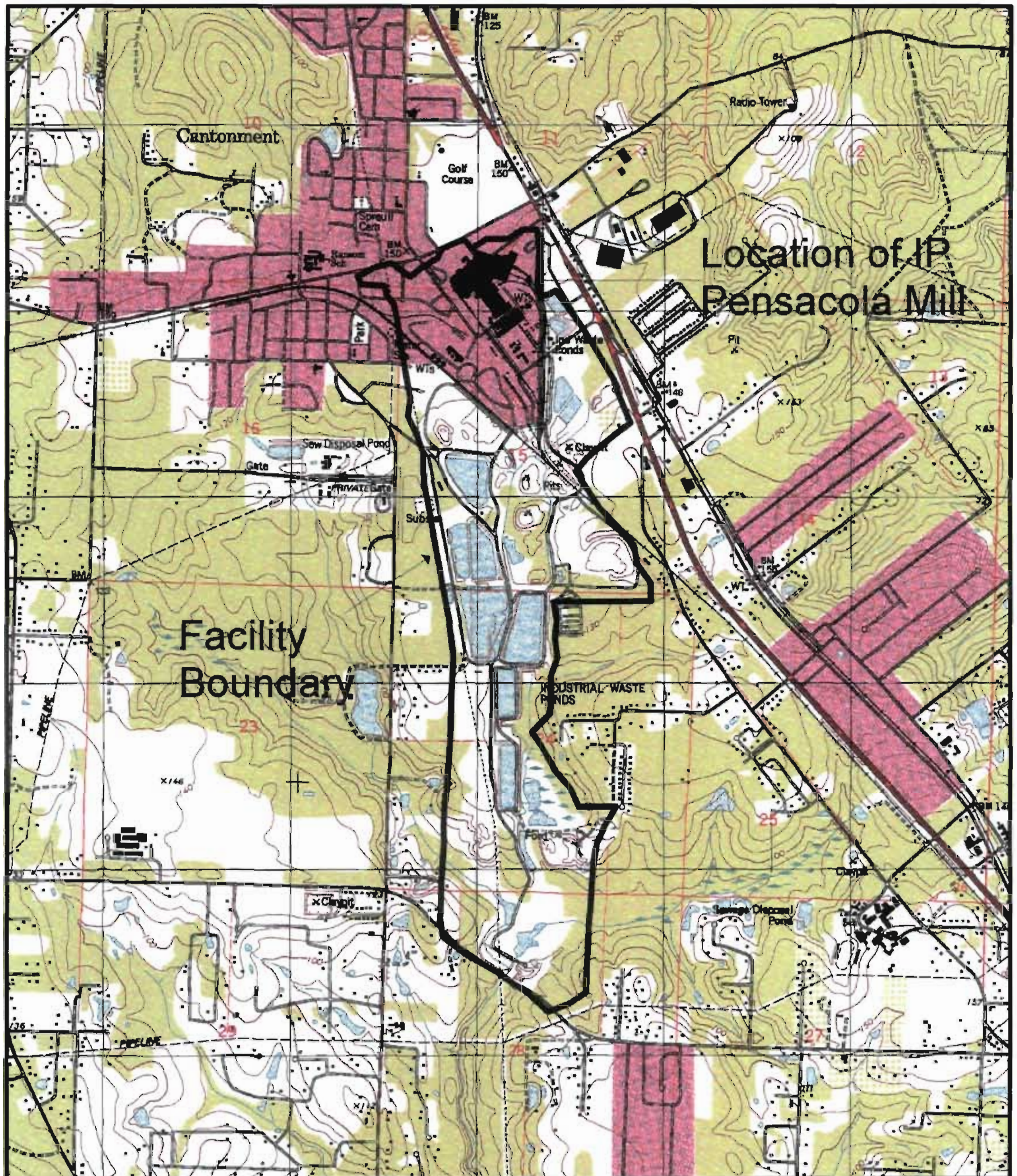
2.4 MILL LOCATION

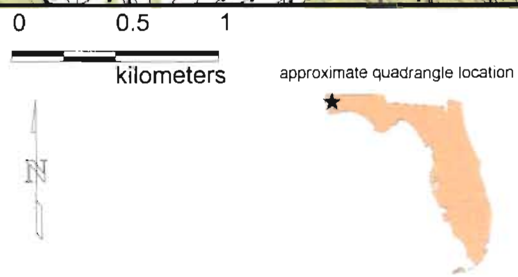
The Pensacola Mill is located in Cantonment which is approximately 20 kilometer (km) north, northwest of Pensacola, Florida. Situated in the central portion of Escambia County, the Mill is about 6.5 km from the Alabama and Florida border. A facility location map is provided in Figure 2-1. The geographical coordinates for the approximate center of the processing area of the Mill are:

- Universal Transverse Mercator (UTM) Easting: 469,000
- Universal Transverse Mercator (UTM) Northing: 3,386,000
- UTM Zone : 16
- North American Datum (NAD): 1927
- Longitude (degrees, minutes, seconds): 87° 19' 24.2"
- Latitude (degrees, minutes, seconds): 30° 36' 28.1"

The Pensacola Mill is in the Mobile, AL; Pensacola-Panama City, FL; Southern MS Interstate Air Quality Control Region (AQCR). Within this AQCR, Escambia County is in attainment or unclassifiable/attainment for all criteria pollutants including ozone as designated in the July 2002 Code of Federal Regulations.

The area surrounding the Pensacola Mill is generally flat with minor changes in elevation. The Mill elevation is 140 ft above mean sea level (amsl). Within a 5 km radius of the Mill the maximum elevation is 203 ft amsl. The elevations for the surrounding topography were obtained from United States Geological Survey (USGS) Digital Elevation Model (DEM) 1:24,000 data files.





Source: Base map adapted from USGS 7.5 minutes series, Cantonment, FLA. Quadrangle, 1978, photorevised 1987

FIGURE 2-1
LOCATION MAP OF THE INTERNATIONAL PAPER PENSACOLA MILL ESCAMBIA COUNTY, FLORIDA

3. SUMMARY OF THE PROPOSED PROJECT AND MILL-WIDE EMISSION INVENTORIES

The proposed project will affect emissions from multiple areas throughout the Mill. As a part of the PSD project evaluation, the emission increase associated with the project has been determined. The project-specific emission inventory will be used to determine if the emissions from the proposed project will result in ambient air concentrations above the PSD significance levels. The project-specific emission inventory will also be used for a Class I AQRV analysis, if required. In addition to the project-specific emission inventory, previous non-PSD permitting projects that occurred during the previous five years will be reviewed to determine if there are any contemporaneous emission increases or creditable emission decreases that must be considered with the project-specific emission inventory. A Mill-wide emission inventory has been prepared for the pollutants that will experience a PSD significant increase as a result of the project. The Mill-wide emission inventory will be used to demonstrate compliance with the NAAQS. Finally, a PSD increment consumption emission inventory has been developed and will be used for confirming that the PSD short-term and annual increments are not exceeded. A summary of the four emission inventories is provided in the following subsections.

3.1 PROJECT EMISSION INVENTORY

The project emission inventory represents the change in emissions associated with the project. To determine the change in emissions, baseline emissions and future emissions were determined and the differences calculated. Baseline emissions were determined using Mill production data for a two year representative period (January 1998 through December 1999). This period is more representative of normal mill operations than more recent years due to the decreased price of pulp and paper. The project emission inventory includes "modified" emission units (emission units that will be physically modified or experience a change in the method of operation) and "affected" emission units (emission units that will not be physically modified or experience a change in the method of operation but that will see a change in emissions due to higher process throughput or utilization).

For sources that are modified, the project emissions represent the difference between the past actual baseline emissions (i.e., January 1998 through December 1999 average annual emissions and peak short-term emissions) and the proposed or existing potential to emit (PTE) for the modified emission unit. Emission units that are "affected" will see an incremental change in emissions above the baseline emissions as a result of the project. For example, the increase in black liquor solids firing (BLS) at the No. 1 and No. 2 Recovery Furnaces will result in an increased pulping capacity for the mill and will increase the wood/chip throughput in the woodyard. Mill engineering studies will be used to determine the percentage increase at the woodyard above current actual emissions. This incremental change in emissions will be included in the air quality modeling study to determine if emissions from the project result in ambient levels above the PSD ambient air Class II significant concentrations levels.

It should be noted for affected emission units that if the percentage increase in emissions above current actual emission levels exceeds the emission unit's annual potential to emit, then a new potential to emit emission rate may be developed. However, most of the affected emission units are capable of absorbing the incremental change in annual emissions and no annual PTE limits will need to be adjusted. Additionally, if it is determined that on a short-term emission basis (i.e., emissions over a 24-hour or shorter period) an affected emission unit has, during the baseline period, already emitted at the maximum rate possible and the emission unit's short term PTE will not change, then there will no short-term emission increase for the affected emission unit.

The annual and short-term project related emission increases from modified and affected emission units are summarized in Table 3-1. Also shown in Table 3-1 are the PSD significant annual emission increase levels. According to Table 3-1, the Mill will experience a significant emissions increase for particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO). The emission units that emit PM_{10}, SO_2, CO, and NO_2 will be included in an air quality modeling analysis to determine the increase in

Table 3-1
Project Related Emissions
IP Mill
Pensacola, Florida

Source	Short-Term and Long-Term Project Related Emission Rates					
	SO_2 lb/hr and tpy		NO_X tpy	CO lb/hr	PM_{10} lb/hr and tpy	
Lime Mud Dryer	3.89	17.04	86.25	[a]	[a]	39.02
No. 1 Recovery Furnace	33.10	144.98	187.85	5.44	18.06	79.12
No. 2 Recovery Furnace	33.10	144.98	187.85	5.44	0.56	2.46
No. 1 Smelt Tank	0.04	0.17	5.84	na	6.64	29.08
No. 2 Smelt Tank	0.04	0.17	5.84	na	4.79	20.98
Thermal Oxidizer [b]	0.70	3.07	5.87	6.80	1.00	4.38
A-Line Bleach Plant	na	na	na	1.91	na	na
B-Line Bleach Plant	na	na	na	1.53	na	na
No. 1 Starch Silo	na	na	na	na	0.007	0.031
No. 2 Starch Silo/Clay Silo	na	na	na	na	0.013	0.057
Dry Additives	na	na	na	na	0.015	0.066
Woodyard	na	na	na	na	0.98	4.29
Project Totals		**310.41**	**479.50**	**110.54** [c]		**179.48**

(a) No short-term emission increase is projected over the baseline peak short-term emissions

(b) The project related emissions from the thermal oxidizer are shown for completeness purposes only. The thermal oxidizer is a contemporaneous project and thus its emissions are included in the contemporaneous project emission inventory.

(c) Emission rate is in units of tons per year.

na = not applicable

ambient air concentration in relation to the PSD ambient air significance levels. Emissions of TRS, H_2SO_4, and VOC will not be evaluated with air dispersion models since there are either no applicable ambient air quality standards (i.e., TRS and H_2SO_4) or acceptable air quality modeling techniques (i.e., VOC).

In the course of calculating the PM_{10} emissions due to the project, instances where PM_{10} emission data were not available, all particulate matter was preliminarily assumed to be PM_{10}. This assumption will result in a conservative estimate of the actual PM_{10} emissions and resulting ambient air concentrations.

A listing of the physical emission characteristics for the sources that are included in the project are provided in Table 3-2. Physical emission characteristics have been summarized for stack sources as well as fugitive emission sources. Physical stack characteristics include such information as source location, release height, stack temperature, stack diameter and stack exit velocity. Any stacks that are inverted or have a raincap will be evaluated with a 0.01 meter per second (m/sec) exit velocity. Fugitive emission sources have been characterized differently than the stack sources as described below.

Fugitive emission sources at the Mill include roadways, storage piles, and buildings that have general roof vents. Since all of the fugitive emission sources have an initial dispersion associated with them (e.g., wakes created by trucks result in an initial dispersion of emissions), the fugitive emission sources will be characterized as volume sources. USEPA guidance contained in Section 1.2.2 of the "Industrial Source Complex (ISC) Model User's Guide – Volume II" (USEPA 1995) will be used to determine the appropriate variables to characterize the volume sources.

There are several types of storage piles at the Pensacola Mill including chip piles, coal piles, and ash piles. For these storage piles the sigma y (s_y) and the sigma z (s_z) values will be based on the actual dimensions of respective pile. The s_y values will be based on the lateral dimensions divided by 4.3 if the pile is represented by a single volume source

Table 3-2
Summary of Physical Stack Characteristics
and Volume Source Characterizations
IP Mill
Pensacola, FL

Source	AERMOD Stack ID	Stack Location (UTM Coordinates NAD 27)		Stack Elevation (meters)	Stack Height (meters)	Stack Exit Velocity (meters/sec)	Stack Temperature (degrees K)	Stack Diameter (meters)
No. 3 Power Boiler	BOILER3	469,182	3,385,726	42.7	45.11	7.620	335.8	2.44
No. 4 Power Boiler	BOILER4	469,236	3,385,715	42.7	67.36	10.210	335.2	3.66
No. 5 Power Boiler	BOILER5	469,199	3,385,809	42.7	14.33	26.270	533.0	1.22
No. 6 Power Boiler	BOILER6	469,148	3,385,726	42.7	38.10	14.420	449.8	2.59
Coal Bunker	CBUNKER	469,235	3,385,760	42.7	10.67	0.001	298.0	1.01
Coal Crusher Vent	CRUSHVNT	469,301	3,385,558	42.7	30.48	0.001	298.0	1.01
Pine Chip Fines Cyclone	CYCLON1	468,998	3,385,505	42.7	13.72	1.220	298.0	0.91
Pine Chip No. 1 Cyclone	CYCLONFI	468,998	3,385,532	42.7	9.14	4.910	298.0	0.61
Dry Additive	DRYADD	469,220	3,385,859	42.7	10.70	16.150	310.8	0.31
Lime Mud Dryer	LMUDDRY	469,280	3,385,515	42.7	41.45	8.750	342.3	1.98
No. 1 Recovery Furnace	RECVRY1	469,323	3,385,736	42.7	55.41	24.380	516.3	2.74
No. 2 Recovery Furnace	RECVRY2	469,303	3,385,721	42.7	55.41	24.380	499.7	2.74
Lime Slaker	SLAKVENT	469,228	3,385,592	42.7	27.43	15.240	360.8	0.70
No. 1 Smelt Tank	SMELT1	469,307	3,385,758	42.7	52.4	9.850	349.7	1.22
No. 2 Smelt Tank	SMELT2	469,286	3,385,743	42.7	52.4	9.510	355.2	1.22
No. 1 Starch Silo	STSILO	469,169	3,385,905	42.7	24.38	11.580	298.0	0.21
No. 2 Starch Silo	STSILO2	469,182	3,385,900	42.7	24.38	11.580	298.0	0.21
Clay Silo	CLAYSILO	469,172	3,385,888	42.7	24.38	11.580	298.0	0.21
Thermal Oxidizer	INCIN	469,294	3,385,689	42.7	30.48	8.130	319.3	0.91
Air Density Separator	AIRSEP	468,973	3,385,540	42.7	18.29	21.880	298.0	0.61
Source	**AERMOD Fugitive Source ID**	**Fugitive Source Location (UTM Coordinates NAD 27)**		**Source Elevation (meters)**	**Initial Sigma Z (meters)**	**Initial Sigma Y (meters)**	**Release Height (meters)**	
Roadways	Road 1-n	Multiple		42.7	1.42	11.34	1.52	
Chip Pile	PINECHIP	Multiple		42.7	4.25	23.8	4.57	
	HARCHIP	Multiple		42.7	7.09	10.6	7.62	
Coal Pile	COALPIL1	Multiple		42.7	3.53	5.33	3.80	
	COALPIL2	Multiple		42.7	3.53	5.33	3.80	
Ash Pile	ASHPILE	Multiple		42.7	1.42	83.4	1.53	
Bark Pile	WASTEWD	Multiple		42.7	1.42	47.7	1.53	

or 2.15 if the pile is represented by multiple volume sources. In all instances involving volume sources that are rectangular in shape, the minimum lateral volume source dimension will be used to calculate the s_y. The minimum lateral dimension will result in a conservative estimate of the initial plume dispersion and result in higher downwind concentrations. The s_z for storage piles will determined by taking the height of the pile and dividing by 2.15. The release height for each storage pile volume source will be determined by multiplying the actual pile height by one-half.

Fugitive emission sources that are vented from buildings will be characterized using the same approach as that used for the storage piles. The only difference will be if the fugitive emissions from a building are all emitted from a roof top vent, then the release height of the building will be used for the volume source release height instead of one-half of the release height.

Emissions from roadway sources will also represented as a volume sources. The initial s_y of the roadway volume sources will be based on the typical roadway width of 12.19 meters (40 feet). Multiple volume sources will be used to represent the entire length of the roadway. In order to manage the number of roadway volume sources and still provide a spatial representation of the roadways, the roadway volume sources will be spaced apart by 24.38 meters (i.e., twice the lateral dimension). The 24.38 meter distance will be measured from the center of each volume source to the neighboring volume source. The initial s_z will be based on a truck height of 3.05 meters (10 feet). The release height of the roadway sources will be one-half of the truck height or 1.52 meters (5feet).

3.2 CONTEMPORANEOUS PERMITTING PROJECTS

Contemporaneous projects that occurred within the past five years or the most recent PSD permitting project, whichever period is less, must be included with the project related emission inventory. At the Pensacola Mill, the thermal oxidizer is the only project that is considered a contemporaneous project for air quality modeling purposes. A summary of the project and the emissions associated with the project are provided in Table 3-3. These emissions will be included with the project related emissions in the air quality

Table 3-3
Contemporaneous Project Emissions
IP Mill
Pensacola, Florida

Contemporaneous Project	Short-Term and Long-Term Emission Rates					
	SO_2 lb/hr and tpy		NO_X tpy	CO lb	PM_{10} lb/hr and tpy	
Thermal Oxidizer	5.71	25.0	39.9	6.80	1.00	4.4

Not same as Table 3-1? Why should use PTE modeling analysis to determine if there are significant ambient air concentrations and the downwind distance to the ambient air significance levels. It should be noted that since the thermal oxidizer is a contemporaneous project, including any current project emissions would result in a duplication of emissions. Therefore, for the significance air quality modeling analysis, only the contemporaneous emissions need to be included.

3.3 MILL-WIDE EMISSION INVENTORY

If the emissions from the proposed project and contemporaneous projects result in ambient air concentrations that are greater than the PSD ambient air significance levels, a Mill-wide emission inventory will be developed. The Mill-wide emission inventory will be developed only for those pollutants that trigger the PSD ambient air significance levels.

The Mill-wide emission inventory will be used to demonstrate compliance with the NAAQS and PSD increments for the applicable pollutants. For the NAAQS analysis, the maximum short-term emission rates will be used to demonstrate compliance with short-term air quality standards and the maximum annual emission rates will be used for demonstrating compliance with the annual air quality standards. Maximum emission rates will be based on permit limits or an emissions unit's maximum capacity and a worst-case emission factor. For the PSD increment analysis, PSD emission rates will be used for each emission unit. The PSD emission rate reflects the difference in emission levels from the minor source baseline date and the average of actual emissions during the current baseline period (i.e., 2001 and 2002). For emission units that will have new permitted emission rates as a result of the project, the PSD emission rate is the difference between the baseline emission rate and the new PTE. allowable

1998 99

3.4 LOCAL EMISSION INVENTORY

An emission inventory of local sources may be required based on the outcome of the significance air quality modeling study. If the emissions from the proposed project and the contemporaneous projects cause ambient air concentrations that exceed the PSD ambient air significance levels, a local emission inventory will be developed on a pollutant specific basis. The significant impact area (SIA) will be determined for each pollutant and averaging period. Emission sources that are within the SIA plus a 50 kilometer buffer may potentially be included in the local emission inventory.

Since the local emission inventory could potentially include many small or distant sources of emissions, a screening approach is proposed to eliminate these insignificant sources. A "20D" approach, which has been accepted by various regulatory agencies (e.g., North Carolina, Tennessee, Pennsylvania, USEPA Region III), will be used to screen out small and distant sources on a pollutant by pollutant basis. Sources will be excluded from the local source emission inventory if, for a particular pollutant, the annual pollutant emissions are less than 20 times the distance between the source and the Pensacola Mill. For example, if a facility has annual PM_{10} emissions of 150 tons per year (tpy) and the source was located 8 km from the Pensacola Mill, it will not be necessary to include the source since 20 times the distance between the sources is 160 km and the annual emissions are only 150 tpy. It should be noted that any emission source that is located within the SIA for a particular pollutant will be included in the local source emission inventory regardless of its annual emissions or distance from the Pensacola Mill.

Information concerning the local emission inventory will be obtained from Florida DEP files. The information will include a list of the physical stack characteristics for the sources, the pollutant emission rates, and if necessary, the PSD increment emission rate. A summary of the local emission sources will be submitted to Florida DEP for review.

4. AIR QUALITY MODELING APPROACH AND TECHNICAL INFORMATION

This section of the air quality modeling protocol contains information on the technical approach that will be followed in the air quality modeling study. The air dispersion model selection is discussed as well as the model options that will be used. The supporting information that will be used in the air quality modeling analysis is presented. The supporting information includes land use determinations, building downwash analyses, meteorological data, and terrain data. Whenever possible, the guidance provided in 40 CFR Part 51 Appendix W "Guideline on Air Quality Models" (USEPA 2001) will be used to conduct the air quality modeling analyses. Additional guidance provided by Florida DEP and other regulatory agencies (e.g., USEPA Region IV and the FLM) will be incorporated as needed.

4.1 AIR DISPERSION MODEL SELECTION

For the SIA, NAAQS, and PSD increment analyses, the AERMOD (**AER**MIC **MOD**el) air dispersion model will be used. The AERMOD model was developed by the AERMIC work group (the **A**merican **M**eteorological Society/**E**PA **R**egulatory **M**odel **I**mprovement **C**ommittee) and was intended to incorporate enhanced understanding of planetary boundary layer (PBL) meteorology into air dispersion calculations. The AERMOD model represents an improvement over the current USEPA recommended Industrial Source Complex Short Term 3 (ISCST3 Version 02035) air dispersion model. The current version of AERMOD is 02222 and includes the PRIME (**P**lume **RI**se **M**odel **E**nhancement) building downwash algorithms. The AERMOD air dispersion model is not a promulgated Appendix A air dispersion model although USEPA intends to promulgate the model. The use of the AERMOD model is acceptable on a case-by-case basis as described in Section 3.2.2 40 CFR Part 51 Appendix W "Guideline on Air Quality Models". The justification for using AERMOD in the air quality modeling study of the Pensacola Mill is provided in the following paragraph.

The AERMOD air dispersion includes two key features that are improvements over the

ISCST3 air dispersion model. First, the 02222 version of AERMOD includes the PRIME downwash algorithms, which represent an improvement to the way building aerodynamic dispersion and cavity concentrations are handled. Second, the PBL concepts that are part of AERMOD improve the manner in which concentrations during convective conditions are calculated. Both of these features of the AERMOD air dispersion model, the building downwash algorithms and the ability to predict convective based concentrations, are important for conducting an air quality modeling study of the Pensacola Mill. The Pensacola Mill is a complex facility with all of the stacks at the Mill subject to varying amounts of building downwash. The ability to predict downwashed concentrations with improved accuracy relative to the downwash algorithms contained in the ISCST3 air dispersion model is an important consideration. Also, given that the Mill is located in relatively flat terrain, a convective condition (i.e. Pasquil Gifford unstable condition) is likely the controlling meteorological condition. The convective scaling velocity approach in AERMOD is a better method for predicting ambient ground level concentrations under convective conditions than the approach which is used by the ISCST3 air dispersion model. Based on these two key factors, the use of the AERMOD air dispersion model should be acceptable as described in 40 CFR Part 51 Appendix W 3.2.2.

Although not as critical as the building downwash and convective scaling velocity components, the complex terrain dispersion algorithms in AERMOD could also be applicable in the air quality modeling analysis. There are several short stacks with small emission rates at the Mill which could impact some of the low level terrain features that are within 10 km of the Mill. The complex terrain algorithms in the AERMOD air dispersion model will handle these selected source-receptor situations better than the COMPLEX I dispersion algorithms that are contained in the ISCST3 air dispersion model.

The AERMOD air dispersion model has various user selectable options that must be considered. USEPA has recommended that certain options be selected when performing air quality modeling studies for regulatory purposes. The following regulatory default options will be used in the AERMOD air quality modeling study;

- Stack-Tip Downwash
- Model Accounts for Elevated Terrain Effects
- Calms Processing Routine Used
- No Exponential Decay for Rural Mode
- Upper Bound Value for "Supersquat" Buildings
- Missing Data Processing Used

4.2 LAND USE ANALYSIS

A land use analysis for the area surrounding the Pensacola Mill was compiled. The land use analysis was based on review of the USGS 7.5 minute topographic map for the area. Following USEPA guidance (USEPA 2001), the land use designation was based on the land use typing scheme developed by Auer (Auer 1978). Using the Auer land use classifications, industrial, commercial, and residential areas are classified as urban land use while agricultural, undeveloped land, and common residential areas are considered to be a rural land use. If more than 50% of the land use within a 3 km radius of the facility is rural, then a rural designation should be used in the air dispersion model. A visual inspection of the USGS topographic map shows that within a 3 km radius of the Pensacola Mill, the land use is overwhelmingly rural, therefore the rural option was selected in the AERMOD air dispersion model. The 3 km radius surrounding the Mill is shown in Figure 4-1.

4.3 RECEPTOR GRID

The receptor grid for the AERMOD analysis will cover a 20-km square area that is centered on the Mill. All receptors will be referenced to the UTM coordinate system, Zone 16, and using NAD 27 datum. Rectangular coordinates will be used to identify each receptor location. The rectangular receptor grid will be centered on 469,183 meters easting and 3,385,829 meters northing and will have the following grid spacing;

Source: Base map adapted from USGS 7.5 minute series, Camtonment, FLA Quadrangle, 1978, photorevised 1987.

Figure 4-1
Land-Use of Area
Surrounding the IP Pensacola Mill

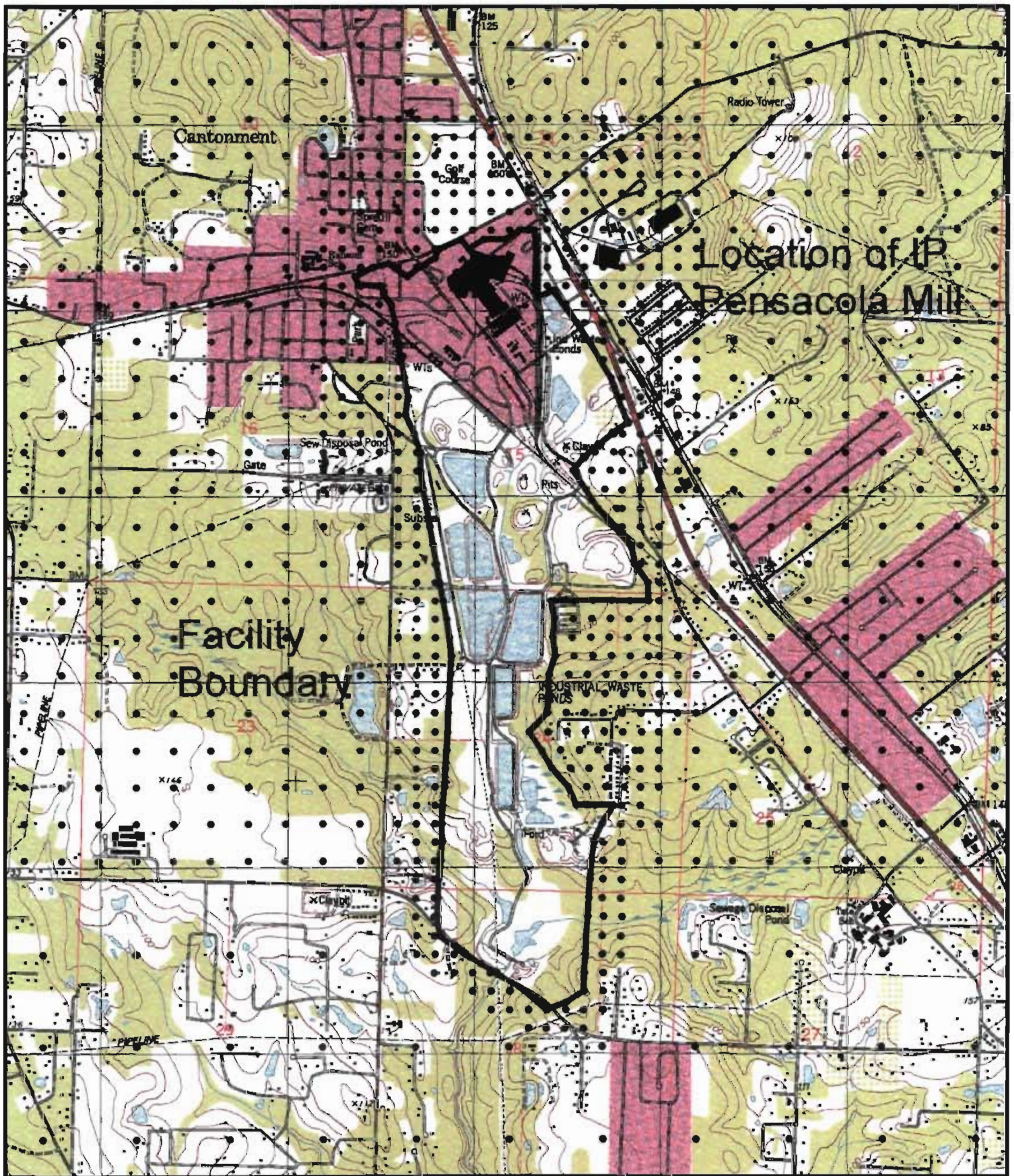
- 100 meters out to ± 1 kilometer
- 200 meters out to ± 3 kilometers
- 500 meters out to ± 5 kilometers
- 1,000 meters out to ± 10 kilometers

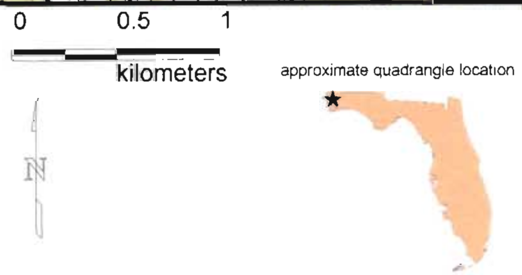
The receptor grid may be expanded if the SIA air quality modeling results indicate that a larger receptor grid is required to determine the SIA radius. The receptor grid will be expanded in 1,000 meter increments.

In addition to the main rectangular coordinate receptor grid, property line receptors will be used in the air quality modeling analysis. The property line receptors will be spaced approximately every 100 meters and will include an additional buffer of receptors that follows the property line but is 100 meters from the edge of the property line. A plot of the inner portion of the receptor grid is shown in Figure 4-2.

Terrain elevations will be assigned to all receptors. The AERMAP terrain preprocessor (Version 02222) and USGS 1:24,000 DEM Level I and II files will be used to determine representative terrain elevations for all of the receptors. In addition to the receptor elevations, AERMAP will also be used to determine the hill height scale for each receptor location. In order to avoid any discontinuities in the determination of the hill height scale, a DEM file domain that extended at least 5 km beyond the ±10 km extend of the receptor grid will be used.

Additional receptors may be added to the original receptor grid if it is determined that a peak concentration is predicted to occur in a area where the receptor grid spacing is greater than 100 meters. A refined 100 meter spacing grid will be centered on the peak predicted receptor and extend out 500 meters to confirm that the overall maximum concentration is determined.





Source: Base map adapted from USGS 7.5 minutes series, Cantonment, FLA. Quadrangle, 1978, photorevised 1987

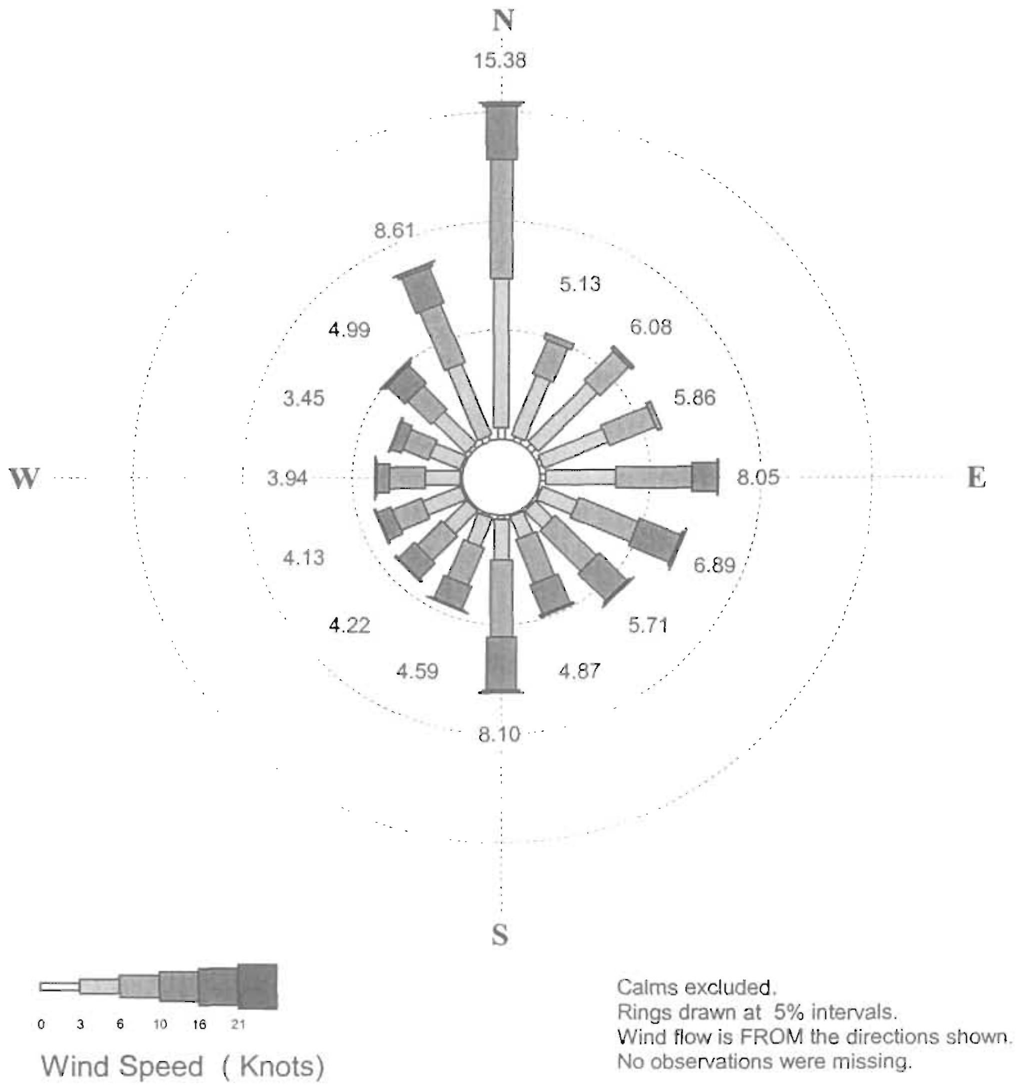
FIGURE 4-6
INNER PORTION OF RECEPTOR GRID
INTERNATIONAL PAPER
PENSACOLA MILL
ESCAMBIA COUNTY, FLORIDA

4.4 METEOROLOGICAL DATA

The meteorological data for the AERMOD air quality modeling study will consist of five years of National Weather Service (NWS) data. Meteorological data for the 1990 thru 1994 period will be used. The surface NWS data will be from the Pensacola, Florida Airport (surface station number 13899) while the upper air NWS data will be from Slidell, Louisiana (upper air station 53813). Both sets of meteorological will be obtained from the National Climatic Data Center (NCDC). The Pensacola NWS data can be considered representative of the meteorological conditions at the Pensacola Mill due to the close proximity of the two sites. Also there are no significant terrain features between the two sites. The Slidell upper air data, while located west of the Pensacola Mill, are representative of the general flow conditions along the Northern edge of the Gulf of Mexico. A five year wind rose (1990-1994) for the Pensacola NWS surface station meteorological data is shown in Figure 4-3. The wind data were collected at a 6.7 meter (22 ft) height.

The AERMET meteorological preprocessor (Version 02222) will be used to prepare the surface and upper air meteorological data for use by the AERMOD air dispersion model. In order to use AERMET, several micro-meteorological variables must be defined. Representative surface roughness, Bowen ratio, and albedo values will be determined for the Pensacola area based on guidance contained in the AERMAP User's Guide. Although the topography surrounding the Pensacola Mill is fairly uniform, 30° sector-based micro-meteorological values will be used. There are two areas surrounding the Pensacola Mill where residential neighborhoods are likely to influence the surface roughness. These two areas have been accounted for in the selection of sector-based surface roughness values. Additionally, seasonal values of surface roughness, Bowen ratio, and albedo will be used. Since the winter season in Pensacola is not typical of northern latitudes, the fall seasonal values of surface roughness, Bowen ratio, and albedo will be used for the winter season. The representative values are shown in Table 4-1.

Figure 4-3
Wind Rose 1990 - 1994
Pensacola, Florida NWS



PERCENT OCCURRENCE: Wind Speed (Knots)
LOWER BOUND OF CATEGORY

DIR	0	3	6	10	16	21
N	0.52	6.81	5.46	2.43	0.15	0.01
NNE	0.23	2.96	1.65	0.29	0.00	0.00
NE	0.28	3.76	1.86	0.18	0.00	0.00
ENE	0.18	3.14	2.29	0.24	0.00	0.00
E	0.25	3.16	3.45	1.14	0.04	0.00
ESE	0.11	1.72	2.92	2.00	0.13	0.01
SE	0.10	1.11	2.61	1.79	0.10	0.01
SSE	0.06	1.09	2.15	1.47	0.10	0.00

TOTAL OBS = 43820 MISSING OBS = 0

PERCENT OCCURRENCE: Wind Speed (Knots)
LOWER BOUND OF CATEGORY

DIR	0	3	6	10	16	21
S	0.18	1.84	3.53	2.41	0.13	0.01
SSW	0.11	1.40	1.87	1.14	0.06	0.01
SW	0.09	1.47	1.58	0.99	0.08	0.01
WSW	0.10	1.85	1.42	0.68	0.08	0.01
W	0.08	1.59	1.61	0.59	0.06	0.01
WNW	0.12	1.50	1.26	0.51	0.06	0.00
NW	0.18	2.03	1.50	1.11	0.12	0.04
NNW	0.27	3.50	2.89	1.76	0.18	0.01

CALM OBS = 3522

Table 4-1
Micro-Meteorological Variables
Selected for Pensacola, FL

Micro-Meteorological Variable	Seasonal Value	Upwind Sector	Micro-Meteorological Value
Albedo [a]	Winter	All	0.18
	Spring	All	0.14
	Summer	All	0.20
	Fall	All	0.18
Bowen Ratio [a]	Winter	All	0.5
	Spring	All	0.3
	Summer	All	0.4
	Fall	All	0.5
Surface Roughness [b]	Winter	90 to 120 and 210 to 360	0.2
	Winter	All other sectors	0.05
	Spring	90 to 120 and 210 to 360	0.2
	Spring	All other sectors	0.05
	Summer	90 to 120 and 210 to 360	0.2
	Summer	All other sectors	0.1
	Fall	90 to 120 and 210 to 360	0.2
	Fall	All other sectors	0.05

[a] Values are from the AERMET User's Manual (USEAP 1999)

[b] Values are from Högström and Högström (Högström and Högström 1978)

Say why these values are used
Don't need to do now, but do need to do

4.5 GOOD ENGINEERING PRACTICE (GEP) STACK HEIGHT ANALYSIS

An analysis will be conducted to determine the potential for building downwash at the Mill. Guidance contained in the USEPA "Guideline for Determination of Good Engineering Practice (GEP) Stack Height (Revised)" (USEPA 1985) and the USEPA Building Profile Input Program (BPIP, 95086) that contains the PRIME algorithms will be followed. To perform the building downwash analysis, a facility plot plan showing the Mill buildings and stacks will be digitized using geographical information system (GIS) software. Heights of all the buildings that are digitized will be entered. Buildings with multiple tiers will be digitized as a single building with multiple tiers rather than multiple buildings with a single tier. Additionally low height buildings may be excluded from the analysis unless there is a stack within the influence area of the building. The result of the GIS digitization process is shown in Figure 4-4. A Mill plot plan is included for comparison purposes in Appendix A.

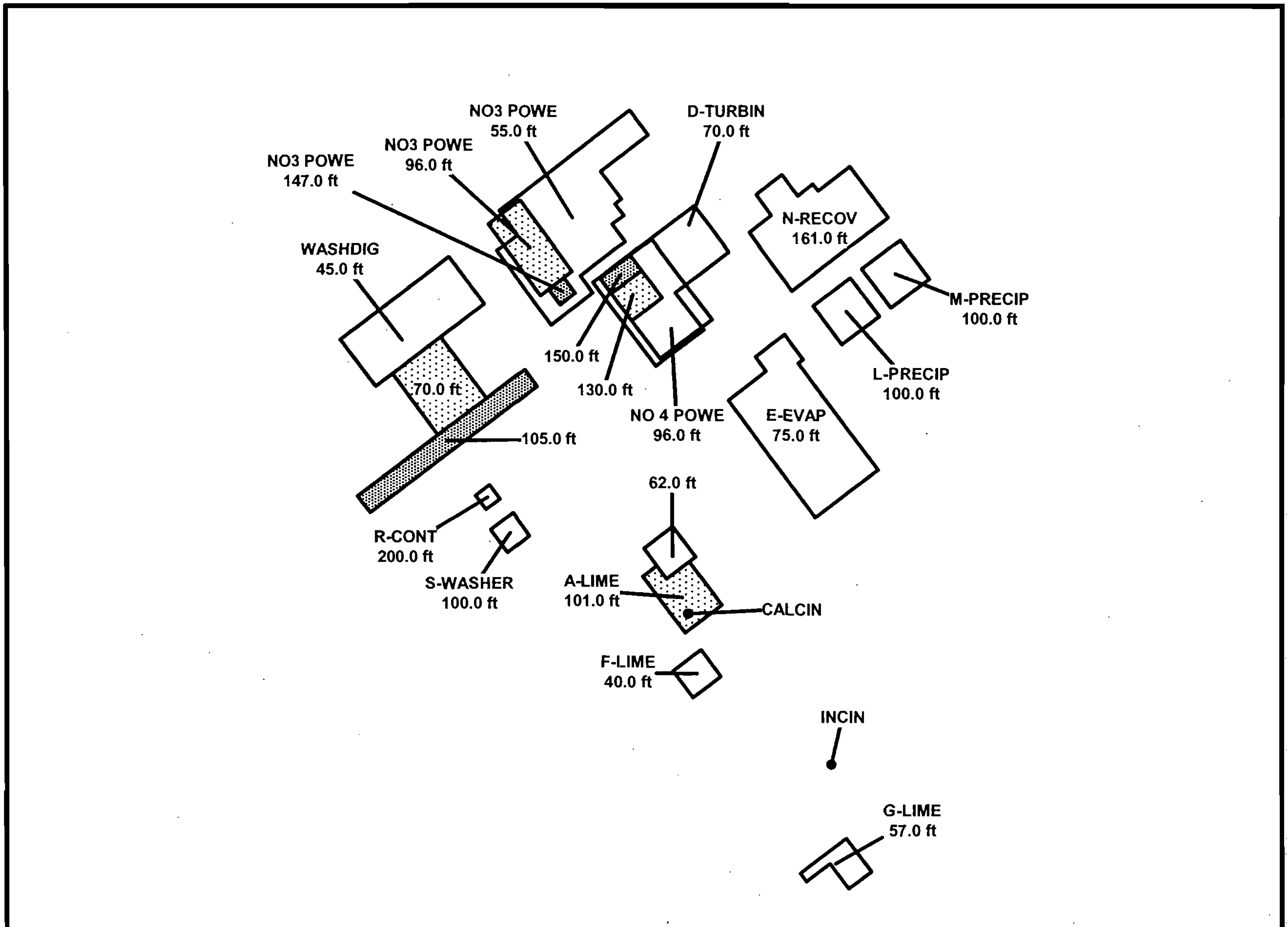


Figure 4-4
Building Downwash Analysis

5. CLASS I AIR QUALITY RELATED VALUES ANALYSIS

160km

The Pensacola Mill is located within 200 km of the Breton Wilderness Area as shown in Figure 5-1. No other Class I areas are within 200 km of the Mill. Prior to performing any air quality modeling analysis to evaluate potential impacts on Class I AQRVs, the FLM will be contacted to confirm that an AQRV analysis is necessary. If an AQRV analysis for visibility, acid deposition, or ambient air concentrations is required, the following procedures will be used.

5.1 AIR QUALITY MODEL SELECTION

The CALPUFF air dispersion model and the CALPOST post processor will be used to determine potential impacts on the AQRVs at the Breton Wilderness Area. The CALPUFF air dispersion model will be used in a screening level mode following the guidance contained the "Inter-Agency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts" (USEPA 1998) and the "Federal Land Manager' Air Quality Related Values Workgroup (FLAG) Phase I Report (United States Forest Service et al. 2000). CALPUFF model option selections that are different from those recommended are presented in Table 5-1.

Since the CALPUFF air dispersion model will be used in a screening mode, the maximum predicted impacts on visibility, deposition, and ambient air concentration do not necessarily need to occur at the Class I area in order to be compared against FLM derived screening level criteria.

5.2 CALPUFF RECEPTOR GRID

A screening level receptor grid will be developed for the CALPUFF analysis. The screening level receptor grid will consist of a polar grid, referenced in Cartesian coordinates. The polar grid will include radials and downwind rings that correspond to

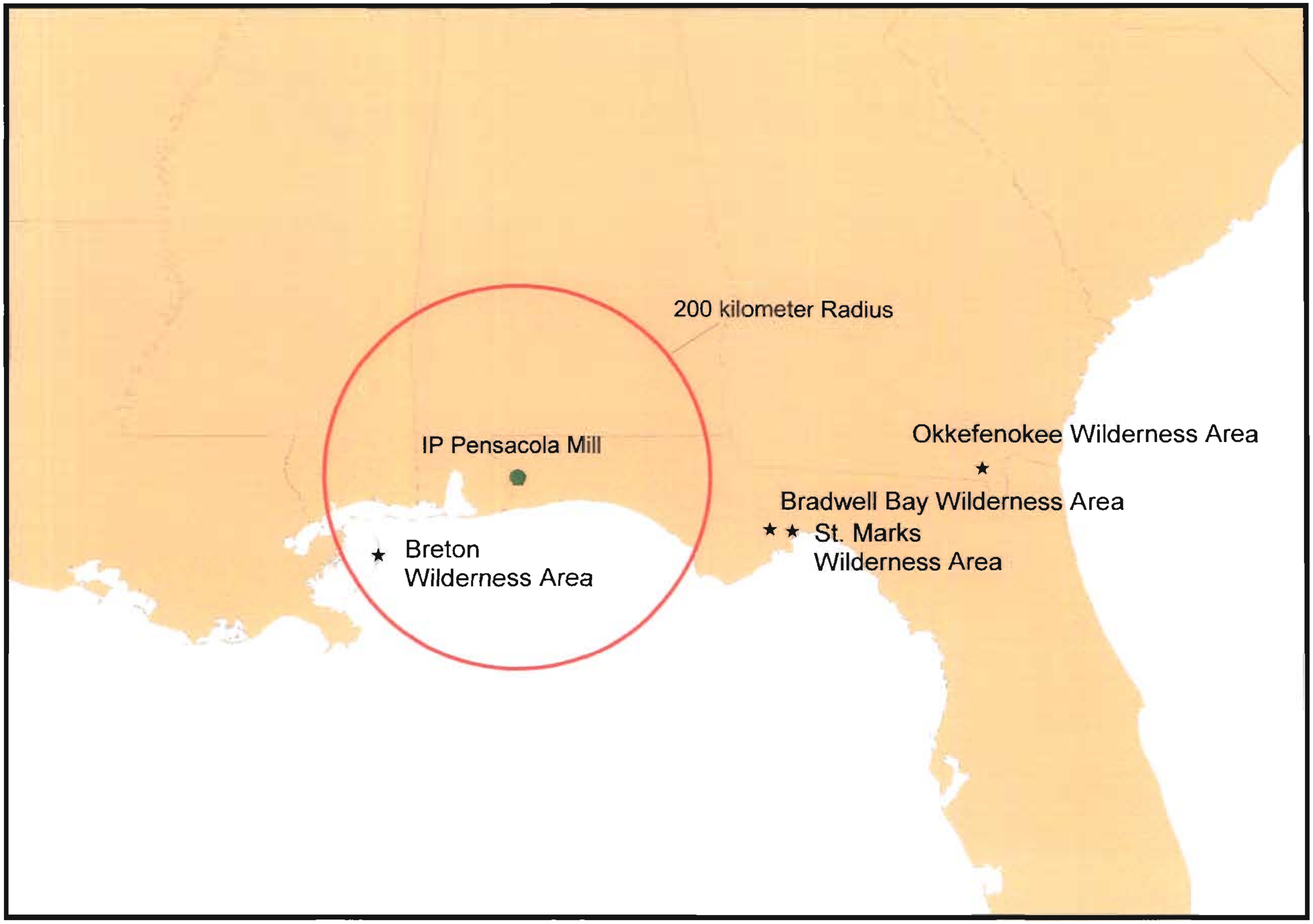


Figure 5-1
Location of Nearby Class I Areas
IP Pensacola Mill, Pensacola, FL

Table 5-1
CALPUFF Model Options Selected

- Six chemical species modeled, with four chemical species emitted, SO_2, H_2SO_4, NO_X, PM_{10}
- MREG = 0
- Dry Deposition set for SO_2, SO_4, NO_X, HNO_3, NO_3
- Grid Cell Spacing = 4 km and 6 vertical layers
- CALPUFF User Manual recommended values for dry deposition, size parameters, and wet deposition scavenging
- Background ozone = ~~60~~ parts per billion 80
- Background ammonia = 10 parts per billion
- PM fine extinction efficiency = 10.0
- Relative Humidity capped at ~~95%~~ / 98%
- Seasonal f(RH) values from isopleth plots will be used instead of Table 2.B-1 values.
- Winter f(RH) = 3.4
- Spring f(RH) = 4.0
- Summer f(RH) = 4.1
- Fall f(RH) = 3.6

Use f(rh) values in table

- the closest edge and the mid-point of the Breton Class I area. There will be 360 one-degree radials and two downwind rings that will be centered at 160 km and 175 km. Since the Breton Wilderness area is basically at sea level, no elevations will be used for any of the receptors.

5.3 CALPUFF METEOROLOGICAL DATA

The same meteorological data as that which will be used for the AERMOD air quality modeling analysis will be used for the CALPUFF screening level analysis. However, instead of using the AERMET meteorological preprocessor, the USEPA PCRAMMET meteorological preprocessor (Version 99169) will be used to develop an ISCST3 based meteorological data array. The micro-meteorological variables that will be used with the AERMET preprocessor will be used in the processing of the ISCST3 based meteorological data.

6. PRESENTATION OF AIR QUALITY MODELING RESULTS

This section of the air quality modeling protocol discusses how the results from the air quality modeling analyses will be evaluated. The various analyses include the significance analysis, any NAAQS and PSD analyses, and the Class I AQRV analyses.

6.1 SIGNIFICANCE ANALYSIS

The air quality modeling analysis will initially determine if emissions from the proposed project and any contemporaneous projects result in ambient air concentrations that are greater than the PSD ambient air significant concentration levels. The modeled concentrations for the five years of meteorological data will be reviewed. If the significance analysis determines that the maximum short-term and maximum annual modeled concentrations are less than the Class II significant concentration levels listed in Table 6-1, then no further air quality modeling analyses will be performed. If the highest modeled concentrations are above the Class II significant concentration levels, then a SIA will be defined and additional air quality modeling analyses will be performed.

The SIA will be defined by a circle with a radius that extends from the center point of the Mill to the greatest downwind distance where a receptor has a maximum concentration that exceeds or is equal to the Class II significant concentrations levels. These SIA will be determined for each averaging period for a particular pollutant. For each pollutant the maximum radius SIA will be established and serve as the basis for developing the local emission inventory for the specific pollutant.

6.2 MULTI-SOURCE AIR QUALITY MODELING ANALYSIS

If the significance analysis determines that the emissions from the proposed project and any contemporaneous projects is above the Class II significant concentration levels, then a multi-source air quality modeling analysis will be conducted. The multi-source air quality modeling analysis will include all of the sources at the Mill that emit the

Table 6-1
PSD Class II Significant Concentration Levels

Pollutant and Averaging Period	Class II Significance Levels ($\mu g/m^3$)
SO_2	
Annual	1.0
24-Hour	5.0
3-Hour	25.0
NO_2	
Annual	1.0
PM_{10}	
Annual	1
24-Hour	5
CO	
8-Hour	500
1-Hour	2,000

pollutants that are determined to be significant. Additionally, other local emission sources will be included in the multi-source air quality modeling analysis as described in Section 3.4.

The multi-source air quality modeling analysis will be used to demonstrate compliance with the NAAQS. The highest, second-highest modeled short-term concentrations from the five years of meteorological data will be used for comparison to the short-term SO_2 and CO NAAQS. For PM_{10}, the highest, sixth-highest from the five years of meteorological data will be used to show compliance with the 24-hour air quality standard. For pollutants with annual standards, the highest annual concentration will be used. For all of the NAAQS demonstrations, representative background ambient air concentration will be added to the modeled concentrations. A discussion of background ambient air concentrations is provided in Section 6.3.

The PSD minor source baseline date for NO_2, PM_{10}, and SO_2 has been triggered for the air quality control region in which the Pensacola Mill is located. Therefore, "actual" emission increases or creditable emission decreases from all sources potentially affect the amount of increment that is consumed. For the PSD analysis, the highest, second-highest modeled concentrations and the maximum annual concentrations from the five years of meteorological data will be compared to the PSD increment levels.

6.3 BACKGROUND AMBIENT AIR DATA

Background ambient air quality data are required for the each pollutant for which an NAAQS demonstration is necessary. The background concentration data should be representative of "background" sources or uninventoried pollutant sources that are not included in the air quality modeling study (e.g., small sources, area sources, mobile sources). The background data do not necessarily need to be from the same airshed as the Pensacola Mill, but may be from a more distant area that is still representative of the air quality in the area surrounding the Mill.

Background ambient air data were obtained from the Aerometric Information Retrieval System (AIRS) for the three most recently available years. The second highest short-term and annual monitored concentrations from the three years of data are proposed for use as background concentrations. The most recent AIRS data are provided in Table 6-2.

6.4 NO TO NO_2 CONVERSION

A NO to NO_2 conversion factor will be used to adjust all modeled annual NO_2 concentrations. The NO to NO_2 conversion factor accounts for the actual composition of the flue gas stream which is primarily NO but once emitted to the atmosphere will begin to convert to NO_2. The NO to NO_2 conversion rate is dependent on multiple variables including residence time, ozone levels, and solar intensity. A default value of 0.75 is recommended in USEPA guidance (USEPA 2001).

6.5 CLASS I AREA AQRV ANALYSIS

The Class I AQRV analysis for Breton Wilderness Area will evaluate the potential for adverse impact on visibility level, acid deposition levels, and ambient air concentrations. The Class I AQRV analysis will be based on project-related emissions only and will not include surface-based fugitive emissions of PM_{10} since these emissions are not likely to travel 160 kilometers. The maximum potential impacts at any of the receptors included in the CALPUFF air quality modeling analysis for the five years of meteorological data will be compared to screening levels that the FLM has established for the Breton Wilderness area. The screening levels for the Class I AQRV analyses are provided in Table 6-3. It should be noted that the nitrogen and sulfur deposition amounts calculated by the CALPUFF air dispersion model and used to evaluate the impact on acid deposition, include dry and wet amounts of nitrate, NO_X, sulfate, and SO_2. If a potential adverse impact is predicted for an AQRV, the FLM and Florida DEP will be contacted to discuss any additional analyses that may be required.

H2H

331.0	173.6	90	61.1
246.5	202.3	89	
242.2	155.2	88	
226.9	160.6	87	
271.0	168.9	86	

Table 6-2
Proposed Background Concentration Levels

75.4

Pollutant and Averaging Period	Monitored Value ($\mu g/m^3$) and Year			Monitor Location
SO_2	2002	2001	2000	
Annual	8.0	8.0	10.6	Pensacola, Escambia County
24-Hour 57.2	53.1	63.8	**61.1**	Pensacola, Escambia County
3-Hour	**217.9**	201.9	247.1	Pensacola, Escambia County
NO_2	2002	2001	2000	
Annual	13.4	**17.2**	19.1	Pensacola, Escambia County
PM_{10}	2002	2001	2000	
Annual	34	51	37	Pensacola, Escambia County
24-Hour	17	**19**	21	Pensacola, Escambia County
CO	2002	2001	2000	
8-Hour	**4,534.8**	4,418.5	6,046.4	Sarasota, Sarasota County
1-Hour	5,465.0	**5,465.0**	7,674.3	Sarasota, Sarasota County

Note: The second highest monitored short-term values for each pollutant and short-term time period, which are highlighted in bold, will be used as a background concentration for the short-term NAAQS demonstrations. The highest annual values from the three years of data will be used for the annual NAAQS demonstrations. The PM_{10} values were selected from the Ellyson Industrial Park monitoring site rather than from the Champion International golf course monitor site that is adjacent to the IP Pensacola Mill. The Sarasota monitoring site is similar to the rural/urban setting of Pensacola and thus this site was selected for CO background concentrations.

Additional Impacts

6.6 CLASS II IMPACT

A discussion of the impacts of the proposed project on the Class II area surrounding the Mill will be provided. As part of this discussion, the potential growth resulting from the project will be estimated. Additionally, acidification of rainfall and impacts on soil and vegetation will be qualitatively addressed.

According to Florida Administrative Code (F.A.C.) Rule 62-212.400(3)(h)(5), information concerning the air quality, commercial, residential, and industrial growth since 1977 should be addressed "in the area the facility or modification would affect". For purposes of defining the area where the proposed modification will have an affect, it is proposed to use the annual significant impact area for the pollutant that has the greatest downwind range of ambient air concentrations above 1.0 $\mu g/m^3$. Since changes in growth are long-term phenomenon, long-term concentrations should be used to establish the area for assessing any changes that have occurred since 1977.

6.7 SUBMITTAL OF AIR QUALITY MODELING RESULTS

A detailed air quality modeling report will be submitted as part of the PSD application for the proposed project. The air quality modeling report will review all of the procedures that were followed in the air quality modeling analysis. An electronic copy of the air quality modeling input and output files as well as supporting files (e.g., meteorological data, building downwash analysis, etc.) will be supplied as an Appendix attachment. Any hardcopy supporting information will also be included in the Appendix attachment.

7. REFERENCES

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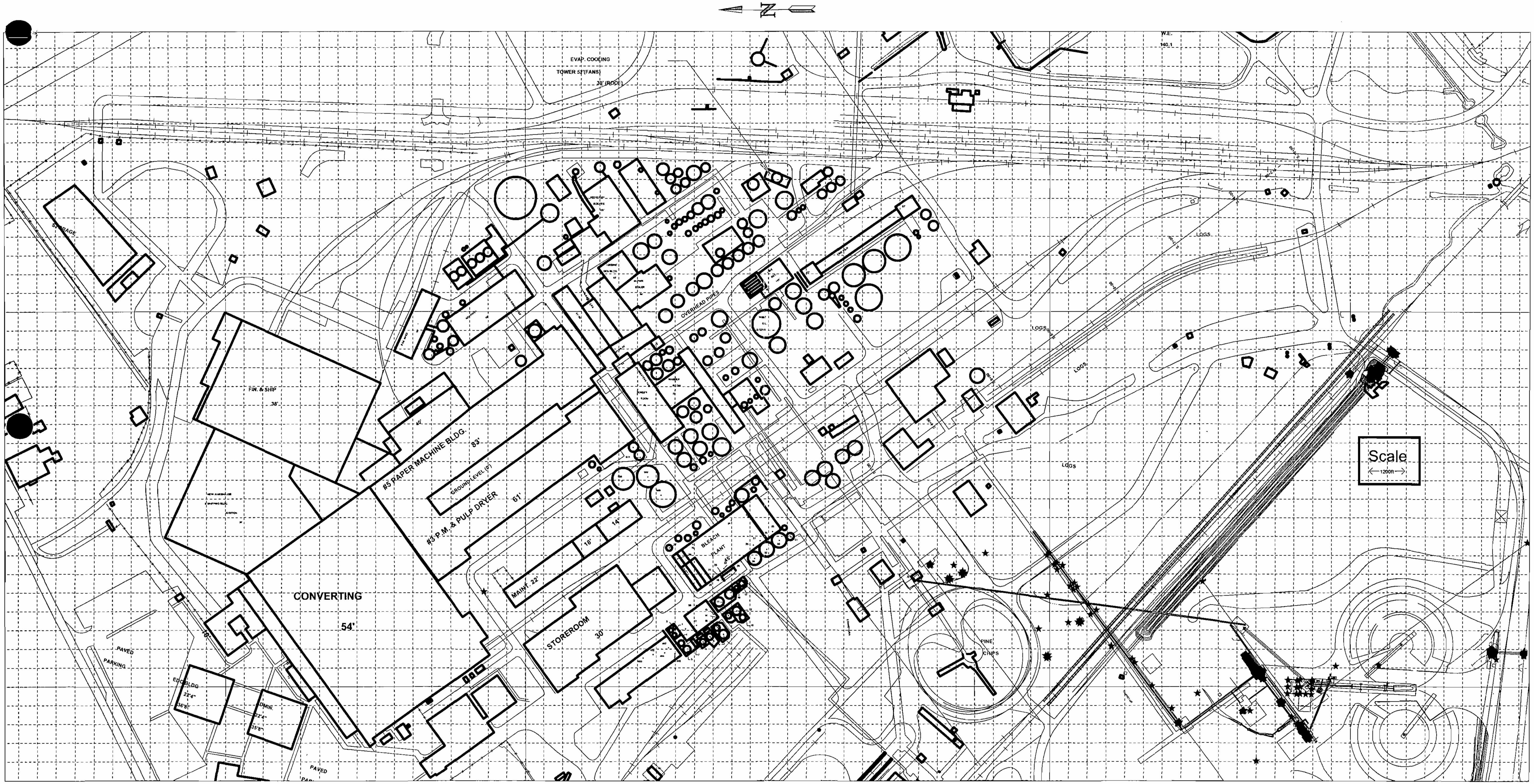
USEPA 2001 – 40 CFR Part 51 Appendix W "Guideline on Air Quality Models (Revised) July 2001.

USEPA 2002a – "Revised Draft User's Guide for the AERMOD Terrain Preprocessor (AERMAP)" U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division Research Triangle Park, NC, August 2002.

USEPA 2002b – "Revised Draft User's Guide for the AMS/EPA Regulatory Model – AERMOD" U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division Research Triangle Park, NC, August 2002.

Appendix A

Scaled Facility Drawing



IP Pensacola Mill
Facility Plot Plan